Complete Guide to Color

• 14 Printers
• 18 Monitors
• 7 Scanners

Plus Everything You Need to Know About:
• Color WYSIWYG
• Prepress
• Calibration

Easy Accounting
17 Painless Solutions

Mastering Sound
A Guide to Audio Basics

A/UX 2.0
A UNIX You Will Love

Hot Reviews:
Vellum
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MicroTV
TypeStyler
TypeAlign
White Knight
Microsoft Office
StarController
TurboStar
Encore and Finale 2
Fast Cache Ilci
MaraThon Racer
Ishido
...and dozens more!

DOUGLAS ADAMS:
The Don't-Panic Mac
If you're using Microsoft® Excel or Word, it's now possible for your entire department to work together without having a get-together. Just add Microsoft Mail. Doing so will add years to the life of your company's carpet. And, perhaps more importantly, allow you to accomplish tasks that were previously impossible with any E-mail system.

Suppose, for instance, that you're preparing a report in Word. Because it features built-in Mail support, you can zap the report throughout your entire workgroup via Mail. Without ever leaving your program.

And without losing formatting.

Then, if those receiving your report are in Word, they can access your document with one keystroke, digest it, add pertinent info, even attach suggestions for changes. And spit it right back to you without leaving their program.

Now if you think that's whiz-bang, get this: When you combine Microsoft Excel with Mail, you can do much more than share spreadsheets. Thanks to Microsoft Excel's built-in macro language, you can do things like write your own macro to receive, process, and fulfill orders. All without utilizing a single iota of manpower.

And that's just one fine example of how Microsoft Excel and Mail let you consolidate and distribute data across a network automatically. Even if you have both Macintoshs® and PCs.

Now that we've covered a few of the unique ways that Microsoft Excel, Word and Mail work together, we'd like to add one more point. We design all of our applications with one goal: To continually exploit the Macintosh's capabilities in ways that profoundly promote productivity. And, of course, keep users attached to their chairs.

For more information on how to keep your hallways clear, just call us at (800) 541-1261, Department K68. And while you're at it, ask us about The Microsoft Office—four of our best-selling business applications at an astonishingly affordable price.
LUCERO NORTHROP & PARTNERS

Tax Accounting

Summary

1989 RESULTS

In order to double our end of FY '89, this meant a FY '88 expenditure of more than 3,000%--from ($5.9 million) to just under $187 million. Total net income increased to $115.8 million in FY '89, from $432,000 in FY '88. This is consistent with our increased commitment to the marketing department and increased current assets more than doubled to $227 million in FY '89, up from $112 million the prior year, along with our increased commitment to the marketing department and increased current assets more than doubled to $227 million in FY '89, up from $112 million the prior year, along with our increased commitment to the marketing department. 

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$432,000</td>
<td>$318,663</td>
<td>$309,266</td>
<td>$239,656</td>
<td>$207,907</td>
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<tr>
<td>Sales</td>
<td>75,480</td>
<td>52,361</td>
<td>56,934</td>
<td>40,710</td>
<td>40,215</td>
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<tr>
<td>Sales</td>
<td>46,932</td>
<td>165,570</td>
<td>33,901</td>
<td>21,420</td>
<td>20,676</td>
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<tr>
<td>Sales</td>
<td>93,456</td>
<td>88,108</td>
<td>62,490</td>
<td>40,997</td>
<td>26,497</td>
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<tr>
<td>Sales</td>
<td>25,631</td>
<td>18,537</td>
<td>12,954</td>
<td>7,306</td>
<td>4,520</td>
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<tr>
<td>Total Assets</td>
<td>$186,978</td>
<td>($9,913)</td>
<td>$142,756</td>
<td>$121,221</td>
<td>$116,088</td>
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<tr>
<td>Total Liabilities</td>
<td>$7,864</td>
<td>6,639</td>
<td>3,715</td>
<td>2,008</td>
<td>1,387</td>
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<tr>
<td>Working Capital</td>
<td>$194,389</td>
<td>726</td>
<td>146,471</td>
<td>123,229</td>
<td>117,657</td>
</tr>
<tr>
<td>Common Stock Data</td>
<td>$79,887</td>
<td>294</td>
<td>59,321</td>
<td>40,998</td>
<td>47,877</td>
</tr>
</tbody>
</table>

Total Assets: $304,690
Total Liabilities: $190,323
Stockholder's Equity: $124,164
Total Liabilities and Equity: $304,690
Working Capital: $189,642
Number of Employees: 3,456

- Net Income per Share: $1.92, $1.91, $1.94, $1.99, $2.59
Microsoft announces an end to the second most common business trip.
Start Up

News .................. 36
As the curtain rises on Guy Kawasaki’s new play, you pull the strings behind the scenes at Apple. Plus the latest industry news, rumors, updates, reviews of the hottest new products, and more.

Bobker’s Dozen ............... 38
by Steven Bobker
Image Grabber: A screen grabber with time-delay.
KidsMath: Eight arithmetic games for kids from 3 to 8.
Design Your Own Home: Architecture: Design your dream house, or transform your present one.
JetLink Express: Now supports HP’s DeskWriter.
Writer’s Dreamtools: Vital data for writers — from chronologies to slang.
Tidy It Up!: Shareware to organize your System Folder.
DataMerge: A powerful tool for manipulating tabular data.
CastLink: Connect your hand-held BOSS diary to your Mac.
Pipe Dream: An addictive arcade-style game with a strategic bent.
Partner: Easier graphics-editing and -embedding for DTPers.
Shadow: Keeps selected files backed up automatically.
MicroLot MS62: A hard-disk drive that’s built to last.
Layouts: Page-layout templates with class.

Pinstripe Picks ............. 42
by Robert R. Wiggins
The Microsoft Office: A real value in business software.
Sales and Market Forecasting Toolkit: An Excel toolkit with worksheets, charts, and macros.
FlexForm Business Templates: Customizable forms for everything from billing to fax transmission.
Letter Writer Plus: Manage correspondence on the fly with this DA.
Retail Engine: Point-of-sale and inventory management for apparel retailers.
Partners LTD: Boilerplate documents for setting up a limited partnership.
The California Nonprofit Corporation Handbook: How to start a nonprofit corporation, with forms on disk.

Reviews ..................... 54
UltraTV: Broadcast video on your Mac: breakthrough or gimmick? TypeAlign: The first utility for Adobe Type Manager owners.
LabelWriter and Smart Label Printer: Smooth solutions to a sticky problem.
Fast Cache IIci and MarathOn Racer: Accelerate your Mac without straining your budget.
Finale 2.0, MusicPro, and Encore: Serious tools for professional musicians.
Ishido: A moment to learn, a lifetime to master, a lot to pay.
Spelling Coach Professional: The most complete spelling/thesaurus you can buy.
HyperBASIC: The power of XCMDs with the simplicity of BASIC.
StrataVISION 3d: The rendering power of a mainframe — on a Mac.
Ashlar Vellum: Computer-designed design meets artificial intelligence.
QMS FS 920 turbo: This PostScript printer outperforms Apple’s IINX — but costs the same.
White Knight: A new version rides to the rescue with powerful telecommunications features.
TypeStyler: An eye-catching utility for creating display type.

Features

The Mac IIx: Fast Times at Apple Computer
by Russell Ito and John Rizzo
A new CPU, a trio of video boards, and a new version of A/UX propel the Mac into the realm of workstation-class speed machines.

From the Ground Up
by Douglas Adams
Everybody’s favorite galactic hitchhiker offers his guide to dancing in the long dark tea-time of the soul of a new machine.

Critical Accounts
by Ken Landis
Few purchasing decisions affect your bottom line faster than your choice of an accounting package. We assess the full range of accounting-software contenders and underscore the ones that will keep you in the black.

Star Wars
by Kurt VanDerSlius
LocalTalk network growing? MacUser’s NetworkShop tests both LocalTalk star concentrators now on the market: the Famillon StarController and the TurboStar, by Nuvotech. Find out which one will help your network grow bigger — not slower.

Buyer’s Guide

Color: Techniques and Technologies
by Robert Verkus
Color publishing on the desktop is a fiendishly complex process: from scanning original art to accurately reproducing images on a printing press. This month MacUser surveys three worlds of desktop color — input, processing, and output — with a detailed examination of the most common problems and their solutions. Also see our special color coverage from the MacUser Labs and in the Desktop Publishing section of Power Tools.
Power Tools

Sound Advice
BY CRAIG O'DONNELL
Apple pioneered the graphical user interface, but those pictures have also been accompanied by sound from the very beginning. Here's how to get started with sound sampling and playback. .......... 284

Using Macros for Full Impact
BY JOHN RIZZO
Print your for m letters from a Full Impact database. ................................. 297

Beating the System
BY MICHAEL SWEANE
File management is the Mac's Achilles' heel. Apple has solutions in store with System 7, but here's a solution you can get now. ................................. 303

The Expert's Edge
BY THOM HOGAN
The DOS environment may still be cheaper, but if Word for Windows is any indication, the Mac OS retains a commanding lead. ................................. 315

Power Programming
BY KURT W, G. MATTHEIS AND THOM HOGAN
The secret to efficient programming is to write one solid program and recycle it. Here's that program. ................................. 320

Tip Sheet
compiled by GREGORY WASSON
Readers send in tips, tricks, and undocumented features for FileMaker II, Word 4.0, the HP DeskWriter, and more. 333

MacUser Labs

In Living Color .............................. Buyer's Guide 32
BY WINN L. ROSCH, JEFF PITTELKAU, AND THE MACUSER LABS STAFF
The quality and fidelity of your Mac's display are never more important than when you're working with color. As color desktop publishing becomes a reality, the choice of a color display system becomes one of the most critical elements in the DTP process.

MacUser Labs evaluated sharpness and color quality on 18 display systems to help you select the right system for your color needs.

Color on the Page .............................. Buyer's Guide 56
BY PHILLIP ROBINSON AND THE MACUSER LABS STAFF
A year ago, color printing was a novelty. Today you can choose from more than two dozen color printers at prices ranging from $1,500 to $75,000. MacUser Labs spent more than 1,000 hours testing the full spectrum of color printers — evaluating everything from printing speed to image quality. The results, along with some subjective evaluations from a panel of artistic experts, separate the crayon scribblers from the polished painters.

Reader Survey
Your chance to tell us what you think and win a Macintosh library. ............ 275

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Advertiser Index ................. 400
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An offer you shouldn't refuse ............. 21
Robert R. Wiggins
Apple's corporate culture shock .......... 25
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How to grow obsolete gracefully. .......... 31
John C. Dvorak
Secrets from the core of Apple .......... 426

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Readers correct some grammar, stick up for favorite word processors and database programs, and get high on C. ................. 11

Cover Photo
Walt Denson
Model
Christina Landman, Look
Stylist
Jennifer Telford
Hair and Makeup
Rebecca Flores
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THE TOUGH NEW GRAPHICS STANDARD FOR THE NINETIES.

A t last. A next-generation entry level graphics program that doesn't limit its users to entry level performance. Or entry level results.

Fact is, UltraPaint does everything you want it to today. And tomorrow, too.

Run it on a MacPlus and SE, and experience the ultimate in high resolution black & white painting, with the help of just about every tool you can imagine. And then some.

Add depth to your compositions, using a complete set of advanced drawing tools to create up to 8 independent object-oriented layers.

GREY SCALE EDITING Manipulate scanned images like a pro, using powerful tools and effects like contrast & brightness controls, water droplets, sharpen & blur, lighten & darken, charcoal, smears, and smart selecting & masking. Produce quality half-tone proofs.

COLOR PAINTING Control the color of every dot on your screen with multiple customizable 256-color palettes, a programmable multi-color airbrush, advanced mask & lasso, and professional special effects like blended fills, color gradients, and more.

OBJECT DRAWING All the basic drawing tools, plus advanced features including autotrac ing of bit maps, Bezier & freehand curves with complete editing control, multiple arrowheads & dashed lines, 256 colors per drawing, WYSIWYG text and 600 dpi precision.

SUPERPAINT USERS: TAKE A GIANT LEAP UP THE EVOLUTIONARY LADDER FOR JUST $50.

Simply send your SuperPaint 1.1 or 2.0 Master Disk to Deneba at the address shown, along with $50 (include check or credit card #, issuer, expiration date & signature). We'll send you UltraPaint. The new state of the art. (Offer expires April 30, 1990)
Macintosh Color Comes Home

You're spending more time working out of the "home office", so you can share your Mac with family, friends, and dinner guests. Which program do you expect to become everyone's favorite?

- your database
- your spreadsheet
- your word processor
- Easy Color Paint
- your finance package
- your network software

Easy Color Paint 1.1 is a versatile 256-color paint program with user-defined patterns, multiple color palettes, color printing -- all you need to "discover the artist within". See it at MacWorld '90, booth #5327, or act now--send $79 or call 1-800-367-6899. We accept Visa/MC, and we offer a 30-day money-back guarantee.

Creative Software
55 Clinton Avenue, New Providence NJ 07974

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CHECK OUT THE 'EYES

Introducing the new ComputerEyes/Pro series video digitizers: Full 24-bit color capture for your Macintosh - only $449.95!

Easily captures beautiful color or b/w images from any video camera, VCR, etc. Use captured images in any desktop publishing program, with HyperCard, or any Macintosh paint or image enhancement program (Studio/8, Digital Darkroom, PhotoMac, etc.) You won't believe your 'Eyes! Unbelievably easy to use - unbeatable image quality.

Two models now available -
- Color (c) for any Macintosh - only $499.95
- New full 24-bit color ComputerEyes/Pro for Mac II - only $449.95

For information, demo disc, or order call 1-800-346-0090
Digital Vision, Inc.
270 Bridge Street
Dedham, MA 02026

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About MacUser

Bright Lights, Big CD

Many MacUser readers find the advertisements almost as interesting as the articles. But this month and last, one ad in particular makes an offer that's pretty hard to top. Apple Computer is giving away a special CD-ROM disc to any MacUser reader who wants it. The disc contains technical-support documents previously available only to Apple dealers, developers, and the press. Quite a deal.

But look again, and you'll discover that the deal gets even better, because MacUser also had a hand in developing the disc. We've taken our popular MiniFinders section and transformed it into a convenient HyperCard stack. This stack represents our first big step into the bright lights of electronic publishing.

We think this MiniFinders stack is a logical starting point for our own push into digital media, and we don't intend to stop there. As we develop future versions of this stack, we expect this electronic buyer's guide to evolve into an expert system that you can use to painlessly make buying decisions. Browse through the electronic MiniFinders, and let us know what you think.

But don't feel left out if you don't have a CD-ROM player yet. Portions of the Apple disc can also be played on an ordinary audio CD player. You'll hear a special message from Apple Products' Jean-Louis Gassée. Hot on his heels will be MacUser's own digital curmudgeon, John C. Dvorak, speculating on where CD-ROM will be when our great-grandchildren are old enough to poke around the attic.

Although Apple's CD-ROM disc is the fastest way to get our MiniFinders stack, it's not the only way. The stack is immediately available in the MacUser Download Area of CompuServe, and you can copy it for free. Just log on to CompuServe, type GO MACUSER, and follow the prompts. This Download Area is the predecessor to what will blossom into a full-fledged online service in the coming months.

MacUser is a magazine — but what's a magazine? In our case, the definition now includes digital media such as the Apple CD-ROM's MiniFinders stack. We're sure that it will continue to expand as we discover other innovative ways to deliver the information you need.
Four reasons why 1990 will be the year of the workgroup.

It's already happening. More and more companies are embracing the idea of workgroup computing. For good reasons, too. Like the ability to swap files, send electronic mail, share printers, and work together more effectively than ever before.

Now, TOPS presents four more... the first complete family of powerful workgroup networking products of the 1990's.

The ideal workgroup network—just add people.

TOPS Network Bundle for DOS and TOPS Network Bundle for Macintosh are real "firsts." The first complete workgroup tools in one box. Each gives you the power to share files, printers, and other resources with one person, your group, your department, or your entire organization.

And best of all, both packages come bundled with the all new TOPS InBox, the powerful, yet easy-to-use electronic mail system.

Complete mail in a box.

On its own, electronic mail can be the key to a successful workgroup. Which brings us to the new InBox. InBox gives your workgroup a fast, reliable and easy-to-use electronic mail system for up to 20 users.

And InBox Plus provides expandable communications to 100 users per Message Center. In fact, used with other InBox Plus Message Centers, or UNIX Mail, MCI Mail, PROFS, VMS, and other systems, InBox Plus lets you send messages anywhere in the world.

TOPS Network Bundle for DOS, Network Bundle for Mac, InBox, and InBox Plus. Four great products. Four great reasons to make 1990 the year of the workgroup in your company. And the best reasons of all to call TOPS today.

1-800-445-TOPS, ext. 407.

When you need connections.

For distribution information outside the U.S., call TOPS International at 1-415-769-3598, TOPS Europe at +44 270 31440, or TOPS Canada at 416-764-4800, ext. 900. Copyright © 1989, Sun Microsystems, Inc.
Introducing
MORE™ 3.0.*
MORE 3.0 is different than the software you use now. Because it's more than just software.
It's a complete, proven success system to help you generate and refine ideas. And to create professional-looking plans, reports, proposals, and presentations faster. Much faster.

Instant Organization.
MORE 3.0's success system starts with powerful outlining that works like a spreadsheet for ideas. It lets you revise, and rethink ideas fast. Because when you move a heading, the details underneath move too, renumbering and reformatting your document automatically as you go.
This flexibility helps get your ideas out, and makes it easy to finish with a logical, organized, attractive document. A winning document. Because documents that sell are easy to read, organized, and well thought through.

Instant Formatting.
Whether you have three weeks, or three minutes, MORE's powerful word processing and library of business templates make everything you write and present look organized, and expertly formatted. And that's important for your success. Because often the only impression people have of you comes from the documents you create.
MORE's word processing includes automatic table of contents generation, text rulers, automatic paragraph styling...

everything you need to customize documents. Or, simply browse through MORE's library of business formats, pick the one you want, and your document's spacing, type size, font, and paragraph style is automatically formatted for you.
The library includes over 100 formats created by graphic artists, formats for everything from

Like a computerized yellow pad, MORE's outlining lets you quickly sharpen an inspired thought, weed out a weak one, set priorities, and weight alternatives.

MORE includes a complete library of templates designed by graphic artists. The templates transform your ideas into stunning documents or presentations. With a single mouse-click.

Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014. 408/253-9600.
*ThinkTank, MORE, and MMPE II names in CA call 408/253-6611, and outside CA call 408/441-7284 for upgrade information. **ASCII, BIFF, SYLK, WRS, WR2. ThinkTank and MORE are trademarks of Symantec Corporation. © 1990 Symantec Corporation.
The World’s Business Program.

memos to business plans to bullet charts and full color presentations. They make you and all your work look consistent and professional.

The Complete System.

When you have more time, the MORE system rewards you with power features to create custom, full color overhead presentations and 35mm slides. It has more graphic power than presentation-only programs. Yet it ensures you’ll be successful immediately with its unique Chart Tutor feature that helps you build presentations in a guided, step-by-step process.

MORE Graph™ is a powerful business graphing application that creates standard business graphs quickly and easily. Graphs you can customize yourself, or select from 50 proven business templates. MORE Graph even links graphs to your spreadsheets and tells you when your numbers change. And of course, you can import data from spreadsheets too. So you never have to re-enter the numbers. **

But perhaps the most surprising part of the MORE system is its innovative success “cookbook” called Making the Most of MORE. It was written by a select group of successful independent business people. So it’s practical, winning business strategies on everything from planning to presentations. Status reports to slides.

Free Video.

The MORE 3.0 success system is the first complete solution for busy professionals. It’s a proven system. Because it was created by combining some of the best business advice in America, and the input of 100,000 successful business people who use ThinkTank™, MORE, and MORE II.

Call today for your free “MORE SUCCESS” video. Because in ten short minutes, you’ll see something you’ve never seen before. The fastest success program in the world.

FREE “MORE SUCCESS” VIDEO CALL (800) 228-4122 Ext. 769F

Whether you have three weeks or three minutes, MORE makes you and everything you write look organized and professional.

has more graphic power than presentation-only programs. Yet it ensures you’ll be successful immediately with its unique Chart Tutor feature that helps you build presentations in a guided, step-by-step process.

MORE Graph™ is a powerful business graphing application that creates standard business graphs quickly and easily. Graphs you can customize yourself, or select from 50 proven business templates. MORE Graph even links graphs to your spreadsheets and tells you when your numbers change. And of course, you can import data from spreadsheets too. So you never have to re-enter the numbers. **

But perhaps the most surprising part of the MORE system is its innovative success “cookbook” called Making the Most of MORE. It was written by

See Us at Macworld Expo Booth #1917!

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When It Comes To Viruses, There’s No Such Thing As Overprotection.

Introducing Symantec AntiVirus for Macintosh (SAM”), Version 2.0.

The original version of SAM just locked up the 1989 Eddy as “The Best AntiViral Program” you can buy. Now with added protection and security, new SAM 2.0 is even more effective. And more essential. Because, when your business is at stake, no amount of protection is too much.

SAM finds and destroys all known viruses and clones. It also protects you from new, unnamed viruses by constantly scanning for suspicious virus-like activity. And only SAM 2.0 protects you with instant virus updates from our exclusive 24-hour Virus Newsline.

To keep viruses from ever becoming a problem, SAM keeps them out. SAM prevents any infected application from launching and spreading a virus, and detects “Trojan Horse” attempts to damage a disk. It checks every floppy or removable you insert, and just touch a hot-key to check files downloaded from networks or by modem.

Total protection. It makes SAM the best-selling, highest rated antiviral program ever created for the Mac. So get new SAM 2.0 today and relax. Because, with SAM 2.0, viruses can come knocking. But they can’t get in.

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Hard Lessons
Wow! “101 Hard Drives” (February ’90) is the answer to my prayers as an objective comparison to help me translate the Babel of hard-disk ads and manufacturing claims. Congratulations on a difficult job superbly done!
Kalon Ho
Brookline, MA

By your own specs, the LaCie Cirrus drives are at the top of the pack in raw speed, best real-world performance, coolest temperature, least noise, and longest warranty. Yet you gave them only 4.5 mice, complained that their case had an odd design, and ignored them altogether when listing your Bottom Line picks.

Dr. David Hibler
Lincoln, NE

Out of 101 drives, the LaCie Cirrus 84 was 1 of only 18 chosen for the spotlight — 4.5 mice should be cause for celebration, not dismay. Mice ratings were based on software quality and ease of use, hardware design and construction quality, and performance. Although LaCie’s drives had top-notch performance, they lost points for hardware shortcomings and nonintuitive software, including internal termination, software-controlled SCSI-ID selection, nonstandard 25-pin SCSI connectors, and missing activity and power indicators. — JP

How could you list the Apple Hard Disk 80SC as a top pick? You had retail drives that beat it in raw speed, real-world performance, and noise. You neglected the issue of Apple’s 90-day warranty and didn’t mention the problems with Quantum drives.
Paul Chance
Huntington Beach, CA

What makes the Apple drive so commendable or, rather, recommendable?

From “frozen land of world’s oldest surviving parliament (seven letters),” H. Asgrimsson inquires whether “anyone in inventive America has come up with a foot-driven mouse? I remember a product called DataGlove. How about a DataSock? No, but we hear that the Nintendo Company (of even-more-inventive Japan) is considering a PowerSock. Perhaps the technology will trickle down — or up.

Mr. Asgrimsson goes on to say, “Keep Dvorak, he’s the main reason I buy MacUser!” We don’t know who leaked word to Iceland that John had been replaced, but don’t fret. We coaxed him back after crossword puzzler Nhoj C. Karovd quit in a fit of “homonym for sneaky glance (live letters).” For the solution to Nhoj’s puzzle, see the end of this month’s Letters.

Manufacturing excellence, which ensures durability. This attention to detail includes a steel chassis liner, the most cleanly assembled power supply (made by Sony) we’ve seen, and time-proven drive mechanisms from Quantum and Seagate. The Quantum mechanism that caused problems in Apple’s internal hard drives was the ProDrive80S, which isn’t used in the external drives. — JP

Broken English
Your review of Sensible Grammar in “The Complete Guide to Word Processing” (February ’90) was interesting. But even more interesting was the sample screen, which instructs users to make a terrible grammatical error. The screen suggests that “if the scripting language weren’t” should be replaced by “if the scripting language wasn’t.” The explanation is that the singular subject should take a singular verb.

Sensible Grammar has applied the wrong rule! The conditional construction in English takes the subjunctive mood.

Pat O’Neil
Tempe, AZ

We chose that screen on purpose (really!) because, to paraphrase the alien commander in the movie Plan 9 from Outer Space, grammar programs are stupid, stupid, stupid! They’re totally unable to identify context. That’s why they’re useful only to nitpickers such as you who are secure enough to overrule them when they step out of bounds. — JB

In the Swim
To the people who complained about the November ’89 cover: Lighten up! I guess the days of the Mac being fun and a tool are gone. These complainers probably own an IBM, gape at game reviews, and kiss only on the cheek.

Patrick Madigan
Milton, MA

Suppose the woman in the pool portrayed a successful novelist or columnist? Isn’t the Macintosh Portable supposed to free us from the postindustrial office environment?

Gary Stewart
Houston, TX

Even Steven
We commend Steven Bobker for his concise and accurate review of our program HyperHIT in Bobker’s Dozen (January ’90) but would like to make a clarification. He stated, “As with all
We like to think of CanOpener as the information retrieval utility for the Mac. Because it lets you search and retrieve text, pictures, and sounds from just about any Macintosh file; then view, save, print or copy the information you need.

But it seems our users have other ways of describing CanOpener, such as "..useful", "..a lifesaver" or (our current favorite) "..the neatest thing since peanut butter!"

And some of the toughest critics of all, the editors of MacUser magazine, recently awarded CanOpener their prestigious Editors' Choice Award for Best File Management Utility.

So, no matter how we describe CanOpener, one thing is clear, it's solving our customers' information retrieval problems. And in our opinion that makes CanOpener just one thing...a success!

CanOpener, $125.
For more information, or to receive a free information package, call 800-552-9157 or 914-747-3116.

We make systems for Macintosh users. It's all we do. It's all we've ever done. And we're happy to do our best to solve them at (913) 383-3111. Let us know how they do.

We were happy to see such a favorable review of HandOff in Bobker's Dozen (February '90). Mr. Bobker's only complaint was that HandOff does not support Apple's Desktop Manager. He'll be pleased to know that a new version of HandOff that does support the Desktop Manager is already in beta test and should be released soon.

Fred Holland, President
Software Innovations, Inc.
Allen, TX

Small Is Beautiful
I applaud Paul Somerson's pledge to champion products from companies of

HyperCard applications, databases created in HyperHIT are slow. In fact, one main advantage of using HyperHIT with HyperCard is that data retrieval is much faster than when using HyperCard alone. In many cases, the search time is reduced to under half a second.

Dorothy A. D’Atoma, President
SoftStream International
Mount Laurel, NJ

Dearly though I love Steve Bobker’s Dozen, I must point out that his review of Ceres Software’s Inspiration (December ‘89) missed the point. After stating that “Inspiration bills itself as a thought processor,” Steve proceeds to review it as an outliner. True, a thought processor has outlining capabilities, but it’s much, much more than an outliner.

You’ll do your readers a service if you’ll run another review of this product, treating it as a thought processor. For many of them, your review will make them aware of hitherto unsuspected potentials, both in themselves and in their Macintoshes — something I believe MacUser does uniquely well.

T. F. Carney
Windsor, Ontario
Canada
You’re not alone — a lot of people out there really like Inspiration. I’m not convinced by all I’ve heard, but I think another look is in order. I’m getting the latest version, and I plan to review it again in an upcoming column. — SB

I was happy to see such a favorable review of HandOff in Bobker’s Dozen (February ‘90). Mr. Bobker’s only complaint was that HandOff does not support Apple’s Desktop Manager. He’ll be pleased to know that a new version of HandOff that does support the Desktop Manager is already in beta test and should be released soon.

Fred Holland, President
Software Innovations, Inc.
Allen, TX

Small Is Beautiful
I applaud Paul Somerson’s pledge to champion products from companies of

When he wrote, “Apple is going to have to face an unpleasant reality: We users don’t need Royal. We don’t want Royal. What we want is a standard, and that standard is Postscript. Adobe was there firstest with the mostest.” Others, like Lee Letlow of Cincinnati, Ohio, see it as a customer-relations issue: “If Apple gets greedy and follows the earlier path of IBM by trying to shake down users, it will lose its place to a more enlightened competitor.”

This month we feature a celebrity question-poser, ON Technology’s Mitch Kapor. (Remember him? He changed the curricula of MBA courses across the nation with a product called 1-2-3.) Mitch’s observation: One of the toughest things about developing On Location, his company’s new DA for file management, was resolving seemingly endless conflicts with other DAs, INITs, and cdevs.

Special Delivery...
... With all the bashing of Apple’s authorized dealer network that’s been going on around here, let’s turn over the mailroom floor to an actual authorized dealer: Brent Flanders of MacSource, Overland, Kansas. “We worked very hard to become Apple-authorized because of the benefits,” he writes, “and not to be labeled as ‘not having our act together.’ So, if you have any question or problems your local Apple dealer can’t handle (and we believe there are some good Apple dealers!), we’ll be happy to do our best to solve them at (913) 333-3111.” Let us know how they do.

After building his own Mac II out of an IBM clone Tower case ($500) and $3,000 worth of “over-the-counter, no-questions-asked, I-know-nothing, I-see-nothing” parts from his local Apple dealer, Walter Cooke of Kingston, Ontario, Canada, found he still missed the Apple label. His solution? “I stuck the plastic ‘Macintosh’ plate I’d saved from the back of my old 128K Mac on the front of my Mac II Tower case.”

Everyone seems to agree that Apple should make System 7 compatible with Adobe Type Manager, and Andy Baird of Hightstown, New Jersey, spoke for most when he wrote, “Apple is going to have to face an unpleasant reality: We users don’t need Royal. We don’t want Royal. What we want is a standard, and that standard is Postscript. Adobe was there firstest with the mostest.” Others, like Lee Letlow of Cincinnati, Ohio, see it as a customer-relations issue: “If Apple gets greedy and follows the earlier path of IBM by trying to shake down users, it will lose its place to a more enlightened competitor.”

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Speak Up:
How can Apple end cdev/INIT conflicts once and for all?
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If you're not ready to give up on your old friends, there's only one thing to do. Call 1-800-ORACLE1, ext. 7663 now.
**LETTERS**

**Electrical Charges**

"Unsafe at Any Frequency?" by Winn L. Rosch (February ‘90) was generally useful and equitable as regards exposure to radiation, but the article confused the effects of the relatively pure 60-hertz waves coming from power lines with the broader spectrum of radiation coming from the flyback transformers of CRTs. Power-line radiation has been implicated in cell cancer and cell studies, while CRTs have mainly been studied in terms of eyestrain, headaches, and an increased number of miscarriages among female users. This latter effect wasn’t mentioned in your article.

Larry Rapoport
Los Angeles, CA

**Off-Color Words**

We appreciate your including New Horizons’ WordMaker in “The Complete Guide to Word Processing” (February ‘90). Unfortunately, there are two omissions in your features-comparison chart. WordMaker does support color text, and it also allows you to input color graphics—including 32-bit-color graphics.

Brian M. Sarrazin, Vice President
New Horizons Software, Inc.
Austin, TX

If you were going to test a 250-mpg rail dragger, you wouldn’t fill its fuel tank with used crankcase oil, run it on a go-cart track, and then whine about its handling and lack of speed. Yet Charles Spezzano tries to run FullWrite Professional, which he admits is “for power users... people preparing complex documents,” on his SE and complains that it can’t handle his 50-page document. I’ve run FullWrite on a Mac II with 5 megabytes of RAM and a 90-megabyte hard drive for over a year, and it has worked fast and flawlessly.

Tony Hymen
Claremont, CA

**Tape Backup Stays Down**

In your recent review of tape drives (December ‘89), you recommended Mac-Products MagicTape 60 tape drive as an inexpensive but effective backup system. Upon receiving mine and hooking it up, I discovered that my SE with a 20-megabyte internal drive wouldn’t boot with the tape drive hooked up to the SCSI port, regardless of whether the MagicTape 60 was on or off. The unit works only if I hook it up after the SE is booted, but I must unhook it again after I turn it off, in order to boot up again.

I called MacProducts’ technical support and was told that this had happened to “a few other people” and that “there is nothing that can be done.” This is quite irritating, and if I weren’t so cheap, I’d send it back, but I’m hoping that if enough people complain, it will be fixed.

Michael Marion
Tupelo, MS

**It’s All Relative**

I commend you for your informative and evenhanded review of Double Helix 3.0 in the February ‘90 issue. However, you’re wrong in saying that data relation is “Odessa’s idsynctronic term for a data file.” Actually, relation is the correct term; it is a data file that is idsynctronic.

The relational data model was defined by Dr. E.F. Codd in 1970. The only data structure allowed is a two-dimensional table. Dr. Codd is a mathematician, and the name for a two-dimensional table in mathematical set theory is relation. It is from that concept that relational databases get their name: A relational database is nothing more than a collection of relations.

Dr. Jan L. Harrington
Poughkeepsie, NY

Regarding your review of 4th Dimension (February ‘90), I’d love to see a 4D database program with 25 different files, 12 open simultaneously, with a total record count of more than 30,000 40-plus-field entries do an efficient (fast) search. Blyth Software has been around since almost day 1. I’ve hung in with them through thick and thin, and they have always come through with flying colors. Their Omnir 5 is the fastest and most reliable database around.

James D. Bakken
Two Harbors, MN

**Hit the C Spot**

First, it’s how to hack your system with ResEdit, and now you’re running a
It's Going Where No High-Speed Modem Has Gone Before.

There's nothing more advanced for Macintosh networks than the new high-speed NetModem V.32. Because the NetModem V.32 pushes performance to the limit. Just plug one into your network and every connected Mac can communicate at any speed up to a sizzling 9,600 bps with full V.32 compatibility. The NetModem V.32 is easy to use, even if you've never seen a modem before, with menubar 'LEDs' and familiar modem sounds fed back to your Mac as your call progresses. It's also economical, saving the expense of a dedicated Mac, multiple modems and extra phone lines — not to mention excessive telephone and online charges.

It even lets you dial in to your network from a remote site to access files, use TOPS®, AppleShare®, E-mail®, printers or any other network resource. And it lets any Mac on your network access a remote network thousands of miles away, creating a powerful, high-speed wide-area internetwork. The Hayes-compatible NetModem V.32 comes with Internet Manager software that lets you create network zones, control traffic, restrict access between zones — even check the location and status of every device in the system. The NetModem V.32 is setting a whole new standard. For more information, call Shiva at 1-800-458-3550.

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The Original Developer of StuffIt Deluxe Died in 3712 B.C.

We’ll let others argue over who invented which idea. We at Aladdin Systems know exactly where the inspiration for StuffIt Deluxe comes from. The ancient Chinese.
The Chinese language compresses words and phrases into simple pictorial characters. StuffIt Deluxe does the same to entire Macintosh files. Huge files that once took up 1 megabyte of space now occupy as little as 16K.

With StuffIt Deluxe, limited space is history.

16 May 1990 MacUser
If you're considering an Apple monitor, here's a nudge in the other direction.
Once again, Radius turns display technology on its ear. Introducing Pivot™, the first display that goes from portrait to landscape with only a gentle push. The new Pivot is the first display that changes orientation, in real time, to match the format of your project. For example, when you’re writing a manuscript, you can see a full page in portrait position. And when you switch to spreadsheets, you can rotate Pivot to view all twelve months.
levels of gray are furnished, with upgrades to
16 levels for near-photographic quality images.

Ideal for graphic design and desktop pub-
lishing. Pivot is compatible with virtually
every Macintosh application and may be used
with either the SE/30 or Macintosh II family.

To find your nearby Radius reseller, phone 1-800-227-2795. Then, before you buy
a display for your Macintosh, check out another
amazing way to look at things from Radius.

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You asked for it! You've waited for it! Now the leader in backup technology proudly presents the ultimate tape backup system for the Macintosh.

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Visit us at Macworld Exposition  Booth 2137
This product is in no way associated with or has affiliation with Apple Computers.
here hasn’t been this much fuss about a delivery system since somebody sued Domino’s Pizza for driving too fast.

In many ways, optical storage promises to shake things up almost as much as the original microcomputer did — at least until this country gets wired for ISDN (but don’t hold your breath).

If you’re skeptical, you’re not alone. The number of Mac owners who have bought CD-ROM drives is in the very low ten thousands. Last issue, when MacUser reviewed every CD-ROM product on the Mac market, we could locate only 38. And Microsoft’s recent Fifth Annual CD-ROM Conference attracted fewer than 100 exhibitors. Apple needs to sell its CD-ROM players for even less than its recently reduced $899 price.

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And there’s still more. Last issue, when MacUser reviewed every CD-ROM product on the Mac market, we could locate only 38. And Microsoft’s recent Fifth Annual CD-ROM Conference attracted fewer than 100 exhibitors. Apple needs to sell its CD-ROM players for even less than its recently reduced $899 price, develop a speedy CD-ROM jukebox, and bless a large-format fewer than 100 exhibitors. Apple needs to sell its CD-ROM players for even less than its recently reduced $899 price.

Similarly, Datapro’s pricey but ground-breaking Consultant CD-ROM suggests what periodicals might resemble a few years from now. It’s like having a consultant slide into your seat and demonstrate the strengths and weaknesses of competing products in real time, while narrating the process. Parts of

latter is like winning the lottery but picking up the prize in nickels.

Why hasn’t the optical market exploded? Why don’t more people own CD-ROM players? Why haven’t developers come up with more titles? It’s the classic chicken-and-egg problem. Vendors are chicken and are afraid of getting egg on their faces.

Exercise 1: Stop and think how things would be different if every Mac had come with a CD-ROM player built in and if Apple had provided a smart, muscular, effortless search tool.

Before you answer, look at some of the sizzling things vendors are now doing with CD-ROM discs. Then contemplate what they could be doing in the future:

Apple saved four million bucks by distributing its tech documentation on CD-ROM discs and now lets its field staff have on-th-spot access to the entire Apple resource library.

Microsoft has combined four of its Mac apps with animated tutorials, easily searchable documentation, and a hefty collection of utilities on a CD-ROM disc. SuperMac, Farallon, and Letrascan have also recently jumped on this “application environment” bandwagon. It’s software that jump-starts — no juggling floppies during installation, lots of on-line assistance, and all the tools and samples you need in one place. One thing that has made the Mac great is ease of training. CD-ROM can make it even easier.

Voyager (with its CD Companion Series: Beethoven’s Ninth Symphony and Warner New Media (with CD Audio Notes: The Magic Flute) have produced a pair of riveting packages that play digital-audio sound while providing interactive commentary and music lore.

Mediagenic’s Cosmic Osmo is a spellbinding slice of pure technology, a masterful 3-D fantasy romp that enchants both children and their parents, a USDA-safe tab of digital acid that makes you sorry Lewis Carroll was a century and a half before the Mac. Even in its pedestrian small-screen black-and-white HyperCard haberdashery, it hints at astonishing things to come.

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PAUL SOMERSON

BY PAUL SOMERSON

Free and Easy

Consultant are a real knockout. We at MacUser do real testing in a real lab. (We’re the only ones who really do.) We wish we could re-create the tests for you while you watched. With a CD-ROM, we could.

(Exercise 2: Drop in on the offices of all the Mac monthlies. Ask to see the labs. At MacUser, you’ll have to specify whether you want to visit the busy product-testing lab; or one of the two equipment-packed lab annexes; or the new MacUser Labs connectivity NetWorkShop, with its dozens of Macs. If you visit any office other than MacUser’s, practice saying incredulously, “That’s it? But where’s the real lab?” Try it.)

Someone at Highlighted Data is either very smart or very prescient. Its Webster’s Ninth New Collegiate Dictionary CD-ROM is not only the most complete Mac lexicon available, but it also offers something wonderful: correct, digitally recorded pronunciations of every word. You’ll never again have to deal with macrons and breves and schwas. You just click and listen and learn. You can also cut and paste the illustrations or bump up the font to a large-print 24-point size. Highlighted Data has to iron out a few performance wrinkles but should be commended for its foresight. This is value-added at its best.

Want more? Bowker, the librarian’s best friend, offers more than a million book citations and more than 70,000 full-text book reviews. Or snap up Broderbund’s CD-ROM Whole Earth Catalog, a random-access treasure. Or Grolier’s Electronic Encyclopedia. Optical Media’s Universe of Sounds. UniDisc’s Guinness Disc of Records. Wayzata’s CIA-Spook World Factbook. Xiphias’ Time Table of Science & Invention. There’s even a disc of “photographic erotica” from Sol in Milan.

It’s the classic chicken-and-egg problem. Vendors are chicken and are afraid of getting egg on their faces.
But think about what CD-ROM will offer in the future. You can produce your own for a lot less than you imagine. These days it costs a mere $500 to $1,000 to master a CD-ROM and just $2 or so for each copy. You can even have Apple put one together for you; they’ll handle the mastering and duplication and hand you 100 discs in as little as five days for $1,500 (for details, contact Apple CD-ROM guru Eileen Hart).

And think of things to come. Do you ever do slide shows? Wouldn’t you like to have a huge library of slides at your fingertips and be able to scan through and select individual ones that suit your pitch that particular day and then click and print them instantly on a nearby film recorder for a custom presentation?

Or distribute your company’s software in a cheap, durable, virus-safe form? Or archive and distribute your company’s data to branch offices effortlessly and cost-effectively? Or sell software packed with help and utilities and added value, and even ads and graphics/sound demos for your other products? Or distribute Mac and IBM software on the same disc? Or use full-motion video or animation to illustrate real-world events? Consider how much easier it is to demonstrate “clockwise” by showing hands that move instead of describing it in words.

Philips’ CD-I and Intel’s DVI compression engines can cram more than an hour of full-motion video onto a disc. Imagine the interactive software this could allow: A tough foreign-policy tête-à-tête between you and the President. A trip to a distant country down streets you randomly decide to wander, interacting with locals. Piloting a rocket to Mars. Leading a leveraged buyout of IBM. Setting up an AIDS clinic. Taking a one-on-one management class with Machiavelli. Discussing the universe’s shape with Einstein.

**Exercise 3:** Get an absolutely free CD-ROM, coproduced by Apple and MacUser, that you can use even if you don’t yet own a CD-ROM player. (You can put it into your audio CD player and hear both Jean-Louis Gassée and our own John Dvorak talk about sexy CD-ROM technology. John also provides a tool kit of custom Dvorak Control Panel sounds.) If you do own a CD-ROM player (and you should), you’ll be able to use Apple’s tech-support tools and samples of third-party CD-ROM software. Plus all of MacUser’s MiniFinders in a convenient, easy-to-use on-line format. It’s hot. And it’s free. Check it out. Get a copy for yourself today before they run out. Just call (800) 441-3001, ext. 100.

This technology truly is the future. Apple believes it. So do we. It’s a bit slow in gaining critical mass, but it’ll get there soon. Remember, CD-ROM wasn’t built in a day.
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Still Easy. Still Fast. And Still the Right Choice...

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1.4 Million-Word Thesaurus  How about 1.4 million new reasons? WriteNow now includes the Proximity WordMaster™ Thesaurus, containing 1.4 million synonyms, antonyms, compared, contrasted, and related word responses at your fingertips—it's the biggest in the Macintosh world!

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The Word Processor of Choice in the Macintosh World  Or how about just one really important reason: When you ask industry critics which word processor they use day-to-day, the answer is always the same: WriteNow. Still the word processor of choice in the Macintosh world.

Reviews

"WriteNow is the definitive Macintosh word processor. It's easy to use, powerful, and comfortable... Highly recommended."
—John Dvorak, Industry Columnist

"[WriteNow] might be the Best Program I've Ever Used. On any computer—it's the fastest Macintosh word processor I've ever seen."
—Jim Seymour, MacUser Magazine

"Even if WriteNow is your first Mac application, you'll be up and running in no time. We rate ease of learning excellent."
—InfoWorld Magazine

Awards

1989 Editors' Choice Award, 'Best New Word Processor'—MacUser

1989 Readers' Choice Award, 'Best Word Processor'—MACazine

#1 Rated Word Processor in Macintosh 'PC Week Poll of Corporate Satisfaction.'
—PC Week Magazine

Comparison of Leading Word Processors

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For more information...

Registered users will receive WriteNow 2.2 upgrade information in the mail. Nonregistered users should call or write for details.

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  Carry your world wherever you go. Put your operating system, applications, and data files on a single cartridge. Keep your data safe and secure or move it from place to place.

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  Eliminate crash anxiety, with laser technology there are no heads to crash. If your hard drive goes down your optical system will put you back on-line immediately.

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  Distribute massive amounts of data in limited quantities. CD-ROM's are great, but not if you need a reduced amount.

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  Learn how to put these and other opticalabilities to work for you, call today for the name of your nearest authorized dealer.

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ou can't pick up a business magazine anymore without reading something about Japan's industrial superiority over the U.S., especially in the high-tech arena. If it's made of silicon, odds are the Japanese can make it faster, better, and cheaper—or at least that's how it seems. The failure of US Memos (the consortium of U.S. manufacturers that was going to wrest the DRAM business back from the Japanese) earlier this year was just another nail in the coffin of U.S. industry. And when an American firm does manage to beat the Japanese in some area, that firm is likely to end up as the feeding frenzy for stock options, company cars, golden parachutes, and other perks. Some of the best and the brightest left Apple when they found themselves spending more time fighting political battles than getting work done.

The problems extended all the way to the top, and Apple has ended up with all the problems of its old corporate culture multiplied by all the problems of the standard corporate culture that's been grafted on top. Apple compensates its executives based on quarterly numbers. So, like countless other companies, Apple finds that its management is most interested in immediate gratification and the bottom line, whereas

**Knee-Jerk Economics**

a Japanese subsidiary. The cheap dollar, high capital-gains tax, heavy regulation of telecommunications, and protectionist cartels and consortia combine with the strong yen and Japan's almost nonexistent taxes on capital gains to make it cost-effective for the Japanese to simply buy American companies at bargain-basement prices. (For more on this subject, read *Microcosm: The Quantum Revolution in Economics and Technology* by George Gilder, a *Forbes* contributing editor.)

It's not just economically that the Japanese are ahead of the U.S. Japanese management is considered more forward-looking, more long-term-oriented, and more stable than U.S. management. Japanese employees are generally more loyal than their American counterparts and are usually considered employees for life. The Japanese don't job-hop as much as Americans do, nor do they live in fear of layoffs—their employer will be around to protect them for their entire life.

Then there's Apple Computer. You might remember that Apple long considered itself an alternative to standard corporate America, and perhaps the hope of the future against the Japanese juggernaut. Apple's corporate culture featured consensus instead of flat, area associates instead of secretaries, stock options instead of pension plans. In his book *Odyssey*, John Sculley described the difficulty of acclimating to Apple's ways of doing things, as well as his vision of how Apple's corporate culture might grow to encompass satellite companies rotating about the Apple mothership. A lot of people wanted to see Apple's corporate counterculture succeed and point the way for other U.S. companies to compete against the Japanese.

Unfortunately, reality intervened. The success of the Macintosh caused Apple to grow by leaps and bounds, and as Apple brought in outsiders to help the company through its growing pains, the outsiders brought with them the very culture that Apple was trying to supplant. Managers began acquiring fiefdoms and building their own little kingdoms, and many old-time Apple employees—the original true believers—found themselves steamrollered, pushed aside, or simply forgotten in its Japanese counterparts are looking five and ten years ahead. Apple is also abnormally focused on its gross profit margin (GPM) and recently raised its target of a 52% GPM to a 55% GPM. If you've ever wondered why Macintoshes are so expensive, a 55% GPM plus the dealer's margin of 35% to 38% means that most of the price of a Macintosh is markup, and this doesn't even count Sony's profit margin on the power supplies and disk drives.

This focus on the GPM even causes Apple to make some bizarre product decisions. For example, System 7.0 is going to require 2 megabytes of memory, and even today most people could use more memory, yet Apple still sells many machines with only 1 megabyte of memory because memory has a relatively low GPM, and putting the extra memory in would lower the GPM even though it would increase sales and profits overall.

Apple's fixation with quarterly numbers has had other effects. When projected profits fall, Apple's knee-jerk reaction is to look for ways to cut expenses, including canceling projects and laying off people just because they happen to be in the wrong department at the wrong time. A good deal has been made of IBM's recent program to decrease

**The Japanese aren't just economically ahead of the U.S., but more forward-looking, long-term oriented, and stable than U.S. management.**

*By Robert R. Wiggins*
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Once a year, Macintosh™ users are asked to name the best Mac-to-mainframe product. And for the past three years, the name they chose was MacIRMA™. This has made us very happy.

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Gateway connections to the mainframe.

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Imagine Suitcase II on your Macintosh...
Macintosh isn't going to last forever. Nothing wonderful ever lasts forever. All over Silicon Valley and points east, engineers are creating the next personal-computer architecture. (Well, maybe Macintosh isn't tending as much as the future is coming.) It's not going to be Macintosh-compatible, and (we) Macintosh bigots have to come to grips with that fact.

What will the computer of the future be like? If I had to guess, I'd place two bets. The first is a pen- or stylus-based notebook computer with handwriting recognition. The second is a computer with a 3-D interface based on RISC technology.

The first kind of computer will work like this: You (hand)print with an electronic pen on a notebook-sized display, and the computer transforms your marks into text.

Rather than cutting and pasting, you'll use copyediting commands: Slash through a word to delete it; draw in a caret (^) to mark an insertion point and add text. Draw a rough sphere, and the computer turns it into a circle.

Initially, this computer is going to run into all kinds of resistance from us. (Us, believe it or not, will be the establishment at that time.) Here's how we will complain about it:

User's Objection: "The handwriting recognition is lousy. When I type an a with Macintosh, at least I know I'll get an a."

Power User's Objection: "There's no software for it. I can't run Excel or PageMaker. It's not MS-DOS-, UNIX-, or Macintosh-compatible. And it's too expensive. I can get a Mac Plus for $250."

Developer's Objection: "Your installed base is much too small, and there's no documentation, technical support, or free development units. We'll try to port our Mac software as soon as we get the next rev out."

The second kind of computer will have a 3-D interface. Basically, some company is going to throw all the RISC technology it can at the problem and give the market a computer with real-time 3-D animation and graphics.

This means that instead of producing a newsletter with mere pictures, you can send a document with three-dimensional images. If you're an architect, for example, you can send a proposal to a client, and the client can "walk" through the building instead of seeing static pictures of it.

Here's how we will complain about this computer:

User's Objection: "Why would anyone buy this computer? With a Macintosh III whatever, I have 3-D graphics and animation right now. I don't mind spending 90% of the time looking at the watch icon."

Power User's Objection: "There's no software for it. I can't run Excel or PageMaker. It's not MS-DOS-, UNIX-, or Macintosh-compatible. And it's too expensive. I can get a Mac Plus for $250."

Developer's Objection: "Your installed base is much too small, and there's no documentation, technical support, or free development units. We'll try to port our Mac software as soon as we get the next rev out."

Do these kinds of objections sound familiar? They should. They're basically what the pundits said about Macintosh in 1984-1985. Look how wrong they were.

ENGINEERS ARE CREATING THE NEXT PERSONAL COMPUTER — AND IT WON'T BE MAC-COMPATIBLE.

By Guy Kawasaki
At first, they'll try the obvious companies such as Aldus, Adobe, Claris, and CE Software. These companies will demand development contracts, do a bozo port, and fail miserably. Microsoft, however, will do a spreadsheet program in exchange for a perpetual no-cost license for Macintosh ROMs.

Business users will express interest in buying the new computer, and the Macintosh marketing (re-)organization will panic. Regis McKenna will come up with this positioning statement: "Macintosh is our mainstream business product. It is for small, medium, and large businesses; homes; and dorms. Our

We have two years to emotionally prepare for the beginning of the end of Macintosh, and five more years before it actually happens.

new computer is for carpal-tunnel-syndrome sufferers in the '90s."

Enlightened Bigotry

I may have the specifics of these new technologies wrong, but something like this will happen. We can either dig in our heels and resist change, or we can embrace it. I know that this is going to be tough — probably tougher on me than on you.

That's why I wrote this column now. The beginning of the end will start in about two years ("1992 won't be like 1984"). Of course, from the time it begins, it will take five more years before there's real software and hardware. That means we have two years to emotionally prepare for the beginning of the end of Macintosh. And then we have five more years before it actually happens.

Macintosh bigots we may be. But at least let us be enlightened Macintosh bigots. We know how we feel about people who still cling to their IBM PCs. Let's not have people think about us in that awful way.

---

32 May 1990 MacUser
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A Power Play

One of the beauties of owning a Macintosh is that you immediately think that you can run Apple better than its management can. This month you can really try to. Cut out the puppets, fold along the dotted lines, and place them on your fingers. We've included a sample play for your first Apple executive-staff meeting.

The players (in approximate order of size of golden parachute):
John Sculley — Chairman, Apple Computer
Mike Spindler — President, Apple Europe
Jean-Louis Gassée — President, Apple Products
Allan Loren — President, Apple USA
Bill Campbell (offstage) — President, Claris Corp.
Secretary

Act I
December 1989

John Sculley: I just got the latest release of MacDraw, and it creates great chain-of-command charts. So let's reorganize the company.
Mike Spindler: Let's start with Apple USA.
Jean-Louis Gassée: Oui, oui.
Allan Loren: Why are you starting with me?
Mike Spindler: You have the lowest profits.
Allan Loren: Don't you think we should talk about the 90-day warranty? Third-world countries such as Canada and France have 12-month warranties. I think we should do the same for U.S. customers.
Jean-Louis Gassée: May I point out that the French had palaces when Americans were running around naked.
Allan Loren: Then why did you buy a palace in Palo Alto?
John Sculley: Enough from you guys. I gave you all your own divisions so you wouldn't fight.

Curtain

Act II
January 1990

Jean-Louis Gassée: There's a bug in MacDraw: The chairman's box can be connected to only three direct reports.
John Sculley: What can we do? Why don't you resign, Allan?
Allan Loren: Resign? Me? I'm just getting the hang of this place.
Jean-Louis Gassée: You're getting the hang of this place? This place is getting ready to hang you.
Allan Loren: Can we get back to the warranty issue?
Jean-Louis Gassée: We don't need to extend the warranty. My engineers make computers so good they never break down.

[A knock on the door; a secretary peeks in.]
Secretary: Jean-Louis, your wife is on the phone. She says it's urgent. The Quantum hard disk in your Mac IIcx won't start up.

Curtain

Act III
February 1990

John Sculley: Hey, I can connect only two boxes to the chairman's box.
Mike Spindler: I've got an idea. Why don't you put me in one box as chief operating officer and put your administrative aide in the other?
Jean-Louis Gassée: There's no way I'm going to work for Mike.
John Sculley: That's not a bad idea. Who thought of this four-president structure anyway? I'll tell you what. Jean-Louis: You can stay a direct report to me.
Jean-Louis Gassée: What's the catch?
John Sculley: I thought you'd never ask. I want you to give responsibility for product marketing and manufacturing to Mike.

Curtain

By Guy Kawasaki
Act IV
March 1990

John Sculley: So how are this quarter's sales, Mike?
Mike Spindler: We're doing great, John. We already have a 40% share of the Helocar market. That's 39% better than the Infiniti. Boy, their ads are dumb. They should show product the way we do.

John Sculley: Remind me to use MacroMind Director to congratulate the BBDO team. Is the press still bugging you about the reorg?
Mike Spindler: Which reorg?
John Sculley: I've lost track. Oh, it must be the one where Allan and what's-his-name left and you became COO.

Mike Spindler: [Chuckles.] Too bad we already used that line about blowing up De! so we could get closer to the customer. I heard that Jean-Louis and Allan are starting a consulting firm called GALL — Gassee And Loren Limited. Or was that GAUL?

John Sculley: We should get Regis McKenna on the phone.

Intermission

Act V
30 minutes later

John Sculley: RIM said to stick to the party line that a COO would help Apple better coordinate business operations while streamlining day-to-day operations.
Mike Spindler: Sounds good to me.
Secretary: I'm sorry to interrupt again, but Bill Campbell's on the line.
John Sculley: What does he want?
Secretary: He wants to know when Claris can go public.

John Sculley: Tell him that he can't go public until he agrees to publish HyperCard stacks.

Secretary: John, Jean-Louis called too. He wanted to know if you wanted to buy some Perrier real cheap for the exec staff off-sites.

Curtain

GASSEÉ GONE?
CUPERTINO, CA — In a month full of high-level turmoil at Apple, Jean-Louis Gassee, president of Apple Products, has reportedly offered his resignation. Rumors of Gassee's departure come less than two weeks after the resignation of Apple USA president Allan Loren. These events potentially leave the company in a leadership vacuum as its stock takes a beating on the market and criticism of Apple's product direction has become more heated. Although Apple had not officially confirmed Gassee's departure at press time, it's widely believed that the primary reason for the delay is that the terms of the flamboyant Frenchman's departure have yet to be agreed on. Meanwhile, many Apple employees have rallied to Gassee's cause, even holding demonstrations outside his office window to show their support.

CLARIS COMING TO SQL
SANTA CLARA, CA — Claris has purchased SQL technology from Red Brick Systems. The technology was originally marketed as EQT (Executive Query Tool). EQT lets Mac users browse through and download information from a mainframe SQL database without having to understand SQL. Queries are made with familiar Mac click-and-drag techniques. Claris plans to market the technology in a stand-alone product that's expected to ship before 1991.

ALDUS/SILICON BEACH DEAL DONE
SAN FRANCISCO, CA — As expected, Aldus has formally announced that it will acquire Silicon Beach Software. Silicon Beach will become a wholly owned subsidiary of Aldus but will continue to operate as an independent company. The responsibility for technical support of Silicon Beach's product line is still unclear, but Silicon Beach has indicated that it plans to continue supporting its products. Charlie Jackson, Silicon Beach's president and founder, will assist in the transition and will continue his association with the company as a consultant. Personal Press, Silicon Beach's planned low-end page-layout package, is due to be released soon.

IBM TAKES NEXTSTEP
ARMONK, NY — In the first tangible result of their previously announced partnership, IBM announced that it will use NeXT Computer's NextStep interface and development environment on its newest PS/2 computers and future workstations running AIX, IBM's version of UNIX.
1. **Image Grabber**

In some ways, Image Grabber is a throwback to earlier screen grabbers such as Camera. It's a DA and therefore can't be invoked via an F-key. But because it is a DA, it's very small, ultrastable, and compatible with all Macs.

Like Camera, Image Grabber has a time-delay mode, so you can set up the screen as desired — complete with pull-down menus. You can capture both 8- and 24-bit-color screens, as well as color screens in 2-bit black-and-white, without switching your monitor's cdev. The dialog box in which you select a file type or destination shows how much disk space the capture area you've selected requires. You can shoot screens that cover multiple monitors, although not in the time-delay mode.

Image Grabber saves screens to the Clipboard as MacPaint or PICT files, or sends them directly to the printer. Color printing is supported. You can also save screen areas as icons. This feature is useful when you're creating such things as help screens and icons.

Image Grabber has outstanding performance and reliability, and the excellent manual clearly explains all phases of operation.

Sebastian Software, P.O. Box 70278, Bellevue, WA 98007; (206) 661-9602. Version 2.0. $30.

2. **KidsMath**

KidsMath is a set of eight arithmetic games aimed at children between 3 and 8. That's a rather ambitious goal, as it covers the widely differing capabilities of preschoolers to third-graders. In fact, KidsMath will prove tough for younger users. Most eight-year-olds, however, will find it to be plenty of educational fun.

Unfortunately, KidsMath doesn't take advantage of larger-than-9-inch Mac screens or color. Color, in particular, would make the details of the games easier to see and would grab attention more effectively. And the clarity of the visual clues is poor. Expect to have to teach a nonreading child how to play KidsMath. There are some other flaws too. For example, in the arcade-like Paddle Ball, it's not enough to click on the right answer. The child must also click on the OK button at the bottom of the column of numbers.

But the games offer a sufficient variety of challenges to hold a child's interest, and several have exceptional features, such as animated coaching when the child selects the wrong answer.

Great Wave Software, 5853 Scotts Valley Drive, Scotts Valley, CA 95066; (408) 438-1990. Version 1.1. $49.95.

3. **Design Your Own Home: Architecture**

Whether you're designing your new abode or simply moving, a good floor plan can make the job of arranging your possessions much easier. Design Your Own Home gives you just that. Using a basic drawing engine that most users will be comfortable with, it adds powerful grid and dimensioning features.

Everything is drawn to one of 12 common architectural drawing scales. Changing the scale is a one-step process, but it's usually necessary to do some minor touch-ups of interior objects and text.

The basic package comes with two dozen sample floor plans in a variety of styles, and other libraries of plans are available. A wide selection of standard electrical and plumbing symbols and furniture shapes is also included.

The primary virtue of Design Your Own Home is the inclusion of a wide variety of shapes and symbols and full floor plans. These are real-time and work-savers.

Abracadatta, P.O. Box 2440, Eugene, OR 97402; (503) 342-3030. $99.95; additional libraries $29.95 each.

4. **JetLink Express**

The JetLink Express reviewed here is an updated version of the program reviewed in the January '90 issue. It now supports Hewlett-Packard's excellent DeskWriter ink-jet printer (see Bobker's Dozen, April '90).

JetLink Express prints most material about 10 to 15 percent faster than the generic HP driver — a barely noticeable degree that's significant only if you frequently print very long jobs. It does print gray-scale art noticeably better. Text quality would improve if GDT provided better-looking fonts.

GDT Softworks, 4684 Leighwood Highway, Suite 189, Burnaby, BC V6C 6B7, Canada; (800) 663-6222 or (604) 291-9121. Version 1.0.2. $149.
**6 Tidy It Up!**

Tidy It Up is a simple and completely safe application that organizes and straightens up your System Folder. It's quick and does a very good job. The interface is unusually attractive and intuitive. Since all it does is move files around, it can't harm anything or cause conflicts.

The categories Tidy It Up uses are fully user-customizable, and there's an adequate variety of arrangements from which to choose. Categories are generally denoted by empty folders that carry the category name. It's also possible to code by color.

If you like a neat hard disk with a well-organized System Folder, Tidy It Up is a must. It's shareware and available on most major BBSs.

**DataMerge**

DataMerge is designed to simplify the manipulation of tabular data. It works with all major spreadsheet programs and data-manipulation software. The only requirement is that the program be able to save or export data as columns of text.

It can merge up to nine files, which can be larger than available RAM, although that will slow performance. Input files can have up to 256 columns, but output files are limited to a 99-column width. Columns in the input files can be separated by tabs, commas, colons, semicolons, single spaces, or groups of spaces. It can also read columns defined by character count. And it has an even wider variety of output options.

DataMerge's performance is excellent. DataMerge belongs in the libraries of people who manipulate large amounts of data.

**Pipe Dream**

Pipe Dream is a great arcade-style game. It doesn't move too fast at the middle levels and always rewards foresight and strategy. The game involves placing "pipe" sections in an unbroken chain. "Fluid" moves through the pipe; you must keep ahead of it for a distance that varies, depending on the level.

Pipe Dream is the best new game I've played since Crystal Quest (April '88). The reasonable copy protection is based on the manual (you must enter a code). Pipe Dream doesn't make much use of color and uses only the area of a 9-inch Mac screen. But it runs fine under MultiFinder — important to game addicts.

LucasFilm Ltd., Games Division, P.O. Box 10307, San Rafael, CA 94912; (415) 662-8902. $39.95.
Partner

Partner is a neat new INIT that makes the graphics-editing and -embedding process much less painful than it usually is in DTP. It lets you use graphics applications without ever leaving your publication. It achieves this by linking its own power with that of MultiFinder.

Partner works with MacWrite II, Word 3.02 and 4.0, PageMaker (3.01 or later), and QuarkXPress (2.11 or later). It supports several graphics programs, including MacDraw, MacDraw II, Illustrator, Illustrator 88, FreeHand, MacPaint II, FullPaint, and Canvas.

Its most valuable feature, at least for me, is the ability to edit graphics in place. You can also use your graphics program to create images from within your DTP software. Partner is also able to put graphics files into software that does not normally accept them. For example, you can embed FreeHand graphics in Word.

Files can get very large, resulting in a performance slowdown. The manual says all you need is 1 megabyte of RAM. It's kidding. Two megabytes is the absolute minimum. Nonetheless, Partner is a slick effort.

Salient, 3101 Avalon Court, Palo Alto, CA 94306; (415) 852-9567. Version 1.0. $99.

Shadow

Shadow, an easy-to-use DA, is designed to automatically back up selected files, both at specified time intervals and with specific actions. This versatility hasn't been matched in Mac backup utilities, and performance is usually excellent. There are some programs that use nonstandard Save commands, however, that it simply can't handle. Unfortunately that list includes major programs such as Excel 2.2. Also, Shadow can automatically save or back up only 99 files per list. It's best for frequently backing up your main working documents. If you have many of them, however, Shadow — ordinarily a very quick program — takes too much time to do its chores. If you're not careful, it can become a drag on productivity.

If you tend to be lax about saving and/or backing up, Shadow could well save your bacon.

Natural Intelligence, 96 Richdale Ave., Cambridge, MA 02140; (800) 899-4841 or (617) 268-7558. Version 1.23. $49.95.

MicroNet MS62

Sometimes benchmarks aren't the most relevant measure of a piece of hardware. When the February '90 MacUser Labs report "101 Hard Drives" stated that the MS62 was very slow — less than half as fast as any similarly sized unit — I decided to do some checking on my own. True, this isn't the fastest hard-disk drive, but it launches Word, Excel, and Studio/8 about as fast as any hard-disk drive I've ever used. By every measure I checked, the MicroNet is a world-class performer.

Although the lab report explains why the MS62 gets only four mice, you should also take into consideration that it has many features found in more highly rated hard-disk drives. Although it's no bigger than other zero-footprint units, it weighs several pounds more. That extra weight manifests itself in the Rolls-Royce-quality construction. The case can take abuse.

The software (the review covered version 4.0; I have 4.0k) is outstanding. I have long considered LaCie's SilverLining to be the paradigm of hard-disk utility software, but MicroNet Utilities 4.0k is now in second place on my list — and it's even better than SilverLining in some respects.

Another plus for MS62 purchasers is MicroNet's reputation for service and backup. There is no hard-disk-drive company that supports its products any better.

MicroNet Technology, 20 Mason, Irvine, CA 92718; (714) 927-6033. $1,095.
Power Defined.

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Master the power of your software quickly as your own private tutor talks you through the software, step by step. With your hands on the keyboard, trying each new skill as it's explained, you'll learn quickly and thoroughly. Our interactive, hands-on tutorials are available for:

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If you're looking for a fast, convenient, affordable way to unleash the power of your software, call us at 1-800-TEACH-99 or 408-559-8635 and we'll send you a complete catalog — at no charge.
**Sales and Market Forecasting Toolkit**

Tim Berry has carved out a small niche in the business-productivity-software market, offering toolkits consisting of spreadsheet (and sometimes word-processing) templates along with excellent documentation. The Sales and Market Forecasting (SMF) Toolkit consists of 18 worksheets, 8 charts, and 1 macro sheet, all Excel-based. SMF Toolkit also comes with an added attraction, Berry’s Forecaster application program (also available separately), which lets you create a graph visually and then shows you the numbers needed to produce the chart. (If you need more of this kind of functionality, look into Flexigraphs [see Pinstripe Picks, April '90].)

SMF Toolkit is designed to teach you how to do your own forecasts rather than just plugging numbers into templates. The manual is more a textbook than a reference manual and explains each step along the way. Although it is only 114 pages, it manages to give you all the information you need to start using Excel spreadsheets and graphics to produce market forecasts.


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**The Microsoft Office**

The Microsoft Office CD-ROM disc is an incredible bargain. It consists of Word, Excel, PowerPoint, and Mail with on-line documentation, animation, graphics, sound, and dozens of extras at a special price. Microsoft—which has a big investment in CD-ROM technology—has an ulterior motive: to provide enough incentive to get you to hop onto the CD-ROM bandwagon. And the deal Microsoft is offering just might be big enough to make it finally worth investing in a CD-ROM drive.

The Microsoft Office CD-ROM disc comprises a startup stack that lets you install the applications, as well as some support files, on your hard disk. Then you use The Microsoft Office HyperCard stack to access everything remaining on the CD-ROM disc as well as the applications you've just installed on your hard disk. Fifteen megabytes of fully animated tours created with MacroMind Director are available to get you started. Once you're up to speed, the Microsoft Office stack serves as a menu and navigation system for accessing 25 megabytes of HyperCard documentation stacks and installing the many extras. The documentation takes full advantage of the medium by including recorded sequences that demonstrate various operations and by making nearly every word (except for pronouns and articles) "hot," so all you have to do is select some text and the stack will scan for all occurrences of that topic.

There are more than 40 megabytes of extras that range from a complete set of screen fonts for the Adobe Type Library to the Fish cdew that lets animated fish swim across your desktop. Clip art for use in PowerPoint and Word is included from T/Maker, Multi-Ad Services, Emerald City Software, and Genigraphics. Demonstration versions and sample stacks are included for many products, including Works, the Xyphias Time Table of History, GeoQuery, SmartScrap, DocuComp, What's Best!, AutoMac III, AutoSave, and Financial Calculator.

Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399; (206) 882-8080. $949.

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**FlexForm Business Templates**

FlexForm's templates are intended to free you from having to design your own forms. You can just use these forms, created by the FORMula team of information specialists, as they come, using the supplied SmartForm Assistant program, or you can purchase SmartForm Designer and modify them. (See "In Good Form," January '90 for more information on forms-design software.)

FlexForm Business Templates: General Business. Volume I consists of 46 templates, including forms for inventory, production, selling, delivery, billing, collections, and envelopes. Volume II includes purchasing, receiving, accounting, employee/payroll, disbursing, and envelope forms, and miscellaneous forms such as a fax-transmittal sheet.

These templates are very good, designed to work with high-quality output devices such as the LaserWriter while remaining attractive on ImageWriters.

One caveat: Be sure you're buying the General Business templates, because Antic has another line that is also called FlexForm Business Templates, which is a line of Page-Maker templates.

Antic Software, 544 Second St., San Francisco, CA 94107; (415) 957-0886. $89.95 per volume.
The California Nonprofit Corporation Handbook

Nolo Press has a long history of saving people money, legal fees, and The California Nonprofit Handbook continues the tradition by helping you form a nonprofit corporation. The book includes an overview of nonprofit corporations, California corporation law, and the requirements to get a federal 501(c)(3) income-tax exemption, as well as a complete description of all the details you need to know. All the forms necessary for setting up a nonprofit corporation are included as tear-out in the book, as well as in Word, MacWrite, and text format on disk.

Each step is covered in detail, from preparing and submitting federal and California tax-exemption applications, to preparing and filing articles of incorporation and preparing bylaws, to preparing the minutes of the first meeting of directors. Supplemental forms are also included, such as a bill of sale (for transferring assets into your new corporation) and certification provisions for board actions.

If you're thinking of forming a nonprofit corporation in California, you'll find this handbook invaluable.

Nolo Press, 950 Parker St, Berkeley, CA 94710; (415) 448-1876. $39.95.

Retail Engine

Retail Engine is a point-of-sale and inventory-management system for apparel retailers (although any retailer could conceivably adapt to it). The front end of Retail Engine is Point of Sale, which runs on a Mac at the counter (for back-room operations, there is a similar application, Sales Recorder). Point of Sale can handle just about any kind of sales operation, including sales on account, re-sales, back orders, gift certificates, voided transactions, and even multiple sales-tax jurisdictions. With the optional bar-code scanner and cash drawer, Point of Sale becomes a cash register as well. It can produce several reports and print packing lists: duplicate receipts; price tags with bar codes; and reference lists of salespeople, tax types, or payment types.

Retail Engine Manager processes all sales entered through Point of Sale (or Sales Recorder). The Manager handles all inventory-related tasks such as purchasing and receiving and can also produce dozens of reports covering sales, inventory, accounts receivable, and transaction summaries.

Retail Engine is a solid system that comes with good documentation, but it isn't perfect. The interface is unattractive and not always intuitive, and functions such as lookups can't be used in the middle of a transaction. Some of Retail Engine's flaws are due to limitations in Omnis 3, the program with which it was developed; when an Omnis version is available (no projected date) it should make Retail Engine better.

Houberg Development, 4833 Contour Blvd., Suite 4, P.O. Box 161501, San Diego, CA 92116; (619) 287-7444. Version 3.0, $1,595 to $3,145; Retail Engine Accounting, $395; Bar Code Reader, $995; Cash Drawer, $487.

Letter Writer Plus

Letter Writer Plus, formerly ExpressWrite (see Bobker's Dozen, April '90), is a handy DA for creating correspondence on the fly. To go along with its new name, it has been substantially revised and is a better program than its predecessor. The interface has been improved. Its use of icons for most common commands makes it unusually easy to learn. Basic forms such as letterheads can be saved as stationery, and regularly used text can be saved as "paragraphs" and inserted where needed with a click. The program's text handling is good: Multiple styles and fonts are supported, but, unfortunately, tabs are not.

The program's packaging has also been improved. The manual is much better than the previous version, and to get you started, there's a selection of 50 letters from the LetterWorks collection (see Pinstripe Picks, March '90).

Letter Writer Plus now supports graphics for letterheads in a header area, but that's the only area where graphics can be placed—they're sorely missed in the return addresses of envelopes. Still, Letter Writer Plus is an excellent envelope printer. The mail-merge facility, which has always been excellent for light- and medium-duty jobs, is enhanced by the ability to use Address Book Plus files.

PowerUp Software Corp., 2629 Campus Drive, San Jose, CA 95139; (415) 345-5900. Version 1.0, $39.95.
The majority of products we carry are covered by 30-60 day Money Back Guarantees (as listed here in red). If you’re not happy with one of those products, call us for an authorization and return it with all of the original packaging within the guarantee period for a refund check (or credit on your credit card). We reserve the right to limit quantities on such returns.

Version numbers in our ads are current at press time. You will receive the latest version listed here in red. If you’re not happy with a product when ordering, call us for an upgrade. Thanks!

Finally, please note that version numbers are subject to change. If you’re not happy with a product, please return it within the guarantee (free upgrade to 1.1).
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**Solutions, Inc.** 60 day MBG

SmartSnap & The Clipper II—SmartSnap DA creates multiple scrapbooks, stores & searches images by name or thumbnail index. Copy all or part of an image with a marque or lasso. The Clipper crops & scales images to precise sizes. $45.

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Despite your incredible reputation, I was aghast!

Dear MacConnection,

A couple of months ago I had a minor problem with the status lights on my extended keyboard. Despite the fact that I had been using it for nearly 4 months, you took it back for a full refund. I didn’t even have to ship it; you just sent Airborne to pick it up. Despite your incredible reputation, even I was aghast. I have been a Mac user since the 128K machines. Advice and support were very new to mail order then. It’s interesting to note what you have done all by your lonesomes in New Hampshire. All the other mail order dealers have had to follow suit or fall out of business. You have truly “Macintoshed” mail order.

Paul D. Maddock
College Station, TX

MacConnection, 14 Mill Street, Marlow, NH 03456 1-800/334-4444 603/446-7711 FAX 603/446-7791

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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!
Call 800/334-4444.

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1115 LaserWriter II Toner Cartridge ................................ 111.
1114 Avery ................................. 60 day MBG
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5392 Disk Labels—Laser 3½" (Qty. 630) ......................... 29.
4807 Laser Labels 1" x 2½" (Qty. 3000) ......................... 24.
1114 Basic Needs .................. 30 day MBG
5635 Keyboard Flip ................................................... 6.
6682 Hard Cover-ImageWriter II ................................. 16.
* I/O Design .......................... 30 day MBG
1723 ImageWriter II Cover ........................................ 8.
1724 Mac SE Cover .................................................. 10.
1114 CoStar .............................. 30 day MBG
6091 The Organizer ........................ 199.
199 Goldstein & Blair ................ 30 day MBG
199 Targus ................................. 30 day MBG
2379 MacLuggage ImageWear II ................................... 49.
2376 MacLuggage Macinwear Plus ............................... 64.
2381 MacLuggage Macinwear SE ......................... 75.

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4862 SE Protection Pak (ext. keyboard) ......................... 75.
4861 SE Protection Pak (std. keyboard) ......................... 65.
199 Goldstein & Blair ................ 30 day MBG
4863 MacLuggage III Carry Case .............................. 59.
4864 MacLuggage ImageWear II ................................... 49.
4976 PowerBacker 450 ............................................. 339.
4975 PowerBacker 520 ............................................. 399.
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199 Goldstein & Blair ................ 30 day MBG
4863 MacLuggage III Carry Case .............................. 59.
4864 MacLuggage ImageWear II ................................... 49.
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Orange Micro ...30 day MBG
3038 Grappler C/Mac/GS 2.0...$78.
MicroTV brings broadcast video to your Mac, but is it more than just a gimmick?

