MACWORLD

The Macintosh® Magazine

September 1991 $3.95   Canada $4.95

New
QUICKTIME

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9 WORD PROCESSORS

INSIDE APPLE
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POSTSCRIPT VERSUS
TRUETYPE

73 HARD DRIVES
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Circle 260 on reader service card

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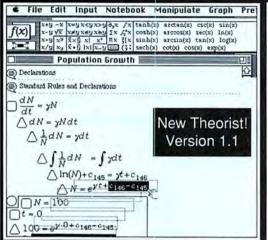
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REVIEWS

Mirror's Color Monitors Give You More Mice at Half the Price.

Radius has always made an excellent big screen color monitor. But according to a recent MacUser magazine article, Mirror makes a better one. In fact, in one of the biggest reviews yet on the color display category, MacUser gave Mirror 4.5 Mice and said "its 19" Trinitron System was a razor-sharp standout and had excellent software".

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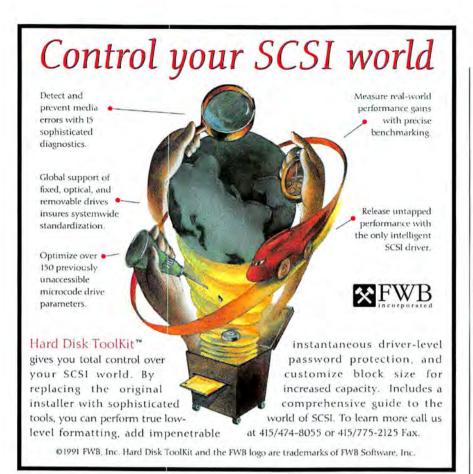
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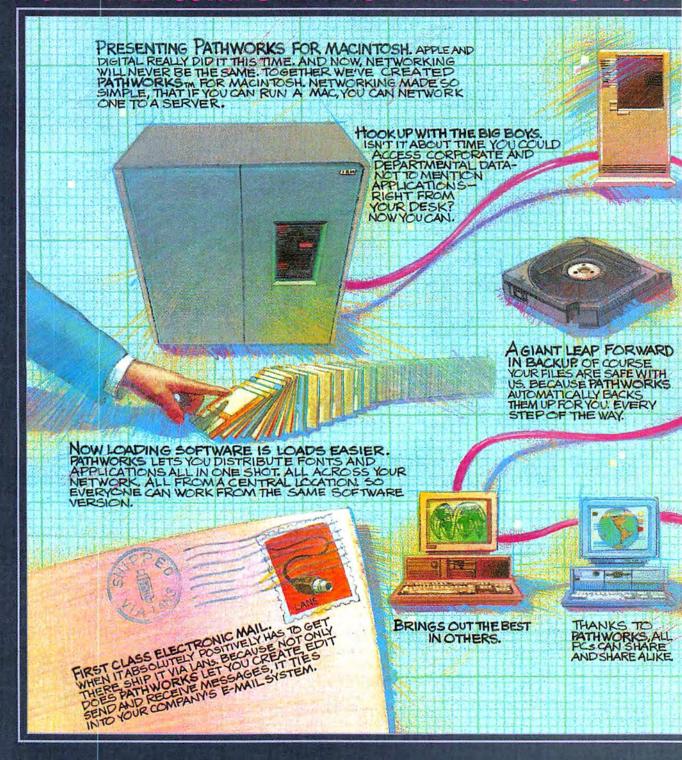
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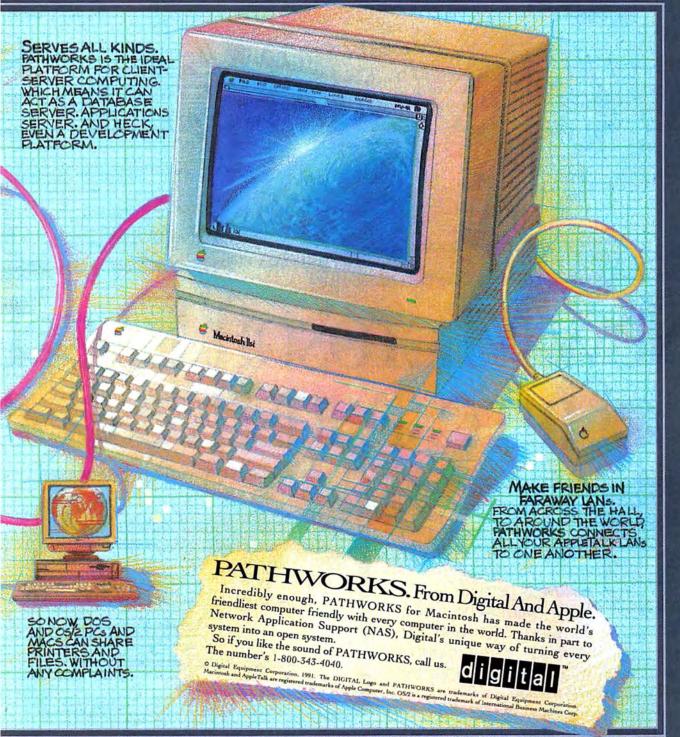
Circle 207 on reader service card

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

New Microsoft Excel of an exhaustive cor

Betsy Mill put it all in perspective when she wrote to us, "I love [Microsoft] Excel as much as my microwave oven but no love is perfect."
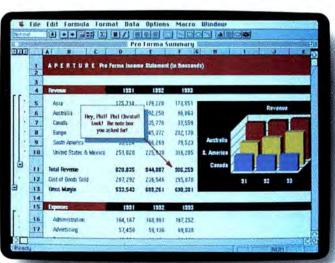
Well, Betsy, get a load of this. We think new Microsoft® Excel version 3.0 is the closest thing to perfection ever seen in a spreadsheet for the Mac. For one good reason.

Power made easy.

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

Highlight a row or column of numbers, hit the Σ button (that's Autosum™),

Yes, Paul, a single button now lets you access 68 chart types, 24 of which are 3-D. You can incorporate these right into your worksheet, along with text and data. And notice the outlining feature on the left? Go nuts.

and *voilà* – it all adds up.

Do quick, push-button formatting.

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Microsoft

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version 3.0. The result respondence course.

Take a look at the new Toolbar. In one step, you can now access style sheets, outlining features, Autosum, formatting options, drawing tools, charts of all kinds and macros. Go to town.

or expand worksheets without having to create multiple files.

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

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

Or the Goal Seek feature, which lets you put in the total you want and works backwards from there to fill in the variable you need?
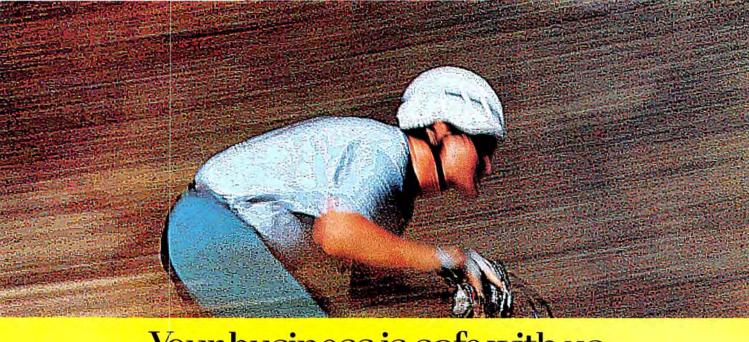
Or the fact that this is the first System 7.0 application available?

Plus, you can update to version 3.0 for $129. If you acquired your current version of Microsoft Excel on or after 12/7/90, the upgrade is only $50.* Call (800) 541-1261, Department Q83, to find out more.
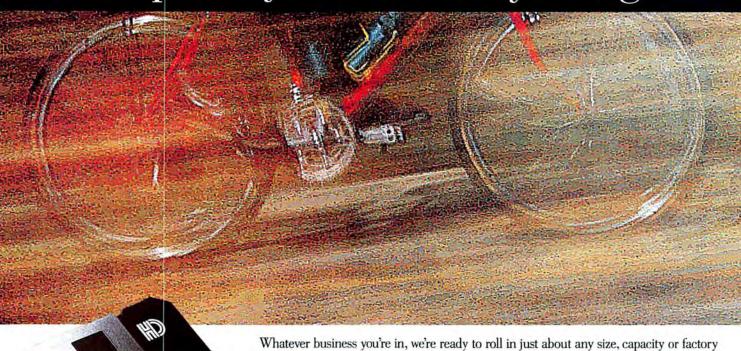
By the way, Bryan Larson: we said hi to Bill for you. He sends his regards.

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MacBulletin

Ethernet and Color for the IIsi

Asante Technologies and Radius are jointly offering an Asante Ethernet board and a Radius 256-color graphics board that work together in the single-slot confines of a Mac IIsi. The combination product, called the MacCon+30i/Radius, lists for $379 and began shipping in late May. The Ethernet board accepts thin Ethernet cabling or 10BaseT twisted-pair wire. For more information, contact Radius at 408/434-1010, or Asante at 408/752-8388.

7000 MIPS Kodak Board Translates Color Spaces

Kodak Electronic Printing Systems has designed a color-space–translation and image-processing accelerator board that the company says provides between 6000 and 7000 MIPS of processing power dedicated to graphics manipulation. To help artists and graphic designers translate between the different color spaces—methods of creating color—used by various printers, scanners, and monitors, the board uses KCMS (Kodak Color Management System). The device is also designed to manipulate very large 24-bit files. Kodak expects to ship the board by the fourth quarter, at an estimated price of about $5000. The board will only be sold through third parties, including RasterOps and Radius, who will add calibration or other software. For more information, contact Kodak at 508/667-5550.

Colors of the Delta

DeltaPoint is racing to keep DeltaGraph ahead of the graphing capabilities of Wingz, Excel 3.0, Lotus 1-2-3, and other spreadsheets. DeltaGraph Professional adds user-definable curve-fitting and a stack of new chart and graph types. For presentations, there are bullet charts, organization charts, pictographs, vertical and horizontal time lines, and improved tables; for scientists, there are XYZ surface fills and 3-D contour fills, bubble charts, spider charts, and ternary charts. DeltaGraph Professional also adds presentation tools, including a slide-show feature that provides sorting in thumbnail or list view, and visual and sound transitions. DeltaGraph Professional also supports Publish and Subscribe under System 7. It will list for $295. For more information, contact DeltaPoint at 408/648-4000.

On the Table

Table Editor, a utility for designing tables that is included with Aldus PageMaker, has a bug that in-terferes with producing hairlines in tables. The bug does not show up on screen or in laser printer output. (Aldus paid one customer $125 for the expense of hand-scoring missing hairlines on image-setter output.) Aldus is at 206/622-5500. Meanwhile, Tycho, the Mac's only stand-alone table editor, is being upgraded. Version 1.5, which lists for $149.95, has search-and-replace; supports fractional character widths; supports adding user-definable text styles to a menu; comes with the Dingbats font in Adobe Type 1 format; and can swap the contents of any adjacent cells. Tycho publisher Macreations is now at 303/447-3705.

Outbound Puts Mac in a Notebook

Outbound Systems has created a series of Mac-compatible notebook computers that weigh 6¼ pounds, including a hard drive. Called the Notebook System 2000, Notebook System 2030, and Notebook System 2030S, the systems come with Apple ROM chips already installed. The System 2000 has a 20MHz 68000 processor and a 20MB hard drive. The System 2030 includes a 20MHz or 30MHz 68030 and a 40MB hard drive. The System 2030S has a 68882 math coprocessor and comes standard with 4MB of RAM, the maximum RAM for all three systems. At press time, Outbound had not set prices for any of the computers, which it expected to ship by the end of July. Contact Outbound at 303/786-9200 or 800/444-4607.

Apple, IBM Ink Long-Term Deal

Apple and IBM have tentatively agreed to work together on software and hardware projects that will fundamentally change the personal computer market. The companies plan to develop a single system software platform to run on Motorola 680X0, Intel 80X86, and IBM's System/6000 RISC chips. According to the plan, Apple will migrate to an IBM-designed RISC chip, which Motorola will manufacture. The companies expect to ship products in two to three years. The agreement strips Microsoft of its role as the primary system software developer for IBM PCs. In another stab at Microsoft, the Apple-IBM agreement also proposes a platform-independent multimedia environment (Microsoft has been pursuing a PC-only Microsoft Windows–based multimedia strategy). The plan also calls for tighter integration of Macs with IBM mainframes.
(continues)

Cork Computer Files for Bankruptcy

Cork Computer Corporation, which had planned a Macintosh clone, has filed for reorganization under Chapter 11 of the Bankruptcy Code in Federal Court in the Western district of Texas. The company, based in Austin, Texas, had said it was cloning the Mac Operating System using the sophisticated and expensive clean-room approach.

Bug Report: Word and Printers

Microsoft has released a minor upgrade to Word 4.0 to deal with incompatibilities between Word and Apple's two new printers, the Personal LaserWriter and the StyleWriter. The upgrade also has filters for converting WordPerfect for the PC 5.0 and 5.1 files to Word format. For more information, call Microsoft at 206/882-8080.

Map Followers

Two Macintosh mapping products are being upgraded. GeoQuery will be able to query and map 4th Dimension databases under System 7. It will also add support for linear data (roads, for example) and will include files for the interstate highway system. It will also support aggregating regions for analytical purposes, shading regions for presentation purposes, and user-definable symbols for pushpins. Shipping and price were undecided at press time. GeoQuery is at 708/357-0535. MapInfo 1.1 is shipping. It provides more statistical analyses, including count, minimum and maximum, mean, variance, and standard deviation; has built-in PICT screen capture; and has improved digitizing tablet support. The Find command can operate on multiple geographical criteria (for example, finding the intersection of two streets). MapInfo 1.1 lists for $995. MapInfo is at 518/274-8673.

Minitab's Mac Interface

When the first Mac version of Minitab came out last year, it shared the command-line interface of its mainframe, minicomputer, and DOS cousins. Version 8 puts all the commands into normal Mac menus and dialog boxes, and adds general linear-modeling capabilities, statistical process control, a new data editor, and design of experiments capability. Minitab lists for $695. For more information, contact Minitab at 814/238-3280.

Sierra On-Line's Mac Line

Sierra is preparing a string of new games for the Mac. Some are sequels to earlier games, such as King's Quest V ($59.95); Space Quest IV ($59.95); Leisure Suit Larry 5.0 (price not set); and Police Quest 3.0 (price not set). New tales include Conquests of the Long Bow—the Legend of Robin Hood, which has animation based on human actors' movements (price not set); and The Adventures of Willie Beamish (price not set). Sierra On-Line is at 209/683-4468.

The Macintosh Security State

Utility publisher Microcom is developing a single-user security product for the Mac, and Casady & Greene is preparing version 2.0 of Access Managed Environment, or A.M.E. Microcom's Citadel will list for $149.95 and include password protection for floppy drives and hard drives; three levels of file encryption, including DES; a screen locker; the Virex INIT for detecting viruses; and a tool for erasing the contents of deleted files so they cannot be retrieved. For more information, call 919/490-1277. A.M.E. 2.0 has a revamped interface and simplified installation; provides more detailed reports; can lock a hard drive without locking the floppy drive on the same machine; and can create a user-accessible folder on an otherwise locked hard drive (the folder can be configured to delete its contents periodically or when the authorized user logs out). Casady & Greene points out that System 7's alias feature creates backdoor security implications that A.M.E. 2.0 doesn't solve. Casady & Greene is at 408/484-9228.

Excel's Children

Microsoft Excel 3.0 is generating add-ons that extend a spreadsheet user's ability solve multivariable problems. The $199.95 What-If Solver Premium Edition is being developed by Frontline Systems, the same company that wrote the Solver utility bundled with Excel. You can restrict Premium Edition to looking for yes/no or for integer solutions for situations that can't be solved with fractional answers, such as deciding to send a truck on a delivery run or deciding how many trucks to buy. It can manage both linear and nonlinear problems, and it provides a sensitivity-analysis report that shows how much the variables in a problem can change without changing the solution. Frontline is at 415/329-6877. Palisade is developing a $395 Excel-compatible version of its Monte Carlo simulation package @Risk (Monte Carlo simulation lets you test a range of probable outcomes for multiple variables). Unlike the competing Crystal Ball, @Risk runs inside Excel. Palisade is at 607/277-8000.

QMS to Introduce High-Res Printers

QMS plans to introduce the QMS-PS 815 MR and QMS-PS 825 MR, 8-ppm PostScript laser printers that can put out 600 by 600 resolution. Proprietary hardware and software enhancements produce the higher resolution, which can be selected through software or on a front-panel LCD. The printers can operate at 300 dpi, to save processing time. The PS 815 MR has one paper tray; the PS 825 MR has two. The printers will list for about $5495 and $6495, respectively. Like some other QMS printers, each can recognize and print PCL or PostScript files received simultaneously through the printer's Centronics, RS-232C, and AppleTalk ports. Both products were slated to ship in early August. For information, contact QMS at 205/633-4300.

'd think we'd be satisfied.

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If all this weren't enough, both ScanMaker models include the latest image processing software. Enhance, refine and separate your images with the full version of Adobe Photoshop for the Macintosh or PhotoStyler from U-Lead Systems for Windows 3.0.

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Why I Love QuickTime

NOT JUST BECAUSE IT'S WAY COOL

BY JERRY BORRELL

What the heck is QuickTime? A new addition to system software, developed by a group of engineers at Apple, that will probably ship to all of us late in 1991. Remember QuickDraw, the fundamental drawing model that is an integral part of the Macintosh Operating System? Well—if you don't remember, QuickDraw is the part of the Macintosh OS that creates the screen display, supports windows, draws lines, handles color, and basically takes care of all the graphics and drawing functions.

QuickTime, the software written by software engineer Bruce Leak and the system software group at Apple, is the equivalent (and a lot more) of QuickDraw for video, images, and animation. It is the fundamental architecture, the human interface, and the actual software that will allow the Macintosh to display, compress, edit, create, and store video. Video as in T.V. Without any special hardware.

In part I love QuickTime because it is largely the work of one man; at least as much as any aspect of a computer operating system can be one individual's work. Certainly others contributed significantly to many aspects of QuickTime, but still it was conceived, shaped, and ultimately formed by Bruce Leak, whose work has provided the Macintosh with the sort of breakthrough in technology that can add years of life to the Mac. It is not a coincidence that this same programmer was responsible for much of the work on 32-bit Quick-Draw, which has had a profound impact on personal computing.

Why do I appreciate this man's contribution so much? Because it indicates that it is still possible for one individual to make a difference. Because it shows that there are still sparks of originality, innovation, and life in a $6 billion company. The sort of innovation that creates opportunities for dozens of other innovative companies. It reminds me of the early days of Andy Hertzfeld and the Macintosh, when life at Apple (and programming) was simpler. Heroes were identifiable by their contributions, not by their hierarchical position on committees.

QuickTime is a seminal development for personal computing. Just as PageMaker helped define a new era of personal computer applications based on the Mac's QuickDraw software, so too a new generation of application software based on Quick-Time will redefine what we do with personal computers. This development will create a new genre of users and a new wave of developers—and give older companies new life. Companies like Light Source, Diva, even Adobe.

QuickTime will bring to 2 million Macintoshes (those with a 68020 or higher microprocessor) the ability to play video without any specialized hardware. It will up the ante for all personal computers, as did the incorporation of 8-bit color in the Macin-tosh II in 1989. It won't happen quickly—Apple's third-party developers are only beginning to work with the first versions of QuickTime. But just as 32-bit QuickDraw is used by almost every Macintosh application, so too will QuickTime slowly find use in most applications, from E-mail to word processors.
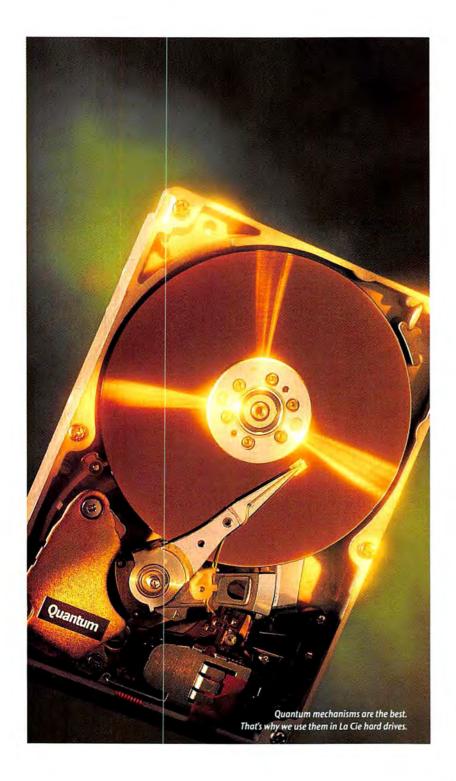
QuickTime is not just something that will allow nerds and video freaks to have MTV on their Mac (although, come to think of it, that's way cool). Nope. QuickTime is going to change how the world uses computers. And if we could just get corporate management at Apple to spend a little time appreciating what they have instead of running for cover, the company just might be able to communicate the importance of that message to its customers.

QuickTime's Impact

The majority of Macintosh users, especially in these days of millions of Mac Classic sales, do not invest in expensive video boards, high-performance graphics, Ethernet networks, *(continues)*

Quantum mechanisms are the best.
That's why we use them in La Cie hard drives.

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DRIVES
ARE THE
BEST
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BUY.

1

A Quantum Difference.

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

Typical application access time using 64KB DisCache.
**Seagate drive mechanisms also available (capacities from 300MB to 1.2GB).

or devices for watching television on their Macs. The majority of Macs are used with word processors, spreadsheets, and (for those in companies) E-mail software. Many of you often write to complain that computer magazines (all of us) are too high-tech, too focused on corporate and high-end users of the Macintosh. And QuickTime sounds suspiciously like some more of that sophisticated stuff that most people will never be able to afford to use.

Wrong. As part of system software, QuickTime will come with every new Macintosh. Or you will get it from a dealer as part of a system software upgrade (at $50 to $100). QuickTime will underlie all aspects of what you can do with a Macintosh, just as printing does now. QuickTime will free hundreds of software developers from worrying about whether you have access to expensive video hardware. If you have a version of system software with QuickTime installed and applications that support it, you have access to video in either black and white, gray scale, or color.

And developers are working furiously to incorporate QuickTime. WordPerfect Corporation, for example, has QuickTime, up and working, on its best-selling word processor. Last May WordPerfect demonstrated a movie clip incorporated into its namesake application.

It was that demo that convinced me of the universal appeal and applicability of video, although it did raise a couple of questions. So, fine, I'll have access to video in my word processor—how do I get video into my computer? And once I get it, how do I show it to anyone?

Getting Video In

Rule number one: Don't think of QuickTime as only allowing you to watch TV on your Mac. Sure, there will be a subset of Mac owners who can afford to buy a color video board that receives television and cable. In fact, RasterOps, SuperMac, Radius, and a few others are already in a race to produce such a board for so little money that most of us will want to buy one. SuperMac plans a board for less than $500; RasterOps ships one today for under $600.

The point is, however, that QuickTime will allow you to make movies using any graphics format, not just that of video. Aldus, for example, recently showed a word processor document that incorporated a Persuasion presentation in a QuickTime window. Now you have text available, say in monthly reports—soon you'll

QuickTime and the applications it will spawn will ever so slowly wean us from our paper habit. . . . Paper will cease to compete with what we can produce on our computers.

be able to incorporate a series of color charts that can be played from within a document. Similarly, you might incorporate a series of Excel charts within your monthly report. Or if you're writing a scientific or technical paper, you might include some animations, or key sequences from an experiment. An architect might include a series of drawings within a building proposal, or a walk-through of a draft design.
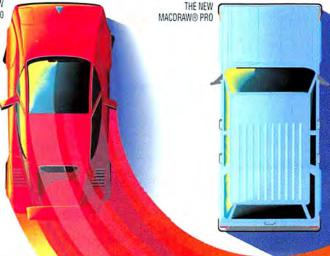
All of which brings up the second question: How do I show this to anyone? This is the big issue that has hampered presentation software on personal computers for over a decade. Sure, I can make pretty pictures, but how can people see them?

Video Out? Print to Video

The answer to this question is perhaps the most important aspect of QuickTime of all. In the future, you will use a computer—not paper—to disseminate information. The very fact that QuickTime cannot be incorporated onto paper will provide the long-awaited impetus for all of us to shift the paradigm of how we use computers. Almost 15 years ago, another generation of computer pundits *(continues)*

proclaimed the era of the paperless office. Up to now, all we've seen is more paper; somehow the computer has contributed to the proliferation of paper. QuickTime and the applications it will spawn will ever so slowly wean us from our paper habit.

We won't notice it at first. The E-mail packages will begin supplying video-capture capability. Companies

QuickTime will underlie all aspects of what you can do with a Macintosh, just as printing does now

will add photographs of E-mail users to their file servers. Users will digitize (or have scanned) a photo that will pop up like a talking-head photo of a correspondent giving an interview from some video-less hot spot. Farallon or Brightstar may improve on that by allowing the little talking head to lip-sync phonetically to match the words in a message. Someone will build a video-capture device the size of a mouse that will sit atop your computer to digitize a video message. Companies like San Francisco–based FM Waves may sell video and animation clips, analogous to still clip art, and the computer weenies among us will start incorporating little clips into our messages—scenes from our favorite movies, shots of our favorite film stars.

And somewhere along the line, as we process words, make a spreadsheet, desktop publish, draw, generate charts, send messages, and create on our Macintosh, instead of going to the File Menu and selecting Print, we'll select Print to video. Then we'll paste a film of our message, or a copy of a news clip, or an animation into a memo. And because that is going to be so much more compelling, we won't even contemplate making a paper copy. Paper will simply cease to compete with what we can produce for one another on our computers. That time is the end of 1991. **M**

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The Macintosh of the future is

Introducing the System 7 Personal Upgrade Kit.

You've read and heard a lot about System 7, the new system software for Apple® Macintosh® computers.

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You can order it right from the next page, or from your authorized Apple reseller. Just proceed to the phone number above the coupon. But if you'd like a reminder of what System 7 is all about, please read on.
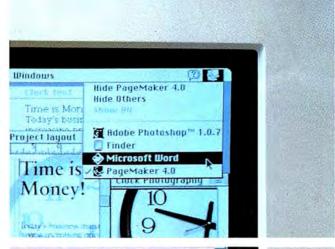
More powerful capabilities. More ease of use.

That's what System 7 brings to your Macintosh. As soon as you install it, you'll enjoy an array of new capabilities, and be ready for a new generation of software. And since System 7 runs virtually all current applications, you'll enjoy its benefits without giving up a thing.

What's on the Apple menu? You decide, by dragging any document or application into the Apple Menu Items folder. To open it, just click. And for a quick way to see what's inside a folder, click the triangle next to it.

With enhanced multitasking, you can keep several applications open at once, and continue to work while you print, search for, copy, or share files. Thanks to virtual memory, multitasking capability isn't limited by the amount of RAM.

Introducing Balloon Help. Point to anything—a menu item, icon, or tool— and a balloon appears, telling you what it is and what it does. Balloon Help is available in the Apple Finder™ and in a new generation of applications.
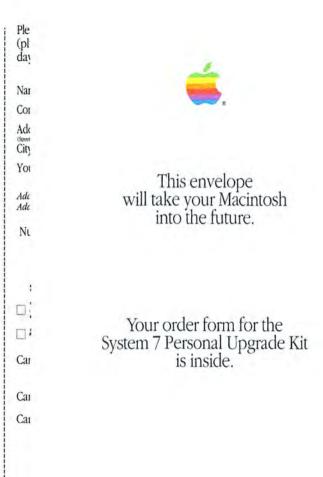
With TrueType, even the largest letters display perfectly on the screen, with no jaggy, "staircase" edges. You also get terrific printed output with almost any kind of printer. And System 7 is compatible with the fonts you already have.

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will take your Macintosh
into the future.

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System 7 Personal Upgrade Kit
is inside.

Send for your
System 7 Personal
Upgrade Kit.

It's the best thing
that ever happened to
your Macintosh.

Your System 7 Personal Upgrade Kit
comes with everything you need to make
your move into the future a smooth one.

the Macintosh on your desk.

We've also made Macintosh easier to use. For instance, take a look at Apple Balloon Help,™ our new on-line help feature. Point to an item on the screen, and a balloon pops up next to it, telling you what it's for. So applications are quicker to learn, and easier to make the most of.

Everything gets smoother and simpler.

With System 7, there's a big improvement in big type. Thanks to Apple's TrueType™ font technology, you get perfectly smooth letters on the screen, no matter what their size, along with more professional-looking output. And you don't need the Font/DA Mover. To install TrueType fonts, just drag their icons into the System Folder. (Ditto for desk accessories.)

Open an application. Work. Save. Quit. Open another application. Until now, that's how you've probably moved from, say, a word processing program to a spreadsheet. With improved multitasking, you can keep several applications open at once, and choose between them with a mouse click. So you don't have to stop what you're doing to print, search for files, duplicate files, or share data.

Using applications simultaneously can demand lots of memory, but with System 7 you aren't likely to see a not-enough-memory message. Because there's virtual memory.* When you need extra memory, just tell System 7 to use the spare room on your hard disk. Your Macintosh will work without interruption, and so will you.

See what's developing.

System 7 gives developers a far-reaching new set of tools, enabling them to offer applications that do new things for you. For example, to the fame and success of cut and paste, we've added publish and subscribe. Change something in one document, and it can change—automatically—in every document where it appears. Even if the documents are in different applications or on different computers across a network.

System 7 also enables any Macintosh on a network to share documents and applications with any other.

We could go on. But the main point is really this:

System 7 is ready for your Macintosh.

To run System 7, all you need is 2 megabytes of memory and a hard disk. (If you don't have enough memory, you can purchase it from your authorized Apple reseller.)

System 7 sets new standards in personal computing, and so does the way Apple brings it to you. To make installation simple and sure, your System 7 Personal Upgrade Kit** comes with everything you need—disks, manuals, and 90 days of telephone upgrade assistance. Yet your System 7 Personal Upgrade Kit costs only $99 (plus shipping and handling).†

Which, of course, brings us to the matter of getting System 7 into your hands, and onto your Macintosh, as soon as possible.

Call the toll-free number below. We'll take your order, or give you the name of an authorized Apple reseller. Or you can mail the accompanying form. And let System 7 give you even more of what Macintosh has always given you. The power to be your best.®

You can order System 7 from this page, or from your Apple reseller.
Call 1-800-654-1068, ext. 310

The Macintosh applications of the future are ready today.
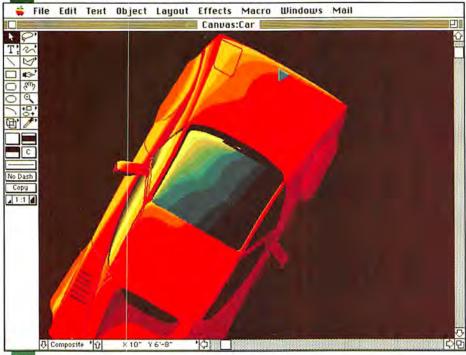
Hundreds of forward-thinking developers have already taken advantage of the powerful capabilities of System 7 to create exciting new applications that help you work in innovative ways. You'll find just a sampling of these applications described for you on the next 19 pages. Best of all, you'll find these applications of the future ready today where you buy your Apple Macintosh software.

Buy them now and you'll get a bonus for thinking ahead.

As you read about the new applications on the following pages, be sure to look for the symbols shown above. They point out the valuable offers you can receive when you buy an application. For complete details and redemption forms, look for the System 7 display at your authorized Apple reseller. But hurry, these terrific opportunities end October 31, 1991.

MacWrite Pro
from Claris Corporation

SUG. RETAIL PRICE $249.00

The all new word processor from Claris, MacWrite® Pro, offers sophisticated productivity tools and accessible desktop publishing functionality for creating documents with impact. With MacWrite Pro, you have the ability to include and place non-text objects such as graphs, charts, tables, and even sound in your documents. Plus with Claris® ADDit™ modules, you can customize MacWrite Pro to meet your specific needs, like adding a math equation editor—without any programming.

MacWrite Pro takes full advantage of System 7 functionality such as Publish and Subscribe, Balloon Help, TrueType, and key Apple Events. For example, with Publish and Subscribe, you can subscribe to a spreadsheet chart or graph produced and published in Claris Resolve™. By subscribing to these files and others, you can easily assemble various pieces of work created in a variety of applications—all in MacWrite Pro. The end result is a sophisticated document with real impact.
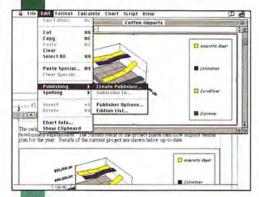
Purchase MacWrite II today and get a free upgrade to MacWrite Pro and Correct Grammar. Send dated sales receipt and System 7 coupon from an Apple authorized dealer, registration card and MacWrite II box sticker. Offer expires September 30, 1991. *See your authorized Apple reseller for details and coupon to redeem this offer.*

Claris Resolve
from Claris Corporation
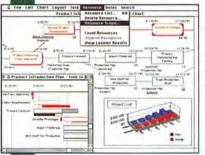
SUG. RETAIL PRICE $399.00

Claris® Resolve™ is the new Macintosh spreadsheet for visible results, combining analytical and charting functionality. Its familiar tool palette makes it easy to build sophisticated business models. And with System 7's Publish and Subscribe support, enhance the power of your other applications by subscribing to financial data or charts published in Claris Resolve. You can also extend the analytical power of Resolve via its unique Apple Event support, and add charting capabilities to many of your other applications. Plus, Claris Resolve supports standard System 7 functions like TrueType for sharp text, and Balloon Help for interactive assistance at a click of the mouse.