It's a revolution. It's a gimmick.

It's an inexpensive integration of computing and television. It's an expensive low-resolution, black-and-white TV. It's a powerful multimedia tool. It's a toy.

That pretty much sums up MicroTV, a NuBus card that lets you view broadcast or direct video input on your Mac screen. Most users probably don't need what MicroTV provides, but its real-time video-capture capability makes it useful as a cheap surveillance or storyboarding tool. It's a unique device, but uniqueness isn't enough to earn it an endorsement — at least not yet.

IS THE MEDIUM THE MESSAGE? MicroTV is a full-sized NuBus card that installs in a Mac II-family machine equipped with an 8-bit-color or gray-scale display. Aside from 32-bit QuickDraw, which Aapps provides on a disk, the only other software required is the Aapps MicroTV Sample Application, which is on the same disk. Launching the application brings up a window that looks like a DA: It's not resizable, and it doesn't have a normal title bar. What you see is a small window (128 x 108 pixels — about 1.5 x 1.25 inches) for the video image, as well as a channel selector, volume control, and on/off switch. The menus let you add channels directly to a menu, choose the video source (Direct Input or Standard Tuner) and resolution (Faster TV or Better TV), and select whether or not to view all the video controls.

With the sample application, you can do on-the-fly frame captures by pressing Command-C. The captured image is written to the Clipboard as a gray-scale PICT document, creating an image that's only as big as what you see on-screen.

Like most TVs, MicroTV has a tuner that's more sensitive to certain stations than others, so where your Mac is located and whether or not you have an external antenna have an impact on the image contrast, brightness, and sharpness.

To help improve the resolution problem, Aapps has introduced Aapps Video Professional, a version of MicroTV with a daughterboard that raises the image quality to standard VHS. (An upgrade kit with just the daughterboard is also available.) The image is noticeably clearer, and the sample beta software doubled the image size to a more comfortable 3 x 2.5 inches (but it's still not resizable). The larger screen size slows the frame rate down to around 25 frames per second, even in the Faster video mode, which throws the sound completely out of sync.

MicroTV doesn't use the Mac's built-in audio capabilities. The sound is pumped through a tiny speaker mounted on the board, so the speaker doesn't face directly out of the Mac box. As a result, the sound is muffled, and in order to hear it, you have to turn up the volume, which overdrives the speaker.

THE BOTTOM LINE There are still some major questions surrounding this product. The board I received was one of the first units shipped, and it had several visible wires — including a three-inch length on the back that actually had some slack in it. Presumably these will be eliminated in the final production run. The bigger questions concern image resolution and Aapps' approach to the product. Aapps calls its shipping application a "sample," because the company intends to concentrate on hardware, relying on third-party developers for its software.

This route might work for a company such as Apple, but it seems dubious in this kind of situation. For example, it's hard to image that Farallon's MacRecorder would have attained its success if that company hadn't provided software support and development.

MicroTV isn't for everyone. If you need frame capture, you'd be better off selecting one of the markedly better products, such as frame grabbers from Scion, Data Translation, and Advent. Or, if you need live-video pass-through, there are better products available, such as the Mass Micro system. If you do need both capabilities and you're on a budget, MicroTV may be a viable solution. And if you're the type of Mac user who has to have every imaginable accessory, you'll probably want to add MicroTV to your collection. But if all you really want to do is watch TV on your Mac, put a Sony Watchman on top of your monitor.

— Russell Ito

Get Info

MicroTV

Manufactured by: Aapps, 756 N. Pastonia Ave., Sunnyvale, CA 94086; (408) 735-8550.
Version: 1.03 (Sample Application).
List Price: $395; Aapps Video Professional, $595.
TypeAlign

With the first ATM utility, Emerald City pushes the limits of typography—again.

With all the hoopla over Adobe Type Manager, it’s no surprise that an ATM enhancer, or add-on, has already made the scene. TypeAlign is an elegant and engaging new type utility from Emerald City Software, the wizards who produced SmartArt.

PATH TYPE TypeAlign consists of an INIT and a DA that accesses the INIT’s magic. The magic in this case is the ability to place text along circular, angled, or arbitrary paths. Since the utility operates as a DA, you can create this kind of text at any time. Alternatively, you can save TypeAlign text as EPSF, PICT, or Illustrator 88 files and import them later as graphics. In the past, placing text along paths could be a frustratingly involved process (as in Illustrator 88) or involved working in a stand-alone program (FreeHand) or with buggy, noncommercial software (such as the shareware program Text Bender). TypeAlign does away with all that nonsense and makes the whole process easy.

Installation is simple. Drag the TypeAlign INIT into your System Folder (which must also contain ATM), and install the DA. Restart your Mac, and start to play.

When you choose TypeAlign from the Apple menu, the main TypeAlign window appears. If you choose the snapshot tool from the tool palette, the TypeAlign window turns transparent (à la The Clipper), allowing you to position the window over a document from another application. Click on the snapshot tool again, and a grayed copy of the area covered by the TypeAlign window remains. You can use this as a guide if you’re creating a graphic to fit into a specific space.

You then draw a path with one of the DA’s three line tools: straight line, arc, or freehand. You can select the font, style, point size, and a limited number of special effects from the TypeAlign menu. When you begin typing, the characters line up along the path you’ve defined. The text remains fully editable: You can kern letter pairs and align text left, right, centered, or justified.

Point sizes are limited to 9 to 144 points; type styles include plain, bold, italic, underline, outline, shadow, condensed, and extended. TypeAlign also includes four special effects: accent, which adds a thin outline to your text, and 25%, 50%, and 75% gray fill. Emerald City Software plans to add more special effects.

(The company’s programmers might want to keep ImageWriter owners in mind for some of the new effects they devise. The accent effect is simply too subtle to be of any use on a low-resolution device such as the ImageWriter or even on the HP LaserJet.)

Once a text string is placed along a path, you can further distort the shape by dragging control points that appear when you select the text with the pointer tool. You can place the graphic into other programs via the Clipboard or by exporting the graphic as an EPSF, PICT, or Illustrator 88 file.

DRAWBACKS TypeAlign’s use of the Clipboard is somewhat disappointing. You can create two or more text strings in the TypeAlign window, but when you choose Copy from the Edit menu, only the most recent or the currently selected string is copied to the Clipboard. This detracts from the program’s usefulness. You should be able to Shift-select more than one text string in the TypeAlign window and copy all of them at once. Also, if you use the magnifying tool or in any way deselect the object on-screen, copying to the Clipboard doesn’t work. A text object must be selected or have the cursor blinking in it. Future releases should correct these problems.

There are some other minor annoyances: TypeAlign graphics pasted into SuperCard print out poorly. And TypeAlign 1.0 graphics that are copied and pasted via the Clipboard sometimes print out with portions of the PostScript code showing. (If you experience this, contact Emerald City Software; version 1.0.2 fixes the problem.)

THE BOTTOM LINE MacUser’s editors chose TypeAlign 1.0 as the Best Typographic Product of 1989. Its rough edges (caused, I suspect, by a hasty attempt to push the program to market before Christmas) should be smoothed out by the time you read this.
—Gregory Wasson

Get Info

TypeAlign

Published by: Emerald City Software, 1890 Shoreline Blvd., Mountain View, CA 94043; (415) 324-8080.
Version: 1.0.2.
List Price: $99.95.
## Most Printers are Macintosh Compatible! Is Yours?

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**LabelWriter and Smart Label Printer**

At last, two elegant printers address a sticky problem.

Even in the most technologically advanced offices, there's still one task that's almost invariably done manually: addressing envelopes. But that's not necessary anymore, thanks to a tiny thermal label printer built by Seiko Instruments and distributed by both that company and CoStar.

**STICK WITH SUPPORT** Unlike Seiko Instruments, CoStar is aggressively supporting its version, called the LabelWriter, which is the one I'll discuss. The LabelWriter is about the size of a tape dispenser and weighs just over a pound. An LED on the front indicates power and error conditions. On the back is an on/off switch, a label-advance button, an AC power socket, and a serial interface. To install it, you connect it to one of the Mac's RS-232 c serial ports, plug it in the power transformer, and add a DA.

Whenever you print a label, simply copy the address to the clipboard, select the LabelWriter DA, and click on the Print button. In roughly 25 seconds, the LabelWriter churns out a 3.5-x-1.125-inch, self-adhesive label with the recipient's name and address. (The print mechanism was designed to be wide enough to accommodate larger labels should they ever be introduced.)

The LabelWriter DA lets you set font, size, style, and justification, but any attributes you set apply to the entire label. Depending on the format, you can squeeze up to 9 lines or 213 characters onto each label. Presently you can print only text, although you can fool the DA by converting graphics into a font, using a utility such as The Art Importer.

The memory feature lets you easily store commonly used labels for quick retrieval. And you can set options such as darkness, number of copies, and which serial port to use. Finally, with the supplied Code 39 font, you can generate bar codes of up to 13 characters.

The LabelWriter uses a thermal-direct print head that writes on heat-sensitive labels at a resolution of 72 x 105 dpi. It's extremely quiet, and there are no ribbons, toner, or cartridges to replace. It comes with one roll of labels, and CoStar sells additional rolls for about 5 cents per label.

At that price, the LabelWriter isn't well suited to mass mailings, but its DA can automatically generate a strip of labels from existing mail lists.

**THE BOTTOM LINE** The LabelWriter is a boon for anyone who needs one-at-a-time labels. With a street price of around $200, it's a little expensive, but it sure beats manually feeding envelopes into a recall-trant printer or digging out the typewriter every time you need a label.

As much as I like the LabelWriter, it breaks some Macintosh guidelines: You can't specify the format of individual characters, and there is no provision for integrating graphics and text. These two complaints may be addressed shortly with the introduction of a printer driver that makes the LabelWriter Chooser-selectable. CoStar also promises a Control Panel document called AutoLabel that will automatically find addresses on the first page of a word-processing document and print them on the LabelWriter whenever you send a letter to the main printer.

— Owen W. Linzmayer

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**Get Info**

**LabelWriter**

Manufactured by: CoStar Corp.,
22 Bridge St., Greenwich, CT
06830; (800) 426-7827 or
(203) 661-9700.

List Price: $249.95.

**Smart Label Printer**

Manufactured by: Seiko
Instruments USA, PC Products
Division, 1144 Ringwood Court,
San Jose, CA 95131;
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**Fast Cache IIci**

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**Cache-Card Enhancement**

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Times shown are as a percentage of Mac II time. Larger values are better.

Don’t have enough cache? Third-party vendors are beginning to offer add-on cache hardware for people who don’t have enough RAM to give up to the Control Panel’s cache setting. I looked at a couple of these new cache boards for the Mac II and the Iici and found them to be a viable alternative for users who need better performance.

A RAM cache holds an application’s required data in electronic memory until the CPU is ready to use it. Since accessing computer memory is faster than accessing a hard disk, a cache accelerates the CPU, getting information to it as fast as the CPU can use it. The resulting speed improvement is only a fraction of the boost you get with an accelerator, but it comes at a fraction of the cost.

**Fast Cache IIci**

DayStar’s Fast Cache IIci is designed specifically for the Mac Iici’s processor direct slot. It caches information in 64K of static RAM rated at 25 nanoseconds, which is more than three times faster than the Iici’s own RAM. In actual performance, the Fast Cache increased the speed of the Iici between 5 and 40 percent, depending on the application, with an average speed increase of 23 percent. Recalculation of an Excel spreadsheet showed the most dramatic improvement — 39 percent — and the drawing speed of a complex MacDraw diagram increased by 31 percent. As fast as this may be, however, a cache card still doesn’t bring a Iici up to the speed of the new IIx (see “The Mac IIx: Fast Times at Apple Computer” in this issue).

**MaraThon Racer**

The Dove MaraThon Racer card for the Macintosh II doesn’t produce as much acceleration as the Fast Cache IIci, which is too bad, since the Mac II needs acceleration more than the Iici does. Like the Fast Cache, the MaraThon Racer uses high-speed static RAM, but only half as much, boosting Mac II performance by 15 percent overall. Recalculation of the Excel spreadsheet improved by 21 percent. As shown in the chart, neither cache card did much to improve a 4th Dimension database sort.

One of the reasons that DayStar’s cache card does more for the Iici than Dove’s does for the Mac II is that the Iici was specifically designed with a cache card in mind. Also, since a Mac II wasn’t specifically designed to accept a cache card, installing the Dove MaraThon Racer is a little tricky: You must remove your 68020 CPU, install it on the MaraThon Racer, and plug the cache board into the 68020 chip holder on the Mac’s motherboard. Extra care should be used — especially when removing the CPU — to keep any of the 68020’s 114 pins from bending.

**THE BOTTOM LINE**

Even with these complications, I can still recommend the Dove MaraThon Racer as a good shot in the arm for the Mac II. Why? It retails for only $259. At this price, there’s no reason why every Mac II shouldn’t have one.

Mac Iici users have to put out more cash: The Fast Cache IIci retails for slightly less than $1,000. It’s probably worth it for users doing high-end applications, such as 3-D CAD or 24-bit-color processing, but it’s not for casual users.

— John Rizzo

---

**Fast Cache IIci**

Manufactured by: DayStar Digital, 5556 Atlanta Highway, Flowery Branch, GA 30542; (800) 962-2077 or (404) 967-2077. List Price: $995.

**MaraThon Racer**

Manufactured by: Dove Computer, 1200 N. 23rd St., Wilmington, NC 28405; (800) 622-7627 or (919) 763-9718. List Price: $259.
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Finale 2.0, MusicProse, and Encore

Coda's newest Finale is better, but Passport Designs deserves the Encore.

The search for the perfect music-notation program is something akin to the quest for the Holy Grail, but that impossible dream is now closer to reality with the introduction of three new products: Coda Music Software's Finale 2.0 and MusicProse, and Passport Design's Encore. All three give professional music copyists, arrangers, and composers the tools they need to do their work.

Finale 2.0 is the latest version of Coda's landmark music-notation/sequencing program. Finale 1.0 was a major achievement but was overshadowed by its faults: It was too expensive, and slow, had a clumsy interface, and offered too many choices (see "Measure for Measure," August '89). Thankfully, all of these problems (and more) have been remedied. Finale 2.0 is one tight, mean monster of a program.

Following the informative manual's suggestions (and yes, there are still four manuals), I set my RAM cache to 2 megabytes. Coda suggests using a RAM disk for maximum speed. (Incidentally, anyone seriously interested in creating music professionally on a Mac had better get as much speed and memory as the wallet will allow. I've learned this the hard way, and Coda warns Mac Plus users about this as well.)

The cache idea worked, and Finale now loads and redraws at blazing speed: 3 seconds for initial loading and 1 second or less for redraws on the 8-megabyte disk I used for testing. There is still a bewildering array of tools and choices to deal with, but the manual constantly exhorts the new user to "stay with it." And you should: It's worth it.

Finale is still the only music program that features both page view and score view and is capable of doing anything to music, from producing haphazard diagrams to adjusting the size and shape of the note heads themselves. Finale is especially adept with lyrics. Using the Mass Create option, you can type lyrics on your word processor and load them, and Finale automatically flows the words — complete with proper hyphens between notes — exactly where they belong. The program also features a Mass Part Extraction option that takes every line of a score and transfers that line to its own part — fast.

Finale gives you five methods of note entry: file importation (from any sequencing program that supports standard MIDI), real-time synth play, Mac keyboard entry, step-time synth play, and traditional mouse click. "Speedy note entry" on the Mac keyboard is a real-time-saver, and beats the old Graphic Notes Music Publisher at its own game.

On the negative side: The tool icons don't identify their function when you click on them, so it's hard to remember what they represent without looking at the fairly large "Quick Reference" card. Synthesizer owners without a pedal will also find it difficult to enter real-time music, since you have to tap in the beat while you're playing. Printing pages can be a nightmare, because Finale still uses EVPUs (Enigma virtual-page units) instead of inches or points, even though the tool that accesses them is called the "page layout" tool. There is an answer here, however: MusicProse. Finale's sister program.

MusicProse is Coda's simplified version of Finale. Its Page View mode is similar to Finale's, but the tool palette is considerably smaller.

MusicProse is the name of what was to be called Finale Basic because that's what it is: a simpler version of Finale designed specifically for preparing lead sheets, piano-vocal parts, and small-ensemble scores and that uses inches instead of EVPUs. (Thank you, Coda.)

Most of the good parts of Finale are here, along with some new good things, but the endless choices and the higher price tag are missing. MusicProse can import and play back just about anything, and it has a new, streamlined user interface and a much quicker learning curve (Finale still takes a good two months to get comfortable with). It lets users enter notation in the same way Finale does, because at the heart of both programs is the Enigma Music Toolkit.
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Encore boasts an intuitive interface and a wonderful features list, and it's quite intelligent. You can import MIDI directly, and if you select Guess Durations and Beam on Beat from the Notes menu, the music winds up looking like this.

The beautifully written program from Passport Designs combines some of the elements of its sister program, NoteWriter, with MIDI play and record capabilities. Encore features the same abilities as Finale and MusicPro: that is, it lets you enter music five different ways and can import and export to just about anything — but there the similarities end.

Encore's interface is very easy to understand and, therefore, its learning curve is very short. It's easy to figure out how things work with the manual. After only a few hours, I felt confident enough to use Encore for a real job.

Encore is "quasi-rules-based," which means that it figures out some things for you and lets you do the rest. This is good because, as the extremely well-written (and often hilarious manual) points out, "computers aren't very smart." The manual also takes a well-aimed shot at Professional Composer's uncanny ability to turn MIDI data into tons of 64th notes. Encore doesn't make that mistake. When it "guesses" about the durations of what you've either played on a synth or imported as a MIDI file, it's usually right. It can handle up to 64 tracks of MIDI data with four voices per staff, works well on older Mac models, and features a page-oriented display.

With Encore it's easy to make the page look the way you want it to look, since you can manipulate any object on-screen by just clicking on that object and moving it. Encore supports multiple files, and it can deal with large scores, piano parts (there's still no beaming across bar lines, but Passport's programmers are working on that), and just about anything else you can dream up. I miss "auto-beaming" of 8th and 16th notes, but Passport says that's in the works too. (The company may hold a record for the speediest incorporation of user requests.)

The Bottom Line

If you're serious about the music you write or play, one of these programs should be in your future. Finale packs sheer power, a much-improved interface, and better documentation, but it's best suited to professional publishers, universities, and anyone doing large-scale compositional or publishing projects in which absolute control over all the music elements is essential. MusicPro offers an easier-than-Finale feel and should run faster on Mac Pluses and SEs. It's good for users who do smaller projects and retains some degree of Finale's fabled powers and MIDI capabilities. Encore has a wonderful interface and

right.

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Finale opened the same MIDI file with less-than-satisfactory results. The initial look was worse than this; although Encore didn’t need to quantize the file, Finale did. The second attempt at opening the file, shown here, used 16th-note quantization, but the result is still way off the mark and needs a lot of work to get into printable shape.

intuitive features, and if it could beam across bar lines it’d be perfect. Still, it emerges as the all-around choice. Encore can handle the widest variety of projects with ease. And if you want to cover every contingency, Encore and MusicProse together make a formidable duet that should solve most notation problems.

— Ken Gruberman

**Get Info**

**Encore**

Published by: Passport Designs, 625 Miramontes St., Half Moon Bay, CA 94019; (415) 726-0280.

Version: 1.1.6a.

List Price: $595.

**Finale 2.0**

Published by: Coda Music Software, 1401 E. 79th St., Minneapolis, MN 55425-1126; (612) 854-1288.

Version: 2.0.

List Price: $749.

**MusicProse**

Published by: Coda Music Software, 1401 E. 79th St., Minneapolis, MN 55425-1126; (612) 854-1288.

Version: 1.0.

List Price: $249.

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Two packages define a new genre of software: brainstorming tools.

You need a name for your new Mac software package — something catchy, clever, and communicative. You want people to associate the product with Apple, so you check your thesaurus for some words to play with and come up with a few obvious choices, such as fruit, red, and produce. You later decide to spell the product with a lowercase r. Each word is also linked in sometimes surprising and idiosyncratic ways to dozens of other words, for a total of more than 700,000 cross-references. You can add your own words, categories, and cross-reference associations as well.

Several tools help you delve through the database. Orient-Clarity walks you through a series of stock questions about the nature of the problem you’re facing, the subgoals that comprise the steps along the way to a problem-solving skill. It comes with a small bag of trinkets to help get you started.

MindLink is a HyperCard stack that combines structured questions with off-the-wall exercises involving random objects designed to increase the problem-solving skills. It comes with a small bag of trinkets to help get you started.

MindLink focuses on the first part of the brainstorming process, guiding you through a structured “gymnasium” for exercising your intellect, helping you to find answers by prompting you with questions. It’s a bit like the old Eliza program — an ironic bit of early artificial intelligence that imitated a pop psychologist by asking vague questions about your state of mind and spitting back whatever you said as a question: “What’s on your mind?” “I’m depressed.” “So you say you’re depressed?”

MindLink is based on the principle that new ideas can emerge from the juxtaposition of existing ideas. Its database of 60,000 words and phrases is cross-indexed, providing a novel language and brainstorming tool.
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1-800-888-8199.
MindLink offers the same mix of structured Q&A and non sequitur as Eliza did—with comparable mixed results.

Suppose the problem at hand is a trillion-dollar federal deficit. MindLink walks you through a variety of intellec-
tual exercises in which you itemize every aspect of your problem, such as your campaign promise not to raise taxes, competition from overseas, the fluctuating value of the dollar, and so on. Next, it might randomly choose an object—perhaps a watch—and ask you to ponder all of the aspects of "watchness" that pertain to your problem. Subsequently, you might be asked to list the ways in which a watch does not relate to your problem. Often you're asked to consult your own collection of random props—a newspaper, a magazine, or an item from the bag of trinkets that comes with MindLink (such as a cork or a toy airplane).

Sound absurd? That's the point. MindLink forces you to zero in on your problem while simultaneously encouraging creative leaps by abruptly shifting mental gears. According to current thinking about creativity, this sort of juxtaposition of all the aspects of your problem provides to bounce around. Writer's Dreamtools catalog lists several random-word databases designed to help you overcome thinker's block.

None of these programs is as focused as IdeaFisher or MindLink, however. IdeaFisher is especially helpful when the goal of your brainstorming is words (product names, titles, advertising slogans, and so on). MindLink is better suited for tackling large, multifaceted problems whose end result is likely to be a strategy or plan of action. MindLink imposes a reasonable methodology on your brainstorming that can prove helpful. It also provides, to paraphrase George Carlin, a place for your brainstorm stuff. But after a few runs, it can also prove monotonous. Once you've internalized the process, it leaves you wanting. To continue to be useful, it needs something more—a database like IdeaFisher's or more-helpful summary reports. (The stack could also benefit from a more functional, intuitive, and appealing design.)

IdeaFisher's database gives it a decided advantage over MindLink, even though the engine isn't exactly pretty and its mechanics also get repetitive. But of the two programs, IdeaFisher is a real triumph of substance over style.

—Jon Zilber

IdeaFisher is a real triumph of substance over style.

THE BOTTOM LINE There are some other, less expensive options to dealing with the problems these programs try to address. If you just want a good database of phrases to bounce around, Writer's Dreamtools (see Bobkier's Dozen in this issue) has a load of them. And the Heizer Software catalog lists several random-word databases designed to help you overcome thinker's block.

IdeaFisher's database gives it a decided advantage over MindLink, even though the engine isn't exactly pretty and its mechanics also get repetitive. But of the two programs, IdeaFisher is a real triumph of substance over style.

—Jon Zilber

Get Info

IdeaFisher

Published by: Fisher Idea Systems, 18881 Von Karman Ave., Ground Floor, Irvine, CA 92715; (714) 474-8111.

List Price: $495.

MindLink

Published by: MindLink, Inc., Box 247, North Pomfret, VT 05053; (802) 457-2025.

Version: 1.0

List Price: $499.

REVIEWS

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Ishido
A new strategy game offers unlimited fun in an upscale limited edition.

Ishido is a first-class strategy game in the "a minute to learn, a lifetime to master" tradition. One object of the game is to empty the 50 tiles from your "pouch" onto the 100 squares of the playing board. Naturally, there's a catch: Each tile shows a pattern and a shape. You can place a tile on the board only next to another tile of either the same pattern or the same shape. To place a tile in a space adjacent to two tiles, you must match one by pattern and the other by shape. To place a tile in a space surrounded by four tiles, you must match two neighbors by pattern and two by shape. Making these four-way matches is the other object of the game.

If you're familiar with games such as Go and Shanghai, you can probably anticipate the kind of strategic tracking and planning needed to succeed at Ishido. The real surprises, though, are the interesting little touches that are just as much a part of Ishido as its rules and strategies. Let's start with the one that hits you like a ton of tiles: the $495 price. No, I didn't drop the decimal point. This "limited edition" game lists for almost $500. The game's creator, Publishing International, has sold the majority of the 1,000

The limited edition version of Ishido, a new strategy game, has top-drawer packaging to house a top-notch program.

The object of Ishido is to place all your tiles on the game board. Smart plays are rewarded with both bonus points and the opportunity to consult the Oracle that lurks within the game.

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EYESORE Vs. EYE PROTECTION

As today's monitors get bigger and brighter, anti-glare filters become less of an option and more of a necessity.

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As a strategy game, Ishido is flawless; but if you don’t eat caviar for breakfast, a nonlimited edition is in the works.

you various ways to cheat legally (which it lets you do, at the expense of losing the right to be listed in the high-score hall of fame).

Underlying all these options is the true meaning of Ishido: an I Ching-based guide to the meaning of life — your life, specifically. You can enable and disable this fortune-telling aspect of the game, in which high scores are rewarded by insights and answers to your innermost questions.

THE BOTTOM LINE As a top-drawer (albeit a pricey drawer) strategy game, Ishido is flawless. But wonderful as the game is, I’m left with one unanswered question for the Ishido Oracle: When will the unlimited edition, priced for the masses, be available? The idea of a limited run may work as a marketing gimmick, but for those left out, it hardly seems like fair play.

— Jon Zilber
**FREEDOM**  \( \text{'frēd-əm'} \)

1: the ability or capacity to act without undue hindrance or restraint  
2: the quality or state of running or operating smoothly and without impediment

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**Spelling Coach Professional**

The Godzilla of spelling checkers just got bigger and more powerful.

Spelling Coach Professional 3.1 easily retains its title as the giant among spelling checkers. It takes four (count 'em!) 800K floppy disks just to hold all its files. But contained within those files is a collection of features that is unmatched by any other current competitor.

NEW AND IMPROVED The major new features of version 3.1 include a redesigned Control Panel (with improved auto-open options), clearer dialog boxes, greater flexibility in hot-key assignments, and—most significantly—Deneba's Big Thesaurus (formerly a separate utility, it is now integrated into Coach). The thesaurus is the best I have ever seen on a computer and is—all by itself—almost enough reason to get Coach. Coach also includes three separate utilities for adding sets of legal, medical, and (new in this version) technical words to the main dictionary.

Coach remains a combined DA and cdev. It either checks words interactively (as you type) or batch-checks an entire document. The new version also offers full compatibility with almost all current word processors, including Word 4.0 and MacWrite II, and can even be used interactively with PageMaker.

In addition to its expanded thesaurus, Coach retains its "concise definitions" files, giving it almost all the features of a printed dictionary. (If you need to save disk space, the thesaurus and definitions files are optional.) And of course, there is the Merriam-Webster dictionary—which the program uses to flag grammatical mistakes (misplaced capitals, double
Spelling Coach Professional is the biggest spelling checker you can buy. This is Coach's Analysis window, which is used during batch checks. Each of the nine icons along the left side of the window is an active button (but good luck trying to guess their functions).

words, and the like) as well as spelling errors.

The interactive checking mode is convenient to use and generally very fast. A minor complaint is that the pop-up menu does not provide an option that lets you type in corrections. In batch-check mode, an Analysis window is available that lists all the suspected misspelled words. From here, you can (among other things) quickly indicate all the words you want Coach to ignore. Ignored words are remembered for the duration of a session, so that subsequent checks do not flag them again.

On the negative side, Coach conducts its batch check via the search-and-replace functions of the active application rather than its own. This can be awkward and occasionally leads to unintended abortion of checks.

NEW AND WORSE My major complaint about Coach is that, for what it should be a simple utility, it's not designed to be easy to learn. Coach depends heavily upon hot-key commands for many actions, yet it provides no easily accessible listing of what functions are performed by certain commands. Unless you read the manual carefully, you may not even be aware that some functions exist. Similarly, Coach's displays (particularly the Analysis window) use buttons labeled only by an (often cryptic) icon. It would have been far preferable to have the name of the button pop up when you clicked on it. As it is, too much memorization is required before you are comfortable using Coach.

In comparing Coach with Thunder II — the other leading interactive spelling
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 REVIEWS

checker—Coach’s biggest missing feature is a glossary function. Thunder II also scores points with its much smaller size and overall more intuitive interface. But Coach contains the thesaurus, concise definitions, and specialized dictionaries.

Coach was significantly slower in a one-page batch check than either Thunder II or the spelling checker included with MacWrite II. However, Coach slowed down the most when searching for words that were spelled correctly but not in its dictionary. I could have saved considerable time by pressing the Option key to halt these searches, but I didn’t because I couldn’t do that with the other programs. On the plus side, Coach does the best job of correctly identifying all the errors, but it doesn’t tend to find the correct alternative to words with misspellings near the beginning of the word (it never suggested checker as an alternative to check for example).

Many users will remain content with their word-processing program’s built-in spelling checker. But if you are among those looking for something better, and especially if having on-line access to definitions and a superior thesaurus appeals to you, then consider getting Coach. It’s the closest thing to a complete dictionary currently available for the Mac.

— Ted Landau

Get Info

Spelling Coach Professional

Published by: Doneba Software, 3305 N.W. 74th Ave., Miami, FL 33122; (800) 622-6827. Version: 3.1.
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The New York Times

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HyperBASIC has a long way to go before becoming the XCMD compiler of choice.

HyperCard has a powerful feature called language extensibility. The developers of HyperCard realized that they could not anticipate all the commands a HyperTalk programmer would ever want to use, so they created a broad general set of commands and built in the ability to extend HyperTalk with external commands (XCMDs) and external functions (XFCNs).

XCMDs and XFCNs have traditionally been built with Mac development languages such as C or Pascal. Unfortunately, many serious HyperTalk programmers balk at the burden of learning a new complex programming language and development environment just to be able to create their own XCMDs. HyperBASIC is aimed at the programmers who want the gain without the pain.

HyperBASIC is a stand-alone XCMD compiler application. You write XCMDs in the BASIC language instead of in C or Pascal. Teknosys picked BASIC because it felt that most people have had exposure to BASIC in school and that, like HyperTalk, BASIC is a friendly, easily approachable language.

The BASIC compiler for HyperBASIC is typical of modern BASIC languages in that it supports If/Then/Else, While/Wend, and Case statements as well as line labels. It supports different number bases and the following standard mathematical functions: sine, cosine, tangent, exponential, log, and square root. HyperBASIC includes BASIC's powerful string-handling commands as well as ten-dimensional arrays. For programmers who want to take full advantage of the Mac Toolbox, HyperBASIC provides access to 352 Toolbox traps. HyperBASIC also supports interaction with HyperCard through a series of 11 HyperCard callbacks that allow you to get or set the contents of any card or background field, get or set global variables, send HyperCard commands to
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MacWarehouse sale prices, based on capacity, are shown in the chart. Also shown are the savings from pre-holiday prices. (This is a limited time offer, valid through April 30, 1990.) Overnight delivery is just $3, anywhere in the Continental United States.

So call us now and tomorrow morning you'll be up and running with the best hard drive deal in the business!

Mac Warehouse
1-800-255-6227

Call toll-free
Twenty-four hours a day, seven days a week
Inquiries 1-201-367-0440
Fax 1-201-905-9279

MacWarehouse 30-Day Money Back Guarantee

Many of our drives come with the MacWarehouse 30-Day Money Back Guarantee. If, for any reason, you're not completely satisfied, call us within thirty days of receipt for a return authorization number and full refund of the purchase price.

Savings are calculated from MacWarehouse December 1989 published prices. *Quantum drives are for internal installation and require an internal Drive Kit for $59. **PLI is a 50meg turbo drive. ***40meg Removable Cartridge Drives come with 1 cartridge. Additional cartridges available.

<table>
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<th></th>
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<th>30+ MB</th>
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TypeStyler (Broderbund)
Take an ordinary message - then bend it, shape it, anyway you want it! With TypeStyler you'll create dramatic graphics without expensive typesetting. Type it - then Style it using an array of unique paint features. Feed free to import and export PICT, Paint and EPS file formats, export Adobe Illustrator outlines and more. TypeStyler comes with 10 AGFA Compagraphics face types and works with thousands of fonts including Type I from Adobe. Next time say it with style...Say It With TypeStyler! (graphics) $119.

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ICD
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Imageware II Carrying Case ....... 49.
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Macinware Mac II Carrying Case .. 90.
Macinware Mac Plus Carrying Case .. 64.
Macinware SE Carrying Case ....... 75.
Monitorware Apple RGB Case ....... 80.
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PowerBacker 360 UPS Line ...... 260.
PowerBacker 800 UPS Line ....... 749.
PowerBacker 1200 UPS Line ...... 949.
System Saver ......................... 63.

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SE Silencer ............................. 39.
Polaroid
Circular Polarizing Filter ........... 35.
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Deluxe Plus/SE-KBX Case (black)... 69.
ImageWriter II Case (black) ....... 45.
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Iixl/b Case ............................. 75.

Macintosh SE/Plus w/Extended Keyboard Carrying Case (Targus)
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Create scenes with props, depth, shadows, textures and reflections. Adjust three different types of lighting (directional, spotlight, and point source), move camera, and rotate objects to set up the perfect rendering of your concept. Mapping allows any 2D image to be wrapped around an object. Import, manipulate and render data from other 3D formats, and 2D formats (PICT, EPS). StrataVISION 3d takes full advantage of the 32 bit Color QuickDraw. It paints PostScript printers, film recorders, and video recorders. (graphics) $375.

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B.A.S.F. made in U.S.A
DS/DD (box of 10) ................. 14.
DS/HD (1.44 Mb) ..................... 24.

Sony
DS/HD (box of 10) ................. 13.
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Your name is automatically entered into the drawing when you order from MacWarehouse. (Or just mail the entry coupon.)

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SuperCard 1.5 (Silicon Beach)

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Whether you're seeking an entry-level position or an executive's corner office, the ResumExpert Software Series is the next best thing to knowing the boss. Professionally written and fully-formatted Microsoft Word templates let you easily create eye-catching resumes. MacUser 10/89 awarded ResumExpert 4 mice and raved about the "excellent manual" that includes expert writing tips. MacUser 12/89 rated it as one of the Top 200 Software Programs of 1989. See line listings for all 10 editions. (business) $39. each.

Managing Your Money

A fully integrated software program addressing every aspect of personal and small business finance. Write and print checks, set up a personal budget, estimate your taxes and more. (finance) $124.

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Gray-scale scanners show their true colors with Colorset. Allows your gray-scale scanner to scan color images, then edit and save them as 8, 16 or 32-bit PICT and color TIFF files. Now you can scan color images, then edit and save them as 8, 16 or 32-bit PICT and color TIFF files. (graphics) $229.

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utility) $259.

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PhoneNET Repeater ..................... 315.
PhoneNET Star Controller .......... 825.
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<th>Product Name</th>
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<tr>
<td>Practica Musica 2.2</td>
<td>Meet your personal music tutor. With Practica Musica you'll have fun while learning to read and write music. Develop your ear for intervals, chords, melody and rhythm. Called &quot;a sensational learning program&quot; by MacUser. Includes a coordinated textbook and a wide range of activities to stimulate beginners and advanced students. MIDI compatible. (music)</td>
<td>$69.00</td>
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<tr>
<td>Fontographer 3.05</td>
<td>Create quality Postscript characters that are just your type. Fontographer 3.0 creates and edits downloadable PostScript fonts for special purposes (headlines, advertising and logos). Its auto-trace capability facilitates work with scanned characters and images including automatic hinting, Bezier curves, and an integrated bitmap editor for screen fonts. (fonts)</td>
<td>$249.00</td>
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<tr>
<td>Metro ImageBase</td>
<td>(Full Line Available) Art Deco ReportMaker, Newsletter Maker or Business, ProArt Bus., Sports or Holidays, ea. $16.00</td>
<td>$59.00</td>
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<td>Paracomp</td>
<td>Multifunctional software for media and entertainment.</td>
<td>$139.00</td>
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<td>StrataVISION</td>
<td>Strategic Mapping, Inc. (Select Micro) by Mac Maker 4.0, Color 1.5, Color 2.0, PixelPaint 2.0, PixelPaint Professional.</td>
<td>$399.00</td>
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<tr>
<td>Fontographer 3.05</td>
<td>Create quality Postscript characters that are just your type. Fontographer 3.0 creates and edits downloadable PostScript fonts for special purposes (headlines, advertising and logos). Its auto-trace capability facilitates work with scanned characters and images including automatic hinting, Bezier curves, and an integrated bitmap editor for screen fonts. (fonts)</td>
<td>$249.00</td>
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<tr>
<td>HyperDialer (DataDesk International)</td>
<td>You can connect your Macintosh to your existing business or home telephone for automatic dialing with Apple's HyperCard. DataDesk's HyperDialer is designed specifically for HyperCard's touch-tone dialing capabilities and works with line business phones without requiring a modem or dedicated phone line for automatic dialing.</td>
<td>$29.95</td>
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<tr>
<td>HyperImageBase</td>
<td>(Full Line Available) Art Deco ReportMaker, Newsletter Maker or Business, ProArt Bus., Sports or Holidays, ea. $16.00</td>
<td>$59.00</td>
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<td>Bright Star Technology</td>
<td>HyperAnalyzer 1.5.1.</td>
<td>$98.00</td>
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<td>Softstream International</td>
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<td>HyperHTML</td>
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<td>$28.00</td>
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<td>HyperSymmetry</td>
<td>Symmetry</td>
<td>$49.00</td>
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<td>SmartOne 2400 Modem</td>
<td>Modem (Best Data Products)</td>
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<td>SmartOne 2400 Modem</td>
<td>For beginners and experienced modern users. If you need a 2400 baud modem, the Smart One 2400 Modem provides an economical alternative. For less than the cost of some 1200 bps units, you get a Hayes compatible modem with auto answer/originate, 300, 1200 and 2400 baud operation, pass-through phone jack, speaker with programmable volume, and a manufacturer's two-year warranty. All user options are stored in non-volatile memory. Includes software and cable. (modems)</td>
<td>$145.00</td>
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<td>HAREWARE &amp; PERIPHERALS</td>
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<td>Cutting Edge</td>
<td>Two Page 19 Monochrome Monitor99</td>
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<td>General Computing Company</td>
<td>WriteMove Ink Jet Printer</td>
<td>$57.00</td>
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<td>Magnavox</td>
<td>Color Monitor 14&quot;</td>
<td>$53.00</td>
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<td>Microtek</td>
<td>Mictek MF-300CS Scanner.</td>
<td>$159.00</td>
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<td>Mobius</td>
<td>Multiscreen Video Card w/</td>
<td>$59.00</td>
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<td>Qume</td>
<td>Crystal Print Publisher</td>
<td>$299.00</td>
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<tr>
<td>Sekoeka America</td>
<td>Sekoeka Printer (dot-matrix)</td>
<td>$235.00</td>
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<td>ThunderWare</td>
<td>LightningScan</td>
<td>$369.00</td>
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<td>ThunderScan 5.0</td>
<td>HyperDialer</td>
<td>$187.00</td>
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<td>HYPERWARE</td>
<td>BanTam</td>
<td>$22.00</td>
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<td>Virex</td>
<td>(IBM/Microcom)</td>
<td>$39.00</td>
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<td>Cable @ Weekends</td>
<td>HyperCard</td>
<td>$19.95</td>
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<td>HyperCard</td>
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</tbody>
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FileGuard Extended Edition
(ASS Software) We chose FileGuard as the top Security Product. MacWorld (10/24/89 Product Watch). Protect your hard drives from unauthorized access (including security bypass with a system diskette), copying and erasure. Protect applications and files (including system folder) from alterations by unauthorized users. (security) Single Pack $125, Office Pack $309, Office Pack 10 $599.

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Supra Modem 2400 ............. 129.
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Altech 
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MinnCad - 2.0 (Graphsoft) This year MinnCad - is the people's choice, winning both the U.S. and Australian Macworld World Class Awards for CAD. For the price of most 2D CAD packages, MinnCad provides 2D, 3D, a hatched specsheet and a programming language. The quality is unsurpassed. (cad/cae) $519

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1. Entries must be received on or before 11/30/90. Winner selected in random drawing by attorneys for MacWAREHOUSE Inc. (MWH), whose decisions are final. 3. In case of tie, a grand prize winner will be selected at random from among all entries. 4. Winner will be notified by mail. 5. Odds of winning depend on the number of entries. 6. MWH will announce the winner on or around 12/20/90. Winner notified by mail. Prizes: A signed copy of Steve Jobs' Bestseller "The Ultimate Computer Answer Book". A 31-day subscription to CompuServe. A $100 gift certificate tosoftcom (spelling checkers) $53.

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Unlock the awesome power in your Mac with a Power User's Memory Upgrade. By replacing the existing 256K chips with powerful 1M memory modules you can increase your Mac's power to SE 5.2MB or SE with the new Cutting Edge 102 Page Monochrome Display System. The Cutting Edge Monochrome Monitor includes the interface card and matches just about all the features of other big-screen display systems costing twice as much. It has a 1024 x 768 resolution of 70Hz here and a high resolution of 72 DPI. Like all Cutting Edge products it comes with a one year warranty and a 30 day money back guarantee. Please specify your Mac model when ordering (hardware) $995.

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StrataVISION 3d brings mainframe rendering power to the Mac, provided you have the RAM — and the patience.

StrataVISION 3d is a modeling and visualization tool for the Mac II family that can create photorealistic 3-D images that were previously available only with a mainframe. Finished scenes look like snapshots of real-world objects in real-world lighting, but because a Mac isn’t a mainframe, rendering can be excruciatingly slow.

TOOLS OF THE TRADE StrataVISION uses tools similar to those in Super3D, Pro3D, Zing, and Swivel 3D, so its interface soon becomes familiar. You create wire-frame shapes, assign them qualities, and then render any area of your 3-D space. Your final product is a 32-bit snapshot that you can save in either PICT2 or TIFF format.

Your working view is a wire-frame. The sphere, cylinder, cone, cube, and other shapes have dedicated tools. Other 3-D shapes begin with a 2-D outline that you trace with familiar drawing tools and then extrude or spin to define a solid. Built-in-object creation is somewhat limited. You can’t control the precise number of lathed facets, so there’s no way, for example, to produce a simple pyramid in one step. Moreover, you can’t lathe an object less than a full 360 degrees. Also absent is a numerical way to set or display an object’s dimensions — it’s all done by eyeballing. You can, however, import precisely dimensioned 3-D models in DXF format from CAD applications. The program also imports MiniCAD files that have been converted to a “3-D mesh” format.

StrataVISION can also form extruded or lathable outlines by automatically tracing any pasted bit map. Black or dark areas define solid matter, and any enclosed white space becomes a hole. Unfortunately, you can’t reshape objects or outlines by repositioning vertices; editing is limited to resizing an object along any of its axes.

StrataVISION can also trace text. If you have ATM installed, it should let you create smooth text at any size.

You can create reusable elements on the fly by saving any existing object as a named part or by drawing a new object in a separate window. Once you’ve created them, you can access your creations through a hierarchical menu. Picking elements from a menu saves both time and memory when you need many duplicates of the same object in one drawing, because object copies don’t take as much space as their originals. This approach is a powerful tool in that you can alter the attributes of one master part and all its copies in the model will update appropriately.

Objects have six handles that can be used for resizing or rotation. Resizing works as it does in any drawing program. In rotation mode, the corner and side handles spin the object on the x-, y-, or z-axis. There are no alignment tools except for a customizable grid, and there’s no numerical object positioning or orientation. You navigate through a 3-D world by using a logical set of handles for orbiting your viewpoint along the three axes and by employing tools for altering the degree of perspective, distance, and magnification — all by eye.

With StrataVISION you achieve real-world appearance by applying qualities, such as natural color and texture, to the otherwise plain-colored 3-D solids in your space, mostly by wrapping bit maps around solid objects. One bit map can be used for color-texturing the surface, another for adding bumpiness, and another for applying variable transparency. There are several other types of bit-mapped effects for even more realism. These bit-map-applied qualities combine with a host of base qualities you set for an object — transparency, index of refraction, reflectivity, and so on. Once you’ve created a group of qualities, you can save it as a named attribute, which becomes available from a menu.

Any number and mixture of global, spot, and point-source lights can illuminate an object. The spot and point-source lights work like lamps: You place and point them as you see fit. Global lights point inward from infinity toward the center of the world. You position them by dragging them to anywhere in the universe.

SLOW: RENDERING AT WORK Rendering a snapshot is a complex imaging process that can take considerable time and/or disk space. Your available RAM can limit the size and number of bit maps you
Designing the Future...
MicroStation

From the world’s leading supplier of computer-aided design solutions comes MicroStation, the first production CAD package for the Apple Macintosh. MicroStation is a powerful 2D/3D CAD system incorporating a full implementation of the Macintosh user interface to give you the standard look and feel of Macintosh software. Easy to learn and easy to use. MicroStation lets you share common data simultaneously within a network of PCs, Macintoshes, and UNIX workstations. MicroStation offers a wide range of third-party applications and a sophisticated platform for developing your own applications.

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For a free MicroStation Mac demo or further information on MicroStation and related products: in the U.S., call 800-345-4856; in Alabama only, call 800-345-0218; in Canada, call 416-625-2081; in other countries outside the U.S., contact an Intergraph sales office.

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can use (2 megabytes are required; 5 are recommended). The basic rendering modes are line drawing, gray scale, and full color. Options include surface smoothing (defracturing), smooth edges (anti-aliasing), shadows, transparency, reflectivity (ray-tracing), refraction, and surface mapping. Rendering options can be saved, and reused, as named sets. Objects' attributes are rendered only if you switch on the related options, so you can speed things up by being selective. The larger your snapshot, the longer it takes, but the final product can be spectacular.

StrataVISION's 2.0 release—slated for the second quarter of 1990—will provide a projected 400% improvement in rendering speed. Version 2.0 will also sport numerical precision with numerical feedback, rulers, a snap-to grid, plus metric and English measurement units. A key-frame-animation utility called StrataFlight will enable you to save key frames arranged on a time line and will automatically render and optionally assemble them into a PICS document. New shaping powers will include the Bezier curve and fully editable vertices in both 2-D and 3-D. Lathing will be possible to any degree, and you will be able to specify the number of facets. Version 2.0 will also import PICT objects for extrusion and lathing.

THE BOTTOM LINE StrataVISION 3d is inexpensive and capable enough to justify the cost of a Mac II accelerator—or a IicI—which can drastically cut rendering time. This version needs a healthy dose of precision options. To make full use of it, you'll need a color painting program and possibly a scanner so you can provide those all-important bit maps. StrataVISION gives you mainframe rendering power on a budget, although its current performance limitations may make it less of a bargain than it first appears.

—Salvatore Parascandolo

Advanced Security, DiskLock, FileGuard

If you're security conscious, you now have three more weapons.

As the Mac has insinuated itself into corporate settings, security products have proliferated at a breakneck speed. Three recent arrivals include major upgrades to already existing programs (Advanced Security and FileGuard) as well as a brand-new piece of software called DiskLock, from Fifth Generation.


DiskLock provides security as a DA by allowing you to limit access to or lock hard disks. It can also encrypt files. The software runs a virus self-check each time it's used, which offers some protection against infection.

FileGuard offers the most impressive array of security features among this batch of products. It provides varying access levels, both to software and hardware, automatic encryption and decryption, application copy protection, and administrator functions. Best of all, FileGuard works almost entirely in the background. All three products boast transparency—a hot concept in desktop security—but only FileGuard really delivers on that promise in its implementation.

Advanced Security

Advanced Security 1.2 is composed of three applications: File Security performs encryption using DES (a government standard), Aclcrypt (a proprietary method), or a simple password to limit file access. You can make files invisible and locked, use session passwords, or batch-process files. The program can automatically sign out of a session and encrypt open files. You open encrypted files by double-clicking and entering a password. File Security also sports a Master Password feature that can extract passwords from files and an event log that keeps track of file access. The program's most admirable feature is its ability to create "encryptograms." These encrypted files can decrypt themselves.
because it doesn't check anything else and some viruses specifically target items such as the Desktop file, which Virus Security wouldn't detect.

**DiskLock**

DiskLock 1.0.1 comprises two programs: an INIT and a program called FolderLock. You access DiskLock's features through a DA.

DiskLock provides automatic hard-disk locking at shutdown and requires users sign in when the drive is first booted. You can set the drive to be locked when idle, and the program compiles a log that tracks disk activity. A utility called Emergency Unlock is always ready, just in case the DiskLock password dialog box doesn't appear when you first boot the drive.

You use FolderLock (also accessed through the DA) to encrypt files, singly or in batches. You can set the program to automatically reencrypt any open protected files on shutdown, and there is provision for a fail-safe master password.

The program uses a proprietary form of encryption. DES is not supported.

**FileGuard**

FileGuard 2.0.2 differs from the first two programs in that it is a cdev that operates to a large extent in the background. It adds a special menu called Protection to the menu bar in every application.

FileGuard provides an added dimension to file and disk access by allowing you to define varying levels of access in a user list. A guest, for example, might be forbidden to insert floppies. Another user might be authorized to encrypt and decrypt personal files—or even delete files—but could do so only to documents on floppy disks. The key is that every user must log in with an assigned name and password when first using the computer. This approach requires some preparation and an administrator responsible for maintaining the user list and assigning passwords.

In terms of encryption, FileGuard automatically asks if you want to encrypt a file when you first save it from within the creating program. There is no need to start up an encryption program and then process files (except for files created before you installed FileGuard). Files can also be locked or made invisible. FileGuard does not support DES. You open encrypted files by double-clicking and entering a password. The program maintains a detailed user log for each file.

In addition to file and drive protection, FileGuard boasts a unique feature: It can protect applications. Protected applications can be made to run only on your hard disk, which prevents people from stealing software. You can also create software demos that will function for a specified period of time or for a fixed number of launches. FileGuard also provides support for magnetic-card readers.

**Advanced Security**

*Published by:* Advanced Gravis Computer Technology, Suite D12, 1602 Carolina St., Bellingham, WA 98226; (800) 937-0062 or (604) 434-7274.

*Version:* 1.2.

*List Price:* Single-user version, $149.95; multiuser versions available.

**FolderLock**

*Published by:* Fifth Generation Systems, 11200 Industriplex Blvd., Baton Rouge, LA 70809; (504) 291-7221.

*Version:* 1.0.1.

*List Price:* $189.

**FileGuard**

*Published by:* ASD Software, 4650 Arrow Highway G-21, Montclair, CA 91763; (714) 271-9913.

*Version:* 2.0.2.

*List Price:* $249.

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**Ashlar Vellum**

By introducing elements of artificial intelligence, Ashlar has launched a new era in CAD.

Originally vellum was parchment made from the skin of unborn lambs. Today, vellum is translucent smooth-surfaced paper used for engineering drawings. Soon Vellum will also mean "design and drafting software that thinks." With so many look-alike Mac CAD programs available, any product entering that market needs something unique.

Vellum has Drafting Assistant, a geometric inference engine that applies artificial-intelligence concepts to the electronic drawing board.

Ashlar claims that conventional CAD programs often don't save much time compared with a pen and T square. In fact, a skilled drafter can frequently create a drawing faster by hand than on a computer. And the evolution of CAD systems constantly adds more features and functions, to the detriment of easy learning and efficient use.

Vellum, in contrast, opens to an uncluttered screen. Its power is hidden behind a lean, mean user interface. The drawing palette has only 12 basic tools, and the menu bar adds only six pull-down menus to the standard Apple, File, and Edit menus. Most tools have several pull-out options; the line tool, for example, switches among single-, connected-, and parallel-line modes.

**HIGH-IQ CAD**

Drafting Assistant provides continuous feedback about the precise location of the cursor as it moves around the screen or snaps from one geometric feature to another. This would be almost unworkable if the cursor were just a single pixel, but the active radius is 12 pixels. You can set a different size or turn off the Drafting Assistant entirely by setting a zero radius.

When you move the cursor near a line,
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The result? Upgradeability to MNP-5 with 4800 baud throughput speeds and guaranteed error-free data transfer. A send-fax option for effortless hard copy communications directly from your Mac screen. The ability to accept receive-fax chips when they become available in the future.

And standard features like complete communications software, extended Hayes command set, asynchronous data format, auto answer, adaptive equalization, non-volatile memory, automatic tone and pulse dialing, remote access, self-testing, built-in diagnostics and more.

DataLink/Mac™ (left), the ultimate internal modem for all Mac II's, includes a "Mac standard" serial port allowing for the addition of extra peripherals even when the built-in ports are occupied. Upgradeable to MNP-5 and send-fax.

DataLink Express™ (center), is a smart choice for compact Macs and for Mac II owners who prefer an external. Its exclusive Line Engaged indicator warns if the modem line is already in use. And since DataLink Express is compatible with any computer (w/serial port), we included both mini-8 and DB-25 ports standard. Options include MNP-5 and send fax.

DataLink/Mac Portable™ (right) was designed for low power operation in the new Mac Portable to extend the life of the computer's battery. MNP-5 and send-fax are standard.

Every DataLink modem has been independently tested and certified as meeting or exceeding every FCC guideline and all are proudly made in the USA by Applied Engineering. Free, friendly tech support is just a phone call away.

Order today! To order or for more information on DataLink Modems, see your dealer or call Applied Engineering.

DataLink/Mac ........................................ $349
DataLink/Mac with MNP-5 ................ $399
DataLink Express ................................. $249
DataLink Express with MNP-5 ........ $299
DataLink/Mac Portable .................... $299
MNP-5 Option* ............................. $79
Send-fax Option ............................. $79

*When not originally purchased with modem
ADOBE TYPE MANAGER has had its first upgrade, to version 1.2. The improvements include better spacing when printing from programs that don’t support fractional character widths, more easily distinguished bold characters (especially at smaller point sizes), support for Bitstream Type 1 fonts, better performance in large point sizes, and a banner-printing application for use on ImageWriters. Registered ATM owners can get the update free, as well as an added benefit: the option to purchase any one of the 128 Adobe Type Library packages for $39 (plus $7.50 shipping and handling), which is a substantial savings—the highest-priced package normally sells for more than $300. Ordering information for the upgrade and font offer will be sent automatically to registered owners. Adobe Systems, 1565 Charleston Road, P.O. Box 7900, Mountain View, CA 94039-7900; (415) 961-4400. Version 1.2. $99.

DATABASE, the handy flat-file manager in a DA, has been upgraded to version 1.5. A new file format reportedly improves the program’s speed significantly. New features include searching and sorting records by date, support for international date formats, and a phone dialer, and the records by date, support for international date formats, and a phone dialer. The upgrade fee is $15 to registered owners or free if purchased after November 15, 1989. Preferred Publishers, 5100 Poplar Ave., Suite 706, Memphis, TN 38137; (800) 446-6393 or (901) 683-3383. Version 1.5. $129.95.

WRITENOW, version 2.2, now includes the WordMaster 1.4-million-word thesaurus, a 135,000-word dictionary, compatibility with Microsoft Word 4.0, 3.0, and Write; Format Accelerators that make globally or selectively changing font size/style easy with just a special cut and paste; direct entry of font sizes; a Window Clean Up function with stacking and tiling options; and Control Panel date formatting for use with any application. The upgrade is $39 for registered users and free if version 2.0 was bought after February 1, 1990. T/Maker Co., 1390 Villa St., Mountain View, CA 94041; (415) 962-0195. Version 2.2. $195.

Vellum combines CAD with elements of artificial intelligence. The Drafting Assistant tells you when the cursor reaches significant points in your drawing, such as the intersect and align points shown here. The floating palette in the upper right contains the dimensioning tools.

Unlike MacDraw II or Claris CAD, Vellum provides no bit-mapped pattern fills for objects, relying instead on the intelligent application of a few standard cross-hatching patterns. Any enclosed area can be crosshatched, and the cross-hatching is automatically updated if you change dimensions.

Ashlar plans to release Vellum 3-D as an add-on module in the third quarter of 1990. This will allow the creation of 3-D wire-frame (but not solid) models. Vellum’s internal database is already designed to accommodate 3-D objects.

THE BOTTOMLINE Vellum is a revolutionary entry in a market dominated by evolutionary products, Claris CAD, for example, evolved from MacDraw, and IID’s Dreams is derived from MacDraft. High-end Mac CAD programs (AutoCAD, VersaCAD, Mac Bravo) are often based on successful minicomputer or MS-DOS products. Users who are familiar with these programs—or anyone who is

For more information on Ashlar Vellum, please visit the Get Info section.
Even to the experienced observer, a disc drive is a technological marvel. With discs spinning at 60 revolutions per second, the mechanics involved are astounding. It takes a company with a unique level of skill and experience to produce drives in volume that perform reliably year after year. A company like Seagate.

Our 3.5" ST1096 family is a great example of Seagate craftsmanship. Featuring a choice of 42, 60 or 83 formatted megabytes, these high performance (24 msec average access time) drives are ready for demanding PC and Apple® applications. The family offers ST412/MFM and SCSI interfaces for application flexibility. And they all feature a 50,000 hour mean-time-between-failure rate.

Like the artist who spends years perfecting his craft, Seagate has spent the past decade mastering the fine art of disc drives. For more information on our multi-faceted product line, contact your authorized Seagate distributor, or call Seagate directly at 800-468-DISC, or 408-438-6550.

Seagate
On the outside chance that perhaps you haven’t experienced a GCC Technologies™ UltraDrive, let us take you inside.

For it’s there that you’ll find what makes UltraDrive the most reliable hard disk in the Macintosh® industry.

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Everything that goes into UltraDrive has been meticulously designed and exhaustingly tested. The result: only the very finest components are used. Like the best hard drive mechanisms from Quantum, Seagate®, and Hitachi.

UltraDrive is an engineering marvel inside and out. It features an easy-to-use push-button SCSI selector switch, a security loop to protect against theft, double-shielded cables, a universal power supply and a low-noise cooling fan. Plus a custom-designed wire harness, which protects sensitive wires from exposure to the power supply.

When you’ve been making hard disks for the Macintosh longer than anyone else, even longer than Apple®, it’s not surprising your disks are more reliable.

**An Abundance Of Software.**

Every UltraDrive comes with an impressive array of value-added software.

Included are SUM™ II from Symantec,™ UltraWare™, which features GCC’s DriveManager,™ QuickSpool™ II, and QuickEnvelope™. And finally, SelectShare™, over 3 megabytes of the very best public domain software available.

**UltraDrive S**

If you like what you’ve seen so far, let us introduce UltraDrive S. It’s the only hard

---

**IF YOU DON’T OWN AN ULTRADRIVE, YOU SHOULD LOOK INTO IT.**

- Two bright LEDs indicate disk access and power-on, located high on the faceplate to avoid being hidden by the keyboard.
- Protective metal shielding to prevent electronic interference.
- Low speed, low noise cooling fan.
- Zero draft on all surfaces to complement the Macintosh’s aesthetic design.

---

Two sturdy 50-pin SCSI connectors. External terminator for simple configuration, and double shielded Mac-to-SCSI cable to prevent electronic interference (both included).

Ventilation cutouts thermally engineered to keep internal mechanisms cool and maintain optimal airflow.

Rugged security loop helps to prevent theft.

External push-button seven-position SCSI selector switch.

Only the finest, most reliable, hard disk mechanisms. Fully tested, “burned-in” overnight.
disk nominated as MacUser's Best Storage System of 1989. And UltraDrive S includes all of the same high-quality components, detailed engineering features, and sophisticated software that you'll receive with UltraDrive.

But what sets UltraDrive S apart from the competition is its incredibly fast average access times, its use of on-board disk caching, and a 1:1 interleave on all Macintosh CPUs. Which means that your hard disk will always operate at maximum speed.

So, any way you look at an UltraDrive, you'll find a hard disk to suit your needs.

**Dealing or Direct: Your Choice.**

If you would like to see a demonstration and purchase your hard disk today, simply visit one of GCC's authorized dealers. For the location of the dealer nearest you call, 800-422-7777.

To order direct from GCC, call us toll-free from 9 AM to 8 PM (EST) on weekdays, or 10 AM to 4 PM (EST) on Saturdays. Our trained staff can answer your questions and offer advice on any of our products. Be sure to ask for our free catalog. Orders received by 8 PM (EST) for in-stock items will be shipped the same day via overnight delivery for only $9.

What's more, when you buy direct from GCC we guarantee your satisfaction with a 30-day money-back guarantee.

**Two-Year Warranty.**

All UltraDrive and UltraDrive S hard disks carry a full two-year warranty on parts and labor. We also offer repair service here at GCC and at hundreds of GCC dealers nationwide.

**SUM II**, the 4ward-winning disk utilities package from Symantec Corporation. Features crashed disk recovery, deleted file retrieval, disk optimization, backup, fast disk duplication, and file encryption. A $149 value.

QuickSpool II is a second generation spooler for serial printers like the ImagemWriter II. Reduce your waiting time during printing by as much as 75%. A $59 value.

QuickEnvelope takes the hard work out of printing envelopes. Compatible with any printer that is capable of printing envelopes. Desk accessory convenience. A $49 value.

**GCC TECHNOLOGIES**

Peripherals With Vision.

**GCC Disk Drivers** provide for automatic remapping of bad blocks and execute complex algorithms for media defect management.

**GCC DriveManager** enables the creation of Macintosh, AUX, and ProDOS partitions. Provides password protection, and sets the interleave value. Also tests, initializes, and formats the hard disk.

**GCC Partitions DA** allows partitions to be mounted, unmounted, locked. Also provides password protection from within any application.

**SUM II**

<table>
<thead>
<tr>
<th>Model</th>
<th>EXTERNAL</th>
<th>INTERNAL</th>
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familiar with the Mac interface — should have no difficulty becoming proficient with Vellum.

But Vellum may find its greatest success with two additional groups of users. The first group is experienced draftsmen who have resisted going over to computers because they “can do it faster by hand.” Because Vellum “thinks” like a draftsman, these highly skilled and very valuable personnel may find that they can finally do it faster on a computer.

The second group is composed of engineers and technical personnel who are not proficient in conventional drafting methods or who never learned mechanical drawing in school. Vellum may actually help compensate for some shortcomings in training or experience. Smart software such as Vellum may ultimately lead to smarter users.

— Mike Markowitz

QMS-PS 820 turbo

The QMS-PS 820 turbo isn't much cheaper than Apple's LaserWriter II NTX, but it is faster.

The QMS historically has produced PostScript printers that are comparable in features and output quality to Apple's LaserWriters (QMS uses the same Canon engines that Apple does), perform slightly faster, and cost slightly less. The new QMS-PS 820 turbo continues this tradition. The PS 820 turbo contains a Canon TX engine, nearly identical to the SX of Apple's LaserWriter II NTX, and thus the output quality of the two printers is the same. Both have a controller based on a Motorola 68020. Both can support a dedicated SCSI hard drive for improved performance with large font libraries. And, true to historical form, the PS 820 turbo performs slightly faster than the NTX.

BEYOND THE NTX The 820 turbo contains two paper trays, each of which can hold up to 200 sheets of paper, whereas the NTX has only one tray. Despite the extra paper tray, the 820 turbo still lists for slightly less than the NTX — $4 less, to be precise. (For $1,000 less, you can opt for the 810 turbo, which is similar to the 820 turbo in every aspect but one — it has only a single paper tray.)

When MacUser Labs tested the 820 turbo, we found it an admirable performer. On average, it churned out printed pages 11 percent faster than the NTX, although results varied depending on the type of file we printed (see chart). With our Word, Digital Darkroom, and PageMaker test files, we found no significant difference in performance between Apple's NTX and the 820 turbo. With most graphics applications (Illustrator 88, MacDraw II, Adobe Separator 2.0, and SuperPaint 2.0), the 820 turbo outperformed the NTX by 11 to 24 percent. And the 820 turbo printed an Excel 1.5 spreadsheet a whopping 30 percent faster. (For a complete description of the tests, see our PostScript-printer lab report, "Fit to Print," September '89.)

We also tested the font-caching feature of both printers, using Adobe's Font Folio as a dedicated font disk. When a PostScript printer images type, it stores the most recently imaged characters in a cache, either in printer RAM or on a dedicated external hard-disk drive. Cached characters can be printed much more quickly than uncleared characters. Our font-cache test file contains about 900 different characters, with no repetitions. While the 820 turbo printed this file 21 percent faster than the NTX when no characters were cached (2:34 minutes for the 820 turbo vs. 3:16 minutes for the NTX), the two printers performed identically, both averaging around 30 seconds, with all characters cached on-disk.

TURBOCHARGING THE TURBO If you're a serious font user, attaching an external hard-disk drive to your printer will add years of productive time to your life, time you would otherwise spend waiting for your pages to print. QMS provides utilities for working with an attached hard-disk drive, but — sad to say — the documentation for this feature is pretty bad. For one thing, it doesn't adequately explain the benefits of using a drive, which users should invest in one, or how best to take advantage of one. Also, it mentions the importance of LaserWriter and LaserPrep 6.0, but intensive work only once — buried in a ReadMe file.

LaserWriter/LaserPrep 6.0 (and PrintMonitor 1.3) ship on the Apple Color Disk, along with 32-bit QuickDraw. They do not ship with Macintosh system software. But anyone who prints to a printer with a font disk should absolutely be using these newer drivers. QMS provides them on the utility disks that come with the 820 turbo but doesn't stress their importance.

QMS provides a Dual Tray DA to
THE MOST INGENIOUS PORTABLE PRINTER SINCE THE PENCIL.

Most computer printers are sentenced by their own sheer bulk to lifelong confinement on a desktop.

But now GCC Technologies has created a printer for the Macintosh with considerably more freedom than that. It's called WriteMove: the "biggest" printer ever to come in an incredibly small package.

WriteMove weighs a scant three lbs. It measures just $2\times6\frac{1}{2}\times1\frac{3}{4}$". (Any smaller and you couldn't get the paper in.)

But it's the only ink jet printer of any size that gives you unlimited freedom to reduce and enlarge both type and documents. Because it's the only one with outline fonts—imaging software that provides functionality usually associated with laser printers.

As a result, you can use WriteMove to compose documents with word processing software like Microsoft Word, or Excel. And then silently print them out on cut sheet or fanfold paper at 192-dpi resolution. So, you get much higher print quality than the ImageWriter II, for not much more money.

All of this has obvious consequences for the highly mobile. Since WriteMove works off rechargeable batteries, you will day via overnight delivery for only $9.

And if after trying WriteMove for up to 30 days you aren't completely satisfied, just return the printer and we'll cheerfully refund your money, no questions asked.

WriteMove Portable Printer $599.

Finally, WriteMove carries a full one year warranty covering both parts and labor. We also offer repair service at any one of hundreds of GCC dealers.

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make it easy to use the 820 turbo’s two paper trays. Most applications don’t support dual-tray machines, because Apple’s standard Page Setup dialog box doesn’t. The Dual Tray DA lets you select one-tray-only explicitly (if, for example, you have letter-sized paper in one tray and legal-sized in the other). Or you can use the DA to “chain” the two trays: When one runs out, the printer automatically switches to the other. A terrific idea, but complex AppleTalk networks. QMS is output quality as with Apple’s LaserWriter llNTX. The Dual Tray DA lets you select one-tray and, in many cases, also get dual trays and, in many cases, better performance.

—Henry Hortman

The QMS-PS 820 turbo uses a Canon TX engine nearly identical to the SX engine in Apple’s LaserWriter lNTX. With similar output quality, the QMS is slightly faster than the NTX.

The latest version of the late Red Ryder is an even more powerful telecommunications package. Last year was more than the end of a decade — it was the end of an era as well. Red Ryder, the shareware legend, ceased to exist at the end of 1989 — the victim of lawyers, licensing fees, and other grinchies. Red Ryder had quite a good run, growing from a simple BASIC program into the Swiss army knife of telecommunications software, making it all the way from shareware version 1.0 to the commercial version 10.3 before it demise.

But although the name may be gone, the soul of the software lives on in White Knight, perhaps the first program to have its first version number 11 (the numbering scheme carries over from Red Ryder). White Knight has the same low overhead and low price as its predecessor, and the plain white manual cover makes White Knight look like generic telecommunications software (although the new colored box somewhat spoils the effect).

WHAT’S NEW White Knight is a complete rewrite of Red Ryder, with many major changes as well as the usual bug fixes and minor enhancements. It also comes with an all-new 270-page manual that has two indexes.

The biggest change is the addition of a facility, similar to HyperCard’s XCMDs, called RCMD. RCMDs are code resources written in programming languages such as C or Pascal that extend White Knight’s capabilities. Several sample RCMDs come with the package, including one that supports CompuServe’s Quick B protocol, and more will be available in White Knight’s support roundtable on GENie.

Even if you are not a programmer capable of creating an RCMD, you’ll appreciate White Knight’s procedural language, which has been extended to let you create detailed scripts. The Write a Procedure for Me command records your actions, so you don’t even have to understand the scripting language to write a procedure. For simpler tasks, White Knight offers macro keys, which can be accessed from a separate window as well as from the status bar and can also be used to invoke procedures and RCMDs. White Knight’s Host mode, which lets you use the program as a miniature bulletin-board system for transferring messages and files, has been expanded as well with new commands, three levels of password support, and MultiFinder compatibility.

Among the hundreds of less noticeable changes from and enhancements of Red Ryder, White Knight now supports color and remains one of the only communications programs that supports multiple fonts. White Knight’s menus have been rearranged — hierarchical menus now group related commands. You can access submenu items by using a unique method of typing two keys while holding down...
Now you can have everything you ever wanted in a laser printer. Without paying the price.

Introducing the lowest priced laser printer in history: the $1399 PLP™ II from GCC Technologies. GCC developed the very first personal laser printer in 1987, and has over 10,000 satisfied users ... more than everyone else combined.

Finally, a revolutionary printer at a revolutionary price. In fact, at $1399, it's nothing short of a technological marvel.

**Personal Desktop Printing.**

Three years of research and development have put the finest printer technology right on your desktop: a combination of the newest third generation laser engine, GCC's own custom designed integrated circuits, and the market's most sophisticated QuickDraw™ imaging software yet.

Features such as a silent "sleep" mode, a very user-friendly LCD display and an envelope printing desk accessory have been carefully integrated to create a laser printer that truly is personal.

**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," Persuasion," and Canvas."

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GCC has made acquiring your new PLP II just as easy as using it. If you would like to see a demonstration and purchase your PLP II today, simply visit one of GCC's authorized dealers. For the location of the dealer nearest you, call

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To order direct from GCC, call us toll-free from 9 AM to 8 PM (EST) on weekdays, or 10 AM to 4 PM (EST) on Saturdays. Our trained staff can answer your questions and offer advice on any of our products. (Be sure to ask for our free catalog.) Orders received by 8 PM (EST) will be shipped the same day via overnight delivery for only $2.

What's more, when you buy direct from GCC we guarantee satisfaction. If after trying PLP II for up to 30 days you aren't completely satisfied, return it and we'll cheerfully refund your money.

**One Year Warranty.**

PLP II carries a full one year warranty on parts and labor. We also offer repair service at any Xerox® carry-in service center, or at any one of hundreds of GCC Technologies dealers.

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Four good reasons you should use your Dataflex...

1. Flexibility...
   With the new CTA ScanReader™ program you can automatically enter printed information into your word processor, database, or spreadsheet programs. Forms, catalogs, manuscripts, brochures, technical manuals and documents can be fed into your Macintosh many times faster than manual keying. Requiring only 1 megabyte of memory, Scan Reader™ can read entire pages or just the information you need, in background mode, fast and accurately.

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TECHNICAL SPECIFICATIONS

SYSTEM REQUIREMENTS
Mac Plus, Mac SE, Mac II, Mac IIx, Mac IIcx

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1Mb RAM, 2Mb hard disk space

SCANNERS SUPPORTED
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Programs for the future

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the Command key. The size and position of most windows are now remembered from session to session, and dialog boxes are now centered. Printing support has been improved, throughput has been increased, VT102 emulation has been added, and even MultiFinder support has been improved. White Knight now recognizes all Apple keyboards, so the Install Special Keys utility is necessary only for non-Apple keyboards.

White Knight expands on available file-transfer options as well. Text captures can be appended to existing files, and capturing can be suspended temporarily without closing and reopening of the captured file.

For protocol transfers, White Knight supports XMODEM (Checksum, CRC, I.K., and ack-ahead); YMODEM (standard, I.K., and G); Kermit (standard, long packet, and sliding window); ZMODEM; and Flash, a new high-speed low-overhead protocol for use with error-correcting modems. The CompuServe B protocol has been dropped, but the newer Quick B protocol is available as an RMCD. White Knight supports three "filters" for the terminal window, text transfers, and protocol transfers. As characters are received, the filters can pass them through unchanged, strip them out, or remap them to other characters.

As this weren't enough, programmer Scott Watson has thrown in an extra added attraction, Okyto, for a limited time (the offer may be withdrawn by the time you read this; check with FreeSoft). Okyto is a special-purpose program that has one mission: to talk to other copies of Okyto, either via a modem or over AppleTalk. Like the old shareware program MCS (see Bobker's Dozen, February '90), Okyto lets you send and receive files as well as type conversational messages all at the same time, and you can even look through the directories of the remote system simultaneously (assuming you know the passwords to get access). Okyto is intended to simplify Mac-to-Mac transfers so you don't need to learn White Knight or experiment with different options to send a file from one Mac to another. You just run Okyto and tell it which files to send or receive. If you have a high-speed (9,600-bps or more) modem, you'll have to use special initialization strings to get Okyto to function, so for those modems it's not quite as easy to use.

THE BOTTOM LINE: White Knight is one of the best values in communications software, and with Okyto thrown in (a $39.95 value when purchased separately), it's an even better bargain. Yes, White Knight can be confusing and even overwhelming to a novice, but the new manual tries to make it easier to learn, and with Okyto even novices can quickly be sharing files with friends and coworkers. And yes, White Knight's interface is unattractive when compared with its competition, but it is functional and people seem to like the program, warts and all. There are too many satisfied Red Ryder users to ignore, and White Knight continues the tradition of supporting every possible feature that its users could want and then some—and with RCMDs you can add features even Scott Watson couldn't think of.

— Robert R. Wiggins

**TYPOGRAPHY**

**TypeStyler**

Broderbund's display-type utility is a winner.

Display or decorative type is one of the mainstays of the advertising and publishing industries. Creating it on the Mac has generally required tedious manipulations in draw programs or the use of specialized programs, such as Laser FX and LP Text, that were plagued by clumsy interfaces. LetraStudio was the first type utility to break with this tradition. It allowed users to create and distort decorative type with considerable ease but was restricted to LetraSet fonts.

TypeStyler is the latest player in the type-utility arena. Although LetraSet beat Broderbund to the punch with the release of LetraStudio, TypeStyler promises some stiff competition.

**TYPE ON DISPLAY** TypeStyler is a vastly improved offshoot of technology pioneered in an earlier Broderbund product, PosterMaker Plus. It comes with ten special outline fonts called SmoothFonts, which are a proprietary font type that TypeStyler uses for its manipulations.

TypeStyler also includes a font-conversion command that can change almost any Type 3 or Fontographer font into a SmoothFont (composite fonts based on Adobe originals cannot be converted).

The program has one purpose: to create and manipulate decorative type. It supports 8-bit color and can output files as process-color separations. The program can output to PostScript or QuickDraw printers. Files can be exported as EPSF, EPSF text, MacPaint, or PICT.

**Get Info**

**White Knight**

Published by: FreeSoft Co., 150 Hickory Drive, Beaver Falls, PA 15010; (412) 846-2700.

Version: 11.02.

List Price: $139.
The best thing next to your Macintosh

Now you can download spreadsheets, word processing documents, even name and address stacks from your Macintosh to the Cambridge Z88 two pound portable computer and take them with you, everywhere. Change your files or create new ones on the Cambridge Z88 using the built-in word processor, spreadsheet and other applications. Upload them to your Macintosh when you return.

MacWrite, text and WKS files can be transferred between your Macintosh and the Cambridge Z88 using a cable that connects to your Macintosh's modem port, and software that uses a standard Macintosh interface.