MacProject II 2.5
from Claris Corporation

SUG. RETAIL PRICE $499.00

Claris MacProject® II 2.5 offers flexible management tools for those who plan, schedule, track, and present projects of any size. It takes advantage of System 7 InterApplication Communication (IAC) functionality to provide direct "Exchange" links to the new Claris Resolve spreadsheet. With these built-in links, you can generate project reports and graphs—including cash flow, earned value and project cost. Or link Resolve Scripts to your own menu commands in MacProject II to automatically produce reports and graphs for your organization.
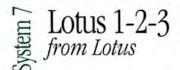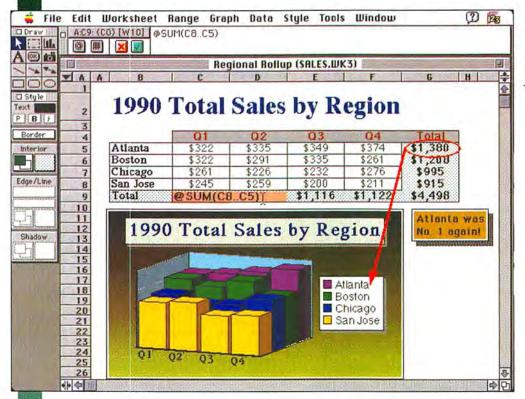
Purchase MacProject II, and get free business planning templates, and a $100.00 rebate certificate for new Claris Resolve spreadsheet software. Offer expires December 31, 1991. *See your authorized Apple reseller for details and coupon to redeem this offer.*

Lotus 1-2-3
from Lotus

Lotus® 1-2-3® for Macintosh is a high performance and truly innovative spreadsheet designed exclusively for the Macintosh environment. It is designed the way a Macintosh user works and will dramatically boost your productivity. 1-2-3 delivers significant new features and functionality which are easy to use. They include: 3D worksheets, direct manipulation of data and charts, a unified work environment for data, graphics, and macros, in-cell editing, tear-off and customizable menus, customizable database forms and DataLens®. Adobe Type Manager® is even **ATM**. included. As a no compromise product, 1-2-3 for Macintosh takes advantage of System 7 capabilities including Publish and Subscribe, Apple Events,
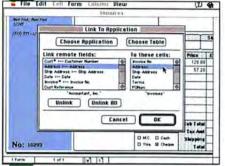
Data Access Manager, Virtual Memory Management and TrueType scalable fonts. The ultimate spreadsheet for Macintosh, 1-2-3 is completely compatible with Excel, and of course, all versions of 1-2-3. 1-2-3 for Macintosh is sold with a 30-day no-risk money-back guarantee to give you complete peace of mind. It's time to switch! See your Lotus Authorized Reseller today.

Lotus
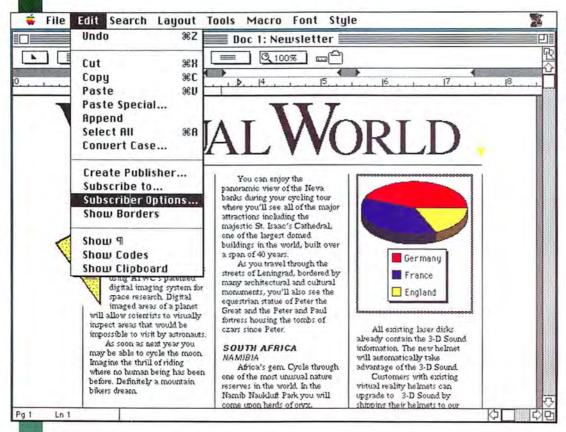
WordPerfect 2.01 for Macintosh
from WordPerfect Corporation

WordPerfect 2.01 for the Macintosh features new System 7 support, along with a new interface with simpler menus and streamlined dialog boxes—making writing on the Macintosh better than ever.

Features include an enhanced ability to move and manipulate graphic images, an integrated graphics editor that lets you create and edit graphics or draw directly over text, and a powerful macro language that simplifies often repeated commands. System 7's Virtual Memory feature lets you work with larger graphics in your WordPerfect documents. TrueType allows you to see your text more clearly on the screen. WordPerfect supports Publish and Subscribe, so if you subscribe to information in a spreadsheet or chart, any changes made to the documents are also reflected in your WordPerfect document. It also supports Balloon Help which offers you a user-friendly way to learn more about the program. And WordPerfect supports Apple Events.

Please contact your local reseller for upgrade information.

Photoshop 2.0
from Adobe Systems

fern.single (1:1)

346K

Bruce Hodge

Adobe Photoshop version 2.0 gives you direct access to a broader spectrum of color editing and production capabilities, and it utilizes the power of several System 7 features.

With Publish and Subscribe, for example, you can publish Photoshop files to page layout programs. Any changes you make to your Photoshop files will be automatically reflected in the page layout. Virtual Memory allows you to work with memory-intensive image files. Photoshop also supports TrueType fonts.

With Photoshop, now you can easily view and edit your high-resolution CMYK color scans right on screen without converting to the RGB of your monitor—just as you would with an expensive prepress system.

But that's just the beginning. This affordable Macintosh program is actually a complete professional prepress, color correction, paint, video editing and darkroom system all in one!

So whether you're a graphic artist, illustrator, photographer or video artist, Adobe Photoshop lets you edit and merge color images into one seamless creation, in 24-bit color or black and white.

Adobe Photoshop

What's more, when you're ready to produce work, you can print high-quality separations directly from Adobe Photoshop or export your encapsulated PostScript (EPS) file to Adobe Illustrator software or a page layout program.

Also included in every Photoshop version 2.0 package is a free copy of Adobe Type Manager version 2.0. For upgrade information, please call Adobe Systems at 800-833-6687.
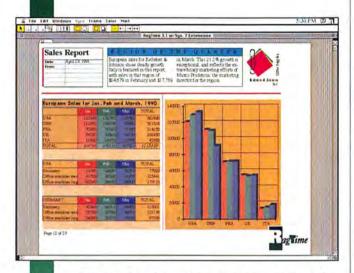
Purchase Adobe Photoshop 2.0 and get the Adobe font called "Wood Type" free (a $185.00 value). *See your authorized Apple reseller for details and coupon to redeem this offer.*

FontStudio
from Letraset

FontStudio 2.0 is the most complete font and logo creation tool available for the Macintosh–providing accurate control and flexibility. Enabling you to create custom variations of fonts, pictures, logos, etc., FontStudio then allows you to assign these elements to any keystroke. FontStudio incorporates System 7 TrueType, PostScript Type 1 and Type 3 import/export capabilities with the preservation of hints. The program allows you to auto-trace a PICT, TIFF, or Paint template or create a font entirely from scratch. You can also auto-hint any font and interpolate between two fonts to create an intermediate font weight. And if you're looking for exciting new fonts, look into Letraset's new collection of TrueType fonts where you buy FontStudio.

$50

Purchase FontStudio and receive a $50.00 cash rebate from Letraset. Send dated sales receipt, product registration card and coupon from an authorized Apple reseller. This offer is available to users in the United States only and may not be combined with any other offer.
See your authorized Apple reseller for details and coupon to redeem this offer.

ColorStudio
from Letraset

ColorStudio is Letraset's powerful color image creation and manipulation software for the Macintosh. ColorStudio's features include professional quality desktop color separations, extensive prepress links, color calibration to specific output devices, support for Photoshop plug-ins, and most significantly, the Shapes module for PostScript drawing. Full CYMK viewing and image-editing capabilities are now part of the program. ColorStudio 1.5 supports System 7 Balloon Help to help you learn the extensive features of ColorStudio. Apple Events enables ColorStudio to link with other applications. It also has TrueType support with the ColorStudio text tool. For upgrade information, please call 800-343-TYPE.
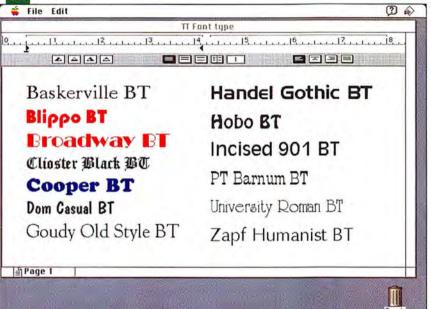
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Purchase ColorStudio and receive a $100.00 cash rebate from Letraset. Send dated sales receipt, product registration card and coupon from an authorized Apple reseller. This offer is available to users in the United States only and may not be combined with any other offer.
See your authorized Apple reseller for details and coupon to redeem this offer.

Bitstream Font Packs 1,2,3,4
from Bitstream

Baskerville BT

Blippo BT

Broadway BT

Clíoster Black BT

Cooper BT

Dom Casual BT

Goudy Old Style BT

Handel Gothic BT

Hobo BT

Incised 901 BT

PT Barnum BT

University Roman BT

Zapf Humanist BT

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Font Pack 1
7 faces included
$89.00

Font Pack 2
7 faces included
$89.00

Font Pack 3
13 faces included
$149.00

Font Pack 4
13 faces included
$149.00

Bitstream Font Packs for TrueType provide the highest quality type available in the TrueType format. The Font Pack typefaces work with any printer or application using the TrueType technology, including Apple StyleWriter® and LaserWriter® printers. The typefaces found in the four Bitstream Font Packs for TrueType can make any document more original, interesting and effective. Font Packs work with any Macintosh-supported printer, providing you have either a Macintosh operating System 7 or 6.0.7 with TrueType technology installed.

Bitstream Font Pack 1

Amerigo™
-Roman
-Italic
-Bold
-Bold Italic
Stencil™
Windsor™
American Text™

Bitstream Font Pack 2

Bernhard Modern™
-Roman
-Italic
-Bold
-Bold Italic
Futura Black
Exotic 350 Demi Bold
Embassy

Bitstream Font Pack 3

Zapf Humanist
-Roman
-Italic
-Bold
-Bold Italic
Baskerville
-Roman
-Italic
-Bold
-Bold Italic
University™ Roman
Broadway™
Bitstream Cooper Black
Cloister Black™
Hobo™

Bitstream Font Pack 4

Incised 901
-Roman
-Italic
-Black
-Compact
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-Bold
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Dom™ Casual
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$ **$10**
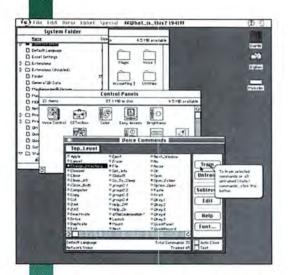
Buy a Bitstream Font Pack and get a $10.00 rebate and a free book titled "The Macintosh is not a typewriter" (a $9.95 value). Only one rebate and book per customer. Valid in U.S. only. Not valid when combined with any other Bitstream coupon. *See your authorized Apple reseller for details and coupon to redeem this offer.*

MacMainFrame Series
from Avatar Corporation

The MacMainFrame Series provides Macintosh-to-IBM mainframe connectivity for all Macintosh computers in stand-alone and gateway configurations for Coax, Token Ring and SDLC networking environments.

MacMainFrame combines the best of the Macintosh and IBM mainframe worlds. MacMainFrame provides full IBM 3270 emulation including support for 3278/3279 terminal, 3287 printer and APA graphics emulation. And it supports IND$FILE file transfer and the CICS, CMS and TSO operating environments.

Yet MacMainFrame gives Macintosh users the power to easily access mainframe information. Because it is a true Macintosh application, MacMainFrame includes support for Macintosh features such as pull-down menus, fonts, MultiFinder and scroll boxes and now Balloon Help and Publish and Subscribe found in System 7. With Balloon Help, you can get help balloons for all basic features, as well as for the status and error condition that occur during connectivity operations. Publish and Subscribe allows you to take information from a MacMainFrame 3270 window and publish it to a Macintosh application. It even supports TrueType for 3287 screen printing.

With MacMainFrame, users can copy and paste information from a mainframe application, such as IBM's PROFS e-mail package, into a Macintosh application such as Microsoft Word for greater productivity.

Through the use of the MacMainFrame API, organizations can also create custom front-end Macintosh applications with API tools including those from Apple, Mitem and Connectivite.
For upgrade information, please call 800-AVA-3270.
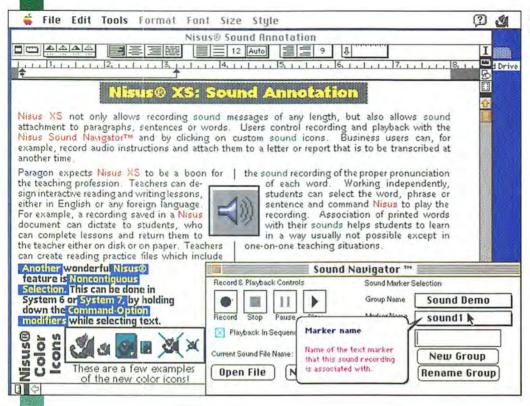
$50

Avatar is now promoting the "MacMainFrame 30-Day Free Trial Offer."
When a user calls to request a MacMainFrame 30-Day Free Trial Kit, they will receive the MacMainFrame product, manuals, etc. so that they can evaluate it for themselves free for 30 days. When they receive the MacMainFrame 30-Day Free Trial Kit, they will also receive a $50.00 coupon redeemable with their first purchase of MacMainFrame for the Macintosh LC.
To order the MacMainFrame 30-Day Free Trial Kit, please call 800-AVA-3270.

Nisus
from Paragon Concepts, Inc.

Nisus® XS: Sound Annotation

Nisus XS not only allows recording sound messages of any length, but also allows sound attachment to paragraphs, sentences or words. Users control recording and playback with the Nisus Sound Navigator™ and by clicking on custom sound icons. Business users can, for example, record audio instructions and attach them to a letter or report that is to be transcribed at another time.

Paragon expects Nisus XS to be a boon for the teaching profession. Teachers can design interactive reading and writing lessons, either in English or any foreign language. For example, a recording saved in a Nisus document can dictate to students, who can complete lessons and return them to the teacher either on disk or on paper. Teachers can create reading practice files which include | the sound recording of the proper pronunciation of each word. Working independently, students can select the word, phrase or sentence and command Nisus to play the recording. Association of printed words with their sounds helps students to learn in a way usually not possible except in one-on-one teaching situations.

Another wonderful Nisus® feature is Noncontiguous Selection. This can be done in System 6 or System 7, by holding down the Command-Option modifiers while selecting text.

Nisus® Color Icons

These are a few examples of the new color icons!

Paragon Concepts powers up its Nisus® 3.06 word processor with the Nisus XS module. This module incorporates System 7 features such as Balloon Help, and InterApplication Communication (IAC) via Publish and Subscribe and Apple Events.

With Balloon Help, Nisus XS provides users with instant, accessible help. And, with Publish and Subscribe, when you subscribe to information in another document, changes made to that information will automatically be reflected in your Nisus document.

Using Apple Events, another application running simultaneously can now share files with Nisus, and can also instruct Nisus to perform editing tasks, including macro execution, on these and other files. Throughout the editing, the files are accessible by both applications.

Nisus 3.06 word processor provides 10 clipboards, unlimited undos, noncontiguous selection, and a lightning-fast search/replace that can even check unopened files. Anything you can find, you can change, replace, index or format, all with one keystroke.

And there's still more. Graphics, custom feature capability and Super Style Sheets are standard in Nisus, which is flexible enough to do exactly what you want, easily.

For upgrade information, please call Paragon Concepts at 800-922-2993.
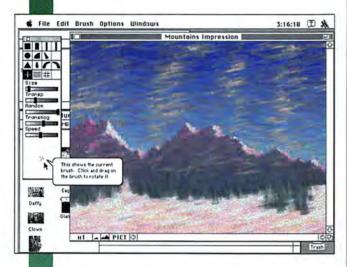
Purchase Nisus and receive a coupon good for a free Nisus XS add-on module (a $75.00 value). This offer is not valid for purchasers of the Nisus Academic Version or with any other promotion. *See your authorized Apple reseller for details and coupon to redeem this offer.*

With Mirror Monochrome Monitors You Get More Screen for Less Green.

Mirror's big screen monochrome displays are proof that you don't always get what you pay for. Sometimes you get more! Take our 19" Two Page Display System. It's about half the price of Apple's 15" Portrait Display yet has almost twice the viewing area. And Mirror's monitor has a faster refresh rate, and comes with an anti-glare screen and tilt/swivel base.

If you're on an even tighter budget and still want big screen convenience, you should consider Mirror's popular 15" Display System. At just $477 including card, it's the lowest priced full-page monitor on the market. It offers all the features of its big brother and both are compatible with all Macintosh CPU's including the SE, Plus and Classic.

Best of all, both are backed by Mirror with a full one year warranty, unlimited free technical support, and a 30 day money back guarantee. So before you part with any green, consider buying one of Mirror's big black and whites, otherwise you might end up seeing red and feeling blue. Call us at **1-800-654-5294.**
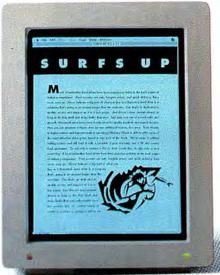
Mirror's popular 15" Monochrome portrait display is just $477 and is compatible with all Macs including the SE, Plus and Classic.

System 7.0 Compatible

MIRROR

Apple 15" Mono/Card **$1748**

Mirror 19" Mono/Card **$877**

To Order Direct, Call 1-800-654-5294

Circle 243 on reader service card

LETTERS

Thieves of Privacy

I too was distressed to read about the government's actions [*The Iconoclast,* March 1991] and feel the public sometimes needs protection from our law enforcement officials; I object, however, to the sentiments expressed by Stephen Bobic [*Letters,* June 1991].

Countless hundreds of thousands of dollars and man-hours are spent each and every day on implementing and maintaining elaborate security systems that would be unnecessary if hackers would mind their own business. This is an invasion of privacy [and] illegal.

Computer programmers and their client base deserve more respect than they get. But don't group hackers with them. You are a common thief, sir, stealing time and money from every system you "visit."
Thomas R. White
Erial, New Jersey

Off Duty Is Off-Limits

I 've just finished reading Leland Campbell's letter [*Letters,* June 1991] and find myself wavering between incredulity and outrage. Granted, hackers do not become publishers by virtue of running bulletin boards. Their privacy is guaranteed, however, by the same laws that protect us from phone taps and mail searches.

As to the suggestion that employers be responsible, or be made responsible, for the actions of their employees, my only response is "nonsense!" When employers in this country monitor the off-duty activities of their employees as a matter of course, I personally will start looking for citizenship elsewhere.
Colin Gerbode
North Hollywood,
California

Information Prohibition

A t our small mail-order business we were looking forward to using Lotus Marketplace to help us contact people who wanted the music-instruction tapes we make, give us the advantages the bigger companies have, and help us make a living. When Steven Levy [*The Iconoclast,* June 1991] says "the good guys finally won" by knocking this product off the market, he missed the boat.

What we don't need are more complications and obstacles to the free exchange of information. We'll end up with it being illegal for anyone but the government to make lists of people and keep files.
E. Denson
Alderpoint, California

The Hard Drive–Only Solution

I enjoyed Robert Eckhardt's article on security ["Solving Your Security Worries," June 1991]. But he missed one simple solution to the problem of unauthorized floppies—disconnect the internal floppy disk drive. We keep most of our drives unhooked except for installations.

If that solution seems too drastic, MacGuardian [415/459-0190] markets a very effective drive lock that stops unauthorized use of a floppy disk drive.

Unfortunately, any security scheme depends on the reliability of the end user.
Penny McQueen
Bloomington, Indiana

Easy Choking

I n reading Steve Roth's article ["Setting Traps," May 1991], I noticed that he said "FreeHand's and Illustrator's tools are better for creating spreads, though with a little work you can also get them to do chokes." I take this to mean the method for choking where a clone of the object to be choked is created be-
(continues)

. . . .

Corrections

The correct 800 telephone number for Deltaic Systems (Where to Buy, July 1991) is 800/745-1240.
(continues)

WARD SCHUMAKER

*MacDraw II (*Best-Sellers, *August 1991) is made by Claris Corporation.*

*Above is the correct photo of the JetFill ink-refilling device (*New Products, *August 1991).*

. . . .

tween the foreground and the background objects and then set to white with the stroke of the background color. The darker foreground object is set to overprint.

This seems like an awful lot of work when it appears to me that simply selecting the darker foreground object and giving it an overprinted stroke of the background color would work just as well. In testing this method using Illustrator 3.0, PageMaker 4.01, and Aldus PrePrint 1.0, it seems to work perfectly. No one I've talked to (specifically, service bureaus) is able to pinpoint the difference between the two techniques.
Jennifer Ball
Rancho La Costa,
California

A Lesson from Chrysler

I am one of those "technically addicted" people Jerry Borrell mentions [*Commentary,* May 1991]. I know that I would instantly love a Mac encased in the shell of the Sony Data Discman.

Maybe Apple should learn from Chrysler, whose Japanese cars in American clothing were a major factor in boosting the image of the troubled company. To compare Chrysler and Apple is to compare apples and oranges, but I want to highlight Apple's inability to exploit a shortcut to give its customers an excellent product. By refusing another chance to enlarge the market for the Macintosh Operating System, Apple is adding momentum to its fall into becoming a niche player.
Dave Pak
Glendale, California

An Apple Backbone

L etters such as the one by David Herron [*Letters,* June 1991] sound an awful lot like arguments we get all the time from our MIS department.

That old argument about Apple being the only source for the Mac gets trotted out all the time. Has anyone tried buying a VAX or Tandem clone lately? Enlightened management looks for the best, most cost-effective solution to their systems problems, not some Big Blue mantra that many departments feel they have to cling to.

With its market share doubling over the past few months, we see that Apple is behaving responsibly in going into cost-reduction mode, accepting some
(continues)

short-term pain for long-term gain.
John Lynchbury
Toronto, Ontario, Canada

EasyKana's Sound Is Real

Lawrence Stevens's *Window Shopping* column [May 1991] was alarmingly inaccurate. In his brief review of the HyperGlot Software product EasyKana, he criticizes its vocalization of Japanese words, reporting that "MacinTalk's drunken-sounding voice simply doesn't provide the accent and inflection accuracy you need when you are trying to learn a foreign language."

Neither EasyKana nor its companion product KanjiMaster uses Macin-Talk. All the sound in these HyperCard stacks is the digitized speech of a native speaker of Japanese, recorded with MacRecorder. The program is indeed an excellent auditory resource for learning Japanese. Here at the University of Georgia, KanjiMaster and EasyKana are used as laboratory materials by students enrolled in credit courses in Japanese. No experienced Macintosh user would confuse Easy-Kana's sound quality with that of the amusingly mechanical MacinTalk.
Brad Cahoon
Athens, Georgia

Unnecessary Joking

I do not appreciate supporting the infantile April Fool trivia that your writer Steven Levy appears to believe is funny [*The Iconoclast*, April 1991]. What a waste of salary, your time and mine, and valued magazine space.
Roy King
Austin, Texas

Likes to Laugh

I was sorry to see your "Geek Chic" spoof of 1990 did not return. I was hoping for an annual tradition of an entire section of humor.
David Swift
Jackson, Wyoming
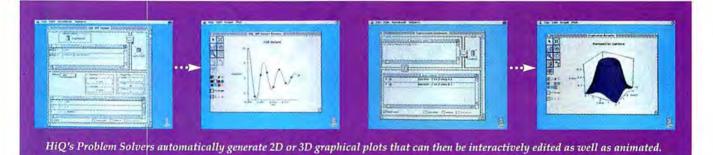
900-Number Support

Who was the Einstein at Epson that put technical support on a 900 line? The cost of Epson's technical support is $2 per minute, excluding the first minute, which is free. I don't want to pay to get a few technical answers concerning the purchase of a new item. Paying for the printer should be the bottom line.
David Sprogis
Belmont, Massachusetts

Epson is not the only company to initiate 900-number telephone support in order to offset technical-support costs. Many companies, including Apple, have 900 numbers for some forms of support.—Ed. ▣

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Letters should be mailed to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (7030,702) or MCI Mail (294-8078). Include a return address. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*

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On June 13, 1991 These 21 People Paid to Attend a MacAcademy Training Workshop in Rochester, NY.

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Bruce A. Roebal

"This was the clearest, most informative computer workshop I have ever attended. I commend all of you on a wonderful presentation."

Pam Giles

"Wow! Ooh! What I can do now! I appreciate the excitement which you teach with. It was so nice to have someone walk me through the steps."

Valerie Smith

"Having worked on a Mac since 1985 I thought it was too late to start any formal training. Boy was I wrong!. The classes were more than just informative - they helped me realize the power I have that I haven't taken advantage of and motivated me to use it. Your teaching method is extremely effective...and entertaining."

Debra Burger

"You've really hit upon a great idea with your teaching format - a very intensive course... I loved it and learned much more this way. Our schools need this type of enthusiasm and intensity but with the positive humor that makes this so human and upbeat. Super pacing, reinforcing, and effective."

Dan Castello

"The level of energy of the instructors was very infectious. I'm anxious to get back to work and apply everything I've learned. MacAcademy - such a deal!"

Anne L. Smith

"These classes were absolutely wonderful. Probably the most rewarding training experience I have ever had."

Carol Vargo

"Each instructor was wonderful. Great knowledge, great material, charm, & flair. The length of each class is perfect. My only regret is that the seminar was only 2 days."

Annette Gacioch

"Very impressed with your whole set-up. MacAcademy is a well run, well organized operation. I can't believe how much I've learned in two days. MacAcademy, you're very professional and definitely a class act."

Louise Spofford

"I feel I learned so much more than I had anticipated doing. I was leery that with a non-hands-on format I couldn't learn as much. Boy was I wrong. Your method allowed for coverage of far more material, and more in-depth material than would ever have been possible hands-on."

Jennifer Fusco

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Toni Wiesinger

"As an educational consultant I have participated and conducted many programs. I had misgivings about MacAcademy's teaching methods. However, the programs were extremely well presented and all questions were answered promptly. I wouldn't hesitate to recommend this program to anyone."

Robert J. Marr

"I can't say enough how great this experience was. I can't wait to get back and put all of this into the works. I would not hesitate to recommend MacAcademy to anyone."

Marie Godleske

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ART BEAT

by Cathy Abes

The tools and the talent behind Macworld's graphics and the techniques that make them possible

Artist: To illustrate a *Macworld News* story on Fractal Design Painter, Los Angeles–based artist Mark Jasin used Painter to create an image that would show off the program's unusual capabilities. In the short time he has used Painter, Jasin has become an enthusiastic fan. "For any artist who's interested in using software that can simulate traditional drawing or painting media, this is it." He says he hasn't found any program more responsive to the Wacom pressure-sensitive stylus. "When I used Painter, the pen was responsive and fast—even in high resolution, I came close to real-time drawing."

Hardware: Macintosh IIci with 8MB of RAM; 80MB internal hard drive; 19-inch SuperMac color monitor; SuperMac Spectrum/24 color board; Microtek MSF-300ZS flatbed color scanner; Wacom ADB pressure-sensitive tablet.

Software: Fractal Design Painter.

How It Was Done: After doing a rough sketch of the rooster in color pencil, Jasin scanned the image directly into Painter, in color, at 100 percent and 270 dots per inch.

The final image that appears in *Macworld News,* page 127.

One of Painter's many unusual features is its ability to simulate different paper textures. Just as with real paper, the paper texture you use affects the look of whatever media is applied to it. From the Paper Palette submenu (Windows menu), Jasin chose Medium Fine as the paper texture for his drawing. He used the default setting of white paper (Preferences menu).

Next Jasin opened the Frisket Palette to select the masking options he wanted. The three choices on the palette's top layer let you choose the type of mask, while the three on the bottom layer designate how the mask is viewed on screen. For the mask type,

Jasin chose the middle option, which masked out the rooster so he could manipulate the background without affecting the rooster. For viewing the mask, he chose the third option: a transparent outline that would allow him to see what was under the mask. Then to access the Masking tool, he extended the toolbox by clicking on the button at the upper-right corner. This displayed three additional tools—a Knife tool for cutting out the mask, and two tools for moving the mask once it's made (one to move the mask up and down and left and right; the other to rotate it).

After creating the mask, Jasin began rendering and

defining the colors. Because he wanted a pastel-chalk effect, Jasin chose the Chalk tool from the Brush Palette. He then began *cycling* the drawing, a traditional drawing technique that involves first laying the foundation of the drawing with broad brushstrokes and then using successively finer brushstrokes to add depth with more colors, fine lines, and details such as facial features, feathers, and highlights.

To create large chalk marks, Jasin chose the rounded-point brush (under the Brush Size Palette) and a medium-size chalk. Under the Brush Behavior Palette, he changed the default of 50% Advance to 65% to give the drawing a rougher texture.

After he had applied some new colors to the scanned image, Jasin began using the Grainy Water variant of the Water tool to blend, or smudge, the colors together. He also used different percentages of bleed in the Brush Behavior mode on different parts of the drawing.

In some areas, Jasin wanted more of a smudging effect—to make the colors blend together. So in those areas, he used a higher percentage of bleed. He also used a different brush size for different areas of the drawing—a larger brush for the background and a smaller one *(continues)*

The original pencil sketch scanned into Painter.

Colors, paper texture, and drawing tools were selected from the appropriate palettes.

After choosing a mask type from the Frisket Palette, Jasin chose the brush characteristics for filling in the background.

Broad brushstrokes were added with the large Chalk tool.

Finer strokes were used to add depth through highlights and details.

for details, such as the rooster's feathers. For the beak, the eyes, and the head, he used the Thin/Stroke variant of the Airbrush tool.

Then, with the Chalk tool, Jasin began adding highlights using several successively smaller fine-point brushes selected from the Brush Size palette. He also used the Rough Out variant of the Special tool (under the Brush Palette) for adding definition, highlights, and an impressionistic effect to various parts of the drawing. Still using the Special tool with the Rough Out variant, he selected the Jit-ter option under Brush Behavior to simulate a pointillistic paint effect, similar to the Seurat effect that the program provides. ◼

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The King of Software

WHY BILL GATES AND MICROSOFT HAVE NO CHOICE BUT TO DOMINATE

BY STEVEN LEVY

In the future," said the spare, bespectacled young man two places over from me at the lunch table, "everything is going to be digital." It was November 1983, and the table was one of many in the banquet room of a New York City hotel. The speaker, our host, whose words were so matter-of-fact they bestowed a predestined quality to his prediction, was even then a figure of legend in the computer business. I am speaking, of course, of William Gates III, cofounder, chairman, CEO, and godhead of Microsoft, the world's biggest and most powerful software concern. Gates had just announced his company's new system product, Windows 1.0, and now was talking informally. And in that single throwaway line a *weltanschauung* was revealed so vividly that if you turned it over you could almost make out the name *Rosebud* on it.

Yes! The world was going digital. And the unspoken corollary was that Bill Gates was going to make sure his company would hasten the inevitable, thus putting his personal stamp on the way we all lived our lives.

Eight years later, there's nothing to contradict the theorem or its corollary. Bill Gates has shaped the world's beginning transition from analog to digital. Microsoft utterly dominates the personal computer software industry. The company owns the operating systems used by the vast majority of personal computers. And though it doesn't own the Macintosh OS, Microsoft is overwhelmingly the largest vendor of Mac applications. With more than 7000 employees and over a billion dollars in annual revenues, it's bigger and more lucrative than any other software concern. The increasing value of the company's stock has made Bill Gates a billionaire four times over. If one were to choose the most powerful person in the information processing field—the one human being with the most leverage over how we will perform our mental labors, revamp the technology of education, and communicate with one another through digital networks, it would be the sandy-haired, slightly eccentric, disarmingly informal 35-year-old Harvard man from Seattle.

Gates has been called a bully, a ruthless czar of software who squashes competitors. Bill Gates, they claim, wants it all, and he'll do anything to get it. The federal government gave provisional credibility to this stream of complaints recently when the Federal Trade Commission began investigating Microsoft's business practices. In theory, the government could charge the corporation with antitrust violations—and even break up Microsoft, the way the government dismantled the phone company.
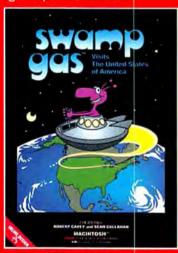
Though the future of that investigation is hazy, it's clear from the reams of press copy about Gates and Microsoft that a lot of people hate the guy *(continues)*

and his company. And some of them seem to have good cause. I'm thinking in particular of the fellows from Go Corporation, who showed their innovative stylus-based operating system to Microsoft engineers to see if the companies could work together to exploit this cutting-edge technology. But Go's executives were less than charmed when, some months after their confidential demo, Microsoft announced Pen Windows—a competing stylus-based operating system. And Microsoft's design team included an engineer who had been present at the Go demo!

Then there's Apple Computer's long-standing complaint that Microsoft Windows is a rip-off of the Macintosh Operating System. The lawsuit, already older than most of my neckties, is still alive. Because Microsoft is so pervasive in the industry, the two companies, at each other's throats in court, continue to work jointly on projects concerning Macintosh applications.

Is Microsoft a predatory company? Is Gates, as one personal computer visionary privately charges, indeed a robber baron in the spirit of Gould and Rockefeller?

Digital Doogie

Bill Gates always struck me as unique in the personal computer field. Like Bill Bradley on a basketball court, he has, in the words of Bradley's biographer, John McPhee, a "sense of where you are." He has the obsessive drive of a hacker working on a tough technical dilemma, yet has an uncanny grasp of the marketplace, as well as a firm conviction of what the future will be like and what he should do about it. And he really doesn't seem to care whether or not you accept his ideas. In interviews, his best ideas are directed toward himself, in a constant self-revelatory stream of consciousness. He sits there talking, *davening* like some crazed rabbinical student, thwarting devil's-advocate questions with ease. How could you fail to be impressed? He's TV's Doogie Howser with balls.

Most of all, he's got a vision. Microsoft is nearly unique in that it not only actually has a vision but also does something about it. The vision is to weave personal computing technology into the fabric of everyone's lives. (What this idea lacks in pithiness is more than compensated for in breadth.) It sounds obvious in 1991, but it wasn't so obvious in 1975, when Gates and a friend began the microcomputer software business.
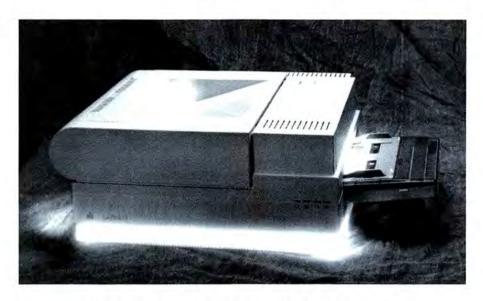
But there's a catch to Gates's vision: in order to pursue it, Microsoft is driven to dominate the industry. The corporate mission is to establish standards that make it easier for just plain users to take advantage of computer power. The ultimate goal, as outlined in a speech Gates gave last fall, is for users to bask in "information at your fingertips," so easy to access that it seems like there is no operating system at all. There will be computers in every office and every home, and operating them will be a cinch.

The Microsoft view of the world is that a single set of standards should rule. And Microsoft should have a piece of each standard. That makes every competing potential standard-setting product appear as a threat to a smooth-running world where the "everything digital" dream will be realized. But in response, Microsoft doesn't need to send in bombers to blow up those competitors—the company simply uses its corporate values of hard work, heavy resources, infinite patience, and unmatchable connections to come up with its own product that fits into the big picture.

As an example, consider the conflict between Apple and Microsoft. Apple was the first company to commercially exploit graphical interfaces in a big way, jumping off from ideas concocted at Xerox. But Microsoft also realized that such interfaces were a logical development in personal computing. Gates's vision compelled the company to adopt a concept so integral to the future of operating systems. So Windows, from version 1.0 on, looked like the Mac to some degree. The first version flopped, so Microsoft kept working on it until, almost a decade later, the company had a winner with Windows 3.0.

Or consider Pen Windows. Microsoft's explanation of the Go controversy is that Go would not tailor its system for Windows, as Microsoft re-*(continues)*

quested. Once this was clear, it was inevitable that Microsoft would come up with its own operating system, so as to maintain its standard across this new interface.