Cambridge Z88 Systems for Macintosh users include the Cambridge Z88, cable and software to transfer files, carry case and batteries.

HyperCard With the optional HC Organizer stack, you can transfer names, addresses, phone numbers and to-do lists.

Memory Cambridge Z88 Systems for Macintosh users provide up to one megabyte of memory, all available for your data files.

Display The Cambridge Z88's display is a supertwist LCD with eight lines by 106 characters.

Keyboard The Cambridge Z88 has a silent keyboard, so you can use it anywhere - in meetings, libraries, classrooms.

Batteries The Cambridge Z88 runs on 4 AA disposable batteries for up to 20 hours, and your data is safe for months - you won't even lose data when you change batteries.

Peripherals The Cambridge Z88 is only 8.25"x11.5"x.675", but it's a complete computer and can be used with a pocket modem, a serial or parallel printer.

Operating system With the Cambridge Z88's task-switching operating system you can have several documents open simultaneously, and quickly switch from one to another. When you return to a document - even after switching off - you'll find it exactly as you left it, without booting, loading, opening, saving, closing or quitting.

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Macintosh & HyperCard are trademarks of Apple Computer
TypeStyler's work is done in the text-attributes dialog box. You type in text and apply shapes, styles, or special effects onto the drawing area.

You create styled type by dragging out a box with the text tool. The text-attributes dialog box appears. This is where you type text, choose a font, and apply any of 35 predefined shapes (what LetraStudio calls envelopes) and 35 styles. The latter are TypeStyler's most welcome feature. LetraStudio forces you to create custom effects such as drop shadows. TypeStyler more forthrightly provides them as "styles." You can customize styles with colors, patterns, or special fills (star burst, dual blend, and the like). Type can also be kerned.

Shapes or styles can also be created and applied to basic graphic objects or "panels" through a similar process.

You can align text and graphic objects through sophisticated pasting procedures that let you copy and paste attributes such as font, shape, area, center, and style.

MISSING CHARACTERS Complaints? Some users will miss precise controls over line widths and gray fills: You select these settings from graphic palettes rather than by entering numbers.

The program runs slowly on low-end machines. Here are the times it took TypeStyler to redraw the screen of the relatively simple "Christmas Carol" graphic shown here: Mac Plus (with SCSI hard-disk drive), 32.8 seconds; SE, 28.7 seconds; SE with Radius Accelerator 25, 10.8 seconds; Mac IIx, 6.3 seconds.

Simply switching between two styles in the text-attributes dialog box takes 5 to 12 seconds on a Mac Plus or SE. (TypeStyler is not unique in this regard; LetraStudio can also be painfully slow, even on a Mac IIx.)

Although using TypeStyler on any system other than a Mac II or a Mac with an accelerator will be unacceptably slow for some users, it's still faster than preparing display type manually — a consideration that speed tests all too often ignore. You can speed things up by displaying styled text as frames rather than in a fully styled form.

THE BOTTOM LINE Despite the complaints, TypeStyler is a valuable addition to DTP. The program may well become the PageMaker of type utilities. LetraStudio offers controls that are far more precise than those of TypeStyler. But TypeStyler, I suspect, will win the hearts of desktop publishers as the emotional favorite — as is clearly the case with PageMaker in the page-layout wars.

Broderbund has produced an admirable application. Its ease of use and relatively low cost make it a winner.

— Gregory Wasson

With TypeStyler, even the relatively simple styled text shown here can take a long time to be painted on-screen — it all depends on what kind of Mac you have.
Send Files over AppleTalk
—in a Flash!

Flash is the fastest, friendliest file transfer program you can buy for the Macintosh. Unleash the power* of your AppleTalk network with Flash.
Quickly send files and messages to any other Macintosh—or group of Macintoshes—on the network. Flash even has a chat mode that lets you talk in real-time to anyone else.

Flash is Fast
- To send a file, just drop it into a Flash folder and off it goes!
- All file transfers are done in the background, so you never have to wait. Flash works while you do.
- Flash’s transfer rate is almost 1MB per minute. Most files are sent in seconds.

Flash is Powerful
- Flash can send and receive any combination of files and folders at the same time.
- The contents of an entire hard drive can be transferred—while you use both computers!
- Flash can communicate across any AppleTalk network zones that also have Flash installed.

Flash is Friendly
- Flash is perfectly integrated into the Macintosh desktop environment.
- Installation is so easy you’ll be using Flash in minutes—not just reading about it!
- You can use Flash anytime, from inside any application.
- Flash tells you when your files arrive, so there’s no need to keep checking. But, in case you forget, Flash keeps a record of all file transfers.

Software Requirements
- All Macintoshes on the network must be running System 6.0 or newer.

Hardware You Need
- An AppleTalk compatible network.
- Two or more Macintoshes with a minimum of 1MB of memory.

Hardware You Don’t Need
- Hard drives not required—Flash works fine on all floppy-based Macintoshes.
- Dedicated File Server not required—Flash will save you thousands of dollars by keeping all of your Macintoshes free for productive uses.

Only $199.95!
You can use Flash with any number of Macintoshes in a single AppleTalk network zone. And, you can add as many Macintoshes as you need to each zone at no extra cost. You are not required to purchase more than one Flash program disk unless you use Flash in more than one zone. Flash can communicate with any other network zones also using Flash.

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Or, order directly from Beagle Bros. Call (800) 345-1750. In California, call (800) 992-4022.
Beagle Bros, Inc. • 6215 Ferris Square, Suite 100 • San Diego, CA 92121 • (619) 452-5500

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*Flash is not able to provide real-time text or binary transfers in a single zone.
The Mac IIfx:

Fast Times at Apple Computer

By Russell Ito and John Rizzo

A new CPU, a trio of video boards, and a new version of A/UX propel the Mac into the realm of workstation-class speed machines.
It's hard to imagine anyone complaining about the Mac IIci's performance, but you'll probably start hearing rumbles of discontent real soon. Apple's first product announcements of the decade represent a huge leap in performance and should put to rest any lingering doubts about the Mac's ability to compete against PC-compatible machines running Windows and Presentation Manager. Collectively, the Macintosh IIfx, three new Macintosh display cards, and a new version of A/UX promise to launch the Mac into entirely new markets. But to really appreciate what Apple has achieved, consider this:

**Fact:** The Mac is a better windowing environment than the glitziest DOS machine. Even a stock IIcx can outperform a 33-megahertz 80386-based unit running Windows, but because earlier Macs lacked that flashy 33-megahertz clock speed, most users don't realize this.

**Fact:** As the number of displayable colors has spiraled upward, the Mac's display speed has spiraled downward. In 24-bit mode, even simple text documents — without any color — can't refresh without rippling. So Mac users who want to take full advantage of their favorite computer's graphic abilities have settled for degraded performance, reinforcing their feelings that the Mac isn't the fastest thing on the block.

**Fact:** Only nerds love UNIX. Typical Mac users, given the choice between using UNIX and having poison oak on the soles of their feet, have a hard time choosing. Unfortunately, UNIX is still the operating system of choice for many high-end workstations and mainframes. And if the Mac is going to challenge — or even connect to — machines in these markets, it'll have to speak UNIX.

**Wicked Fast**

The new Mac IIfx is now Apple's top-of-the-line machine, outperforming the IIci by 70 to 100 percent. A Mac II look-alike with six NuBus slots, the IIfx is the Macintosh for serious engineering, 3-D graphics, multimedia effects processing, and other CPU-intensive tasks.

The IIfx owes its speed to several developments.
Macintosh Training That Works

"I have been using FileMaker for about a year now and decided to get the MacAcademy tape to see how the program was presented, the content, and to see if other tapes would be useful. After looking at the tape I promptly ordered three more! Needless to say I was pleased, as the tapes are professionally done and most useful. You and your company do a fine job."  Mr. James H. Patterson, M.D.

DAYTONA BEACH, FL- "There’s got to be a faster, easier, and less expensive way!" This statement sums up the frustration that Randy Smith felt three years ago as he tried to find training for the Macintosh computer.

That frustration led to the creation of MacAcademy, now the nation’s leading Macintosh training program, and the recent introduction of the country’s first complete Macintosh Video Training Series. MacAcademy teaches over 18,000 people each year in 65 major metro areas. The program is proud of the fact that both beginning and advanced Macintosh users, from over 12,000 companies large and small, have found MacAcademy’s live workshops to be an excellent, low priced training solution.

In order to offer additional training, MacAcademy’s next step was to put each of their dynamic training workshops on video. (And to offer an additional dozen training videos for programs not even offered at MacAcademy.)

Now you may choose from over 26 different, 2-hour, VHS MacAcademy Videos for only $49 each. A complete list of programs can be found in the coupon below.

MacAcademy Video Training tapes offer tremendous advantages for today’s Macintosh user. When using the videos you actually see the steps take place on a Macintosh screen. A small inset will show you the instructor and the mouse or keyboard. The instructors featured on the videos are MacAcademy’s top rated teachers who have trained employees of all but two of the USA’s Fortune 500 companies and who have each received a consistent rating of excellent.

Training videos offer the valuable advantage of building a learning and reference library. If you ever want to brush up on a technique, simply go back to the video and review the technique demonstrated. If you hire a new employee, simply have them review the video for the program they’ll be using. Videos offer the unique flexibility of teaching both individuals or hundreds of people at one sitting.

In addition to a super $49 price, the videos also carry a 30-day satisfaction guarantee. If you're not totally satisfied, simply send the tape back for a full refund.

MacAcademy will continue offering the nation's highest rated live training courses in major cities. But in addition, you may also build your Macintosh training library.

Videos may be ordered by phone with credit card information, or by mail with check, credit card, or purchase order. You may also send orders by FAX. Your business is appreciated and your satisfaction is guaranteed.
Apple surprised everyone (even us) by using a 40-megahertz 68030 CPU, skipping the 33-megahertz variety altogether, and combining it with a 40-megahertz 68882 floating-point processor for numerically intense applications.

You can impress your friends with the megahertz figure, but don't overlook the IIfx's other enhancements. The motherboard contains a 32K cache of superspeedy SRAM (static RAM) that keeps the CPU at top efficiency. (To see what role hardware cache has in performance, see the reviews of Fast Cache IIci and MaraaThon Racer in this issue's StartUp section.)

Input and output processing has also been accelerated with three new chips. Two are dedicated to controlling the serial ports, ADB ports, and the FDHD floppy-disk drive, freeing the CPU from performing low-level I/O tasks. This translates into faster serial-port functions, such as LocalTalk and modem communication. Your hard-disk drive and other SCSI devices will run faster with the IIfx. A SCSI/DMA controller chip enhances the SCSI bus by providing devices on the bus with direct access to memory. This frees the CPU for simultaneous, or "latched," reads and writes from the IIfx's newly designed SIMMs.

A sound port on the back of the IIfx produces 44.1-kilohertz (CD-audio rate), 8-bit, stereo-sampled digital audio for multimedia buffs. A Processor Direct Slot for third-party boards is built in to the motherboard for future applications, offering faster CPU access than does a NuBus slot. Unfortunately, it's different from the PDS on the SE, SE/30, and Iici, which are, in turn, different from each other.

For Mac II and IIX users covetous of the IIfx, Apple will have an upgrade program that will let you swap your old motherboard for the new one. Pricing was not available at press time, but knowing Apple's past upgrade policies, it won't be cheap. In addition, you won't be able to use your old SIMMs. The new 80-nanosecond SIMMs have 64 pins instead of the normal SIMMs' 30. Apple says that several third-party manufacturers have committed to manufacturing the new SIMMs, but don't expect the supply to be plentiful—or cheap. Because the Mac IIfx is expected to list in the $10,000 to $12,000 range, expensive SIMMs may be the least of your worries.

### Video Simplified

Three new display cards represent both an expansion and a contraction of Apple's line. Instead of selling seven cards, Apple has decided to shrink its offerings to just four: the previously released Monochrome Display Card and the three new boards. All the new Macintosh Display Cards automatically recognize and configure themselves to work with any Apple monitor. They support RS-170 standard timing for output to interlaced-video products such as TVs and VCRs. This makes them easily compatible with composite-video devices (although you'll still need an NTSC converter). But the big news is that Apple has conquered the palette/performance paradox.

With the Mac IIfx's increased computing speed and 32-bit QuickDraw's 16.7 million colors, Apple had to boost the video-display speed, and doing that meant taking a RISC. The Macintosh Display Card 8*24 GC is a combination display card/graphics coprocessor that incorporates an Am29000 RISC chip on-board. The 29000 runs at 30 megahertz and speeds up performance to between 5 and 30 times that of conventional systems, so you can see complex graphics nearly as quickly as the IIfx can generate them. Unlike other RISC coprocessors that require customized applications, the 8*24 GC will work...
The less time you spend creating effects like these, the better.

Now you can add new zip to any document—or try out special effects in a flash—with Smart Art™ software. Each volume in the Smart Art library contains fifteen effects, so your text can cast a long shadow or wrap around a circle in seconds. Smart Art effects save a lot of time because they're ready to use in virtually any application. Yet it's easy to customize these pre-built libraries of graphic and type effects by changing the font, size, shading and much more.

How does it work? Smart Art is a desk accessory that cleverly uses the PostScript® language in your laser printer to create special text, 2D and 3D effects on your Macintosh® screen. Once you're satisfied with the effect you've made, paste it into your drawing, word processing or desktop publishing program and output it with any Adobe® PostScript printer or other device. Of course, Smart Art works with any PostScript language font, too.

The less money you spend creating effects like these, the better, too. That's why Smart Art's suggested retail price is only $149.95 a volume. New volumes are also available, so if you don't see the effect you need, just call 1-800-344-8335. Outside the U.S.A. and Canada, call your local distributor.

Smart Art I
Smart Art II
Smart Art III

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Macintosh Ilfx

with any applications — without software modifications — and "32 bit clean" programs will perform even better.

With the Macintosh Ilfx's increased speed and 32-bit QuickDraw's 16.7 million colors, Apple had to take a RISC.

On bootup, a special file downloads a RISC-optimized version of QuickDraw directly to the board's 2 megabytes of VRAM (video random-access memory). From that point, the 29000 takes over and pages information in 64K blocks into the 64K SRAM cache on-board. Apple estimates...
The first affordable 800x400 PostScript® laser printer.

Until now, you had a choice: compromise your graphic standards with a 300 x 300 laser, or compromise your finances with a higher resolution printer.

Now there's the NewGen TurboPS/400 with a standard printing resolution of 400 x 400 dpi. That's almost twice the resolution of standard 300 dpi printers — at about the same price.

If you need even higher resolution, you can upgrade to 800 x 400 dpi with our resolution upgrade kit. You'll get the resolution you need to print fine-lined graphics and smooth fonts, and save time and money by printing your own masters. And best of all, you can get 800 x 400 resolution at about half the cost of high-priced imagesetters.

No wonder our competition is fading.

It's faster, too.
NewGen's dual-processor controller design, utilizing a 20MHz graphics RISC processor, gives us the fastest PostScript-compatible desktop laser you can buy. In fact, it will print most pages three to five times faster than the Apple LaserWriter® LINTX and blow the doors off anything else in its class.

IBM® and Macintosh® compatibility.
The TurboPS/300 gives you plug and play Macintosh compatibility — with LaserWriter LINTX compatibility, AppleTalk® interface, Adobe® downloadable font support and 35 Mac screen/printer fonts.

IBM compatibility includes HP LaserJet II® HPGL and Epson® emulations, and parallel/serial interfaces.

Free test results.
To get the full story on the high-resolution, high-speed TurboPS/400, call NewGen at (714) 641-8900. We'll send you a package including timing test results, print samples and the lowdown on our other remarkable laser, the TurboPS/300.

We'll also send the name of a NewGen reseller in your area. So you can see for yourself. And believe.
Macintosh II fx

that swapping will occur only about 3 percent of the time, so performance shouldn’t be noticeably affected. And for even better performance, the card has two SIMM sockets for adding 2 megabytes of DRAM (dynamic RAM) now and, eventually, up to 8 megabytes with third-party 4-megabyte SIMMs. These are special double-sided SIMMs. Although Apple will release the specs to third-party manufacturers, it will probably be the only source for some time. Although exact pricing wasn’t set at press time, the card is expected to list for around $2,100 when it’s available this summer.

And for users who need color but don’t have a crying need for the 8•24 Mcc’s speed, the Macintosh Display Card 4•8 and 8•24 provide an upgradable 8to-24-bit-color answer but without the RISC coprocessor or the high degree of expandability. The 8-bit 4•8 card displays up to 256 colors on an Apple color monitor and up to 16 grays on Apple’s monochrome models. The 8•24 is a 24-bit card that displays up to 16.7 million colors on Apple’s color monitor and 256 grays on Apple’s monochrome monitors. With the addition of 2 megabytes of VRAM SIMMs, a basic 4•8 model (expected to cost about $700)
can grow to a full 24-bit unit (expected to list for about $1,000).

UNIX with a Human Face

Although what Apple has achieved with A/UX 2.0 may not be as earthshaking as recent events in Eastern Europe, the sight of a normal Macintosh window running a UNIX application under MultiFinder is nearly as startling. A/UX 2.0 fulfills the promise of opening the Macintosh up to UNIX without alienating Mac users who can still see and use their familiar desktop and applications.

Russell Ito is currently searching for a mortgage on a Mac IIx. John Rizzo torture-tests new Macintoshes (among other things) as MacUser’s technical editor.
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"We have buying leverage — and it shows in our prices."

"...and, if not, we can fix anything in tech repair!"
**Hard Drives**

**Leave The Driving To Us**
High performance, low profile, and minimum power demands. What more can you ask from a hard drive? With features like automatic error correction, high shock resistance, voice coil actuator, SCSI controller and internal air filtration system, CompuAdd internal hard drive kits sport drive components that perform to the most demanding expectations. All CompuAdd internal drives are ready to run, complete with Apple System (including utilities like HD Backup) and the CompuAdd formatter utility that takes care of drive formatting, partitioning, and diagnostics. A detailed instruction manual and mounting hardware make installation a snap. Throw in some of the best technical support in the business, along with CompuAdd’s one-year warranty, and your “driving” satisfaction is ensured!

Internal drive kits for SE, SE/30, II, and I1x
20MB Internal HD. 24180 - $325
40MB Internal HD. 24181 - $425
80MB Internal HD. 24182 - $600
100MB Internal HD. 24183 - $700

Internal drive kits for Ile and Ileci
20MB Internal HD. 24184 - $325
40MB Internal HD. 24185 - $425
80MB Internal HD. 24186 - $600
100MB Internal HD. 24187 - $700

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**CompuAdd Internal Hard Drive Kits**

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**Drive, Drive, Drive**
A dependable, preformatted Cutting Edge disk drive fits so neatly under your Macintosh, it’ll be hard to remember that you bought it separately. The Cutting Edge housing — as sleek as it is rugged and compact — features the same convection cooling as your Mac does, so the drive runs quietly, too. Easy to install. Complete with SCSI cable (with lifetime guarantee), Apple System, HD Backup utility, anti-viral software, and integrated SCSI controller. Also includes a personalized copy of TCE Manager formatting and diagnostic software and, of course, a one-year manufacturer’s warranty. Cutting Edge hard drives give new meaning to the word “productivity.”

20MB Hard Drive. 24386 - $359
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80+MB Hard Drive. 24388 - $649
100+MB Hard Drive. 24389 - $699

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First Adobe PostScript Laser Printer For Under $2500!

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The TI microLaser® PS is a truly remarkable Macintosh-compatible PostScript printer. Compact, user-friendly, upgradeable and affordable, its standard features can be enhanced to print your applications with style — your style.

Featuring a complete package of Adobe PostScript and HP LaserJet Series II emulations, the microLaser PS prints at 300x300 dpi and sports 11 PostScript font families with a total of 35 different fonts — all in an infinite array of point sizes. The microLaser fits neatly on your desk because there are no paper tray wings. Its 250-sheet paper drawer conveniently slides into the machine and accepts paper weights from 16 to 34 lbs. For further options, you can easily add a second paper drawer (250-sheet capacity), which fits underneath the printer, or the optional envelope feeder which hooks onto the manual paper slot and automatically feeds up to 40 envelopes. And upgrading the standard 1.5MB RAM is as easy and economical as adding memory boards — up to 4.5MB RAM total. The microLaser is LocalTalk-ready and compatible with the Centronics® parallel interface.

microLaser PS. 22851 - $2425
Envelope Feeder. 38712 - $299
Second Paper Drawer. 38713 - $325

A Family Of Printers
When it comes to impact printers, the Epson name is synonymous with quality. The Epson LX-810 is a hard-working 9-pin, 80-column, dot-matrix printer that works as well for the business user as it does for the student. With an 11-inch carriage, it prints in draft mode at 180cps and in near letter quality at 30cps. Delivers 240x216 bit-mapped graphics and features three resident fonts.

Epson LX-810. 56303 - $199

For higher quality dot-matrix output, the 24-pin Epson LQ-510 adds letter quality print, user-defined characters and more font choices and typestyles. 11-inch carriage. Automatic cut sheet feeder. Prints 180cps in draft mode and 60cps in letter quality mode. Produces 360x360 bit-mapped graphics.

Epson LQ-510. 56340 - $349

For speed, economy and impact you can’t beat the the Epson LQ-2550, Epson’s top-of-the-line dot-matrix printer. With a 15-inch carriage, the LQ-2550 provides letter quality documents at an amazing 133cps. 400cps in draft mode. 360x360 bit-mapped graphics. Eight resident fonts and hundreds of typestyles. Seven-color capability with multi-colored ribbon.

Epson LQ-2550. 56339 - $999

Grappling With Printer Reality
If the question is, “How does my third-party printer connect to my Mac?”, the answer is an Orange Micro Grappler. The Grappler connects to Epson, Hewlett-Packard, Toshiba and other 9-pin and 24-pin dot-matrix printers, including the Epson printers listed on this page. Orange Micro Grappler. 22853 - $136

Defies Any Label
Remember the awful ’80s when printing labels from your Mac was about the LEAST fun you ever had? Now the new Seiko Label Printer promises us all a brighter future in the ’90s. Prints letter-quality labels, bar codes, and large type without ever interrupting your other computer work. Takes only a small space, operates quietly and independently of other printers. Seiko Label Printer. 22852 - $195
Get The Network Under Control
Install a PhoneNET Star Controller in your telephone closet to add ease and efficiency to a network of up to 48 nodes. Connect several Star Controllers and you can manage hundreds of users. Takes advantage of existing telephone wiring. Makes connecting to the network as easy as plugging in a phone! Monitors network activity continuously for signs of trouble and protects the rest of the network by shutting down problem ports automatically. Allows network managers to install, re-configure, and manage networks easily from the central phone closet.

PhoneNET Star Controller. 22516 - $888
Star Wiring Kit Harmonic. 22518 - $64

Connecting The Best
Farallon's PhoneNET Star Connectors make clean connections to the branches of star-configured networks. To get proper resistance and prevent error-causing network reflections, simply plug the pre-terminated Star Connector into the branch device. Comes with Farallon's lifetime guarantee and unlimited phone support.

PhoneNET Star Connector. 22512 - $18
PhoneNET Star Connector 10 pack. 22515 - $138

Bridging The Gap
If your network has exceeded the 32-node limit (or slowed to a crawl before it even reached the limit), it's time for a Hayes InterBridge. InterBridge lets you connect local LocalTalk networks or bridge the gap between remote networks equipped with modems. The InterBridge actually enhances overall network performance while it ties networks together. Lets more people communicate and share printers or other devices on connected networks, too. InterBridge Manager software included enables network managers to customize network connection for particular needs.

Hayes InterBridge. 22509 - $645

Gaining Speed
If your company is expanding by leaps and bounds, the last thing you need is lackluster network performance. Give your growing LocalTalk network a speed boost with Shiva's NetBridge. Plug in two LocalTalk networks and the Shiva NetBridge will make network deterioration a thing of the past. NetBridge is a natural network builder; it doubles your network capacity when you plug it in. Software provided ensures network security and hassle-free network management.

Shiva NetBridge. 22565 - $399

Share And Share Alike
Get the most use from your serial peripheral devices by sharing them on the network. Printers, scanners, high-speed modems, or plotters — the Shiva NetSerial connects most serial peripherals to your LocalTalk network. Offers transfer rates up to 57,600 bit/sec with simple 8-pin, mini-DIN connections from LocalTalk to several brands of minicomputers.

Shiva NetSerial X232. 22504 - $275
Shiva NetSerial V2400. 22507 - $435
Shiva NetModem V32. 22528 - Call

Crossing Network Borders
You no longer need one box to serve as a gateway, another to share serial devices and a third to connect to remote networks. Now you can connect an EtherTalk LAN and two LocalTalk LANs to create a fully-functional internet. Link the internet to a serial port so all workstations can access peripherals on the other side. Or use the serial port and a modem to connect remote internets. You can even dial in to your internets through EtherGate from a remote Mac or PC with a modem.

Shiva EtherGate. 22508 - $1825

Get All Kinds Of Access
If your workgroup shares peripherals via LocalTalk, now you can share a 2400 or 9600 baud modem as well. Shiva's NetModem enables everyone on the network to transmit data over phone lines. The network user simply selects the NetModem in the Chooser, starts the communications software — and the transmission begins. Flashing messages in the Mac menu bar enable senders to monitor transmissions without leaving the office. And, if you're on the road, you can call the NetModem to send messages by electronic mail.

Shiva NetModem V2400. 22507 - $435
Shiva EtherGate. 22508 - $1825

* Full one-year limited warranties on all products!
You Gotta Have Connections
To Get Anywhere!

Need to connect your Mac to an Ethernet network without losing your internal slot? The Adaptec Nodem lets you do so without compromising network connectivity. The Nodem can also be used as a temporary network "dock" for portable computers. Available for your THICK or THIN (Cheapernet) networking requirements. Compatible with all Macintosh models except 128K/512K.

Adaptec Nodem THICK. 22500 - $395
Adaptec Nodem THIN. 22527 - $395.

The Faster The Better

Make the most of your network investment with the Asante MacCon Ethernet interface boards. Full compatibility with AppleShare, Novell's Netware and TOPS. Among the fastest Ethernet boards on the market, the Asante MacCon II/E supports full 32-bit data transfer at speeds up to 10MB/sec over distances up to a thousand feet.

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Dove Fastnet SE Ethernet card. 22501 - $353
Dove Fastnet III Ethernet card. 22502 - $373
Dove FastPath 4 Gateway. 22510 - $1035
Farallon Portable Pack. 22519 - $373
PhoneNET DB-9 Connector. 22511 - $28
PhoneNET Din-8 Connector. 22513 - $31
PhoneNET to LocalTalk Adaptor. 22514 - $31

Another Apple Connection

How can something as simple as a good LocalTalk cable connector be so hard to find? MacAvenue has the answer with its guaranteed LocalTalk connectors. Fits right in to any LocalTalk set-up. Just make the connection and you're in business.

MacAvenue LocalTalk Connectors
DB-9 LocalTalk. 22520 - $32
DB-9 PhoneNet. 22522 - $23
DIN-8 LocalTalk. 22521 - $32
DIN-8 PhoneNet. 22523 - $23

PhoneNET Repeater. 22517 - $313
Star Wiring Kit Harmonic. 22518 - $64
Shiva Telebridge. (See page 14 for description.) 22506 - $339
Tops Flashbox. 22503 - $108

Smarter Communications

Enjoy fast and simple connections to remote computer systems with the help of Hayes SmartCom II communications software. Uses the Mac graphical interface to let you simultaneously print, store and view incoming data.
Hayes SmartCom II. 27662 - $84

Call 800-477-6221 •
**Video**

**Color To The Max**
The Sigma ColorMAX monitor brings presentation graphics, illustrations, and design applications to a new level of color display quality on the Mac II. A 19-inch Sony Trinitron screen is the heart of this high-resolution, 256-color monitor. Refreshes 8-bit color at 70 plus Hz.
Sigma ColorMAX 19-inch Color Monitor.
22000 - $4999

**One Page At A Time**
Get a new view of the world with the PageView full-page display system for the Mac SE. Control Panel enables you to select display modes, system font sizes, screen save, dual or single screen operation mode, and cursor size.
Sigma PageView 15" SE.
22101 - $999
Sigma PageView 15" SE 30.
22106 - $1050
Sigma PageView 15" Mac II.
22100 - $1050

**Color You'll Remember**
E-Machines' high-resolution, 256-color monitors provide stunning color display for the Mac II utilizing a specially adapted Sony Trinitron picture tube. The 16-inch monitor refreshes at 67 Hz while the 19-inch monitor refreshes at 71 Hz. Once you've seen THIS kind of color, you'll never be able to settle for less!
E-Machines T-16 Color Monitor.
22003 - $3199
E-Machines T-19 Color Monitor.
22004 - $4665

**You Gotta Wear Shades**
The Seiko 14-inch color monitor and RasterOps Color Board 264 create BRIGHT colors. 43% brighter than the Apple solution. And the picture is sharp all the way to edge of the screen. By combining Sony Trinitron technology and RasterOps 24-bit color technology, the Seiko monitor gives you the best color for the best price!
Seiko 14-inch Color Monitor.
22002 - $595
RasterOps Color Board 264.
23531 - $699

*Free tech support from the word GO!*
More View For The Mac

Exploit the full power of the Mac II with the Sigma SilverView 21-inch monitor. The 72dpi display area gives you both single-page and two-page spread displays. A fast-moving 73 Hz refresh rate means you’ll never be bothered by a flickering screen. You’ll get more precise graphics and better layouts because you can view full pages and spreads. Customize the monitor to fit your style with the tilt/swivel stand and full contrast/brightness controls.

SilverView Mac II Monitor. 22104 - $1599
SilverView SE 30 Monitor. 22103 - $1599
SilverView SE Monitor. 22107 - $1599

See Me, Feel Me, Touch Me.

Install the Microtouch Mac ‘N Touch touch screen over your Mac SE, Apple-Color, or other monitor, connect it to the Apple Desktop Bus and — wow! — your monitor turns into the gateway to your software. No more imposing than an anti-glare filter, the Mac ‘N Touch is the ultimate intuitive interface. Touch any icon on the screen and drag it where you need it with your finger. With a resolution of 1000x1000 touch points, the Mac ‘N Touch averages the points you tap or touch to one precise pixel position. Ideal for self-running demos. Works with most software without modification.

Mac ‘N Touch. 22202 - $445

Super Human Graphics

Silicon Beach’s SuperPaint helps you create graphics for high-resolution output with a sophisticated AutoTrace tool that automatically converts paint graphics into draw objects. Then, with its SuperBits feature, SuperPaint sets you up to edit the bitmaps. Pair these powerful features with text manipulation, calligraphy, brushes and a freehand tool for Bezier curves, and you have a world class graphics package.

SuperPaint. 29222 - $124

Set Your Imagination Free

Retouch photographs, recombine elements from several images, and rediscover your creativity with Digital Darkroom. Special effects include solarization and blurring as well as stretching and other perspective changes. Digital Darkroom’s tools allow you unlimited gray-scale image manipulation. And, when you’ve captured the masterpiece, Digital Darkroom produces high quality halftone output.

Digital Darkroom. 29224 - $248

The Big Screen Experience

When you’re ready for a larger monitor, the first step is a Mobius MultiScreen SE Video Card. Links the Mac SE to most monochrome monitors including the Apple Portrait Display. Supports dual-screen display, meets stringent standards for portrait display, and redraws the screen 30% faster than your original SE monitor.

Mobius Multiscreen Card. 23530 - $295

MacUser May 1990

Call 800-477-6221
Input Devices

Mice

A. Turbo Charged!
Trackball users have different reasons slowly for pinpoint precision. Speed up
Turbo Mouse AOB.

B. Mousing Around
Find yourself too often in a mess with your mouse cord? The Mobius Cordless
Mouse uses infrared technology to control the cursor up to 20 feet away.

Trackball users have different reasons for leaving their mouse behind, but the
Kensington Turbo Mouse is one of the most popular. Sensing your movements,
it adjusts cursor speed accordingly. Move slowly for pinpoint precision. Speed up
and the cursor accelerates with you.

C. A Key Part Of Your System
An extended keyboard that works with ANY Macintosh, the DataDesk MAC 101
adds all the F-Keys and other key commands — even to an older Macintosh.
Costs less than the Apple model, too!

And, if you have a Plus or earlier Mac, you have real cause to celebrate.

A separate button controls extra fine and accelerated movement.

D. Handmade
If you need to scan images into your Macintosh documents but can’t set up an
elaborate scanning station, try the hand­
held ScanMan from Logitech. You’ll get
32 shades of gray and 24-bit color at 300 dpi. Includes SuperPaint and Digital
Darkroom.

E. The Future Is In Color
The MicroTek 300Z Color Scanner is a full-featured color scanner at a gray-scale
price. Get 16.8 million colors with 256 shades of gray and 24-bit color at 300 dpi.
Includes SuperPaint and Digital

Power Supplies

H. Don’t Stop The Power
When a surge suppressor just doesn’t offer enough protection, plug your Mac
into an Uninterruptable Power Supply from American Power Conversions. This
UPS draws on its battery to keep your system running after a power failure
until you can back up and exit properly. The UPS can even initiate an unattended
network shutdown when you install it on a network server. Uninterruptable
Power Supply. 26292 - $425

K. SCSI Extension Cable
SCSI Extension cable. 6 ft. 26288 - $25
SCSI System cable. 6 ft. 26290 - $35
SCSI Peripheral cable. 2 ft. 26289 - $25
SCSI Peripheral cable. 6 ft. 26291 - $35
MacPlus peripheral adaptor cable. 6 ft. 26283 - $25

Extra long AOB cable . 6 ft. 26900 - $24

L. Another Kind Of Connection
Connect two peripheral devices to one serial port, or connect two computers to
one peripheral with the Kensington A-B Box. Compatible with all Macintosh
models and with the Apple IIGS. Kensington A-B Box. 26890 - $65.
Boards

Full Speed Ahead
DayStar Accelerator Cards can double or even triple the performance of your Mac II, IIX, IICX or IIEC by giving you up to 12 MIPS of unbelievably fast processing power. DayStar cards have a long-standing record of reliability and high quality. All cards are ready to use. Simply plug into the NUBUS slot.

- DayStar 030 - 25MHz IIXx
  23632 - $1795
- DayStar 030 - 33MHz IIXx
  23633 - $3095
- DayStar IIEC Cache Card
  23634 - $754

Build Your Memory
Face facts. Newer and more powerful software programs are memory hogs. You always need more RAM. With 2MB to 4MB you can run at least a couple of applications with MultiFinder. If you really want to get serious, four of the new 4MB SIMMs means you'll have 16MB of RAM power, and that means the sky's the limit. MacAvenue offers only the best surface-mounted products. And you'll get a step-by-step installation guide and a tool to "crack" the Mac Plus or SE.

- 1MB SIMM. 25480 - $Call
- 4MB SIMM. 25481 - $Call

Television In The Computer Age
MicroTV lets you watch television, the VCR, or any other video source through a window on your Mac screen. MicroTV actually lets you operate most programs while video runs in a separate window. Capture any MicroTV image with a keystroke and save the image in PICT II format on the Clipboard. Use the captured image in a newsletter, report, or any other document. Includes 32-bit QuickDraw, channel control, and onboard tuner. Aapps MicroTV.

- 23731 - $275

Win The Marathon
Dove's Marathon 68030 accelerator card doubles the speed of your SE 30, while the 16MHz 020 accelerator makes an SE run faster than a Mac II. Edit detailed graphics and calculate columns in complex spreadsheets or jump from one application to another without waiting for your Mac to catch up. Once you've seen your Mac go this fast, you'll never want to go slow again!

- Dove 33MHz SE 30 Board
  23636 - $965
- Dove SE 020 with 881 and 1MB
  23637 - $875

· If you don't see what you want, call.
At MacAvenue we’re reaching into the future. Keep an eye out for smart, new MacAvenue hardware products, developed by our engineering design group. We’ll deliver them to you, manufacturer direct, at terrific savings. Order by phone, fax or mail.

Love us or your money back. $2 overnight delivery! Toll-free expert product support. 30-day money-back guarantee on anything and everything you purchase. Full one-year limited warranties on all products. Quantity discounts. And, if you don’t find what you want here, call us. We’ll get it for you. Call toll-free TODAY!

MacAvenue’s Stress-Free Guarantee

1. 30-Day Money-Back Guarantee
No questions asked. Every product MacAvenue sells will give complete satisfaction. If not, return it in the original packaging within 30 days of purchase. We’ll refund your money or we’ll pay the return freight, replace the product with new merchandise, and pay the freight back to you.

2. Toll-Free Technical Support • 90-Day Product Replacement
Should you experience a problem with anything you purchase from MacAvenue, call our product support staff at 800-766-6221 weekdays from 8:00am to 7:00pm, CST. We will be happy to assist you with any hardware or software difficulty. If we cannot resolve the problem over the phone, we will assign you a return material authorization (RMA) number and a Federal Express number. We will replace the product with equivalent merchandise and pay the shipping both ways.

3. One-Year Limited Warranty • We Pay Return Freight
For up to one full year after your purchase, MacAvenue will replace or repair (at our option and without cost to you) any product you are not completely satisfied with, and we will pay for return freight to you.

Everything we do at MacAvenue is designed to make it easy for you to get the affordable, reliable Macintosh products you want when you want them.

Call us toll-free from 8:00am to 9:00pm, CST, Monday-Friday, and Saturday 9:00am to 5:00pm.

- Orders placed by 8:00pm, CST, weekdays for “in stock” items ship the same day (barring system failure, etc.) with overnight delivery.
- VISA, MasterCard and American Express accepted. No surcharge.
- When ordering by fax or by mail, please include both your fax and telephone numbers.
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- Purchase orders accepted on a net terms basis with approved credit (minimum $500 initial purchase, thereafter $50).

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All return items must be accompanied by a return merchandise authorization (RMA) number. Prices and product descriptions are subject to change without notice. Neither CompuAdd nor MacAvenue is liable for damage due to omissions or typographical errors.
Fax

Just The Fax, Ma'am
This indispensable communications unit combines fax transmission, a graphic image scanner, and smooth user interface to your Mac. Sends and receives text and graphics by downloading files from Mac or standard paper input. Quite portable and easy to install. Can also be used as a desktop copier.
Relisys Telefax RA2110. 56072 - $1295

Modems

Link Your Mac To The World
The DataLink Mac is an internal 2400 baud modem for your Mac II which includes its own serial port, allowing you to add extra serial devices. The DataLink Mac can also be upgraded to send fax messages, when you're ready.
DataLink Mac. 22307 - $325

Expressly For The Mac
Hayes-compatible at 300 to 2400 baud, Applied Engineering's DataLink Express is the external modem made expressly for the Mac. Status light array enables easy monitoring of all transmissions. Package includes comprehensive communications software. Optional Send-Fax capability.
DataLink Express. 22306 - $215

A Port-A-Modem Deluxe
Designed specifically for the Macintosh Portable, the DataLink/Mac Portable is a state-of-the-art 2400 baud internal modem featuring error correction, a Send-Fax support option and low power operation which can extend the life of the Portable's battery. The modem also supports "Sleep mode," automatically cutting off power to most of the board when the modem is not in use. Software included.
DataLink/Mac Portable. 22308 - $299

Send It Fast!
Whether you're transmitting vital program code or valuable text documents, using the V-series Hayes Smartmodem 9600 assures maximum reliability for your data. Selects speed automatically on the initial handshake and transmits from 9600 down to 300 baud. On-line compression enhances data throughput, cutting data transmission time in half. Saves operator time by analyzing connection possibilities and choosing the most efficient option. (That means you pay less for transmission time!)
Hayes Smartmodem 9600. 49578 - $895

There's Nothing To It
Connect a Hayes Smartmodem 1200 or 2400 to your Mac, plug it into a phone jack, and you're ready to transmit and receive data. The Smartmodem 1200 adjusts speeds automatically from 1200 to 300 baud, monitors the connection, redials the last number called until it makes a connection, and can receive calls unattended.
The Smartmodem 2400 automatically sets transmission rates from 2400 to 300 baud and features digital signal processing, full international compatibility, call progress monitoring, and self-diagnostic tests.
Hayes Smartmodem 1200. 49501 - $299
Hayes Smartmodem 2400. 49576 - $385

From One State To Another
If you're a long way from the office but want to keep in touch, the Shiva TeleBridge will make you feel like you're right next door. With a Shiva TeleBridge and a high-speed modem at each location, you can print documents and send electronic mail to the New York office from the beach in Malibu. Now that's communicating! The only bridge that supports transfer rates up to 57,600 bit/sec, the TeleBridge can move vast amounts of data from coast to coast in minutes. With this equipment, who needs overnight mail service?
Shiva TeleBridge. 22506 - $339

CompuAdd Modems
CompuAdd Modem 1200 baud. 22304 - $99
CompuAdd Modem 2400 baud. 22305 - $159

• Full one-year limited warranties on all products!
Storage

You Can Take It With You
Loss, theft, and hardware failures are the enemies of data security. But with this 44MB Bernoulli hard drive you can give your data both security and portability. Use it with the new Macintosh portable or on your desktop. A portable drive makes a wonderful solution to the problems of backup and storage, too. Operates for two hours between battery charges. Offers nine utilities to manage and safeguard data. And, PageMaker fans, this storage device is endorsed by Aldus.

Iomega Portable 44MB Hard Drive. 24385 - $1850

Iomega Bernoulli Cartridge 3 Pack. 57805 - $199

Laser Power
An 800KB drive is a convenient and useful peripheral for your Macintosh. The Laser 800KB Floppy Drive gives you fast 12ms seek time along with quiet, reliable operation.

Laser 800KB Floppy Drive. 24734 - $175

Translation, Please
Sooner or later, even dedicated Macintosh converts will have to read something from a DOS floppy again. With DaynaFile, you'll never have to worry again about remembering any complicated command-driven process to read from an IBM-compatible. You manage a DaynaFile just like a conventional Mac drive — dragging, selecting and opening files. It operates transparently through your Macintosh applications, connecting to your Mac through the SCSI port. A DaynaFile can be daisy-chained to as many as six devices, and its icon appears on your desktop.

DaynaFile 5.25" 1.2MB. 24732 - $550
DaynaFile 5.25" 360KB/1.2MB. 24733 - $725

Quick, Get It On Tape!
Maximum data security is yours with a Tecmar tape backup. Units include icon-interfaced software and are compatible with all Mac hard drives. Tecmar QTs operate in the background under MultiFinder, so you can still use your Mac while you're backing up or restoring. Optional SCSI T-cable makes QT Mac units portable so you can use them with more than one Mac.

Tecmar QT Mac 40MB Tape Backup. 23830 - $950
Tecmar QT Mac 80MB Tape Backup. 23831 - $1225
Tecmar QT-40 Cable Kit. 24931 - $106
Tecmar QT Mac Data Cartridge 3 Pack. 26080 - $85.00

We Have A Special Rapport
Demand more from your floppy diskettes with the help of the Kennect 2.4 Drive. Stores 2.4MB on a 1.2MB floppy and 1.2MB on an 800KB disk. Reads, writes, and formats to all 3.5-inch disk standards — Apple and DOS. For Mac SE 30, IIfx, IICx or IIC.

Kennect 2.4 800KB Drive. 24730 - $325

For your Mac 512KE, Plus, SE or II, use the Kennect Rapport Adapter with your 800KB drive to accomplish what the Kennect 2.4 drive does for other models.

Kennect Rapport Adapter. 24930 - $195

Sony 3.5" 800KB Diskettes 10 Pack. 57401 - $14.00
Sony 3.5" 1.2MB Diskettes 10 Pack. 57440 - $25.00

Seek And Ye Shall Find
Use OnLocation to find lost files in seconds. This speedy little utility stores a compact index of your hard disk and scans this index when you type in even one word from a file. OnLocation scans the text of a file, so even if you completely forget a file name, your data isn’t lost for good. OnLocation can find text in word processing files and in PageMaker, Excel, or HyperCard files, too.

OnLocation. 30434 - $78

Call 800-477-6221 •
Accessories

Carrying Case

A. Hit The Road
Move your Mac in safe style with this padded, water-repellent nylon case. Features locking accessory pocket for disks and fully padded compartments for keyboard and mouse. There's even room for an extra diskette drive.
MacAvenue Carrying Case. 26894 - $85
MacAvenue Ext. Keyboard Carrying Case. 26901 - $76

Covers

MacPlus/SE System Saver Cover. 26894 - $8
Imagewriter II Dust Cover. 26895 - $8
LaserWriter II Dust Cover. 26897 - $12

Stands

B. Space: The Last Frontier
Free up space on your desktop — stand your Mac II CPU securely on its side beneath your desk so just your monitor and keyboard are left in front of you.
Kensington stand includes a stand to support the Mac II and extra-long cables for your monitor and keyboard. Kensington Mac II Stand and Cable Kit. 26892 - $63

Get A Better Look
Stop craning your neck and slumping in your chair to see your Mac screen! Use a Kensington Tilt/Swivel stand to get a better angle on the computer screen. Tilts to a twenty-degree angle (your neck isn't THAT long) and swivels all the way around (that's a three-sixty).
Kensington Tilt/Swivel Stand. 26582 - $21

C. Standing Tall
This printer stand supports most dot-matrix printers, including the Imagewriter. Raises the front 2.5 inches and the back 4 inches to allow you to monitor the printing. Offers paper storage under the printer and paper catcher to keep copy neat.
Kensington Universal Printer Stand. 26896 - $15
Mac II Monitor Stand. 25580 - $62
Mac II System Stand. 26887 - $20

Carrying Case

Monitor Accessories

D. Stop Glaring At Me!
Getting a glare off your computer screen can be annoying, cause red eyes and give you a headache. A Kensington Anti-Glare Filter reduces screen glare by 91% and improves screen clarity more than 15 times. Attaches to any Macintosh nine-inch monitor with adhesive fasteners — no tools required. Save your sunglasses for the times when you just want to look cool.
Anti-Glare Screen, Beige. 26882 - $32
Anti-Glare Screen, Platinum. 26883 - $32
Apple Color Monitor Polarizing Filter. 26891 - $82
Mac II Monitor Extension Kit. 26899 - $33

Data Storage

E. Wood That It Were
If you enjoy the natural look and feel of wood in your office space, stash your disks in one of MacAvenue's teak boxes. Two sizes.
MacAvenue Teak 3.5-inch single row. 41600 - $20
MacAvenue Teak 3.5-inch double row. 41601 - $29

F. The Medium is The Message
Trust your data to the best name in the business — SONY. High-quality diskettes mean that you'll have safer storage and transportation of your valuable information. Check MacAvenue's everyday low prices on diskettes and cartridges.
Sony 3.5" Diskettes, 800KB, 10 pack. 57401 - $14
Sony 3.5" Diskettes, 1.44MB, 10 pack. 57440 - $25

G. Now You See It, Now You Don't
This keyboard drawer saves desk space and allows you to get your keyboard out of the way when you need space to think.
MacAvenue Keyboard Drawer. 41753 - $19

H. Let's Keep It Clean, Okay?
Remove hard-to-reach dust and dirt on sensitive computers, diskette drives and monitor screens with Compuduster — now 70% more powerful and environmentally safe! Compuduster. 41023 - $24
Kleen Keyboard Kit keeps your keyboard spotless. Includes one ounce of cleaning solvent, eight keyboard swabs, and four ounces of Office Duster Jr.'s compressed air.
Kleen Keyboard Kit. 41019 - $10

I. Fine Art For Your Mac II
Finally the perfect power control center for your Mac II. Masterpiece organizes your power cords with a special computer outlet, four individually switched peripheral outlets and one convenient master switch. Surge suppression and noise control protect your entire system, and a separate filter protects your modem data from electrical disturbances on the phone line. And all of this isn't enough. Masterpiece also has a built-in swivel base for adjusting your monitor to that perfect position.
Masterpiece Mac II. 26893 - $103

Keep Your Mac From Wandering
The Kensington Security Kit tethers your Mac CPU, monitor, and keyboard so they stay where you put them using Apple's built-in security slots. The kit's unique screwdriver and tamper-resistant screws will lock up peripherals, too. Also fits Apple II GS.
Kensington Security Kit. 26884 - $33
Extra Long ADB Cable. 26900 - $24
Word Processing

When it's time to move beyond the realm of word processing into the realm of idea processing, it's time to get Microsoft Word 4.0. With Word, you can design a newsletter from start to finish, create tables without worrying about tabs, and flow type around imported graphics. Cruise through longer documents with the table of contents generator and full indexing capability. With Word 4.0 you can also customize menus and design style sheets to fit your exact needs.

A Junior Partner
If it's just words that make your business going, your relational database must give you all the power you need—even as your database doubles and triples. If your business is moving in this direction, buy 4th Dimension. 4th Dimension gives you the power and flexibility you need to get the most mileage out of your data. 4th Dimension can create forms, detailed reports, and mailing labels, and can communicate with other machines—all from within the Macintosh interface you already know.

And, when it's time to develop serious, special applications for the power of 4th Dimension, 4th Dimension Runtime gives you more power for your program needs. 4th Dimension Runtime.

Database

Into A New Dimension
When you depend on data to keep your business going, your relational database must give you all the power you need—even as your database doubles and triples. If your business is moving in this direction, buy 4th Dimension. 4th Dimension gives you the power and flexibility you need to get the most mileage out of your data. 4th Dimension can create forms, detailed reports, and mailing labels, and can communicate with other machines—all from within the Macintosh interface you already know.

And, when it's time to develop serious, special applications for the power of 4th Dimension, 4th Dimension Runtime gives you more power for your program needs. 4th Dimension Runtime.

Call Today:
Hundreds Of Other Titles Available.

Spelling Coach Pro 3.1 30620 - $112.00
Spellingwell 30596 - $144.00
WordFinder 2.0 30622 - $31.00
WordPerfect Mac 30590 - $183.00
WriteNow 30588 - $107.00

Programing

I Think, Therefore I Program
Flash from concept to product in the blink of an eye. With Think C's fast compiler and linker, programming time shrinks to no time. Devise new applications, DAs, INITs, drivers, or HyperCard functions in this powerful but flexible programming environment. Whether you choose object-oriented programming or procedural programming, Think C will help you build and manage your program with maximum efficiency.

Think C.

Office Programs

BulkMailer 3.3 27812 - $76.00
BulkMailer Plus 27814 - $187.00
KeyPlan 27810 - $243.00
Microsoft Office Bundle 30182 - $525.00
Paracomp Milo 27806 - $156.00
ProVue Panorama 27808 - $197.00

Spreadsheets

Caught In The Crunch
Number crunching used to be dull business, but Wingz makes spreadsheets come alive. Folks who expect spreadsheet programs to handle columns of numbers will love Wingz—it moves numeric mountains! And, as the first graphic spreadsheet, Wingz can also generate
Than A Speeding Pencil...

Dynamic graphs and charts — quickly and in 3-D. Use drawing tools from the Wingz toolbox to combine illustrations and clip art into attention-getting reports and presentations. Then resize text fields to add power to the explanations for your figures. Who says numbers have to be dull?

Wingz.
Full Impact
30184 - $245.00
30196 - $245.00

You Too, Can Excel
Microsoft Excel provides users the power of a fast-moving spreadsheet while it blasts through mountains of data with rocket-speed. Combine the spreadsheet and database with an array of 42 charts, and you have business graphics that will make heads turn at your next presentation. With the built-in macro language you can automate complex, repetitive tasks. And this is just the beginning! Excel also handles complicated scientific, financial, and mathematical functions, supports color display and output, and lets you work on several spreadsheets at once. It's a powerhouse!

Microsoft Excel. 30180 - $245.00

Utilities

Play It Again, SAM (and Sum)
Stop a hideous virus before it starts with Symantec's AntiVirus for the Macintosh (SAM). On-line help takes the guesswork out of scanning suspicious files or folders. When SAM detects any viral activity inside your Mac, it deletes the deviant code immediately.

Sleep peacefully, knowing your data is safe, with the help of SAM's brother, Sum II, Symantec's Utilities for the Macintosh. Sum II maintains dependable backups, recovers lost data, guards against crash damage, and secures your hard drive from spies.

SAM. 30342 - $63.00
Sum II. 30340 - $92.00

Have You Backed-Up Lately?
Keep backup and archive files in perfect order. With full LocalTalk network capability, Retrospect handles large storage devices, too, including optical, tape, and high-capacity hard drives. Organize your filing system the way you've always dreamed of with Retrospect.
Retrospect. 30384 - $152.00

Born On The Fourth Of July
Enjoy safe fireworks and a safe screen. Pyro! prevents phosphor burnout by replacing your screen image with random visual pyrotechnics.
Pyro. 30398 - $14.00

MacUser May 1990
The Mail Must Go Through
Install Microsoft Mail in your office and watch communication and productivity improve exponentially! Brainstorm without the meeting, work as a group with no shouting. With Mail you can massage a document, attach a message or a memo, and pass both to your co-creatives for revision without ever touching paper. For accounting or purchasing, you can add custom forms via Mail's HyperCard formbuilder. AppleShare- and TOPS-compatible, Mail uses the LocalTalk network and can serve multi-vendor networks including VAX and PC networks.

Microsoft Mail/Server powers the electronic mail service, stores messages, or delete users and alter network parameters with ease.

Microsoft Mail
Workstation. 27676 - $83.00
Microsoft Mail - Server. 27678 - $246.00
Microsoft Mail 20 Pack. 27680 - $965.00

Quickmail 10 Pack 27696 - $248.00
Quickmail 5-User 27694 - $165.00
Quickmail Remote 27692 - $292.00
SmartComII 27662 - $84.00
Timbuckta 3.0 27666 - $95.00
Timbuckta Remote 27668 - $123.00
TOPS for DOS 2.1 27684 - $98.00
TOPS for the Macintosh 27682 - $188.00
TrafficWatch 27674 - $127.00
White Knight 27694 - $87.00

Carbon Copy Mac 27708 - $119.00
CompuServe Info Service 27702 - $23.00
CompuServe Navigator 27704 - $38.00
Connect 27706 - $93.00
Desktop Express 27672 - $94.00
Dow-Jones News/Retrieval and Membership 27670 - $23.00
InBox Connection 27689 - $41.00
InBox Starter. 27688 - $143.00
In/Out 5-User 27698 - $127.00
In/Out 10-User 27700 - $187.00
LapLink 2.0 27710 - $85.00
Microphone II 27660 - $213.00
Microsoft Mail - Workstation 27676 - $83.00
Microsoft Mail - Server 27678 - $246.00
Microsoft Mail 20 Pack 27680 - $965.00
NetPrint V.2.0 27686 - $115.00

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CompuServe Navigator 27704 - $38.00
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Desktop Express 27672 - $94.00
Dow-Jones News/Retrieval and Membership 27670 - $23.00
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Microsoft Mail - Workstation 27676 - $83.00
Microsoft Mail - Server 27678 - $246.00
Microsoft Mail 20 Pack 27680 - $965.00
NetPrint V.2.0 27686 - $115.00

- Expert toll-free product support.

Money Management
101 Macros for Excel 28476 - $35.00
Business Sense 28466 - $265.00
Checkwriter 28468 - $35.00
Dollars & Sense 28464 - $78.00
Easy Light MAC 28474 - $41.00
Insight AR 28442 - $395.00
Insight AR/MAC 28440 - $395.00
Insight AR/Mac 28442 - $395.00
Insight General Ledger 28444 - $395.00
Insight Inventory 28446 - $395.00
Insight Payroll 28448 - $395.00
Insight Time Bill 28450 - $395.00
MacMoney 3.5 28478 - $58.00
Managing Your Money 28462 - $122.00
Quicken 28458 - $35.00
StatView II 28470 - $285.00
Statview SE + Graphics 28472 - $201.00

It's Money That I Love
Bypass painful bookkeeping chores with Quicken, the helpful money management program that costs you less than an hour with an accountant. Keep tabs on your expenses, watch the bottom line of your small business, and track your personal income — simply and easily, and all at the same time. Quicken writes and addresses checks, reconciles your bank statement, and lets you know where you are with the budget. Save yourself the monthly headache. Get Quicken! Quicken. 28488 - $35.00

Scheduling
MORE For Your Money
No detail is too small — or too monumental — for MORE II. Juggle several major projects at once. MORE II offers users word processing, outlining, and slide generation as well as handouts for clients. Includes tools to create graphs and charts in color for overheads and printed material. Take your Mac along to impress the crowd with a MORE-II generated, self-running presentation to make MORE of an impression yourself. MORE II. 30604 - $243.00

C.A.T. 29742 - $225.00
Fast Track Schedule 29744 - $108.00

Publishing/Presentation
Adobe Fonts: All 122 available Call Adobe Illustrator 88 29788 - $275.00
Adobe TypeAlign 29826 - $58.00
Certificate Library 29810 - $17.00
Certificate Maker 29808 - $21.00
Cricket Graph 1.3 29806 - $133.00
Cricket Presents 2.0 29804 - $213.00
EPS Business Art 29818 - $73.00
EPS Illustrations 29816 - $72.00
FreeHand 29784 - $345.00
Letraset ImageStudio 29790 - $273.00
Letraset Ready-Set-Go 29792 - $273.00
Letraset Studio 29794 - $273.00
MacKern 29820 - $113.00
PageMaker 29870 - $383.00
PageMaker Color Ext. 29876 - $133.00
Persuasion 29782 - $337.00
PowerPoint 2.01 29798 - $246.00
Publish-It 29842 - $323.00
QuarkStyle 1.0 29800 - $185.00
Silicon Press 29796 - $51.00
Springboard Publisher 29814 - $107.00
Top Honors 29812 - $57.00
Room Full Of Assistants...

Take The XPress
To get into a publishing environment where you have the power and control you want, grab a ticket on the Quark XPress. XPress gives you exact control over line spacing, kerning, and word spacing. Import text from almost any word-processing program and graphics from any format. Ready for color? Quark makes color separations and uses the Pantone Match System to give you a 16 million-color palette for spot color. And, unlike other desktop publishing systems, Quark gives you both an 80,000 word dictionary for spell checking and a “Search-and-Replace” feature.

Quark XPress 2.1. 29802 - $455.00

Present Yourself In The Best Light
Impress your clients, your boss, or just your friends. With Aldus Persuasion, you can outline your thoughts, develop a slide presentation, and generate printed handouts for your audience all at once. Begin with one of Persuasion's templates, complete with charts and graphics, or use your own unique format to make believers out of skeptics. You can even produce a self-running trade show demo.

Persuasion. 29782 - $337.00

Join The Desktop Revolution
Publish anything — newsletters, books, magazines, even box tops! Documents of any length are a piece of cake with Aldus PageMaker. Imports all sorts of graphics files, kerns type, changes leading, and wraps text manually or automatically around irregular images. Get started yourself in a hurry by using the program’s pre-formatted templates, or put PageMaker in the hands of a graphics genius and — voila — you’ll have your own printed masterpiece. PageMaker supports color and accepts almost all word-processing files.

PageMaker. 29780 - $383.00

Beyond The Jagged Edge
Banish forever jagged edges on the bit-mapped letters of your screen fonts!! Adobe TypeManager gives you the smooth-edged look of PostScript type while it dramatically improves the output of your non-postscript printer. By eliminating the need to store several sizes of each font, TypeManager preserves valuable storage capacity on your hard drive.

Adobe TypeManager. 29824 - $55.00

Design Graphics

Adobe Photo Shop 29266 - $570.00
Canvas 29232 - $163.00
Click Art Business 29252 - $27.00
Click Art Christian 29256 - $34.00
Click Art Holidays 29254 - $27.00
Cricket Draw 29234 - $136.00
Curator 29264 - $71.00
DeltaGraph 29259 - $97.00
Digital Darkroom 29224 - $248.00
Dreams 29238 - $263.00
Electronic Arts Studio 29242 - $95.00
Electronic Arts Studio/8 29244 - $295.00
MacDraft 29240 - $143.00
Macromind Accel. 29258 - $115.00
Macromind Director 29216 - $445.00
Paracomp Model Shop 29218 - $378.00
Paracomp Swivel 3-D 29220 - $294.00
PixelPaint 29228 - $223.00
PixelPaint Professional 29230 - $393.00
Smart Art 1 29246 - $83.00
Smart Art 2 29245 - $83.00
Smart Art 3 29250 - $83.00
Super3D 29226 - $313.00
SuperPaint 29222 - $124.00
Videoworks II 29208 - $172.00
Videoworks II Accelerator 29212 - $99.00
Videoworks II HyperCard 29210 - $60.00

Join The Desktop Revolution

Paint The Town
Master the arts of photo retouching and image manipulation with PixelPaint Professional. It takes advantage of 32-bit QuickDraw and 16 million colors. Start a stunning portfolio piece with the amazing airbrush and polish it up with full range of pencil and brush strokes. Or, import a scanned photograph and colorize it, add a drop shadow, and generate special effects. Compatible with all standard file formats, PixelPaint Professional also makes four-color separations.

PixelPaint Professional. 29230 - $393.00

Call toll-free 800-477-6221

MacUser May 1990
Able To LEAP Through The Luck Of The Draw

Design a logo or a masthead with the host of special effects Cricket Draw puts at the user's command. Wrap words along curves, change fonts and styles in blocks of text. You'll give your messages powerful new impact with graded tints and other features that enable you to handle text in new ways. Incorporate freehand drawings and object-oriented graphics into anything you do. Cricket Draw imports EPSF from several programs, including Adobe Illustrator.

Enjoy the flexibility of object-oriented graphics together with the detail of bitmap painting with Cricket Paint. Any shape, line or texture can be immediately incorporated into your illustration—without the confusion of different layers. Paint outputs in a broad range of formats to almost any printer.

Cricket Draw. 29234 - $136.00
Cricket Paint. 29236 - $176.00

More Words Per Minute
If the "hunt and peck" method just isn't getting your work done fast enough, Type! will set your fingers flying over the keyboard in a few short sessions. Type! is a program that entertains users while it teaches them how to improve typing skills with each hand—even with each finger. Type! is the result of scientific research on how people actually learn to type; it was designed not only to tell you where your errors are but to teach you to correct them—on the spot—and then build more productive typing skills.

Type! 27958 - $17.00

Love Triangles
If you've given up on learning the difference between an equilateral and an isosceles, or if the acute angle has finally gotten obtuse, check out Geometry—the program. Geometry is the educational program that can make triangles into friends again. Geometry clarifies abstract concepts through the use of interactive animation. And it won't leave you in the dark when you need a pointer either, because Geometry provides references, explanations, and answers to every problem it poses.

Broderbund Geometry. 27962 - $57.00

Education

Algebraic Proposer 27946 - $44.00
Atlas Explorer 27956 - $27.00
Broderbund Physics 27966 - $57.00
Broderbund Geometry 27962 - $57.00
Broderbund Calculus 27964 - $57.00
ConcertWare + MIDI 27998 - $98.00
Dinosaur Discovery Kit 27976 - $26.00
First Shape 27982 - $31.00
Jam Session 27960 - $28.00
Kids Math 27990 - $25.00
KidsTime 27988 - $24.00
KidTalk 27980 - $31.00
Math Blaster! 27968 - $25.00
Math Blaster Mystery 27970 - $25.00
NumberMaze 27992 - $25.00
Puzzle StoryBook 27974 - $26.00
Reader Rabbit 28000 - $30.00
SmoothTalker 27978 - $31.00
Speed Reader II 27972 - $25.00

Have Fun While You Learn
If you are dragging—one-word-at-a-time—through your reading, get a copy of Speed Reader II to increase both reading speed and comprehension in six easy lessons. You will stop wasting time by training your eyes to move more efficiently across a page. Speed Reader II lets you chart your progress with a selection of graphs so you can watch yourself improve.

Speed Reader II. 27972 - $25.00

Blaster Mystery also develops inductive and deductive reasoning skills while the user solves a mystery.

(P.S. Both Speed Reader II and Math Blaster Mystery are good for adults as well as for kids.)
### Games

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**Take To The Air**

Even without the real-life opportunity to be Top Gun, you can still get behind the regulation FAA controls of a Gates Learjet 25G and zoom through the clouds with Microsoft's Flight Simulator. If you prefer a combative flying experience, go airborne in a World War I fighter. If you choose the Cessna 192, don't push the throttle too hard or you'll stall. Technical questions you face while "flying" are as real as the sound effects. Flight Simulator offers a thrill a minute!

**Flight Simulator 1.02.**

**It's Your Town**

Are you a model citizen? Or does every policeman know you by your first name? It doesn't matter in SimCity, because you're the boss. Build the perfect city — full of ideal renewal projects — or create the most bizarre urban landscape you can imagine. Raise taxes, lower taxes, stop taxes. You're the mayor, the planner, the cop on every beat. You can even cause natural disasters in SimCity. And the Sims — the simulated humans that live in your city — always respond to your decisions. Talk about a dream come true...

**SimCity.**

**To Catch A Thief**

That notorious troublemaker, Carmen Sandiego, is on the loose again and you're the only one who can stop her uncivilized rampages. As a crafty detective, start your investigation by questioning witnesses at the scene of the crime. And, with each "game," you build more insight into Carmen's criminal mind.

In Where in the USA... Carmen's trail jumps from state to state. Luckily, the program gives you access to a crime computer and a copy of Fodor's USA travel guide to help you find her before she gets away.

In Where in Europe... you may have to track Carmen and company through every country of Europe, but the on-screen fact-finder's database and Rand McNally's Concise Atlas of Europe will teach you about all 34 countries while you look for her.

**Where in the USA is Carmen Sandiego?**

**Where in Europe is Carmen Sandiego?**
The Ultimate Desktop Solution

When you’re a master of words, images and color, your ideas soar straight to the top. These tools — the ultimate desktop solution — can be at your fingertips tomorrow.

Call MacAvenue today for the tools you need to solve tomorrow’s problems.

Maximize Your Resources

When your workgroup needs maximum access with minimum interruptions, call MacAvenue for the latest network products!

MacAvenue: the only way to GO!
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If your MacAvenue insert is already gone,

CALL

800-477-6221

We'll mail you one of your own—or one for a friend—TODAY.

MacAvenue: Your New Mail Order Source
For Macintosh Products.

Please circle 377 on reader service card.
Building a workable Mac system is a lot like remodeling a fixer-upper: Just when you think you’re nearly finished, along comes Frank the Vandal.

The Macintosh came out more than six years ago, and I seem to have had the builders in my house for almost that long. Someone asked me the other day what they were doing, and I explained that I had been trying to pluck up the courage to ask them that myself.

Things are rather complicated by the fact that one of them is an electrician called Frank the Vandal. That is, his friends, if he has any that aren’t in the hospital, call him Frank, and I call him Frank the Vandal because every time he needs to get at any bit of wiring, he tends to hack his way through anything else that’s in the way to get at it — plasterwork, woodwork, plumbing, telephone lines, furniture, even other bits of wiring that he’s put in himself on previous raids.

The house was virtually a complete wreck when I bought it. Not quite as much a wreck as it is when Frank’s been here, but nevertheless, it was pretty much an empty shell into which walls, floors, plumbing, and so on had to be put. When the

By Douglas Adams
Managing Your Money... NO OTHER PROGRAM DOES MORE FOR YOUR MONEY.

Managing Your Money® is the most comprehensive, easy to use money management program available on the Macintosh™! Fully integrated and updated for the new tax laws, MYM Mac is everything you'll ever need to master your personal or small business finances:

- CHECK WRITING AND BUDGETING
- TAX PLANNING
- INSURANCE PLANNING
- FINANCIAL PLANNING
- PORTFOLIO MANAGER
- NET WORTH

And there's more:

- POWERFUL SMALL BUSINESS FEATURES
- EXTENSIVE GRAPHICS & REPORTING
- EXPORTS TO EXCEL® AND MACINTAX®
- NOT COPY PROTECTED

Let Andrew Tobias become your financial advisor and find out why year after year, Managing Your Money is rated the outstanding program in its class.

"...Managing Your Money is the Mercedes of personal finance programs."
— Macweek, 9/13/88

Software that makes your personal computer worth having.
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For Macintosh Plus, SE, II, 512KE. Two disk drives (one being at least 800K).
Please circle 5 on reader service card.
From the Ground Up

walls have to be built, a bricklayer comes into the house and builds them. I need floors and stairs and cupboards and things, so a carpenter, whistling a merry carpenter’s tune, comes round and plies his trade. Then a plumber comes round and plumbs. Then Frank the Vandal comes round to wrench some wiring into place, and of course the carpenter and plumber and so on have to come round again and make extensive repairs. I’m going to have to drop the subject of Frank because he’s not a part of the analogy I am by slow degrees attempting elegantly to construct. It’s just that he preys on my mind a bit at the moment, and it’s difficult not to sit here feeling nervous while he’s in the house. So — forget Frank. You’re lucky. You can.

Now the point is this. The house is here. Building this house is the purpose of the whole exercise. If I want anything done in it, I pick up the phone (assuming Frank hasn’t hacked through the line trying to get at a light switch) and someone comes round to the house and does it.

If I want to have some cupboards installed, I don’t have to do the following: I don’t have to have the house completely dismantled, shipped up to Birmingham where the carpenter is, put together again in a way that a carpenter understands, then have the carpenter work on it, and then have the whole thing dismantled again, shipped back down to Islington, and put together again so that it works as a house that I can live in.

So why do I have to do that with my computer? Let me put it another way so that it makes sense. Why, when I’m working in a document in one word processor, do I keep on finding that if I want to do something else to the document I have to virtually dismantle the document and ship it over to another word processor that has a feature I need that the first one doesn’t? (Why don’t I just use the second word processor? Well, because it doesn’t have other features that the first one does, of course.) Or, if I want to put a picture in the document, why do I have to go to another program entirely and do the picture there, and then go through all the mind-numbing palaver of discovering that for some reason the word processor I’m using doesn’t know how to handle graphics in that system that the Mac has now become.

What I want to be able to do is this:

1. Turn on the machine.
2. Work.
3. Have a bit of fun, provided I’ve done enough of 2, which is rarely, but that’s another issue.

When I say “work,” I mean I want to be able to start typing on the screen, and if I feel like putting in a drawing, I draw on the screen. Or I bring something from my scanner onto the screen, or I send something from my screen to someone else. Or I get my Mac to play the tune I’ve just written on the screen on a synthesizer. Or... well, the list obviously is endless. And if I need any particular tool to enable me to do anything complicated, I simply ask for it. And I mean simply. I should never have to put away the thing I’m working on unless I’ve actually finished it (fat chance, say my publishers) or want to do something entirely.

What I’m talking about is the death of the “application.” I don’t mean just when they “unexpectedly” quit; I mean it’s time we simply got rid of them.

What I’m talking about is the death of the “application.” I don’t mean just when they “unexpectedly” quit; I mean it’s time we simply got rid of them.

Ah! HyperCard!

I know it’s unfashionable to say this, because a lot of people feel that HyperCard simply isn’t powerful enough to do useful work in. It is, after all, a first stab at an idea that’s in its infancy. The list of things you can’t do with it is almost as long as the list of macros in Nisus. (What are all those things? The very act of pulling down the macros menu causes lights to dim all over North London.) But it’s a sensationally good idea, and I would dearly love to see something like it become the whole working environment for the Mac. You want the number-crunching power of

MacUser May 1990 151
Hidden in that forest you and your co-workers call hard disks is vital information. Let's say you need all documents concerning a certain client. A few Word and MacWrite documents. A spreadsheet or two. A MacProject plan. And maybe a few electronic mail messages.

You need Marco Polo™ It's the able research assistant for your hard disk or file server.

Step One Take all of the documents anyone in your group wants to keep handy and Marco Polo compresses them to a fraction of their original size. It then puts them together into a central repository, much like a research library.

Step Two At any time, you can ask Marco Polo in plain English to go look for all documents that fit your criteria. By name. By content. By archival date. (You get the idea.)

Marco Polo then fulfills your request. Documents that once filled entire hard drives are searched in just a few seconds.

And now here's the part that separates Marco Polo from ordinary search programs. Instead of merely telling you which files to open, Marco Polo displays a miniature picture of any or all of these documents. And actual size documents are but a double-click away.

So that, much like opening a thick file folder, you can review, copy, or print different but related documents all at once, without any of the original applications.

And that's not all. Perform multiple searches to view your information from different perspectives. By territory. By sales period. By department. (You name it.) Link search queries to HyperCard-like buttons for point and click retrieval. For example, click on the marketing department in an organization chart to display all the documents produced by that group last week.

Your research assistant even works overtime. Marco Polo will notify you about documents of interest that don't even exist today.

If all this sounds like the way people really work, it's because it occurred to us that computers ought to mirror ways people do things.

Not vice versa.

Now let Marco Polo do the work for you. Contact us for the dealer nearest you or for additional information.

(818) 991-6540.

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71 rue des Ateliers, B-1040 Brussels, Belgium 32/733.97.91.

Please circle 166 on reader service card.
From the Ground Up


Or rewrite it.

If it's properly written in object-oriented code, it should be as easy as writing HyperTalk. (All right. You can't write HyperTalk. It should be easier to write than HyperTalk. Just point at the bits you like and click.) We should not have to be tyrannized by application designers who don't know the first thing about how actual people do their actual work: we should be able to just pick up the bits we like and paste them in.

About Cupboards

I've gone on a bit about electricians. I would like to talk about cupboards. One particular cupboard. It's a cupboard in the corner of my study and I dare not go into it, because I know that if I go into it I will not emerge until the end of the afternoon and I will emerge from it a sad and embittered man who has done battle with a seething black serpentine monster and lost. The seething black serpentine monster is a three-foot-high pile of cables, and it both taunts me and haunts me. It taunts me because it knows that whatever cable it is that I want at any particular moment to connect one particular arcane device to another particular arcane device is not to be found anywhere in its tangled entrails, and it haunts me because I know it's right.

I hate cables. They hate me too because they know that one day I will simply be able to go into that cupboard with a flamethrower and get rid of the lot of them.

Frank the Vandal, I have transferred this article to my portable Mac (I know, I know, you hate me. Listen. We'll all have one in the end. They'll bring the price down, trust me. Or rather, don't trust me, trust Apple. Well, yes, I see your point. Please can I get back to what I was saying anyway?) and have taken the additional precaution of taking it round to a friend's house that is entirely electrically isolated from anything that

I hate cables. They hate me too because they know that one day I will simply be able to go into that cupboard with a flamethrower and get rid of the lot of them.

Frank may be up to.

When I get back home with the finished piece, I can either copy it onto a floppy disk, assuming I can find one under the debris of half-finished chapters on my desk and then put that into my main Mac and print it (again assuming that Frank hasn't been near my AppleTalk network with his chain saw). Or I can try to do battle with the monster in the cupboard till I find another AppleTalk connector somewhere in its innards. Or I can crawl around under my desk and disconnect AppleTalk from the IIx and connect it to the portable. Or . . . you get the picture — this is ridiculous. Dickens didn't have to crawl around under his desk trying to match plugs. You look at the sheer yardage of Dicken's output on a shelf and you know he never had to match plugs.

All I want to do is print from my Portable. That isn't all I want. In fact, I want to be able regularly to transfer my address book and diary stacks backwards and forwards between my Portable and my IIx. And all my current half-finished chapters. And anything else I'm tinkering with, which is the reason why my half-finished chapters are half-finished. In other words, I want my Portable to appear on the desktop of my IIx. I don't want to have to do battle with cupboard monsters and then mess about with TOPS every time I want that to happen. I'll tell you all I want to have to do in order to get my Portable to appear on the desktop of my IIx.

I just want to carry it into the same room.

Bang. There it is. It's on the desktop.

This is infrared talk. Or maybe it's microwave talk. I don't really care — any more than I want to care about PICTs and TIFFs and RTFs and SYLKs and all the other acronyms that merely say "We've got a complicated problem, so here's a complicated answer to it."

Let me make one thing clear. I adore my Macintosh, or rather my entire family of however many Macintoshes it is that I've recklessly accumulated over the years. I've adored it since I first saw one at Infocom's offices in Boston in 1983. The thing that has kept me enthralled and hypnotized by it for all that time is the perception that lies at the heart of its design, which is this: "There is no problem so complicated that you can't find a very simple answer to it if you look at it the right way." Or, to put it another way, "The future of computer power is pure simplicity." Some my two major wishes for the 1990s are that the Macintosh systems designers get back to that future, and that Frank the Vandal gets out of my house.

Douglas Adams has authored two trilogies: the four-volume Hitchhiker's series, and the two-volume Dirk Gently saga. The answer is 42.
There's a Word for...
Whether you're a marketing maven on your way up, a scientist knee-deep in formulas, or a temp trying to cope with an unfamiliar corporate mindset, when it comes to putting thoughts to paper, Microsoft is the Word for you.

And our users aren't the only ones who think so. Recently, the editors of Mac User gave Microsoft Word version 4.0 the highest rating of any Macintosh word processing program. Period.

A move we weren't altogether surprised by. You see, besides being perversely committed to research and development, we use a highly sophisticated approach to improving our product. We listen.