You can expect similar moves in the future, particularly when it comes to multimedia, an area in which Bill Gates is positioning Microsoft as the dominant company into the next cen-

tury. Slowly and methodically, Microsoft is purchasing content—books, artwork, and video properties—that can be used in products once multimedia computing is established. For instance, Microsoft recently bought a large share of stock in Dorling Kindersley, a British publishing house that produces informational books like the popular *The Way Things Work*.

An even more daring move has been the ground-breaking practice of buying electronic rights to thousands of works of art. Bill Gates literally set up Interactive Home Systems to furnish his new $10 million home with high-definition digital reproductions of noted paintings and photographs. One purchase was the nonexclusive rights to about 1000 artworks owned by the Seattle Art Museum. He's currently in negotiation with the Art Institute of Chicago for rights to works like Grant Wood's *American Gothic*. The electronic versions of these artworks seem destined to be used in Microsoft products in the future, and competitors in the next century can be expected to gripe about that, too.

Digital Damp

Given Microsoft's aggressive moves to make the world digital, it's not surprising that competitors complain. But the company probably exacerbates the problem by its physical and psychic isolation from the rest of the industry. My last visit was in December 1990, when a major book-publishing house asked me to talk with Gates about the possibility of cowriting his autobiography. Though the project itself was soon shelved, the trip did provide a glimpse of the Microsoft mind-set. I met a slew of executives, all of whom were bright people plucked from various cosmopolitan environs and sent to live in a digital rain forest.
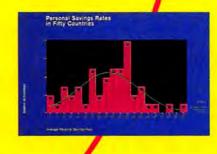
Shorn of daily contact with the gossip of Silicon Valley, they seem to have turned inward. These execs identified with the company so closely it is easy to understand how they might have lost touch with the way competitors regard them. Their mental map of the industry was like that famous cartoon map of the *New Yorker*'s view of the United States, with Microsoft dominating the foreground, IBM across the mountain range, and the companies of Silicon Valley, Utah, and Cambridge as vague spots between them and the horizon.
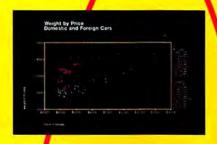
As a result, Microsoft people think that the howls from flattened competitors are sour grapes from people who don't work as hard. They actually feel persecuted. "The personal *(continues)*

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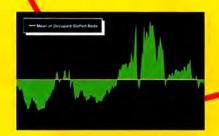
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computer industry is like a big summer camp, where the same people come year after year," one spokesperson told me. "And one summer a kid shows up, and he's gotten much richer than the rest. And everyone gangs up on him."

In this context it is easy to understand a certain potential for permeability in the so-called Chinese wall, a theoretical construct designed to separate Microsoft employees so that people in one part of the company (applications, say) can keep zippered on confidential information that, if revealed, would benefit the fortunes of another part of Microsoft (meaning operating systems). Some observers think this wall was breached in the Go case. But Microsoft thinks otherwise—a spokesperson insists that Microsoft had been considering its own system, and that Go officials knew this when they demonstrated the product. (The people at Go won't comment.) Some eyebrows might be raised at the choice of an observer of Go's demo for the Microsoft Pen Windows design team, but "we make no apologies," says the spokesperson. "We are very aggressive, and once we decide to do something, we go do it." In other words, Microsoft is big, with contacts and alliances all over the industry, and doesn't feel it should suffer because of its size.

The Sun King

The other interesting thing about Microsoft people is their attitude toward the chairman, reminiscent of the ways the seventeenth-century French courtiers regarded the Sun King of Versailles. Every detail about Bill Gates is bandied about and analyzed, almost as though he's some sort of infallible divinity, not the informal fellow I always encounter in interviews.

When I met Gates again last year, my recollection proved accurate: he was, despite all his power and his billions, a straight-arrow guy, even possessing a sense of humility. Gates is the first to admit that Microsoft's success has more than a little to do with luck. During our talk he seemed somewhat indignant at the charges people were throwing at him. Didn't people remember the times when Microsoft failed to dominate? For instance, it's only in the Macintosh marketplaces that Microsoft dominates application software—despite all the hoopla, Excel for the PC has yet to dethrone Lotus 1-2-3.

And speaking of Lotus and luck, Gates recalled the little-known item that Microsoft and Lotus discussed a merger in the mid-1980s. A straight 50-50 deal, forces combined. Gates told me he was willing to pull the trigger, but Jim Manzi of Lotus backed away. In hindsight, of course, the merger would have benefited Lotus much more than Microsoft, which is now many times bigger and more powerful than its spreadsheet rival.

Gates contended that he always tried to compete fairly and honestly, *(continues)*

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at the same time pursuing his goal "hard-core"—with zeal, technical savvy, and resources that few competitors could match. Let's assume that Gates is speaking the truth, and Microsoft doesn't act with consciously predatory intent. In other words, officials don't try to trick companies into yielding secrets, they don't try to force smaller competitors out of business, and they don't unfairly leverage their virtual monopoly on operating systems in the PC world to aid their applications business. That still may not get them off the hook. If I understand what experts tell me about antitrust law, as a company gets bigger and more powerful, owning a larger share of the marketplace and as a result forcing other companies to maintain good relationships with it, even fair competition can technically be in violation of the law.

Microsoft's lead attorney, William Neukom, says, "We consider ourselves a law-abiding, God-fearing, fairminded company." And he is confident that the company won't have to compromise its vision in the future, despite this increasingly sticky situation in which Microsoft dominates systems software while simultaneously competing in applications software. "I don't think the law is so limiting as to dissuade Microsoft from getting to the market what the marketplace wants," he says.
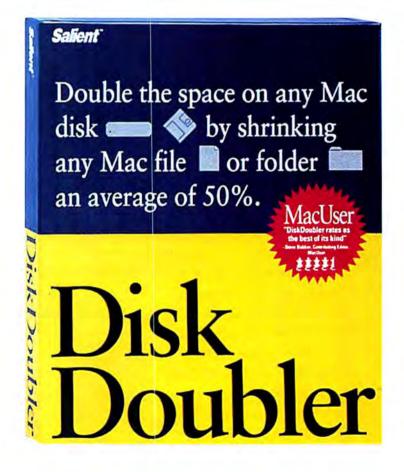
Ultimately, it may be a political decision whether Microsoft is prosecuted for antitrust violations. It hinges on how strictly the government wants to interpret antitrust law. Microsoft is in a unique position in a crucial industry—it wants to standardize and simplify an otherwise complex set of activities in order to broaden their uses and benefit the public. Along the way, of course, the company will become even more powerful.

Therein lies the rub. Some visions are so potent that you can't fulfill them without steamrolling some of the opposition. When I think of Bill Gates, I am reminded of Thomas Alva Edison. Though best known for inventing the light bulb, Edison spent much more of his efforts as a businessman, trying to standardize the nation on direct-current electricity. In order to do this, he had to squash the competing product, alternating current (which some thought a safer alternative and which ultimately prevailed). Though some of his practices were far worse than any Microsoft has ever been accused of, Edison is remembered as a person who dared to think big, and as a result, he is included among the people who changed the way we live.

Bill Gates also thinks big. And I think he will be recalled much like Edison, decades from now, when everything is digital and using a computer is as simple as plugging in a toaster. Pending, of course, action by the U.S. government. ◼

Macworld columnist Steven Levy is writing a book on artificial life.

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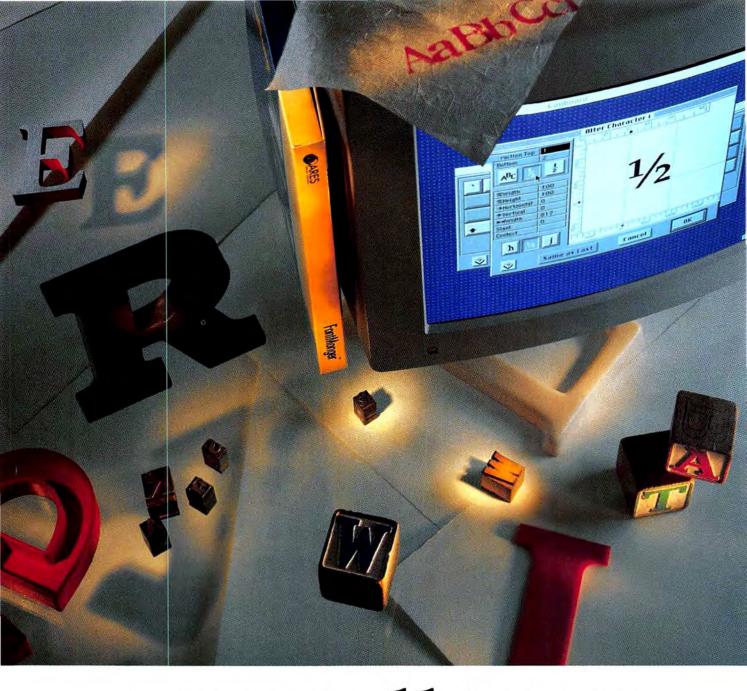
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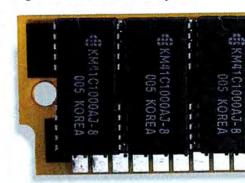
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*Most manufacturers (including Apple) get a little nervous about non-authorized personnel (that means you) working inside their machines. Be advised that opening your Mac may void the warranty, so check with your dealer if you're concerned.

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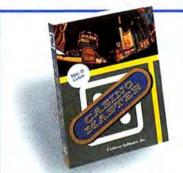
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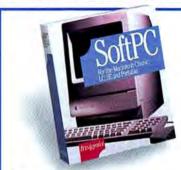
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Realistic graphics, help/advice windows, card
counting, manual with rules/strategy. Includes
Blackjack, Craps, Roulette, Baccarat and Poker.
8525 *(B&W)* . . . **$41.**   8524 *(Color)* . . . **$45.**

	FTL/Software Heaven	
1555	OIDS	25.

★**Great Wave ... 30 day MBG**

2276	❼KidsTime or 5642 ❼KidsMath *ea.*	26.
4334	❼NumberMaze 26. 8527 *(Color)*	36.
8044	❼NM Decimals & Fractions *(Color)*	36.
1517	❼ReadingMaze. 26. 1513 *(Color)*	36.

★**HyperGlot Software ... 30 day MBG**

❼Word Torture 4.0-Beginner to Advanced
(Span., Fren., Germ., Ital. & Rus.) ea. 35.
❼Pronunciation Tutor - Beginner
(Span., Fren.) ea. 35. *(Germ., Chin.)* 39.
❼Verb Tutor - Intermediate
(Spanish, French, German) . . . ea. 39.

9348	❼Chinese Writing Tutor	39.
9349	❼Chinese Survival Manual	39.
6611	❼Kanjimaster - Beg. *(Japanese)*	99.

★**Inline Design ... 30 day MBG**

1562	3 in Three 1.1 *(August '91)*	31.
8809	❼Tesserae or 7622 ❼Darwin's Dil. *ea.*	31.
1944	❼Swamp Gas	31.

Advanced Gravis ... 30 day MBG
9964 *SuperMouse*–Hi-res (320 dpi) mouse with
user-defined buttons to access menu commands.
For graphics, DTP and A/UX. . . . . 84.
9963 *MouseStick*–Advanced optical joystick with
NEW dual control for MS Flight Simulator **$59.**

★**Personal Training Sys. ... 60 day MBG**

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to advanced for QuarkXPress, Excel,
Persuasion, FileMaker II/Pro, PageMaker,
Illustrator, FreeHand, Word, HyperCard,
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Sierra On-line

9733	Hoyle's Book of Games II	23.
7367	Space Quest III *(color reqs. 2 Mb)*	35.

Sir-Tech Software

8229	❼Bane of the Cosmic Forge	35.
8228	Wizardry II: Knight of Diamonds *(CP)*	28.

Software Toolworks

4619	❼Mavis Beacon Typing 1.3 *(CP)*	32.
1908	World Atlas 1.0	52.

★**Spectrum Holobyte ... 30 day MBG**

3464	Tetris, 6112 Welltris or 8180 Faces *ea.*	22.
3459	Falcon 2.2.1 or 8181 Vette 1.0 . *ea.*	33.

★**Spinnaker ... 30 day MBG**

2328	Sargon IV 1.03 *(CP) (chess)*	28.

Insignia Solutions
❼*SoftPC 2.0*–Run MS-DOS applications.
Compatible with Mac II family, SE, SE/30,
Classic, LC, Portable and Plus. Offers complete
IBM PC compatibility combined with Mac's
ease of use. See line listing for specifics.

StudyWare
ACT, GMAT, GRE, or SAT Prep . *ea.* 29.

8098	LSAT Prep for the Mac 2.5	35.

★**Terrace Software ... 30 day MBG**

8192	❼Mum's The Word 1.0 *(gardening)*	79.

★**Toyogo ... 30 day MBG**

1993	Nemesis Scribbler	31.
7624	❼Nemesis Go Master 5.0 *(August '91)*	36.

★**XOR ... 30 day MBG**

6040	MacGolf Classic 1.0 *(CP)*	52.

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MODEMS, MAIL, NETWORKS

★**Abaton ... 30 day MBG**

6266	InterFax 24/96 Modem	349.

Applied Engineering

8363	❼DataLink/Mac Portable	209.
8938	❼DataLink LC	265.
8362	❼QuadraLink	205.

320C

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5737 🕖 *After Dark 2.0T*–Stops screen burn-in. 28.
2196 🕖 *After Dark & M.A.D. Bundle* ...... 42.

★Baseline Publishing ... 30 day MBG
8942 🕖 DoubleTalk *(2 terminals)* .... 84.
★Beagle Bros. ... 30 day MBG
7691 Flash 1.1 .... 125.
★CE Software ... 60 day MBG
5174 🕖 QuickMail *(5)* . 215. 5173 *(10)* . 315.
★CompuServe ... 60 day MBG
1676 🕖 Macintosh Membership Kit 1.03 . 22.
1673 🕖 CompuServe Navigator 3.0 ..... 49.
1674 🕖 Membership Kit/Navigator Bundle 68.
★CoStar Corp. ... 30 day MBG
1995 AppleTalk Network Box-for AddressWriter or 1997 LabelWriter II/II Plus.. ea. 127.
★DataViz ... 60 day MBG
1823 🕖 MacLink Plus/PC 5.0 .... 129.
4842 🕖 MacLink Plus/Translators 5.0 ... 109.
★Dayna ... 60 day MBG
     DaynaPORT E: SE, SE/30, II, IIsi, LC 279.
     DaynaTALK *(5 Pak)* 379. *(10 Pak)* 689.
8719 EtherPrint or 9888 *(10 Base T)* ea. 349.
Dove Computer
6758 DoveFax Desktop 1.1.1 .... 295.
9634 DoveFax+ 1.1.1 .... 359.
EveryWare
8077 AllShare 1.1.4 .... 139.
★Farallon Computing ... 30 day MBG
Full line available. Partial listing.
9805 🕖 Timbuktu 4.0 .... 135.
4866 🕖 Timbuktu/Remote 2.0.1 ...... 135.
8707 Liaison 3.0 .... 279.
9960 PhoneNET Talk .... 135.
9961 PhoneNET Card PC .... 209.
     PhoneNET Card *(SE/30 or II)* . ea. 279.
6273 PhoneNET StarConnector 10-Pack. 129.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
2206 PhoneNET StarController 300 .... 899.
6687 PhoneNET StarController-EN .... 1739.
★Freesoft ... 60 day MBG
6115 🕖 White Knight 11 .... 85.
★Global Village ... 30 day MBG
8946 🕖 TelePort A300 .... 139.
8945 TelePort/FAX .... 185.
Hayes
2300 🕖 Smartcom II 3.2 .... 84.
8614 Personal Modem 2400 Plus ..... 149.
7391 Ultra 9600 Modem .... 669.
★Insight Development ... 30 day MBG
1296 Mosaic 1.0 *(3)*.. 249. 1295 *(10)*.. 375.

Insignia Solutions
7557 🕖 Access PC 1.1 .... $62.
7058 🕖 SoftPC-AT/EGA Module 1.4.... 124.
9726 🕖 SoftPC 2.0 *(Classic, LC, SE, Port.)* 135.
4089 🕖 SoftPC 1.3 .... 245.
Intel Corporation
5119 2400EX Modem .... 179.
6420 2400EX MNP Modem .... 229.
8193 9600EX Modem *(w/QuickLink II)*.. 549.
★Int'l Business Software ... 30 day MBG
8581 DataClub 8581 *(3)* 199. 8580 *(10)* 539.
★Kennect Tech. ... 30 day MBG
5631 🕖 Rapport 1.3.6 .... 195.
7588 Drive 360 or 7590 Drive 1200. ea. 249.
5632 Drive 2.4 *(3½")* *(incl. FastBack II)* . 325.
★Microcom ... 30 day MBG
7459 🕖 CarbonCopy Mac *(single)* ...... 59.
1556 🕖 CarbonCopy Mac *(unlimited)* .. 179.
8027 MacModem V.32 .... 689.
★Microsoft ... 30 day MBG
9444 🕖 Microsoft Mail 3.0 *(1-5 user)* ... 269.
★Nuvotech ... 60 day MBG
3000 TurboNet ST *(DIN-8)* 30. 6751 *(12)* 279.
6272 NuvoLink SC .... 389.