All of which has led to innovations like Word 4.0's powerful Table feature, enabling users to create side-by-side paragraphs, lists and even forms, without the hassle of dealing with tabs.

And since there are other word processing programs, Word 4.0 provides connectivity to Microsoft Word version 5.0 for the PC, PC WordPerfect, DCA and other file formats. So now you can share your work with those less fortunate than yourself.

What's more, Word 4.0 is uniquely capable of delivering even more performance when it's used with other applications. For example, even highly educated executives can import Microsoft Excel tables and charts and automatically update them. Making it easy to ensure document accuracy. Plus, Microsoft Mail can be sent from within Word 4.0, significantly boosting workgroup productivity.

For something a tad more informative than this ad, call (800) 541-1261, Dept. J93, to receive a brochure or ask for the location of your nearest dealer for a demo. You'll find that no matter what type of word processing you're performing, you could be doing it better.

Just take our Word for it.
Accounting software spans a range from one-write systems for individual users to massive consolidated accounting systems for corporations. We assess the full range of programs and recommend what's best for you.

The Macintosh accounting-software industry expanded in 1989. Several new products, such as Satori’s Components and Layered’s atOnce!, have made significant inroads into the market this year, while older programs such as Chang Lab’s Rags to Riches continue to guard their market share.

For new users, trying to pick which accounting system will work best for their business is still difficult. The distinctions among the three market segments—one-write systems, corporate accounting, and consolidated accounting—are more blurred than ever.

Choosing an accounting system is not only important to the health of your business; it’s critical. Without a solid, functional accounting system, your business will have problems in control, cash flow, inventory, and a host of other areas.

To demystify the accounting-software market, we are reviewing similar packages together. Three market segments split the Mac accounting-software market not by price—although the prices for packages in one segment are often alike—but by functionality.

The easiest way for you to zoom in on which suite of software you should evaluate is to read the introduction to each section to learn if that segment applies to your business. If it does, then our capsule reviews of each product will give you a good overview of the market, and our bottom-line results can help you pick the winners in each area.

To choose a system, we recommend that you see a program in action. In most areas, small accounting firms and accounting-implementation consultants can show you how one or more packages work. Many of these firms often install the software for a nominal fee if you buy it from them.

More often than not, the additional cost (these firms usually sell software at list price) is worth the implementation assistance. Installing an accounting system is a time-consuming, critical process that is best left to the professionals.

The performance of your software is governed by its installation. How you set up the chart of accounts, how your reports are defined, and how you link your Mac accounting to your manual-accounting systems all influence the overall performance of your Mac’s accounting system. At a minimum, get some feedback from your CPA. Rest assured, he or she is using a computer.
Mac users in Business and Graphic Arts have long found the superior graphics of Cricket alluring. Now, Cricket Presents, Graph, and Draw have something you'll find even more irresistible. It's the promise of greater innovation and long-term backing that comes with the name Computer Associates. With the addition of CA-Cricket to its roster of Macintosh products that already includes such renowned programs as Bedford Accounting software, Computer Associates makes yet a further commitment to all Mac users.

It's a commitment that goes beyond giving you the best service and support in the industry. It's a commitment to back your graphics products with the same kind of innovative graphics technology we've already made available to thousands of companies throughout the world.

For more information about CA-Cricket's graphics packages and our new support program, SupportPlus™, call 1-800-531-5236. (In Canada, 1-800-663-6904.) It's sure to be food for thought.

See us at MacWorld, Moscone Center, Booth 443.

Please circle 25 on reader service card.
One-Write Systems

One-write systems take their name from the manual accounting forms used in many small businesses. Manual systems use carbon or NCR paper to make a copy of all receipt and disbursement transactions. The Mac versions of one-write systems replace the carbon paper with disk storage and add additional functions such as reporting, automatic batching of recurring entries, and the like.

One-write programs are best suited for small cash-based businesses such as retail stores, sole proprietorships, and professionals who don’t need time billing. These programs are characterized by an integrated general-ledger, accounts-payable, and accounts-receivable system. They don’t offer inventory, time-billing, job-cost, or order-entry systems, but they do strictly watch where your cash comes in and goes out.

atOnce! 1.0

atOnce! is an integrated general-ledger, accounts-payable, accounts-receivable, and payroll system for small businesses. The system is designed to work in stand-alone mode for businesses with up to approximately $10 million in sales.

atOnce! allows multiple modules to be open simultaneously, so you can enter invoices into accounts receivable and then switch to accounts payable without closing your receivables out.

A helpful aspect of atOnce! is its Inquire feature, which lets you keep lists of such items as your general-ledger accounts, customers, invoices, bills, and employees as a reference guide outside the accounting system. The system is driven by an icon-based application palette that controls your navigation through the four modules.

atOnce! offers 12 or 13 periods per fiscal year with up to 26 open periods stored online. The system also tracks actual versus budget performance for all income and expense accounts. The accounting numbering system uses two- to eight-digit account numbers. The ledger system can handle up to 100 departments and divisions and supports auto-reversing and recurring entries.

atOnce! offers a full set of standard reports as well as a custom report writer. Layered planned to release an updated version that imports and exports data to spreadsheets by early March. The current version requires a Mac Plus or later with a hard-disk drive and System 4.1 or later.

Pros: Accounts receivable uses the open-item or balance-forward accounting method for the entire company or by customer. Offers a recording feature for handwritten checks. Full-function payroll. Full background printing.

Cons: Can slow down in high transaction usage.

List Price: $395
Layered, Inc.
The Schrak Center
529 Main St.
Boston, MA 02129
(617) 242-7700

PLAINS & SIMPLE 1.05

An excellent one-write system, Plains & Simple is easy to install, has excellent documentation, and is backed by one of the most professional service organizations in the business. The system offers a full general-ledger, accounts-receivable, accounts-payable and reporting module. Plains & Simple flows smoothly, makes nice use of the Mac interface, and is as easy to use as manual systems. Its cash receipting is flexible, so that cash can be applied to oldest or specific transactions, for example.

Plains & Simple offers three- to six-digit account numbers that can be expanded at any time. To simplify installation, the system supplies 14 predefined account categories. Even though it is a low-end one-write system, Plains & Simple offers a full audit-trail capability. The program works on a Mac Plus or later with a 20-megabyte hard-disk drive and requires System 3.2 or later.

Pros: Maintains multiple checking accounts. Provides more than 20 comprehensive reports. Handles multiple company accounts.


List Price: $395
Great Plains Software, Inc.
1701 S.W. 38th St.
Fargo, ND 58103
(701) 281-0550

MacUser May 1990
I used to think a large screen was a luxury. Now I can't live without it!

Until now, high quality large screen displays cost more than a Mac Plus. Once I got over the sticker shock, I found that a large screen display was the greatest productivity enhancement I'd experienced. I challenged our own engineers to build display systems with the quality and features of the market leader at prices anyone can justify.

PixelView™. . . it didn't happen overnight!

We sourced tubes from the same manufacturer as Apple. We chose the same screen phosphor used by Apple and Radius, but to completely eliminate irritating flicker, we boosted our vertical refresh rate to 78hz. Then we added enhancements like pop-up menus, enlarged cursor and menu options, screen saver and screen copy. And believe it or not, we did it at a $667 price!

From Mac Plus to Portable—we've got you covered.

We have PixelView display systems for the Mac Plus, SE, SE30, II, IIx, IIcx, IIci, and Mac portable! And PixelView systems come in single or dual page screens.

Take one for a test spin. (But don't say I didn't warn you!)

Take my modem. Take my (gulp) hard drive, but leave me my monitor! I feel that strongly, and believe you will too. Don't go another day squinting and scrolling! Try any of our display systems for 30 days. If you aren't convinced that your money was well spent, we want it back!

"I want you to test drive one for 30 days. Love it or return it!"

Ronald Eibensteiner, President/CEO

Call us today at 1 800 654-5294
Buy At Factory Prices!

V40 40Mb Hard Drive

How can we sell our New V40 for $427? This price breakthrough is made possible by new drive technologies and our volume purchases. The V40 drive ships formatted, tested and loaded with 10Mb of software and includes all the features found on our other drives; cables, international power supplies, external SCSI switching, and cooling fan.

One year warranty. Sorry, no dealer inquiries.

20Mb Internal Hard Drive

Sleek, fast, and quiet. International power supply, SCSI switching, fan, and cables are standard equipment. Shipped formatted, tested and loaded with over 10Mb of software. Internal and external models available for most Macs. Two year warranty.

Model Mb Int. Ext.
M20 20 $337 $397
M30 30 $377 $457
M45 45 $427 $517
M60 60 $557 $687
(all use super quiet 3.5" drives)

MP-Series 40Mb Internal

These are the premium drives that review's rave about! Similar to the M Series, except our MP Series drives contain the fastest mechanisms in the industry (the slowest of which is 19ms). Internal and external models available for most Macs. Two year warranty.

Model Mb Int. Ext.
MP40 40 $447 $527
MP60 60 $757 $837
MP100 100 $97 887
MP200 200 $147 1227
MP290 290 $1997
MP580 580 $2997

RM600 Erasable Optical

If you're saving huge files (like 24 bit images, scans, or large data-bases), the RM600 is the right solution for you! Our RM600 erasable optical delivers disk storage at the lowest cost per Mb. We've incorporated second generation technology to bring you the greatest speed and industry-wide compatibility. Full ISO/ANSI compliance.

Two year warranty.

RM• Erasable Optical

If you're saving huge files (like 24 bit images, scans, or large data-bases), the RM600 is the right solution for you! Our RM600 erasable optical delivers disk storage at the lowest cost per Mb. We've incorporated second generation technology to bring you the greatest speed and industry-wide compatibility. Full ISO/ANSI compliance.

Two year warranty.

MP40 40 $447 $527
MP60 60 $757 $837
MP100 100 $97 887
MP200 200 $147 1227
MP290 290 $1997
MP580 580 $2997

DriveCare

Dead Ehman or Apple Drive? Our experts can breathe new life into almost any fixed or removable hard drive. And we recover data too! SuperMac, Jasmine, Rodime, CMS MacBottom, and others. 20-500Mb. They're all welcome! (ie: 40Mb start at $277).

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Introducing Real-Time Accounting for the Macintosh®.

The Macintosh® has always had the potential to be a powerful accounting tool. All you needed was the right software.

Now it's here. Introducing Champion Accounting Software for the Macintosh user. The same features that have made Champion the leading real-time business accounting system in the DOS world are now available to you.

Here are just some of the advantages you can expect with Champion:
• Advanced real-time technology eliminates the need to "batch" or "post". They are done automatically.
• Convenient pop-up windows for instant, on-line access to essential data.
• 24 months "open"—an indispensable feature when a 13th period just isn’t enough.
• A CPA perfect audit trail.

• Unlimited description of services for detailed professional billing statements.
• Data security: if your computer goes down, your books will be restored and balanced automatically.
• A built-in expense coding field lets you prepare special customized reports.
• Source code is available so that you can modify the software to suit your specific needs. Or you may opt to use Champion’s custom programming services.

And this is just the beginning. Add up all of Champion’s features, and you have everything it takes to turn your Macintosh into a serious accounting tool. For the name of the Champion dealer nearest you, call 1-800-688-8666. Dealer inquiries are also invited.

Macintosh is a registered trademark of Apple Computer, Inc.

Please circle 46 on reader service card.
he major difference between one-
write and corporate accounting sys-
tems is that corporate systems use
classic double-entry bookkeeping.
For each entry, there must be one
or more offsetting entries that equal the origi-
nal entry. In a one-write system, a cash deposit
to the bank might be recorded as "Deposit,
$1,000, January 2, 1990." In a double-entry
system, an offsetting entry, such as "Received
$1,000, Acme supplies, in payment" would be
made, with the proper debits and credits to the
right accounts.

Double entry is the key to any corporate
accounting system. The system of checks and
balances established by the multiple entries is
what keeps the books in balance.

Corporate systems are often modular, so
they work on an AppleShare or TOPS network
in a multiple-user, single-entry mode. Unlike
ture multiuser systems, these systems cannot
provide multiuser access to the general ledger,
the heart of the accounting system.

In a multiple-user, single-entry mode, users
access the same information files, but all the
users get their own copy. Thus, any changes
made are reflected only in that user's copy. In
a true multiuser system, all users access the
same copy of a file, which reflects all changes
automatically.

Also, in a multiple-user, single-entry mode,
each module, such as accounts receivable,
accounts payable, and inventory, can operate
independently. Then, through a controlled
posting cycle, the information from each
module is uploaded to the general ledger,
where the accounts are maintained and the re-
ports are printed.

**ACCPAC Bedford's Simply Accounting 1.05E**

Now owned by Computer Associates,
ACCPAC Bedford's Simply Accounting is a
solid corporate accounting system that of-
fers full general-ledger, accounts-payable,
accounts-receivable, payroll, inventory,
control, and job-cost functions.

Simply Accounting is a fully integrated
system, so that it automatically passes in-
formation from one module to the next. The
system makes good use of the
Mac interface, even though its
screens look like manual ac-
counting documents.

The system offers a user-
defined chart of accounts with
flexible four-digit design and
can apply entries to prior peri-
ods within the current fiscal
year. Journal entries accom-
modate up to 100 accounts,
which makes it easy to split
accounts.

Simply Accounting offers a
full audit trail and suppresses
zero balances in reports. In ac-
counts receivable, full or par-
tial payments may be tracked. In
accounts payable, users may
define their own aging periods,
and the system retains or purges
invoices that are fully paid. The
program requires a Mac Plus
with an 800K disk drive and 1
megabyte of memory.

**Pros:**
Uses average-weighted-cost method
for inventory. Reports goods
on either a margin or a markup
basis. Payroll links directly to
job cost, handling up to 1,000
active projects.

**Cons:** No custom report
writer or future transaction
capability. No recurring en-
tries. Checking account can-
not be reconciled on-screen.
No discount or finance-charge
calculation. No batch corrects.

**Business Sense 1.3**

Business Sense is an easy
way to get into double-entry
bookkeeping through a one-write-like sys-

tem. It does automatic double-entry book-
keeping, reports on two years of data, and
displays current running balances. Lookups
are made easy through a unique account
"remembering" feature. Business Sense has
good documentation and uses the full im-
plementation of the Macintosh interface.
The program requires a Mac Plus or later
with a second disk drive; a hard-disk drive is
recommended.

**Pros:** All entries can be sorted. Does full
reporting. Strong import/export capability.
"Six-foot breakers, collisions with distressed vessels, constant dampness — it's not exactly a friendly, office-computing environment."

According to Robert Hope of the Seattle Fire Department, it takes rugged hardware to weather the operating conditions on the Chief Seattle fireboat. But they've got a security and storage system that definitely has sea legs.

"Bernoulli® is tough," says Hope. "And it has to be. Because our Bernoulli stores critical handling and extinguishing procedures for chemical fires."

"When we're on stormy seas, tied to a burning vessel that has chemicals aboard, our Bernoulli takes a beating. We don't rely on a hard disk, because if we ever had a head crash, the situation could literally blow up in our faces."

Bernoulli is the complete primary storage solution. With patented technology, its drives and removable 44MB disks are engineered to last. Their unique design makes them virtually
head-crash free; and with 22msec effective access time, Bernoulli offers hard-disk performance, without the risk. Bernoulli uses Reed-Solomon data protection that's 15 times more effective than hard disks. And Bernoulli Disks can withstand 1000Gs of shock without data loss.

The Chief Seattle crew put those specs to the test. "We dropped Bernoulli 18 inches to the floor while it was accessing, and it kept on accessing," said Hope. "That was all the proof we needed."

Bernoulli comes in both single-and dual-drive, 44MB versions for PC and Macintosh®. Its removable disks allow the Chief Seattle crew to store working backup copies of their important data off the ship.

"The best compliment we can pay Bernoulli," Hope says, "is that we've had it on line 24 hours a day for up to three weeks at a time, without a hitch. That's with firefighters who have no prior computer experience. In nearly two years of that kind of abuse, we've never lost a bit of data."

Even if you never have to take your data to sea, you can still secure it to weather the worst. Call 1-800-777-4639 for free Bernoulli literature and specifications. Because there's no such thing as going overboard when it comes to protecting your data.
Critical Accounts

Uses subaccounts.

Cons: Doesn't store transaction by invoice number. No check-memoing capability. Can cause contention problems when run on AppleShare.

List Price: $495

Digital Etc.

1749 14th St., Suite 203
Santa Monica, CA 90400
(213) 452-5636

COMPONENTS 1.0

Components is setting new standards in the Mac accounting world, unfortunately much too slowly. Components has two major advantages so far: the complete processing control that it gives users, allowing them the flexibility to post transactions automatically or manually, and the object-oriented report writer that lets users define a report in a see-by-doing, non-programming mode. Components' object-oriented accounting offers maximum flexibility, using a full graphic interface. Users can easily design their own entry journals and reports.

Unfortunately, even with these strengths, Components is incomplete. Only the general-ledger and accounts-receivable modules were on the market at press time, enough to make an impact but not enough to make a splash. Without the balance of the system — accounts payable, payroll, and inventory — Satori is at an extreme competitive disadvantage. Its competitors are selling products that Satori has only promised. Satori planned to release the accounts-payable module by April, with payroll and inventory modules to follow by the end of summer.

The program works on a Mac Plus or later and requires two 800K drives and System 4.1 or later. A hard-disk drive is recommended. (Note: The five-mouse rating is only for existing modules. As new modules come out, the rating may change.)

Cons: Doesn't store transaction by invoice number. No check-memoing capability.

Pros: Time-flexible posting and closing routines. Modifiable on-line help. Logos can be easily printed on checks or statements. Users can design entry journals.

Cons: No context-sensitive help screens. Cannot be run in multiuser mode. User must know accounting and be able to use a power spreadsheet for CCA to reach its full potential.

List Price: $395

Satori Software

2815 Second Ave., Suite 560
Seattle, WA 98121
(206) 443-9765

CCA (Computerized Classic Accounting) from Absolute Solutions of San Diego, California is the first spreadsheet-based accounting template to really make a mark in the industry. CCA is built on Microsoft Excel, and gives the user all of Excel's benefits while passing on only a few of its disadvantages.

CCA applies the calculation power of Excel to the relatively simple task of maintaining a general-ledger system. It uses a full menu-driven command system to control the accounting functions. You can stay within this menu or drop directly into Excel to do advanced analysis at any time. Custom work-sheets or analysis can be easily integrated into the CCA posting system, so virtually any type of account or business can be managed with CCA.

CCA has a full, detailed audit-trail capability and password-protection options for all reports, journals, and ledgers. A fail-safe system prevents common accounting errors such as defining an accounts-payable item as an accounts-receivable item. The program requires a hard-disk drive, Excel 1.5 or later, and System 6.0 or later.

Pros: CCA can keep as many accounting periods open and on-line as you want. Subledgers can be used in any ledger or account. Excel provides unlimited analytic power.

Cons: No context-sensitive help screens. Cannot be run in multiuser mode. User must know accounting and be able to use a power spreadsheet for CCA to reach its full potential.

List Price: Base system, $395

Absolute Solutions, Inc.

3142 Vista Way, Suite 400
Oceanside, CA 92056
(800) 633-7666
(800) 458-3399 (in CA)
Mind Your Own Business 1.0

An exciting newcomer, MYOB (Mind Your Own Business) offers a lot of punch for very little scratch. The system is an integrated general-ledger, checkbook, accounts-receivable, accounts-payable, and inventory system. Unfortunately, the system doesn't offer an integrated payroll system, which limits its competitiveness in this category, but it can do just about anything else its competitors can in a single-company environment.

MYOB is a high-powered natural for new or low-powered users. It has a pleasant, intuitive feel, making good use of the Mac interface. It automatically makes recurring entries. The To Do list automatically alerts you to overdue receivables, payables, discounts about to expire, inventory items that need to be reordered, and so on. It's like having a full-time accounting manager watching over your shoulder. Also included is a card file that lets you use MYOB to keep track of everything else in your business. The program works on a Mac Plus with a hard-disk drive and System 6.0 or later.


Cons: Appropriate only for use in a single company. No department breakdowns. No user-defined aging periods.

List Price: $99

Teleware, Inc.
The Rotunda
22 Hill Road
Parsippany, NJ 07054
(800) 322-6962
(201) 334-1154

MultiLedger 1.3, CashLedger 1.3, Payroll 4.1

These three products complement each other and are reviewed as a single unit. MultiLedger comprises a complete full-function general ledger and accounts-payable, accounts-receivable, and inventory modules. Payroll comes as a separate module. CashLedger is a new product that uses cash-basis accounting rather than MultiLedger's accrual accounting. CashLedger can be integrated with Payroll.

MultiLedger does batch processing, handles multiple companies, tracks budgets, and combines financial information with PICT files for high-resolution statement printing. The program requires a Mac Plus or later and System 4.1 or later. A hard-disk drive is recommended for Payroll and MultiLedger if they have 200 or more users.

Pros: Both cash and accrual accounting are supported. Double-entry bookkeeping is supported transparently. Concise, easily understandable documentation. Complete report library.

Cons: No transaction journals. No customer credit limits. Does not calculate finance charges.

List Price: MultiLedger, $395; CashLedger, $195; upgrade to MultiLedger, $200 (files are compatible); Payroll, $295

CheckMark Software, Inc.
1520 E. Mulberry, Suite 200
Fort Collins, CO 80524
(800) 444-9922
(303) 484-3541

Rags to Riches

Chang Laboratories has been producing the Rags to Riches series of accounting programs since 1984. Rags to Riches undoubtedly holds the title of "old reliable" in the Mac accounting market. The series has always been highly rated, although it has been intermittently in or out of vogue.

The latest Rags to Riches release offers general-ledger, accounts-receivable, accounts-payable, inventory, and professional-billing programs. Rags to Riches has several unique features, such as the ability to zoom in to, or automatically recall, layers of detail within the system. The system has a clairvoyant search capability, meaning that it can look ahead of your typing for the name of vendors or payees and then automatically completes the entry.

Rags to Riches also automatically posts entries through its full integration of all the modules and automatically

List Price: $99

Teleware, Inc.
The Rotunda
22 Hill Road
Parsippany, NJ 07054
(800) 322-6962
(201) 334-1154

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Please circle 106 on reader service card.
If that sounds like an outrageous statement, it sure is.

But then, this is one outrageous set of utilities.

In fact, comparing the Norton Utilities® for the Macintosh® to anybody else's utilities for the Macintosh is, well, kind of embarrassing.

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To see what we mean, see what happens when you call up our revolutionary Norton Disk Doctor®.

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In fact, the Disk Doctor automatically diagnoses and repairs the 45 most common—and dangerous—problems your disk can confront you with.

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We save your trash.
Of course, any time a human being uses a computer—yes, even a Mac—there's a risk of losing data.

Which is why, seven years ago, Peter Norton Computing invented the legendary UnErase®

Like the rest of the tools in this box, UnErase has been designed expressly for the Mac, to recover more kinds of trashed files, more quickly and with less effort on your part than any other program.

Instead of just one level of data recovery, we give you three.

You can UniErase by File Type.

*Total times to recover a reformatted 40MB Quantum internal hard drive on a Macintosh Iie with respective volume information files installed.
Any resemblance to other Macintosh utilities is pure coincidence.

By Text Search. Or use Quick UnErase to scan your fully loaded hard drive in as little as five seconds. (You don't even want to know how long it takes everybody else.) Whether your drive is fully loaded or nearly empty, Speed Disk™ is—here we go again—the quickest, easiest and safest way to dramatically accelerate disk access.

And unlike other programs, Speed Disk won't lose your data even if your Mac loses power.

Speaking of losing data, when it comes to losing large quantities of it quickly, nothing compares with accidentally reformattting your hard disk.

And when it comes to unformatting your hard disk, nothing compares with our Format Recover and FileSaver.

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What a find.

Of course, you don't have to lose your data to want to get at it as quickly as possible.

That's something you want to do every day, every time you open a file.

So you'll be interested to know that Fast Find locates and opens files so quickly, you may never use the Mac's standard Find File desk accessory again. But you'll use our accessories and control panel devices daily.

If all of this looks too good to be true, see your favorite software dealer for a demonstration.

If you haven't got a favorite software dealer, call us right away at 1-800-365-1010 Ext. 423.

We'll send you more information.
Now we have 3 easy-to-learn, easy-to-use accounting programs created especially for the Macintosh.

**MULTI LEDGER**
An integrated accounting program which combines General Ledger, Accounts Payable, Accounts Receivable, and Inventory tracking. Generates checks, customer invoices, customer statements, and a wide variety of financial and management reports. Prints on ImageWriters, LaserWriters, and many other printers.

**PAYROLL**
A complete payroll system for organizations with 1 to 1000 employees. Use it as a stand-alone program or integrate it with either of our ledger programs. Calculates both employee and employer taxes and deductions. All state and federal tax tables and parameters are included and all can be modified by the user.

**CASH LEDGER**
An "entry-level" General Ledger program for those who don't need payables, receivables, or inventory tracking. Shares many of the same G/L features and advantages of MultiLedger, including check-writing, bank reconciliation, and financial reports. Upgradable to MultiLedger if more features are needed in the future.

**COMMENTS FROM RECENT REVIEWS**

"My favorite all-around accounting program is CheckMark Software's MultiLedger/Payroll set. It was the simplest and most logical I examined that provided a reasonably full set of capabilities. Its price/performance ratio represents an excellent bargain."

Macworld / September 1988

"MultiLedger is ideal for the small business. It's easy to set up and use and has an amazing set of accounting features when compared to other programs that cost more and don't offer much more power."

MACazine / March 1989

"I don't know of any other Mac accounting software which contains so many features and modules for the price."

Computers in Accounting / January 1989

"A welcome and impressive bonus is the Payroll program which can be linked to MultiLedger... MultiLedger and Payroll are a bargain for companies that don't need a networked system."

MacUser / April 1989

"Our favorite package was MultiLedger... it's the most elegant, usable and Mac-like of all the packages we reviewed... CheckMark offers unlimited free telephone support to all users. This policy would lead to bankruptcy if the program were as confusing as others."

The Macintosh Buyer's Guide / Spring 1989

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Easy. Powerful. If you thought they didn't go together, consider what the Macintosh did to redefine personal computing.

It let users concentrate on what they were trying to achieve or produce, while other systems forced them to focus on the operation of the computer itself. The amazing success of the Macintosh shows that when thinking people are given a choice between simplicity and power, they'll take both.

Those who created the Macintosh realized that it takes more time, more work, and more creative thinking to make something simple than it does to make something complicated. Their success has enabled us to create easy-to-use, affordable accounting programs for small and medium-sized businesses of all kinds.

To see if one or more of our programs can work for you, just give us a call. We'll send you a free demo disk of all three programs, reprints of recent reviews, and dealer names in your area.

You'll see for yourself just how easy and painless accounting on the Macintosh has become.
Critical Accounts

posts finance charges as well. The reporting options are quite detailed yet remain flexible even within their structure. Multiple windows can be open simultaneously, which makes it easy to see the relationships among modules. Opening too many windows can become confusing, however.

The professional-billing module works well for doctors, lawyers, consultants, or any other professionals who bill their customers for time and materials. The program works on a 512K Mac, but Chang Laboratories recommends using at least a Mac Plus.


Cons: No automatic reversals. No recurring or automatic postings. No custom-report capability.

List Price: General ledger, accounts payable, and accounts receivable, $199.95 each; inventory and professional billing, $399.95 each.

Chang Laboratories, Inc.
3350 Scott Blvd.
Santa Clara, CA 95054
(408) 727-8096

Service Industry Accounting 5.38

An Australian firm, Sybiz Software Pty., has taken a stab at developing an accounting system for service industries with its SIA (Service Industry Accounting) program. This is an integrated accounting package that includes an inventory system and job costing for manufacturing businesses. SIA's market emphasis is small service and manufacturing businesses.

Modules are represented as books, so that it looks familiar to nonaccountants. Each book handles a different set of tasks. The book of job cards, for example, handles estimating, costing, and charging. There is also a ledger book that contains the general ledger, a sales book for receivables, and so on. The graphic representation makes effective use of the Macintosh's interface — pages are flipped, and the books are literally opened and closed. SIA also generates reorder reports. The program requires a Mac Plus with 1 megabyte, one 800K disk drive, and System 4.0 or later.

Pros: Each book is controlled by a two-level-password security system. Sales-analysis codes allow various sales reports to be produced. Provides direct disbursements from the general ledger. Tracks actual figures versus budget. Does physical inventory count and variance reporting.

Cons: Cannot consolidate multiple companies. Cannot calculate finance charges or customer credit limits. No recurring entries.

List Price: $395
Brown-Wagh Publishing
16766 Lark Ave., Suite 210
Los Gatos, CA 95030
(408) 451-0900
(408) 395-3838

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802-865-9220, Solutions, Inc., 30 Commerce St., Williston, VT 05495

See us at MacWorld, Booth #727, Moscone Center

Please circle 172 on reader service card.
Consolidated Accounting Systems

Consolidated accounting systems are the top of the line in Mac accounting. They are fully integrated, modular, multi-company systems designed to run either in multi-user mode or on a network in a multi-user, single-entry mode.

Consolidated systems’ modules can be used in any combination, as long as the general-ledger system is always used.

The key aspect of consolidated accounting systems is that they are designed to handle high volumes of processing and data-entry transactions. These systems are typically installed in businesses with more than $10 million in sales in which the accounting department is divided into accounts receivable, accounts payable, general ledger, and general-accounting functions such as job cost and inventory.

Consolidated accounting systems are limited only by the size of their disks. No programmatic limits on accounts are set, or if they are, the number is massive, such as SBT’s 16-million-customer limit. These systems also provide industrial-strength backup and recovery utilities and built-in archiving features for prior-period data.

The consolidated-accounting market is complex, and the stakes are high. Don’t pick a system just because it’s the least expensive — choose the accounting system that best fits your business. It’s not the cost of the system that you’re betting when you buy the system; it’s your business.
A4 2.0

A4 is the first accounting system built on ACIUS' 4th Dimension database engine. Although A4 offers a full general ledger and accounts-receivable and accounts-payable modules, the program definitely takes advantage of the customizable 4D shell, so it could accommodate a lot more modules.

One of A4’s major selling points is that users who are 4th Dimension-literate can easily customize the application, as long as they don’t mind getting their hands dirty in 4D’s procedural language. The full Mac interface implementation of 4th Dimension governs A4’s interface, and the accounting package provides unlimited storage and flexibility. The program requires a Mac SE or later with 2.5 megabytes of RAM and a 20-megabyte hard-disk drive, System 6.0.3 or later, and 4th Dimension version 2.0.10 or later. An accelerator card is recommended.

Pros: Built on the powerful 4D database engine. Easily prints mailing labels. True multiuser system with follow-up and calendar facilities.
Cons: Limited functionality considering the power of the shell (there is no point-of-sale module, for example). No LIFO (last-in, first-out) costing in inventory. No payroll system. Can sometimes run slowly, as it is limited by 4th Dimension’s speed. Needs to be enhanced to compete against other multiuser systems.

List Price: $2,000
Softek Design
882 Calgary Way
Golden, CO 80401
(303) 526-0666

Flexware 6.02C

Based on the proprietary Flexware fourth-generation language, the Flexware series is a true multiuser accounting system for the Mac. The system is designed to be installed by an implementer or developer — it is not for off-the-shelf sales.
Flexware provides direct access to the development language for user customization. The development environment offers its own database, which provides quite good performance in high-transaction environments.
There are nine Flexware modules: general ledger, accounts receivable, accounts payable, inventory, job cost, payroll, order processing, purchasing, and point-of-sale. The on-line help system tracks your progress and displays information you may need only at the moment. The full implementation of Flexware offers around 200 reports. If that’s not enough, users can employ the report writer to create reports.
Flexware can automatically pass data into Excel, which is a very powerful analysis feature.

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

With a small size and a $1,195* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

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

There is a better way.

Please circle 102 on reader service card.
Security is provided down to the field level. The product makes decent use of the Mac interface, but it's not state-of-the-art.

On the other hand, Flexware has a unique double-drive transaction recording and backup system for high-value information. A separate database server-management system can also be installed with the rest of the package.

Flexware is a solid, high-speed, dependable product, but it's just a tad behind Multi-user Desktop Accounting (see write-up later in this article). Flexware lacks user-friendly customization tools, which makes it complex to implement. That's the price it pays for providing a product that can be all things to all people. But if you find a good implementer, the package can be a phenomenal success. Flexware requires a Mac Plus or later with 1 megabyte of RAM, a 20-megabyte hard-disk drive, and System 6.03 or later.

**Pros:** High-speed system. Unique double-drive transaction recording. Can be customized for vertical-market uses. Automatically populates Excel or Wingz spreadsheets for analysis or graphing.

**Cons:** Requires third-party installation assistance. Customization is developer-, not user-, driven.

**List Price:** $895 each, except order processing and purchasing, $795; job cost, $995; point-of-sale, $695

**Flexware**
150404 E. Valley Blvd.
City of Industry, CA 91746
(800) 527-5687
(818) 961-0237

**Great Plains Accounting Series 5.2**

Great Plains wins the bulk test. The series consists of ten modules: general ledger, accounts receivable, accounts payable, payroll, inventory, order entry, purchase order, job cost, network manager, import manager, and the analytically oriented executive adviser. Each module has three volumes of documentation—a reference manual, a learning guide, and an orientation manual.

**Pros:** Financial statements can be tailored. Handles up to 13 accounting periods. Does period-to-period comparisons. Tracks handwritten checks. Calculates up to 239 taxes on inventory in 36 locations. Full audit trails for project-change orders. True multiuser system.

**Cons:** Requires a Mac SE or later with 1 megabyte of RAM and a 20-megabyte hard-disk drive.

With the HP ScanJet Plus, you've

The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

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So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call 1-800-752-0900, Ext. 1005 for your authorized HP dealer.

For all its amenities, ease of use, good image quality, and low price, Publish! recommends the HP ScanJet Plus as their "Best Buy."
Excellent order-entry/point-of-sale module.

Cons: Limited use of the Mac interface.
No customer credit limits in point-of-sale.

List Price: $795 each except executive advisor, $595; network manager, $995; job cost, $995; import manager, $495

Great Plains Software
P.O. Box 9739
Fargo, ND 58109
(800) 345-3276
(701) 281-0550

Insight Expert Accounting Series

The Insight Series (general ledger, accounts payable, accounts receivable, inventory, payroll, and time billing) offers superb functionality. Each module conforms nicely to the Mac interface and the tempo set by the other modules. The copious documentation is valuable and easy to read.

Insight, patterned after the manual ledger-card concept, conforms well to the Mac interface. It's easy to understand what happens to the cards during processing.

Insight's inventory offers LIFO (last-in first-out), FIFO (first-in first-out), average, and last-cost methods. The systems also provide dynamic and flagged reordering. In addition to standard financial reports, Insight offers a useful set of financial-statement ratios and pie charts that make it easy to interpret the health of your business.

Time billing provides employee productivity, multiple billing levels, and methods by project or job.

Insight installs easily; works quickly; and provides a user-friendly, high-powered accounting platform. The program requires a Mac Plus or later, a 20-megabyte hard-disk drive, and System 4.1 or later.

Pros: Performs full credit checks by customer. Provides customer-profitability reporting. Generates cash-requirements schedules. Has flexible fiscal and reporting periods, separate or consolidated financial statements by entity, up to 13 accounting periods, and Choice of cash or accrual accounting.

Cons: No on-screen check reconciliations.
No check-memoing capability.

List Price: $695 per module
Layered, Inc.
The Schrafft Center
529 Main St.
Boston, MA 02129
(800) 622-4436
(617) 242-7700

Multi-user Desktop Accounting 2.05

Built on the Omnis 3 Plus database engine, MDA (Multi-user Desktop Accounting) sets the standards for multi-user performance and accounting functionality in the Mac off-the-shelf accounting market. MDA consists of general ledger, accounts payable, accounts receivable, inventory, sales rep activity, purchases, receipts, sales order/quotes, and invoicing. MDA offers eight user-security classifications, making it the most secure system on the market.

The account-number scheme uses three

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### Critical Accounts

components: one for basic account numbers, the second for subaccounts, and the third for department numbers. On top of this is an account-classification system for ranging and determining debit or credit accounts.

MDA makes fair use of the Mac interface, and the switching time between modules is nominal. The sales rep activity module makes managing a sales force a breeze.

Each of the modules is fully integrated and offers a wide range of reports. Data entry is easy, and the package really shows its stuff in high-transaction environments.

Logsoft plans to release a version of MDA that's compatible with Ornis 5 by the end of 1990. The current version requires a Mac Plus or later with 1 megabyte of RAM and a 20-megabyte hard-disk drive.

**Pros:** Works well in high-transaction environments, especially point-of-sale.

**Cons:** Ornis 3's interface is somewhat lackluster. Payroll is not integrated.

**List Price:** Single user, $1,795; up to five users, $2,795.

Logsoft, Inc.
1291 E. Hillsdale Blvd., #205
Foster City, CA 94404
(415) 570-7811

**SBT DATABASE ACCOUNTING LIBRARY: SERIES SIX PLUS**

Designed as a multiuser system, the SBT Database Accounting Library is driven by the FoxBASE+ database engine. The series consists of the following modules: general ledger, billing, inventory control and open items, accounts receivable, accounts payable and check writing, sales-order processing, purchase-order processing, payroll and labor accounting, manufacturing planning, fixed-asset management, job cost, time and billing, service and equipment maintenance, and property management.

SBT is the only full-range accounting system on the market that is built on a multiuser database system. The accounting series supports up to 99 companies with up to 999 departments each.

**SBT** has a nicely implemented audit-trail capability. In addition, the package automatically calculates 20 key business ratios and can handle nonprofit fund accounting in the general ledger.

The inventory-control and sales-order-processing modules mesh nicely to provide a rich point-of-sale system. Payroll performs as you would expect. The manufacturing-planning module generates bills of material and work orders and reconciles work in process to finished goods.

The job-cost module generates a wealth of management information that includes cost, budget, variance, percent variance, and under- and over-budget projections. Although somewhat out of the mainstream, the property-accounting module works well, and the service-and-equipment-maintenance module is a nice addition.

SBT requires a Mac Plus or later and System 6.0.2 or later. It works with 3Com, Novell, and AppleShare networks.

**Pros:** Full multiuser system. Handles multiple depreciation types. Three types of budgets may be generated and tracked. Holds 24-month customer and 36-month item histories.

**Cons:** Report writer requires patience. Documentation can be cumbersome.

**List Price:** Each single-user module, $295; each multiuser module, $595.

SBT Corp.
One Harbor Drive
Sausalito, CA 94965
(415) 331-9900

**WOS FUND ACCOUNTING**

Unlike the other accounting systems reviewed here, WOS Fund Accounting is designed to meet the unique needs of nonprofit organizations such as governments, school districts, government agencies, and not-for-profit agencies. The system consists of general-ledger, payroll, purchase order/voucher, and accounts-receivable modules.

WOS Fund Accounting provides double-entry capability for nonprofit organizations. Multiple fiscal years can be kept open, which is often required by schools and charities; these organizations are the major users of WOS. The system handles grant reporting easily and has a specialized module for student billing.

WOS has its own market niche because commercial accounting systems often have to be jury-rigged to fit the needs of nonprofit organizations. WOS doesn't offer all the panache of Insight or Great Plains, but it does provide solid...
functionality and good design. The program works only on a Mac Plus or SE with a 20-megabyte hard-disk drive. Farallon is planning to release a version in 1990 that will work on the SE/30 and later models.

Pros: Handles multiple-fund accounting, maintaining GAAP. Encumbrances are easily placed. Multiple-year adjustments, multiple-fund disbursements, and vouchers are supported. Powerful browse-key functions. Meets most federal reporting requirements.

Cons: No recurring entries or transactions. Limited password protection.

List Price: $4,995

Farallon Computing, Inc.
1321 Wakarusa Drive
Suite 101
Lawrence, KS 66049
(800) 843-8101
(913) 843-8101

Ken Landis has been using Apple computers to solve accounting problems since 1976.

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The Bottom Line

One-Write Systems

Both Plains & Simple and atOnce! are excellent one-write systems, but when it comes to exploiting the power of the Mac, atOnce! does a better job than Plains & Simple. Great Plains goes for the no-nonsense, straight accounting approach, whereas Layered’s development philosophy for at Once! seems to squeeze every last bit of the friendliness out of the Mac. If you want to take the greatest advantage of the Mac’s interface, atOnce! will give you your money’s worth.

Corporate Accounting Systems

In any market in which there are eight competitors, it’s hard to pick an overall winner. As far as the mouse ratings go, Mind Your Own Business, Multiledger, and Computerized Classic Accounting tie for the top spot with four and a half mice each.

Mind Your Own Business is the winner if you’re looking for a functional structured accounting system. The Multiledger-Cashledger combination takes the cake if you want payroll, and Computerized Classic Accounting is for those with a financial and spreadsheet bent who don’t just need a bookkeeper but also a business-analysis system.

All the other systems each have something valuable to offer, but one of these three will provide the best fit for almost any business’ needs.

Consolidated Accounting Systems

If you’re looking for an off-the-shelf multiuser, single-entry system, then Insight is probably your best bet again this year. Insight has taken the Mac interface to the limit. Unfortunately, Insight isn’t a true multiuser system, as are Great Plains and SBT, and it doesn’t offer order entry. If you need those two features, then consider Great Plains, MDA, or SBT. The latter is the best off-the-shelf multiuser, multientity system, but Flexware does an even better job.can if you find a good implementation/development firm.
**SOFTWARE**

**1st Aid Software**
Complete Undelete 36
Deluxe 1st Aid Kit 116
Sector Collector 36

**3 Graphics**
Images w/impact
Accents & Borders 1 64
Business 1 64
Graphics & Symbols 1 50

**Microphone II** II
Software Ventures
Eddy Award honorable mention
Top of the line personal computer communications software.

**A Lasting Impression**
Resume-expect 38

**Axion**
CheckWriter II 36
Payroll 3.5 109
Payroll Plus 173
TimeCard 116
TimeMinder 1.4 174

**Abbott Systems**
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The two
LocalTalk
active-star
concentrators now
on the market vie
for top billing.

Most AppleTalk networks
start small—a few Macs
and a LaserWriter hooked
together with some con-
nectors and a little bit of
wire. Then a few people
down the hall decide they
want to use that Laser-
Writer, so you throw some cable
through the ceiling and connect their
Macintoshes to the network. It’s not
long before everyone in the building
wants in, and each Macintosh’s sig-
nal now has farther to go and more
people to serve. Printing is painfully
slow, and the network is sluggish and
inefficient.

Built-in AppleTalk has made net-
working so simple that it’s easy to
forget that small networks have a
habit of outgrowing their usefulness
— careful network design is crucial
to allow for growth and reliability. One way to cope with your current expansion, as well as to leave room for growth, is to invest in one or more active-star concentrators, which will allow you to expand, enhance, and manage your network.

Active-star concentrators (also known as star hubs) are signal amplifiers installed in your phone closet that have wires running outward to work areas throughout the building. This layout is known as an active-star topology. A passive-star topology uses the same configuration but no concentrator — signals can’t travel long distances, and they become progressively weaker as you add more devices to the network.

In an active-star topology, a device, or node, on the network sends a signal, which travels down the wire to the concentrator. The concentrator then amplifies the signal and sends it to another node — the printer, for example.

Because an amplified signal can travel farther, concentrators let you build larger networks than you can build with a passive-star configuration. Because all the wires emanate from a central point, concentrators help keep the wiring orderly and easy to manage. They also provide some management utilities that let you monitor and control the network and find trouble spots quickly.

**The Contenders**

Two LocalTalk active-star concentrators are now on the market: the Farallon StarController, which has been around for about three years, and the Nuvotech TurboStar, which shipped late last summer. Although these two devices perform the same function, they’re quite different.

The biggest contrast is the number of ports each has — 12 for the StarController and 16 for the TurboStar. The main advantage of having more ports is that you can allocate wire runs from each port more sparingly. The manufacturers recommend that you run no more than four wires from each port, since a signal’s strength is divided by the number of wires a port has connected to it. Having fewer wire runs on each port also gives you better control over each one and makes troubleshooting easier. (It’s worth noting that although the TurboStar costs about $500 more than the StarController, the cost per port for each concentrator is nearly the same — slightly more than $100.)

The fact that the TurboStar has more ports than the StarController doesn’t mean it can handle more devices. How heavily the network is used — not the number of ports available — determines how many devices you can hook up. If you want to increase the number without compromising performance, you’ll have to add a router (see “A Guide to LocalTalk Routers,” September ’89) or add a higher-speed network such
Farallon's StarController (left) and Nuvotech's TurboStar (right) monitor network activity in very different ways: The TurboStar contains a computer that enables it to do network management from any Mac on the network; the StarController requires a direct connection to a single Mac, which analyzes the StarController's internal activity.

Another major difference between the two concentrators is that the TurboStar has the guts of a computer—it contains a microprocessor chip and a proprietary EPROM (erasable programmable read-only memory). As a result, you can do network management from any Mac on the network, but if the network goes down, your network-management utilities go with it.

Unlike the TurboStar, the StarController is not a computer and therefore cannot be accessed over the network. It uses a direct connection to a single Macintosh, which analyzes the StarController's internal activities.

Each method has its advantages: The TurboStar's network-analysis programs are a little more sophisticated and more convenient to access, because you can do so over the network, but the StarController's method ensures that you always have a separate access pathway, even when the network is down.

Crosstalk

Output voltage is another major difference between these two devices: The TurboStar's output voltage is +/- 5V, and the StarController's is +/- 3.5 V. The higher voltage enables the TurboStar to send signals over longer distances, but tests in *MacUser*’s NetWorkShop found that the higher voltage also creates a greater tendency toward the electrical phenomenon “crosstalk,” which can hurt network performance.

Crosstalk occurs when two signals traveling down different pairs of wire in the same sheath interact with each other. (This is similar to what happens when you play a string instrument—when one string is plucked, the adjacent strings vibrate as well.) With electrical signals, crosstalk is more likely if the signals have similar frequencies and the voltages are strong.

Crosstalk also depends on what kind of cable your network uses (see the “Wire Types” sidebar). Twisted-pair wiring is preferable for networks, because no matter what interference the wires are subject to, the relative voltage between the two wires remains the same, making crosstalk unlikely. Quad and 25-pair cabling also contain twisted-pair wiring, but it only reduces interference from outside the cable and can’t prevent crosstalk.

Knowing how your building is wired before you choose a star as Ethernet (upcoming issues of *MacUser* will examine Ethernet in detail).
We used a point-to-point reliability test to see how well the Farallon StarController and the NuvoTech TurboStar transmit signals on terminated and unterminated wires over distances ranging from 500 feet (for the normal office environment) to 3,000 feet (the maximum length Farallon recommends).

Using Apple's network-management utility InterPoll, we sent echo packets from one node on the network to another and then returned the signal to the original node. InterPoll evaluated each signal's quality and the time taken for each round trip.

Both star concentrators performed similarly on terminated and unterminated wires of less than 500 feet. The StarController showed a slight performance edge, particularly on short distances with unterminated wiring. The TurboStar performed better than the StarController on long terminated and unterminated wires.

**Test 1**

Echo packets were sent from the SE/30 (port 1), 500 feet from the concentrator, to the NTX printer (port 7), also 500 feet away.

**Test 2**

Echo packets were sent from the IICi (port 8), 20 feet from the concentrator, to a Mac Plus (port 9). Although port 9 was 500 feet from the concentrator, there were four nodes on that port, so the signal actually traveled 2,000 feet.

**Test 3**

Echo packets were sent from the SE/30 (port 2), 20 feet from the concentrator, to the Mac Ilx (port 5), 3,000 feet from the concentrator.
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**Star Wars**

collector is crucial. If the structure contains a lot of 25-pair or quad cabling and you’re concerned about the possibility of crosstalk, the TurboStar, with its higher voltage, may not be the right choice. In many older buildings in the eastern United States, for example, 25-pair cable is used as the main distribution cable.

You might also encounter crosstalk in a LocalTalk network if you use the TurboStar to connect computers on different floors. When wiring a network, you connect floors with your phone closet’s riser cables, made from 25-pair cabling, which increases the likelihood of crosstalk.

Interference between the signal frequencies used by digital phones and those used by LocalTalk can also cause crosstalk if your LocalTalk and digital-phone signals are in the same sheath of wire and your network is wired with quad or 25-pair wiring. This doesn’t pose any problems for LocalTalk users, but you may hear some clicking when you’re using a digital phone.

**Electrical Noise**

There are other types of signal disruption besides crosstalk that concentrators need to be able to identify and control.

Two types of false signals can originate inside the network: reflections, which occur when signals echo off the ends of the wire, and jamming, which is caused when damaged devices on the network transmit meaningless electronic jabbering. External devices, such as fluorescent lights or electric motors, can also cause network noise.

**Reflections**

Reflections occur naturally when a signal encounters a place in a wire where the flow impedance is abnormal, for instance when the wire changes gauge or comes to an end. This causes the primary signal to echo.

Wire ends cause large reflections unless you install terminators that match the wire’s natural impedance. Concentrators allow for missing or improperly placed terminators by setting the threshold for an incoming signal so high that only strong primary signals are amplified, and weak reflected signals are ignored. (If the threshold setting is too high, however, legitimate signals from distant devices might be ignored.) A concentrator can also avoid reflections by “muting” itself—turning off its ports briefly after sending a signal or waiting a certain length of time between signals in order to let the reflections die down.

The TurboStar has a low threshold, and it can’t mute itself. As a result, it can hear signals from devices wired more than 3,000 feet away from it (the StarController’s recommended distance limit), but it’s also more likely to amplify reflected signals. On wires shorter than 200 feet without terminators, it is likely to bounce the reflections back and forth from port to port.

The StarController, which is less sensitive than the TurboStar, sets a higher threshold and mutes itself for ten microseconds after sending a packet, or data block. In MacUser’s NetWorkShop tests, the StarController performed quite well with
improperly terminated short wires.
You should always keep your networks properly terminated, but every network manager knows that users occasionally inadvertently move terminators.

**Jamming**
Another source of network noise is jamming, which is usually caused by a faulty device such as a router or LaserWriter. You can often solve the problem by briefly turning off the jamming device.

A concentrator can't stop the device from jamming, but it can disconnect its port, which allows the rest of the network to function properly. Any other devices on that port will also be disconnected from the network, however.

Both the TurboStar and the Star-Controller have an antijamming feature that assumes a port is jamming if

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### Wire Types

- **Twisted-pair:** Each pair is twisted independently.
- **Quad cable:** Two pairs of wires are twisted together.
- **25-pair cable:** Individual pairs have a slight twist, and then all the pairs are twisted together.

If twisted-pair wire passes a noise source, the twist in the wire balances the noise's effect evenly between the two wires so that the voltage between them is unaffected.

Wire pairs have to be resistant to noise coming from inside the wire as well as noise from other wires in the same sheath. In twisted-pair wire, each pair is twisted independently so that signals from one pair of wires won't affect another pair. In quad wire, however, the two pairs aren't twisted, so they maintain the same relationship to each other over the length of the cable. If strong signals are sent from different ports down wire pairs in the same sheath of quad cable, crosstalk can occur.

The TurboStar's high voltage will make crosstalk more likely if you use it to link devices on different floors, because 25-pair riser cable is used to connect floors.
it has been receiving a signal for longer than about 21 milliseconds (the length of the longest permissible LocalTalk packet).

The StarController shuts the port off after 37.5 milliseconds. It automatically turns the port on again after 4 seconds, and if jamming persists, it turns it off again after another 37.5 seconds.

The TurboStar allows jamming to continue for approximately 45 milliseconds before it shuts off the affected port, but it discretely samples incoming signals before turning it on again. If the device is still jamming, it doesn’t turn the port on again, but it will activate it once a minute regardless of the port’s state.

Activating the antijamming procedure takes less than 1 percent of either devices’ operating time.

**External Noise**

One avoidable source of network noise is having wiring too close to a power source such as fluorescent lights or a generator. Using twisted-pair wiring helps avoid this (see the “Wire Types” sidebar).

When you’re wiring your network, especially if you’re using flat, untwisted line cord, don’t pass the wires too close to wiring for other power sources, as this could bring your network to a halt, regardless of which concentrator you use.

Always consult building codes when installing network wiring. It is illegal to install line cord in ceilings and crawl spaces because it isn’t plenum-rated (plenum is a special coating that doesn’t produce poisonous gases when burned).

**Network Management**

Nowhere are the differences between the Star Controller and the TurboStar more apparent than in the way they communicate with networks. The TurboStar uses its own computational horsepower for network management, whereas the StarController simply reports network activity to the manager’s Mac, which handles the computation and interpretation.

You have to hook the StarController to the serial port of the network manager’s Mac to do network management, so you’ll need an extra pair of wires at the node where the StarController is installed. Having to devote two extra wires for this purpose can be inconvenient, and it can also be inconvenient to have network-management functions isolated at one machine. On the plus side, however, this setup provides a reliable path that exists independently of the network, and network management continues no matter what disasters occur on the network.

StarCommand 2.0 (now an application, upgraded from a DA) is the StarController’s network-management software. Stored in the System Folder, it runs in the background of the network manager’s Mac under MultiFinder. It has an updated user interface with one useful new feature: the ability to continuously monitor the state of multiple StarControllers on a network and provide notification if conditions change (for instance, if a device connected to one of the concentrators jams). Two separately available Farallon utilities, CheckNet and TrafficWatch, also help you troubleshoot.
allow the StarController to access network information from any port.

The TurboStar's computerlike configuration allows the network manager to use the LocalTalk network for troubleshooting and maintenance, and the TurboStar's software lets you access information from any node on the network. If the network is extensively damaged, however, the TurboStar's management tools are inaccessible too. You can attempt to make the manager's node as rock-solid as possible by devoting one port exclusively to it, but there is no way to completely safeguard the TurboStar's management utilities from network failures.

**Error Tracking**

Each device has its own unique management features. The StarController, for instance, can check a port's wiring quality, which allows you to quickly determine if the termination characteristics of that port have changed since you set it up. (For a report on the usefulness of this feature, see "Star Performance," September '89).

The TurboStar makes up for its lack of a line-quality test by maintaining an error log that keeps a running total of packets received and CRCs (cyclic redundancy checks), timeout errors, and overruns on a port-by-port basis. Since CRC errors are usually caused by termination problems, this is just as useful as a line-quality check in determining a port's termination status. (These errors are very rare, however. You should be concerned about this only if there are more than 5 CRC errors for every 10,000 data packets.)

Overruns and timeouts don't necessarily mean network trouble. If there are more than 500 per 10,000 data packets, call Nuvotech for help in figuring out what's going on.

The TurboStar tells you the activity level of each of its ports and what devices are connected to each port (see Figure 4). This lets you see if your users have changed position on the network without telling you. Annoyingly, however, the main management window doesn't change as network conditions change: You have to close and then reopen the window to get an update.

Useful as they are, neither the StarController's nor the TurboStar's management features can replace the usual toolbox of network-management utilities, such as Inter-Poll, that you need in order to effectively prevent and fix network problems (see "Monitoring Your Network," August '89, for more information on network-management utilities).

The TurboStar's design means that it may have built-in networking and monitoring utilities someday. Nuvotech is keeping a tight lid on plans for the TurboStar, but it would be relatively easy to add a slotted bus that could contain cards for a variety of procedures, management utilities and other tools, and Ethernet and LocalTalk routers. Whether or not all this could be accomplished by upgrading the current hardware is unclear, but the architecture is robust enough to last for the next ten years or so — at least as long as LocalTalk's expected life span.

The StarController, on the other hand, is available on all Mac products and peripherals.

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Star Wars

hand, has been on the market for three years with few improvements in its network-management features. However, its setup more or less guarantees that the network manager’s Mac is safe from the vagaries of the network’s performance, and it also works with more wire types more reliably than the TurboStar does.

Which star concentrator is best depends entirely on your situation, but when it comes to networks, reliability is essential.

Technical Support

Always consider the quality of the technical support and documentation when buying a star concentrator. Farallon has excellent technical support, and the StarController manual is well written and clear.

Nuvotech has been in the market a shorter time than Farallon; has a smaller tech-support staff; and at press time, had only the briefest manual to accompany the TurboStar (the manual is currently undergoing a major upgrade). Time will show how well the firm supports its customers.

Both of these products do the same thing, but they’re not interchangeable. Carefully assess your workspace and your future needs before investing in a star concentrator—you’ll be repaid with both reliability and room to grow.

Kurt VanderStuils is a MacUser contributing editor.

The Bottom Line

If you’re going to buy a star concentrator right now, the Farallon StarController is your best bet. It works reliably with a greater variety of wiring conditions than the TurboStar does, and what it lacks in network-management capabilities—such as port lookup and statistical monitoring, it makes up for in versatility, reliability, and the backing of a company committed to its customers.

The TurboStar has better network-management capabilities than the StarController, and its computerlike design lends itself easily to future developments. Until Nuvotech provides a way to cut the voltage when necessary and changes the software so that the management window updates when network conditions change, however, I can’t recommend the TurboStar.

Capsule Reviews

StarController

The StarController distributes network signals to devices on a network and provides some network management and troubleshooting capabilities. It is the industry standard and has a good record in most environments.

Pros: Very reliable in a variety of typical wiring situations; has superior documentation and technical support.

Cons: Network management lacks some of the better features of the TurboStar—unlikely to improve.

Requires: Wiring kit (purchased separately) and a connector for each device. Farallon’s management utilities (CheckNet and TrafficWatch) must also be purchased separately.

List Price: $1,295.

Farallon Computing, 2000 Powell St., Emeryville, CA 94608; (415) 596-9000.

TurboStar

The TurboStar distributes signals to devices on a network and has some network-management and troubleshooting capabilities. Its innovative design is compromised by its poor performance in some wiring situations.

Pros: Easy-to-access management and troubleshooting functions. Since it has a proprietary EPROM, it could grow to include management tools, Ethernet routers, and a LocalTalk bridging function.

Cons: Because of its high voltage, the TurboStar doesn’t perform properly with some wiring types.

Requires: Telephone-wiring accessories (purchased separately) and a connector for each device.

List Price: $1,795.

Nuvotech, Inc., 2015 Bridgeway, Suite 204, Sausalito, CA 94965; (415) 331-7815.
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*National Software Testing Laboratory ran benchmarks comparing the Macintosh IIfx with the IBM Model 70-445 running Microsoft Excel, Adobe Illustrator, and Lotus 1-2-3. The IIfx was 3.7 times faster running these three popular programs, doing the things you normally do in business. In the same test, the IIfx was also faster than the Compaq 386/25. The full NIST test results are available on request. Apple, the Apple logo, III and Macintosh are registered trademarks, and "The power to be your best" is a trademark.
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When you move into color publishing on the Mac, you enter a workspace that is full of promise — and problems. Few other technologies stretch the desktop metaphor to such limits: A dazzling array of sophisticated computer tools is available, from color scanners and printers to retouching and separation software. But sophisticated digital tools haven’t fully solved one of color publishing’s central technical issues — what you see on your color monitor isn’t always what you get on your color printer. Industry leaders are developing solutions to the problem of color WYSIWYG, but it’s still a trap for unwary beginners. Publishing professionals already know that you have to juggle high-tech color tools with traditional publishing techniques.

This *MacUser* buyer’s guide defines the major issues in color publishing and uncovers some of the latest solutions. We start with a trio of feature articles examining the current state of color on the Mac, from input to processing to output. Next, *MacUser Labs* presents two comprehensive reports on color printers and monitors, with the lowdown on the best products available. All together, they provide a primer for publishers who are thinking of going desktop and in-depth product information for those who’ve already taken the leap.
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So insist on the superior quality you've come to expect from SuperMac. The best look. The best feel. The best performance. And the best value. Ask your dealer for a SuperMac graphics system.
Color publishing on the desktop is a complex process, from scanning an original piece of art to reproducing the image on a printing press. In three sections — input, processing, and output — this article provides an overall map to desktop color. As we examine the software and hardware tools used in the process, we discuss common problems — as well as solutions — both present and future.

By Robert Virkus

One person can desktop-publish a black-and-white document with relative ease, acting as writer, editor, graphic artist, and production manager. But desktop color reproduction involves a more elaborate scenario. In traditional publishing, film is used at each step — a photograph is taken, retouched, stripped, cropped, placed in a layout, and color-separated.

The Art of Scanning

With desktop publishing, computer files replace the film in much of the process, with standards such as Adobe’s PostScript and OPI (the Aldus-sponsored Open Prepress Interface) providing the links. But while computers allow for a degree of precision never before possible, color publishing remains a job best handled by skilled professionals.

The Scanner’s Role

The quality of the scanner used at the input stage is crucial. If the scanner fails to capture enough information from the scanned image, the image-processing software and separation utilities cannot entirely compensate for the loss. Fortunately, scanners sensitive enough to provide the full tonal range required for quality reproduction are now being introduced by such companies as Barneyscan, Howtek, Nikon, Sharp, and Truel.

Scanners convert the light reflected from a photograph into numbers a computer can manipulate. Desktop scanners use a silicon chip called a charge-coupled device, or CCD, to measure the light. When exposed to light, thousands of tiny elements in the CCD emit electrical charges corresponding to the light’s intensity. The higher the number of elements in a scanner’s CCD array, the higher the resolution of its images.
To create comps, the software sends the CMYK values to a QMS printer (F), which reproduces the image by dithering and making halftones. For the final four-color separation, individual C, M, Y, and K layers are sent to an imagesetter such as a Linotronic (G). The process produces four sheets of film that will create plates for the cyan, magenta, yellow, and black in the finished product (H) (see “Separation Anxiety”).

The player or scanner sends the RGB information to a color-video board installed in a Mac running a painting, drawing, or page-layout application capable of color separation (D). The video board displays the image on the screen, where you can manipulate it by using colors you choose with a color picker such as Apple’s (E). The software then converts the RGB values of the altered image to the CMYK (cyan, magenta, yellow, and black) scheme that output devices use (see “Color Transformations”).

Scanners vary in quality according to their resolution (dots per inch, or dpi) and their dynamic range (bits of color captured per pixel). How much resolution you need depends on the size of your original image and output image and the screen frequency you require for color separations. For color separations, you should scan at twice your intended screen frequency to compensate for the information lost when the image is printed as a mosaic of dots, called a halftone.

The scanners discussed here have a dynamic range of 24 bits of color per pixel, which translates to 16.8 million distinct colors — more than enough to capture the image on a color slide.

There are complications, however. In theory, these scanners capture 8 bits of color in each of three passes over an image, scanning for the red, green, and blue components. In reality, they are able to capture only 6 bits. As a result, either the dark areas go black or the light areas go white. And if you boost the image’s brightness after scanning, you lose even more detail in the light areas.

**Scanners: Flatbed and Slide**

The desktop-color-scanner market is divided into flatbed (reflective-copy) scanners and slide (transparency) scanners. Flatbed scanners typically scan flat art of up to 11 x 17 inches at 300 dpi and 8 bits of data per color channel. Some newer models scan at 600 dpi and 12 bits of data per color for 8-bit color accuracy. Flatbed scanners often have optional mirror attachments that let you scan transparencies, including 35mm slides (scans of slides are often blurry, however).

Flatbed scanners have definite problems providing enough tonal range for quality separations in the output stage. Scanning a slide at 300 dpi renders too little detail. Slide scanners provide extremely high resolution, considering the size of the 35mm original, but the resolution is still borderline for full-page color separations.

**Making Compromises**

A printing press can reproduce many fewer colors than are possible within a transparency. Certain characteristics of transparencies can be adjusted during the scanning process so that the image reproduced on the printing press best resembles the original photograph. The art of scanning a color photograph involves knowing what compromises have to be made and how best to apply them while still retaining the true colors of the original as much as possible.

Along with color-craft knowledge, operating a scanner requires a certain technical expertise. Color scanners require continual calibration to ensure that the scanner light, mechanics, focus, and...
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After all, at this price, you can hardly afford not to.

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Better Images Through Innovation.
filters are adjusted so that the color components will be separated correctly. When checking out scanners, remember to examine the controlling software as well as the technical specifications of the scanner itself.

**Controlling the Scan**

There are basically two types of scanning software: image-capture software, which controls the scanner and image modification, and processing software, which we’ll address in the next section. The current trend is toward dual-purpose software that allows you to adjust the scanning parameters and then scan and modify the image. Some scanner manufacturers provide their own processing software or a copy of an off-the-shelf package such as Avalon’s PhotoMac or Adobe’s Photoshop. Otherwise, you have to buy your own processing software, which may be preferable anyway.

The key at this stage, though, is having control of your scanner. For quality images, you want to create a scan that looks good from the start. To achieve this, you’ll need software with flexible scanning controls. When you evaluate scanners, look for the following features:

**Resolution.** You don’t always want or need the maximum resolution your scanner can provide. You should be able to choose other resolutions, both to keep file sizes down and to fine-tune scans for special situations.

**Scan area.** Often you’ll want to scan only a portion of an image, either to keep the file size down or as a means of cropping the picture. Most scanner software lets you do a quick preview scan and then draw a box around the area you want to capture — an approach that seems to work well.

**Disk space and memory.** Some scanning software tells you how much space is required for an image before you scan it and whether or not you have enough space to complete the scan. Some software cannot capture an image bigger than available RAM, whereas other programs use available disk space to capture larger images.

**Scaling.** If you know in advance what size your final image should be, it’s useful to be able to scale, or resize, the image during scanning. The trick is not to scale an image to a larger size than what you will eventually use. If you use scaling and resolution control, you stand a much better chance of capturing enough information for making separations later.

**Brightness and contrast.** You should adjust brightness and contrast before scanning an image, rather than after. When you use image-editing software to change the brightness and contrast, you lose information as you decrease certain values. For more sophisticated adjustment of contrast and brightness, you can use a method called gamma correction. Scanners save color information on a straight 1-to-1 basis, but the amount of information needed to interpret a dark area is greater than the amount of information needed to interpret a light one. To solve this problem, the information is saved on a curve, and more information stored on the dark end of the scale with gamma correction. Instead of using a linear slider to adjust contrast and brightness, you edit the contrast/brightness curve before scanning (see Figures 1 and 2).

**Shrinking Files While You Scan**

Color scans tend to produce large files — at maximum resolution, Nikon’s slide scanner LS-3500 produces a 75-megabyte file, for example. And as scanners improve, the files will get larger. Larger files have greater spatial and color resolution, giving you more detail and more room for image manipulation. Although file-compression utilities such as StuffIt and its commercial version, StuffIt Deluxe, may help when you’re transferring images from system to system, on-the-fly compression and decompression techniques will be required to effectively work with color images.

In on-the-fly compression, images are automatically compressed every time you store them and automatically decompressed whenever you want to view them. It usually requires a combination of software and customized computer chips that assist in compression and decompression at high speed. Electronics For Imaging (EFI) produces developer software called ECOMP that does on-the-fly compression by deleting redundant data that the eye won’t miss in the decompressed image. The software’s adaptive algorithms scan the input image, filtering and preserving its tonal data, color data, and spatial-acuity attributes.

We now have the tools for input at our disposal. The next job is to learn how to use them properly — how to set them up, how to maintain them, and how to capture a good image with the resolution and tonal range required for four-color process separations.
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Scanning the Market

The Sharp JX-600 Commercial Color Scanner (not shown but similar: the Sharp JX-450 24-bit flatbed scanner)

Howtek's Scanmaster flatbed scanner

Truvel's TZ-3BWC 24-bit scanner

Flatbed Scanners

Sharp's JX-450 24-bit flatbed scanner scans images of up to 11 x 17 inches with resolution up to 300 dpi. The scanner's software controls resolution, sharpness, scan speed, and image area, and does some color correction. The new JX-600's resolution is up to 600 dpi, and it digitizes the red, green, and blue values for each pixel with 10 bits of data, converting to 8 bits via a table. Sharp scanners don't come with their own software, so you must buy scanning software with a built-in driver, such as ChromaScan, LaserPaint Color II, PixelScan, Studio/8 Scanner Installer, ImageStudio 1.5, or Color Studio.

Howtek makes a version of the Sharp scanner with its own driver, called the Scanmaster, which comes with a full-featured application called MacScanlt. You can adjust brightness, contrast, and gamma for the red, green, and blue layers individually and for some predefined color-correction procedures as well.

The lights and lens of Truvel's TZ-3BWC 24-bit scanner are on a moving arm that rides above the scanner bed, so it can scan three-dimensional objects that are up to four inches tall. Adjusting the lens allows resolutions of up to 900 dpi. The Truvel must be calibrated each time you turn it on, an elaborate procedure. Also, the calibration software is nonintuitive and difficult to get used to. The scanning lights take about 30 minutes to warm up, but if you leave the scanner on all the time, the bright lights become a nuisance.

Slide Scanners

The Barneyscan was the first 35mm slide scanner to approach professional input quality, with a 1,024-element CCD array that captures 8 bits of color per pixel. The scanner comes with BarneyscanMac, a basic capture program for scanning, and BarneyscanXP, a powerful color-correction and paint program.

BarneyscanMac does a quick prescan so you can indicate cropping and adjust brightness and contrast before doing a high-resolution scan. If you change the resolution and cropping areas, the software tells you how big the resulting file will be.

BarneyscanXP, a proprietary version of Adobe's Photoshop that uses virtual-memory techniques, lets you split images into component channels (red-green-blue, cyan-magenta-yellow-black, or hue-saturation-brightness), edit each channel, and then recombine them. The program lets you create masks so you can apply effects to specific regions or values within an image. The Barneyscan is a straight three-pass, eight-bit scanner with limited dynamic range, but the software makes it easy to set the exposure of the scan for optimum values in the areas you want to capture.

Nikon's LS-3500 slide scanner may be the easiest to use, in that it's self-calibrating and focuses automatically. Nikon's Colorflex software examines a slide's tonal range, from dark to light. You can use this preview to set cropping borders and adjust the exposure and gamma controls. You can reduce the size of the resulting file by reducing the resolution (at maximum resolution, the file can be as large as 75 megabytes).

The Howtek Scanmaster 35 scans 2,000 x 2,000 pixels and comes with MacScanlt software. You have to calibrate the Scanmaster 35 every time you turn it on, but calibration is a simple procedure. You can preview an image, choose the portion you want to capture, set all the image-enhancement options, and view the results on-screen. Once the image looks right, you rescans. The preview scan captures 12 bits each of red, green, and blue data and then converts that data to 8 bits, which results in more-accurate color reproduction.
These darkroom-type effects were done with the image-adjustment capabilities of Photoshop to modify such things as hue/saturation, color balance, and brightness/contrast.

The colors of the babies' pajamas in the top image were changed to those in the bottom image with both ColorStudio and Photoshop. This was done by tinting a selected area, using the auto-selection tools, and further refining it by hand.

Color Transformations

Processing color images on the desktop has come a long way in the past few years. The processing tools currently available are so powerful that you can now accomplish tasks that earlier could only be done on million-dollar, high-end prepress systems. With products such as Letraset's ColorStudio or Adobe's Photoshop, you can correct your color images and manipulate them in many ways. Color correction involves subtly adjusting an image's color balance, sharpness, brightness and contrast, and other factors, which improves the image's four-color reproduction (see the "Altered Color States" sidebar).

Color manipulation means creating a new image by altering an old one. This can involve anything from darkening the sky so that it's a deeper blue to changing the color of a model's dress to cutting and pasting selected portions of two or more images to achieve a special effect.

Like photo correction and manipulation, mechanical color production is a complex process that involves preparation for four-color separation. Problems arise here because drawing, painting, and layout programs are not consistent in the way they display Pantone-compatible RGB color values on-screen: Artists cannot rely on what they see (see "The
The above special effects moveing file s over a network is less pain­going to move any cl ose r to the yet to be addressed by the softwa re indus­WYSIWYG idea l.

For workable color, five megabytes of RAM is the absolute minimum — and that may be too confini n g, since some processing software, and the images they prepare, work only within available RAM. Memory prices have decreased dramati­cally lately, so the extra $300 or so to bring your machine up to 8 megabytes will be a small part of your total budget. Some software, such as Letraset’s ColorStudio, Adobe’s Photoshop, and Avalon’s PhotoMac, use virtual memory to allocate a section of your hard-disk drive for temporary storage that can be called back into RAM as needed. You can make software that doesn’t have this capability more usable on a 5-mega­byte Mac IIx on up by using Connec­tix’s Virtual software. (Apple’s System 7 is expected to include virtual-memory capabilities.)

If you are outfitting an older Mac II or find that even the Ileii is not fast enough, you may want to invest in a CPU acceler­ator board, which will make your soft­ware run faster. You can also adopt the strategy of buying a video board that’s accelerator-ready or that has on-board acceleration, such as the SuperMac Spect­rum/24 Series III card with its 32-bit QuickDraw accelerator and support for a wide range of monitors. Other video boards, with various acceleration strate­gies, are available from companies such as Radius and Truevision.

Video cards that have been optimized for a particular color monitor are often

Pantone Touch” in the DTP section in this issue). Color standardization across applications is a difficult issue that has yet to be addressed by the software industry, but it’s an important one if we’re going to move any closer to the WYSIWYG ideal.

Color Needs Speed
To do any viable color-image processing, you’re going to need a fully equipped Mac II or later. The faster your CPU, the larger your hard-disk drive, and the more RAM you’ve got, the easier it’s going to be to massage large color images. And moving files over a network is less pain­ful with a fast network.

For workable color, five megabytes of

Altered Color States
Fixing finished photos can be a night­mare. The darkroom time and the cost of reshooting can push a project over budget or keep corrections from being made. The advantages of scanning photos into a computer and doing the corrections there include instant feedback, advanced and automated tools, and the ability to quickly undo effects you don’t like.

The most important features offered by programs that process true-24-bit-color images fall into five categories: selection, color adjustment, touch-up, artistic effects, and output.

Powerful selection abilities are the most important for retouching (see Figure A). Most Mac users are spoiled by paint pro­grams that let them lasso part of an illustration. Although this is simple to do in black and white, it’s much more complex for a program to intelligently outline a color selection from within a color image. Both Letraset’s ColorStudio and Adobe’s Photo­shop include powerful tools that let you automatically make selections based on varied color criteria. Since even these automatic functions aren’t perfect, they also allow you to add or subtract from a current selection so that you can refine the criteria until the image is exactly as you want it.

ColorStudio, PhotoMac, and Photoshop also allow you to make traditional dark­room modifications — adjusting the con­trast, brightness, hue, saturation, and other color-balance aspects in a specific section or for the whole image (see Figure B). If an image is damaged, there are touch­up features you can use, not just in these programs but also in SuperMac’s PixelPaint Professional. You can smudge blunders, sharpen blurred sections, and blur sec­tions that appear too obtrusive. In addition, ColorStudio, PhotoMac, and Photos­hop let you change the color balance of selected images to highlight or de-empha­size items.

Professionals can use these programs for special effects that go beyond all but those possible in the most sophisticated darkrooms — adding titles and highlights with color blends and fills — and for showing off special effects such as warp­ing, rotating, enlarging, and reducing (see Figure C).

Little of this work would be of value without a way to get it into print. All the programs mentioned here include the ability to make color separations for final printing. This task is complicated because of the great difference between the colors that can be displayed on-screen and the more limited colors that can be produced by most printing processes (see the “TekColor Solution” sidebar).

The current crop of software for pro­cessing true-color images has matured significantly, enabling the Mac to produce results worthy of professionals and giving us one more great publishing tool.

— Ben Calica and Gillian Newson

Figure C: The above special effects — including Rotate, Warping, Flip Vertical, and added text — are a sample of what can be achieved with PixelPaint Professional.
Technology moves so fast that your purchase may seem outdated the day you unpack it! Take Macintosh color display systems, for example. Most color applications you use now are written for 8-bit systems. But buying an 8-bit display system—a major investment—might leave you stranded as your needs turn to 24-bit color. So you may be tempted to delay purchasing a color display system.

Or you can buy a ColorMAX 8/24 display system today. It has the best 19” TRINITRON® monitor available for the Macintosh IIvx family, and our own 8-bit color adapter. The ColorMAX 8/24 system is designed to be upgraded easily by adding memory to your adapter card. A short visit to your dealer brings you full 24-bit color. As your color needs increase, your system’s capabilities can, too—for much less than the price of a new 24-bit system.

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part of a display system. Having monitors from the same company for everyone on your production team helps minimize color-display variations among monitors, although without calibration systems such as Radius’ or Barco’s, the same monitors from the same company, even if purchased at the same time, can display color differently. (See the “Color Calibration” sidebar and the MacUser Labs color-monitor report in this issue for a comparison of color-display systems.)

The Hard Facts
Since color files can be huge, you’re going to need a large hard-disk drive. A minimum of 80 megabytes is essential, but you’ll probably want something more in the neighborhood of 300 megabytes for backup copies, virtual memory, and multiple versions of an image.

One strategy to keep in mind is to purchase a removable disk drive, such as those available from Bay Microsystems, Mass Microsystems, Microtech, DPI, Peripheral Land, Info Technologies, and Rel Tech Technology (see “The Never-Ending Storage,” March ’89). Because you have to transfer your files to a service bureau for processing and modem transfer can take too long, even at 2,400 or 9,600 baud, make sure that your service bureau can support the device you’re planning to buy, since universal standards for this medium don’t exist. (Some service bureaus, as part of your contract, supply the removable disk drive themselves.)

You may also want to look into purchasing a removable, erasable optical drive, which is capable of storing up to 1 gigabyte on a single cartridge (see “Letting in the Light,” November ’89). Manufacturers include Storage Dimensions, Peripheral Land, Pinnacle Micro, Jasmine, LaCie, Racet Computers, and MACsetra.

Networks That Work
You’re going to find passing color files around within a work group a bit slow on a network with LocalTalk (230K bits per second [Kbps]). To speed up the process, you can outfit your Macs with DaynaTalk or FlashBox connectors from Dayna Communications or TOPS to theoretically achieve LocalTalk speeds in the 700-to-800-Kbps range, but an Ethernet network, capable of speeds of 10 megabits per second, is a better choice for heavy traffic.

One of the first steps in moving closer to WYSIWYG color on the Mac desktop is to make sure your monitor is displaying consistently accurate colors. This is no simple task. Two companies, Radius and Barco/RasterOps, have come up with a couple of innovative methods for tackling the tricky issue of color-monitor calibration.

The Radius Precision Color Calibrator calibrates the video card to produce predictable and accurate colors. The Radius system uses a combination of proprietary software and an optical sensor that attaches to the ADB (Apple Desktop Bus). A sensor clamps onto the screen with a suction cup and reads the red, green, and blue phosphors’ intensity levels. The software then analyzes the monitor’s response to output from the video card. If the monitor doesn’t show the desired contrast and brightness, the video card’s output is adjusted until the monitor shows the desired results.

This system guarantees that your Radius monitor will have the same response as do all calibrated Radius monitors. It also provides several settings for different scanners and printers. In addition, it allows you to adjust the color temperature, or the monitor’s “whiteness.”

The missing equation in the Radius system is the monitor’s reliability. Radius is banking on the consistency of the Sony Trinitron, which, although one of the best in the industry, is not perfect.

Barco has addressed the monitor-reliability problem by marketing a calibrated monitor, sold in the U.S. by RasterOps. Like Radius’, the Barco Calibrator also uses an intensity sensor and offers color-temperature adjustments. But instead of creating a feedback loop to the video card, the Barco Calibrator loops its feedback to a processing system within the monitor. Data from the optical sensor is used to maintain consistent response levels from the phosphors. This ensures the stability of the monitor and color for a long period of time by correcting for amplifier drift, aging phosphors, and environmental changes. Because this correction is constant, a Barco monitor is theoretically always calibrated to its original factory specifications.

The Barco Calibrator is handicapped by having no feedback to the video card, which can be inaccurate by as much as 10 percent. Another problem is that the Matsushita Shadow Mask tube that Barco uses is inferior to that of Radius’ Trinitron in focus, brightness, and uniformity.

So what is the best calibration scheme? The jury’s still out, but some combination of both products, giving you correct signals from the video card and a stable monitor, would be ideal.

— Paul Yi

**Figure D:** The Radius and Barco calibration strategies both use optical sensors to adjust colors on a monitor, but there the similarity stops. Radius adjusts the video card’s output levels (Loop A) to account for color drift, whereas Barco adjusts the monitor’s settings (Loop B) against the original factory specifications. An ideal calibration scheme would let you make both adjustments to ensure more-stable on-screen color.
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The TekColor Solution

A perfectly calibrated monitor gives you consistent colors, but since backlit monitors show colors differently than does the printed page, how do you precisely translate a monitor's color values to those of your printer?

The problem lies in the fact that monitors use an additive system to create colors: Red, green, and blue (RGB) are added together in varying percentages. A printer, on the other hand, uses a subtractive system — various mixtures of cyan, magenta, yellow, and black dyes (CMYK) subtract colors from the spectrum when reflected from paper to the human eye. Because of the difference between additive and subtractive color, there are many colors that a monitor can reproduce that a printer can't and a few colors that a printer can reproduce that a monitor can't. The possible colors that a monitor or printer can reproduce is called its color gamut.

One manufacturer, Tektronix, has come up with one of the best solutions to this dilemma with its product TekColor. It shows great promise for WYSIWYG color.

The first step Tektronix took was to determine the gamuts for several monitors and match them to gamuts of specific printers. Currently, Apple, E-Machines, Radius, and RasterOps monitors and Tektronix ColorQuick and 4693DX color printers are supported, with more to follow. Because it accesses tables that map the full color gamuts of these monitors and printers to each other, TekColor can track displayed colors against those that will print.

TekColor comes as a cdev that replaces the Apple Color Picker. When you choose colors to display, a dialog box (see Figure E) shows the gamuts of both the monitor and the printer as two triangular, overlapping leaves. Each device can reproduce the colors of the other only where they overlap.

Additionally, TekColor assures the conversion of RGB values to CMYK values for specific devices. Most current applications on the Mac employ an RGB model to display colors and a corresponding CMYK model to print them but assign only generalized RGB and CMYK values when the program displays or prints a color. These models make it appear as though a specific monitor or printer is capable of displaying and printing all RGB and CMYK values, which is not the case. (The issue is complicated by wide use of the Pantone color-matching system for predictable spot-color output.) This becomes obvious when RGB and CMYK models and the gamuts of particular devices are mapped against Tektronix's color model, TekHVC (hue, value, chroma), which is a version of the CIE color model developed in the 1930s to mathematically define the range of colors that humans can see (see Figure F).

TekColor can assess the limited gamuts of each particular device and accurately convert their values. This is all done on the fly as the image is being rasterized and processed.

By using TekHVC as an objective color model and mapping the gamuts of monitors and printers to it, TekColor theoretically guarantees true WYSIWYG color. Although devices still need to be calibrated to account for drift, TekColor moves us one revolutionary step closer to the WYSIWYG ideal.

— Paul Yi
You can't get any brighter than this. If you want the brightest, boldest color money can buy, you want a Tektronix color printer. No other printer on the market can make you look this good.

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New developments notwithstanding, to date there is no such thing as true-color WYSIWYG. Even the monitor on a $1 million Scitex system doesn’t accurately represent what images will look like when they’re finally printed. Operators have to depend on their skill and judgment in knowing what variations may occur and how to compensate for them.

Separation Anxiety

As a result, color-publishing experts aren’t going to find themselves out on the street just because the Mac can make color reproduction easier; in fact, their services may be even more valuable now, and possibly less expensive. The potential for producing sloppy color on the desktop is immense. With powerful tools such as color-retouching and-separation software, unskilled users can boich an image as easily as they can enhance it.

Because color reproduction is difficult, requiring extraordinary control over every variable, it’s vital that you learn as much as you can about every facet of the process. Your best educational tool may well be your prepress vendor, who has learned the trade by using traditional methods and has a wealth of color knowledge to draw on.

Color Halftones

Four-color printing requires separating an image into four halftones — cyan, magenta, yellow, and black — each of which is assigned a proportional value of its color. Since printing presses can print ink only at full intensity, photo processing uses halftone screens to produce a pattern of large and small dots representing intensities of color.

Printing four halftones on top of each other is not an easy task — inks aren’t perfect, film shows color differently than
paper, paper absorbs ink at different rates, presses apply ink differently... the complications go on and on.

To create quality separations, you need to be able to control some or all of these aspects as well as several technical factors such as screen angles, dot gain, traps, registration, under-color removal, and gray-component replacement.

You can start your education in color printing by learning how your processing software deals with these factors. Experiment with the program’s default parameters, and then output some film without making any corrections, to give yourself a base from which to work. Gradually adjust the various settings, one at a time, until you get a feel for what the controls do and how they affect your output.

Screen Angles
When the dots in each color are oriented the same way or at an acute angle, the result is an undesirable moiré pattern in the printed image. To avoid this, each halftone screen must be rotated at a slightly different angle. Typical rotation values for each screen are 105 degrees for cyan, 75 for magenta, 90 for yellow, and 45 for black.

Color-separation software should allow you to precisely adjust screen angles by rotating each individual layer in single-degree increments.

Dot Gain
Dot gain is the enlargement in dot size that occurs in any printing process. Depending on the type of paper, the original film’s dot size can grow as much as 15 to 30 percent. Because it absorbs ink, uncoated paper, such as newsprint, results in the greatest dot gain, whereas coated paper, such as the kind MacUser is printed on, results in the least.

The amount of ink used during printing also affects dot gain. As more ink is printed, the dot size becomes bigger, increasing the contrast and darkening the color. On the other hand, too little ink lowers the contrast and detracts from the reproduction’s quality. The optimal amount of ink depends on the paper used and the particular tendencies of the printing press used.

Dot gain doesn’t affect all the dots in a halftone to the same degree — it tends to be greater in the middle tones, where the dots create 50-percent shades, than in the highlights and dark areas. This results in darker middle tones, which reduce the contrast and detail and make the picture look darker.

Registration
Registration is the precise placement of the four separations on top of each other when shooting composite film and lining up printing plates on a press. Improper registration results in blurry, out-of-focus images. Color-separation software should let you create registration marks and labels identifying the different color plates.

Trapping
To see the effects of another technical pitfall, pick up any magazine or newspaper and examine the areas where one color ends and another begins. If trapping wasn’t properly accomplished in the original artwork and stripping process (the positioning and assembly of the film components), there will be a white space between the two colors. This occurs because printing presses and paper aren’t perfect, resulting in a slight drift in registration.

Using traps is a way of compensating for possible misregistration at press time by making the outlines of abutting color objects slightly thicker than usual so that the outlines overlap.

Under-Color Removal
Strictly speaking, only cyan, magenta, and yellow are process colors — when all three are printed on the same area, they produce black by absorbing all the colors reflected from the white surface of the paper. Because of impurities in the ink, however, combining equal amounts of the three colors usually results in a brownish color, so the reproduction doesn’t match the contrast of the original. By adding black ink, however, you can add detail and contrast that are otherwise impossible to reproduce.

One of the best ways to use black is to
How the other half lives.

It's a world of rich, saturated 300dpi color. Where you get high resolution, high quality, consistent color output in the first print or the thousandth. In sizes up to a full 11"x17" bleed.

With its 32-bit QuickDraw Chooser-level driver, the QD5500 gives you 300dpi text in any size or orientation. Best of all, your documents will be compatible with the LaserWriter's Page Setup command so there's no need for repagination when using both a QD5500 and a LaserWriter.

So see how the other half lives. Call us at (800) 873-4561.
Trapping involves taking measures to prevent a gap between two adjacent colors caused by printing-press misregistration. This exaggerated example shows the results of no trapping and poor registration.

To ensure correct trapping, this image has two overlapping text layers — the bottom layer has a stroke of color created by mixture of the type and background colors. This compensates for the slight drift in registration that occurs during printing.

Remove some of the cyan, magenta, and yellow inks from the dark neutral areas of the reproduction to make room for a strong, rich black. This process is called UCR (under-color removal).

This process has other advantages too, such as the ability to bring out better detail and contrast in a photograph. This is true for the three process colors as well as for black, substituting black for the three process colors makes UCR more economical than true four-color printing — the total deposit of ink on paper is much less. Using black ink also makes it easier to balance the other three colors, especially in shadowed areas.

Gray-Component Replacement

In recent years, the idea of UCR has been extended to apply to any image area in which all four colors are printing (which usually includes most of the image in a continuous-tone photograph, where there is an immense variety of colors). Again, the amounts of cyan, magenta, and yellow are reduced, and the amount of black is increased to compensate. This technique is called GCR (gray-component replacement).

Separation Software

Color-separation programs are abundant: Some are stand-alone products that separate a variety of color images; others incorporate separation capabilities within a page-layout or graphics program. Most separation software provides varying amounts of control over all the variables described.

One of the most comprehensive separation programs is the recently released Aldus PrePrint. PrePrint incorporates built-in color knowledge and works in conjunction with PageMaker Color Extension and other applications that conform to the Aldus-sponsored OPI (Open Prepress Interface) and Adobe color conventions.

PrePrint allows you to improve color and gray-scale TIFF images; make color adjustments to accommodate the press on which the publication will be printed; and produce color separations of TIFF files or the entire document, including text, illustrations, and images.

PrePrint is specifically designed for production rather than design. It uses either predefined values or a range of choices that, according to Aldus, have “real world” antecedents. (Aldus spent many months in color trade shops around the world researching how color separations are made.) In PrePrint, certain functions, such as normalizing tones and gray-balancing an image, are used quite extensively but almost always within a fairly narrow spectrum of possibilities. PrePrint lets you fix many problems, such as dot gain, by clicking on a single button.

Coming Attractions

Color output is a combination of art, science, and technical skill. Professionals who work with color often spend years in training, and it’s their judgment and skill that we have relied on for so long to produce quality color printing. The potential cost savings of bringing some of these skills to the desktop are enormous — as much as two-thirds of your prepress bill — but so too are the responsibilities.

Color from the desktop is here, and on the technical side, it’s only going to get better and easier. The art, however, will always be part of the process. There will always be a need in color publishing for creative, skilled professionals.

While scrolling through our incredibly long font menu one day, we noticed the italics were hiding in the 1's and the bolds were huddled in the B's. Usually—but not always. There had to be a better way.

That’s why we created Adobe Type Reunion: simply drop Adobe Type Reunion into your system folder and your fonts are automatically sorted by name and weight—forever. Now you can easily find any font, in virtually any application. Plus, Adobe Type Reunion costs just $65.00 and works with popular font utilities like Suitcase II and Master Juggler.

So if your font families are scattered all over, isn’t it time you reunite them? To find out where you can buy Adobe Type Reunion, just call 1-800-344-8335. Outside the U.S.A. and Canada, call your local distributor.
### Output Obstacles

The final step in producing film is using an imagesetter, which is similar to an extremely high-resolution laser printer that can output an image on either film or photosensitive paper.

The most commonly used imagesetter is the Linotronic L300, which was in the first generation of these machines that could be connected to a PostScript RIP (raster-image processor). A PostScript RIP converts the type and image information into a pixel-by-pixel rendition in the requested size and resolution for the particular imagesetter it’s connected to. Other manufacturers have caught up with Linotronic and now offer their own PostScript-compatible imagesetters, such as the Agfa/Compugraphic 9400 and the Varityper 4300.

Several smaller companies have also introduced imagesetters, such as the Ultra Setter from Hell Graphics and the ColorSetter 2000 from Optronix. The price has come down enough on these machines — from more than $250,000 a few years ago to $50,000 or less today — that some publishers that generate a lot of film work are contemplating installing one in-house.

But there’s more to printing than just buying the hardware. Operating an imagesetter in-house isn’t a minor undertaking. Beyond the cost of purchasing the machine are operating and maintenance costs. You also need one or two trained operators, and to prepare for emergencies, you need some kind of backup — either a second machine or a local prepress house that is willing to rent its equipment to you.

Imagesetters are relatively delicate machines that need calibrating at least once a day. In addition, film densities must be checked, and the processing chemicals, film, and laser need to be routinely adjusted (see “Getting It on Film” in this issue’s DTP section).

Output personnel require extensive training, and they must be constantly vigilant — a couple of the disadvantages of bringing imagesetters in-house. Also, the relatively lower-cost imagesetters are being asked to perform functions that machines costing tens of thousands of dollars have typically done, which can cause problems.

A major difficulty is producing good-quality output consistently. Most low-cost imagesetters are based on machines that were originally designed for typesetting. Positioning four sheets of film to register dot-for-dot is a tough assignment for them. Imagesetters also experience occasional problems with banding at certain screen angles, poor registration because of varying film feed during exposure, and inconsistent dot formation. Manufacturers are addressing these problems, and current indications are that these technical problems will be solved. But with so many variables in the process, any of which can cause problems, outputting film is a job that is usually better left to the professionals at a preprint shop.

In-house or at a prepress bureau, outputting a halftone is a time-consuming business. When you multiply that by four to get separations, it’s evident that outputting film efficiently without running up huge bills isn’t easy — four pieces of film can take two hours or more to produce, which can mean the loss of any cost savings from doing prepress work on your Mac.

The PostScript professional imagesetters that high-end prepress service bureaus use contain special RIPs that accept gray-valued pixels and generate halftone dots at the correct size and shape to create film images. These RIPs have been optimized for speed, and since they’ve been around for at least 20 years, they can create algorithms that construct dots that print well.

Desktop-color-prepress vendors have looked to PostScript by default to do the halftoning for them, but unfortunately, Adobe’s halftoning algorithm is primitive by color-industry standards. Adobe is aware of this problem and is expected to release a more comprehensive Color PostScript sometime this year.

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**Figure 6:** After this color image is separated with a color-separation program, it is sent to an imagesetter, which outputs four negatives. These are used to expose the printing plates, and then cyan, magenta, yellow, and black inks are applied to their respective plates on the printing press.
Introducing the Kodak Diconix M150 plus printer. Don't take a Mac anywhere without one. Now you can print out a sudden revision, a quick letter, an instant overhead anywhere!

Just think of all the things you can do if you have a printer with your Macintosh computer. Those last-minute improvements on the presentation. And the letters and reports that could be on their way right now. Then there's the sheer convenience of being able to read what you write before you get back to the office.

It's all easy if you have the new Kodak Diconix M150 plus printer. It's easy to carry (3.1 lbs.), prints PostScript®-quality outline fonts using Adobe Type Manager™ software, as well as presentation graphics. And it works as well on the desktop as it does on the road. No printer in the world is quieter, smaller or lighter.

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Macintosh computer and new Kodak Diconix printer

WHAT'S ONE WITHOUT THE OTHER?

KODAK

The new vision of Kodak
Color Product Directory

This list includes only products used in the process of creating printed color images on the desktop.

**Color Calibrators and WYSIWYG Color**

- **Radius**
  1710 Fortune Drive
  San Jose, CA 95131
  (408) 434-1010
  Precision Color Calibrator, $595

- **RasterOps**
  2500 Walsh Ave.
  Santa Clara, CA 95051
  (408) 582-6000
  Barco Calibrator, $12,500 (includes monitor and board)

- **Tektronix, Inc.**
  P.O. Box 1000
  Wilsonville, OR 97070
  (800) 835-6100
  TekColor, $50

- **Adobe Systems, Inc.**
  1585 Charleston Road
  Mountain View, CA 94039
  (800) 344-8335
  Adobe Photoshop, $895
  Adobe Illustrator 88 1.9.3, $495

- **Aldus Corp.**
  411 First Ave. S.
  Seattle, WA 98104
  (206) 622-9500
  Aldus PrePrint, $495
  FreeHand 2.02, $495

- **Avalon Development Group**
  1000 Massachusetts Drive
  Cambridge, MA 02138
  (617) 661-1405
  PhotoMac, $795

- **Claris Corp.**
  5201 Patrick Henry Drive
  Santa Clara, CA 95052
  (408) 727-8227
  MacDraw II 7.1, $399

- **Computer Friends**
  14250 N.W. Science Park Drive
  Portland, OR 97229
  (800) 547-3303
  Modern Artist 2.0, $395

- **Deneba Software**
  3305 N.W. 74th Ave.
  Miami, FL 33122
  (305) 594-6695
  Canvas 2.1 (with Separator), $299.95

- **LaserWare**
  P.O. Box 668
  San Rafael, CA 94915
  (415) 453-9500
  LaserPaint Color II, $595

- **Letraset USA**
  40 Eisenhower Drive
  Paramus, NJ 07653
  (201) 845-6100
  ColorStudio, $1,995
  DesignStudio, $795

- **Migrant Software**
  313 Iona St.
  Natick, PA 19072
  (215) 667-9781
  RagTime, $599

- **Multi-Ad Services**
  1720 W. Detweiller Drive
  Peoria, IL 61615
  (309) 692-1830
  Multi-Ad Creator, $995

- **Pre-Press Technologies, Inc.**
  2443 Impala Drive
  Carlsbad, CA 92008
  (619) 931-2695
  SpectreSepsPM (for PageMaker), $295
  SpectreSepsDX (for QuarkXPress), $295

- **Quark**
  300 S. Jackson, Suite 100
  Denver, CO 80209
  (303) 394-2211
  QuarkXPress, $795

- **SuperMac Technology**
  485 Potrero Ave.
  Sunnyvale, CA 94086
  (408) 245-2102
  PixelPaint 2 (includes PixelScan for JX-450 and Scanmaster), $395
  PixelPaint Professional (includes PixelScan for JX-450 and Scanmaster), $695

**Color-Slide Makers**

- **Agfa Matrix**
  1000 Technology Square
  Cambridge, MA 02139
  (617) 727-2651
  LFR, $8,750
  LFR Plus, $13,750

- **American Liquid Light**
  2341 W. 20th St.
  Torrance, CA 90051
  (800) 826-9877
  (213) 618-0274
  Still Light, $3,995
  Verid, $5,995

- **Lasergraphics**
  20 Ada
  Irvine, CA 92718
  (714) 727-2651
  LFR, $8,750
  LFR Plus, $13,750

- **Management Graphics**
  1401 E. 79th St.
  Minneapolis, MN 55425
  (612) 854-1200
  Solitaire, 4-line resolution, $27,000; 8-line resolution, $35,000; 16-line resolution, $75,000

- **Mirus Corp.**
  4301 Great America Parkway, Suite 300
  Santa Clara, CA 95054
  (408) 990-9770
  Mirus FilmPrinter, $6,390

- **Pansophic Systems**
  2400 Cabot Drive
  Lisle, IL 60532
  (603) 223-7335
  Masterpiece Film Recorder, Model 8770, $55,000
  Masterpiece Film Recorder, Model 8780, $70,000

- **Polaroid Corp.**
  575 Technology Square
  Cambridge, MA 02139
  (800) 225-1618
  Bravo Computer Slide Maker, $6,000

- **Presentation Technologies**
  743 N. Pastoria
  Sunnyvale, CA 94086
  (408) 749-1959
  Montage FR1, $6,995
Think of OcéColor as a color laser printer. A full palette of Pantone-certified colors in a machine as easy to use as your monochrome laser printer, ready to print accurate design comps and persuasive presentations on paper or overheads. OcéColor uses true Adobe POSTSCRIPT® to assure compatibility with presentation graphics, desktop publishing, and graphic arts programs on Macintosh and PC systems. OcéColor gives you unsurpassed print quality, blazing speed, and a full one-year warranty. All this, combined in a machine that's truly desktop—smaller, lighter, and even quieter than your laser printer.

If you want to know more about how OcéColor can express your ideas more vividly and persuasively, call (800) 545-5445 and ask about the OcéColor printer.

OcéColor
Color Product Directory, continued

**Memory Management**

Aladdin Systems  
Deer Park Center, Suite 23A-171  
Aptos, CA 95003  
(408) 659-9175  
StuffIt Classic, $25  
StuffIt Deluxe, $99.95

Cnnectix Corp.  
125 Constitution Drive  
Mentlo Park, CA 94025  
(415) 324-0727  
Virtual, $199; with PMMU, $545

**Electronics for Imaging**

Aladdin Systems  
Deer Park Genier, Suite 23A-171  
Aptos, CA 95003  
(408) 659-9175  
Stufflt Classic, $25  
Stufflt Deluxe, $99.95

Connectix Corp.  
125 Constitution Drive  
Mentlo Park, CA 94025  
(415) 324-0727  
Virtual, $199; with PMMU, $545

**Scanners**

Array Technologies, Inc.  
7730 Pardee Lane  
Oakland, CA 94621  
(415) 933-3000  
AS-1Mac, $28,400

Barneyscan Corp.  
1125 Atlantic Ave.  
Alameda, CA 94501  
(415) 521-3388  
Barneyscan Slide Scanner, $9,495

Eikonix  
32 Wiggins Ave.  
Bedford, MA 01730  
(617) 676-195  
Eikonix 1412 Slide Scanner, $9,495

Imagro Corp.  
2 Griswold Ave., Suite 208  
West Nyack, NY 10994  
(914) 353-4701  
GCS-450, $1,140  
GCS-120, $1,019  
GCS-33, $1,299

Knowledge Software, Inc.  
P.O. Box 728  
Ossining, NY 10562  
(914) 762-7667  
Nikon LS-3500 with PhotoMagic software, $15,000

Miekeetek Lab, Inc.  
180 Knox St.  
Torrance, CA 90052  
(213) 321-2121  
Miekeetek MFS-390Z, $2,995

Mitsubishi International Corp.  
701 Westchester Ave.  
White Plains, NY 10604  
(914) 222-0200  
SC-7500, $8,950

Nikon, Inc.  
Electronic Imaging Dept.  
623 Stewart Ave.  
Garden City, NY 11530  
(516) 222-0200  
Nikon LS-3500, $9,995

Sharp Electronics Corp.  
Sharp Plaza  
Mahwah, NJ 07430  
(201) 529-6200  
JX-100 Personal Color Scanner, $995

Travel Corp.  
9843 Fullbright Ave.  
Chatsworth, CA 91311  
(818) 407-1101  
Travel T-Z-8BWC, $11,590  
Travel T-Z-8BWC, $12,590

Adobe Systems, Inc.  
1505 Charleston Road  
P.O. Box 7900  
Mountain View, CA 94039  
(650) 344-8335  
Adobe Scanner, $195

ColorWare, $395

Adobe Streamline (works with any scanner that can produce TIFF files), $395

Imagegenes  
901 N.E. Loop 410, Suite 630  
San Antonio, TX 78209  
(612) 824-1746  
ChromeScan (works with JX-300, JX-450, 
Scannamster I, and Scanmaster II), $195

LaserWare  
P.O. Box 668  
San Rafael, CA 94915  
(415) 543-9500  
LaserPaint Color II (works with JX-300, 
JX-450, Scanmaster, Scanmaster II, 
Scanmaster 35, and Scanmaster 35 II), 
$595

Mitsubishi International Corp.  
701 Westchester Ave.  
White Plains, NY 10604  
(914) 997-4999  
SC-7500 Utility (works with SC-7500), 
$300

Nikon, Inc.  
Electronic Imaging Dept.  
623 Stewart Ave.  
Garden City, NY 11530  
(516) 222-0200  
ColorFlex (works with Nikon LS-3500), 
$750

Prism Enterprises  
14703 S. Baltimore Ave., Suite 248  
Laurel, MD 20707  
(301) 694-0511  
MacScan (works with JX-300 and 
JX-450), $99

Sharp Electronics  
Sharp Plaza  
Mahwah, NJ 07430  
(201) 529-9500  
Studio/8 Scanner Installer (works with 
JX-300 and JX-450), free to owners of 
Studio/8

Studio/8, Inc.  
436 Lakeside Office Park, Building 2  
1341 S. Semoran Blvd.  
Winter Park, FL 32793  
(407) 678-0707  
Colorset (turns gray-scale scanners into 
color scanners; works with Adonit 
300GS, Apple Scanner, Datacopy 700GS 
and 800GS, and HP ScanJet Plus), 
$399.95

MacUser May 1990 Buyer's Guide 29
You know what it's like. If you're in graphic arts, you know there's a lot of grunt-work. Like rubbing-down type. And tracing and filling letters to comp-up headlines. Trying to get true colors from a junkyard of dried-out markers. Inking and re-inking rules and borders because of clogged pens. T-squaring elements to be sure they're aligned and square. Counting characters. Spinning proportion wheels. Tracing off the Lucy. Wouldn't it be nice to spend more time exercising your brain instead of designing double-truck ads, brochure spreads or creating a large horizontal illustration.

That's exactly what you can do using today's advanced layout, design, and illustration programs, the Macintosh family of computers and a CalComp DrawingCard display system.

CalComp large screen displays help you get the most from your Macintosh. For one thing, they never let you lose sight of the big picture. DrawingCard is the first 21" system to give you two full pages of color side-by-side at actual size. That's critical when you're designing double-truck ads, brochure spreads or creating a large horizontal illustration.

DrawingCard's flat screen eliminates distortion and with its excellent resolution and contrast you can see the effect of small changes in the colors right on the screen. Or evaluate the visual effect of half-point variations in type size and leading. You can even see the precise amount of letter overlap when you set your headlines "tight and touching."

And with DrawingCard displays, what you see on the screen is what you get on your printer because screen resolution is true 72 dpi.
How to build a better burger.

There are three DrawingCard systems to choose from. Our 8-bit GrayVision display system with 256 shades of gray is ideal for desktop publishing and design projects using line art and black-and-white halftones.

Our 8-bit ChromaVision system with 256 colors is the perfect match for the great majority of desktop publishing, design and illustration projects where 4-color reproduction is needed.

And our 24-bit ChromaVision Plus system (shown above) with 16.7 million colors is the ultimate display where color accuracy is especially critical such as color retouching.

DrawingCard display systems are just one way CalComp, a worldwide graphics leader, supports the arts on Macintosh. There's also WIZ, a new mouse system that combines the features of a traditional mouse with the power of a graphics pad. Plus a complete line of high-performance printers.

So stop using those antique hand tools today. After all, the graphic arts should be full of inspiration, not perspiration. For more information about DrawingCard displays, call: 1-800-CalComp.

In Canada, call: (416) 635-9010.
MacUser Labs focuses on 18 display systems that take you over the rainbow.

In Living Color

All those intermediary hues constitute the difference between reality and its representation on the computer screen — unless you endow your Mac II with a color display system. Equipped for either 8- or 24-bit color, the Mac can use a palette of 16.8 million colors — wider than even Rembrandt or Renoir could have imagined.

The color-display market has changed dramatically since we last reviewed color systems (see “True Colors,” October ’88). Color has blossomed on the desktop, from image retouching and color prepress to animation and CAD. Scanners have soared, and printers have proliferated (see “Color on the Page.” in this issue). On the display side, quality has improved and 24-bit color has gone from a novelty to a mainstream option.

To assess the state of display art, MacUser Labs put 18 Mac II color display systems through their paces. Each system consisted of a monitor (ranging in size from 13 to 21 inches) coupled with an 8-bit video card from the same manufacturer. We also tested one 24-bit system, the RasterOps Calibrator (at press time, an 8-bit version had just been released). Eleven of the monitors can also be purchased with 24-bit NuBus cards (see Table 1), and seven of the 8-bit setups are available with SE/30 cards (PCPC’s cards are 16 bits).
Most companies sell monitors and cards separately as well as bundled together (see the “Mix and Match” sidebar). For instance, the 14-inch Magnavox monitor that comes with the MacProducts Magic View system can also be purchased separately, for $695, and works with Apple's 8-bit video card. Be forewarned, however, that coupling disparate monitors and cards may not provide you with the superior focus, color accuracy, and other qualities that you get in a prepackaged Mac display system.

How much will you pay for a color display system? That depends on what you want — how many hues and how many inches. Certainly, it's a bigger investment than a monochrome or gray-scale setup. (For more on these systems, see “A Study in Black and White,” April '90, and “Grading the Grays,” October '89.) The best retail price we've found is an amazing $895 for the MacProducts Magic View. Apple's 13-inch High-Resolution RGB system is a hefty $1,647. A bigger screen takes a much bigger bite from your budget. The least expensive, Generation X's CT-II, costs $3,999 and gives you a 20-inch Ikegami-Sony Trinitron monitor coupled to an 8-bit video board. At the upper end, the RasterOps Calibrator sets you back $12,500 — but you also get an ultra-high-end system with 24-bit color; an internal microprocessor that controls all aspects of monitor performance; and the Optisense calibrator, an external sensor that helps control color accuracy. In general, expect an SE/30 system to cost about the same as an 8-bit Mac II setup, and plan to pay a few thousand dollars more for a full 24 bits of color.

Color by Number

The big question is whether you need direct color — 24 bits (or the 16 bits PCPC offers on its SE/30 video cards) — or if you can get by with 8-bit color.

There's no question about it: Images displayed in 24 bits have smoother shadings and a broader range of hues than do 8-bit images. (You must have 32-bit QuickDraw installed to use more than 8 bits of color, and you need a Mac II to handle 24-bit color.) The principal difference between 8- and 24-bit color is how the color information is stored (see the “How It Works” sidebar). Either kind of system can select from a palette of millions of colors, but an 8-bit setup can put only 256 different colors onto your screen at one time. In contrast, a 24-bit system can display any of its 16.8 million hues anywhere, anytime.

Direct-color systems can display all the color possibilities, with no banding or dithering, but you pay for that capability in memory, speed, and price. Storing millions of color values requires a lot of memory — 24-bit color needs three times as much video RAM as does 8-bit. This added memory requirement is the reason...
COLOR: MONITORS

24-bit boards cost more.

Screen redraws can be interminable in 24-bit mode, because all the extra data makes the Mac's microprocessor work much harder to display images on-screen. Thankfully, 32-bit QuickDraw has been streamlined to cut some of that speed penalty, but you can still expect screen changes with 24-bit color to take two to three times longer than in 8-bit mode. To help put the zip back into screen updates, you might consider a graphics accelerator (see the "QuickDraw Accelerators" sidebar). A graphics accelerator can make 24-bit performance faster than that of unaccelerated 8-bit operations. SuperMac considers accelerators so necessary for acceptable 24-bit performance that it bundles the accelerator-equipped Spectrum/24 Series III card with its 24-bit systems.

Sticking with 8-bit color really isn't a hardship, however. No image ever contains 16 million different hues — and after all, there are usually fewer than a million pixels on a Mac screen. Scanned photographs usually have a palette of only 2,000 to 4,000 distinct colors and can be displayed reasonably well with just 256 colors. Nevertheless, 8-bit images are less realistic than 24-bit images. Typically, they have the overall cast of a single color because of the restricted on-screen palette. Eight-bit images also tend to be grainy, because the color differences of adjacent pixels are less subtle than they are with 24 bits.

Mix and Match

When quality counts, the best choice for a Mac color display is a matched monitor and video board. Sometimes, however, you need more flexibility. You might have several different computer systems — Macs, Apple IIs, PCs — and you'd like to standardize on one monitor. Or perhaps you need to plug the monitor into an NTSC source such as a multimedia card or VCR, which have lower scan rates than Mac displays. Then again, maybe you just want a monitor that's 20 to 30 percent cheaper than the typical Mac-only display.

In each of these cases, the solution is a multiscan, or multiphase, monitor. Unlike the fixed-frequency displays common in the Mac world, multiscan monitors can handle a wide range of horizontal and vertical scanning frequencies. Multiscans are popular on the PC side because those computers are plagued by several different monitor and video-card standards.

All multiscan monitors are not created equal, however, and you must shop carefully to ensure that the one you buy meets your needs. Most importantly, multiscans differ in the frequencies and types of signals they can accommodate. If the horizontal and vertical frequency range of your multiscan monitor doesn't encompass the frequency generated by your video board, you'll wind up with a rolling screen image akin to that of a '50s television on the fritz. (See Table 1 for the scan rates of the video boards we reviewed.) Multiscans also differ in their input capabilities. The possibilities include digital (Apple II and early PCs), analog (Mac II and IBM-compatible VGA systems), and composite (NTSC sources). Finally, the display systems use several different color standards; if you need to accommodate all the variations, be sure to get a multiscan monitor with a color-mode switch.

One nifty feature often overlooked in choosing a multiscan monitor is the ability to automatically size the image so that it properly fills the screen. Auto-sizing compensates for the variations in video standards and ensures that the display fills the screen without overflowing the edges. If a multiscan monitor has readily accessible size and position controls, you can compensate for size discrepancies manually — provided you don't mind readjusting the display every time you switch computers or operating modes.

In case your appetite is now sufficiently whetted, here are a few of our multiscanning favorites. If all you need is an inexpensive display that matches the Mac II standard of 640 x 480 pixels, check out the Magnavox Mac Color Display ($695). This monitor is part of the MacProducts Magic View system we reviewed; contact Magnavox for the location of your nearest dealer. Magnavox, 1 Philips Drive, Knoxville, TN 37914; (615) 521-4316.

For a bit more money, you can get what we feel is the best small color monitor for the Mac: the Sony CPD-1304. This 14-inch Trinitron tube is on the pricey side at $1,095, but it's money well spent. Sony Corp., Computer Peripheral Products, 1 Sony Drive, Park Ridge, NJ 07656; (201) 930-1000.

Need NTSC composite video? Try the Mitsubishi AUM-1381ATS DiamondScan or the Sony GVM-2000. Both feature NTSC; Mac II; and IBM CGA,EGA, and VGA video compatibility. The DiamondScan ($898) has a 14-inch shadow-mask tube, and the Sony GVM-2000 ($2,300) features a 20-inch Trinitron tube. Mitsubishi, 991 Knox St., Torrance, CA 90502; (213) 515-3993.

If you want an inexpensive 8-bit video card for any of the monitors mentioned above, check out the Micron Xced NB6-48 video card ($95). Bundled with the card are a DA called Gamma, which can set brightness, contrast, and gamma of the RGB video signals; and MacroPaint, which is a basic color paint package. Micron Technology, Inc., 2805 E. Columbia Road, Boise, ID 83706; (800) 642-7681 or (208) 386-3800.

— Winn L. Rosch and Jeff Pittelkau
How It Works: Indexed versus Direct Color

Indexed (8-bit) color

In 2-, 4-, or 8-bit mode, the Mac stores colors as entries in a CLUT (color-lookup table) with 4, 16, or 256 entries, respectively. CLUTs contain four 16-bit channels: an index channel and red, green, and blue channels. If a color isn’t in the current palette, QuickDraw returns the index value of the closest available color. If 32-bit QuickDraw is installed, colors are dithered for a more realistic image. The index channel is truncated to 2, 4, or 8 bits so that modes with fewer bits display faster and take up less memory.

Table:

<table>
<thead>
<tr>
<th>CLUT entry</th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>65535</td>
<td>5229</td>
<td>6482</td>
</tr>
<tr>
<td>Index</td>
<td>201</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Direct (32-bit) color

In 16- or 32-bit mode, you’re not constrained by a CLUT, only by the width of the color channels. In 32-bit mode, three 8-bit channels provide the full 16.8 million colors. In 16-bit mode, three 5-bit color channels allow access to a 32,768-color subset. The fourth channel, called alpha, has yet to be defined by Apple. Most vendors’ cards offer 24-bit color and don’t support the alpha channel, but a few companies have true 32-bit video cards that support the alpha channel for special applications.

Indexed-color video card

An 8-bit card stores color as a bit map of index values. A copy of the current CLUT lives inside a single RAMDAC chip. The chip’s RAM converts the index values to RGB data, and its DACs (digital-to-analog converters) turn the RGB data into video. Less video RAM and fewer components keep the price of indexed color down, but the limitations are easy to see (left half of screen).

Direct-color video card

A 24-bit card stores color as a bit map of RGB and alpha-channel data. Three RAMDAC chips convert RGB data to video. Inside each RAMDAC is a RAM LUT (lookup table) and a single DAC. The money spent on additional RAM and components pays off in smoother, more realistic color (right half of screen).

Color Picker

The Color Picker lets you specify red, green, and blue (RGB) levels between 0 (black) and 65,535 (full brightness). Color QuickDraw supports three 16-bit channels — were there no roadblocks, these 48 bits could provide for 281 trillion colors! Unfortunately, video cards are limited to 8 bits per color channel. Multiply 256 possibilities each for red, green, and blue, and you have nearly 16.8 million colors.

— Jeff Pittelkau
The fact that you own or are considering a Macintosh II, IIX, IICx or SE/30 shows you're serious about computers. That you want to reach as far as a great system will let you. So you can reach your potential.

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the Macs.

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Monitor Performance

Maximum usable brightness is the brightest screen image that a monitor can produce while maintaining a focused image. Convergence was measured at the center and corners of each monitor; the score represents the maximum beam displacement in millimeters. For focus, our jury graded each display on its ability to maintain a sharp image over the entire screen, using a scale of 1 (worst) to 5 (best). MTF sharpness measures the contrast between adjacent one-pixel-wide lines. Gray linearity reveals how well a monitor can display proportional levels of brightness, or gray; the results show how close each monitor came to theoretical perfection (100 percent). Color tracking assesses the calibration of the electron guns, which affects color accuracy. All the monitors did very well, a tribute to the current state of color display technology.

For all tests except convergence, higher scores (longer bars) are better.

<table>
<thead>
<tr>
<th>Small</th>
<th>Brightness</th>
<th>Convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple High-Resolution RGB</td>
<td>40</td>
<td>0.2</td>
</tr>
<tr>
<td>E-Machines ColorPage 15</td>
<td>35</td>
<td>0.2</td>
</tr>
<tr>
<td>E-Machines ColorPage T16</td>
<td>30</td>
<td>0.2</td>
</tr>
<tr>
<td>E-Machines TX</td>
<td>25</td>
<td>0.2</td>
</tr>
<tr>
<td>MacProducts Magic View</td>
<td>20</td>
<td>0.2</td>
</tr>
<tr>
<td>CalComp DrawingCard Graphics Display</td>
<td>15</td>
<td>0.2</td>
</tr>
<tr>
<td>E-Machines T19</td>
<td>10</td>
<td>0.2</td>
</tr>
<tr>
<td>Generation X CT-II</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>MegaGraphics MegaScreen 2008</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>PCPC II 19&quot; Color Graphics System</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>PCPC II 21&quot; Color Graphics System</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Radius Color Display</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>RasterOps 700+ Display</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>RasterOps Calibrator</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Relax Ikegami Trinitron</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Sigma Designs ColorMAX 8/24</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>SuperMac 19&quot; Color Display</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>SuperMac 19&quot; Trinitron Color Display</td>
<td>0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Large</th>
<th>Brightness</th>
<th>Convergence</th>
</tr>
</thead>
<tbody>
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<td>Apple High-Resolution RGB</td>
<td>40</td>
<td>0.2</td>
</tr>
<tr>
<td>E-Machines ColorPage 15</td>
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<td>0.2</td>
</tr>
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<td>E-Machines ColorPage T16</td>
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<td>0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

(Apple) to 21 inches (CalComp, PCPC). A large monitor obviously can show you more — more rows of a spreadsheet, an entire drawing, even two 8.5-x-11-inch pages side by side. Smaller monitors are considerably less expensive, however, and often have sharper displays, which you may prefer for word processing or detail work.

Exactly how much information a monitor can display also depends on its resolution, which is variously measured in pixel dimensions and dpi (dots per inch). Pixel dimensions are the height and width of the active screen as measured in pixels (picture elements, or dots); the dpi figure indicates how closely these pixels are packed together. We'll refer to resolution in terms of dpi because that's what determines the pixel dimensions, which in turn tell you how much data you can see on-screen at one time.

Most of the monitors have screen resolutions of 72 dpi, the standard set by Apple for a one-to-one (WYSIWYG) match with what appears on paper. A higher dpi yields images that are smaller on-screen than they are on paper; a lower dpi magnifies the display. Higher resolutions can make the screen appear sharper, although text may be almost too small to read; a lower resolution lets you work farther from the screen and is good for presentations.

Similarly sized monitors with varying resolutions show vastly different amounts of information. For example, of E-Machines' two 16-inch models, the TX displays nearly 40 percent more information than does the ColorPage T16. The difference is resolution — the TX has an 87-dpi display, which shows 827,392 pixels on-screen, more than any of the other small monitors. The ColorPage T16, with its Apple-standard 72 dpi, can't keep up. Two of the large monitors can display more than a million pixels. With a resolution of 82 dpi, the Radius Color Display can show 1,016,064 pixels; that's 25 percent more screen area than that of the other 19-inch monitors and also more information than the 21-inch models can handle. The CalComp DrawingCard comes close, with
just over a million pixels; PCPC's 21-inch model displays only as much data as most 19-inch monitors do.

Resolution is controlled by the video card, but another determinant of screen sharpness, dot pitch, depends on the technology used in the CRT (cathode-ray tube). All color CRTs use three electron beams (red, green, and blue) to produce images. In conventional displays, three electron guns are arranged in a triangle and aimed at phosphor dots painted on the screen. The phosphors are grouped into triads of red, green, and blue dots, and each electron beam strikes dots of the same color. To help aim the beams and prevent them from bleeding into adjacent dots, conventional CRTs—such as those in the Magic View and Calibrator—use a shadow mask, a thin sheet of metal riddled with holes. The spacing of these holes is the tube's dot pitch, and it sets the lower limit for sharpness.

Stray beams can overheat shadow masks and deform them, so vendors such as CalComp, PCPC, and SuperMac now use masks made from INVAR, a heat-resistant alloy that doesn't deform. This heat resistance lets manufacturers use higher beam currents, which produces a brighter and more uniform picture than traditional shadow-mask designs can.

Despite these improvements, the standard for Mac CRTs remains the Sony Trinitron, used in 12 of the displays reviewed here. Trinitrons have a justly deserved reputation for superior sharpness. Their secret is a single electron gun that produces three identical horizontally aligned beams. The beams are aimed through an aperture grille, which has long vertical slots instead of holes. In addition, the screen phosphors are laid down in vertical stripes, not dots. This setup provides brighter, better-focused beams limited only by the "slot pitch."

Our tests confirmed that dot pitch is a major factor in screen sharpness. The monitors with the smallest dot pitches—Apple's High-Resolution RGB (.25 mm) and the two 16-inch E-Machines monitors (.26 mm)—were noticeably sharper than the 19-inch Trinitrons (.31 mm dot pitch). There's a good reason that the best-focused monitors are the smaller ones: The farther a beam of electrons
COLOR: MONITORS

QuickDraw Accelerators

A display with 16.8 million colors doesn't just nick you in the checkbook — it costs dearly in speed as well. The Mac's main processor bears the burden of manipulating 32-bit QuickDraw instructions before sending image data to the video card. The result is an annoying time lag between when you move the mouse and when the shifted object finally drops anchor. To hurry things along, both SuperMac and Radius now offer accelerator cards that improve processing speeds by routing QuickDraw calls away from the Mac's CPU.

SuperMac’s Spectrum/24 Series III ($4,499) is a 24-bit video card with a built-in 32-bit Color QuickDraw accelerator. This all-in-one solution can be matched with just about any 19-inch color monitor, and it comes standard with SuperMac's 24-bit color display systems. SuperMac also sells the Graphics Accelerator ($499), an add-on card that mounts directly onto its ColorCard/24 ($399).

Rather than piggybacking on the video card, Radius accelerators fit in a NuBus slot alongside a Radius video board. The Radius QuickColor Graphics Accelerator ($795) employs an Acorn RISC processor that churns through QuickDraw instructions at a healthy 27 megabytes per second. The QuickColor works with any of Radius' DirectColor video boards as well as the Radius GS/C card, so it can be added to the Color Display we reviewed.

Radius also markets the QuickCAD Graphics Engine ($1,495), an accelerator that speeds up display for non-QuickDraw, vector-based CAD software, such as AutoCAD, VersaCAD, and Pegasys. QuickCAD makes these PC immigrants run nimbly on any Mac II that's equipped with a Radius DirectColor or GS/C card. And because QuickCAD is an extended version of the QuickColor Graphics Accelerator, you'll gain faster processing for QuickDraw-based displays as well.

Both SuperMac and Radius claim that their accelerator cards speed up screen response by 2 to 20 times, depending on the QuickDraw routine. To see for ourselves, we ran benchmarks on a Mac IIcx with 8 megabytes of memory. First we tested the SuperMac Graphics Accelerator mounted on a ColorCard/24 board, which was attached to Apple's 13-inch High-Resolution RGB monitor. Scrolling was an impressive 7 times as fast, and Fill Rectangles, a routine that repeatedly paints colored rectangles on the screen, displayed 6 times as fast with acceleration.

We then clocked a 19-inch Radius Color Display that contained a DirectColor/24 card assisted by the QuickColor Graphics Accelerator. Scrolling was nearly 2.5 times as fast, and Fill Rectangles was just over 4.5 times as fast.

These numbers show that accelerators travel, the more it spreads. Thus, bigger monitors are harder to focus.

Trinitrons have another advantage: a tube that curves only horizontally. Its vertical flatness reduces the image distortion and glare common to conventional tubes, which are spherical. The latest in CRT technology, the Zenith Flat Tension Mask (FTM), goes one step further, producing a flat screen. Unfortunately, it’s hard to maintain focus and geometry on a flat screen. The only monitor that uses an FTM, the ColorPage 15, has a large dot pitch (.3 mm) and the worst focus.

Fine Lines

In order to display a sharp, undistorted image, a monitor must have excellent convergence and geometry. Convergence measures how well aligned the three electron beams are when they converge on a single pixel at the screen. Convergence problems are most noticeable at the screen periphery, because that's where the beams are hardest to control. In a monitor with poor convergence, pixels become a three-color blur. Objects look fuzzy and may be ringed with color.

Convergence problems can severely limit sharpness. The finest detail a Mac can display is the width of one pixel; at 72 dpi, that pixel is .35 mm wide. Convergence errors often reach or exceed this figure, making fine detail impossible to display in the misconverged area of the screen. Misconvergence is most important (and the greatest problem) for monitors that have resolutions greater than 80 dpi, because their pixels are so much smaller.

We measured the convergence of each monitor at the center and in all four corners. The resulting score represents the maximum beam displacement we recorded (see Figure 1). The E-Machines ColorPage T16 had the best convergence; its worst displacement was only .15 mm — less than half a pixel. The TX did almost as well; its score of .2 mm is particularly impressive, given its 87-dpi resolution. Our other high-resolution monitor, the Radius Color Display, didn't fare as well. It had the worst score (.5 mm), equaled only by those of the
Looking Sharp

As you can see, the apparent sharpness of a color display is influenced by a complex array of factors, including resolution, dot pitch, and convergence. Brightness and glare protection also play a role, as we'll find out shortly. With a poorly focused display, you can't tell the difference between a lowercase ‘g’ and a lowercase ‘m’ and a gray linearity, such as the SuperMac 19” Color Display, doesn’t represent different shades of gray accurately, so dark grays may appear black. The Magic View, on the other hand, has the best distribution of gray levels, displaying all the subtle variations in its images.

A monitor with good glare protection lets you reduce brightness and preserve focus. Only the Apple and MacProducts displays lack antiglare treatments, and both suffer from severe glare problems. The best protection is an OCLI (Optical Coating Labs, Inc.) panel, which virtually eliminates glare, although it shows fingerprints with amazing clarity. The E-Machines ColorPage 15 is the only monitor with a true OCLI panel; unfortunately, it’s combined with darkened glass, resulting in a dim display that requires you to jack up the brightness so much that it creates severe focus problems.

Most other monitors have similar panels; we found that those with Asahi Glass Anti-Reflective (AR) panels had glare protection equivalent to OCLI’s.

Brighter Whites

The absolute intensity of a monitor is important, particularly if you work in brightly lit surroundings in which glare is a problem. However, brighter images may not be as sharp. Increasing the intensity of an electron beam makes it wider, so it may bleed into adjacent pixels. We measured maximum visible brightness, the brightest setting that can be kept in focus (see Figure 1). Under average indoor lighting, most users set their monitors to between 15 and 25 footlamberts. The ColorPage T16 radiated nearly 40 footlamberts, making it more than twice as bright as the two dimmest displays, the ColorPage 15 and Radius Color Display (18.5 footlamberts).

We also determined each monitor’s gray linearity, or how well it displays proportional levels of brightness (see Figure 1). Ideally, a monitor should show an area of 50-percent gray at half the intensity of pure white, and likewise for other gray levels. A monitor with poor gray linearity, such as the SuperMac 19” Color Display, doesn’t represent different shades of gray accurately, so dark grays may appear black. The Magic View, on the other hand, has the best distribution of gray levels, displaying all the subtle variations in its images.

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screen to paper is almost impossible, although several companies now offer products that attempt some kind of calibration (see the "Color Calibration" and "Tektronix Solution" sidebars in this buyer's guide). One of these firms is Barco, which manufactures the Calibrator monitor.

A monitor's "white" depends on the temperature of its phosphor; the resulting color cast in turn affects the display of every other color. Sony Trinitrons use a cool (9,300 Kelvin) phosphor, which has a blush tint. Nonetheless, the glow of the screen looks like true white — until you put a sheet of white paper next to it. Do this little exercise, and you'll find that the SuperMac 19" Color Display and RasterOps Calibrator are the closest matches to paper white. Both have a low phosphor temperature (6,500 Kelvin and 5,300 Kelvin, respectively), which results in a more yellowish cast.

A more crucial determinant of color quality is the firing accuracy of the electron guns. When producing a gray, for example, the three guns should track perfectly — that is, they should fire with equal intensity. If any of the beams varies even slightly in intensity, the gray will be tinged with color. Poor tracking gives every image an unwanted color cast and destroys any hope of WYSIWYG color.

The simplest way to check color tracking is to measure gray purity, or the absence of color in grays. We assessed the intensity of the red, green, and blue phosphors of each monitor at various levels of gray (see Figure 1); all except the hapless ColorPage 15 passed with flying (lack of) colors. Interestingly, the Calibrator's tracking was no better than any other monitor's, despite its high-powered calibration hardware.

For a subjective assessment of the screens' color accuracy, we displayed a Canvas document containing a color gradient with varying hues and saturation levels. Our jury compared the on-screen appearance of the colors from monitor to monitor, looking for properly saturated colors and good midtones. All the monitors had acceptable color, with the E-Machines T19, Generation X, MegaGraphics, and PCPC II 21" displays achieving perfect scores. The only monitor with colors that looked truly "off" was — yet again — the ColorPage 15.

Minor Annoyances

There are several additional factors that can make your life in front of a monitor either pleasant or hellish. One of these so-called nuisance factors, glare, has already been discussed. We also checked each monitor for flicker, jitter (image instability), bandwidth problems, screen shrinkage, and noise. All the displays had minimal nuisances, and except for glare, the only irritant worth mentioning is flicker.

Flicker is a slight instability of the screen image. It results when the screen refresh is not fast enough to make individual frames blend seamlessly together. The vertical-scan (or refresh) rate of a display system generally determines how apparent flicker will be. Perception of flicker is very subjective, though; at MacUser Labs, flicker seems more apparent under fluorescent illumination.

Refresh rates above 65 hertz are usually sufficient to eliminate flicker, and our observations bear this out. Only four monitors — the two PCPC displays, the RasterOps Calibrator, and the Relackegam Trinitron — displayed discernible flicker, and all four had a refresh rate of 60 hertz. This flicker was so bothersome that it cost each monitor half a mouse in the overall ratings. By the time you read this, however, both PCPC and RasterOps should be shipping their systems with higher refresh rates.

In Control

Setting up a Mac II color display system is easy: Plug in the NuBus card, attach the monitor, and turn it on. A color monitor shouldn't require frequent adjustment, but it should still have controls for tweaking the convergence and for degranulating, which removes the screen distortions caused by nearby magnetic fields (a frailty of color displays).

A few manufacturers give you a modest software bonus (see Table I). The most common utilities provide brightness and contrast controls, screen savers, screen capture, and big-screen niceties such as an enlarged menu font and cursor, and pop-up or tear-off menus. The Radius Cdev provides a well-rounded set of utilities, including the ability to capture color screens with the Command-Shift-3 sequence. The E-Machines displays also...
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The Relax Ikegami Trinitron (shown) and Generation X CT-II use Sony Trinitron tubes coupled with electronics from Ikegami.

The RasterOps Calibrator is the most sophisticated monitor ever built. This ultra-high-end system offers 24-bit color: an internal microprocessor that controls all aspects of monitor performance (including color drift); and the Opisense calibrator, an external sensor that helps control color accuracy.

include some handy utilities.

The RasterOps Calibrator offers the ultimate in monitor control (see Figure 3). Its DA lets you set brightness, contrast, color temperature, and screen geometry. The geometry controls are very useful because you can hand-tweak your monitor to perfection, eliminating bowing or pincushioning. The DA also lets you store different preferred brightness, contrast, and color-temperature settings for two users.

The RasterOps and SuperMac display systems have board-based pan and zoom options plus a virtual desktop that lets you work with screen sizes greater than the normal 1,024 x 768 pixels. Essentially, you trade color for screen size: The more video memory you devote to the virtual screen, the fewer color-bit levels are available. In 24-bit mode, the RasterOps monitors support an extended desktop of 1,024 x 1,024 pixels—only slightly larger than normal. In 4-bit mode, the horizontal screen width grows to 2,048 pixels, or 2.4 feet. At 2 bits, it’s a whopping 4.7 feet. The SuperMac monitors offer even more desktop per bit; in 8-bit mode, the Mac II displays support virtual screens of 4.7 x 1.8 feet. SuperMac plans to add additional firmware features, such as a lockable menu bar, in the near future.

The PCPC displays are bundled with Stepping Out II, a virtual-screen utility that can also magnify images up to 16 times. Because Stepping Out II uses the Mac’s RAM, however, virtual-screen scrolling isn’t as swift or smooth as using the board-based method.

Software and other goodies are nice pluses, but they can’t redeem a fuzzy image or poor color quality. Our recommendations (see “The Bottom Line”) can help you find your own pot of gold at the end of the 16.8-million-color rainbow.

Winn L. Rosch is an attorney who often writes about computer-related topics.

The winner and still champion among 8-bit color display systems is the E-Machines ColorPage T16 ($3,595). We simply couldn’t find a flaw in this razor-sharp 16-inch Trinitron. It scored near the top in every test and has excellent glare protection and software to boot. Its companion model, the TX ($4,495), uses the same excellent monitor matched with a higher-resolution video card. The result is an incredibly sharp 87-dpi display that’s just right for CAD and freehand drawing (but less desirable for WYSIWYG desktop publishing). Overall, the 16-inch Trinitrons appear to optimize the technology without succumbing to the focus problems of larger displays. If this size and quality appeal to you, keep an eye out for similar 16-inch models from MegaGraphics, RasterOps, and PCPC.

For those who prefer a smaller monitor, the Apple High-Resolution RGB display ($1,647) remains our favorite. It was the first Mac color display to hit the market, but it still sets the standard for focus and color quality. Its only drawback is a lack of adequate glare protection. If you just want a rock-bottom color display, consider the MacProducts Magic View. It’s not as sharp as the Apple, and it didn’t receive the best test scores, but hey—it’s only $895!

Among the big screens, we recommend the RasterOps 708+ Display ($5,790) and the SuperMac 19" Trinitron Color Display ($5,799). These 18-inch Trinitrons scored well across the board; add to that hardware pan, zoom, and virtual-desktop capability, and you have two products that go one step beyond. If you can’t afford a Trinitron, buy the SuperMac 19" Color Display ($4,799)—it’s the best non-Trinitron display we’ve seen in MacUser Labs, ever. Both SuperMac displays include a QuickDraw accelerator in their 24-bit versions.

If you prefer a 24-bit color system, we recommend that you purchase one of the above systems with a 24-bit card. But if you’re not sure whether you want 8- or 24-bit video, the Sigma Designs Color MAX 8/24 ($6,295) is a smart choice. Its 8-bit video card contains all the necessary electronics for 24-bit video, and the video RAM needed for the upgrade costs less than $500.

One monitor we can’t recommend is the E-Machines ColorPage 15 ($2,095). It uses Zenith’s new Flat Tension Mask technology, which produces a perfectly flat screen, and it has superior glare protection. Unfortunately, these very assets combine to produce a very dim display with the worst focus and color quality of all the monitors. Until these problems are solved, steer clear.
Color Hardcopy
To The Macs.

Once you've created that breathtaking color masterpiece or designed the winning presentation on your Macintosh™ II, bring those colors to life. For brilliant color hardcopy, choose a Mitsubishi® color thermal printer.

Mitsubishi printers can be used with virtually all Macintosh II-based applications. These printers are easy to use and will excel in any Mac II environment where high quality, color hardcopy is essential.

The G330, G370 and G650 color thermal transfer printers unleash all the bold, bright colors of your designs—every time. And for near-photographic quality, the S340 sublimation printer utilizes a state-of-the-art “dye-diffusion” process capable of printing up to 16.7 million colors. The S340 received the 1989 MacUser Magazine Editors' Choice Honorable Mention Award for Most Significant Hardware Product.

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Mitsubishi Electronics

MacUser

1989
Editors' Choice
Honorable Mention

Mitsubishi
Electronics

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Please circle 167 on reader service card.
### Table 1: Features of Color Display Systems

<table>
<thead>
<tr>
<th>Mouse rating</th>
<th>Apple Color High-Resolution RGB</th>
<th>E·Machines ColorPage 15</th>
<th>E·Machines ColorPage T16</th>
<th>E·Machines TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>List price*</td>
<td>Mac II system, 8-bit $1,647</td>
<td>$2,095</td>
<td>$3,595</td>
<td>$4,495</td>
</tr>
<tr>
<td></td>
<td>Mac II system, 24-bit NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Mac SE/30 system, 8-bit NA</td>
<td>NA</td>
<td>NA</td>
<td>$4,495</td>
</tr>
<tr>
<td>Monitor specifications</td>
<td>Tube manufacturer and type Sony Trinitron</td>
<td>Zenith Flat Tension Mask</td>
<td>Sony Trinitron</td>
<td>Sony Trinitron</td>
</tr>
<tr>
<td></td>
<td>Dot pitch (millimeters) 0.25 mm</td>
<td>0.3 mm</td>
<td>0.26 mm</td>
<td>0.26 mm</td>
</tr>
<tr>
<td></td>
<td>CRT size (diagonal [in.]) 13 in.</td>
<td>15 in.</td>
<td>16 in.</td>
<td>16 in.</td>
</tr>
<tr>
<td></td>
<td>Active screen size (diagonal [in.]) 11.5 in.</td>
<td>13 in.</td>
<td>14.5 in.</td>
<td>15 in.</td>
</tr>
<tr>
<td></td>
<td>Screen dimensions (W x H [pixels]) 640 x 480</td>
<td>768 x 576</td>
<td>832 x 624</td>
<td>72 dpi</td>
</tr>
<tr>
<td></td>
<td>Resolution (dots per inch) 69 dpi</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>87 dpi</td>
</tr>
<tr>
<td></td>
<td>8-bit color modes 2, 4, 16, 256</td>
<td>2, 16, 256</td>
<td>2, 16, 256</td>
<td>2, 256</td>
</tr>
<tr>
<td></td>
<td>24-bit color modes NA</td>
<td>NA</td>
<td>NA</td>
<td>2, 4, 16, 256, thousands, millions</td>
</tr>
<tr>
<td></td>
<td>Vertical scan rate (hertz) 66.7 Hz</td>
<td>67 Hz</td>
<td>67 Hz</td>
<td>72 Hz</td>
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<tr>
<td></td>
<td>Horizontal scan rate (kilohertz) 35 kHz</td>
<td>46 kHz</td>
<td>45 kHz</td>
<td>60.97 kHz</td>
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<tr>
<td>Controls</td>
<td>Power switch rear</td>
<td>rear</td>
<td>front</td>
<td>front</td>
</tr>
<tr>
<td></td>
<td>Power indicator front</td>
<td>front</td>
<td>front</td>
<td>front</td>
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<tr>
<td></td>
<td>Brightness/contrast right</td>
<td>right</td>
<td>front (contrast only)</td>
<td>front (contrast only)</td>
</tr>
<tr>
<td></td>
<td>Degaussing rear</td>
<td>automatic at power-up</td>
<td>automatic at power-up</td>
<td>automatic at power-up</td>
</tr>
<tr>
<td></td>
<td>Convergence rear</td>
<td>none</td>
<td>front</td>
<td>front</td>
</tr>
<tr>
<td>Other</td>
<td>Antiglare treatment none</td>
<td>OCLI AR panel</td>
<td>silica coating</td>
<td>silica coating</td>
</tr>
<tr>
<td></td>
<td>Tilt/swivel stand no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>Video-cable length (feet) 3.3 ft</td>
<td>6 ft</td>
<td>6 ft</td>
<td>6 ft</td>
</tr>
<tr>
<td></td>
<td>Power consumption (watts) 160 watts</td>
<td>160 watts</td>
<td>220 watts</td>
<td>175 watts</td>
</tr>
<tr>
<td></td>
<td>Case dimensions (W x H x D [in.]) 13.62 x 11.75 x 15.75</td>
<td>14.75 x 14 x 15.35</td>
<td>16 x 17 x 17.7</td>
<td>16 x 17 x 17.7</td>
</tr>
<tr>
<td></td>
<td>Weight (pounds) 34 lb</td>
<td>40 lb</td>
<td>59.4 lb</td>
<td>60 lb</td>
</tr>
<tr>
<td></td>
<td>Software no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>Warranty 90 days</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 986-1010</td>
<td>E·Machines, Inc. 9305 S.W. Gemini Drive Beaverton, OR 97005 (503) 646-6999</td>
<td>E·Machines, Inc. 9305 S.W. Gemini Drive Beaverton, OR 97005 (503) 646-6999</td>
<td>E·Machines, Inc. 9305 S.W. Gemini Drive Beaverton, OR 97005 (503) 646-6999</td>
</tr>
</tbody>
</table>

*Many manufacturers also sell the monitors and cards separately.

*Apple also has a 4-bit video card ($499) and a 4-bit expansion kit ($149).
Presenting the world's first true publishing program. The first to give you the tools, power, and precision to publish documents that far exceed the look, quality, color, and professionalism formerly associated with desktop publishing. Presenting the new QuarkXPress 3.0. "Just how good is it? Well, you're looking at it."

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2. **Move your words and pictures as a group.**
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Nobody reads copy anyway. MacDraw II.
Table 1: Features of Color Display Systems, continued

<table>
<thead>
<tr>
<th>Mouse rating</th>
<th>Small</th>
<th>Large</th>
<th>Large</th>
<th>Large</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacProducts Magic View</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List price*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mac II system, 8-bit</td>
<td>$895</td>
<td>$6,395</td>
<td>$5,995</td>
<td>$3,999</td>
<td>$5,948</td>
</tr>
<tr>
<td>Mac II system, 24-bit</td>
<td>NA</td>
<td>$6,595</td>
<td>$8,090</td>
<td>$4,999 (T-24gx)</td>
<td>$9,149</td>
</tr>
<tr>
<td>Mac SE/30 system, 8-bit</td>
<td>$999</td>
<td>NA</td>
<td>$5,995</td>
<td>$3,999 (CT/30)</td>
<td>$6,198 (3D88 model)</td>
</tr>
<tr>
<td>Monitor specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tube manufacturer and type</td>
<td>Philips shadow mask</td>
<td>Hitachi INVAR shadow mask</td>
<td>Sony Trinitron</td>
<td>Ikegami-Sony Trinitron</td>
<td>Sony Trinitron</td>
</tr>
<tr>
<td>Dot pitch (millimeters)</td>
<td>0.29 mm</td>
<td>0.26 mm</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
</tr>
<tr>
<td>CRT size (diagonal [in.])</td>
<td>14 in.</td>
<td>19 in.</td>
<td>20 in.</td>
<td>19 in.</td>
<td>19 in.*</td>
</tr>
<tr>
<td>Active screen size (diagonal [in.])</td>
<td>12.95 in.</td>
<td>19.25 in.</td>
<td>17.25 in.</td>
<td>17.7 in.</td>
<td>17.5 in.</td>
</tr>
<tr>
<td>Screen dimensions (W x H [pixels])</td>
<td>640 x 480</td>
<td>1,152 x 870</td>
<td>1,024 x 808</td>
<td>1,024 x 768</td>
<td>1,024 x 826</td>
</tr>
<tr>
<td>Resolution (dots per inch)</td>
<td>72 dpi</td>
<td>72 dpi</td>
<td>75 dpi</td>
<td>72 dpi</td>
<td>75 dpi</td>
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<tr>
<td>8-bit color modes</td>
<td>2, 4, 16, 256</td>
<td>2, 4, 16, 256</td>
<td>2, 4, 16, 256</td>
<td>2, 4, 16, 256, millions</td>
<td>2, 4, 16, 256, millions</td>
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<tr>
<td>24-bit color modes</td>
<td>NA</td>
<td>2, 4, 16, 256, millions</td>
<td>2, 4, 16, 256, thousands, millions</td>
<td>2, 4, 16, 256, millions</td>
<td>2, 4, 16, 256, millions</td>
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<tr>
<td>Vertical scan rate (hertz)</td>
<td>60.7 Hz</td>
<td>75 Hz</td>
<td>71.3 Hz</td>
<td>75 Hz</td>
<td>69 Hz</td>
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<tr>
<td>Horizontal scan rate (kHz)</td>
<td>35 kHz</td>
<td>70 kHz</td>
<td>60.24 kHz</td>
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<tr>
<td>Controls</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Power switch</td>
<td>front</td>
<td>front panel</td>
<td>front</td>
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<tr>
<td>Power indicator</td>
<td>front</td>
<td>front</td>
<td>front</td>
<td>front</td>
<td>front</td>
</tr>
<tr>
<td>Brightness/contrast</td>
<td>front</td>
<td>front (contrast only)</td>
<td>front</td>
<td>front (contrast only)</td>
<td>front (contrast only)</td>
</tr>
<tr>
<td>Degaussing</td>
<td>automatic at power-up</td>
<td>automatic at power-up</td>
<td>right</td>
<td>automatic at power-up</td>
<td></td>
</tr>
<tr>
<td>Convergence</td>
<td>none</td>
<td>front</td>
<td>right</td>
<td>front</td>
<td>front</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiglare treatment</td>
<td>none</td>
<td>Asahi Glass AR panel</td>
<td>OCLI-type AR panel</td>
<td>OCLI-type AR panel</td>
<td>OCLI-type AR panel</td>
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<tr>
<td>Tilt/swivel stand</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Video cable length (feet)</td>
<td>5.3 ft</td>
<td>6 ft</td>
<td>6 ft</td>
<td>6 ft</td>
<td>5 ft</td>
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<td>Power consumption (watts)</td>
<td>85 watts</td>
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<td>150 watts</td>
<td>150 watts</td>
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<td>Case dimensions (W x H x D [in.])</td>
<td>14 x 15.5 x 16</td>
<td>19.5 x 19 x 20.5</td>
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<td>19.5 x 19 x 21</td>
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<td>86 lb</td>
<td>85 lb</td>
<td>76 lb</td>
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<tr>
<td>Software</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes (as of April '90)</td>
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<td>Warranty</td>
<td>monitor, 2 years card, 1 year</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>MacProducts USA, Inc. 8303 Mogae Expo. Suite 218 Austin, TX 78759 (800) 822-3475 (512) 343-9441</td>
<td>CalComp, Inc. 2411 W. La Palma Ave. Anaheim, CA 92801 (800) 225-2667 (714) 821-2000</td>
<td>E-Machines, Inc. 9305 S.W. Gemini Drive Beaverton, OR 97005 (503) 646-6699</td>
<td>Generation X Technologies 333 W. El Camino Real, Suite 510 Sunnyvale, CA 94087 (800) 448-8231 (408) 739-4570</td>
<td>MegaGraphics, Inc. 430 Calle San Pablo Camarillo, CA 93010 (800) 429-0183 (805) 484-3799</td>
</tr>
</tbody>
</table>

*Many manufacturers also sell the monitors and cards separately.

MacProducts will offer a 24-bit system in June 1990.

A 16-inch system is also available.
All These Videos Were Created By A Mouse

If you can point and click, you can produce professional quality color videos with ColorSpace III. The video card that lets you overlay anything created on a Mac II onto live or recorded video.

ColorSpace III's advanced genlocking technology assures crisp, high-quality images by synchronizing Mac graphics, titles, and animations to any standard TV video signal. You can even digitize still images from a video camera.

And while ColorSpace III is easy to use, it lets you get as sophisticated as you want. Because it works with all the most powerful Mac software—HyperCard,™ SuperCard,™ and Director.™ All of which makes ColorSpace III the technology of choice for today's desktop video applications: animations; film and commercial storyboards; sales/promotional/instructional videos.

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550 Del Rey Avenue, Sunnyvale, California 94086. In Canada call (604) 276-2326. For international distribution call 408-522-1200.

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<table>
<thead>
<tr>
<th>Table 1: Features of Color Display Systems, continued</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mouse rating</strong></td>
</tr>
<tr>
<td>Large PCPC II 21&quot; Color Display System</td>
</tr>
<tr>
<td>Large Radius Color Display</td>
</tr>
<tr>
<td>Large RasterOps 708+ Display</td>
</tr>
</tbody>
</table>

**List price**

- Mac II system, 8-bit **$3,658**
- Mac SE/30 system, 8-bit **$4,358** (16 bits)
- Mac SE/30 system, 24-bit **$4,858**
- MacUser May 1990 Buyer’s Guide 53

*Many manufacturers also sell the monitors and cards separately.

**For $1,479, the 8-bit card can be upgraded to 24 bits; the card must be returned to PCPC for upgrading.

- The 16-bit SE/30 system supports 2, 4, 16, 256, thousands.

- System also available with the DirectColor/8 card, which is upgradable by using the 8-bit DirectColor Memory Expansion Kit ($1,005).
You’ll want your MacTV, too—interactive-multimedia. Live, full-color, flicker-free video in a window on your Mac monitor. And the only way to get it is with ColorSpace FX. Designed to work with ColorSpace III, ColorSpace FX is the first low-cost, high-quality digital effects card to put broadcast-quality video on your desktop.

FX works with all the most powerful Mac software. Including HyperCard, Director Interactive, Authorware Professional, and SuperCard. So you can combine text and video in new, exciting ways on a single screen. Spice things up with zooms, fades, spins, mirrors, and squeezes. And produce the most exciting multimedia this side of Hollywood: business training and interactive learning systems, live teleconferencing, and more.

For details and the nearest dealer, call 800-522-7979. And say you want your MacTV.
Table 1: Features of Color Display Systems, continued

<table>
<thead>
<tr>
<th>Mouse rating</th>
<th>Large</th>
<th>RasterOps Calibrator</th>
<th>Large</th>
<th>Relax Ikogami Trinitron</th>
<th>Large</th>
<th>Sigma Designs ColorMAX 8/24</th>
<th>Large</th>
<th>SuperMac 19&quot; Color Display</th>
<th>Large</th>
<th>SuperMac 19&quot; Trinitron Color Display</th>
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<tbody>
<tr>
<td>List price*</td>
<td>Mac II system, 8-bit</td>
<td>$9,995</td>
<td>$4,995</td>
<td>$6,295**</td>
<td>$4,799</td>
<td>$5,799</td>
<td>$5,599</td>
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<td>Monitor specifications</td>
<td>Tube manufacturer and type</td>
<td>Matsushita shadow mask</td>
<td>Ikegami-Sony Trinitron</td>
<td>Sony Trinitron</td>
<td>Hitachi INVAR shadow mask</td>
<td>Sony Trinitron</td>
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<tr>
<td>Dot pitch (millimeters)</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
<td>0.31 mm</td>
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<tr>
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<td>19 in.</td>
<td>19 in.</td>
<td>19 in.</td>
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<td>1,024 x 768</td>
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<td>1,024 x 768</td>
<td>1,024 x 768</td>
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<td>Resolution (dots per inch)</td>
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<td>72 dpi</td>
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<td>8-bit color modes</td>
<td>2, 4, 16, 256</td>
<td>2, 4, 16, 256</td>
<td>2, 4, 16, 256</td>
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<tr>
<td>24-bit color modes</td>
<td>2, 4, 16, 256, millions</td>
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<td>Vertical scan rate (hertz)</td>
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<td>front</td>
<td>front</td>
<td>front</td>
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<tr>
<td>Brightness/contrast</td>
<td>front and DA</td>
<td>front</td>
<td>front (contrast only)</td>
<td>front</td>
<td>front (contrast only)</td>
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<td></td>
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<tr>
<td>Degaussing</td>
<td>front and DA</td>
<td>right</td>
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<td>automatic at power-up</td>
<td>automatic at power-up</td>
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<td>front</td>
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<td>Other</td>
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<td>silica coating</td>
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<td>5 ft</td>
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<tr>
<td>Power consumption (watts)</td>
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<tr>
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<td>yes</td>
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<td>Sigma Designs, Inc.</td>
<td>SuperMac Technology</td>
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<tr>
<td></td>
<td>2500 Walsh Ave. Santa Clara, CA 95051</td>
<td>3101 Whipple Road Suite 22 Union City, CA 94587</td>
<td>46501 Landing Freeway Fremont, CA 94538</td>
<td>485 Potrero Ave. Sunnyvale, CA 94086</td>
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</tr>
</tbody>
</table>

*Many manufacturers also sell the monitors and cards separately.

**Sigma's 8-bit card is upgradeable to 24 bits by addition of 16 Toshiba VRAM chips (about $20 each); total upgrade price may be higher.

MacUser May 1990 Buyer's Guide 55
MacUser Labs tests the full spectrum of color printers and finds that the leap from color screen to color page has never been easier.