Freesoft ... 60 day MBG
6115 🕖 *White Knight 11*–10 award winning communications program that supports XMODEM, YMODEM, ZMODEM, Kermit, and CompuServe Error Correcting protocols. Includes Okyto 1.0 and a free subscription to GEnie **$85.**

★Practical Peripherals ... 30 day MBG
3102 2400 Baud External Modem ..... 179.
8994 2400 V.42 bis Modem .... 209.
7934 PM9600SA Modem 1.26 .... 489.
9849 SmartPack 9600 .... 529.
★Prometheus ... 30 day MBG
8350 ProModem 2400 Mini for Mac.... 124.
8349 ProModem 24/96 MSR .... 289.
8738 ProModem 9600M Plus .... 599.
8990 ProModem Ultima .... 689.
★Shiva ... 30 day MBG
3444 🕖 NetSerial 3.3 .... 275.
4347 NetBridge or 4942 🕖 TeleBridge.. 409.
3443 🕖 NetModem V2400 3.3 .... 339.
6519 🕖 EtherGate 1.50.1 .... 1299.
8189 FastPath V *(July '91)* .... 1889.
Sitka/TOPS
4188 Teleconnector *(DIN8)* 23. 2230 *(10)* 189.
3720 TOPS Flashcard .... 155.
6264 🕖 TOPS Network 3.1 *(August '91)* . 187.
★Software Ventures ... 30 day MBG
3455 🕖 MicroPhone II 3.0 .... 215.
★Solutions, Inc. ... 60 day MBG
6720 FAXGATE Plus 3.0 *(July '91)* ..... 239.

★Symmetry ... 30 day MBG
9969 EasyShare 1.2.1 .... $69.
★Synergy ... 30 day MBG
6618 🕖 VersaTerm 4.5 90. 6619 PRO 3.5 177.
★Traveling Software ... 60 day MBG
3729 LapLink Mac III Connectivity Pac .. 93.
★Zoom Telephonics ... 30 day MBG
1168 MX2400R Modem *(w/QuickLink II)* . 89.
1176 MX2400S Modem *(w/SendFax 9600)* 105.
1179 V.42bis Modem *(w/MacPack)* .... 169.
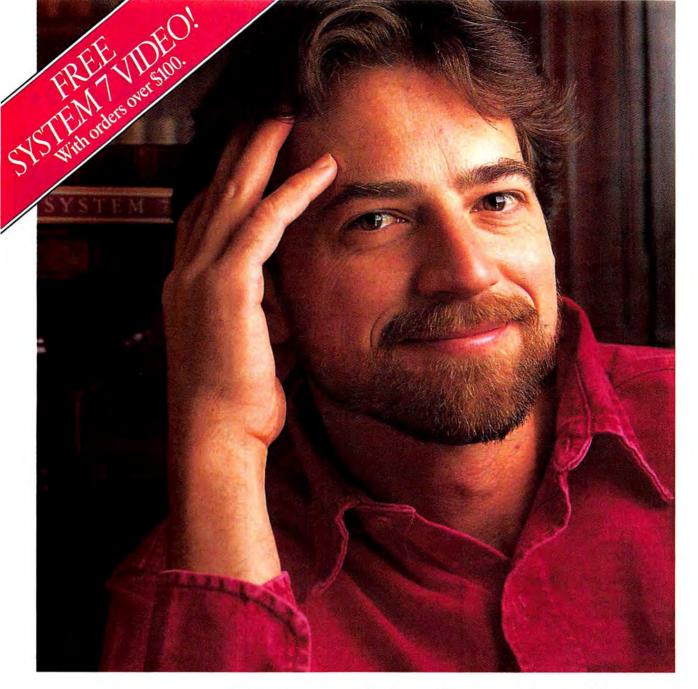
INPUT/OUTPUT
MONITORS, KEYBOARDS, MICE, PRINTERS & SCANNERS

★Abaton ... 30 day MBG
7432 🕖 Scan 300/GS *(reqs. Scan Kit)* .. 999.
     Includes free ProPoint *($79 value)*.
1495 Scan 300/Color *(reqs. install. kit)* . 1419.
1496 Int. Kit for 300/Color w/Photoshop 479.
1537 LaserScript LX .... 1729.
★Advanced Gravis ... 30 day MBG
9963 Gravis Mouse Stick .... 59.
9964 Gravis Super Mouse .... 84.
American Power
6686 UPS 370ci .... 339.
Applied Engineering
9799 🕖 Cache-In .... 199.
Bravo Communications
9813 2 Pos. Laser *(compatible switch box)* 95.
9817 4 Pos. Laser *(compatible switch box)* 119.
Caere
8124 🕖 Typist 1.0 .... 479.
4476 🕖 OmniPage 2.12 .... 495.
★CoStar Corp. ... 30 day MBG
1884 LabelWriter II .... 193.
1880 LabelWriter II Plus .... 299.
1418 AddressWriter .... 469.
1886 AddressWriter Label Feeder .... 63.
1885 Stingray ADB .... 89.
★Cutting Edge ... 30 day MBG
9956 119 Enhanced Keyboard .... 119.
★Datadesk ... 30 day MBG
9830 MAC101E .... 129.
6901 Switchboard *(modular keyboard)* . 159.
★Everex ... 30 day MBG
1144 Silhouette Trackball .... 82.

Baseline Publishing ... 30 day MBG
7784 🕖 *Color MacCheese*–Affordable 32-bit color painting. Perfect for the Mac II LC. **$56.**
7785 🕖 *Talking Moose*–Jokes, humor & more 23.
8055 🕖 *Screenshot*–The one-step screen graphics solution .... 33.

System 7? Lon Poole tells all!

As a *Macworld* Contributing Editor, author of *The Macworld Guide to System 7,* and all-around operating system aficionado, Lon Poole has been writing a lot about System 7 lately. But the best way to get a writer to really start making sense is to take his hands off the keyboard and put his face in front of the camera. So that's what we're doing—a video of Lon Poole explaining all about System 7 produced at the studios of PCTV®,

somewhere in the wilderness near Marlow, NH.

If you've been trying to figure out what System 7 can do for you, this is a great way to find out. And it's *free to anyone who places an order over $100.* (Limit one per customer.) Or you can buy a copy for $9.

By the way, Lon's publisher and accountant asked us to remind you that we'll also sell you his book on System 7 for just $19. Or buy the book *and* video for $25. You'll be System 7 savvy in no time.

MacConnection

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8989	High Speed SCSI for Mercury 16+	$209.
7817	16 MHz Mercury 030 (for Mac SE)	389.
8624	16 MHz Mercury 030 (for Mac Plus)	519.
7816	20 MHz Gemini 030	799.
8708	25 MHz Gemini 030	1179.
7814	33 MHz Gemini II 030	1375.
8371	40 MHz Gemini II 030	1499.
	20 - 40 MHz Gemini Classic	call
	68882 Math Coprocessors	call

ACCESSORIES

RIBBONS, CASES, DUST COVERS

Apple Computer

7748	Personal LaserWriter Toner Cart.	89.
1115	LaserWriter II Toner Cartridge	105.

★**Avery** ... 60 day MBG

4811	Transparencies 8½" x 11" (Qty. 50)	22.
4807	Laser Labels 1" x 2⅝" (Qty. 3000)	24.
5392	Disk Labels 3½"-Laser (Qty. 630)	29.
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9501	Mac LC w/12" Monitor Cover	10.
9503	Mac IIsi Ext. w/13" Monitor Cover	10.

★**CoStar** ... 30 day MBG

7453	The Organizer Jr.	82.
6091	The Organizer	199.

★**Curtis Manufacturing** ... 30 day MBG

9742	Tilt & Swivel (MT-1)	19.
8973	Apple Security Kit (SL-2)	22.
8046	MVP Mouse	89.

Ergotron

	MacTilt (Classic, SE or SE/30) .. ea.	68.

★**Goldstein & Blair** ... 30 day MBG

8198	"What Do I Do Now" Book	10.
1913	The Mac Bible Guide to System 7	10.
8374	The Macintosh Bible (with disks)	25.

IDG Books

2238	Macworld Guide to System 7.	19.

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8812	Ultimate Classic Carrying Case.	64.
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2578	Extra Long ADB Kybd. Cable (7 ft.)	24.
2559	Apple Security Kit	33.
9303	Keyboard Shelf	39.
6763	SE Radiation/Anti-Glare Filter	52.
5064	Apple Color Monitor Polarizing Filter	63.

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1505	Oak Disk Case (36) 32. 4632 (90)	32.
8795	Switch Box (2 Pos.) 32. 8796 (4 Pos.)	49.

★**Mobius Technologies** ... 60 day MBG

4470	Fanny Mac QT (Platinum)	53.

★**Moustrak** ... 60 day MBG

2694	Moustrak Pad (7"x9") 8. 2692 (9"x11")	9.
2693	Moustrak Pad Low Friction (9" x 11")	10.

Ribbons

3255	Image II Black 4. 9362 (12 Pak)	29.
3261	Image II Multi-4-Color 9. 9810 (6 Pak)	39.

★**Sopris Softworks** ... 60 day MBG

	Ripstop Nylon Dust Covers	call.
4014	High Trek Mac SE & Ext. Kybd. Case	69.
2009	Mac Classic Economy Case	49.
2005	Mac II LC Carrying Case.	69.

Nutmeg Systems ... 30 day MBG
19" Gray-Scale Display for SE/30, II or IIsi—Delivers a flicker-free 72 dpi image at 78 MHz with 256 shades of gray. Includes video card, tilt/swivel base and anti-glare screen. Please see line listings for additional Nutmeg products... **ea. $1295.**

★**Targus** ... 60 day MBG

3618	ImageWriter II Case	45.
3617	Mac Classic/Plus/SE Case	59.
4015	Mac SE & Ext. Kybd. Carry Case	75.

★**Tripp Lite** ... 30 day MBG

6199	Isobar 4 (surge suppressor, 4 outlets)	49.
6200	Isobar 6 (surge suppressor, 6 outlets)	59.

STORAGE MEDIA

★**Fuji** ... 60 day MBG

2214	3½" DS Disks (10) 11. 2242 (50)	49.
2215	3½" HD Disks (10) 18. 2241 (50)	79.
2243	3½" DS Disks Color (10)	12.
2239	3½" HD Disks Color (10)	19.

★**MacConnection** ... 60 day MBG

6592	44 Meg Cartridge 74. 9728 (10)	699.

★**Sony** ... 60 day MBG

3297	3½" DS Disks (10) 11. 6148 (30)	29.
3298	3½" HD Disks (10) 18. 6375 (30)	49.
8185	QD2040 Tape Cartridge	19.

★**3M** ... 60 day MBG

3943	DC2000 40 Mb Data Cartridge	19.

Total Systems ... 30 day MBG
Gemini Classic—All the muscle of the award-winning Gemini II for the Mac Classic, plus 4 Mb SIMM support, special RAM disk capability—with beefed-up power supply for reliability. Includes Virtual from Connectix **call.**

★**MAXELL** ... 60 day MBG

2792	3½" DS Disks (10)	13.
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GDT Softworks
6256	❼PrintLink Collection 4.01	$59.
7687	❼Mac Daisy Link 1.1.5.	59.
6151	❼JetLink Express 2.1.	89.
8960	ParaLink Express	99.

Hewlett-Packard
6514	HP DeskWriter Printer	569.
9993	HP LaserJet IIIP (with toner)	1149.
6754	HP LaserJet III (with toner)	1699.

Hitachi
9492	14'' Color Monitor (w/Mac II adaptor)	599.

★Kensington ... 30 day MBG
	❼Turbo Mouse 3.0 (Plus or ADB) ea.	107.

Kraft Systems
7519	KM30 ADB Joystick	42.

★Logitech ... 30 day MBG
1671	MouseMan	77.
1672	TrackMan	89.
5082	ScanMan Model 32 G-Scale Scanner	299.

MegaGraphics
	❼19'' Rival Sys. LC, SE, SE/30, II ea.	1199.
	❼19'' G/S System for SE/30, II . .ea.	1895.

★MicroSpeed ... 30 day MBG
6620	MacTRAC (for 512, 512E & Plus)	62.
6621	MacTRAC ADB (for SE & II family)	75.

Global Village ... 30 day MBG
TelePort A300–1990 MacUser Editors' Choice Award for *Best Communications Product*. 2400 bps/MNP-5 modem connects via ADB Port. SendFax (9600 baud) optional.
8946 ❼*Basic* . **$139.**   8945 *with FAX* . **$185.**

★Microtek ... 30 day MBG
1981	MS-II OCR Scanner	849.
1978	Scanmaker 600GS	1199.
1985	Scanmaker 600ZS	1599.
1982	Scanmaker 1850S	2299.

Monster Design Group
1486	Monster Speakers (two, stereo)	175.

★Mouse Systems ... 30 day MBG
7560	Trackball ADB	68.
	Little Mouse or Little Mouse Plus . ea.	74.
9471	A³ Mouse	85.

★Nutmeg Systems ... 30 day MBG
	❼19'' for SE, SE/30, II, IIsi . . . . .ea.	995.
	❼19'' for G-Scale SE/30, II, IIsi . . . ea.	1295.
	❼20'' Color System: SE/30, II, IIsi ea.	2595.

★Orange Micro ... 30 day MBG
3036	❼Grappler 2.0 (9 pin)	92.
6229	❼Grappler LX	134.

Pacific Data Products
7412	❼Pacific Page (PE) 529. 1473 (XL)	979.

★Sophisticated Circuits ... 30 day MBG
8009	❼PowerKey 1.01	64.
8008	PowerKey Remote	32.

Software Ventures ... 30 day MBG
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TheComplete PC
6104	Half-Page Scanner/400	289.

Thunderware
4994	LightningScan 400	385.

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7497	1 Meg SIMMs for IIfx (set of 4)	199.

Applied Engineering
8360	❼3.5 Mac 800k Drive	195.
8361	❼1.44 Meg High Density Drive	229.
	MacRam Classic with 0, 1, or 3 Mb.	call
1971	FastMath LC	175.

CD Technology
9962	❼Porta Drive HD (200 Mb)	1395.

★Cutting Edge ... 30 day MBG
3989	800K External Disk Drive . special	119.
5456	44 Meg Removable Drive	599.

Iomega
2224 *90 Meg Transportable Drive*–Rugged and built to last, this drive will absorb 1000 g's of shock and provide 90 Meg of portable storage. Awards from *MacUser, Macworld, Byte,* and *InfoWorld.* Five year warranty. (reqs. kit) . **$799.**

3990	30 + Meg Hard Drive	$359.
3991	45 + Meg Hard Drive	379.
5275	60 + Meg Hard Drive	399.
5276	80 + Meg Hard Drive	469.
1213	52 Meg Hard Drive (Quantum)	439.
1569	105 Meg Hard Drive (Quantum)	649.
1573	185 Meg Hard Drive	899.
1217	601 Meg Hard Drive	2229.

★Dayna ... 60 day MBG
8723	DaynaFILE 360k Drive	449.
8722	DaynaFILE 1.2 5¼'' Drive	449.
8724	DaynaFILE Dual 360k & 1.44 Mb .	739.

★DayStar Digital ... 30 day MBG
Listed items do not include coprocessor.
	LT200 Connection (PC) 189. (MC)	299.
8556	FastCache for Mac IIci	279.
	25 MHz PowerCache 030 for II, IIx, IIcx, IIsi	749.
	40 MHz PowerCache 030 for II, IIx, IIcx, IIci, IIsi	949.
	50 MHz PowerCache 030 for II, IIx, IIcx, IIci, IIsi	1689.
8583	SCSI PowerCard (reqs. memory)	1095.
1970	Ram PowerCard	749.

DayStar Digital ... 30 day MBG
40 & 50 MHz PowerCache IIsi–New from DayStar Digital! Double the performance of your 20 MHz Mac IIsi with DayStar's PowerCache IIsi. PDS adapter included.
2038 *40 MHz.* **$949.**   2014 *50 MHz.* **$1689.**

Dove Computer
	MaraThon 030 Upgrades	call
	MaraThon 030 Racer (Plus, SE, or II)	call

★Fifth Generation ... 30 day MBG
9403	JukeBox Five (auto disk feeder)	155.
9809	FastBack Tape	999.

Iomega
7551	44 Meg Transportable (reqs. kit)	call
2224	90 Meg Transportable (reqs. kit)	799.

★Micron ... 30 day MBG
7149	Xceed IIci-128 Cache Card	239.
6680	Xceed for SE/30 (640 x 480)	279.

Peripheral Land, Inc. (PLI)
8335	PLI TurboFloppy 1.4	309.
8334	PLI SuperFloppy	429.
8333	PLI Sony 40 Turbo Ext. Drive	439.
8327	PLI Infinity 40 Turbo	699.
9752	PLI Infinity 88 Turbo	1199.
9862	PLI Infinity 40 Twin	1199.
8330	PLI 105 Meg Ext. Drive	699.
8329	PLI 200 Meg Ext. Drive	1179.
1866	Quick SCSI Card	319.

Sigma Designs
1501	DoubleUp	159.

The Changing Nature of Support

HOTLINES AND DEVELOPERS AREN'T THE ONLY SOURCES OF HELP

BY DEBORAH BRANSCUM

Apple technical support? It sounds like an oxymoron, but after years of insisting that customers see their dealers with questions, in May Apple established a tech-support group for System 7. Customers who buy the system software upgrade kit get an 800 telephone number to call for support and can also access a 24-hour automated question-and-answer line. Macintosh users who don't buy the kit can get help via a 900 telephone number at $2 per minute, or by calling the recorded Q&A line at 408/257-7700.

What explains Apple's change of heart? "Users are getting savvy and using support to make buying decisions," says Alameda, California–based support consultant Mikael Blaisdell. "And companies realize it is a way they have to compete in the 1990s, because the quality of the relationships they have with their customers is the one thing that can't be easily duplicated by other companies."