Color on the Page

By Phillip Robinson and the MacUser Labs staff

Back in the late '80s — October '88, to be exact — we tested the only two serious color printers then available to Mac users: the QMS ColorScript 100 and the Tektronix 4693D. Both were big, heavy, and expensive. Neither worked smoothly with all the applications we tried. Other manufacturers were waiting for a firm color standard from Apple before entering the color market. The breakthrough came in April '89 with the release of 32-bit QuickDraw.

The '90s will be the Color Decade. In the past 12 months, waves of color applications, display systems, and printers have appeared. Most take advantage of Apple's new color standard. Today you can choose from more than two dozen color printers at prices ranging from $1,500 to $75,000.

MacUser Labs tested 14 members of the new generation of color printers. We looked at representatives from the three major color technologies: inexpensive inkjets, thermal-wax-transfer workhorses, and state-of-the-art sublimal-dye-transfer printers that produce images of almost photographic quality (see Figure 1). We spent more than a thousand hours in our lab, evaluating everything from printing speed to image quality. Five other printers also passed through our lab but were kept separate from the others for various reasons (see the "More Color, Anyone?" sidebar).

To separate the crayon scribblers from the polished painters, we printed test pages that included color transitions (gradients), color-range samples, fine lines, curves, and text of different sizes. We also printed scanned color photographs, a PageMaker...
layout, and a Persuasion chart. We used different drivers, printed on paper and transparencies, and clocked speeds. We turned a spectrophotometer on the colors. Finally, we asked a jury pulled from MacUser’s experienced, skeptical art department to judge some prints side by side.

**Color Whose World?**

Not everyone needs color printing. If you spend your day word processing, crunching numbers, or managing a database, save your green and stick to black and white. But if you prepare presentations, color can impart that extra punch to your handouts or overhead projections. If you’re a desktop publisher, designer, or artist, you need color proofs (sample prints) to check hues, intensities, and the overall appearance of color compositions. Simple presentations demand less from a printer than do proofs. A day in the boardroom isn’t ruined if the red on a bar chart isn’t precisely the same red you saw on your Mac. However, more-complex presentations — with scanned images, intricate diagrams, logos, or 3-D models — demand more from a printer: sharp line edges, smooth color transitions, and crisp fonts.

If you’re choosing a printer for color proofs, don’t be scared off by price — think instead of the time and money you’ll save. A high-quality Cromalin colorproof from an outside service costs between $50 and $100, and you have to wait three to five days before you see your image. In minutes, an inkjet or thermal-wax printer can give you a rough idea for 25 to 50 cents per page; a sublimal-dye printer takes about the same amount of time to give you near-Cromalin results for less than $5.

**When Does 4 Equal 16 Million?**

Despite differences in technology, all color printers use three primaries: cyan, magenta, and yellow (CMY). Some add a fourth, black (K). Although it’s possible to mix equal amounts of the CMY primaries to make black, the result isn’t as rich or dark as a pure black. From these three or four colors, printers — and the software that drives them — create millions of additional colors by dithering.

Inkjets shoot minute drops of ink onto a page, and thermal printers apply drops of melted wax or plastic. These drops create tiny dots. Each individual dot is so small that your eye blends neighboring dots together. If the dots are different colors, you’ll perceive another color — one that’s not really there. For example, a black dot next to a white dot is seen as a larger gray dot. A cyan dot joins a yellow dot to produce green. This is the basis of dithering.

The number of dots laid down per inch determines a printer’s resolution — the higher the resolution, the crisper the image. All the inkjets print 180 dpi (dots per inch) except the Tektronix ColorQuick, which squeezes 216 dpi out of its 180-dpi Sharp JX-730 print engine. Most thermal-wax printers can produce 300 dpi. The CalComp PlotMaster and Lasergraphics CPS are exceptions, printing 203 dpi horizontally and 200 dpi vertically.

Because each individual dot can be any one of four colors, the total number of colors that can be shown by a pair of dots equals 4 times 4, or 16 colors. There’s no limit to the size or shape of a dither group; any pattern is possible if your software is up to it. A dither square of 8 dots on a side can produce 16,777,216 colors — the upper limit of 32-bit QuickDraw.

As you might guess, the difference between reds #1,000,000 and #1,000,001 is minuscule. The amount of difference between two colors is influenced by the size of the printer’s gamut — the array of all possible colors that the printer can produce (see Figure 2). A large gamut, or color range, allows a wider variety of colors than a small gamut. (The total number of colors, however, is limited to the 16.8 million produced by dithering.) The three Tektronix printers — the ColorQuick, 4693DX, and Phaser CPS — have the largest color gamuts. They produce consistently vivid colors over a broad range of hues. The Hewlett-Packard
PaintJet XL and Shinko CHC-345 suffer from a narrow range of possible colors.

All printers face a dual challenge when dithering: pattern choice and resolution. If a 64-dot group is half cyan and half yellow, should it be a square with all the cyan dots on one side and all the yellow ones on the other? Or should the dots be distributed in a checkerboard pattern throughout the group? How about a random distribution? The three patterns look astonishingly different when repeated many times across a printed page.

A bad dither pattern can create banding, distracting patterns, or blurring in a print. But there’s no one best dither for all uses. Different types of images look best with different dithers. For example, the randomized Floyd-Steinberg dither — included in the software drivers for the Sharp JX-730, CalComp PlotMaster, and Lasergraphics CPS — is generally regarded as best for scanned photographic images. The more ordered Bayer dither included with the same printers works especially well for images of flat, untextured surfaces.

PostScript provides only one dither, a pattern that mimics traditional halftone printing. The printers we tested outputted at 300 dpi, however, less than one-fourth the resolution of a typical halftone color separation (as used in this magazine). Images printed with the PostScript dither look like halftone images as they would appear under a powerful magnifying glass. The PostScript clone in the Tektronix Phaser CPS uses an entirely different dither to avoid this effect.

Dithering degrades a printer’s resolution, and low resolution can destroy text or fine lines. When printing a pure primary (or black), a printer can call on its entire resolution to smooth a line or font. To produce a diagonal line, for instance, it can step up one dot at a time as the diagonal rises across the page. But when an 8 x 8 dither is the basic printing unit, a new block can be added only every eight dots. The apparent resolution is then one-eighth of the original. With a 300-dpi printer, for example, dithering with 8 x 8 blocks cuts apparent resolution to a mere 37.5 dpi.

Instead of laying down individual dots, the Mitsubishi S340-10 uses dye sublimation — that is, it vaporizes dyes, which blend with each other as they soak into the page (see the “How They Work” sidebar). A sublimal-dye printer doesn’t need to dither to make millions of colors, because it can mix varying amounts of primary colors in each dot. Although the S340-10 starts at only 150 dpi, its apparent resolution is higher than that of printers that must trade resolution for dithering.

RIP It Up

Choosing dither patterns is one of the duties of a complex combination of hardware and software known as a RIP (raster-image processor). The RIP’s job is to translate the image you see on-screen into the dots of ink, wax, plastic, or dye that form the same image on the printed page. Depending on the software, the RIP’s work is done in the printer or in a

More Color, Anyone?

Not satisfied with MacUser’s selection of 14 color printers? Here are a few more ways to get color out of your Mac.

If your printing needs are small — literally — the postcard-sized images of the Kodak SV6510 Color Video Printer ($4,500) might be right for you. Although its 137-dpi resolution is slightly lower than that of the Mitsubishi S340-10, our tests showed that the sublimal-dye Kodak produced output that was just as good (and at times better). The SV6510 can also serve as an image-capture and -processor device. You can connect a Kodak CCD 1000 RGB camera, a Kodak SV6035 Slide/Video Transfer Unit, or any other RGB or NTSC video source and upload PICT images to the Mac. Eastman Kodak Co., 343 State St., Rochester, NY 14650, (800) 445-6325, ext. 110.

The soon-to-be-released Kodak XL7700 ($25,000) is a 200-dpi sublimal-dye printer that will produce 11 x 17-inch images as crisp and vivid as any we’ve seen. At the top end of sublimal-dye printing is the DuPont 4Cast ($75,000), which prints at 300 dpi in sizes up to 11 x 17 inches. The 4Cast includes a software-based PostScript RIP from Adobe. DuPont, 660 Eagle Run Road, Route 278 NI9S, Newark.
Macintosh/printer combination.

Many printers let you select RIP software (see Table 1). When better RIP software is released, you can upgrade these printers' performance simply by installing a new RIP driver.

The most familiar RIP software comes with the PostScript page-description language, which is used by the Oce Graphics and QMS printers. PostScript printers produce smooth graphics and high-quality text (using 35 built-in, or resident, fonts), but PostScript can add several thousand dollars to a printer's price. For instance, the $9,995 QMS ColorScript 100, with PostScript, uses the same print engine as the non-PostScript $5,995 Mitsubishi G370-10. The Tektronix Phaser CPS avoids this extra expense by using a PostScript clone that works as well as the real thing except that it choke on Adobe's encrypted Type 1 fonts. True PostScript printers are faster than other color printers, since the PostScript RIP does all of its work in printer hardware rather than on the Mac.

All other printers use RIPs that are based solely on QuickDraw, the imaging technique that Apple builds into each Mac's ROM. QuickDraw requires the Mac to perform all the rasterizing calculations and uses only software-based outline fonts, as opposed to resident fonts. The Hewlett-Packard PaintJet and PainJet XL, Tektronix ColorQuick and 4693DX, and Seiko CH-5504 all provide proprietary RIP software. The CalComp PlotMaster and Sharp JX-730 come with Cricket Expressions, which allows you to choose from eight dither patterns and 35 outline fonts. The Shinko CHC-345 comes with ColorOut, a relatively straightforward one-dither, no-font RIP driver from GMS, which promises more fonts and features in the future. (As we went to press, GMS announced a five-dither—but still fontless—version). The Lasergraphics CPS comes with the MacRascal driver. This powerful RIP includes 9 dithering patterns; 8 outline fonts, with an option for 35 more; and many settings.
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For a limited time, when you buy Adobe Illustrator 88 software, Adobe Type Manager software comes along with it, free. So if you want the drawing program used by professional designers and illustrators, buy it now. While you can also improve your type’s screen image—without spending a dime. Call 1-800-344-8335 to find your nearest Adobe Authorized Dealer today.

Because what’s new today is gone tomorrow.
How They Work: Color Printers

**Inkjets:** Inkjet print heads move across the paper, laying down dots of ink to form lines of colors. Special clay-coated paper is needed to prevent the ink from spreading on the page. Inkjet resolution is related more to cost than to the technology itself.

Hewlett-Packard PaintJets integrate the ink and the print head into one disposable cartridge. The ink is electrically heated and vaporized through 30 nozzles in each cartridge. Any ink that dries on the nozzle is cleaned manually with a built-in wiper. You simply replace clogged cartridges with new ones.

The Sharp JX-730 and Tektronix ColorQuick use pressure produced by a piezoelectric diaphragm to force ink onto the paper. This method consumes more ink than does the Hewlett-Packard process and produces richer colors. To prevent clogging, a five-minute cleaning cycle flushes the nozzles each time the machine is turned off.

**Thermals:** Colored wax, plastic, or sublimal dye comes on plastic ribbons in pagesized blocks of cyan, yellow, magenta, and sometimes black. Since a printing pass is made for each color, accurate registration is crucial. The printable area is limited, because the printer must grab the trailing end of the paper and pull it back for each color pass.

A thermal-wax head melts colored wax or plastic onto smooth paper. The dye is transferred by mechanical pressure between the head and the platen roller. The paper is then peeled away; the unmelted wax remains on the ribbon; and the melted dye sticks to the paper, resulting in a glossy image.

When a sublimal dye is heated, it changes from a solid directly into a gas in a process called sublimation. The gaseous dye diffuses in the chemical coating of the receiving paper and reverts to a solid. The amount of dye transferred depends on the temperature of the heating element. Because the intensity of each color is controlled, and because sublimal dyes may be laid on top of each other, dithering is not required to create a full range of colors.

— Paul Yi
Connect Apples to Apples

As you can see, the Publisher Series video boards from Generation X allow you to connect any Macintosh computer to any Apple monochrome monitor. Nobody else can do that. Not even Apple!

And talk about comparing Apples to Apples; the Publisher Series video boards for the Mac Plus, SE, SE/30, Mac II family and the new Mac Portable all work according to Apple's specifications for quality and compatibility.

That means high resolution and high vertical refresh rates — as high as 1152 x 870 pixels and 75Hz on the Apple Two-Page monitor.

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Now let's talk Apples to Oranges. The Publisher Series video boards will work with many monitors in addition to those from Apple — from 15" to 21". It's your pick.

So if you want to connect Apples to Apples, or even Apples to Oranges, pick the Publisher Series video boards.

For more information, call: 1-800-448-8231

Apples To Apples.

How to connect any Macintosh computer to any Apple monochrome monitor...
and controls for color-value adjustment and color replacement.

Freedom of Press from CAI provides the advantages of PostScript for QuickDraw printers. It converts PostScript code to a format that QuickDraw printers can understand and print. Although Freedom of Press isn’t bundled with any of the printers we tested, it can be added as an option to many. Freedom of Press provides excellent output and includes Bitstream equivalents of the standard 35 PostScript fonts, but it’s somewhat clunky to use and the roundabout imaging process ties up the Mac. Using it is also script building using a PostScript printer; the results are impressive, however (see StartUp Reviews, January ’90).

Making the Connection

Before you can enjoy your chosen RIP, you first face the chore of connecting your color printer to your Mac. Both the Hewlett-Packard PaintJet and PaintJet XL have serial interfaces that connect to the Mac’s printer port, although the XL is twice as fast, at 19,200 bps (bits per second). The Sharp JX-730 offers two interface options: the $125 Paralink serial-to-parallel converter from Jonathan Freeman Technologies and the slightly faster $195 Hurdler II-CPF NuBus card from Creative Solutions. The Tektronix ColorQuick uses a fast and simple SCSI connection.

The three thermal-wax printers with PostScript or a PostScript clone built in — the QMS ColorScript 100, Oce 5232 CPS Color PS, and Tektronix Phaser CPS — connect to the Mac via a LocalTalk network and thus can be shared by other Macs. The Tektronix Phaser CPS can also spool and manage printing for as many as four other LocalTalk printers at once.

The non-PostScript printers are a more diverse lot to install. The Shinko requires a parallel NuBus card such as a Hurdler II-CPF or a Unigate from Computer Friends. The Tektronix 4693DX comes with a NuBus card and also accepts optional cards (available from Tektronix) that connect as many as four Macs without a network. The Mitsubishi G370-10 and S340-10 both require a parallel NuBus card, but neither the card nor the required RIP driver software are included with either Mitsubishi printer — you must shop for them yourself.

The Lasergraphics and Seiko connect to the Mac’s SCSI port through an external SCSI/parallel converter box. The CalComp PlotMaster ships with a 19,200-bps serial interface, but we recommend the parallel option, because it can cut print times in half. The Seiko is the toughest installation of all, from the motherboard that has to be slipped and screwed into place, to the manual settings on the front panel.

### Table 1: RIP Options

<table>
<thead>
<tr>
<th>App.</th>
<th>ColorOut</th>
<th>Cricket Expressions</th>
<th>Freedom of Press</th>
<th>MacResco</th>
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<td>$495</td>
<td>$690*</td>
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<td>CalComp PlotMaster 5920A</td>
<td></td>
<td></td>
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<tr>
<td>Lasergraphics CPS</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mitsubishi G370-10</td>
<td>$195*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oce 5232 CPS Color PS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QMS ColorScript 100 Model 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seiko CH-5504</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Shinko CHC-345</td>
<td>$195*</td>
<td>$3,130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tektronix 4693DX Color Image</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tektronix Phaser CPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sublimal-dye thermal transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mitsubishi S340-10</td>
<td>$195*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes NuBus interface card (required for Freedom of Press installations).

*Includes Paralink interface. $195 version includes Hurdler II-CPF NuBus interface card.

The right RIP is an important ingredient in printer performance. Fortunately, you're not limited to the RIP software shipped with most printers. Third-party RIP software is available that can improve both speed and image quality. Look for RIPS with more features, fonts, and dithers to appear in the future and for prices to come down as the color-printer market continues to grow.

Media Watch

If you’re bothered by the process of changing toner in your LaserWriter, be prepared for even more colorful complications when you move up to a color printer — especially if you choose an inkjet. An inkjet refill operation can threaten not only your patience but also your wardrobe. For instance, the Sharp and Tektronix inkjets come with liquid inks that can splash during refilling or when the printer is moved.

To prevent clogging, the JX-730 and the ColorQuick have a cleaning and priming cycle, which hums along for a few minutes after you’ve finished printing. The ColorQuick produces rich colors by using large amounts of ink, more than the PaintJets and the Sharp. The PaintJet and PaintJet XL combine the ink reservoir and the print head into disposable cartridges — one for each color in the XL and a single cartridge for all three colors in the PaintJet (along with one for black). You never touch the inks. When a nozzle clogs so badly that a quick wipe on the
If you’re tired of chasing a mouse all over your desk, fumbling around on a cumbersome ball or wasting valuable desk space with a tablet, it’s time for Felix™. Because Felix makes your computing easier, it means you’ll work faster and more productively. Designed as an extension of your fingertips, Felix lets you control the Macintosh® screen cursor with pin-point accuracy. It’s as natural as writing with a pen or as simple as pointing your finger. Felix moves within an amazingly small area of just one square inch and gives you control over your Macintosh’s screen like you’ve never had before. Special software comes with Felix that turns this “super mouse” into a truly intelligent input device and lets you do things you may not have thought were even possible. Things like instantly creating high-precision floating window areas anywhere on the screen, and providing “no-hands” automatic access to important window control areas like the close box, zoom box, etc. Felix can change the way you relate to your Macintosh and make it easier for you to get more things done in less time. Felix never moonlights as a desktop vacuum either, so you don’t have to clean or maintain it like you would a normal mouse. Priced at $169, Felix will be your best friend on the desktop. We guarantee you’ll love it.

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cleaning station built into the printer won't fix it, you just toss the cartridge and insert a new one. You pay for convenience, though: PaintJet cartridges cost five times as much as the JX-730 and ColorQuick refills.

The PaintJet has both friction and tractor-feed options for paper and transparencies; the PaintJet XL has an impeccable automatic sheet feeder. The JX-730 has only an inconvenient hand-loaded single-sheet paper feeder that is prone to crooked feeds. The ColorQuick comes with cut-sheet, manual single-sheet, and roll feeders that didn't misalign during our tests.

The thermal-wax and sublimal-dye printers share a similar ink scheme: the colored wax, plastic, or dye comes on wide rolled ribbons. (The sublimal-dye Mitsubishi S340-10 is the only printer that needs different ribbons for paper and transparencies.) The ribbons contain full-page rectangles of color, in repeating sequences of CMY or CMYK, that are used only once for a single page. All the cyan dots on a page are printed, the page is returned to its original position, the color rolls move to the next color rectangle, all the yellow dots are printed, and so on. You'll pay between 28 and 78 cents (Lasergraphics, with wax, versus Océ, with plastic ink) per complete thermal image on paper. Transparencies cost three to four times as much. The Mitsubishi S340-10 is in a class by itself, with paper prints at $4.80 each and transparencies costing $5.60 apiece.

Two factors are important in judging speed: how soon you regain control of your Mac and how long it takes for the page to print. We tested each printer on a complex PageMaker proof and a simple Persuasion presentation chart. The QMS ColorScript was the overall winner, with the Océ Graphics 5232 and Tektronix 4693DX close behind. The Tektronix Phaser CPS returned the cursor fastest, thanks to its spooling, but the complex proof taxed its Postscript-clone RIP. Although the inks were slower than most thermals, the real snail was the CalComp PlotMaster.

The colors a printer produces are affected by its media, dyes and inks, and dithering. To show how four different printers respond to the same input, we printed a "brown" from the same Canvas file and then magnified the dither pattern 20 times. Océ's PostScript dither uses more yellow than the others, whereas the Seiko's brown looks almost red. Like the Seiko, the Sharp JX-730 uses a generous amount of black, but its dither and ink combine to produce a dark-brown color. The Mitsubishi uses no dithering, and the result is a seemingly solid brown.

Color printers tend to have smaller potential print areas than do monochrome printers. On A-size paper (8.5 x 11 inches), the Océ Graphics 5232 and Tektronix 4693DX have the smallest printable areas, at 8.1 x 8.3 inches. The Océ is only a tiny bit larger at 8.8 x 10 inches, but it's also the only
Introducing the first color PostScript printer priced to keep you in the black.

The QMS ColorScript 100 Model 10. Just $9,995.

Show-stopping presentations, powerful projections and crystal clear calculations in hard copy or transparency form. Everything your business needs to stand out from the crowd. All in a full spectrum of color for just $9,995. The QMS ColorScript® 100 Model 10 easily connects to your Mac® or PC to add full color and the power of true Adobe® PostScript to your business — and, at this price, it helps you stay in the black! It's another first from QMS® and a breakthrough in color PostScript® printers.

Limitless Possibilities. The new QMS ColorScript 100 Model 10 allows you to have total control over the final appearance of your hard copies and transparencies. The Model 10 includes 35 resident typefaces that, thanks to PostScript, can be scaled to virtually any size and shape. Put that together with its ability to print over 16 million color variations and you'll see an entirely new dimension to composition.

Exclusive Advantages. The compact Model 10 gives you advantages you won't find with the competition. For example, PC users can put the Model 10 to work without adding any additional boards. And Mac users simply plug the Model 10 into the AppleTalk® port. The Model 10 prints at 300 dpi for near typeset quality presentations that spring to life in colors that adhere to PANTONE® Color Standards. If you need to expand your printing capabilities or memory, the Model 10 is designed to easily accept a 1 MB or 4 MB RAM upgrade. The Model 10 also features an SCSI interface that makes adding enough memory to store the entire PostScript typeface library as simple as plugging in a lamp.

1-800-523-2696. If improving your business edge is important to you, call our toll free number for the nearest Laser Connection® dealer. Your Laser Connection dealer can give you a demonstration and show you how the QMS ColorScript 100 Model 10 will add a colorful dimension to your presentations — and help keep you in the black.


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printer able to print on B-size paper (11 x 17 inches), with an image size of 10 x 15 inches. The Seiko has the largest A-size print area, 8.25 x 10.7 inches, and can print an image of 8.53 x 11.9 inches — larger than letter-sized — on its own “Super A-size” paper. Some printers also have big brothers that accommodate B-size paper (see Table 2).

Our tests couldn’t answer every question about ink and paper. For example, how long will the colors last on paper? Only the Océ makes a specific claim to use “archival” plastic ink. Will the ink smear or rub off after extended use? Thermal wax that sits on top of the page is in more danger than inkjet ink or sublimal dyes, which soak into the paper.

Someday My Prints Will Come

Even the fastest color printers are far slower than their monochrome cousins. Besides noting total printing time, we determined how quickly — or slowly — each printer returned control of the Mac before printing both simple and complex files (see Figure 3). Printers that RIP internally turned out to be strikingly faster than those that process images inside the Mac. When preparing to print a simple, undithered PICT file, for example, the sluggish CalComp PlotMaster — which uses a software RIP inside the Mac — took a thousand times longer to return control of the Mac than did the speedy Tektronix Phaser CPS.

The Phaser CPS has a hard-disk spooler that quickly soaks up the image from the Mac and gives the cursor back faster than any other printer we tested. The Phaser tied with the QMS ColorScript for first printer to finish the simple Persuasion page. On the more complex PageMaker page, however, the Phaser’s PostScript clone was not as swift as the Adobe original used by QMS.

Inkjet printers have two speeds, one for printing on paper and a slower one for transparencies. On paper, the PaintJet XL and the ColorQuick keep up with the average thermal printer, but the plain PaintJet (with its slow serial connection) and the Sharp JX-730 are among the slowest printers. They’re kept out of the cellar by the CalComp PlotMaster, which needed well over an hour to print the PageMaker document — most other printers were done in 10 to 20 minutes. What’s worse, the PlotMaster tied up the Mac for all but the last few seconds of the printing process. On transparencies only the Hewlett-Packard PaintJet XL came close to the speed of the average thermal printer.

Looks Are Everything

After negotiating an obstacle course of hardware-installation tests, software-installation options, and clock watching, our intrepid technicians finally reached the heart of the matter: How good do the prints look?

When evaluating color prints, remember that WYSIWYG (what you see is what you get) color is still an unreachable ideal (see “Color Transformations” in this buyer’s guide). The on-screen color may be only a distant relative of the color that shows up on the printed page (see Figure 4), but don’t blame the printer alone. Your monitor, application, and driver software all have their own ideas
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“We have a Macintosh® computer on almost every desk. I’ve tried other temporary help companies and Kelly is the best. Kelly takes the time to make sure I get the kind of people that I need.”

KELLY Temporary Services
The Kelly Girl® People – The First and The Best®

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about each color’s hue and intensity. The dither pattern you choose may skew the apparent color. The light under which you are looking at the print also has an enormous effect on what color you perceive.

Tektronix has taken an important first step toward resolving this confusion with a process called TekColor (see “The TekColor Solution” sidebar in “Color Transformations” in this buyer’s guide). TekColor knows the color tendencies of many popular monitors; just tell it which one you’re using, and TekColor adjusts the ColorQuick’s output accordingly. At press time, TekColor supported only the ColorQuick printer, but a version for the 4693DX should be out by now, with a Phaser CPS version on the way.

The Océ 5232 CPS and QMS ColorScript 100 use a different strategy for color control. They are Pantone-certified—that is, they produce colors that mesh with the popular Pantone Matching System (see “The Pantone Touch” in this month’s DTP section). The Pantone system, widely used by designers and printers, provides a unique identification number for hundreds of hues and tints. You need a Pantone-licensed application such as QuarkXPress or Adobe Illustrator to take full advantage of this feature.

Our spectrophotometer tests provided an objective analysis of each printer’s potential color range. The larger the color range, the likelier it is that the printer can produce the color you want. Other attributes aren’t as easily quantified, however, so we asked a jury of experienced publishing professionals to rate each sample image’s overall appearance, line and text resolution, consistency, and edge definition.

For overall attractive output, our jury’s first choice was the Mitsubishi S340-10 first, followed closely by the Shinko, the Mitsubishi G370-10, and the Phaser (see Figure 5). The PaintJets and PlotMaster finished last. The S340-10’s images point to a future in which sublimal-dye printers turn out prints that rival photographs for smooth continuous colors.

If you want bright, vivid colors—especially the primaries so popular in presentations—all three Tektronix printers will fill the bill. The large Tektronix color gamut play a role here, offering brighter, richer colors than the results most other printers can attain. If your presentations are more complex, the Phaser CPS is recommended for good line resolution on both paper and transparencies. The Seko printer had by far the poorest line resolution on both media.

On paper, the Mitsubishi S340-10 sublimal-dye printer won the colored-line-resolution award by a wide margin. This is a bit surprising in view of its low 150-dpi resolution but points out how dithering reduces resolution for thermal-wax and inkjet printers. In a virtual tie for second — a distant second — came the CalComp Tektronix Phaser, QMS, Océ, and Mitsubishi G370-10 printers. The most important factor in text quality turned out to be the printer’s resolution (see Figure 6). Because dithering trades resolution for millions of colors, text is sharpest when printed in one of the four primaries. As might be expected, the three 300-dpi PostScript printers — Phaser, QMS, and Océ — produced crisp text. High-resolution QuickDraw printers using Freedom of Press printed text of equal caliper, but the 180-dpi PaintJets and Sharp JX-730 showed noticeable jaggies. The 150-dpi Mitsubishi S340-10, with its low resolution and lack of resident fonts, turned in the poorest text performance.

Because it doesn’t dither, the S340-10 easily produced the most-even color areas. The Phaser and the Sharp JX-730 were a close second, with the PaintJets and the Shinko and Seiko printers at the bottom of the heap. The S340-10 also produced the smoothest color gradients. The Océ, which did well in some other tests, was at the bottom, along with the Tektronix 4693DX, the only printer that’s still stuck in the 8-bit-QuickDraw world (a deficiency that should have been remedied by the time this report is in print).

The first transparency test—for precision and clarity of hairlines—dislodged the S340-10 from the top spot. Here the Phaser was first, followed by the Océ,
Mitsubishi G370-10, QMS, and CalComp printers. The Seiko trailed the pack, along with the PaintJet and the Shinko. But when printing color gradients on transparencies, the S340-10 again regained its lead by a healthy margin over the second-place group, which comprised the Shinko, Seiko, QMS, and Phaser. At the bottom were the Océ, the Tektronix 4693DX, and the ColorQuick.

Overall, the Mitsubishi S340-10 emerged as the clear champ. The Phaser, Mitsubishi G370-10, and QMS also scored well. The ColorQuick finished at

Table 2: Features of Color Printers

<table>
<thead>
<tr>
<th>Inkjet</th>
<th>Hewlett-Packard PaintJet</th>
<th>Hewlett-Packard PaintJet XL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>List price</td>
<td>$1,395</td>
<td>$2,495</td>
</tr>
<tr>
<td>Driver software included</td>
<td>Included with interface</td>
<td>Included with interface</td>
</tr>
<tr>
<td>Interface</td>
<td>$125</td>
<td>$125</td>
</tr>
<tr>
<td>A-sized paper</td>
<td>200 sheets, $21</td>
<td>200 sheets, $21</td>
</tr>
<tr>
<td>A-sized transparencies</td>
<td>50 sheets, $55</td>
<td>50 sheets, $55</td>
</tr>
<tr>
<td>Ink or ribbon</td>
<td>3-color, $35; black, $30</td>
<td>$30 per color</td>
</tr>
<tr>
<td>Cost per A-sized print</td>
<td>$0.11*</td>
<td>$0.11*</td>
</tr>
<tr>
<td>Cost per A-sized transparency</td>
<td>$0.77*</td>
<td>$0.77*</td>
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<tr>
<td>One-year on-site service contract</td>
<td>variable</td>
<td>variable</td>
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<tr>
<td>Hardware</td>
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<tr>
<td>Maximum resolution (dpi)</td>
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<tr>
<td>Colors</td>
<td>CMYK</td>
<td>CMYK</td>
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<td>Print-engine manufacturer</td>
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<td>HP</td>
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<td>Hard-disk drive</td>
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<td>none</td>
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<tr>
<td>Printer interface</td>
<td>Centronics</td>
<td>Centronics</td>
</tr>
<tr>
<td>Mac interface</td>
<td>RS-232 serial</td>
<td>RS-232 serial</td>
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<tr>
<td>Emulations (other printers)</td>
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<td>none</td>
</tr>
<tr>
<td>B-sized version</td>
<td>PaintJet XL handles B-sized paper</td>
<td>handles B-sized paper</td>
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<tr>
<td>Dimensions (W x D x H [in.])</td>
<td>17.5 x 12 x 4</td>
<td>29.5 x 17.5 x 9</td>
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<tr>
<td>Weight (lb)</td>
<td>11 lb</td>
<td>39 lb</td>
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<tr>
<td>Software</td>
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<tr>
<td>Imaging technique</td>
<td>QuickDraw</td>
<td>QuickDraw</td>
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<tr>
<td>Driver software</td>
<td>PaintJet 2.0</td>
<td>PaintJet 2.0</td>
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<td>Driver-software developer</td>
<td>Palomar</td>
<td>Palomar</td>
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<tr>
<td>Dither patterns</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Size of dither cell</td>
<td>8 x 8</td>
<td>8 x 8</td>
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<tr>
<td>Printarea on A-sized paper</td>
<td>8 x 10.5 in.</td>
<td>8 x 10.5 in.</td>
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<tr>
<td>Fonts</td>
<td>2 resident, 4 outline</td>
<td>2 resident, 4 outline</td>
</tr>
<tr>
<td>Media handling</td>
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<tr>
<td>Delivery</td>
<td>Z-fold, sheets</td>
<td>Z-fold, sheets</td>
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<td>Sizes</td>
<td>A, A4</td>
<td>A, A3, A4, B</td>
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<tr>
<td>Tray capacity</td>
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<td>200 sheets, 70 transparencies</td>
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<td>Accepts plain paper</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Other</td>
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</tr>
<tr>
<td>Warranty period</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Hewlett-Packard Co. 19310 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900</td>
<td>Hewlett-Packard Co. 19310 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900</td>
</tr>
</tbody>
</table>

*Media only; ink use varies according to image.
*A tractor feed ($290) and cut-sheet feeder ($790) are optional.
*A new driver with 32-bit support should be available when this report is in print.
*A ribbon for printing transparencies costs $340 for 100 prints.

The four inkjet printers (clockwise from top left): Sharp JX-730 Color Ink Jet, Tektronix ColorQuick, Hewlett-Packard PaintJet, and Hewlett-Packard PaintJet XL.

Four thermal-wax-transfer printers (clockwise from top left): Seiko CH-5504, Lasergraphics CPS, CalComp PlotMaster 5922A, and Océ Graphics 5232 CPS Color PS.
## Sharp JX-730 Color Ink Jet

<table>
<thead>
<tr>
<th>Price</th>
<th>Included</th>
<th>Paper Types</th>
<th>Transparencies</th>
<th>Noise</th>
<th>Size</th>
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</thead>
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<td>$2,195</td>
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<td>100 sheets, $25</td>
<td>40 transparencies</td>
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<td>90 days</td>
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</table>

## Tektronix ColorQuick

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<th>Noise</th>
<th>Size</th>
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<td>included</td>
<td>500 sheets, $25</td>
<td>50 transparencies</td>
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<td>90 days</td>
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## CalComp PlotMaster 5902A

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<th>Transparencies</th>
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</thead>
<tbody>
<tr>
<td>$5,595</td>
<td>included</td>
<td>500 sheets, $25</td>
<td>40 transparencies</td>
<td>no</td>
<td>90 days</td>
</tr>
</tbody>
</table>

## Lasergraphics CPS
- Excellent print quality. Fast. Low dpi. Includes MacRascal. Same print engine as CalComp with improved RIP.

<table>
<thead>
<tr>
<th>Price</th>
<th>Included</th>
<th>Paper Types</th>
<th>Transparencies</th>
<th>Noise</th>
<th>Size</th>
</tr>
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<tbody>
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<td>$7,495</td>
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<td>500 sheets, $25</td>
<td>40 transparencies</td>
<td>no</td>
<td>90 days</td>
</tr>
</tbody>
</table>

## Mitsubishi G370-10
- Excellent image quality. Compact. No hardware/software interface. Would receive 5.5 mice if interface were included. Inexpensive.

<table>
<thead>
<tr>
<th>Price</th>
<th>Included</th>
<th>Paper Types</th>
<th>Transparencies</th>
<th>Noise</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5,995</td>
<td>included</td>
<td>500 sheets, $25</td>
<td>40 transparencies</td>
<td>no</td>
<td>90 days</td>
</tr>
</tbody>
</table>

### Additional Specifications
- **180 dpi**
  - 216 dpi
  - 200 dpi (H), 200 dpi (V)
- **CMYK**
  - CMYK CMYK CMYK CMYK CMYK
- **TTI parallel**
  - RS-232 parallel
- **RS-232 serial, NIBUS**
  - SCSI, Centronics
- **Tektronix 4695 and 4696**
  - Tektronix 4696
- **prints up to 13.5 x 21 in.**
  - handles B-sized paper
- **25.75 x 14 x 4.75**
  - 24.5 x 14.75 x 6
- **28.75 lb**
  - 25 lb
- **QuickDraw**
  - QuickDraw QuickDraw QuickDraw QuickDraw QuickDraw
- **Cricket Expressions**
  - Cricket Expressions Cricket Expressions Cricket Expressions Cricket Expressions Cricket Expressions
- **Cricket Software**
  - Cricket Software Cricket Software Cricket Software Cricket Software Cricket Software
- **8**
  - 1
- **4 x 4, 5 x 5**
  - 16 x 16
- **9 x 10.5 in.**
  - 8 x 10.5 in.
- **35 outline**
  - none
- **sheets, rolls (paper only)**
  - sheets, rolls
- **A, B, leg. 3, 12 x 18 in.**
  - A, A
- **no key**
  - 100 sheets
- **yes**
  - yes
- **90 days**
  - 90 days

### Contact Information
- Sharp Electronics Corp., Sharp Plaza, System Division, Mahwah, NJ 07430
- Tektronix, Inc., Graphics Printing Division, Wilsonville, OR 97070
- CalComp, 2411 W. LaPalm Ave., Anaheim, CA 92801
- Lasergraphics, Inc., 17671 Cowan Ave., Irvine, CA 92714
- Mitsubishi Electronics America, 991 Knox St., Torrance, CA 90502
the top of the inkjet group and was applauded for the most-brilliant and most-saturated colors of any printer in the lab. The PaintJets had several low rankings, as did the Shinko.

In a Perfect World . . .

No printer can do everything inexpensively and well. An inkjet can't produce proofs as good as a thermal-wax printer's, but it may print better transparencies. A sublimal-dye printer offers the highest image quality but costs a bundle to buy and operate compared with an inkjet.

![Image of printers]

Table 2: Features of Color Printers, continued

<table>
<thead>
<tr>
<th>Model</th>
<th>ColorScript 100 Model 10</th>
<th>Oce Graphics 5232 CPS Color PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>List price</td>
<td>$9,995</td>
<td>$15,990</td>
</tr>
<tr>
<td>Driver software</td>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>Interface</td>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>A-sized paper</td>
<td>2,000 sheets, $125</td>
<td>2,000 sheets, $125</td>
</tr>
<tr>
<td>A-sized transparencies</td>
<td>100 sheets, $125</td>
<td>100 sheets, $125</td>
</tr>
<tr>
<td>Ink or ribbon</td>
<td>two 55-print ribbons, $105</td>
<td>two 55-print ribbons, $105</td>
</tr>
<tr>
<td>Cost per A-sized print</td>
<td>$0.68</td>
<td>$0.73</td>
</tr>
<tr>
<td>Cost per A-sized transparency</td>
<td>$1.17</td>
<td>$1.20</td>
</tr>
<tr>
<td>One-year on-site service contract</td>
<td>$1,269</td>
<td>$1,269 - $1,450</td>
</tr>
<tr>
<td>Hardware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum resolution (dpi)</td>
<td>300 dpi</td>
<td>300 dpi</td>
</tr>
<tr>
<td>Colors</td>
<td>CMY or CMYK</td>
<td>CMYK</td>
</tr>
<tr>
<td>Print-engine manufacturer</td>
<td>Mitsubishi</td>
<td>Sanyo</td>
</tr>
<tr>
<td>Hard-disk drive</td>
<td>20MB, 40MB ($1,595), 40MB ($1,995)</td>
<td>20MB (995), 40MB ($1,495)</td>
</tr>
<tr>
<td>Printer interface</td>
<td>RS-232, RS-422, LocalTalk, Centronics</td>
<td>RS-232, RS-422, LocalTalk, Centronics</td>
</tr>
<tr>
<td>Mac interface</td>
<td>LocalTalk</td>
<td>LocalTalk</td>
</tr>
<tr>
<td>Emulations (other printers)</td>
<td>none</td>
<td>HP-GL</td>
</tr>
<tr>
<td>B-sized version</td>
<td>handles B-sized paper</td>
<td>Model 30, $15,995</td>
</tr>
<tr>
<td>Dimensions (W x D x H [in.])</td>
<td>17 x 24.75 x 11.25</td>
<td>17 x 24.75 x 11.25</td>
</tr>
<tr>
<td>Weight</td>
<td>65 lb</td>
<td>65 lb</td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imaging technique</td>
<td>PostScript</td>
<td>PostScript</td>
</tr>
<tr>
<td>Driver software</td>
<td>LaserWriter 6.0</td>
<td>LaserWriter 6.0</td>
</tr>
<tr>
<td>Driver-software developer</td>
<td>Apple Computer</td>
<td>Apple Computer</td>
</tr>
<tr>
<td>Dither patterns</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Size of dither cell</td>
<td>default, 5 x 5; programmable</td>
<td>3-color, 5 x 5; 4-color, 6 x 6</td>
</tr>
<tr>
<td>Printable area on A-sized paper</td>
<td>8.1 x 9 in.</td>
<td>8.1 x 9 in.</td>
</tr>
<tr>
<td>Fonts</td>
<td>35 resident</td>
<td>35 resident</td>
</tr>
<tr>
<td>Media handling</td>
<td></td>
<td></td>
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<tr>
<td>Delivery</td>
<td>rolls</td>
<td>sheets</td>
</tr>
<tr>
<td>Sizes</td>
<td>A, B</td>
<td>A, legal, A4, special A4</td>
</tr>
<tr>
<td>Tray capacity</td>
<td>no tray</td>
<td>100 sheets</td>
</tr>
<tr>
<td>Accepts plain paper</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty period</td>
<td>1 year</td>
<td>90 days</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Oce/Schlumberger Graphics 385 Raylindale Mountain View, CA 94043 (800) 537-7598 (415) 964-7500</td>
<td>QMS Color Script 100 Model 10 2906 Pass Mobile, AL 36618 (800) 631-2602 (205) 633-1400</td>
</tr>
</tbody>
</table>

*Media only: ink use varies according to image.
*A tractor feed ($290) and cut-sheet feeder ($390) are optional.
*A new driver with 32-bit support should be available when this report is in print.
*A ribbon for printing transparencies costs $340 for 100 prints.

The thermal-wax Mitsubishi G370-10 and sublimal-dye-thermal-transfer Mitsubishi S340-10 (top, left to right) are nearly identical in appearance to the OMS ColorScript 100 Model 1 (bottom).

Three thermal-wax-transfer printers (clockwise from top left): Tektronix Phaser CPS, Tektronix 4683DX Color Image, and Shinko CHC-345.
<table>
<thead>
<tr>
<th>Thermal-Wax Transfer</th>
<th>Sublimal-Dye Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seiko CH-5504</strong></td>
<td><strong>Mitsubishi 5340-10</strong></td>
</tr>
<tr>
<td>Good color range. Poor line resolution. Slow. Compact. Largest print area. Bundled with Adobe Type Manager, Plus Pack, and Emerald City Type Align.</td>
<td>Best print quality. Mediocrec color range. Excellent gradients. No hardware/software interface. Would receive 4.5 mice if interface were included.</td>
</tr>
<tr>
<td>$7,000 - $9,000</td>
<td>$13,995</td>
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<tr>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>one 145-sheet rolls, $30</td>
<td>one 145-sheet rolls, $30</td>
</tr>
<tr>
<td>one 200-sheet roll, $14</td>
<td>one 200-sheet roll, $14</td>
</tr>
<tr>
<td>one 100-sheet roll, $68</td>
<td>one 100-sheet roll, $68</td>
</tr>
<tr>
<td>one 123-print ribbon, $245</td>
<td>one 123-print ribbon, $245</td>
</tr>
<tr>
<td>$0.05</td>
<td>$0.05</td>
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<tr>
<td>$1.17</td>
<td>$1.17</td>
</tr>
<tr>
<td>$500 - $800</td>
<td>$500 - $800</td>
</tr>
<tr>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>one 300-sheet roll, $30</td>
<td>one 300-sheet roll, $30</td>
</tr>
<tr>
<td>one 400-sheet roll, $35</td>
<td>one 400-sheet roll, $35</td>
</tr>
<tr>
<td>one 500-sheet roll, $40</td>
<td>one 500-sheet roll, $40</td>
</tr>
<tr>
<td>one 1000-sheet roll, $50</td>
<td>one 1000-sheet roll, $50</td>
</tr>
<tr>
<td>one 2000-sheet roll, $85</td>
<td>one 2000-sheet roll, $85</td>
</tr>
<tr>
<td>$0.55</td>
<td>$0.55</td>
</tr>
<tr>
<td>$1.56</td>
<td>$1.56</td>
</tr>
<tr>
<td>$3.00</td>
<td>$3.00</td>
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<tr>
<td>$10.00</td>
<td>$10.00</td>
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<tr>
<td>Included</td>
<td>Included</td>
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<tr>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>300 dpi</td>
<td>300 dpi</td>
</tr>
<tr>
<td>CMY or CMYK</td>
<td>CMYK</td>
</tr>
<tr>
<td>Seiko</td>
<td>Sharp</td>
</tr>
<tr>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Centronics</td>
<td>LocalTalk</td>
</tr>
<tr>
<td>-SCSI</td>
<td>Centronics</td>
</tr>
<tr>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>QD 5514, $11,000 - $13,000</td>
<td>CHC-645, $3,000 - $4,000</td>
</tr>
<tr>
<td>included</td>
<td>included</td>
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<tr>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>14 x 17.5 x 8</td>
<td>14 x 17.5 x 8</td>
</tr>
<tr>
<td>16 x 16.25 x 6.5</td>
<td>16 x 16.25 x 6.5</td>
</tr>
<tr>
<td>34.75 x 21.25 x 12.5</td>
<td>34.75 x 21.25 x 12.5</td>
</tr>
<tr>
<td>30 outline</td>
<td>30 outline</td>
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<tr>
<td>no tray</td>
<td>no tray</td>
</tr>
<tr>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>5 rolls</td>
<td>5 rolls</td>
</tr>
<tr>
<td>100 sheets, 50 transparencies</td>
<td>100 sheets, 50 transparencies</td>
</tr>
<tr>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>user, 90 days; dealer, 180 days</td>
<td>user, 90 days; dealer, 180 days</td>
</tr>
<tr>
<td>Seiko Instruments USA, Inc.</td>
<td>Mitsubishi Electronics America</td>
</tr>
<tr>
<td>1130 Ringwood Court</td>
<td>991 Knox St.</td>
</tr>
<tr>
<td>San Jose, CA 95131</td>
<td>Torrance, CA 90502</td>
</tr>
<tr>
<td>(650) 973-4561</td>
<td>(213) 217-5732</td>
</tr>
<tr>
<td>(408) 922-5903</td>
<td>(800) 835-6100</td>
</tr>
</tbody>
</table>

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COLOR: PRINTERS

None can approach the speed of a monochrome laser printer. In general, inkjets are cheaper than thermal-wax or sublimal-dye printers, and QuickDraws are cheaper than PostScripts. Thermal-wax printers produce richer colors than their inkjet and sublimal-dye counterparts, although a sublimal-dye printer turns out the smoothest color gradients. Software is a critical factor in case of use, image and text quality, and speed. Serial interfaces are much slower than parallel ones, and LocalTalk connectors allow fast network access.

The five-mouse color printer doesn’t exist — yet. When it appears, it may use a technology different from that of any of the printers we tested (see the “On the Horizon” sidebar). Until some new technology corner’s the market, however, read through “The Bottom Line” to learn which printer is best for your individual needs.

In the '70s, Phillip Robinson was an R&D engineer; in the '80s, he was an author; and in the '90s, he plans to specialize in beach-office telecommunications. MacUser Labs would like to thank Minolta for its loan of spectrophotometric test equipment, and Bob Klein for his assistance in using it. We would also like to thank Bob Tow of Xerox PARC for sharing his knowledge of color theory.

The Bottom Line

Which is the better team, the San Francisco 49ers or the Oakland A’s? Neither, of course — they’re both champs. Joe Montana could never hit a high, inside fastball, and Jose Canseco would be instantly sacked by a blitzing linebacker. Picking the best color printer is equally nonsensical — don’t ask an inkjet to do the work of a thermal-wax printer, and don’t expect a thermal-wax printer to produce images as smooth as those from a sublimal-dye printer.

You should know the printer’s job description before you head to the store. Weigh the print quality, color accuracy, and speed you need against the price you can pay. For simple presentations — pie-chart transparencies or red text on a spreadsheet — the right inkjet will do just fine. Inkjets cost between $1,400 and $2,500; the least expensive thermal-wax printer, on the other hand, costs nearly $5,000. Our favorite inkjet is the Tektronix ColorQuick ($2,345). It’s fast enough for everyday use, has a good range of paper-feed options, and provides the highest resolution of any inkjet we tested. The ColorQuick almost qualifies as the poor man’s proofing printer. It has bright, vivid colors, and it supports TekColor, Tektronix’s unique screen-to-page color-matching utility.

On the Horizon

As good as color printing has become, it’s certain to get better. Today’s inkjet and thermal-wax printers will continue to evolve, perhaps reaching 600-dpi resolution and certainly running at higher speeds. More sublimal-dye printers are already appearing, with that continuous-tone color printing we like so much (see the “More Color, Anyone?” sidebar). But new technologies — color dry silver, color laser, and Cycolor — are emerging, and they promise even better color images.

Color dry silver is a high-speed, high-resolution, dry-process version of the traditional silver halide technology used in photographic film. Honeywell and 3M are jointly testing it for use in medical imaging, CAD/CAM, and business.

Color laser printing is based on the same technology as its monochrome counterpart, except that most color lasers run each page through the entire process four times, each time with tone of a different color. This repetition demands superb registration to assure precise color overlays. Color lasers have been in the news for several years but haven’t yet reached the personal-computer market. Kodak’s ColorEdge cranks out 17.5 pages per minute, weighs more than a thousand pounds, and costs more than $100,000. Canon’s $42,500 CLC 500 color laser copier can accept input from video cameras, a computer, or its own flatbed scanner. It prints at 400 dpi and has color-remapping software and its own graphics tablet. Sharp, Xerox, Konica, and Ilford are also in this market, along with a small firm called Colorcopy that’s working on a one-pass, 300-dpi model.

Cycolor comes from Mead Imaging. A donor ribbon coated with millions of photosensitive cylihts — microcapsulated dye balls — is exposed to light and then pressed against the page. Exposed cylihts squeeze their color onto the page; unexposed cylihts remain dormant. Because the cyliht dyes can be mixed in precise proportions and are translucent, Cycolor can create near-photographic-quality prints with the shine of offset or sublimal-dye printing. The Cycolor process will probably make a first appearance in color copiers from firms such as Brother and Noritsu.

— Phillip Robinson

Proofs and sophisticated presentations call for better quality than an inkjet can provide. For complex drawings and colorful pictures, you’ll need a thermal-wax printer. If your pages contain text, you need PostScript, Freedom of Press, or at least a QuickDraw enhancer such as MacRascal. The QMS ColorScript 100 Model 10 ($9,995) met with stiff competition, but its unparalleled ease of installation and use helped it edge out the other thermals. The ColorScript is fast, includes PostScript, and consistently scored near the top in our print-quality tests.

For the best possible proofs, you should consider moving up to a sublimal-dye printer. The Mitsubishi S340-10 ($13,995) is expensive to operate and not as easy to set up and use as the ColorScript, but it was the clear winner of the print-quality competition. For proofs, the ColorScript — with its speed and PostScript compatibility — may be the more logical choice, but we admit to being seduced by the beautiful output of the Mitsubishi S340-10.
A DRIVE

Infinity Optical...
600MB rewritable cartridge with a 25-year warranty!
Need to store large amounts of data reliably, quickly and safely? Need to move it from computer to computer, city to city? Do you work with graphics, multimedia, databases, sound, scientific data or networks? If you answered yes to any of the above questions, buy an Infinity Optical. Fast, rewritable and economical, it's the best solution for your high-capacity storage needs.

IS A DRIVE,

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45MB removable cartridges are powerful and convenient
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IS A DRIVE...

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200 and 250MB 3.5" drives will unleash your Mac
New standards are being set for high-capacity hard drives, and PLI is setting them. Our 200 and 250MB drives boost your Mac storage capacity and offer a 3.5" form factor with a 100,000 hour MTBF. Like all PLI products, they're very fast, high-performance drives with long-term reliability and are surprisingly affordable.

OR IS IT?

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Casady and Greene's security program keeps your data safe!

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Silent fans, durable, attractive construction, and pedestals for vertical mounting. PLI drives are built with the finest components, and undergo rigorous pre-ship testing.

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This is not just another display clone. It's the new Magnavox Analog Color (MAC) display, specifically designed and engineered to complement the Macintosh II system.

When we decided to develop a display exclusively for the Macintosh II, we started with two objectives: Make it work better, and make it cost less.

Our 14" MAC display appeals to even the most discriminating user. It's equipped with our new proprietary 0.29mm dot pitch CRT for superb resolution, and a glossy CRT face for crystal clear images. Graphics and text on the MAC display shine at their best. The integrated tilt-base provides the ultimate in user comfort.

Additionally we offer a solid, two-year warranty instead of the usual 90 days. And the $699 retail makes this a great value.

Designing a superior display for the Macintosh II system was smart. Offering it for $300 less, that's very smart.
We need your help. We'd like to know what's on your mind. What issues and technologies will shape the 1990s? Is multimedia for real? What about Windows? What do you think Apple is doing right, and what could it do better? And what's MacUser doing right — and what changes would you like to see?

The following survey will help us gauge the issues that you — our readers — are most concerned with. Your answers will help us provide the Macintosh coverage you need. We'll also report our findings from the survey in a future issue of MacUser and pass your comments on to Apple Computer — so this is also your chance to be heard by the folks in Cupertino. To stand up and be counted, just photocopy the survey and return it to us by June 30, 1990.

Hey, we know how easy it is to forget to send back those magazine sweepstakes forms to Ed McMahon, and we wouldn't dream of asking you to do something for nothing. So thanks to the generosity of Microsoft Press, ten lucky winners, randomly selected from all responses, will receive a complete library of ten Macintosh books. They include the new edition of Ted Nelson's Computer Lib/ Dream Machines, the irrevocable classic that — more than a quarter century ago — pointed the fledgling computer industry toward concepts and problems that are still unfolding; The Big Chip by W. R. Philbrick and Bruce Jensen, the world's first "technographic" novel; and eight other books that will boost your productivity in word processing, spreadsheet, desktop publishing, and more.

It's an instant Mac library worth more than $200, containing well over a million words. And it's our way of saying "Thanks a million" for sending your survey in. Send your responses to MacUser Reader Survey, 950 Tower Lane, 18th Floor, Foster City, CA 94404, by June 30, 1990.

This survey contains three groups of questions about Macintosh products and companies, how you use your own Mac, and how you feel about MacUser.

### About the Macintosh

**Support and Service**

Prices, features, and benchmarks tell only part of the story. For each of the following product categories, note whether or not you use a product in that category and, if you do, name the company that you feel provides the best after-sale support:

<table>
<thead>
<tr>
<th><strong>Business Software</strong></th>
<th><strong>Use</strong></th>
<th><strong>Don't Use</strong></th>
<th><strong>Company That Provides Best Support</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Database</td>
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<tr>
<td>Integrated software</td>
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</tr>
<tr>
<td>Personal finance</td>
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</tr>
<tr>
<td>Project management</td>
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<td>0</td>
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</tr>
<tr>
<td>Spreadsheet</td>
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<td>0</td>
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</tr>
<tr>
<td>Word processor</td>
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</tr>
<tr>
<td>Word processor add-on</td>
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<thead>
<tr>
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<th><strong>Don't Use</strong></th>
<th><strong>Company That Provides Best Support</strong></th>
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<tbody>
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<td>DTP utility</td>
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<td>Page layout</td>
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<td>Painting</td>
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</tr>
<tr>
<td>Typography</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>
**Reader Survey**

**Support and Service**

Prices, features, and benchmarks tell only part of the story. For each of the following product categories, note whether or not you use a product in that category and, if you do, name the company that you feel provides the best after-sale support:

<table>
<thead>
<tr>
<th>Technical Software</th>
<th>Use</th>
<th>Don't Use</th>
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</thead>
<tbody>
<tr>
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<td>CAD</td>
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<tr>
<td>Network management</td>
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</tr>
<tr>
<td>Programming tool</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Simulation/Statistical analysis</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Telecommunication</td>
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<td></td>
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<table>
<thead>
<tr>
<th>Other Software</th>
<th>Use</th>
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</thead>
<tbody>
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<tr>
<td>Multimedia</td>
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<td>Music</td>
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<td>Presentation</td>
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<tr>
<td>Stackware</td>
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<td></td>
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<tr>
<td>Utility</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other software</td>
<td></td>
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<table>
<thead>
<tr>
<th>Output Hardware</th>
<th>Use</th>
<th>Don't Use</th>
<th>Company That Provides Best Support</th>
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</thead>
<tbody>
<tr>
<td>Laser printer</td>
<td></td>
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<tr>
<td>Monitors/display system</td>
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<tr>
<td>Nonlaser printer</td>
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<thead>
<tr>
<th>Input Hardware</th>
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<th>Company That Provides Best Support</th>
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<td>Graphics tablet</td>
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<td>Keyboard</td>
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<td>Mouse</td>
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<td>Scanner</td>
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<th>Storage Media</th>
<th>Use</th>
<th>Don't Use</th>
<th>Company That Provides Best Support</th>
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<tr>
<td>CD-ROM drive</td>
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<td>Erasable-optical drive</td>
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<td>Hard-disk drive</td>
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<tr>
<td>Removable medium</td>
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<table>
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<tr>
<th>Communications Hardware</th>
<th>Use</th>
<th>Don't Use</th>
<th>Company That Provides Best Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fax modem</td>
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<tr>
<td>LAN</td>
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<tr>
<td>Mac-to-mainframe hardware</td>
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<td>Mac-to-PC hardware</td>
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<tr>
<td>Modem</td>
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<tr>
<td>Networking board</td>
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<table>
<thead>
<tr>
<th>Miscellaneous Hardware</th>
<th>Use</th>
<th>Don't Use</th>
<th>Company That Provides Best Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator board</td>
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<tr>
<td>Accessory</td>
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</table>
Product Design

Have you ever found yourself feeling that a great hardware or software product is missing one little feature that would make your life a lot easier — but nobody seems to have thought of it? If you’ve got a wish list of features that are missing from any of these product categories, write them in:

The feature(s) I’d like to be added would do the following:

<table>
<thead>
<tr>
<th>Business Software</th>
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</thead>
<tbody>
<tr>
<td>Accounting</td>
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<tr>
<td>Database</td>
<td></td>
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<tr>
<td>Integrated software</td>
<td></td>
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<tr>
<td>Personal finance</td>
<td></td>
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<tr>
<td>Project management</td>
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<tr>
<td>Spreadsheet</td>
<td></td>
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<tr>
<td>Word processor</td>
<td></td>
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<tr>
<td>Word processor add-on</td>
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<table>
<thead>
<tr>
<th>DTP Software</th>
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<tbody>
<tr>
<td>Charting</td>
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<tr>
<td>Clip art</td>
<td></td>
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<tr>
<td>Drawing</td>
<td></td>
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<tr>
<td>DTP utility</td>
<td></td>
</tr>
<tr>
<td>Page layout</td>
<td></td>
</tr>
<tr>
<td>Painting</td>
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<table>
<thead>
<tr>
<th>Technical Software</th>
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<tbody>
<tr>
<td>AI/Expert system</td>
<td></td>
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<tr>
<td>CAD</td>
<td></td>
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<tr>
<td>Network management</td>
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<tr>
<td>Programming tool</td>
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<tr>
<td>Simulation/Statistical analysis</td>
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<tr>
<td>Telecommunication</td>
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<table>
<thead>
<tr>
<th>Other</th>
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<tbody>
<tr>
<td>Music</td>
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<tr>
<td>Music</td>
<td></td>
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<tr>
<td>Presentation</td>
<td></td>
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<tr>
<td>Stackware</td>
<td></td>
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<tr>
<td>Utility</td>
<td></td>
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<tr>
<td>Other</td>
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</tbody>
</table>
### Future Shock

The Mac marketplace is full of buzzwords. Which of the following emerging applications and technologies are passing fads, and which are The Next Big Thing(s)?

<table>
<thead>
<tr>
<th>Issues and Trends</th>
<th>Never Heard of It</th>
<th>Just a Fad</th>
<th>Not Real Yet</th>
<th>Need More Information</th>
<th>Will Make a Real Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/UX</td>
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<tr>
<td>Color applications</td>
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<tr>
<td>Connectivity</td>
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<tr>
<td>Desktop presentations</td>
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<tr>
<td>Font wars</td>
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<td>&gt;300-dpi output</td>
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<tr>
<td>Groupware</td>
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<td>Hypertext</td>
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<tr>
<td>Laptops</td>
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<tr>
<td>Mac-based workstations</td>
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<td>Mac/PC detente</td>
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<tr>
<td>Multimedia</td>
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<tr>
<td>PostScript clones</td>
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<tr>
<td>Prepress applications</td>
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<tr>
<td>System 7</td>
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<tr>
<td>Windows</td>
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<table>
<thead>
<tr>
<th>Technologies</th>
<th>Never Heard of It</th>
<th>Just a Fad</th>
<th>Not Real Yet</th>
<th>Need More Information</th>
<th>Will Make a Real Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-ROM</td>
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<tr>
<td>Read/write optical storage</td>
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<tr>
<td>RISC</td>
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<tr>
<td>NeXT</td>
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</tbody>
</table>

### If I Ran Apple...

Like all multibillion-dollar companies, Apple has to balance all the different concerns of its diverse customers (as well as its stockholders). If you were appointed CEO of Apple Computer, how concerned would you be about the following consumer criticisms? (Feel free to write in your solutions.)

<table>
<thead>
<tr>
<th>Consumer Criticisms</th>
<th>Not a Big Deal</th>
<th>Serious Problem</th>
<th>Hopeless</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices getting too complex</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Competition from NeXT</td>
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<tr>
<td>Competition from OS/2</td>
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<tr>
<td>Competition from Windows</td>
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<tr>
<td>Dealer-network problems</td>
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<tr>
<td>Dueling font standards</td>
<td></td>
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</tr>
</tbody>
</table>
Dueling PostScript clones  
Excess of CPU choices  
High CPU prices  
High peripheral prices  
Inadequate warranties  
Lack of CPU choices  
Lack of technological innovation  
Obsolete System software  
Slowness of CPUs  
Third-party-software conflicts  

About Yourself

Approximately how many Macs are at your work site?  

Do you consider yourself a:
○ Novice  ○ Hacker/developer  
○ Power user  ○ Guru  

I use my Mac ○ at home ○ at work ○ both  

I use my Mac about _____ hours in an average week.  

How many people do you personally assist or advise in:  
_____ Mac product selection  
_____ Mac product troubleshooting  
_____ Mac product training  

Is your Mac part of a network?  
○ Yes ○ No ○ Don’t know  

If “Yes,” which of these do you use on your network:  
○ Color printer  ○ Laser printer  
○ E-mail  ○ Modem  
○ Fax modem  ○ Multiuser database  
○ File server  ○ Nonlaser printer  
○ Groupware software  ○ Plotter  
○ Remote-access software  ○ Scanner  

What non-Mac CPUs are also on your network  
(check all that apply):  
○ Apollo  ○ Silicon Graphics  
○ Apple II family  ○ Sun  
○ Mainframe  ○ VAX  
○ NeXT  ○ Other CPU: ________  
○ PC-compatible  ○ Other CPU: ________  

The Mac I use most often is a (check one):  
○ Mac Plus  ○ Mac Ilcx  
○ Mac SE  ○ Mac Ilci  
○ Mac SE/30  ○ Mac Portable  
○ Mac II  ○ Other Mac  
○ Mac IIX  ○ specify: ________  

The Mac I use most often has ______ megabytes of memory, a ______-megabyte hard-disk drive, and a color/monochrome/gray-scale (circle one) display system.  

Do you belong to a Mac user group?  
○ Yes ○ No
Reader Survey

About MacUser

How useful are each of the following in helping you make buying decisions about products covered in MacUser:

<table>
<thead>
<tr>
<th>Not Useful</th>
<th>Somewhat Useful</th>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Eddy awards</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Capsule reviews</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Feature-comparison tables</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Graphics</td>
<td>○</td>
<td>○</td>
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<tr>
<td>In-depth evaluations</td>
<td>○</td>
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<tr>
<td>Lab benchmarks</td>
<td>○</td>
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<tr>
<td>MiniFinders</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Mouse ratings</td>
<td>○</td>
<td>○</td>
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<tr>
<td>“On the Horizon” sidebars</td>
<td>○</td>
<td>○</td>
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<tr>
<td>“The Bottom Line” summaries</td>
<td>○</td>
<td>○</td>
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</tbody>
</table>

List any topics you’d like to see a special in-depth report about in a future MacUser issue:

What sections of MacUser do you like best?

<table>
<thead>
<tr>
<th>Read it first</th>
<th>Always read it</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisements</td>
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<tr>
<td>Beating the System</td>
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<td>Bridges</td>
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<tr>
<td>Case studies</td>
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<tr>
<td>Columns (especially ________)</td>
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<td>DTP</td>
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<td>Features</td>
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<td>Help Folder</td>
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<td>Lab reports</td>
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<td>Letters</td>
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<td>MiniFinders</td>
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<tr>
<td>Special reports</td>
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<tr>
<td>Tip Sheet</td>
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</tbody>
</table>

Send your responses to MacUser Reader Survey, 950 Tower Lane, 10th Floor, Foster City, CA 94404, by June 30, 1990.

(You may respond anonymously, but you will not be included in the drawing for the Microsoft Press Mac library.)

Your responses will be treated confidentially. If you don’t mind being quoted in print for a future MacUser summary of these findings, please check the box below and sign and date this form.

( ) You may quote me in MacUser’s summary of this survey.

Name ____________________________________________
Address ____________________________________________ Phone (optional) __________

Signature __________________________________________ Date __________
Now you can travel from here to there with twice the horsepower.

Getting from your Macintosh to virtually any fax machine in the world is now a lot faster.

Because the new 9600-bps Abaton InterFax 24/96 gets your message across twice as fast as before. And since the InterFax software compresses the file before sending it out, you spend even less time faxing than with any other 9600-bps fax/modem.

But we didn't just double the raw output speed, we made it easier to use. We included direct scan support, so you can fax art and photos straight from the scanner with excellent resolution. We also made the software easier to use — it's as simple as printing to any printer. And we made the InterFax work in background (with or without MultiFinder), so you can get back to work while your Mac faxes. You can even schedule when faxes are sent to take advantage of lower phone rates.

As an added plus, the new InterFax also works as a 2400-bps Hayes-compatible data modem with MNP 5 error correction. All these features together made MacUser name the InterFax 24/96 the best communication product of 1989.

If you want to get from here to wherever with twice the horsepower, call Abaton at 1-800-444-5321, or fax a note and your business card to (415) 683-2956. The new InterFax 24/96 will make your ideas easier to publish. Anywhere.

Introducing the Interfax 24/96

Please circle 80 on reader service card.
WIZ is an exciting new productivity tool. It combines the easy-to-use features of a mouse with the power of an intelligent graphics pad to enhance every pointing, tracing and drawing function you do.

And it gives most Mac and PC users a short cut through tedious keystrokes and menu picking steps. So it's easier for new computer users to learn both the system and the software. While experienced users immediately become more productive, powerful and creative.

But the most amazing thing about WIZ is that you get it all for a suggested retail price of under $250.

**Features/Benefits**

6 programmable functions. The three WIZ mouse rocker buttons allow you the flexibility and convenience to program up to four different commands or macros. Two others control your mouse and template clicks.

Speed. WIZ eliminates the need for scrolling through multiple on-screen menus or remembering the many keyboard commands used by software packages. Programmable buttons and templates allow instant access to commonly used software commands.

Pinpoint accuracy. WIZ is the most accurate mouse system on the market, with 1000 dots per inch (dpi) resolution, compared to as much as 400 dpi offered by other mouse manufacturers. The very high accuracy of the pad, combined with the cross-
Who can use WIZ?

Anyone who is now using a mouse or thinking about using one including:
- Business professionals can use WIZ with all their applications to help save time when creating presentations and business forms, including spreadsheets and graphics.
- Graphic artists can use WIZ to assist with the creation of simple to sophisticated designs and graphics.
- Electronic publishers, both professional and occasional, can use WIZ to help speed the creation of a variety of professional-looking documents such as newsletters, flyers, pamphlets and stationery.
- Engineers and architects can use WIZ as a CAD tool for conceptual designs and technical drawings.
- Writers and journalists can use WIZ to assist in the creation of articles, manuscripts or stories.

WIZ Software Application Templates

Enhance productivity. When you want speed and power, use the WIZ mouse or pen and intelligent pad with a template. WIZ comes with a standard template for your computer’s operating system. Plus there’s a variety of optional templates for the most popular software packages, which makes using packages quick and easy.

Easy to use. The color-coded templates come complete with easy to install software and instructions.

Templates

Over 35 optional software templates are available for most IBM and Apple packages, including:
- Aldus PageMaker
- WordPerfect
- Harvard Graphics
- Microsoft Excel
- Claris MacDraw II

Availability and Support:

See WIZ today at your local computer store or dealer.

If your dealer doesn’t have WIZ in stock, he can order it through our distributor Ingram Micro D by calling 800-456-8000.

For product information on WIZ call CalComp at 800-456-5888.

© 1990 CalComp Inc. WIZ and the WIZ logo are trademarks of CalComp. All product names and logos are trademarks or registered trademarks of their respective owners. For Canadian distribution call CalComp at 800-458-5888. Prices outside the continental United States will vary.

Everything else is just a mouse!

Please circle 48 on reader service card.
The Mac pioneered acceptance of a graphical user interface, but people forget that from the very beginning there’s been sound to go along with those pictures.

Ever since the Mac II debuted with a choice of beep sounds, average users have been incorporating sound into their systems. HyperCard scripts, in particular, have added sound effects to everything — from Cosmic Osmo to training stacks.

The importance of sound for the future has not gone unnoticed. Apple has developed a device-independent AIFF (Audio Interchange File Format), which should see a lot of use in the future. System 7 is also rumored to have big changes in sound management.

But there’s no need to wait for these projected developments any longer. You can start working with sound now, using inexpensive hardware and software, and achieve results that would have been the exclusive domain of professional sound designers just a few short years ago. Whether you want to enhance a HyperCard training stack or just add a little pizzazz to your own Mac, sound is one area in which a small investment in time and money can pay big dividends.

What You Need to Know

When you work with graphics on the Mac, your data is in the form of pictures. When you work with sound, your data is in the form of samples. A sample is simply a digitized representation of a sound, much as a movie is a sequence of individual pictures that create the illusion of motion. Similarly, a sample is made by taking many different audio “snapshots” and stringing them together. It’s the same basic process used in digital recording and mastering to create compact discs.

Figure 1 shows how a sound is translated...
into sampled numeric data that the Mac understands.

As with motion pictures, the more snapshots you take, the more information you capture, and the more realistic the end result. The sampling rate is expressed in kilohertz, which means thousands of cycles per second. A 22-kilohertz sample, then, is recorded at 22,000 cycles per second. The more cycles per second, the more realistic the sound. And the higher the sampling rate, the more data you have, which means bigger files.

Figure 2 shows the trade-off between fidelity and file size that you can expect at different Mac sampling rates. For technical reasons, you always have to sample a sound at a rate equal to at least twice the highest frequency that you want to play back. Thus, a 22-kilohertz sample (which is the best a Mac can do without the addition of extra hardware such as Digitool’s Audiomedia board for the Macintosh II family) translates to about 11 kilohertz as heard by the human ear. (The upper limit of human hearing is around 20 kilohertz.) When you record samples at a lower kilohertz setting, you lose the high-frequency subtleties of the sound—the stuff that distinguishes hi-fi from medium-fi.

Sampled sound on the Mac shares something else with graphics: a number of different and sometimes incompatible formats. You should know about the following three types: standard snd resources, which are what Mac users with System 6 use to turn their beep into monkey’s chatter or a clink-clank; HyperCard snd resources, which are in a different format than System snd resources and must be converted before they’ll work; and finally, sound captured as data instead of as a resource. The latter format is the one Farallon Computing’s SoundEdit program uses automatically to save sounds, although it can also save them as resources. Because the most popular shareware program for handling such data files is Bruce Tomlin’s SoundMaster, we’ll refer to them as SoundMaster files.

You can standardize the format of sound files by converting from one type to another. Table 1 shows what you need to perform conversions. The table is based on information from a HyperCard stack by Bob Caceres of The Boston Computer Society. This stack is part of a complete SoundUtils package that also includes copies of all the shareware programs you need to work with sound. See the “Shareware Resources” sidebar to find out where to get individual utilities or the entire package.

**Sound Devices**

If you want to edit sounds or capture your own, the place to start is with Farallon Computing’s MacRecorder and its accompanying software (see “StartUp” January ’90 for a review). Because MacRecorder uses your Mac’s available memory for sampling, you’ll want 2 or more megabytes of RAM. It might get tight with only 1 megabyte—samples must fit into memory to play. The amount of memory you have determines the maximum length of time you can record.

---

*By Craig O’Donnell*
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any one sound: when you run out of RAM, your time’s up. So be sure to boot with MultiFinder off.

A hard disk helps too. A 20-second sample that was recorded at 22 kilohertz will eat up 400K of disk space. That’s why HyperCard stacks containing sound resources grow big so quickly.

Finally, use HyperCard 1.2.1 or later for stacks that feature sound. Version 1.0 is notorious for crashing during sample playback.

The MacRecorder consists of three parts: the sampler proper, which is a mouse-sized digitizer with a built-in microphone plus inputs for external sources; the SoundEdit application for sophisticated sample editing; and two stacks, HyperSound and HyperSound ToolKit, for creating and manipulating samples in HyperCard.

SoundEdit’s interface beats that of many professional sound applications, and it’s intuitive enough that you can get started without reading the manual first. But the documentation is so good you
Table 1: Moving Sounds from Ear to There

<table>
<thead>
<tr>
<th>Convert from snd (HyperCard resource) . . .</th>
<th>Convert from snd (System resource) . . .</th>
<th>Convert from data (SoundMaster) . . .</th>
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<td>. . . to snd (HyperCard resource)</td>
<td>use ResCopy XCMD, Apple's HyperCard</td>
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<tr>
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<td>utility that simulates Font/DA mover</td>
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<td>. . . to snd (System resource)</td>
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<td>. . . to data (SoundMaster)</td>
<td>use Sound Leech</td>
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<td>the sound files in and out of your</td>
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<td>folder with the Finder</td>
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</table>

Although no public-domain software can perform this conversion, you can convert the System and to a HyperCard snd and copy it to a HyperCard stack. Then convert the newly created HyperCard snd resource to a SoundMaster-compatible sound file.

Table based on Bob Caceres’ Sound Utilities stack.

could use it to make SoundEdit an excellent learning lab.

SoundEdit handles both sound data files and snd resources. The graphic waveform display conveys a lot of information, and you’ll soon learn to recognize the beginnings and endings of syllables, drumbeats, and other reference points.

Each sample may be played in full or in part, and the standard Macintosh click-drag and Cut, Copy, and Paste editing lets you manipulate pieces of sound. The Effects menu contains a long list of sonic modifiers such as echo, backwards, and bend. Some are useful and others are useless, but all are easy to try. And they’re all undoable. (For more about SoundEdit’s effects, see “Can We Talk?” June ‘88).

Other Hardware

MacRecorder comes with an internal microphone, but it’s nothing to write home about. You can dramatically improve the quality of your own live sampling if you invest in a better microphone and plug it into the Mic jack on the MacRecorder.

By the same token, the Macintosh’s internal speaker doesn’t even rate a...
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Based on the information provided, this page seems to list various accessories, drives, and software related to Macintosh systems. The items listed include hardware components such as toner cartridges, keyboard covers, and memory upgrades, as well as software products like Adobe Photoshop and MacStack drives. The page also promotes software from companies like CE Software, QuickMail 2.0, and ResumExpert.

In the top left corner of the page, there is a notice about checking our prices for better deals, with additional information about overnight delivery for $7. Additionally, there is a mention of a price of $1,875 for an Infinity Turbo Dual 40 Meg. The right side of the page contains information about the availability of hotlines and technical support services for 8AM - 6PM EST.

Overall, the page appears to be a comprehensive resource for Macintosh users, offering a wide range of products and services to enhance their computing experience.
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POWER TOOLS

Tips for Great Sound

As you work, use a reference monitor so you hear exactly the same nuances that the members of your audience will. In other words, if they’re going to hear your work on the Mac’s internal speaker, use the Mac’s speaker as you sample and edit. Never make final decisions on output based on listening to speakers that are better than those your audience will hear.

Using the best audio source you can, match the sampling rate to the sound’s overall quality; otherwise you’re wasting disk space and risking creating unintelligible sound.

Always start samples cleanly. Delete dead air. In a 22-kilohertz sample, a half second of silence uses as much space as a half second of music: 11K. A good rule of thumb: When you look at the beginning and ending of your sample under high magnification, the wiggly waveform should be at zero. If it isn’t, you’ll hear a click.

If there’s a click or pop in the middle of a sample (such as when you’re sampling from a scratched record), you can usually isolate it by selecting and listening until you can position your cursor a tiny bit ahead of the click on the waveform. The click will look like a spike — select and delete it.

Your sounds will seem much more natural if they don’t begin or end with a click. To avoid clicks, choose a little bit of the end of the sound, and fade to zero with the Envelope; fade from zero at the beginning of a sound.

The Sounds of Music

If you’re recording music, stick with either 11 kilohertz or 22 kilohertz. (If the source is the absolute pits — a cassette recording of a phone call, for instance — 7 kilohertz is OK.) Any tonality lost at 11 kilohertz is repaired in disk space, because your files will be smaller. Keep in mind that the tonal balance of an 11-kilohertz sample best matches the internal speaker’s tone.