There's plenty of variety in the technical support currently offered, and it's available from independent companies as well as Mac developers.

WordPerfect has built its business in part on expensive, extensive technical support via toll-free telephone numbers. Ashton-Tate, on the other hand, offers unlimited "vanilla" support on regular telephone lines. Customers who want improved support buy an Assist plan, which offers an 800 number, senior-level technicians, and

WordPerfect "hold jockey" updates callers on hold times. Some companies reject WordPerfect's tech support as an industry ideal.

shorter hold times. A few companies, such as Quark, require payment for technical support after the first 90 days following registration.

Company policies vary, but basic telephone technical support appeared far from endangered when *Macworld* surveyed more than 30 companies from our *Best-Sellers* section about their policies (see "Angling for Answers"). In 1990, the industry newsletter *Soft letter* published the results of a technical support survey, which covered 282 software developers across the personal computer industry. Last year 60 percent of the companies offered unlimited telephone

support. "Eliminating free tech support for new buyers is economic suicide. There's no way it's going to go away," says *Soft letter* publisher and editor Jeffrey Tarter.

Moreover, developers are becoming increasingly sophisticated about additional avenues of aid. These include online forums and bulletin boards, faxback systems that send documents to users on demand, and automated systems that offer recorded responses to common questions.

Microsoft, for example, offers technical support via CompuServe, America Online, and GEnie. The forums offer access to the Microsoft Knowledge Base, which has more than 20,000 items of technical information, as well as a software library of templates and upgrades. A much smaller company, CE Software, has a handful of tech-support technicians instead of hundreds but maintains a lively online presence on America Online and other services.

Adobe Systems receives about 15,000 tech-support calls each month; two-thirds are about its Macintosh products. Some 42 tech-support people answer phones every day. Dave Brown, who oversees tech support as *(continues)*

director of operations, says Adobe is beefing up its support in a variety of ways. Earlier in the year, for example, the company established a 24-hour fax-back system. Users can call a toll-free number to select up to three documents that will be faxed back to the caller.

Aldus has been using an automated Q&A system for just over one year. About 50 technicians field some 9000 Mac-related calls monthly. Customers can choose to try the automated response system first, then wait for a technician if the system fails to solve the problem. I spent a little

under five minutes pressing different touch-tone buttons on my phone to end up with prerecorded advice on solving a PageMaker printing problem. Microsoft and Adobe have similar automated response systems.

According to *Soft letter*'s survey, *(continues)*

ANGLING FOR ANSWERS

Company	Customer Service	Technical Support	Support Details	Hours (Pacific time)	Online Access[II]
Adobe Systems	800/344-8335	415/961-0911	free, unlimited, 800/235-0078 *	MTWTH, 6 a.m.–5 p.m. F, 6 a.m.–2 p.m.	AL, CS
Aldus Corporation	206/628-2320	206/628-2040 900/226-2261	90 days free [†] $15 per call	7 a.m.–5 p.m.	CS
Apple Computer	800/776-2333	System 7 only 900/535-2775	90 days free with upgrade kit [†] $2 per minute 408/257-7700 [‡]	6 a.m.–5 p.m.	AL
Ashton-Tate	213/329-9989	408/927-0880	free, unlimited [†], 800/727-4866 [‡]	6 a.m.–4:30 p.m.	CS
Berkeley Systems	415/540-5536	[§]	free, unlimited	9 a.m.–5 p.m.	AL, AOL, CS
Brøderbund Software	800/521-6263	415/492-3500	free, unlimited	8 a.m.–5 p.m.	CS, GE
Casady & Greene	408/484-9228	[§]	free, unlimited	9 a.m.–5 p.m.	AL, AOL
Central Point Software	503/690-8090	503/690-8080	free, unlimited; ask tech support for BBS password	7 a.m.–5 p.m.	BBS 503/690-6650
Claris Corporation	408/727-8227	408/727-9054	free, unlimited, 800/735-7393 [‡]	6 a.m.–6 p.m.	AL, AOL, CS
CMS Enhancements	714/222-6000	714/222-6617	free, unlimited	7 a.m.–5 p.m.	BBS 714/222-6601
Deneba Software	800/622-6827	[§]	free, unlimited	6 a.m.–2 p.m.	CS, GE
Ehman	307/789-3830	[§]	free, unlimited	7 a.m.–5 p.m.	AL, AOL
Farallon Computing	415/596-9000	[§]	free, unlimited	6 a.m.–6 p.m.	AL, AOL, CS, CT, GE
FreeSoft	412/846-2700	[§]	free, unlimited	10 a.m.–2 p.m.	GE
GCC Technologies	800/422-7777	[§]	free, unlimited	5:30 a.m.–5 p.m.	AL, AOL, CS, GE
Informix Software	913/492-9922	[§]	free, unlimited	6:30 a.m.–3 p.m.	
Intuit	800/624-8742	415/322-2800	free, unlimited	5 a.m.–5 p.m.	
Microcom Software	919/490-1277	[§]	free, unlimited	M–Th, 6 a.m.–2:45 p.m. F, 6 a.m.–1:45 p.m.	AOL
MicroNet Technology	714/837-6033	[§]	free, unlimited	8 a.m.–5 p.m.	AL
Microsoft Corporation	800/426-9400	206/454-2030 206/635-7080 Excel 206/635-7200 Word 206/635-7160 Works	free, unlimited	8 a.m.–5 p.m.	AL, AOL, CS, GE
Quark	303/934-2211	303/934-0784	90 days free [†]	6 a.m.–4 p.m.	
Radius	408/434-1012	[§]	free, unlimited	M–Th, 8 a.m.–5 p.m. F, 8 a.m.–3 p.m.	AL, CS, CT
RasterOps Corporation	800/729-2656	[§]	free, unlimited	9 a.m.–5 p.m.	AL, CT
Rodime Systems	305/480-9226	305/480-9867	free, unlimited	5:30 a.m.–2:30 p.m.	AL
Salient Software	415/321-5375	[§]	free, unlimited	8:30 a.m.–5 p.m.	AL, AOL
Sitka Corporation	415/769-9669	415/769-8711	free, unlimited	MTThF, 7 a.m.–5 p.m. W, 7 a.m.–3 p.m.	AL, CS; BBS 415/769-8774
Software Toolworks	800/231-3088	415/883-5157	free, unlimited	6:30 a.m.–5 p.m.	AL, CS
Software Ventures	415/644-1325	[§]	free, unlimited	9 a.m.–4:30 p.m.	BBS 415/849-1912
SuperMac Technology	408/245-2202	408/245-0646	free, unlimited	6 a.m.–6 p.m.	BBS 408/773-4500
Symantec Corporation	800/441-7234	213/319-2012	free, unlimited	7 a.m.–5 p.m.	AOL, CS; BBS 408/973-9598
T/Maker Company	415/962-0195	[§]	free, unlimited	8:30 a.m.–5:15 p.m.	AL, CS
WordPerfect Corporation	801/225-5000	800/336-3614	free, unlimited after hours, 801/222-9010	6 a.m.–5 p.m.	CS

* *Fax-back system for technical notes.*   [†] *Paid support plan available.*   [‡] *Recorded responses to common questions.*   [§] *Use customer-service telephone number.*

[II] *AL = AppleLink; AOL = America Online; BBS = Bulletin Board System; CS = CompuServe; CT = Connect; GE = GEnie*

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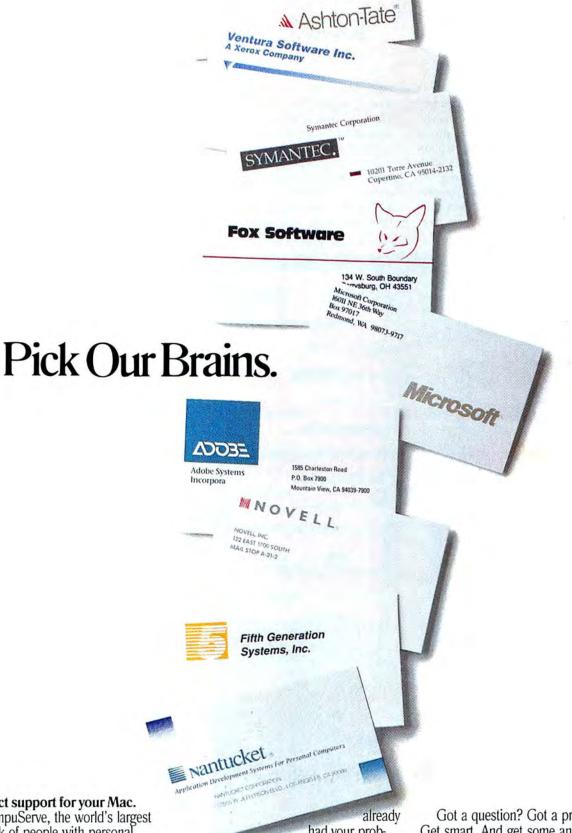
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most tech-support calls come within the first 90 days of program ownership, so there's not a lot of money to be made by charging for support. "What paid support does do is allow developers to provide various kinds of premium service," says Tarter.

Aldus, for example, answers questions from registered users at no charge for 90 days after the first call to tech support. After that, there are two paid plans, plus a 900-number option. The basic plan is $99 for one year of support for one application. It includes a toll-free number, free minor upgrades, and a 25 percent discount on major releases (PageMaker 4.0, for example). The premier program costs $179 and offers priority queuing for faster access (in addition to the toll-free line), a 40 percent discount on major releases, Aldus TechNotes, and one free document-design consultation by fax.

"We went to a 900 number because it was the missing link between free support ending and contracts starting," says John Archdeacon, director of customer service for Aldus North America. "We had a void for the infrequent caller." Unlike with many tech-support 900 numbers, Aldus charges a flat $15 fee per call.

Third-Party Support

As more developers charge for premium service (which Adobe is considering), third-party support may become more common.

IBM actually offers support for both DOS and Macintosh machines through corporate contracts (contact your local IBM office for information). Businessland Solution Line Plus (800/527-1144) provides a similar service at $50 per solution, charged to a credit card or established account. There is no charge if the technician cannot solve the problem.

Computer Hand Holding (415/882-0517) in San Francisco has offered support services since 1983. About 30 percent of the company's support involves Macintoshes. Computer Hand Holding has a staff of seven and primarily serves corporate clients such as Charles Schwab & Co. For small groups and individuals, Computer Hand Holding charges $450 per year for up to 20 calls; other plans are available.

Kirin International of Buffalo, New York, claims to provide problem solving for more than 600 software and hardware products, including major Macintosh applications. Kirin's Computer Helpline (900/446-2468) is available around the clock, every day, at $2 per minute. Corporate plans are also available; call 800/753-2468 for more information.

Roughly two years ago Danton Mendell founded 900 Support (900/776-4357) to troubleshoot problems with Novell networks; about 10 percent of the company's calls cover Mac issues. An 800 number (800/937-4832) was added this year so users who work at companies that block the use of 900 *(continues)*

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Color monitor illustration by Rob Mageira

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telephone numbers can buy support via credit card. The 24-hour service costs $4.99 for the first minute and $2.99 for each additional minute.

What's cost-effective for corporations may not be affordable for individuals, but there are a huge number of support resources for Mac owners, including books, training materials, and classes. Don't overlook other us-

ers as a source of support. Macintosh user groups can be a great source of technical expertise. Berkeley, California's BMUG, for example, answered 4200 calls in May, the majority of them about System 7. Most groups don't have formal telephone help but do have experts in different applications who are willing to discuss problems. If you don't belong to a user group

yet, call Apple at 800/538-9696 ext. 500 or 408/996-1010 to find a local MUG.

Troubleshooting Tips

Before you call anyone for help, take time to think through the problem. "You don't want to call at the drop of a hat because . . . calling for help is time-consuming," writes tech-support expert Ralph Wilson in *Help: The Art of Computer Technical Support* (Peachpit Press, 1991). "By struggling a little with the manual and the system, you gain considerable power as you gain self-sufficiency."

Clearly there are times when it makes sense to call on tech support. But before you dial, take these steps recommended by Wilson in his book. **1. Rethink what you're doing.** Go through the steps slowly and deliberately. Simple user errors cause many problems. **2. Is the answer in the documentation?** Manuals vary in quality; if you can't find your subject, try possible synonyms. Don't forget documentation on disk: "Readme files often provide the solutions to the most annoying problems because the problems hadn't been encountered yet when the manual was written," writes Wilson. **3. Go over the fundamentals.** Make sure cables are connected, the machine is plugged in, and you've followed installation and configuration instructions. **4. Try the vanilla test.** It's easier to diagnose a problem on a simple system than on a complicated system, Wilson notes. Many problems are compatibility problems. Make your system as simple as possible (and still able to support what you're trying to do). "This might mean booting the computer from a floppy, or removing special devices from the configuration." Adding software and hardware one piece at a time can help you locate the culprit. **5. Can you repeat it?** Which actions lead to the problem? What conditions trigger it? Make specific notes. "You might be able to discover patterns to the system behavior that point to the cause," Wilson writes. **6. Is it really supposed to do what you want?** Developers can be vague about the limitations of their products, but, writes Wilson, "take a moment when you're stuck to confirm that the *(continues)*

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Output Resolution:
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Gamma Correction:
None

Silverscanner

Original:
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Brightness level:
default

Input resolution:
150 dpi

Size: 419K

Output Resolution:
200 dpi

Line Screen: 150 lpi

Gamma Correction:
None

Microtek Scan

Original:
8 x 10 color print

Brightness level:
default

Input resolution:
150 dpi

Size: 1201K

Output Resolution:
200 dpi

Line Screen: 150 lpi

Color Correction:
None

Silverscanner

Original:
8 x 10 color print

Brightness level:
default

Input resolution:
150 dpi

Size: 1220K

Output Resolution:
200 dpi

Line Screen: 150 lpi

Color Correction:
None

When it comes to selecting the right scanner, be forewarned. There is a difference you can see in black and white. And color. Just look at this comparison between the La Cie Silverscanner and the Microtek 300ZS. Both images were scanned at default settings with no corrections. This entire ad was then created and separated using Adobe Photoshop, Quark XPress 3.0 and a Linotronic 330.

As you can see, Silverscanner produced a better-looking image than the Microtek scan. Silverscanner lets you scan color, gray-scale, halftone and line art with dazzling clarity. La Cie gives you more with OCR compatability, faster color previews, versatile scanning controls and up to 1200 dpi.

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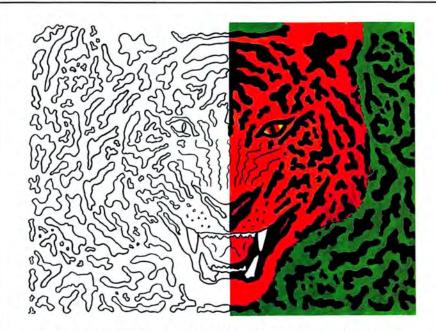
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SERVICE HERO

Reader Carl Nuzzo writes from Europe to applaud Kid's Approved Disks of Long Beach, California. Nuzzo bought Dinosaur Discovery Kit and First Letters and Words from Kid's for a preschooler. The programs worked fine on a Mac SE until it was upgraded to 4MB of memory. Nuzzo returned the disks to Kid's, asking for help. Two weeks later, the president of the company called Nuzzo in Denmark and discussed the problem for about 30 minutes. She returned the disks to Nuzzo with a check for the purchase price. If the disks didn't work after installing a new System, Nuzzo could keep the check and return the disks. "Fortunately, I was able to get the programs running as long as I used a separate boot disk, so I returned her check," writes Nuzzo.

system is supposed to do what you want."

When you do call tech support, take heart. Virtually all the tech-support managers I spoke with admitted that hold times for customers are longer than they should be, but all say they are working to improve tech support overall. Aldus's automated response system may move to an 800 number, for example, and RasterOps is bucking the trend toward paid support with a new customer-satisfaction center that offers toll-free technical support. There's no perfect system, but there are a growing number of ways to get help when it's needed. **M**

(Research assistance by Carolyn Bickford.)

Send nominees for sainthood to Service Heroes, Macworld, *501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop* Conspicuous Consumer *a line if a company is ignoring you.*

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Verbatim

An interview with Tom Nalevanko, cofounder and president of Mainstay

BY JERRY BORRELL

T om Nalevanko grew up in the Pittsburgh area and attended Saint Vincent College, where he received a B.A. in mathematics in 1969. The following year he received a B.S. in mechanical engineering at Pennsylvania State University. He then received a Hughes Fellowship from Hughes Aircraft in Los Angeles, where he worked while attending graduate school at UCLA. He received an M.S. in engineering in 1972. After graduation Nalevanko continued to work for Hughes Aircraft, first in Los Angeles for two years and then in Paris for five years on a cooperative defense program. He returned to Los Angeles in 1979 and completed his M.B.A. at UCLA the following year. Nalevanko cofounded Mainstay two years later. The Southern California company is probably best known for Capture, its screen-capture program.

MW When was Mainstay founded?

Nalevanko In 1982, when we started doing games for the TRS 80, Commodore, Atari, even the Apple II. The company was actually called Funsoft from 1982 to 1984.

MW The company doesn't do games anymore. What happened?

Nalevanko Our intent was always to do a business product, and whenever we got an entertainment product finished for a particular machine, the market for that personal computer died. So we made the strategic decision to put quality games on all CPUs. Then the game market died! That's about the time that the Mac came out and we decided to develop for the Mac.

MW Why did you choose the Mac over another CPU?

Nalevanko We were interested in doing serious software, and the Mac seemed to be the second serious rebirth of the personal computer. The IBM PC—I didn't believe in it. At the time we had one full-time programmer, Yves Lempereur from Belgium, and he didn't want to work on the IBM PC either.