When the sampling rate is too low and the sound you’re recording contains a lot of treble, a peculiarly digital distortion called aliasing can occur. It sounds like a lot of crystal chimes and musical saws making noise far away as the sample plays. At the 5- and 7-kilohertz rates, sampling music often leads to this kind of distortion. To avoid it, sample at 22 kilohertz and employ file compression, a SoundEdit option that lets you reduce the amount of disk space used to store a sound while experiencing only a slight loss in audio fidelity.

If you’re using a prerecorded source, don’t record with a microphone. Always connect your music source to the Line jack on the MacRecorder; this is called “going direct,” and the results are well worth it. All you need to make the connection is a patch cord with the right plugs on either end.

Hearing Voices

Voices vary incredibly in timbre and frequency. To capture them accurately, use a master 22-kilohertz sample, and then downsample to 11-kilohertz and 7-kilohertz files (down-sampling is when you take a sample recorded at one frequency and use SoundEdit’s Mixer option to convert it to a lower frequency). Then see which is most acceptable.

If you can tape a voice before you tape the rest of your sounds, do so. If not, have the speaker enunciate slowly and loudly, without shouting, keeping the microphone three to six inches from the mouth. Do as many takes as you need to get it right, because you might not be able to fix it later.

Shareware Resources

Even without MacRecorder and SoundEdit, you can get your Mac to sound off. The nation’s private bulletin boards, on-line services, and user-group disk libraries can provide you access to a zillion bytes of sound bites from TV, movies, and songs.

Once you’ve got some sounds, you can take advantage of the wealth of sound-utility programs available as shareware. The easiest way to collect them all is to obtain Bob Caceres’ Sound Materials package, which includes his own Sound Utilz stack, copies of the five shareware programs listed below, and several samples. You can get a copy through MacServe on-line service (log on to CompuServe and type GO MACUSER) or by mail through BCS-Mac (48 Grove St., Somerville, MA 02144 (617) 625-7080). Boston Computer Society members, $4; others, $10; add $3 postage and handling to each order. Bob’s stack is free; he just asks that you pay your shareware fees to Ricardo and Bruce, the other shareware developers represented in the Sound Materials package.

ResCopy XCMD, an Apple utility written by Steve Muller, is not part of the Sound Utilz package but is available from most on-line services.

Shareware Resources

Sound Leech: Converts and resources to SoundMaster format.
Robert S. Mason, Jr.
157 Sutton Road
Lebanon, NJ 08833
Shareware

SoundMaster: A cdev that lets you assign sounds to system events such as Reset, Beep, and Shut Down.
Bruce Tomlin
15801 Chase Hill Blvd., #109
San Antonio, TX 78256
Shareware, $10

Sound Mover: Moves snd resources and from files. Designed to look and work like FONITCH. The best approach? Make a master 22-kilohertz sample, and then downsample to 11-kilohertz and 7-kilohertz files (down-sampling is when you take a sample recorded at one frequency and use SoundEdit’s Mixer option to convert it to a lower frequency). Then see which is most acceptable.

Sound->snd 1.2e: Converts SoundMaster-type files to snd resources.
Riccardo Ettore
67 Rue de la Limite
1970 W-Oppe
Belgium
Shareware, $20

SuperPlay 4.0: Plays sounds and resources on various sampling speeds. Can play every sound, even if it has a sample position.
John Raymonds
21738 Barbara St.
Torrance, CA 90503
Shareware

black-and-white postcard. Using a minia-
Carbon Copy Mac is a remote control software package for the Macintosh. It allows one Mac to remotely access and operate another Mac's peripherals, screen, keyboard, and mouse.

Carbon Copy by Microspan Software. $119.00

This new object-oriented series is like having your own accounting construction set. Design your own invoices in the A/R and track the customers, reps, territories and items.

Composets AR by Satori. $369.00

Transfer files over AppleTalk™ in a Flash! Sending to individuals or groups is fast—just by dropping the files into folders! Unlimited users per AppleTalk zone.

Flash by Beagle Bros. $119.00
A desk accessory in three volumes, uses PostScript in your laser printer to create text, 2D and 3D effects on your color screen. Each volume contains 15 effects.

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Need to create letters from spreadsheet data? Here's a mail-merge macro that prints form letters from a Full Impact database.

By John Rizzo

Figure 1: This short FullTalk macro turns the spreadsheet program Full Impact into a simple mailing-list manager.

```
Macro
{
; Define which row database starts at.
Current_Row := 2
;
; Create the named ranges for text substitution. Use your own field names.
; Cell number is the first cell in each field column.
Add_range("Name",A2)
Add_range("Number_Macs",B2)
Add_range("Number_PC",C2)
;
; Print form letters for all rows until the current cell in column A is empty.
; The 1 refers to column A but can be changed to any column in your database.
While ~Isnull(Cell(1,Current_Row))
{
; Modify the named range to correspond to the same column,
; but reflect the correct row. Numbers 1, 2, & 3 refer to columns.
Modify_range("Name",Cell(1,Current_Row))
Modify_range("Number_Macs",Cell(2,Current_Row))
Modify_range("Number_PC",Cell(3,Current_Row))
;
; Print the form letter
Print_one(1,1,1,1)
;
; Next row (if any)
Current_Row := Current_Row + 1
}
;
; Clean up when done
Remove_range("Name")
Remove_range("Number_Macs")
Remove_range("Number_PC")
}
```

Figure 1: This short FullTalk macro turns the spreadsheet program Full Impact into a simple mailing-list manager.
Security & Virus Protection
Logs software & hardware activities
Protects against illegal copying
Prevents launching of unauthorized programs
Multiple levels of Users with individual/group access controls
Specific Desk Accessory Control
Multiple encryption/password options

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This macro generates form letters.

But even without XMacros, FullTalk macros let you add functionality to your software. Here’s an example of what even a simple FullTalk macro can do. With just a dozen lines of code, this mail-merge macro by Dylan Ashe of Ashton-Tate automatically generates form letters addressed to different people and fills in the data pertinent to each person.

This macro works as follows:
1. Figure 2 shows a sample letter and database that work with the example code given in Figure 1. Select a range of cells, go to the Draw menu, choose Paragraph, and start typing. You'll need to put double less-than and greater-than signs ($<$ and $>$) around your field names, which are typically column headings.

2. Select New Macro from the Macro menu, and type in the code in Figure 1 (you can omit lines following the semi-colons, as they're comments only). This macro applies to the example shown. To customize it, change the type in italics to fit your database.

3. To print your letters, select Run Macro from the Macro window.

Figure 2: Full Impact’s FullTalk macro language enables you to take this form letter and print a copy for each selected record in your database.
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WinMark Copiers

Profitability by division

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<td>119%</td>
</tr>
</tbody>
</table>
it's been changed in Microsoft Excel.

To insure data integrity, we've even built in alerts that will warn you of such grievous errors as circular references. In fact, Microsoft Excel is so bright, it will actually review your worksheet and flag any formulas that don't fit an established pattern.

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TO: Shannon Pitts
FR: Peter Cohen
DT: November 13th, 1989
RE: Presentation to the Board

In preparation for the annual meeting, I've created a 20-minute slide presentation on our successful entry into the small printer market.

The presentation will explain to the shareholders that, on a basis of sound marketing strategy, reinforced with our knowledge of the printer business at other levels, we have been able to grow from a 2 percent share of market to 9 percent in 18 short months.

To the right is an excerpt of the presentation which illustrates our growth. Anticipated concerns will probably center around quality of service and the ability to meet market demand over the next year.

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That's right. For the third year running, the readers of Macworld magazine have voted the Kensington Turbo Mouse® “Best Input Device” for Macintosh computers. Who were the contenders? Every other trackball and mouse on the market. (Not to mention joysticks, keyboards and graphics tablets.) The winning secret? Simple.

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Data Space Exploration

The problem is easy to state: You need to be able to locate information in files as quickly as possible. But Apple hasn’t addressed that need in the present file system, and apparently it doesn’t intend to in the next.

The file system is that part of the system software that keeps track of files. Apple did replace the original Macintosh File System with the Hierarchical File System — a marked improvement — and will be adding some powerful file-handling features in System 7. But will these features allow you to locate information in files as quickly as possible? Don’t count on it. Take heart, though. Many minds are working on the problem, and they’re coming up with a variety of solutions — one of which you can put to use right now.

First a look to the future. Some feel that before long, the very notion of a file system may become obsolete. Ted Nelson, originator of the term hypertext and a deep thinker about information handling, has for decades denounced “the tyranny of the file.” The file, he argues, is an arbitrary encapsulation of data that serves chiefly to hide information. Nelson’s vision of universal hypertext would provide sophisticated access directly to the text, without the interference of files.

In spite of Nelson’s complaints, it’s obvious that files do serve a purpose. We need some sort of encapsulation of data to avoid being overwhelmed by information, but it needn’t be an arbitrary encapsulation. One approach to non-arbitrary data encapsulation is object-oriented design. Object-oriented interface design (directly manipulable objects) is at the heart of the Mac desktop metaphor, and object-oriented databases are making inroads at the high end of database design. Newsletter writer Esther Dyson predicts, “Object-oriented databases are not going to replace regular ones anytime soon. Instead, they will replace file systems . . . .”

It’s a tantalizing idea, especially given Apple’s deep commitment to object-oriented thinking. And accessing information with a Mac will surely take on a more object-oriented flavor. But this too is still in the future, and it isn’t going to help you manage the mass of files that grows daily on your system.

The “Search for System 7” sidebar will give you a glimpse into file-management techniques of the relatively near future via System 7.

But a more immediate solution to your management problems could well be On Location, from ON Technology, former Lotus chairman Mitch Kapor’s Cambridge, Massachusetts, company. It’s a new utility that finds files, moves them around, and finds text information within them. Other utilities do some of these things. On Location does all these things and does them well. That makes it more than just another DA.

On Location is indeed mostly a DA, although it is augmented by a Startup document. As with Find File, Apple’s file-finding DA, you type in the name or part of the name of a file, and the utility tries to find it for you. With On Location, though, finding is a “hot” function: As soon as you start typing, it starts searching. Let me amend that: As soon as you start typing, it starts finding. Each additional character you type narrows its search; backspacing over a character broadens the search again. Even if you type nothing, On Location doesn’t sit idle: it gives you a list of all the files on the disk or in the folder under examination.

You can also specify how the characters you type are to be used in searching. If you choose exact matching, On Location will search for files that explicitly match those characters. But
you can also choose to have the program search for the typed characters at the beginning of the file’s name, at the end, or just somewhere within the filename. And you can limit the search to just a folder or extend it to the whole disk.

On Location also lets you search on the basis of a file’s contents, which means you can get at the text in a file without knowing the file’s name. The utility can list all files containing the word Kapor before Find File can tell you if there even are any files named Kapor.

The Self-Indexing Advantage

Where On Location differs from other file-manipulation products is in its speed. I won’t mention a lot of specific numbers since my experience is with a prerelease version, but one sample search took me 30 seconds with Find File and 10 seconds with On Location, including the time it took to invoke each utility. Most of the 10 seconds On Location took was invocation time, so the speed advantage would be even greater for subsequent searches.

On Location gets its speed by circumventing the Macintosh File System and using its own way of keeping track of files. It uses a technology called digital signature compression that creates a compact index to both the names of disk files and their text contents.

Here’s how it works: On Location must create an index for each volume it will be dealing with. This one-time task may take an hour or so for a hard disk, and you may have to let it work overnight for a CD-ROM disc. The Startup document thereafter updates the index as you add or delete files. On Location performs its searches without ever looking at the files or at the directory. It looks only at its own index. The index contains information not only about filenames but also about file contents. Text is the only kind of content indexed, naturally, but it’s thoroughly indexed. If you’ve worked with CD-ROM discs, you understand the idea of content indexing, or inverted indexing. The idea is to create a list of every unique word occurring anywhere on the disk and for each word to create a list of the places where it occurs. With a CD-ROM disc, such an index can be created once and placed on the disc; with a hard disk, you need to be able to update the index when files are changed. That’s what the On Location Startup document quietly does in the background as you work.

Searching By Content

To look for files on the basis of their contents, you click on a different button than the one you used to search for files by name and type in the characters to be searched. The list you get contains the files with the text you’ve specified. Once you’ve found a file, either by name or by contents, you can open it if it is more or less a text file. While you have

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Please circle 18 on reader service card.
a file open, you can select and copy text, but you can't modify the file's contents. You can even search for a text string in files on an unmounted volume, because On Location is examining only the index it created itself. Of course, you can't open files on unmounted disks — that would be too good to be true.

It has a couple of nice touches: You can perform word-root matching, and you can easily select the previous or next file to examine.

Root matching is impressive — when it works. You type, for example, compute, and On Location finds files containing that word. It will also find the HyperCard Clip Art stack if it's on the disk, because that stack contains the word computer. The matching technique depends on having a dictionary and/or rules for forming plurals, verb forms, and so on. On Location would need lots of help to do this job reliably, but it doesn't come with any. Still, root matching is a nice feature, and you can use it when selecting files as well as when searching for a word in an opened file.

The previous/next-file feature can be handy for comparing files visually. Here's a scenario: You have two versions of a document, but you can't remember which one you liked best, or why. On Location lets you jump back and forth between the two and look for crucial differences.

On Location can display text from just about any file, not just text files, on any mounted volume, including the fields of a HyperCard stack. For certain word-processing file formats, it's also able to show stylized text. It has translators specifically for several of these formats.

The technology behind this feature, a XTND translator technology under license from Claris and originally developed at DataViz, is interesting. XTNDs are drop-in modules that Claris is putting into all its applications and is making available to developers for free. The ability to search files by contents is a powerful feature in a utility, but it's rapidly becoming a necessary element in any adequate file system. When you have to keep track of a few dozen files you've created, you can probably recall what's in each just by looking at the name. But you begin to lose this ability when dealing with hundreds of files unless you have clear filing conventions.

If you have several thousand files on a hard disk or network, representing different versions of different elements of different projects worked on by different people, you're subject to the whims of others. As soon as someone names a file in an idiosyncratic way or moves it out of its proper folder, it can become a black box. There's no point in having to go through the trouble of launching a program such as PageMaker just to see what's in a file. Because Apple's file system doesn't provide access to the contents of files, it's good that someone is dealing with the need.

---

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~j/~

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Winners and Users

I promised two months ago to present the winners of past puzzle competitions. As last month's discussion of CD-ROM discs and file management grew into two columns, I had to postpone the announcements until this month.

October's winner is Howard Bowers of Sarasota, Florida. The puzzle was to simulate the action of the forthcoming System 7 Trash, which will not empty until you tell it to. Howard solved it by covering the Trash with a trash folder and creating a macro for emptying the trash folder into the hidden Trash. An "I Beat the System" T-shirt is on the way.

November's winner is Suzanne Garner of Maple Grove, Minnesota. The puzzle was to determine how many nonoverlapping icons could fit on a standard (SE) Mac screen, subject to certain reasonable constraints. Suzanne discerned that the answer was 50 but didn't comment on the fact that the organization is that of the stars on an American flag.

December's puzzle was to slim the System file by removing resources. The winner is Hugh Miller of Mount Vernon, Iowa. He got his System down to 51K, which is small enough to put FileMaker Plus along with the System, Finder, and ImageWriter files onto the internal 400K drive in his 512K Mac. He used older versions of the System files and removed the DAs and all but the required fonts. He keeps unslimed FileMaker Plus and System disks to run on his 800K external drive, but when he needs to dedicate the external drive to documents, this disk works well for him.

Some others who slimmed impressively, on a variety of machines, were Daniel Thiel, Chico, California; Arthur Wiese, Jr., Muskego, Wisconsin; Angelo Serra, Maumee, Ohio; John Scott, Jr., Greensboro, North Carolina; and George Csetai, Bridgeport, Connecticut. Users of orphaned Macs have the greatest need for such tricks, however, and Hugh really showed how to be resourceful by being resourceless.

January's puzzle turned out to be more puzzling than I'd intended. I presented a window and asked how the icons in it had been organized. The trouble is, the window shown in the issue was not the window I'd created, but was an entirely different window — apparently created by OTP gremlins. T-shirts go to Lloyd Loring of South Bend, Indiana; Randy Asher of San Ramon, California; Wade Van Buskirk of Mendocino, California; and David Lueders of Bethesda, Maryland, for their logical explanations for the gremlins' window.

Pound for Pound

For those of you who haven't snared a T-shirt yet, here's a brand new puzzle to consider.

How heavy is a megabyte of data? It depends on the medium, of course. Pound for pound, a CD-ROM disc is a more efficient storage medium than microfiche or floppy disk, not surprisingly; but between microfiche and floppy disk, which is more efficient? I know the weight of a megabyte of data in seven media; if you can top that, send me your numbers. I'll award an "I Beat the System" T-shirt in any size to the calculator who sends the most complete and accurate answer. Consider only the weight of the storage medium, not, for example, the weight of a CD-ROM drive.

If you're into challenges, you may be interested to know that Mike Swaine also publishes a newsletter of HyperCard tips and tricks. For information, write to The Prose Lab, Dept. MU, 31 Patrick Road, Santa Cruz, CA 95060.

Send your puzzle solutions to:
Michael Swaine
Title: MacUser
C/O: MacUser
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The Search for System 7

Several specific features of the new Finder, due out with the release of version 7 of the operating-system software this year, will affect file management. These features include alias files, an intelligent System Folder, containers, new tools for finding and selecting files, and custom views. There will also be more "things" to manage and a new categorization scheme that should make that management process more consistent and logical.

Today, the objects requiring management are chiefly files, which are classified as either applications or documents, INITs, cdevs, and other System Folder fodder are documents. But there are some objects with different behavior from either applications or documents: folders, for example, and the Trash and the desktop. Then there are volumes, such as disks; and devices, such as printers — all of which have characteristic behaviors and require management too.

Under System 7, each of these things, as well as any other objects with icons, will fit into one of five categories: applications, documents, containers, alias files, and desktop printers. And some of these are involved in System 7's approach to file management — or, rather, information management.

**Aliasing**

The use of aliases is a simple and intuitive approach to the problem of nonhierarchical storage and retrieval.

Here's the problem: You have a file, a letter to your accountant spelling out some home-mortgage facts pertaining to your 1989 taxes. Does it go into your Taxes folder or into your House folder or into your Correspondence folder? Put it in the wrong place, and you may have a hard time finding it later. This problem isn't unique to electronic filing systems — we've all heard stories of the file clerk who can't retire because only he knows where things are filed.

A partial solution in the case of the irreplaceable file clerk is to put some trace of the file in every folder where there's any chance that anyone would look for it. "Some trace" could be either a copy or a note pointing to the location of the file. This isn't a great system — things get messy as soon as you need to move or rename a file. But it can work for electronic filing, where it's possible to link the various traces of the file so that if one is moved, the others are updated. That's how System 7 does it, only better, and the technique used is the alias file.

You put the original file anywhere and create a number of alias files — then or later — to put into other folders or, say, out on the desktop. An alias file is not a copy of the original but is a small special file containing the original's icon, a pointer to its name, and information about how to find the original (not a pointer to the original). When you select an alias file by double-clicking on its icon or picking it from a file dialog box, the original is opened exactly as though it had been selected directly.

What's more, with the alias files, you can move around and rename the original files selectively. System 7 will provide a Select menu item, which will let you select files, folders, and other items according to the criteria you specify. You can select, for example, all objects created later than 3/29/89.

Another feature that will be useful for keeping track of files is the ability to create custom views. The hierarchical view should be particularly nice, as it will allow you to see the full contents of a folder (container), thereby displaying all the levels of the hierarchy, not just the top level you see now. You will also be able to augment the filename with a multiline description placed next to or under the file's icon.

Last month I praised long filenames for providing a descriptive window into a file, and these new descriptions are a logical extension of this, worthy of commendation.

**System 7 Will Finally Start Taking Responsibility for Its Own Files.** This is important since there will be more rules than ever about where System files must be placed.

System 7 will finally start taking responsibility for its own files. This is important since there will be more rules than ever about where System files must be placed.

**New Finder Features**

The new Finder has some features that will make it a better tool for finding information. There will be a Find menu selection much like the Find File DA, but the new Find will check all volumes, including AppleShare volumes, automatically. It will also retrieve the found file — opening and, if necessary, scrolling its window.

Related to finding files is selecting them. To currently select a group of files, you must combine some of these maneuvers: shift-click repeatedly, type Command-A, drag carefully, and/or shift-click to deselect...
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Windows Won’t Kill the Mac

Microsoft Word for Windows is available, but maybe it shouldn’t be.

Heresy of heresies. I’m writing this column on my IBM PC clone, using Microsoft Word for Windows.

Don’t be too concerned. I haven’t abandoned the Mac, which remains my favorite machine. Instead, I’m doing a bit of slumming to research an option and to make a point.

You’ve probably read the same articles I have: “Graphical interfaces such as Windows and Presentation Manager have caught the IBM PC up to the Macintosh,” report the self-appointed analysts and would-be trend-spotters (or are they just reprinting Microsoft and IBM press releases?). Since you can buy a state-of-the-art PC for as little as $2,000 (including a color display and 40-megabyte hard disk), these analysts are predicting the slow erosion of Apple’s dominance in graphically oriented applications such as desktop publishing and multimedia.

Well, most of the predictions I’ve read aren’t worth the paper they’ve been laser-printed on (probably using a Mac). Those who believe that Microsoft’s new operating-system offerings have evened up the playing field are wrong — dead wrong.

Word for Windows

Let’s take the program I’m using to write this, for example (Word for Windows 1.0). Now, installing Word on a Mac isn’t particularly hard — you just drag the application file from the floppy onto your hard disk, and you can start using the product. The primary files for Macintosh Word even fit on a single disk (two, if you include the help and dictionary files), and since only three files are involved here, you don’t have to worry too much about directory clutter.

Not so with Word for Windows (I’ll call it WoW from here on, but don’t confuse that acronym with my opinion of the program). WoW comes on eight 1.2-megabyte disks (or twelve 3.5-inch disks), the first of which is named Setup. You have to have all those disks handy, because you need every one of them to install a minimal WoW. WoW comes with a confusing single-page instruction sheet that attempts to describe some of the subtleties of installation but fails. (To get an idea of how confident Microsoft is about Windows, note the instruction that says “We don’t recommend that you run Setup while Windows is running.”)

After telling Setup where I wanted the program installed, I shuffled disks while the utility copied files to my hard disk. Then I got to a section of Setup that involved picking things from lists. Instead of the familiar point and select or drag-select we Mac users are so used to finding in lists, Microsoft forces you to use the arrow keys to move to a choice and then press Enter, which returns you to the question that asks if you want to install a utility. To install multiple utilities, you must arrow, Enter, arrow, Enter, arrow, Enter, ad infinitum. To choose five files to copy, I had to press 20 keys! Sure makes you appreciate the Macintosh’s click-and-drag system. Also makes you

By Thom Hogan

Windows is too

<table>
<thead>
<tr>
<th>Big</th>
<th>Requires too much disk room on most machines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ugly</td>
<td>This is not your father’s Macintosh.</td>
</tr>
<tr>
<td>Clumsy</td>
<td>Things Mac users take for granted aren’t included.</td>
</tr>
<tr>
<td>Finicky</td>
<td>Get out the DOS and hardware manuals if you want to install it correctly.</td>
</tr>
<tr>
<td>Strange</td>
<td>Using Alt-semicolon to call up the type-leading dialog box is anything but intuitive.</td>
</tr>
</tbody>
</table>

Word for Windows proves that the grass isn’t always greener on the other side.
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Delete key instead). Need I go on? Suffice it to say that WoW is no Mac Word.

**Other Windows Programs**

So WoW is just poorly executed. Does this mean that the Windows-as-replacement-for-Mac camp might be right after all? The PC and Mac versions of Excel, for example, are much closer in interface, function, and file formats. If you know one, you'll feel right at home with the other. Yet even these program twins point out vast differences between the Mac and PC Windows products. Many of the things I think are wrong with Windows and Presentation Manager go beyond the menu structure and dialog boxes — problems that any Mac user will immediately comprehend but that may be hard for PC folks to understand (all those analysts are probably 1-2-3 crunchers, right?).

First, Windows looks ugly. Yes, ugly. WoW is trying its best to display Times 12-point type on my VGA display, but the x-height is exaggerated, the characters are squarish, and the black-on-white text is nowhere near as crisp as it is on my Mac II's color monitor. On some monitors, the x-height of Times characters isn't as exaggerated, but then the squarishness of the font face makes the display less readable. Icons are particularly ugly in Windows, mostly because Microsoft has forced designers to create icons that look OK in several resolutions.

Printing presents another problem. WoW doesn't come with printer drivers for any printer I have available (where's the DeskJet driver, Microsoft?). I could, of course, hook up my expensive PostScript printer to my inexpensive PC, but that seems to invalidate the premise of using the PC as an inexpensive substitute for the Mac.

Then there's Windows' insistence on giving everything a keyboard equivalent. Don't get me wrong — I actually like keeping my hands on the keyboard. But those little underline characters look obnoxious. Of course, without them, you'd never guess that Alt-T pulls down the Format menu or that the semicolon key lets you set leading. A few commands' equivalents, such as using the Escape key for Cancel, aren't on the menus or in the dialog boxes.

The interface problem is bigger than it seems. Microsoft stil-, excuse me, licensed a core of ideas from Apple's Mac, but IBM insisted on making any new PC interface keystroke-compatible with something it calls SAA (Standard Application Architecture). The applications group within Microsoft seems to have its own ideas; it's hoping to get a BASIC-like language embedded into all applications and the operating system. The result is a visual and interactive mess.

OK, enough slumming. If you were thinking about adopting Windows as a low-priced alternative to the Mac interface, think again. Sometimes old clichés ring true: You get what you pays for.

Thom Hogan edits *The Macintosh II Report*. Sample copies can be obtained by sending $2 to Macreations, 329 Horizon Way, Pacifica, CA 94044.

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The Only Program You’ll Ever Need

All it takes is one solid C program, and you’ve got a foundation you can use to create any application.

From pasta to prescription drugs, everything comes in generic packages these days. Now we’d like to introduce you to Generic App, a complete stand-alone application that provides a platform for just about any standard Mac program. It performs the simplest of application duties — initializing the Mac interface, monitoring user input, and managing multiple documents. It’s generic because it can be used as a starting place for almost any programming project.

You may be surprised at just how much code Generic App requires. In fact, because we promised our editors that we’d provide you with a complete, running program every month, what you’re getting here is a stripped-down version of Generic — miniGeneric. We’ll take two more months to flesh out some of the subtleties of Mac programs and complete Generic App. We’ll eventually use Generic App as the basis for several handy utility programs, each of which will illustrate a particular aspect of Mac programming.

In this month’s installment, you will learn about software hierarchies, which are an essential element of good software design. We’ll also introduce two essential features of a Mac application: events and resources. Then we’ll apply this knowledge to the operation of Generic App’s menus.

Software Layers

Mac software is organized in layers, like an upside-down wedding cake (see Figure 1). The top layers depend on functions the bottom layers provide. Near the bottom of the hierarchy is the Macintosh operating system (OS), which mediates the boundary between the hardware and software and forms the foundation of our applications. Collections of software that act together to achieve the same goal on the system level are known as managers. A typical OS manager is the Device Manager, which provides access to standard devices through a structure called a device control block, or DCB. OS managers are a bit esoteric, and application developers can usually ignore the details of this layer. Indeed, that’s what software layers are for — they encapsulate the details of the technology within themselves.

By Kurt W. G. Matthies and Thom Hogan
Of greater interest to us is the next layer in the hierarchy — the application Toolbox. The managers here provide the Macintosh look and feel that we’ve come to take for granted. The Window Manager, Menu Manager, and Palette Manager are all typical Toolbox managers.

### Just a Shell

The next layer is the application shell, the supporting structure of an application. All Mac programs have menus, windows, dialog boxes, and so on. What distinguishes them from each other is their specific functionality. For example, in a word-processing program, the application layer consists of the modules that process text — the interface is supplied by the shell. We’re borrowing the concept from object-oriented-programming (OOP) texts, but the principle of layered, reusable code applies to our procedural environment as well.

Whatever your programming background, your first hurdle as a Macintosh novice is building the application shell. Once it’s built, you can use it over and over again for every application you write. It’s been said that programmers write only one program in their careers and spend the rest of their time modifying or fixing it — Generic App is the foundation for that one program.

### Road Map of Generic App

The complete source code for this month’s project is available from CompuServe. Simply type GO MACUSER at any ! prompt. If you are not a CompuServe user, call (800) 848-8199 or (614) 457-8600 for more information on subscribing. Alternatively, you can order the disk directly from us for $10 by calling (800) 952-6300 and asking for Department 28.

You’ll find that the miniGenApp folder contains a .rscc file, which controls the support structure of an application. It includes the menus, windows, dialog boxes, and so on. Whatever your programming background, your first hurdle as a Macintosh novice is building the application shell. Once it’s built, you can use it over and over again for every application you write. It’s been said that programmers write only one program in their careers and spend the rest of their time modifying or fixing it — Generic App is the foundation for that one program.

#### Table 1: Contents of miniGenApp Folder

<table>
<thead>
<tr>
<th>Filename</th>
<th>Location</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>miniGenApp</td>
<td>Project folder</td>
<td>Project file</td>
</tr>
<tr>
<td>miniGenApp.rsc</td>
<td>Project folder</td>
<td>Project’s resource file</td>
</tr>
<tr>
<td>Shell.c</td>
<td>Src folder</td>
<td>Main entry point, event parsing</td>
</tr>
<tr>
<td>AppInit.c</td>
<td>Src folder</td>
<td>Application-initialization routines</td>
</tr>
<tr>
<td>MenuUtil.c</td>
<td>Src folder</td>
<td>Menu utilities</td>
</tr>
<tr>
<td>WindowUtil.c</td>
<td>Src folder</td>
<td>Window sizing, movement, scrolling</td>
</tr>
<tr>
<td>DialogUtil.c</td>
<td>Src folder</td>
<td>Dialog-box procedures</td>
</tr>
<tr>
<td>AboutBox.c</td>
<td>Src folder</td>
<td>About-box rendering</td>
</tr>
<tr>
<td>MiscUtil.c</td>
<td>Src folder</td>
<td>Miscellaneous utilities</td>
</tr>
<tr>
<td>DocUtil.c</td>
<td>Src folder</td>
<td>Document management</td>
</tr>
<tr>
<td>FileUtil.c</td>
<td>Src folder</td>
<td>File I/O utilities</td>
</tr>
<tr>
<td>Display.c</td>
<td>Src folder</td>
<td>Drawing functions for application</td>
</tr>
<tr>
<td>XxxxPr.h</td>
<td>Hdr folder</td>
<td>Prototypes — one for each .c file</td>
</tr>
<tr>
<td>AppConstants.h</td>
<td>Hdr folder</td>
<td>Application constants (defined)</td>
</tr>
<tr>
<td>AppGlobals.h</td>
<td>Hdr folder</td>
<td>Application global declarations</td>
</tr>
<tr>
<td>MenuConstants.h</td>
<td>Hdr folder</td>
<td>Menu constant definitions</td>
</tr>
</tbody>
</table>
POWER TOOLS

contains a project file, a project resource file, a source folder with ten source files, and a header folder with the project's header files (see Table 1). Put the project folder into your Develop folder. You'll need all of those files to compile the project.

You'll remember that the C source code for our first project, Hello World (see "Hello, Programming," April '90), was in one file. Generic App is a much larger project, so we've organized the C source into ten files. Why split up the program? Every programmer will give a slightly different answer, but the main reason is to isolate independent modules within the program (a process called encapsulation that makes it easier to debug and maintain a program); to keep the program code organized (as opposed to adding to it helter-skelter, which results in what dedicated hackers call spaghetti logic because it snakes all over the place); to keep to a minimum the portion of code that must be recompiled and relinked when making small changes, as often happens in the debugging process; and to retain control over how the program gets split into code segments, which have a maximum size of 32K (more on that in a later column).

There's an art to distributing the functions among the source files; many factors come into play. Most routines fall together naturally by their actions — the trick is in determining where to draw the line. It might make the most sense to group all Clipboard functions in a single file, for example. That way, if you later make a change to your program that affects the Clipboard, you will know exactly which file to update to handle the change.

Another consideration is procedural encapsulation, which is achieved through the use of local functions. The scope of local functions, called static functions in C, is limited to the source file in which they're defined. In other words, they can be called only from functions defined in the same source file.

You create static functions by placing the static keyword before function names in their function-body definition. Data encapsulation makes use of static variables. Static variables are like global variables, but their scope is limited to the source file in which they're defined, just as is the case with static functions. Example 1 demonstrates the syntax. Either of these constructs may have an influence on the layout of your source code.

The Main Event

Without input, a computer is a useless hunk of hardware (unless you're in need of a high-end paperweight). A computer application needs to know when its user is pawing the keyboard or twiddling the mouse button. The OS layer's event mechanism translates real-world events initiated by the user into

`Table 2: Event-Record Contents by Event Type`

<table>
<thead>
<tr>
<th>Message</th>
<th>When</th>
<th>Where</th>
<th>Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>nullEvent</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>Mouse events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mouseDown</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td>Button state</td>
</tr>
<tr>
<td>mouseUp</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td>Button state</td>
</tr>
<tr>
<td>Keyboard events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>keyDown</td>
<td>Character code</td>
<td>Mouse location at event</td>
<td>Option, Caps, Shift, Command keys</td>
</tr>
<tr>
<td></td>
<td>Key code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>keyUp</td>
<td>Character code</td>
<td>Mouse location at event</td>
<td>Option, Caps, Shift, Command keys</td>
</tr>
<tr>
<td></td>
<td>Key code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>autoKey</td>
<td>Character code</td>
<td>Mouse location at event</td>
<td>Option, Caps, Shift, Command keys</td>
</tr>
<tr>
<td></td>
<td>Key code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window Manager events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>updateEvt</td>
<td>Pointer to window</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>activateEvt</td>
<td>Pointer to window</td>
<td>Mouse location at event</td>
<td>Activate/ deactivate</td>
</tr>
<tr>
<td>diskEvt</td>
<td>Drive-number</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td></td>
<td>result code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>networkEvt</td>
<td>Handle to param block</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>driverEvt</td>
<td>Varies</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>Application-defined events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>app1Evt</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>app2Evt</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>app3Evt</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td></td>
</tr>
<tr>
<td>app4Evt</td>
<td>Ticks since startup</td>
<td>Mouse location at event</td>
<td>MultiFinder suspend/resume</td>
</tr>
</tbody>
</table>
data structures available to the program. Events reach your application in the form of event records, which are in turn posted to the event queue, a data structure maintained by the operating system. Here's software layering in action — you never need to access an event record directly from the queue; instead, you obtain the next available one by calling an Event Manager procedure, WaitNextEvent.

**Macintosh-Programming Caveat #1.**

WaitNextEvent is not documented in Inside Macintosh, but it is documented in a Macintosh Technical Note. See the "Getting Technical" sidebar for information on these indispensable references.

Generic App's shell spends most of its time in a loop, as do virtually all Mac programs. Each time through the loop, it checks to see if a new event has occurred. The WaitNextEvent procedure returns a nonzero result if an event is available, and it fills an event record with the event data. To illustrate this process, we've excerpted the event loop in Example 2.

In Generic App, we're interested only in mouse-down and key-down events and the Window Manager's activate and update events. When we get one of these events, we use the event type to pass control to the corresponding routine. Figure 2 shows this event-parsing scheme. The event data structure that is filled in by WaitNextEvent contains the what,
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when, and where data associated with the event. The contents of the record vary according to the event code that is returned in the event field of the event record. We've consolidated the possible event-record values in Table 2. A few notes about the table: The events are grouped by type along the left border of the table, and the event record's fields appear along the top. If a cell is blank, the value of the field is undefined for this type of event and can be ignored.

**Macintosh-Programming Caveat #2.**

The Macintosh OS and Toolbox are constantly evolving. Just because a value is undefined at this time doesn't mean it always will be. Apple is very good about warning programmers (via the tech notes) when it anticipates changes that might affect existing programs, but it's not perfect.

**Applications Have Menus**

Most applications manage menus in the same way that others do—they install menus at initialization and treat them as static structures throughout the life of the program. Menus are initialized from menu descriptions that are stored in the application's resource fork or compiled into the program. Most commercial applications define their menus in a resource, which is an advantage because the menu strings can be changed without modification of the source code. We've used the resource editor ResEdit to create our menus.

**Handle with Care**

Before you can add a menu to your application, you should know something about memory. RAM is a limited commodity in any computing environment. Each application needs its own private memory space for its code and data. The OS manages memory as blocks of contiguous bytes, each block identified by a reference, and it keeps track of which blocks are being used and which locations are free.

Applications request memory through the Memory Manager. A reference to a block of memory, which happens to be a pointer to a pointer to the block, is called a handle. This double-indirection scheme lets the Mac move the block around in memory without directly affecting an application—and the Mac software moves memory whenever it needs a larger contiguous chunk of memory than is currently available, which is often. Because our program keeps only the address of a pointer to the object (the handle) and not the address of the object itself, a handle's value doesn't need updating after a block of memory has been moved.

If you find all this address-of and object stuff confusing, don't worry—you're not alone. Pointers and addresses are at the top of the list of hard-to-understand C topics. We'll try to keep our handle usage as simple as possible until we can give you Pointers and Handles 101 in a future column.

**Figure 2: In event parsing, events are extracted from the event queue in the main event loop and passed on to functions keyed by event code.**

In addition to facilitating dynamic-memory management, handles also contribute a "shorthand" notation to the language. Consider this: The data associated with each menu consists of many items—the names and attributes for the menu items, the menu title, and other relevant information. This data adds up to a lot of bytes. It's highly inefficient to pass all that to a function—it would take more of the computer's time and space on the stack than is actually needed. Instead, you pass a handle, which means you pass a
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Please circle 36 on reader service card.
POWER TOOLS

4-byte key that the function can then use to access the data directly. So the Memory Manager is actually a built-in database manager — simple but effective.

Macintosh-Programming Caveat #3. Memory management on the Mac, despite the preceding simple description, is a black art. Scott Knaster, once known as the king of Mac program debugging, wrote an entire book on the subject (How to Write Macintosh Software, 2nd Ed., Hasbrouck Heights, New Jersey: Hayden, 1986). One reason Apple wants to do away with DAs and cdevs in future versions of the operating system is that they confuse and complicate the memory-management picture: You can write a “correct” program, only to find that a DA has come along and moved or changed memory on you, making your program crash. We promise to address this topic too in future installments, but for now, consider yourself forewarned.

What’s on the Menu?
Here’s an exercise: Use ResEdit to look in the project’s resource file, miniGenApp.rsrc. Resources, as we’ll see in future columns, are a great way to organize(7,4),(995,991)

```
Example 3

void setUpMenus ()
{
    gDeskMenu = GetMenu (kAppMenuID);
    AddResMenu (deskMenu, 'DRVR');
    InsertMenu (deskMenu, 0);
    gfileMenu = GetMenu (kFileMenuID);
    InsertMenu (fileMenu, 0);
    gEditMenu = GetMenu (kEditMenuID);
    InsertMenu (editMenu, 0);
    DrawMenuBar();
}
/* setupMenus */
```

resources have a number and an optional name that identifies them within the resource type. Now open the File-menu template by double-clicking, and you’ll see some of the data associated with this menu.

This menu data stored in the resource is called a template. The menu data is read from the template into RAM with the Menu Manager routine GetMenu, which returns a menu handle to the data now in memory. All menu handles for an application are maintained in an internal data structure called the menu list, which makes them available to users through MenuSelect. Usually, you’ll never directly change the menu list in your application — once more, the Toolbox hides the details of the system from you with an encapsulating layer of calls. One of the calls in this layer, InsertMenu, adds menus to the menu list. Example 3, which is taken from the file AppNile.c, illustrates the process.

We don’t need to know all the details of DAs before we can add them to our Apple menu. Note the additional call to AddResMenu that’s made when the Apple menu is being processed. The purpose of this particular call is to ask the system to look for DAs and then to add the
POWER TOOLS

Example 5

```c
switch (theItem)
{
    case kNewItem:
        doOpenDoc ();
        /* <=- We forgot the break! */
    case kCloseItem:
        doCloseDoc ( (FrontWindow ()));
    . . .
```

DAs’ names to the menu.

Read Any Good Menus Lately?

An application needs to react to user selections. We call this reading the menu. When a mouse-down event is detected in the menu list, MenuSelect automatically takes care of the menu-display and -selection chores that you normally associate with a menu selection. When MenuSelect has finished updating the display, it returns with the menu and item number of the selection.

Example 4 demonstrates choosing an action based on a menu selection. Our function, doMenu(), is called after MenuSelect has done its work. doMenu() is passed a long word (4 bytes). The top word contains the menu ID of the selected menu, and the bottom word contains the item number the user has selected. HiWord and LoWord are Toolbox macros that extract these parts of the long word.

Example 4 demonstrates choosing an action based on a menu selection. Our function, doMenu(), is called after MenuSelect has done its work. doMenu() is passed a long word (4 bytes). The top word contains the menu ID of the selected menu, and the bottom word contains the item number the user has selected. HiWord and LoWord are Toolbox macros that extract these parts of the long word.

The menu-selection parser is a two-stage switch. The first stage determines which menu was selected from menuID and passes itemNumber to the selected function for that menu. The second switch, which is illustrated by doFileMenu(), determines the item number selected and calls the action procedure for that particular selection.

Give Me a Break

Note the break statement that terminates each branch of the switch. Without a break, the flow of control would “fall through” and execute the next case.

Consider the variation on an excerpt of doFileMenu() in Example 5. When you select New from the File menu, control flows to doOpenDoc(), but because we forgot the break, when the time comes that doOpenDoc() returns, doCloseDoc() will be called. You see the window open and then immediately close. Leaving the break out of a switch branch is a common mistake made by both beginning and experienced coders.

Putting It All Together

Well, we’ve done it again. If you’ve already compiled and run the application, you know that we’ve written yet another Hello World. Is this déjà vu? Sure, but we now have a genuine event-processing platform. Check it out. Open a DA, and drag it in front of your window. Now close it. Notice how the application automatically updates the window. What you’ve got here is a real Mac update engine that’s (almost) ready to support multiple documents. Next month, we’ll talk about this update mechanism and create some real document windows that respond to all sorts of variations in size and location. Also, we’ll have more on resources and memory. Happy traces.

P.S.: What’s Bugging You?

There’s a lot of code in Generic App that we can’t cover in a line-by-line description within the confines of this column. What we’re trying to give you is a practical background in primary concepts. This information could also come in the form of implementation descriptions, but as we stated at the outset, the bulk of the work is left to you. We don’t think you want us to paraphrase Inside Mac, and we also know that there are some good how-to books available. We don’t want to give you more of the same here.

But what is really bugging you, and how can we help? C-language syntax can certainly be cryptic. Perhaps you just can’t fathom pointer manipulation or passing arguments to Pascal functions. Maybe you’ve read the chapter on the Resource Manager in Inside Mac five times, and you still can’t get your resources written to a file. (We’ll bet that you need to call ChangedResource before WriteResource!.) What else do you need to know about Macintosh programming?

We’d like to hear from you. The most convenient way to reach us is on MacNet (KMatthies and THogan are our mail names) or by writing to us in care of MacUser.
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Creating Resources and Menus

Resources are vital to any Mac program. Indeed, a correctly designed program should define in the resource fork of the file all menus, dialog boxes, alerts, icons, pictures, and text strings that are displayed. That way, any changes you need to make — perhaps you need a Spanish version of your program? — are confined to the resources and don’t affect the program code.

The problem with resources is that Apple has provided us with two not-quite-finished ways to deal with them. The traditional method has been to use ResEdit, a funky little what-you-see-is-almost-what-you-get editor that lets you manipulate the resources in a file directly (even after the program has been compiled). You can create some resource items, such as dialog boxes, exactly as the user will see them in your program (you simply create items and drag them to the appropriate places). Other resources, particularly menus, require you to painfully fill in a series of editText boxes — make one mistake (and you probably won’t see it because there’s no visual feedback to show how your menu will look), and you’re liable to mess up your program to the point where it crashes. Adding keyboard command equivalents, hierarchical menus, and other options is a real pain with ResEdit.

Apple’s second method is to use Rez, part of the MPW (Mac Programmer’s Workshop). Rez lets you create resources by describing them with a structured text file. In some ways, this is a preferred method because you get maintainable source code for the resources that can easily be passed along to other users, either on paper or as a file. Unfortunately, it comes with the baggage of MPW as overhead. If you’re not a traditional UNIX programmer, you’ll probably have trouble understanding MPW, let alone figuring out how to get Rez to run. The editor that comes with MPW is somewhat cumbersome, so I suggest you get a copy of the QUED Programmer’s Editor if you’re going to do much editing in MPW.

Fortunately, there are several other ways to create resources that are more Mac-like. The one I like most is an extension to ResEdit that makes the menu portion of that program a WYSIWYG menu editor. This add-on is a shareware product (Alan T. Goates, OtherWare, 310 S. 13th E., #5, Salt Lake City, UT 84102). Unfortunately, the latest version I have is for ResEdit 1.1d3, and ResEdit has since moved up to version 1.2. Perhaps Alan will have caught up with Apple by the time you read this.

Next best is Prototyper. Forget Prototyper as a creator of generic application code — its real value is as a resource maker. Unfortunately, Prototyper too has flaws. In the menu section, for example, adding new selections to the end of the menu is not particularly intuitive, and cut-and-paste functions are not available, meaning you have to move things manually one at a time if you change your mind about placement. Prototyper’s interface needs a bit of work, because many of its pieces don’t always work as you might expect (try tabbing between editText boxes, for instance). Nevertheless, Prototyper is well worth the effort you invest in it, especially if you’re interested in seeing what the menu and dialog-box structures of your program look like before you commit them to code.

Now that you know all the options for dealing with resources, let’s try them out with the Generic App program in this month’s Power Programming column.

1. Pull up ResEdit, and create a new file called GenApp.rsrc. (Press Command-N, and then enter the name GenApp.rsrc.)

2. Create a new menu resource. (Press Command-N, and pick MENU from the list that appears.)

3. Create a new menu. (We’ll start with the Apple menu — enter a MenuID of 0 and a ProcID of 0. Next enter Enable Flags of -1 and the name of the menu. Starting to see why this is a pain?)

4. Click on the group of five asterisks at the bottom of the menu information — you should get a box around them. Press Command-N to create a new menu item. Fill in the boxes for that item (for now, just the name is enough). If you need more menu items, click on the asterisks at the bottom of the last menu item and press Command-N again. The trick here is to learn that the asterisks are associated with menu items — if you want to copy, cut, or paste, make sure you have selected a set of asterisks first.

When you’ve finished with your menus, click on the GenApp.rsrc title bar to make that window active and then click on its close box. To save your work, click on Yes in the dialog box that appears, and then quit ResEdit. If you’re working with MultiFinder, this is the safest way to save your work with ResEdit — we’ve encountered situations in which other methods, including attempting to quit (by pressing Command-Q), result in crashes.

By Thom Hogan
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Tip Sheet

Readers Share Their Tips and Tricks

**PageMaker 3.0**

PageMaker has no menu-based command for vertical justification, but you can vertically justify columns in a primitive fashion. Assuming the tops of all the columns are even, this procedure gets the columns to line up perfectly along the bottom of a page:

1. Measure the distance between the bottoms of two columns and the bottom of the page, and divide that number by the number of paragraph endings in the shorter column (if the shorter column ends with a whole paragraph, subtract one from the total).

2. Highlight all the paragraphs in the shorter column except for the last one, press Command-M, and type the number you found in step 1 in the Spacing After box. The shorter column will expand to fill the extra space.

**Stuffit**

If you need to send more than 20 files via modem, you’ll need to send data in at least two sessions. Save yourself some time by enclosing all the files in one folder. Stuffit can archive entire folders of various sizes.

**Sue Ann Sanders**

Milwaukee, WI

**HP DeskWriter**

You may notice when printing a document that extends from top to bottom on a U.S. letter-size page (a Reflex Plus report, for example) that the HP DeskWriter leaves the bottom inch of the paper blank and prints those last lines on a second sheet. To fool the DeskWriter into printing all the data onto the letter-size paper, use the Page Setup command to indicate that you are using U.S. legal-size paper even though you aren’t.

**Clayton L. Olson**

Santa Cruz, CA

**Illustrator 88**

Incorporating a bit-mapped image from a program such as MacPaint into an Illustrator 88 illustration is difficult because Illustrator can’t import a paint or PICT graphic into the Artwork mode by using either the Place command or the Clipboard.

The workaround is simple and takes advantage of the fact that Illustrator can import or place an EPSF image into Artwork. Use Aldus FreeHand’s Place command to import your paint graphic into a new FreeHand document. Then use FreeHand’s Export command to save the placed graphic as an EPSF file. Now return to Illustrator and place the FreeHand EPSF graphic. Don’t forget to select “Show placed images” in the Preferences dialog box of Illustrator’s Edit menu to view the placed EPSF files in both the Artwork and the Preview modes.

If you want to import this whole hodgepodge into a page-layout program, check the box in the Save dialog box to “Include copy of placed Encapsulated PostScript files for other applications.”

**Uri Marcus**

Haifa, Israel

**Word 4.0**

Are you annoyed by having to select Show Ruler from the Format menu every time you open a Word 4.0 document? You can make your documents open with the ruler automatically displayed by using Commands from the Edit menu. Here’s how to do it:

1. Open any Word 4.0 document. Make sure Full Menus is selected.

2. Choose Commands from the Edit menu.

3. Make sure the dialog box says “Configuration: Word Settings (4)” in the lower left corner. This tells you the name of the file you’re customizing.

4. Scroll down the command list until Open Documents With Ruler shows up. (Shortcut: Press the O key to jump to the beginning of the O listings.) Click on the command name to select it.

5. Click on the Add button.

6. Click on Cancel.

The Open Documents With Ruler command will now be listed on the Format menu. It won’t be checked, though, so you’ll have to activate it. Highlight the new menu command to select it. Every document you open from now on...

---

**Compiled by Gregory Wasson**

---

**Figure 1:** Users of a shared FileMaker II file can communicate with each other on an AppleTalk or TOPS network by creating a separate Public Messages file.
Figure 2: The combination of Word’s formula-building feature and the macron character in most Adobe typefaces lets you put macrons over vowels.

In response to Allen Morrison’s query in Help Folder about macrons (December '89): There is some hope if you use Microsoft Word. In most Adobe laser fonts, you can access a plain macron character (') by pressing Shift-Option-comma (although the macron may not show on-screen if you don’t have the appropriate screen font). Microsoft Word’s formula language allows you to overstrike one character with another, placing a macron over long vowels.

To put a macron over the desired vowel, type the formula character. Command-Option-A (it may not be visible if the paragraph markers are hidden, so make sure Show Line is checked on the Edit menu, or press Command-Y). If you get a beep instead of the formula character, select Full Menus from the Edit menu.

Type an \ for Overstrike, and then type (e,’)—as shown in Figure 2.

Andrew Roazen
Westfield, MA

You can also buy fonts that include special keys with the macron character. One good source is Linguists’ Software, P.O. Box 580, Edmonds, WA 98020-0580, Ed.]
on the numeric keypad) to get
to the very beginning of the
document. Now type a word
in the type style you wish to
change from — for example,
type italic in italic — and
select that word. Then type or
perform the following steps:

1. Click on the AutoMac III icon and assign a keystroke
to run the macro, such as Command-Option-U for underline.
   Click on Record.
2. Type Command-Option-R, which finds the next
   occurring instance of the selected type style.
3. Click on the AutoMac III icon, and add a time delay
   of five seconds.
4. Type Command-Shift-I. This toggles the italic style,
in this case to off.
5. Type Command-Shift-U. This toggles the underline
   style, in this case to on.
6. Type Command-9 (numeric-keypad 9), which
   returns you to the beginning of the
document.
7. Type Command-Shift-6 (numeric-keypad 6), which
   selects the word italic again.
8. Click on the AutoMac III icon. Click on Mise. Click
   on J (Jump to a Macro). Jump the macro back to itself by
typing its name (Command-Option-U), which causes the
   macro to repeat until all italicized words are converted to
   underline.
9. Click on OK. Click on Stop.
   To run the macro, make sure
   you’ve put a word at the very
   beginning of the document in
   the style you want to change
   from and select that word.
   Then type Command-Option-
   U (or whatever keystroke
   you’ve assigned to the macro).

Your macro will repeat until
all italics are converted to
underlines. When a dialog box
asks, “Continue checking
from beginning of docu-
ment?” type Option-period to
stop the macro, then click on
Cancel. Otherwise your macro
will change your underlines
back to italics and back to
underlines in an endless loop.

This macro can be adapted
to interchange any fonts or
character formats. For ex-
ample, to change random
occurrences of Venice to Zapf
Chancery, put a word in the
Venice font at the very begin-
ning of your document. Then,
instead of using the two toggle
commands I’ve described,
record into your macro the
selection of Zapf Chancery
from the Font menu.

Robert J. Yanal
Southfield, MI

Ready, Set, Go! 4.5
Underlining text that has
been selected as italic from
the Style menu can be tricky
in Ready, Set, Go!
If you’re like most users,
you double-click on words to
select them and then make
style changes. However, as
with most word processors,
double-clicking on a word in
Ready, Set, Go! selects both
the word and the space after it. If
this word is then underlined,
for example, the space fol-
lowing the word will also be
underlined.

You can eliminate this
problem by simply pressing
the Command key when
double-clicking on the word.
This ensures that the space
after the selected word won’t
be selected too.

Michael Conley
San Diego, CA

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Apple Business, November 1989

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Help Folder

Answers to Readers’ Questions

Is your Mac sick? Need a diagnosis? Leave it up to the doctor — Bob LeVitus. He’s the author of Dr. Macintosh: Tips, Techniques and Advice on Mastering the Macintosh and the former editor-in-chief of MACazine. Now he’s also the guy who answers your questions in this space every month.

Mystery Font

Q. Why does LaserStatus DA report that there is a font called Seattle in my LaserWriter Plus? Font/DA Mover doesn’t find Seattle installed in my system. DiskTop doesn’t find a file called Seattle anywhere on my hard disk.

Interestingly, this mystery font is visible only after the printer has been used. In other words, if the printer has been shut down and restarted (or reset with LaserStatus) and I use LaserStatus to examine it before anything is printed, Seattle’s not there. It appears only after I print a file (any file, I think).

Randall Hunt
Simi Valley, CA

A. You’re not imagining things. When you print a document, the printer driver downloads Seattle; it remains resident in your printer until it is shut down or reset. The reason why is less clear. . . .

I couldn’t discover an official explanation of why the Apple laser-printer drivers download the Seattle font, but I did hear some stories. The one that rings truest (at least to my ears) was that Microsoft Multiplan — an early, unsuccessful predecessor of Excel — used a funny font called Seattle, which Microsoft thought looked good on the screen and printed nicely on the ImageWriter.

When the LaserWriter appeared on the scene and Multiplan owners tried to print with it, the Seattle font came out looking just like it had come from an ImageWriter, because the printer didn’t know about any font called Seattle and downloaded the bit-mapped font.

Instead of leaning on Microsoft to update its software and abandon this font, Apple had the LaserPrep file create the Seattle font whenever the printer is initialized, just in case someone wanted to print a document with Multiplan.

Hesitant Accelerator

Q. I want to upgrade the speed of my Macintosh SE (20-megabyte hard-disk drive; 4 megabytes of RAM) with an accelerator board. Because I’ve heard of people running into compatibility problems with software programs, INITs, and edves, however, I’m a bit wary of upgrading.

Which accelerator boards work 100 percent with a Macintosh SE configured like mine?

Kenneth J. Brum
Riverside, IL

A. Accelerator products for the Macintosh SE are much more reliable today than they were a year or two ago. You will find very few programs, INITs, or edves that won’t work with the newer ones.

Radius is a well-known brand with an excellent reputation. Or, if you’re still concerned about compatibility, spend the big bucks and go with the Apple SE/30 upgrade.

Bar Codes

Q. I’ve heard that the U.S. Postal Service uses bar codes to direct mail. Do you have any information on how bar coding might be used in addresses and what format this would take?

Foster C. Wilson
Newark, OH

A. If you already have a Mac and a laser printer, all you need is the excellent envelope-printing DA, Kiwi-Envelopes! (Kiwi Software, 6546 Fardall Road, Santa Barbara, CA 93117; [805] 968-7432). It can generate bar codes designed with the assistance of the U.S. Postal Service to yield envelopes with a high readability rate. Kiwi-Envelopes! takes care of everything for you, and it has a slick, intuitive interface you’re sure to appreciate. Another nice touch: The manual contains an excellent discussion of the Postal Service’s PostNet bar-code system.

Although Kiwi-Envelopes! can be used with an ImageWriter for addressing envelopes, you’ll need a laser printer if you want to use the bar-code feature.

Missing Buttons

Q. I subscribed to your magazine four months ago and received the MacUser HyperDisk. I enjoy the magazine and find it useful, but I haven’t been able to

By Bob LeVitus

---

Figure 1: Where you put which SIMM makes all the difference in Apple’s 68030 machines. For more details on installing memory, see “The Persistence of Memory,” February ’89.

Q. I own an SE/30 with 1 megabyte of RAM. I bought four 1-megabyte SIMMs and installed them in the SIMM slots next to the already installed bank of 256K SIMMs.

I expected that my machine would then have 5 megabytes of RAM; instead, it has only 2 megabytes.

Should I have put the 1-megabyte chips into the slots that had the 256K chips in them and moved the 256K chips to the empty slots?

Terry Ottesen
Petersburg, AK

A. Yes. Starting from scratch: Move the 256K chips to the empty slots; then fill the slots you removed the 256K chips from with the 1-megabyte chips (see Figure 1). Voila! Five megabytes of RAM.
make any of the buttons on the HyperDisk transfer to my HyperCard stacks. When I use the transfer utility included on the disk, the icon flashes, indicating a successful transfer. However, I can never find the button image anywhere in the target stack.

Lawrence J. Weber
Denver, CO

ImageWriter Funny Papers

Q. I never select the European paper sizes (such as A4) in the Page Setup dialog box, but I would like to use 8.5-x-5.5-inch paper. Is there an easy way to modify these default sizes?

Rick Johnson
Waukesha, WI

A. You don't say what printer you're using, but if it's an ImageWriter, you're in luck. There's a freeware utility called PREC Manager, created by Bill Steinberg, coauthor of Pyro!. (It should be available from the usual shareware outlets: CompuServe, user-group libraries, bulletin-board systems, and so on.) PREC (which stands for Print RECord) Manager lets you modify any of the ImageWriter paper sizes (see Figure 2) quickly and effortlessly.

Figure 2: PREC Manager makes it easy to specify up to six custom paper sizes on an ImageWriter.

A. What you transferred were icon resources, not buttons or pictures. That's why you can't find them—they're hidden deep in the bowels of the stacks you transferred them to, waiting to be used. Here's how to use them:

1. Select New Button from the Objects menu.
2. Double-click on the new button.
3. Click on the icon button in the dialog box.
4. Scroll until you find the icon(s) you transferred.

If you want to use the icon with an existing button:

1. Select the Button tool.
2. Double-click on the button into which you want to put the icon.
3. Click on the icon button in the dialog box.
4. Scroll until you find the icon you want.

Changing your mailing address?

It's a simple procedure to ensure that your next issue of MacUser will catch up with you as soon as you move. Please send your NEW address PLUS your current mailing label to:

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Please allow up to 60 days for change of address to take place.
He'd Rather Fight than Switch

Q. On page 237 of the September '89 issue, you advise Kyle G. Murphy that it is OK to use the Reset switch on the Mac. You may be right, but I had a serious problem with such use on my SE/30. Ultimately I lost everything on my hard drive.

In attempting to find the cause of the problem, I ended up working with a systems engineer inside Apple. He felt that the cause of my problem was clearly my use of the Reset/Interrupt switch. He strongly advised that nonprogrammers stay completely away from it. I took mine off entirely.

Neil M. Kosterman
Itasca, IL

A. Poppycock! The Reset switch is perfectly safe to use if you use it only when your Mac has irrecoverably crashed. If you happen to push it while you have a document open, you can indeed damage a file or disk. But the damage will be no worse than if you had pulled the plug or flicked the power switch.

I agree with what Chris Espinosa said in his reply to Kyle: “The same Reset signal gets sent to the Macintosh if you turn on the Macintosh or press the Reset half of the programmer’s switch. So if the Macintosh has truly crashed, the Reset switch is just as safe (in fact, a little nicer, because it puts less stress on the power supply and other circuitry).”

The programmer’s switch can even help prevent damage from some crashes. Here’s a little trick that can help you escape gracefully from certain crashes.

Press the Interrupt switch and type:

```
SM 0 A9F4 (press Return)
G 0 (press Return)
```

If it works, which it does at least half the time, you’ll be returned to the Finder. Once you’re back at the Finder, you can select Restart from the Special menu, which gives your Mac a chance to shut down the file system properly and minimizes the risk of damage to disks or files.

As long as you use the Reset or Interrupt switches only when your Mac is hopelessly crashed, using the switches is as safe as, and probably safer than, turning your Mac off and on.

Who’s More Likely To Have A Heart Attack?

People born today have a much better chance of avoiding heart attack. In fact, since 1977, death rates from heart attack have dropped by 30.9%. Death rates from stroke have gone down a remarkable 37.3%.

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Adobe Type Set 2:

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The Pantone Touch

We waited a long time for color to come to the Mac. Like Dorothy in The Wizard of Oz, we stepped from a black-and-white world into somewhere over the rainbow. Unfortunately, when we try to print the vibrant colors that appear on the silver screen, the results often seem just a pigment of our imagination.

This problem didn’t start with the computer. Color is a form of communication, and not everybody speaks the same language. Our eyes, for example, see far more colors than can be created with the RGB (red, green, blue) scheme that monitors use. The CMYK (cyan, magenta, yellow, black) system used for four-color printing offers an even smaller subset of colors.

These trickle-down color theories mean we can rarely match what we see in the real world. In traditional publishing, there are color-matching systems that ensure that the colors from the designer’s desk matches the color on the printed page. The PMS (Pantone Matching System), the most prominent color-matching system, and its competitors are now wending their way to the Mac. Thus far, however, many Mac publishers find them less functional than a box of crayons for getting a matching color on paper.

Setting the Standard

In the publishing industry, Pantone is the reigning standard for spot color. For more than 25 years, Pantone has provided color references such as the Pantone Color Formula Guide, a book that contains solid-ink samples printed on coated and uncoated stock. Designers make their selection from among 747 Pantone color samples that show the printed ink color and then give the Pantone color number or a tear-out chip sample to the printer, who uses it to mix the ink formula.

An alternative to picking multiple spot colors is to convert each Pantone color to screen-tint percentages and print it as a process color, using CMYK inks. The Pantone Process Color Simulation Guide shows each solid-sample next to the closest match produced with Pantone’s recommended screen percentages and approved inks (see Figure 1). Some colors are closer than others — because of the limitations of CMYK inks, not even Pantone can always achieve a perfect match.

Pantone licenses its system to third parties such as Letraset, which markets a line of matching colored papers, markers, and transparent films. More recently, Pantone has popped up in color software and output devices for the Macintosh. The list of licensees is growing rapidly and includes programs such as Illustrator 88, FreeHand, PageMaker, QuarkXPress, PixelPaint, and Letraset’s Studio applications. The first printers to implement the Pantone system are the QMS ColorScript 100 and Oce’s Color PostScript Printer.

For the Mac, Pantone offers 736 of the colors in its 747-color library — some of the high-intensity (fluorescent) and metallic colors aren’t included. Only values for coated stock are used, because of their popularity in color work. When Pantone licenses its color system to a hardware or software company, it provides that company several sets of numeric values, called lookup tables. These include RGB values for displaying Pantone colors on your monitor, a general set of CMYK screen percentages, and specific CMYK screen percentages for Pantone-licensed output devices such as the ColorScript 100. Some software vendors (Quark, for
They just won't fit onto one page. This is the Image Club PostScript Typeface Library. 600 licensed "brand name" typefaces compatible with your Mac or PC and any PostScript printer. The type face is available in full disclosure, complete with character sets and complete families as illustrated here or in the entire library of 400 fonts (a price list is available from the Image Club). Desktop Typewriter

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example) incorporate these values into the main program; others store them as a separate file (such as FreeHand's PANTONE Colors file) that the program accesses when needed.

For many users, the mere mention of Pantone's name in a Mac application inspires trust in the resulting color accuracy. Unfortunately, the truth is that Pantone colors can vary wildly from program to program, monitor to monitor, and printer to printer. Some, but not all, of these problems are beyond Pantone's control. Variables such as paper color and quality, equipment condition, screen-tint values and angle, dot gain, quality of ink, ink flow, registration, ink-printing order, and poor pressmanship have always affected traditional printing. Moving to the Mac adds problems with scanners, monitors, and imagesetters.

Pantone also has a few quirks in its specifications for screen values and printing order. For example, its original RGB values were determined on a PC with a Mitsubishi monitor, which has a different phosphor color than the Sony Trinitrons that populate the Mac world. The inks are printed in YMCK order in the Pantone Process Color Simulation

**Figure 2: Screen Display**

<table>
<thead>
<tr>
<th></th>
<th>160C</th>
<th>190C</th>
<th>305C</th>
<th>2577C</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuarkXPress 2.12</td>
<td></td>
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<tr>
<td>PageMaker 3.02CE</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FreeHand 2.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illustrator 88 1.9.3</td>
<td></td>
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</tr>
</tbody>
</table>

The same Pantone color can vary wildly in appearance from program to program, depending on how the developer implements the Pantone data. Even programs from the same company, such as PageMaker and FreeHand, may display different hues for the same color.
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CMYK is the traditional method of printing process colors and laying down the inks in a different order can change a color's appearance. In addition, Pantone doesn't specify any screen angles, which also affect color accuracy. The company has promised updated guides and new tools to help straighten everything out, but for now we're on our own.

What You See

Computer color travels one road to the monitor and another to the printer. Several problems contribute to the differing appearances of Pantone colors on-screen, ranging from how well a monitor is calibrated to how a company uses the licensed color values. Some developers use Pantone's RGB values as-is to display colors, while others try to improve color accuracy by reverse-engineering the RGB values from the supplied CMYK percentages. The upshot is that the same Pantone color can vary greatly in appearance from program to program (see Figure 2).

Monitors display Pantone colors differently, depending on their voltage, voltage, etc.

Printing a Pantone color can be even more problematic than viewing it. Each sample was printed from QuarkXPress 2.12 (the Linotronic sample was printed from Illustrator 88). The QMS ColorScript is a Pantone licensee and uses PostScript screen values for output. The Tektronix Phaser, a QuickDraw printer, uses proprietary screen values and more brilliant dyes. The Mitsubishi prints dye-sublimation technology, which produces smoother output with no dot patterns. The Linotronic 300 is a high-resolution imagesetter that can output four-color separations directly to film, as was done in this case.
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POWER TOOLS

temperature, phosphor set, and gamma curve. New color-calibration devices can help, but there is debate over how much relief they actually bring (see the “Color Calibration” sidebar in "Color Transformations" in this month's "Buyer’s Guide" and "Between the Lines," March '90). Furthermore, about 10 percent of Pantone's hues are outside the color gamut that the screen can display and can only be approximated.

Programs such as Illustrator and FreeHand, which are based on progressive colors, can also wreak havoc with Pantone colors. These programs let you adjust screen colors to match printed CMYK swatches. Unfortunately, these alterations affect all the program's color information, including the displayed values for Pantone colors. Instead of adjusting the progressive colors, you have to use the screen color as a rough guide and pick your final colors by using one of Pantone's printed guides.

To ensure the best color match, be sure your program uses the current implementation of Pantone's RGB values. Pantone has a corrected set of RGB values for the Sony Trinitron in its Pantone Electronic Color Systems Licensee Manual, which should be in the hands of developers by now. A quick call to your application's tech-support staff can confirm this.

What You Get

Printing a Pantone color is even more problematic than viewing it. A major factor is whether you're using spot colors or CMYK simulations for four-color printing. For example, in the new guide, Pantone 160 (brown) is listed as 0c/60m/100y/34k. This value is correct in the latest versions of many programs, including Illustrator 88 1.9.3, QuarkXPress 2.12, FreeHand 2.01, and PageMaker Color Extension. However, previous versions of these programs may have the wrong values (QuarkXPress 2.11 uses 0c/55m/100y/30k). To be on the safe side, always check a program's screen-tint percentages against the Pantone guide when converting colors to CMYK. If they're different, use the guide to select the correct percentages.

Pantone-licensed printers, such as the ColorScript 100, have a separate set of calibrated CMYK screen tints. All the programs mentioned above produced similar results when printing Pantone 160 to the ColorScript. However, none of them matched the color shown in the Pantone Process Simulation Guide. One reason is the difference in lines per inch. The Pantone data is based on 150 lpi; printing at a lower resolution, such as 60 lpi, alters a color's appearance. In addition, the CMYK dyes used by printers such as the ColorScript may look radically different than the CMYK inks used on the printing press. Screen angling also affects color. For example, QuarkXPress uses a 45-degree screen angle to produce better color and avoid

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Goodbye NTX, Hello NTQ

If you already own an Apple LaserWriter, you’re in luck. With a LaserMAX MX6 controller you can boost your resolution from 300 dpi all the way up to 800 x 800 TurboRes for Near Typeset Quality.
the distracting moiré pattern displayed by programs such as Illustrator.

Finally, the same Pantone 160 can produce still different results when printed to final film on an imagesetter. When I had a service bureau print film and measure it with a densitometer, both QuarkXPress and FreeHand came out with percentages of 0c/55m/100y/28k. In my case, the service bureau was printing from older versions of the programs, so make sure yours has the most current versions of your applications.

Ask the service bureau to verify the screen percentages of Pantone colors with a densitometer.

Even with the correct screen values, accurate Pantone color depends on the actual tints used for printing. If the imagesetter is not calibrated correctly, the 60-percent screen required for magenta may wind up being only 55 percent. Similarly, some programs compensate for imagesetter dot gain and others don’t. Dot gain alters colors by increasing the thickness of the printed dot — turning a 10-percent screen into 12 percent, for example.

**Possible Futures**

Obviously, Pantone is not a panacea for your color ills, despite the marketing hype — there are simply too many variables.

Obviously, Pantone is not a panacea for your color ills, despite the marketing hype. There are simply too many variables, and Pantone is still ironing out the kinks in its computer implementations. But with the help of Radius, Pantone is taking steps to ensure that all licensees can immediately implement any changes in its color values. The two companies have developed the Pantone Precision Color Toolkit, a system resource that serves as a library for Pantone color data. Applications use the Toolkit as their single source for RGB values and CMYK screen percentages. You can update all your programs at the same time by replacing the resource. The Toolkit lets you select a monitor and display card whose particular specifications have been factored into getting the best Pantone colors on-screen. The Toolkit ships with the Radius PrecisionColor Calibrator and will be bundled with future releases of Pantone-licensed software.

Even with these improvements, however, critics contend that Pantone has too few colors, and that they are chosen for their popularity rather than for accurate transitions between color steps. There are matching systems based on the science of color, which has been researched for decades by standard-setters such as the International Commission on Illumination (CIE, for Commission Internationale de l’Eclairage). Because color is made up of light waves, with peaks and valleys (reflectance curves), researchers can plot color mathematically. Every color’s curve is unique, so the values can be used to obtain accurate matches in paints, textiles, plastics, and ceramics.

Tektronix uses CIE-based data for TekColor, its color-fidelity dev that helps you choose screen colors that have exact matches on your printer (see “The TekColor Solution” sidebar in “Color Transformations” in this month’s “Buyer’s Guide”). A newcomer to the market, Color Curve Systems (Minneapolis, Minnesota), has a set of color guides similar to Pantone’s. The Color Curve System is more scientific than Pantone’s, offering 2,185 graduated colors based on CIE data. It currently provides no support for CMYK simulations or Mac software, however.

As objective and scientific as these systems sound, remember that printing isn’t controlled by computers and remains a subjective craft. You still need pressmen adjusting the fine flow of ink with their hands, eyes, and experience. Despite its shortcomings, Pantone has stood the test of time as a color-matching system for the printing industry. If the Pantone Precision Color Toolkit solves some of the current problems and is readily available to everyone, it may provide a similar standard for the Mac.

Steve McKinstry is president of DPI (Digital Publishing Integration), a consulting agency in San Francisco, California. He was a pioneer in desktop color prepress technology during his tenure as design director for Macintosh Today. He lives in Anacortes, Washington.
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Getting It on Film

More and more desktop publishers are turning to service bureaus for the film used in both color and black-and-white printing. Producing high-quality film requires an attention to detail that can tax even the most seasoned PostScript service bureau. The imagesetter must be well maintained, and it must produce output that is both accurate and consistent. Even with years of experience in putting high-resolution text and graphics onto paper, a shop still might not be able to handle this kind of demanding work (although the staff may tell you differently).

By asking a few questions about the equipment and services, you can assess a service bureau’s capabilities and decide whether it can satisfy your output needs. Here are some suggested questions and the answers you should receive. If the staff won’t or can’t answer these inquiries, it’s probably not a high-quality shop.

**Can you show me some samples of your work?**

A professional service bureau should keep a portfolio of output samples to show potential clients. The portfolio lets you see the kinds of work it is doing and determine whether it has the type of experience you require.

**What resolutions can your machines handle?**

Any shop serious about gray scale and color has imagesetters capable of printing at least 2,500 dots per inch, although you may not need such high resolution for some jobs.

**Do you own a densitometer?**

If the service bureau does, make sure it’s used regularly. A densitometer is an optical device that generates density readings from film. Using one is the only way a service bureau can determine the accuracy and consistency of the gray values its machines produce. A densitometer can tell you when a 10-percent gray is really 12 percent. Without this essential accuracy check, you risk output that is too light or too dark and colors that are, well, wrong. (Remember, the gray levels on film determine how much ink will be used to print a particular color.) If the answer to this question is “no” or a blank stare, find another service bureau.

**Do you calibrate your imagesetters regularly?**

Again, the answer should be “yes.” Every imagesetter is unique and requires calibration at regular intervals. First, the imagesetter must be working properly and providing consistent output. Then the operator must take densitometer readings, because there are always discrepancies between the gray values requested and what the imagesetter produces on film. After determining what the differences are, the operator can compensate for them by adjusting the transfer function of the relevant applications or printer-description files.

**Do you have equipment dedicated just to film, or do you switch back and forth between paper and film?**

A machine properly calibrated to work with paper must be recalibrated for accurate film work, because paper and film have different densities. If the service bureau is switching between paper and film on a single device, make sure the staff is taking the necessary precautions — such as recalibrating the imagesetter, altering its density setting, or

---

**Figure 1: Calibration Strip**

To assess the quality of a service bureau’s imagesetter, have the shop print a calibration test strip, which you can easily construct in Adobe Illustrator or Aldus FreeHand. Once the film has been processed, have the operator take a densitometer reading for each gray value, including 100-percent black. The density of black in the film is called its D-max and should be at least 3.8. Keep track of those densitometer values, along with the date and location of output. You can compare the results with those from other service bureaus, or print the file again later to check the consistency of a machine’s output.
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What kind of film processor do you use, and is it carefully maintained?

The processors for developing imagesetter film come in two flavors: replenishing supply and recirculating. Replenishing-supply processors provide the most consistent quality, because they’re always running fresh chemicals through the system. In contrast, recirculating processors yield varying results depending on the age of the chemicals, which are changed at regular intervals. Recirculating processors can still give you decent film quality, but beware of the service bureaus that blindly adjust speed and density controls to compensate for aging chemicals.

Do you own a color-proofing device?

You should always proof color film. If your service bureau can provide color proofs, you save both time and money. Low-resolution color printers such as the QMS ColorScript 100 and Tektronix Phaser CPS can generate only rough proofs for composition and color. The most accurate way to preview what you will see on the printed page is to generate a proof from the actual four-color film.

A service bureau should keep a portfolio of output samples to show potential clients. This lets you determine if it has the experience you require.

Do you inspect your film before sending it to the client?

Believe it or not, many shops run film and ship it off without examination. A high-quality shop first inspects all film for scratches and light leaks. With four-color separations, it also overlays the film layers on a light box and checks for registration problems. If you experience any of these film problems, your service bureau should rerun the job at no cost to you.

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<th>Our Price</th>
<th>SIMMs (continued)</th>
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*Published prices in Computer Shopper 2/90
POWER TOOLS

produced by the imagesetter. Laminated match prints are much more accurate for color viewing than overlay-type proofs, or color keys.

Tips for Successful Four-Color Work

- Before generating color separations at a service bureau, check with your printer. After all, the film is totally useless if it can’t be printed on paper. Ask about line-screen frequencies and film sizes. Many printers require film sheets of a certain size for use with their pin-registration systems. If your film is the wrong size, the printer may have to re-contact the imagesetter film at an additional cost to you. If your printer has never worked with imagesetter film before, provide a sample and ask for feedback. If there are problems, this is when you want them to surface, not at press time, when the costs can be prohibitive.
- Unless you’re a color-separation expert, allow yourself plenty of time for surprises. Even when you think you’ve covered every detail, unforeseen problems will show up, especially in deadline situations.
- For best results, all four films for a color job should be run at one time, without breaks, to help ensure accurate registration and consistent densities among the plates.

Not every service bureau needs to meet the strict requirements for quality film output. Printing simple text and line art is not as demanding as dealing with color separations, although you should still expect a well-calibrated and maintained imagesetter. If, however, you require four-color separations, look for a quality shop and expect to pay extra for the added expertise.

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Sharing: From Apples to Alligators

Is it UNIX or is it AppleShare? Only your Gator knows for sure. Cayman’s GatorShare puts NFS servers on the Mac desktop.

Cayman Systems’ GatorBox is a router that lets Macs on LocalTalk networks communicate with a variety of devices on an Ethernet network. It supports Apple’s EtherTalk protocols as well as the TCP/IP protocols common to UNIX machines. The GatorBox is an “intelligent” device with its own CPU and RAM. Cayman also offers downloadable software packages that enable GatorBox to perform additional tasks. The first of these, GatorShare, is currently the only gateway product that lets Mac users access UNIX’s NFS (network file system) by using standard AppleShare client software. I tested the GatorShare-GatorBox duo in action and found that they deliver on their promise (albeit with some significant rough edges) of providing routing and NFS-to-AppleShare translation in a single self-contained device.

NFS is a distributed file system that lets networked UNIX users freely share files. NFS is implemented on top of the TCP/IP “stack” of protocols, and it is available on computers ranging from Crays to PCs.

Macintosh users and system administrators in medium-to-large-sized computer networks often must connect AppleTalk networks with TCP/IP Ethernet networks. Creating such an internetwork enables users on dissimilar networks to share files and printers and to exchange electronic mail. Be forewarned, though, that connecting TCP/IP and AppleTalk networks can be a hairy experience. If you wish to use GatorBox and GatorShare to connect to an NFS server, be sure you fully understand TCP/IP networking terms, have a detailed understanding of your current network environment, and have some experience with UNIX system administration.

The GatorBox gives Mac users access to TCP/IP services by providing a gateway between TCP/IP and AppleTalk. When loaded with GatorShare software, the GatorBox is capable of translating between AFP (AppleTalk Filing Protocol) and NFS. AFP lets you log on to and access files on an AppleShare server. Once GatorShare is installed and configured, you can access NFS servers just as if they were AppleShare servers. You don’t need to install any additional software on your Mac; client software for accessing AppleShare servers comes with the Mac’s system software.

Getting Started

If you are a new UNIX system administrator and need to learn the intricacies of TCP/IP internetworking, you’ll find that both GatorBox’s and GatorShare’s documentation leave much to be desired. Although the manuals state that you should already know TCP/IP and AppleTalk network administration, they don’t tell you where to find more information. Despite this deficiency, a decent checklist of essential information provides a starting point.

If you’re familiar with the installation of networking software and have a handle on UNIX system administration, the Cayman documentation suffices, although the step-by-step introduction is confusing and there is too

By Vernon Keenan

Figure 1: GatorShare translates from LocalTalk AFP to Ethernet NFS faster than the GatorBox routing software routes AFP from LocalTalk to EtherTalk.
much repetition between the GatorBox and GatorShare manuals. The GatorShare documentation should be clearly supplementary to GatorBox's. The troubleshooting appendix is quite good, however. Overall, the documentation, combined with the diagnostic software and Cayman's helpful technical support, can help to identify most installation problems. If you already have NFS servers on your Ethernet network, GatorShare's installation is straightforward. The GatorBox is connected to the LocalTalk and Ethernet networks, and a single Mac is designated to support the GatorBox. The GatorBox's essential software, GatorKeeper, is stored in a folder on the administrator Mac and is automatically downloaded when the GatorBox is rebooted; the Mac must be turned on, connected to the GatorBox's LocalTalk network, and have GatorKeeper running to reboot successfully. A UNIX host can also act as a boot server for the GatorBox. This booting scheme is unfortunate, because it relies on the boot server's being available at all times. It would be better to have the software download to the GatorBox once and remain there, battery-backed, until the next software upgrade. Shiva's EtherGate is an excellent example of this type of approach.

The GatorKeeper software uses a nonstandard and somewhat unintuitive iconic user interface to configure the myriad parameters needed to run GatorShare (see Figure 2). GatorKeeper has several useful status, load-average, and diagnostic functions in addition to its configuration abilities. After you save the configuration, restart the GatorBox with the new setup. After a one-minute reboot cycle, you can verify the presence of the NFS server by checking for an AppleShare server in the Chooser.

Using GatorShare
I used the NFS-server capabilities of a NeXT computer in the MacUser NetworkShop to test GatorShare. After I got the NFS server to operate, GatorShare worked as expected. I used the AppleShare icon in the Chooser to access and mount directories that were being exported by the NeXT server.

I had some initial difficulty getting NFS installed properly on the NeXT

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system. Fortunately, GatorKeeper's built-in diagnostics let me view detailed error messages that came from the NeXT. They confirmed that the basic connection was fine but that I needed to fix an export problem on the host computer.

After everything was properly installed and the NFS server volume appeared on the desktop, GatorShare correctly emulated an AppleShare server, with a few pesky exceptions. GatorShare doesn't allow special Mac characters, such as ~ and ` to be used in the names of files and folders. The / character is also illegal, because it's the directory pathname separator in UNIX. This can be an important limitation if you want to use the NFS server as a generic backup device. I was surprised that GatorShare didn't map the special characters into ones that could be used on the UNIX system.

Another major problem turned up when I tested GatorShare with 4th Dimension file-server tests, and nearly all the multiuser file-sharing tests failed. I was able to get NCSA Telnet to operate from LocalTalk through the GatorBox's TCP/IP translation service, however.

How Fast Is a Gator?

When a Mac, an NFS server, and a GatorBox are on the same Ethernet network, only GatorShare's gateway function is used. This introduces a marginal

Report Card

GatorShare


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Copy in g a 2-megabyte l ile from an App leShare serv er on El herTalk to a Mac cli ent on EtherTalk takes 31.5 se con ds. It takes 61.5 seconds to copy the same file from the NeXT NFS server to the EtherTalk Ma cintosh cli ent. The ad ditional overhead com es from the Gator­Share gateway.

When a Mac on LocalTalk com muni cates with an NFS server on Ether net, the stor y changes. If a LocalTalk Mac com muni cates with an NFS server on Ether­net, GatorShare’s gateway (not Gator­Box’s router function, as one might expect) is used. Copy in g a 2-megabyte file from an Ethernet NFS server to the LocalTalk Mac cli ent via GatorShare takes 149 seconds; copy in g from an AppleShare server on Ether­Talk via the GatorBox takes 158.5 seconds. See mingly counterin teruitive, routing between LocalTalk and EtherTalk with the Gator­Box is slow er than GatorShare’s trans la tion of LocalTalk AFP to Ethernet NFS.

The speed of GatorShare de­pends on how you use it. For straight Ethernet work, there’s roughly a 50-per­cent per­formance hit because of the translation. But you’re paying for the GatorBox, whether you use its routing capability or not. If you use the routing function, don’t ex­pect to win any speed medals.

GatorShare is currently the only Local­Talk-to-Ethernet gateway product that trans­lates the NFS file-service protocol to AFP and back again. The manual — not the greatest — is workable, especially if you’re experienced with complex networking products. The diagnostic software is helpful in pinpointing problems. The filename limitation will be a problem for some users, but we found the lack of support for byte-range locking to be more significant — it means you can’t use GatorShare to support multi­user Mac applications.

Many of these drawbacks will soon be­come moot, however. GatorShare 1.5 and GatorKeeper 1.5 should be available as you read this. The major changes to GatorShare will be full support for byte-range locking and remapping of Mac-specific characters for NFS servers. GatorKeeper will be changed to make administration easier. You will be able to designate a Mac on EtherTalk as the “boot Mac,” which wasn’t possible with version 1.4.1. Cayman will also supply an INIT that loads the necessary software to the GatorBox without GatorKeeper’s running on that Mac. You will also be able to designate a boot Mac on another network, making possible the administration of an Internet from a single Mac.

My conclusion? GatorShare lets users mount NFS volumes just like AppleShare’s, enabling them to access data on a UNIX system in a completely natural way. Noth­ing else currently does this, so if you want to get at NFS servers through the familiar AppleShare software interface, GatorShare is the product to buy.

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With A/UX 2.0, Apple has finally provided us with the UNIX we’ve been waiting for.

A/UX has long been pigeonholed as the ultimate user-unfriendly hackers-only operating system. Apple’s initial UNIX implementation, A/UX 1.0, ran on a Mac — but to a large extent, it still behaved like UNIX.

A/UX 2.0 looks like a Mac, acts like a Mac, runs Mac applications, and is a complete UNIX to boot. Apple has delivered a system that complies with all the important UNIX standards and runs Mac applications, so you get the best of both worlds.

Look and Feel

When you start it up, A/UX 2.0 looks like a Mac running MultiFinder. The Finder’s desktop shows up, the Apple menu and other standard menus appear, as do both Mac and UNIX volumes. Unless you look carefully, you can easily mistake an A/UX 2.0 system for a “normal” Mac. You can launch Mac and UNIX applications and switch between them as easily as you would under MultiFinder. You can even select printers and AppleShare servers from the Chooser. Mac applications run under A/UX 2.0 with no perceptible performance loss. The integration of UNIX and the Macintosh interface is impeccable.

A/UX 2.0’s “emulation” of the native Mac operating system is based on System 6, but it already has a few System 7 features. The A/UX MultiFinder offers Set Aside (the ability to make all the windows and dialog boxes associated with an application disappear), and it uses the Desktop Manager to manage Finder icons for applications and documents. All Mac software that is to run under System 7 must be “32-bit clean,” which goes for A/UX 2.0 as well. But, in contrast to the initial A/UX, this A/UX lets you run almost any Mac software that is 32-bit clean, including INITs and cdves. You won’t have to give up your favorite Mac enhancers under A/UX 2.0.

Three Windows and a Desktop

With the new version of A/UX, you can run three distinctly different types of applications simultaneously (see Figure 1): vanilla-UNIX applications, Mac applications, and X Window applications (if you have the X Window system for A/UX, you’ll need an add-on for A/UX 2.0). So-called hybrid applications — UNIX applications that make Mac Toolbox calls — will also become available. Brown University’s Intermedia is such an application.

You can copy and paste text among these different types of applications. There’s no support in A/UX for cutting and pasting bit maps or PICT files, but with a Mac screen-capture utility, you should theoretically also be able to cut graphics from UNIX and X Window applications and paste them into a Mac app.

The integration of UNIX into the Mac paradigm is very good, but for some tasks, the “normal” text-oriented way is the only way to get something done. Happily, A/UX comes with all the standard UNIX utilities. Three different shells (Bourne, Korn, and C) are available, as are the numerous standard UNIX text-editing environments. But for those who like to be as Mac as possible, A/UX 2.0 offers nicer alternatives. TextEditor is a Mac editor based on the MPW (Macintosh Programmer’s Workshop) editor and can be used instead of vi (or any other UNIX editor).

More importantly, though, the many UNIX utilities have a friendlier facade with A/UX 2.0. Another MPW spin-off, Commando, lets users build UNIX command lines by selecting familiar check boxes and radio buttons. Each UNIX utility has its own custom Commando interface. Once you’ve made all your selections, Commando creates a syntactically correct command line and passes it to the UNIX shell. Commando is a great solution for users who want the powerful features that many
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UNIX utilities offer but don’t use them often enough to warrant learning the esoteric syntax.

Another example of the seamlessness of A/UX 2.0’s environment is its handling of different file systems. Mac HFS volumes show up on the A/UX Finder desktop as do AT&T and BSD UNIX file systems. All the different UNIX file types now have their own icons in the A/UX Finder. Mac floppies appear on the desktop like any other volume. Apple File Exchange can run under A/UX 2.0 to support DOS file transfer, and with Dayna’s DOS Mounter INIT, you can mount four file systems on your A/UX 2.0 desktop and move files among them transparently.

---

**And It’s Really UNIX**

All this talk of a nicer user interface and seamless Mac integration might lead to the conclusion that compromises were made on the UNIX side. Not so. A/UX 2.0 is based on AT&T’s System V Release 2, Version 2. It incorporates BSD 4.3 extensions and is POSIX-compliant. Applications that run in these standard environments can be ported with ease to A/UX, because the necessary development tools are included.

Two other A/UX 2.0 features include NFS 3.2, for remote file sharing, and Berkeley Network Services, which provides remote log-in, execution of UNIX applications, and E-mail. A/UX can communicate over either LocalTalk or EtherTalk. TCP/IP is also supported, over either Ethernet (the same card can be used for EtherTalk) or over serial lines with SL/IP.

Several applications, both Macintosh and UNIX, are proven performers under A/UX 2.0. Word 4.0, Excel 2.2, Wingz, and More II all run. IPT’s uShare, an AFP server that runs on UNIX systems, works as well, offering another way to share files with non-A/UX Macs.

A/UX 2.0 will be available from A/UX-authorized dealers by midyear. For the first time, A/UX will be distributed on a CD-ROM disc, along with the necessary floppies to install it on a hard disk. It will also come as a system bundle with several different CPUs, an 80-megabyte hard disk, or on a 40-megabyte QIC-100 tape.

A/UX 2.0 is a tremendous leap forward — at last. Apple has provided us with the UNIX we’ve been waiting for.

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Apple File Exchange (AFE) is one of the utilities that comes with the Mac System. AFE offers a simple interface and works with a wide variety of data transfer methods. Its best feature is that it works with current and future Macintosh Plus translators. By itself, its translators are limited to Macintosh (System) and AppleTalk (System). Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

Apple PC 5.25 is a drive that connects to the Mac and reads 5.25-inch DOS floppy disks. Unlike most Mac drives, this one doesn’t show up on the desktop. Access to DOS files is through Apple File Exchange. Requires Mac plus 512K, hard disk, and Apple Drive. $399.95. (Version 3.1) Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

AppleShare is the file-sharing software that Apple bundle with its computers. AppleShare requires you to dedicate a Mac and a hard disk to it. All files located on the network to protect them from other users on the server level. Interface to network is provided at a revised Finder. $799. (Available: AppleShare Print Server, Version 2.0. Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

AppleSharePlus is a software bundle that lets you share data with other Macs. It includes AppleShare Print Server and Command (System). Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

Charity Share is a file-sharing software that lets you share data with other Macs. It includes AppleShare Print Server and Command (System). Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

DaynaFile is a site-to-site computer backup system. DaynaFile provides real-time recovery of data on up to 100 Macs, including Mac users, AppleTalk networks, and PC users. DaynaFile is provided as a government. $365. Absolute Software, 3142 Vista Way, Suite 400, Orange, CA 92865. (Jan 90)

Desktop Express is a simple-to-use, automated communication program for using MCI Mail and Novell NOS. Performance is faster than other programs and can be used by one or more users. Requires Mac SE or NuBus slot. Drive, $299; board, $129. Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

Desktoi Share is a file-sharing software that lets you share data with other Macs. It includes AppleShare Print Server and Command (System). Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

Liaison is a site-to-site computer backup system. Liaison provides real-time recovery of data on up to 100 Macs, including Mac users, AppleTalk networks, and PC users. Liaison is provided as a government. $365. Absolute Software, 3142 Vista Way, Suite 400, Orange, CA 92865. (Jan 90)

LinkPlus Mac is a Mac-to-PC drive that connects to the Mac and reads 5.25-inch DOS floppy disks. The drive connects to a Mac/SCT card and appears on the Mac as a hard disk. Requires Mac Plus, hard disk, and Desktoi Share. $359. (Version 2.3) NIT (Nov 89)

Liaison is a site-to-site computer backup system. Liaison provides real-time recovery of data on up to 100 Macs, including Mac users, AppleTalk networks, and PC users. Liaison is provided as a government. $365. Absolute Software, 3142 Vista Way, Suite 400, Orange, CA 92865. (Jan 90)

MacLinkPlus/PC offers more Mac-to-PC connectivity than MacLink. MacLinkPlus offers connectivity between the Mac and PC applications when this version is used. Requires Mac Plus, hard disk, and Desktoi Share. $359. (Additional modules now available: Inventory Control, Version 1.0.1. Time Billing, Version 2.0.1. NIT (Nov 89))

MacMonitor is a Mac-based AppleTalk bridge for connecting two local networks. This network bridge is designed for users who have had problems with network protocols. Requires Mac Plus and System. $50. Macintosh Software, P.O. Box 31337, Hartford, CT 06103. (203) 223-5911. NCP (Aug 89)

Micphone II is a high-powered terminal program that’s easy enough for novices. Very powerful and complete, it will allow full automation of communications if desired. Requires AppleTalk, Mac, and System. Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348. (404) 411-1617. NCP (Jan 89) * 15 Edy

MicroStation is a relational database management system that’s easy enough for novices. Very powerful and complete, it will allow full automation of communications if desired. Requires AppleTalk, Mac, and System. Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348. (404) 411-1617. NCP (Jan 89) * 15 Edy

MicroTerm/pcAnywhere III are programs that work together to take control of an MS-DOS machine from the Mac keyboard. Version 3.0 of MicroTerm/pcAnywhere III offers more translations between more PC and Mac applications than does any other application. Interlace is friendly, and its users can’t be modified, which forces you to reduce connect-time costs. Requires 1 megabyte: NCP (Aug 89)

Novell, 122 E. 1700 S., Provo, UT 84606. (800) 545-4034. NCP (Aug 78) * 10 Edy

Packet Joey is a software-based Apple Talk bridge for connecting two AppleTalk networks. It allows Mac links to be connected to another AppleTalk network. Requires Mac Plus, hard disk, and Desktoi Share. $399. (Version 1.05) Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

Packet Joey is a software-based Apple Talk bridge for connecting two AppleTalk networks. It allows Mac links to be connected to another AppleTalk network. Requires Mac Plus, hard disk, and Desktoi Share. $399. (Version 1.05) Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

PC Connect is a Mac-based AppleTalk bridge for connecting two local networks. This network bridge is designed for users who have had problems with network protocols. Requires Mac Plus and System. $50. Macintosh Software, P.O. Box 31337, Hartford, CT 06103. (203) 223-5911. NCP (Aug 89)

Rapport/Drive 2.4 is a connected/drive combination. When the Rapport connector is attached to the external disk-drive port of a Mac Plus or SE, it allows MS-DOS 3.5-inch disks to be inserted into the Mac’s internal drive instead of through Apple File Exchange. Drive 2.4 is a simple-to-use, external drive that connects to the Rapport connector. Rapport, $299; Drive 2.4, $495. Kemptech Technology, 120 A Halfway Lane, East Gales, CA 93510. (800) 552-1226 or (408) 522-7600. NCP (Nov 89)

Red Ryder is a full-featured telecommunications program that supports Maxis, Modem, and Kermit. It has big-screen support, a procedure creator, and up to 16 keyboard macros. Version 10.3 reviewed. $99. The FireSoft Company, 150 Hickory Drive, P.O. Box 940, PA 15010. (412) 460-2700. NCP (Jan 89) * 37 Edy

Smartcom II is a basic terminal software that allows for different terminal applications and has a powerful command language. The last version available can keep up even at 9,600 baud. The language supports Modem, Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348. (404) 411-1617. NCP (Jan 89) * 15 Edy

Remote Pro is IBM PC compatible that includes a Mac monitor. The serial update will be available as well, but this version has some quirks. The PC-to-Mac translators are limited to Mac, which means that it will not be able to connect to other Macs. Requires Mac Plus, hard disk, and Desktoi Share. $399. (Version 1.05) Apple Computer, 20025 Mariann Ave., Cupertino, CA 95014. (Oct 89)

TOSPs is a file server designed to network computers with different operating systems. Supports Macs, MS-DOS, and UNIX. Access to files and directories is transparent to the user; they appear as Mac folders. Only handles ASCII or Text files. Requires Mac SE or SE compatible with MacTalk. Version 1 available to MacTalk customers. MacTalk users can keep up even at 9,600 baud. The language supports Modem, Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348. (404) 411-1617. NCP (Jan 89) * 15 Edy

UnixTalk is a TCP/IP terminal program with several special features. Does one of the best V.42bis emulations available and specializes in fax communications. Requires Mac SE or compatible with MacTalk. Requires 1.25K. $395. (Version 3.0 now available) Synergy Software, 2457 Perkiomen Ave., Reading, PA 19606. (610) 728-7593. NCP (Nov 89)

DATABASES

DataBase is an excellent file-manager in a DA. Handles pictures, text, spreadsheets, and databases. Requires 68020 and Infopreserved system, but other files. Version 1.12. Requires 512K or later. $129.95. Preferred Publishers, 5100 Poplar Ave., Suite 706, Memphis, TN 38119.

dBASE Mac is a relational DBMS that includes a structured programming language.
Double Helix II is a powerful database that supports a multiuser environment with capabilities for the development system for easy creation of databases. This database is a best-selling product with an upgrade. Uses an icon-based development system for all alternatives to menu commands without help novice users. Requires 6666. NCP (Feb '89). Associates. 2000 Hearst St., Berkeley, CA 94709. (415) 655-6666. (Feb '89)

EndNote is an OK flat-file manager. Biggest strength is its more than 100 forms templates that work with standard preprinted business forms. Version 2.0. Requires Mac Plus. $495. Miratel. 3420 Ocean Park Blvd., Suite 3020, Santa Monica, CA 90405. (800) 423-1020. (Apr '89)

FileMaker II is an OK flat-file manager. biggest strength is its 10 more than 100 forms templates that work with standard preprinted business forms. Version 2.0. Requires Mac Plus. $195. Microsoft Corp., 16011 N.E. 34th Way, Redmond, WA 98073-9717. (Nov '89)

FileMaker is a solid development-oriented flat-file manager, ideal for businesses environments. Has flexible layouts, hierarchical menus and a single window interface. Has a powerful search engine. Requires Mac Plus and two 800 K drives or a hard disk drive. $495. Claris. 201 Patrick Henry Drive, Santa Clara, CA 95050. (800) 258-3100. (Feb '89)

FileVision IV is a picture-oriented flat-file manager. The application of choice for graphic-text integration projects. Doesn't slack up well in straight text uses. Version 1.0. Requires Mac Plus. $495. Miratel. 3420 Ocean Park Blvd., Suite 3020, Santa Monica, CA 90405. (800) 423-1020. (Apr '89)

4th DIMENSION is a versatile tool that creates stand-alone relational databases. Design layout environments and easily retaining information. Robust. Includes a powerful search engine. Requires Mac Plus and two 800 K drives or a hard disk drive. $495. Claris. 201 Patrick Henry Drive, Santa Clara, CA 95050. (800) 258-3100. (Feb '89)


Panorama II is a relational database that can read unmodified dBASE III PLUS applications created in the MS-DOS world. Amazingly fast. Good import/export capabilities. Version 1.0. Requires Mac Plus. $249.50. Zenith Technology, P.O. Box 1050, Frederick, CO 80530. (403) 717-2861. (July '89)

FormSet is a collection of 66 business forms, including job estimates, shipping documents, and time cards, and forms that can be customized with company name and logo. A fill-in form includes data stamping, field calculation, and so on. $995. EncoreSoft. 1721 Pacific Ave., Suite 100, Oakland, CA 94607. (Jan '90)

Interleaf Publisher is a powerful page-layout program with 24-bit color. The program of choice for producing large compiled documents. Version 3.5 has an improved user interface, but still suffers from poor font management. Requires Mac Plus and 2 megabytes. $1,995. Interleaf, 10 Canal Park, Cambridge, MA 02141. (617) 577-9890. (Apr '89)


LetrTuck lets you add, delete, or modify the kern pair settings for any installed font. Version 1.0. Requires Mac Plus or later and hard drive. $95. SoftStream Corp., 2639 Campus Drive, Suite 425, San Mateo, CA 94403. (800) 663-8195. (Feb '89)

MasterKey-The Art Importer creates PostScript fonts containing up to 16 graphic characters such as special logotypes, and PICT and GIF graphics. As fonts, graphics can be used in programs that don't normally accept them, and viewing is as easy as changing the point size. Version 2.0. Requires Mac Plus and 5 Megabytes. $995. Adobe Systems, Inc., 3255 Market St., 6th Floor, San Francisco, CA 94111. (800) 642-4424. (July '90)

TrueForm creates an electronic form by scanning a preexisting page one or more times and editing it for use in other forms. Used for creating test score capabilities, automatic field definition, and capturing faster printing. The only forms package with a database-like interface. Version 1.0. Requires Mac Plus, $495. (Version 1.0 now available for $495, $395 educational) BlueSky Research, 334 S. W. Third Ave., Portland, OR 97204. (800) 642-3888. (Sep '90)

Textures is an implementation of TeX, the big daddy of typesetting programs. Good for people looking to maintain in the early days. Otherwise very sticky with a high learning curve. Version 1.0. Requires Mac Plus, $495. (Version 1.0 now available for $495, $395 educational) BlueSky Research, 334 S. W. Third Ave., Portland, OR 97204. (800) 642-3888. (Sep '90)

TrueForm is a major upgrade. Greatly increased power includes up to 100 new fonts, 126 pseudo-color, auto-true type, 147 color fonts. As fonts, graphics and shapes can be changed and expanded, and expanded text manipulation. Has a steep learning curve but is relatively easy to use once you get the hang of it. Version 1.0. Requires Mac Plus and 5 Megabytes. $495. Aldus. 411 First Ave. S., Seattle, WA 98104-2071. (602) 626-2375. (Apr '89)

MacUser May 1990 369
MiniFinder project is a popular collection of EPS art work. Requires 1 megabyte $99. Tactic Software, 3315 South Dixie, Miami, FL 33175.

Canvas 2.0 

Canvas 2.0 is a rich drawing/painting program, featuring fully Rendered curves, circle/polygon, polygons, pencil, and perspective viewing. It also supports 32-bit deep color, 16 million colors, 2D content, and the ability to save your creations in EPS format. Requires 1 megabyte, two SOOK drives or hard disk, and System 6.0. $299. Peerless Software, 335 N.W. 74th Ave., Miami, FL 33169. (305) 594-4960. (NCP Apr '89)

Clip3D 

Clip3D is a set of powerful 3D clip-art collections bundled with a powerful editing program. Images are in Pro3D format and provide exceptional output quality. On a Mac II, the D addition is 1.0 requires 1 megabyte $89 per package, including Clip3D editor. Enabling Technologies, 600 S. Deborou, Suite 1304, Chicago, IL 60612. (602) 427-0408. (NCP Apr '89)

Clipper 1.0 

Clipper 1.0 is a set of business-oriented EPS clip volume 2, Business letterheads and clip art. Each volume contains 14 clip art categories. Requires 1 megabyte $129.50. Dream Software, 4020 Page Ave., Los Angeles, CA 90031. (800) 676-5565. (NCP Apr '89)

Collectors Edition 1.0 

Collectors Edition 1.0 contains a useful assortment of dripguts, borders, and two edition 2.0 requires 1 megabyte $125. (New edition now available for $225) Adobe Systems, 1566 Charleston Road, P.O. Box 7900, Mountain View, CA 94030. (415) 329-7070. (NCP Apr '89)

Cricket Color Paint 

Cricket Color Paint is an 8-bit color paint program that retains Cricket Paint's FreshPaint features and has a few new tools. If you're looking for a seamless interface, stick with Canvas 2.0 or Stylus/8. Version 1.0. Requires Mac II or later, 2 megabytes, and System 6.0. (New release announced.) Computer Associates, 1165 Sorrento Valley Road, San Diego, CA 92121-1808. (213) 886-9903. (NCP Apr '89)

CA-Cricket Draw 1.0 

CA-Cricket Draw 1.0 is an object-oriented drawing program that will produce stunning, high-resolution art. Requires 1 megabyte and System 6.0 or later. $295. Computer Associates, 1165 Sorrento Valley Road, San Diego, CA 92121-1808. (213) 886-9903. (NCP Apr '89)

CA-Cricket Paint 1.0 

CA-Cricket Paint 1.0 is a monochrome paint program with a few interesting tools but not enough new features. It has a color dot matrix printer. FreshPaint is better. Version 1.0. Requires System 4.2 or later. $995. Computer Associates, 1165 Sorrento Valley Road, San Diego, CA 92121-1808. (213) 886-9903. (NCP May '89)

Crystal Paint 3.0 

Crystal Paint creates an electronic Banksy. This is Mac's Paintbrush minus all the visual, simple, yet wonderful application. Does not work on a Mac II. MacPaint friendly. Version 3.0 requires 1 megabyte $43.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. (800) 676-5565. (NCP Apr '89)

DeskPaint & DeskDraw 2.0 

DeskPaint & DeskDraw 2.0 is a set of DA graphics utilities. DeskPaint handles bit-mapped files, whereas DeskDraw handles paint files. Somewhat busier interface than some paint programs. Version 2.0 requires Mac II and System 5.0 or later. $129.50. DeskPaint, version 2.01c, DeskDraw, version 2.01b, and DeskPaint help desk, version 42, Tucson, AZ 85712. (915) 217-6520. (Jen Jul '89)

DigitArt 

DigitArt is a drawing/painting collection of EPS clip art available on disk and CD-ROM. Comes with a well-designed catalog of images. Requires a program that reads EPS files. $99. (Fifteen volumes noted to be available.) Best Friends Software, 1221 Magnolia Ave., Suite 3-B, Riverside, CA 92506. (714) 785-6805. (NCP Jan '89)

MacPaint 2.0 

MacPaint 2.0 is enhanced all the years. Supports multiple windows, design templates, and a magic eraser for corrections. It lacks free rotation and distortion options. Version 2.0 requires Mac II, compatible with Mac II Plus and Mac II. Requires 2 megabytes and System 6.0. $1495. Apple Computer, 1 Infinite Loop, Cupertino, CA 95014-2084. (408) 972-9051. (NCP July '89) 95-07 Eddy

MacMind Director 

MacMind Director is a feature-rich tool for creating color and black-and-white presentations. Object-oriented animation capabilities provide numerous creative options. Also MIDII input. Version 1.4 requires Mac Plus or later, hard disk drive, and System 6.0. $1495. Todd Land, Suite 468, San Francisco, CA 94107. (415) 442-6050. (NCP Sept '89)

MapMaker 1.2 

MapMaker 1.2 is a digital cartographer that charts demographic and marketing information. Extensive AutoTiler/Word color schemes — some at an additional cost. Version 3.0 requires Mac II, $349. (Version 4.0 now available for $395) SelectMicro Systems, 22262 Am Fritchie, Yorktown Heights, NY 10598. (914) 242-4670. (NCP Dec '88)

Metro ImageBase Electronic Art 4.0.0 

Metro ImageBase Electronic Art 4.0.0 is still a TIFF out program, but adds a few new features, but there's still room for improvement. Formerly Metro ImageBase, Version 1.4. Requires Mac II, color board and 2 megabytes: hard disk drive recommended. Version 6.0. $255.00 (NCP Jan '89)

MiniCAD+ 1.0 

MiniCAD+ 1.0 is well designed, including by incorporating a Facsimile-language, 3-D graphics, and a spreadsheet. Has a MacDraw-like feel, but added features compete with CAD. May have the best 3-D capabilities among low-cost CAD programs. Version 2.0 requires Mac Plus or later, hard disk drive, and System 6.0. 2 megabytes recommended. $655. Graphsoft, 3070 Coast Ave., Suite 202, Elliot City, Md 21043. (301) 246-0867. (NCP Sept '89)

Modern Artist 2.0 

Modern Artist 2.0 is still an interesting color paint program and has added a few new features, but there's still room for improvement. Formerly Modern Artist, Version 1.0. Requires System 4.2 or later, $149.50. (Version 1.2 now available for $149.50) MicroImages, 17430 Chatsworth St., Granada Hills, CA 91344. Version 1.0 requires 1 megabyte and hard disk drive recommended. $595. MicroSoft Technology, 485 Pohrno Ave., Sunnyvale, CA 94086. (800) 523-2464. (NCP May '89)

PixelPaint 2.0 

PixelPaint 2.0 is a professional-grade 256-color painting program with a good interface, practical tools, and special effects. Works with many tile formats. Four-color rendering, extendable palettes, and a simulated brush are included. Perfect for Star and Hotwok color scanners that has excellent 8-bit imaging. Version 2.0. Requires Mac II or SE, 64-bit color, and two SOOK drives or hard disk. $595. (Version 1.2 available for $595) Symmetry, 225 E. First St., Seattle, WA 98104-2871. (206) 628-2375. (NCP May '89) 96-4862

Pictorial Paint 

Pictorial Paint is not the equal of StudioPaint or PixelPaint, but it doesh offer a workable painting environment, multimedia capability, some interesting features, but limited power. Version 2.0 requires Mac II with color card, $399.50. (Version 2.0 now available for $149.50) Micronizations, 17430 Chatsworth St., Granada Hills, CA 91344. Version 1.0 requires 1 megabyte and hard disk drive recommended. $595. MicroSoft Technology, 485 Pohrno Ave., Sunnyvale, CA 94086. (800) 523-2464. (NCP May '89)

Pictorial Paint Professional 

Pictorial Paint Professional is the 32-bit descendant of the original Pictorial Paint. Interface sometimes hides the well-designed painting tools capabilities. Supports Mac II and Plus/Plus or later, 64-bit color, and color-tolerating and manipulating tools as well as anti-aliasing. Suits a few pixels but is a serious and necessary tool for digital artists. Version 1.0 requires Mac II, 64-bit color, and two SOOK drives or hard disk drive. Version 2.0 requires Mac II, 64-bit color and two SOOK drives or hard disk. $595. (NCP May '89)

PowerPaint 

PowerPaint is a professional-quality tool. Good color schemes. Can send presentations to Graphics to produce color slides. Version 2.0 requires System 4.1 or later, 1 megabyte, hard disk drive, and Mac Plus or Plus/Plus or later. $595. (New version available for $595) Symmetry, 225 E. First St., Seattle, WA 98104-2871. (206) 628-2375. (NCP May '89) 96-4862

PixelPaint 

PixelPaint is a professional-grade 256-color painting program with a good interface, practical tools, and special effects. Works with many tile formats. Four-color rendering, extendable palettes, and a simulated brush are included. Perfect for Star and Hottok color scanners that has excellent 8-bit imaging. Version 2.0. Requires Mac II or SE, 64-bit color, and two SOOK drives or hard disk. $595. (Version 1.2 available for $595) Symmetry, 225 E. First St., Seattle, WA 98104-2871. (206) 628-2375. (NCP May '89) 96-4862
**ShowCase F/X 1.1**
An animated-till package that provides several textual effects, including Aegis' own Pour fonts, to use for making title sequences or page borders. Requires 1 megabyte. Works on the Mac II and II+.

**Smart Art 1.1**
Is a 3D PostScript utility disguised as a DA. It creates special effects such as rotating images and a rotating object in a graphic file into any program. The main image always has 15 percent effects; future releases will include customizable graphic effects.

**VideoWorks II**
Is a full PostScript utility with a front-end interface. Requires Mac Plus and PostScript printer. $149.95 per volume.

**SuperPaint 2.0**
Is an easy-to-use animation program — the best available on the Mac. Has an overlay mode that acts as a slide show carousel for presentations. Works in color on the Mac II $195. Requires 1 megabyte and a 68000 drive. Version 2.02 now available for $295. Mac/ProMac, 410 Townsend St., #408, San Francisco, CA 94110. (415) 629-2672. (Oct 89)

**VideoWorks II Accelerator 1.1**
Compresses VideoWorks II images for faster and more efficient speed. Requires Mac II, 1 megabyte of RAM, and VideoWorks II. $95.

** replk**
A tool for converting Macintosh graphics to other formats. Requires Mac Plus and PostScript printer. $149.95 per volume.

**Virtual Visual No. 5**
Is a port of a DOS charting and presentations package. Excellent charting capabilities, including 3-D. More difficult to work on and is not as good as VideoWorks II. Requires Output Manager (included) to print to a slide maker. Includes four 'LiveTalker' sets, each with 100 slides. $59.95 per volume. (Now available for $59.95) Mac Plus. (Feb 89)

**Vivid Impressions**
Is a high-end color paint program. Requires Mac Plus, and PostScript printer. $130. Casady & Greene. P.O. Box 22770, San Jose, CA 95150. (408) 924-8586. (Apr 89)

**Streamline**
Is an animated-till package — auto-tracking package — auto-tracking in all it does. Can quickly produce nearly print-ready pages with tiny tweaking. Retains original images, including black-and-white values. For those who need professional quality output. Requires 300-ppi output devices. $395. Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94040-7950. (Nov 88)

**SuperD 1.0**
Is an excellent macromade program that also has impressive flip-frame animation capabilities. You’ll find an exchangeable library of special paint tools with 300-ppi capabilites, and a HyperCard playback utility (XCM). Version 1.0 reviewed. Requires Mac Plus or later. $149.95. Electronic Arts, 5440 Gateway Drive, San Mateo, CA 94406. (415) 572-2787. (Nov 88)

**Studio 6**
Is a professional-level color paint application for the Mac II. SuperD 2.0 offers improved interface performance and speed. Version 1.0. Requires Mac I or II and System 3 or later, 2 megabytes. $149.95 (RAM recommended). $195 (1 MB). (June 89)

**Overlay II 1.0**
Is a 3D PostScript utility for the Mac II that offers graphics enhancements, a 3D PostScript printer driver, and a PostScript-to-PDF converter. Requires 300-ppi output devices. Version 2.0 now available for $495. Silicon Beach Software, 5830 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126. (619) 693-6995. (Nov 89)

**SuperPaint 2.0**
Is the first update of the original paint/program. Some of the features include direct graphics manipulation, a clipboard, and a set of 300-ppi output devices. (Version 2.0 now available for $495.) Silicon Beach Software, 5830 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126 (619) 693-6995. (Nov 89)

**Swe3l 1.1**
Quickly turns scanned images into full color. Casts true shadows onto other objects and can project color graphics onto solids. Objects can be rotated and manipulated, and a selection of 2500 materials can be edited without any distortion. It can animate objects or fly your view through a scene, saving frames for playback. $495. Requires Mac Plus, and 8 MB floppy drives. $395. (Version 1.1 now available for $495) Paracomp, 123 Apple Drive, Santa Clara, CA 95051. (408) 456-9001. (Feb 89)

**TrueForm**
Is a full-fledged presentation program that supports resolutions exceeding 300 dpi, and eight-color support. A great program but not particularly fast. Version 2.0 reviewed. Requires Mac Plus. $195. Silicon Beach Software, P.O. Box 261430. San Diego, CA 92126 (619) 693-6995. (Nov 89)

**VersaCAD**
Is a powerful CAD program that doesn’t show any of its MS-DOS tools. Excellentternpt interface, manipulates full pictures, support. Library of standard symbols. Excellent fast and smooth. Requires 8 MB floppy drives and 1 MB hard drive. $21 now available) VersaCAD, 2124 Main St., Huntington Beach, CA 92648. (714) 578-7700. NCP (May 89).

**CardComm**
Is a full-featured streaming tattab that lets you resize and resample the drawing area. Three sizes, six different input devices (pens and puck), and very sophisticated software. $1295. CardComm, 1 Santa Monica Ave., Cupertino, CA 95014. (408) 990-1010. (Dec 88)

**Apple Scanner II**
Is the 10-bit grayscale scanner with 18-bit scanning capability. Also has a 35mm film card. Requires 1 megabyte and a 68000 drive. Version 2.0 now available for $495. Apple, 1 Infinite Loop (P.O. Box 608, Cupertino, CA 95014). (408) 990-1010. (Oct 88)

**MacUser**
Has an excellent Mac User’s Guide. Comes on two B00K disks and includes screen shots and documentation. Mac. (408) 749-5508. (Feb 89)

**Dest PC Scan 2000 1.1**
Is an 8-bit scanner that saves images in up to 256 levels of gray. Can be configured for IBM PCs. Requires 1 megabyte. Scanner, $1,295. Aegis Plus, 410 Townsend St., #408, San Francisco, CA 94110. (415) 629-2672. (Nov 89)

**FreeWheel Pointer 1.0**
Is a large pointing device that requires no battery power. Requires Mac Plus and HyperDialer, $195. (Now available for $195) AppIe Computer. 20525 Mariani Ave., Cupertino, CA 95014. (408) 556-5307. (Feb 89)

**HyperDialer 1.0**
Is a high-end pointing device that requires a battery power. Requires Mac Plus and HyperDialer, $195. (Now available for $195) AppIe Computer. 20525 Mariani Ave., Cupertino, CA 95014. (408) 556-5307. (Feb 89)

**VIVID**

**HeadMaster**
Is designed for users with little or no movement of their hands. It uses ultrasound signals emitted from a headband to determine the movement of the user’s head. A roller on top of the mouse button. On-screen keyboard appears as a row of characters. Very slow typing. Available for Mac II, Plus, and SE. Requires Apple Monitor. $85. (Oct 88)

**HyperPaint**
Is a software program that allows you to design, store, and print high-quality graphics. Requires Mac II. Multifinder friendly. $39.95. Data Desk International, 7651 Balboa Ave., Vancouver, BC. (604) 780-1674. (Sept 88)

**Image Maker**

**ImageWriter LO**
Does high-resolution text and graphics at 216 dpi. Too, so it reduces 72-dpi screen fonts to a third of their actual size. Takes a lot of memory. Printer Driver version 2.0. Requires 1 megabyte and 10 MB hard drive. $595. Apple Computer. 20525 Mariani Ave., Cupertino, CA 95014. (408) 990-1910. (Nov 88)

**IS/ABB**
Is a series of five sizes with seven possible printing devices, including multibullet cards and multibullet stylus. Operates in either absolute or relative modes, active real-time graphics on menu is handy for intensive drawing work. Two-inch deep, $100. Apple II, Apple III, Mac II; Apple II, Apple III, Mac II; Apple II, Apple III, Mac II. (408) 749-5508. (Feb 89)

**Lightning Stroke**
Is an imaging software program that uses a colored or colored pen or mouse and a high-res tablet for precise graphics input. Memory chips with some applications and DAs. Keyboards mice can be inserted to change the position of the pen or mouse. $395. Is/ABB 350. $1,145. Apple Plus, 410 Townsend St., #408, San Francisco, CA 94110. (415) 629-2672. (Oct 89)

**LaserWri er Plus**
Is Apple's mid-priced PostScript laser printer. It's faster than the LaserWriter Plus, with blacker, grayer scales. Costs less than even Apple. Requires Mac Plus, and 3 megabytes. $695. (Now available for $650) Apple, 1 Infinite Loop (P.O. Box 608, Cupertino, CA 95014). (408) 990-1910. (May 88)

**LaserWriter INTX**
Is Apple's top-of-the-line PostScript laser printer. $679.95 chip makes it very speedy, expandable to 12 megabytes, SCSA hand
Disk can be attached to fords. Requires 512K. $6,599. Now, $5,699. Apple Computer. 2053 Mariani Ave., Cupertino, CA 95014. (408) 596-1010. (May '88)

Macintosh II/420 $220 is a fast 600-megabyte internal hard disk for the Mac II. The drive is a repacked Mimprius West V Control Data). Average access time is 16 milliseconds. No slow seeks. 5M. Apple Microdrive. 2054 Mission Ave., Cupertino, CA 95014. (408) 996-1010. (May '88)

Mac 105 Extends Keyboard 420 is a good consumer value. Also comes in 20-,

Macintosh II/420 is a hardware and software interface for laboratory instruments. Standard configuration samples up to 142 kbyte. Specifications: IBM PC/XT mode. Disk type: 3.5" floppy disk. Settling time: 0.0001 seconds. RAM: 128K. Data Desk International. 7651 Haskell Ave., Van Nuys, CA 91406. (201) 760-1674. Software NPC (Apr '89)

Macintosh II/420 $6,999 is a competitive value. Also comes in 20-,

370 M, May 1990 MacUser
**Personal Finance**

**MacInTax**


**Quick Fix**

A feature-rich program that assists you in saving money. For current owners of California forms sold separately. **Version 3.01 reviewed. Requires 512K and printer. $19.99. (Version 3.5 reviewed) Also available from Successful Software. 11222 Le Cime Blvd., Suite 300, Independence, OH 44131. (216) 891-5626. (Mac) **$9.95**

**Wall Street Investor**

Stock market trader's desktop. Information down from an electronic bulletin board, plus user-chosen criteria for your own stock-screening/charts.

- Price: $95
- System: Mac
- Version: 3.0
- Features: Stock charts, research articles, and a number of automated stock screens.

LANDesign is an intelligent network management tool. It allows you to manage your network from anywhere, as if the computer you want to access is right at your desk. Version 1.1 requires Mac Plus, hard disks 512K, printer memory 512K, and System 3.5 or later. LazerJet II series, LaserJet Plus, LaserJet Plus, DeskJet 1200, or HP compatible printers, and System 6.0. $195. Digitek, 113 McCake Crescent, Thornhill, Ontario L4J 2S6, Canada. (416) 738-4651. NCP (Sep '89).


MacPrint Carp is a printer driver that lets you print to PostScript Hewlett-Packard printers. Provides screen fonts for every imaginable HP text and graphic printer. Version 1.5 now available. $149. SoftWorks, 4664 Lougheed Highway, Suite 880, Burnaby, British Columbia V5C 6B7, Canada (Jan '90).

PowerScreen is a superb Screen replacement. It catalogs your Screen shots and lets you retrieve and/or crop anything that can be copied to the Clipboard. Version 1.1 requires Mac Plus, hard disk recommended, 68K or later. Loop Software, P.O. Box 1249, Missoula, Mont. 59802. (version 2.0 now available, NCP (Sept '89).

PowerRmm is two products in one. The first allows full access to menus from anywhere on the screen. The second, called Gadgets, includes a phone dialer, notes, and calendar. Version 1.0 requires Mac Plus and MultiFinder 6.0.1. Introductory price. $29.95. Solutions International, 30 Commerce St., Willsboro, VT 05495. (802) 658-2735. NCP (Sept '89).

PictureThis is a superlative graphics work. ScreenSaver is a major enhancement to the standard ScreenSaver DA. The Printer provides you with a transparent CD printer window, allowing you to view or crop a graphic to the area that it will be printed on. Version 2.0 requires MultiFinder 4.1 or later. 339 Technology, 21171 Counsel Road, Lebanon, IL 62256. Oct '89.

PictureBook is a small package that makes using MultiFinder less confusing and a lot more pleasant. Hides all but the active window when you are not using MultiFinder. Version 2.0 requires MultiFinder 4.1 or later. 339 Technology, 21171 Counsel Road, Lebanon, IL 62256. Oct '89.

PrintControl is a set of shared applications, two DAs, and two INITs that perform various functions, from disk and file recovery to backup to disk options to encryption. Would be better if it were better integrated. Doesn't have the smoothness Mac users expect. Requires 512K or later and System 4.2 or later. $79. Version 1.0 requires Mac Plus or later, hard disk recommended. Gott Software, P.O. Box 2007, Beaverton, OR 97005. (503) 630-8000. NCP (Aug '90).

QuickKeys lets you make full use of your keyboard. Assign any command to any key. Requires 512K or later. Vaxington Software, 2080, Redmond, WA 98052. (version 2.0 now available, NCP (Dec '88).

QuickScreen is a set of screen replacements. Updated frequently. Version 1.5 now available. $29.95. SoftWorks, 4664 Lougheed Highway, Suite 880, Burnaby, British Columbia V5C 6B7, Canada (Jan '90).

ReadIt!!! is an upgrade of OldLook's OCR program. Still a good value and performance. Also includes printer drivers for most scanners, batch processing, background operation under MultiFinder, and 20 font formats. Recognizes multiple columns, italics, and some fonts. Version 2.0 requires Mac Plus or later. Version 1.5 requires 512K or later and System 3.1 or later. $24.95. Fifth Generation Systems, 1522 Bell Ave., Tulsa, OK 74110. (version 2.0 now available, NCP (Sept '89).

Read-It! is a very good OCR program that can create edit-able text files cut of scanned images. It works only with certain scanners and requires a lot of memory, so you can use it only with the Mac Plus or later, hard disk recommended. Version 1.0 requires Mac Plus and 2 megabytes. $95.95. MacVision, 750 Red Road, Suite A, South Miami, FL 33143. (305) 882-9655. NCP (Aug '89).


ScreenRecorder is a utility that lets you capture screens or parts of screens. Dilfers from similar products in that it captures the entire screen in a real window and so can be used as you work. Version 1.0 requires 512K or later and System 6.0.1. Introductory price. $29.95; regular price. $59.95. Aladdin Systems, 217 E. 86th St., Suite 153, New York, New York 10028. (version 2.0 now available, NCP (Aug '89).

ScreenShots is a package of five utilities. Version 1.0 requires Mac Plus or later. Cortek (Europe) Ltd. Suite 1200, Houston, TX 77024. (713) 535-4090. NCP (Sep '89).

ScreenShots is an excellent software disk partition that allows partitions to be set up on the Mac plus disk and in various ways. Password-protected, and even encrpted. Version 1.0 requires 512K or later. $33.95. Version 1.2 now available for $99.95. Soft Inc. P.O. Box 297, Spring, TX 77379-0297. (713) 535-4090. NCP (May '90).

NightWatch is a program that announces appointments without returning to the Finder. Under MultiFinder, all applications are listed on a pop-up menu. Can also launch directly to a specific document. Version 1.0 requires Mac Plus and MultiFinder. Currently $59.95. Version 1.2, includes System 7.1 compatibility, 68K, and Stepping Out. Version 1.0 requires 512K drive, Mac II and MultiFinder friendly. $149.50. Kent Macsoft, 3210 Redwood, Suite 301, Houston, TX 77024. (713) 535-4090. NCP (Aug '89).

On Cue!!! is a collection of shared applications, two DAs, and two INITs that perform various functions, from disk and file recovery to backup to disk options to encryption. Would be better if it were better integrated. Doesn't have the smoothness Mac users expect. Requires 512K and later and System 4.2 or later. $79. Version 1.0 requires Mac Plus, hard disk recommended. Gott Software, P.O. Box 2007, Beaverton, OR 97005. (503) 630-8000. NCP (Aug '90).

On Cue!!! is an advanced disk-hard-utility set. It has the best disk-paritioning software available and can format most hard disks. It also has powerful and safe optimizing and testing facilities. Excellent performance. Also includes DS Backup, DC backup software, and a mini disk duplicator. Version 3.5. Requires Mac Plus. Version 1.0 requires 68K or later and System 6.0.1. Introductory price. $129.95. Read-it Software, 16 Dyes Road, Doncaster, Melbourne, 3109, Australia (Nov '90).

On Cue!!! is an advanced disk-hard-utility set. It has the best disk-paritioning software available and can format most hard disks. It also has powerful and safe optimizing and testing facilities. Excellent performance. Also includes DS Backup, DC backup software, and a mini disk duplicator. Version 3.5. Requires Mac Plus. Version 1.0 requires 68K or later and System 6.0.1. Introductory price. $129.95. Read-it Software, 16 Dyes Road, Doncaster, Melbourne, 3109, Australia (Nov '90).

OrbitScreen is a utility that allows you to change screens or parts of screens. Differs from similar products in that it captures the entire window remains on the screen. Version 1.2 requires System 4.1 or later. $60. Smart insert Software, 21171 Counsel Road, Lebanon, IL 62256. Oct '89.

PictureBook is a small package that makes using MultiFinder less confusing and a lot more pleasant. Hides all but the active window when you are not using MultiFinder. Version 2.0 requires MultiFinder 4.1 or later. 339 Technology, 21171 Counsel Road, Lebanon, IL 62256. Oct '89.
**Word Processors**

**ArchText**
- A text processor with many hypertext capabilities as well as the ability to include graphics. "Nodes" of text are accessed by means of different "links." Very powerful. Version 1.0. Requires 1 megabyte. $349.95. (Version 2.0 now available for $395.95)
- BrainPower. 30497 Canwood St., Suite 201. Agoura Hills, CA 91301.
- Barron's Educational Series, Inc., 130 Volland St., Freeport, IL 61032.
- UserTek, 4444 E. 66th St., Suite C, Tulsa, OK 74136.

**ChiefWriter**
- A full-featured word processor (similar to Microsoft Word) with a Chinese character set. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Kaihin Brushwriter
- The most powerful Chinese word processor for Macintosh. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**FeiMa-P**
- A simplified Chinese word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**QuickWriter**
- A stand-alone batch spelling checker. Also checks for punctuation and other errors. Good dictionary, thorough checking, simple interface. Requires Mac Plus and System 5.0 or later. $79.95. Canwood St., Suite 201. Agoura Hills, CA 91301.
- Barron's Educational Series, Inc., 130 Volland St., Freeport, IL 61032.
- UserTek, 4444 E. 66th St., Suite C, Tulsa, OK 74136.

**Vantage**
- A full-screen word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WordPerfect**
- A full-screen word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WriteNow 2.0**
- A full-screen word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WordPerfect Spell Checker**
- A spell checker for Microsoft Word. It includes a glossary of technical terms. Requires Mac Plus and System 4.1 or later. $200 disk drive or hard disk drive recommended. $124.95. New Horizons Software. P.O. Box 43167, Austin, TX 78765.
- Barron’s Educational Series, Inc., 130 Volland St., Freeport, IL 61032.
- UserTek, 4444 E. 66th St., Suite C, Tulsa, OK 74136.
- BrainPower. 30497 Canwood St., Suite 201. Agoura Hills, CA 91301.
- Barron’s Educational Series, Inc., 130 Volland St., Freeport, IL 61032.

**WordPerfect's Spell Checker**
- A spell checker for Microsoft Word. It includes a dictionary of real English words. Requires Mac Plus and System 4.1 or later. $200 disk drive or hard disk drive recommended. $124.95. New Horizons Software. P.O. Box 43167, Austin, TX 78765.
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**WriteNow**
- A full-screen word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WritePerfect**
- A word processor for Macintosh. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WordPro**
- A full-screen word processor. Version 1.0. Requires Mac Plus and System 5.0 or later. $99.95. (Version 2.0 now available for $125)
- Microsoft Word 4.0
- Adobe Acrobat Print Writer II

**WritePerfect's Spell Checker**
- A spell checker for Microsoft Word. It includes a dictionary of real English words. Requires Mac Plus and System 4.1 or later. $200 disk drive or hard disk drive recommended. $124.95. New Horizons Software. P.O. Box 43167, Austin, TX 78765.
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<td><strong>The MacZone</strong></td>
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<td>Five $50 gift certificates</td>
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<td><strong>Yalcom</strong></td>
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<td>Great Gantt!</td>
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Play your cards right at the Macworld Expo in San Francisco and you'll walk away with more than the latest products and a bunch of brochures. You could win Apple's Macintosh Portable computer courtesy of MacUser magazine. It's all part of MacUser's Great Mac Portable Giveaway.

Here's how it works:

1. Just register at the MacUser booth (1630) and pick up a game card. Then tour the exhibits to complete the card which will make you eligible for the Mac Portable drawing. If your completed card is picked, you win!

Naturally there'll be dozens of other great prizes for participants to win. And everyone eligible for the drawing will receive a special gift from MacUser. See the back of your game card for complete details and a prize list.

You'll also get MacUser's own Expo Directory to help you quickly find the products most important to you.

So as long as you're at the Expo, why not make yourself a winner? Play MacUser's Great Mac Portable Giveaway. Win a prize. And who knows... along with all the latest computer information, you could walk away with the latest Mac computer.
Memory...
Satisfy memory-hungry applications with Third Wave RAM expansions for Macs and NTX printers. We assure the highest quality surface mount construction in a full range of speeds to quench that RAM appetite. Call our toll-free order line for current pricing, 1-800-284-0486.

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SCSI Hard Disks: Internal and External (zero-footprint or vertical). Capacities 40MB and up, using the most reliable mechanisms on the market.

Streaming Tape: Models 60T and 150T tape backup, with backup speeds up to 5MB/minute. Bundled with award-winning Retrospect software for the ultimate in speed, convenience, and features.

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- **80x, v**: $749
- **105x, v**: $799
- **135x, v**: $899
- **180x, v**: $1149
- **45R**: $849
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- **150T**: $849
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- **PMMU**: $189
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Unmatched image quality! 19" screen, paper white screen phosphor, and 75 Hz flicker-free images in 256 shades of gray. Resolution of 1024 x 768 for accurate proofing. Includes Pan/Zoom feature and integrated swiveled base. Call for more information.

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<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>ClearVue (Mac II)</td>
<td>$1149</td>
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<tr>
<td>ClearVue SE w/16MHz 68000 Accelerator</td>
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<td>ColorBoard 208</td>
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<td>ColorBoard 224</td>
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<td>ColorBoard 264 II</td>
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<td>ColorBoard 264 SE030</td>
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<td>ColorBoard 364</td>
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<td>FrameGrabber (NTSC)</td>
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<td>14&quot; Trinitron 24-bit</td>
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<td>19&quot; Trinitron 32-bit</td>
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ColorBoard 224 with 19" Monitor
Trinitron Color Monitor with 1024 by 768 selectable resolution. Includes Pan/Zoom feature: with a single keystroke, you can instantly zoom the image 2x or 4x. Call for more information.

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<thead>
<tr>
<th>Model</th>
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<td>E-Mach Z-21 IQ (GS)</td>
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<td>Radius GS Display</td>
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<td>Radius 21&quot; B&amp;W Display</td>
<td>Call</td>
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<tr>
<td>Radius 21&quot; GS Display</td>
<td>Call</td>
</tr>
</tbody>
</table>

Other Monitors Available! Please call.

Samsung Full-Page Monitor
At this price, you can't afford not to have one of these incredible eyesavers. Quality images at a price that will let you experience the convenience of large-screen viewing.

SAMSUNG

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No more squinting and scrolling! Seeing two pages at once will save you hours of time. True-WYSIWYG, 72 dpi resolution, and 78hz vertical refresh rate (among a dozen others!).

SOFTWARE THAT FITS™
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Discount mail-order prices on large-screen monitors for professional applications:

• highest resolutions
• advanced technology
• easy installation

ORDER TODAY!
Discount Mail Order Pioneers

"We've been making Macintosh customers happy for five years! We were the first Macintosh mail order company to run its entire operation on Macs, so we understand just how important that technical answer can be to those of you who count on your Macs every day to help you earn a living.

1st-of-its-kind return policy
We're true pioneers when it comes to our return policy—we were the first company to offer returns! We offer a refund of the purchase price on all software except fonts, clipart and special order items, minus the applicable trial fee.

Unlike the competition, this offer covers over 1000 products, including those published by Microsoft, Aldus, Adobe, Ashton-Tate, Borland, Broderbund, Claris, Cricket, Letraset, WordPerfect, Mindscape and Caere.

— Real Provencher
President

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FREE CONSULTATION to help configure a system to your exact requirements.

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Mac IIc B&W Two-Page System, 2 Mb RAM, 46 Mb Hard Drive, Mac 101 Keyboard...........3550
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Mac IIci 14" Trinitron, 5 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard..................7050
Mac IIcx 19" Trinitron 8-bit Color, 5 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard........9095
Mac IIx 16" Trinitron 8-bit Color, 5 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard........4650
Mac IIx 19" Trinitron 8-bit Color, 5 Mb RAM, 195 Mb Hard Drive, Mac 101 Keyboard..........10095
Mac SE030 14" Trinitron 24-bit Color, 5 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard........9900
Mac SE030 System, 5 Mb RAM, 105 Mb Hard Drive, Mac 101 Keyboard.......................4500
Mac SE w/2-Floppy Drives, FP Display, 2.5 Mb RAM, 46 Mb Hard Drive, Mac 101 Keyboard........3300
Mac SE w/2-Floppy Drives, 2.5 Mb RAM, 46 Mb Hard Drive, Mac 101 Keyboard................2800

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QUANTUM HARD DRIVES
Int 40 Mb.....................................53
Int 80 Mb.....................................83
Int 105 Mb.................................89
Ext 40 Mb.................................73
Ext 80 Mb.................................103
Ext 105 Mb.................................108

EVEREX
EMAC 60T (Tape Back-up).................66

EVERY OTHER FRIDAY SPECIAL

EMAC 150 Tape Back-up.................$96

PERIPHERAL LAND
1.44 Mb Floppy.............................32
Infinity Turbo 40........................96
Infinity Dual Turbo 40..................197
PL 200 Int..................................146
PL 250 Int.................................176

We specialize in high-end graphics workstations...
AT DISCOUNT PRICES!

If you don’t like it...
Unbelievable Quality
Unbeatable Price

Ricoh Laser 6000/PS
Postscript Laser Printer

- Adobe Postscript Version 50.5
- 35 Resident Fonts
- Letter, Legal, Envelopes, and European
- One Year Warranty with first 90 days on site
- Incredible Blacks and Clear Fine Lines
- Two Megabytes of RAM Expandable to Four Megabytes
- Optional Two Bin Automatic Paper Tray Available

Retail Price
$3,499.

Introductory Price
$2,495.

Visa, MasterCard, and American Express accepted NO surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders, additional $5.00 charge. AZ residents add 6.5%. All shipments made by Federal Express. Standard Air which is 1 to 2 day service. COD's Shipped by UPS 2 day air. Call for shipping costs. Products purchased in error are subject to a 20% restocking fee. All prices subject to change without notice. All products subject to availability.
The Reasons You Should Buy From MacLand...

1. **Price**
   - Because of our multi-million dollar buying power, we purchase large volumes of quality hardware at low prices and pass the savings on to our customers.

2. **Delivery**
   - We offer Same Day Shipping on all in stock items if we receive your order by 3 pm Mountain Standard Time. ALL credit card orders are shipped by FEDERAL EXPRESS STANDARD AIR service which means you get your merchandise fast!

---

**Externals**

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**300-600 Megabyte**

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<td>Imprimis - MacWren 300 16ms</td>
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**SE, SE30 & llcx, llci Internals**

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**100-200 Megabyte**

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<td>Quantum 310 40ms (2 Year Warranty)</td>
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**Mac II & IIX Internals**

**30 Day Money Back Guarantee**

ON ALL IMPRIMIS, QUANTUM AND SEAGATE HARD DISK DRIVES

---

**Technical Support**

- MacLand has the best technical support, period. We provide you with technical support BEFORE AND AFTER your purchase. Best of all, to assure you the highest quality, our trained technicians test ALL hard disk drives for quality and viruses before we ship them to you.

---

**Quantum Hard Disk Drives**

Industry leading Quantum quality, dependability and fast access speeds at affordable prices. Backed by our Two Year Warranty, all Quantum drives come complete with cables and software.

**40 Megabyte**

<table>
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**60 Megabyte**

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<td>CMS Enhancement 81 28ms</td>
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<td>PowerDrive 80 28ms</td>
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**100-200 Megabyte**

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<td>Tape 16ms</td>
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<td>Quantum 105 19ms (2 Year Warranty)</td>
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<td>Quantum 120 15ms (2 Year Warranty)</td>
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<tr>
<td>Quantum 170 15ms (2 Year Warranty)</td>
<td>$1,099</td>
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---

**Inspec ted & Tested by MacLand Technician**

---

**Mac II and Technical Support Call 1-800-333-3353 (FAX #602-345-2217)**

---

For Ordering and Technical Support Call 1-800-333-3353 (FAX #602-345-2217)

---

5006 South Ash Avenue, Suite 101 Tempe AZ 85282 (602) 820-5802
Ricoh Laser 6000/PS

The 6000/PS provides all of the power and performance that you'll ever need to get the job done. This Adobe Postscript Laser Printer can do letter, legal, envelopes, transparencies, and European paper sizes. Backed with a solid One Year Warranty. An unbelievable price of $2,495. This month!

Removables/Tape Back-Ups

<table>
<thead>
<tr>
<th>Removable/Tape Back-Ups</th>
<th>Retail Price</th>
<th>Sale Price</th>
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<tr>
<td>44 Megabyte Removable</td>
<td>$839</td>
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<td>40-150 Megabyte Tape</td>
<td>$789</td>
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<td>Cache 350 Tape</td>
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<td>CMS Enhancements 60</td>
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<tr>
<td>Irwin 80 Meg Tape</td>
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<tr>
<td>SyQuest Removable Cartridges (Will fit 44 Removable Drive)</td>
<td>$89</td>
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Printers

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<td>Hewlett Packard DeskWriter</td>
<td>$4,299</td>
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<tr>
<td>SyQuest 44 Megabyte Removable Cartridge</td>
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Memory Upgrades

One Meg SIMMS Mac Portable Memory Now Available.

Scanners

<table>
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<th>Scanners</th>
<th>Retail Price</th>
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<tbody>
<tr>
<td>Abaton 300/S W/Interface</td>
<td>$1,249</td>
<td>$1,475</td>
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<td>Abaton 300 GS W/Interface</td>
<td>$2,199</td>
<td>$2,495</td>
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<td>Hewlett Packard ScanJet W/Interface</td>
<td>$2,199</td>
<td>$2,495</td>
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<tr>
<td>Microtek MS II Sheet Feed</td>
<td>$1,049</td>
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<td>Microtek MSF 300GS</td>
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<td>Microtek MSF 300Z - Color W/Interface</td>
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Monitors

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<tr>
<td>Magnavox 14&quot; Color Display</td>
<td>$695</td>
<td>$489</td>
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<tr>
<td>NEC MacSync 14&quot; Color Monitor</td>
<td>$895</td>
<td>$519</td>
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</table>

Visa, MasterCard, and American Express accepted NO surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders, additional $6.00 charge. AZ residents add 8.5%. All shipments made by Federal Express. Standard Air which is 1 to 2 day service. COD's Shipped by UPS 2 day air. Call for shipping costs. Products purchased in error shipped. We accept COD orders, additional $5.00 charge. AZ residents add 6.5%. All shipments made by Federal Express.
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Internal    External
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Seagate 31  $349   $399
Seagate 46  $399   $449
Seagate 62  $475   $549
Seagate 81  $499   $589

30 DAY MONEY BACK GUARANTEE
ON SEAGATE HARD DISK DRIVES

No questions asked. If you are unsatisfied with any of these drives for any reason you may return them within 30 days of your invoice for a full refund less shipping.

Accelerator Boards

radius™

Radius 16 for MacPlus or Mac SE  Call.
Radius 25 for Mac SE  Call.

SiCline SI033 33MHz for Mac II, IIX, IICX  $3,499.
SiCline SI033 33MHz with 88882 for Mac II, IIX, IICX  $3,499.

Modems/Fax Modems

Abaton Fax modem 4800 Baud  $259.
Abaton Fax modem 9600 Baud  $399.
Hayes 2400 External  $499.

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ACIS

ADIOS SYSTEMS

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ALOHA

ALPAGRAPICS

ALSOFT

ALOHA

BLYTH SOFTWARE

BRODERBUND

CASEAS

CE SOFTWARE

CENTRUM SOFTWARE

CHANG LABS

ADOBE PHOTOSHOP

A LASTING IMPRESSION

AATRAX

ACIS

ADIOS SYSTEMS

ALEPH SOFTWARE

ALLEY MANAGEMENT SYSTEM

ALOHA

ALPAGRAPICS

ALSOFT

ALOHA

BLYTH SOFTWARE

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CASEAS

CE SOFTWARE

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ADOBE PHOTOSHOP

...
Increase your speed with the Mac toot Keyboard. This award winning keyboard includes Master Strokes enhancement software. Assign any amount of keystrokes to one function key.

MONEY BACK GUARANTEE!

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- Credit card is not charged until order is shipped.
- California residents add 6.75% sales tax.
- Hours: Mon - Fri, 10 - 11 EST.
- Call (818) 501-6581. Fax (818) 501-3760.
- All prices & policies subject to change without notice.

Shipping

- UPS Standard Air/Blue. Hardware over 10 lbs will be shipped ground.
- Same day shipping on orders placed by 9:00 pm EST, if items are on hand.

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- Defective software will be replaced immediately by the same item. Call (818) 501-0661 for RA number before return.
- Money Back Guarantee. If products have a 30-day money back guarantee. Please inquire when you order.

FAX 1-818-501-3760

1-800-825-6227

FOR USA & Canada

MAC WORLD EXPOSITION

VISIT US AT MAC WORLD EXPOSITION

BROOKS HALL • BOOTH NO. 5807

SAN FRANCISCO • APRIL 11-13, 1990

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To pick this up for $2,645 just pick up this.  

We’ve got all.  
Hardware, software and systems. From Apple, RasterOps and Microsoft, just to name a few. In fact, we have over 6,500 items for all your computer needs. Quantity discounts. And prices that leave the other guys guessing.  

Put us to the test.  
Just thumb through this magazine until something catches your eye. Then call us for a price on the same item. Even after you add the cost of your phone call at $2/minute you’ll still get the lowest price anywhere.  

It’s no-risk. Guaranteed.  
On top of our lowest price, best selection offer, we’ve got a guarantee that will settle the deal. A generous 150 day return on most hardware and software! So, if it’s not just what you needed, send it back. You’ll get a refund, no questions asked.  

So call us.  
Just say go. We have $160 million of inventory in 16 warehouses worldwide. So we can ship your order immediately. So, call us anytime Monday through Saturday, 8 a.m. to 10 p.m. (CST) to order, or even if you’re just curious. You’ll find out that getting the best price on hardware, software and peripherals from people that really know Macintosh, is as easy as picking up the phone.  

Payment You may charge your order to Visa, MasterCard or American Express. Send checks, CODs, and Company and Institutional PO’s to $60,000 maximum on CODs. Texas residents only add 7.75% sales tax. Prices and terms are subject to change and availability. International: 10% surcharge on international orders. Terms: You are not charged until your order is shipped. Shipping: Minimum $15.00 UPS Ground, Blue, Red, Federal Express; $25.00 UPS Surplus. Mail items may be in original condition and package. Self mail is not accepted. Restrictions may be subject to a restocking fee. Ask for details when ordering.  

Bottom Line Distribution cannot be responsible for errors in typographical or photographic. Mail in orders accepted with $10.00 exchange.  

Fax: 1-900-420-8770  
International Fax: 512-469-5678  
2021 Guadalupe, Suite 30 • Austin, Texas 78705  

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<td>4585</td>
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<td>Portable w/40 mb Hard Disk</td>
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<td>All RasterOps products available at lowest prices</td>
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<td>Abaton Interfax</td>
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<td>46 Megabyte Seagate ST-157N</td>
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<td>2MB SIMM's</td>
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<td>Lifetime Manufacturer's Warranty!</td>
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#### MAGIC DRIVE TAPE

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   c) Mac II

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   c) 10+

3. Your primary job function is: (check one)
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<td>Advertising Coordinator</td>
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<td>Anne R. Brockinton</td>
<td>Wanda D. Brown</td>
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<td>C. WESLEY WALTON (212) 503-5136</td>
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<td>AZ, FL, MA, MI, MO, NJ, NC, NV, NY, TX, VT, WA</td>
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<td>KAREN A. CASTORINO (212) 503-5140</td>
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<table>
<thead>
<tr>
<th>Description</th>
<th>RAM</th>
<th>SE</th>
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**Best-Priced Portables!**

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<td>$5799 Only $4,349</td>
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<tr>
<td>w/40M HD</td>
<td>$6499 Only $4,575</td>
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**Microsoft & Claris Specials!**
Works $169 Word $219 Excel $229
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**Display Systems!**
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MacUser May 1990 407
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<table>
<thead>
<tr>
<th>Computer</th>
<th>Memory</th>
<th>Price</th>
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<td>Mac SE/20 1Mb 10x</td>
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<td>Mac IICX 1Mb 10x</td>
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<td>Mac Portable 40Mb 10x</td>
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<td>HP Deskwriter</td>
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<td>Quantum Int. 40/80/10Mb</td>
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<td>Peripherals Monitor/Card</td>
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<td>Mac SE 1Mb 20x</td>
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<td>Mac SE 1Mb 20x</td>
<td>$1795</td>
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</table>

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**DISK DRIVES**

<table>
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<th>DRIVE</th>
<th>INTERNAL</th>
<th>EXTERNAL</th>
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<td>44mb Syquest</td>
<td>649.00</td>
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<th>HARD DRIVE</th>
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<td>20 MEG INTERNAL</td>
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<td>31 MEG INTERNAL</td>
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<td>40 MEG INTERNAL</td>
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<td>45 MEG EXTERNAL</td>
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<tr>
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<td>$699</td>
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<tr>
<td>105 MEG EXTERNAL</td>
<td>$829</td>
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<td>Fits in SE = Mac II with 2 drives</td>
<td>Include P.O. Backup Software</td>
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<td>Fits in SE = Mac II with 2 drives</td>
<td>External files under Mac</td>
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<tr>
<td>Seagate = Miniscr ipt—Quantum</td>
<td>WESTCOM COMPUTER</td>
</tr>
<tr>
<td>WESTCOM COMPUTER</td>
<td>2332 N. 44th Street, 2 Phoenix AZ 85008</td>
</tr>
<tr>
<td>Phone: 602-955-1404</td>
<td>FAX: 602-840-3767</td>
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**MacUser Marketplace**

Listings are grouped by category and sold by column inches.
### Quantum Pro Series

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<th>Capacity</th>
<th>Access</th>
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<th>External</th>
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<td>12MS</td>
<td>$355</td>
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<td>210MB</td>
<td>10MS</td>
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**PRICES SUBJECT TO DROP - CALL FOR INFO.**

### DISKETTES

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<th>Type</th>
<th>Capacity</th>
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<td>DSDD (1.0 MB)</td>
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</tr>
<tr>
<td>DSDD (2.0 MB)</td>
<td>$1.99</td>
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<tr>
<td>Data Cartridges</td>
<td>5/box</td>
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<tr>
<td>DC2000</td>
<td>$14.85</td>
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<tr>
<td>DC2000 Thermal</td>
<td>$17.90</td>
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<tr>
<td>DC2080 Romhut</td>
<td>$18.70</td>
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<tr>
<td>DC2120 Romhut</td>
<td>$24.30</td>
<td></td>
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<tr>
<td>DC300XL/P</td>
<td>$18.95</td>
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<tr>
<td>DC600A</td>
<td>$19.85</td>
<td></td>
</tr>
</tbody>
</table>

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- 5.25" DSDD White Box: 27c
- 5.25" DSHD Bulk: 49c
- 5.25" DISK HOLDER: 3.80

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- 3.5" DSDD White Box: 57c
- 3.5" DSDD Bulk: 1.39
- 3.5" DSDD White Box: 1.49
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- 3.5" DSDD Bulk: 1.39
- 3.5" DSDD White Box: 1.49
- 5.25" DSDD Bulk: 20c
- 5.25" DSDD White Box: 27c
- 5.25" DSHD Bulk: 49c
- 5.25" DISK HOLDER: 3.80

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I often get to talk to the elusive Buffalo Chip, Apple maven and hacker extraordinaire. Buffalo contacted me over MCI mail to tell me he had something to say, but he could only tell me in a public forum where he felt safe. To him this meant the CompuServe CB system, where chaos seems to be the rule.

Buffalo said that I couldn't quote him, but that I could capture the screens and reproduce them. So I captured this conversation, which told of Apple’s future plans for the Mac.

---

**CAPTURE ON**

(Al-267, Spike) gotta go sleep off this cold

(Al-127, MacUser) Hey is Buffalo Chip here?

(Al-267, Spike) nite all

(Al-46, RAMBONE) Any cute guys here?

(Al-71, Buffalo Chip) Dvorak, I have to make this quick.

(Al-71, Buffalo Chip) Are you capturing this?

Don't try to figure out who I am.

(Al-127, MacUser) Don't worry. I'm not interested in who you are.

(Al-71, Buffalo Chip) Apple is going to switch to RISC in 1991 or 1992 if things don't work. It's going to be the Mac III.

(Al-127, MacUser) So what else should I know?

(Al-204, *TOUGH GUY*) Complete corporate reorganization. Stem to stern.

What about Gassee and the others? Any news?

(Al-204, *TOUGH GUY*) Dunno, but there will be a big emphasis on multi-media and a new architecture. All new in 1991. Look for a huge rollout like the old days. Maybe in January. The key is numerology.

(Al-204, *TOUGH GUY*) Take the values of the word RISC - A=1, Z=26 and everything is in-between. RISC=18+9+19+3 you add them and get (Al-204, *TOUGH GUY*) 49. 4 plus 9 equals 13 and one plus three equals 4. It will be on a Mac III. System 7!

It was then that I knew he was crazy.

---

**By John C. Dvorak**

---
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<thead>
<tr>
<th>Size (MB)</th>
<th>Internal</th>
<th>External</th>
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<tr>
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<td>45 Removable</td>
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