MW So in 1984 you began developing for the Mac?

Nalevanko Yes. At one point our bank account was down to $100. We've bootstrapped the company since then. I remember getting back to the office with the Mac. We wanted to begin developing software, but there were no tools. I knew Alain Rossman [one of the original evangelists at Apple] because of my Paris experience. I called him and said that we wanted to develop software. He said it would be no problem and sent us MDS [Macintosh Development System], which was mainframe-oriented, not Mac-like in our minds. So Yves started to write an assembler program for the Macintosh on the Atari. Eventually, as the program progressed, he switched to development on the Mac.

MW You wrote your own development system. How long did that take?

Nalevanko From March to September of 1984, when we had an editor/assembler for the Mac called MacASM. It was the first commercial assembler for the Mac. Apple didn't have MDS out until ten months after we were finished.

Our program would have been more successful if Apple had admit-

ted that its system would not be out for ten months. People would have used ours. [Instead] people held off on buying our program. And Apple also gave away MDS to deserving developers. In the end, MDS died. We sold almost as many MacASMs as Apple sold MDS, about 2700 copies, so we were still pretty successful. Later MacASM waned because of Apple developments like MPW. *(continues)*

MW When did you start on your next Mac program?

Nalevanko In late 1984 we started working on something else. That was prior to the Mac Plus. Clearly there was no market for much outside of utilities, so we did that primarily to survive.

MW Were there many small development tool or language companies in those days?

Nalevanko Manx, Consulair, Aztec—all essentially gone or reduced. Only the Think people [producers of Lightspeed C and Lightspeed Pascal, now part of Symantec] are left. We cooperate with them. Our language products are interpreters, and we'll be compatible with most of the Think products and complement their products.

MW Apple is making a lot of strategic statements about object-oriented programming.

Nalevanko We believe that object-oriented programming languages are the future. We're currently working on visual procedural languages as a first step to implementing them in object form.

MW Mainstay has been known for the large number of products the company has produced.

Nalevanko Now we have seven or eight main products. At one time we had more. Over the years we decided against utilities that can be obviated by changes in system software. For example, MacBooster was a disk cache that was killed off in 1986 after that function appeared in system software.

MW You've had others like that?

Nalevanko MacSpool, a print spooler, had quite a bit of success. Now MultiFinder provides spooling. Our product supported the ImageWriter, and we let the product die. It was too difficult to handle problems caused by the rapidly changing System.

MW Is Visual Interactive Programming [VIP], one of your current products, a programming environment?

Nalevanko It is, and it has had some success, but it's a proprietary language not accepted by the community, which wants to use standard languages for development. We continue to work on products like VIP, and later this year we'll release a Visual C and a Visual BASIC.

Another product is MacFlow, a flow-chart program. In 1986 we met the developers of MacFlow at the Macazine show and licensed the program; it is still our most successful
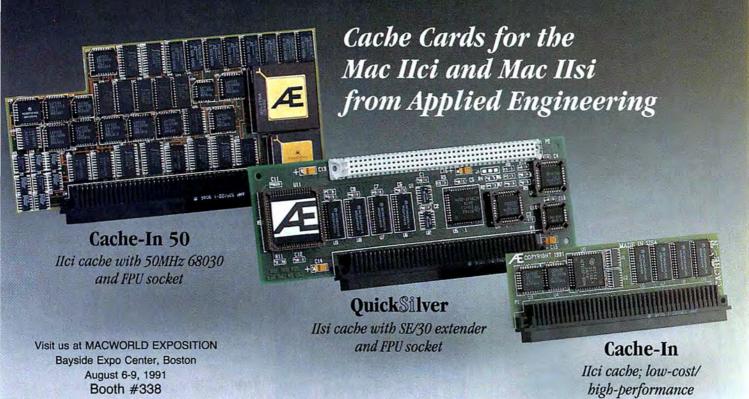
People will have several computers. A hand-held computer that communicates with a portable that talks to a desktop that talks to servers.

product. It has an installed base of easily 20,000.

MW What about MacSchedule?

Nalevanko We brought that out in 1987; it is very complementary to MacProject. It's another licensed product. We have only two like that. It sells well in Japan, where they like to run projects from a Gantt chart coupled with financial data.

(continues)

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Applied Engineering's hardware know-how doesn't end with cache cards though. We also make a full line of internal and external data/fax modems — the DataLink family— designed specifically for the Macintosh. Applied's QuadraLink provides four extra serial ports for the

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Circle 124 on reader service card

MW How big is Mainstay?

Nalevanko We have 20 people, mostly in the United States. We're totally privately owned and have revenues of about $3 million.

MW What about development in Europe?

Nalevanko We have an office in Brussels for development, and European sales is run by my partner, Alain Marsily. We've done several products there—VIP, MarkUp, and MarcoPolo.

MW How does European development work?

Sales of low-end software do not correspond to the increase in Mac sales. People are buying less or pirating.

Nalevanko We have large phone bills. We have E-mail links. We have a product marketing manager there, and we all attend the major Mac trade shows. Also we do cross-localization—U.S. products are localized for Europe in Belgium. In Japan our distributor does the localization.

MW Have the low-cost Macs benefited your sales?

Nalevanko Not at all. Our products are used in business, typically Fortune 1000 companies—not by Classic us-

ers. Low-cost machines have had no apparent effect on our sales.

MW What about the LC and the si?

Nalevanko The si has helped somewhat, the LC somewhat, the Classic not at all. We have made a conscious decision not to focus on the Classic, but to go for the business market that continues to buy software.

MW Macintosh Classic buyers aren't buying software?

Nalevanko The Software Publishers Association has said that sales of low-end software, such as word processors, do not correspond to the increase in Macintosh sales. What does that mean? That people are buying less or that piracy is occurring. Draw your own conclusion.

MW What do you think?

Nalevanko That people are buying software and that there is a piracy phenomenon.

MW Do you think copy protection is going to come back?

Nalevanko I don't think it will, despite the severe piracy problems in the world. In the Mideast companies sell only one or two copies of any product because of the piracy problem. I don't think that copy protection can come back because it inconveniences users, and I can't see the protection giving an actual advantage to the user.

MW You produce a number of other products. How would you describe them?

Nalevanko In 1988 we changed our product direction after the Macworld Expo. We wanted to begin involving people with networks. We wanted a product to allow multiple users to mark up and annotate documents on a network. We developed MarkUp, the first groupware product for the Macintosh.

MW I remember going to my first demo of MarkUp. I was really encour-
(continues)

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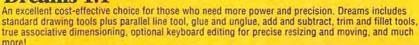
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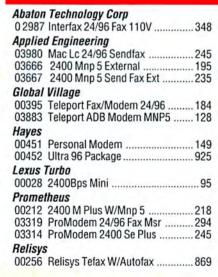
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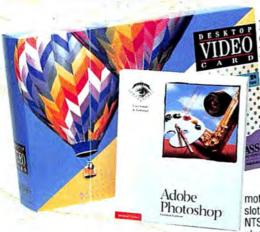
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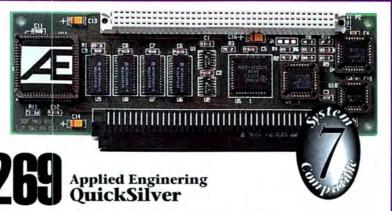#01057 Courier HST

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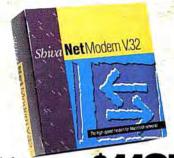

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System 7 Compatible

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Walker, Richer, Quinn

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aged, but there does not appear to have been much product movement in that direction. Is the Mac really up to groupware?

Nalevanko At the time we did MarkUp you needed an AppleShare server. But we felt that System 7 would give file sharing to all Macintosh users. System 7 means that any document can be made into a group MarkUp document, annotated, and edited. MarkUp does writing on the document, or on an image of a document, and multiple users can do this at the same time. The first version of the application had a document-center approach, and people didn't accept that so well. The second version, to be released in July, is oriented to individual documents.

MW Name the most important aspects of System 7.

Nalevanko File sharing. The ability to hide and show applications. You

know, I honestly do not believe that it is all that easy for users. Apple wouldn't have to have phone help for end users if it were. I have my doubts about how many users will use Publish and Subscribe mechanisms.

New users will find it more difficult to use. User groups will help. Phone support will help. Users will be better off with functions like the integrated Find File, which actually does that. Lots of IAC [interapplication communication] applications will make a difference to the user; for example, when a phone book is integrated with a word processor, there will be more vertical applications that will help.

MW Does System 7 really make a difference for the Mac?

Nalevanko It renews our interest, and causes more people to look at the Mac and make the right decision, to purchase the Mac over clones or whatever else.

MW System 7's release was a catharsis for Apple. What will 8.0 be like?

Nalevanko Apple announced that they're not thinking about 8.0. We'll see a several-year transition to 8.0. In the meantime, we'll see mail, integrated annotation, better voice integration. I think that we'll see a progression of improvements for the operating system.

MW Will Apple continue to be able to drag along its installed base?

Nalevanko I think that they won't be able to do that. I see two areas of change—to RISC, for which the operating system can be the same, and to the development of pen-based systems. There has to be some communication between a portable computer and the mother ship, because I think that people will have several computers. A hand-held computer that communicates with a portable that talks to a desktop that talks to servers.

MW Mainstay is one of the last companies developing products exclusively for the Macintosh.

Nalevanko Since 1984 we've developed only for the Mac. But there are Windows versions of our products in the future. We have a Mac focus, but our customers have put us under pressure for cross-platform compatibility. One business customer said, "If you don't do a Windows version of your product, we will." The important part for users is not just that they have file compatibility. They want to open a flow chart from Windows on the Mac, or open a Mac chart on a PC.

MW How have your experiences with Apple Computer varied over the years?

Nalevanko We have good relations with Apple. By and large, Apple does the best job of computer manufacturers in supporting its developers. But the reality is that Apple acts in its own self-interest, to sell platforms. If you do something that sells new Macs, they love you. If you do something that just helps the installed base, they couldn't care less. The big mistake that some developers make is focusing on the installed base. Apple isn't concerned with people who have a Mac, but with those who are buying their next CPU.

MW Most third-party developers now work on multiple computers. Why?

Nalevanko It's a function of the cost structure and dynamics of the industry, which is driven by customers who have both Macs and PCs. There are very few Mac-only shops. You add value to your applications by making them compatible across platforms.

MW In the best of all possible worlds, could Apple have kept its developers captive?

Nalevanko Apple would have had to offer more direct financial help, and that would only have delayed it [the move to other computers]. The message of the Apple Worldwide Developer Conference this year is that the developer community is not in that good financial shape. It is just not possible to bootstrap a company any longer.

MW What happened to small developers from the early Mac years?

Nalevanko Small companies sold out to large companies. From 1984 to 1987 you could start a company and bootstrap it and be successful. Now there is so much noise in the market that even if you have a good product, to gain market share and distribution is very difficult.

MW Will you sell your company too?

Nalevanko We continue to grow and have no plans to sell the company. But the goal of any enterprise is to *(continues)*

Color. Spe

21" SuperMatch™
Two-Page Color Display

realize its value. Over time that may mean an acquisition or sale, but it's satisfying to grow something from nothing.

MW What is your take on Claris?

Nalevanko I think having Claris as part of Apple is a fundamental obstacle to certain kinds of software developers. For example, if I'm working on an object-oriented database, I have a concern about Claris because of File-Maker Pro. Claris is Apple, so I have to consider a different product area. You can raise the issue of whether there is a "Chinese wall" between Apple and Claris, but people come and go between the two companies. They talk.

I feel for the developers of Write-Now, or of CAD packages. I see the Claris and Microsoft war and the ones squashed in the middle, the small developers. I think that the Mac market loses because if a developer has to sell any product in the same realm as Claris, which is not truly financially independent, the developer suffers. If Claris makes a mistake with a product, Apple cannot afford to let the product fail; it will do what it takes to make Claris look good.

MW What do you think about Claris's new spreadsheet?

Nalevanko I think that people will remain true to Excel. Wizzy things are just not enough to sell the Claris spreadsheet.

MW I hear that Apple will sell about 2 million CPUs in fiscal year 1991.

Nalevanko That confirms what I hear. Even software sales are not doubling. Sales are somewhat stagnant. Low-end CPUs are not pulling sales.

MW What are the best applications in the market today?

Nalevanko Excel 3.0. WriteNow—lean and mean. I like that in a program. CompuServe Navigator—saves users time and dollars. I've encouraged Apple to do that for AppleLink.

MW What is the most important thing

Apple can do for its developers now?

Nalevanko Continue technical support. Have a sense of timeliness. It is difficult to plan applications if you have to factor in major system software changes. Possibly Apple could aid small companies with marketing—for example, we're invited into their booth at trade shows.

New users will find 7.0 more difficult to use. User groups will help. Phone support will help.

MW There seems to be an incredible intensity associated with the development and marketing of Macintosh software.

Nalevanko I think it's as intense in any software market. There's lots of energy across the spectrum for Windows and UNIX. The Macintosh takes a real commitment.

MW What will be the next big issue in the Mac environment?

Nalevanko A compatible document architecture. The common denominator for documents is now paper. We need a universal format. The closest proposal for that is Adobe's Multiple Master proposal for an advanced, editable, PostScript format in which fonts look the same on all documents. Apple should support that. ▣

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MACWORLD NEWS

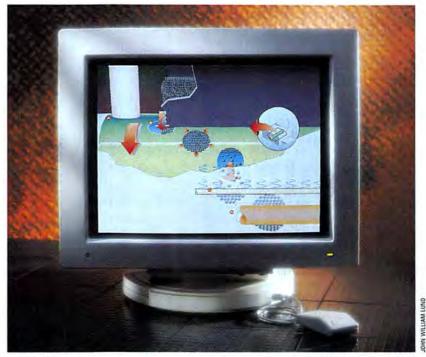by Dan Littman and Tom Moran

Apple Two-Page Color Monitor Emits Low ELF

In its first foray into the large-screen color monitor market, Apple is coming out with a 21-inch display that emits reduced levels of electromagnetic fields. Called the Macintosh 21" Color Display, the monitor has a 75Hz refresh rate that eliminates flicker, and it has a resolution of 1152 by 870 (at 79 dpi) for viewing two full pages at once. It also has a built-in autodegausser that senses and adjusts to outside magnetic fields that can cause discoloration of the screen image. Apple said the monitor meets Swedish MPR standards for VLF and ELF magnetic-field emissions, which are implicated but not proven as health hazards. Preliminary testing of a prototype 21" Color Display by Macworld Lab indicated that the monitor will perform relatively well in terms of those emissions.

The overall quality of the image was excellent on the prototype. To eliminate moirés (interference patterns), Apple used an asymmetric dot pitch; that is, the vertical distance between dots is slightly different from the horizontal distance between dots. The screen itself is relatively flat and square and is covered with an optical coating that reduces glare. The brightness and contrast controls are on the front of the monitor's case, and the base contains two ADB ports on either side. A third ADB port, on the rear, lets the user place the Mac away from the monitor if desired.

The new monitor, sold without a graphics board, is compatible with Apple's Macintosh Display Card 8•24 and Macintosh Display Card 8•24GC,

Apple's Macintosh 21" Color Display is being offered only outside the U.S. after considerable criticism from competitors over Apple's entry into the large-display market.

as well as boards from other vendors. With the Apple graphics boards the monitor displays 256 colors simultaneously from a palette of 16.7 million colors. The monitor can show the full 16.7 million colors simultaneously with graphics boards currently available from several third parties including RasterOps and SuperMac, according to Apple.

The 21" Color Display was announced by Apple Pacific and Apple Europe on June 3, and it will not be available in the United States—at least at first. The monitor has been the source of controversy ever since third-party developers and distributors found out it was under development. They began a letter-writing campaign urging Apple not to introduce the product because they thought that a two-page, low-ELF monitor with the

Apple logo on it might garner the lion's share of the large-screen display market, which they had pioneered. Since large-screen displays are big-ticket items with large profit margins, international distributors felt they might be driven out of business, possibly hurting Apple's ability to sell its computers in international markets. Several vendors and sources at Apple said that the company partly conceded to earlier pressure by agreeing not to introduce the monitor in the U.S. (see *MacBulletin*, July 1991). However, the Macintosh 21" Color Display will be available in Canada and Mexico, through Apple Pacific, Apple said at press time. Apple cited higher international demand as its reason for not offering the 21" Color Display in the U.S. The monitor was built for *(continues)*

Apple by FIMI, a subsidiary of Philips Italy, using a tube from a Japanese maker that Apple declined to name.

The Macintosh 21" Color Display was scheduled to enter volume production by July 1. Its price will vary depending on the currency exchange rate in the countries where it is sold, but Apple's guideline price is $5500 in U.S. dollars. For more information, contact an international Apple dealer.—**T.M.**

The Macintosh Newsroom

The Archdiocese of Los Angeles produces two Catholic-oriented newspapers, the English-language broadsheet *Tidings,* and the 24-plus-page *Vida Nueva,* which, with a circulation of 110,000, is the area's largest Spanish-language weekly.

Vida Nueva editor Alberto Aguilar and creative director Karen Steeb put out the archdiocese weekly on a multiuser Mac system.

When the archdiocese decided to bring its production in-house, director of communication David Moore knew PageMaker and QuarkXPress wouldn't satisfy the multiuser needs of a classified ad department and editorial desk. So for about $300,000— substantially less than a dedicated editorial-only system—Moore's group of 37 people installed Macs running a suite of applications from Digital Technology International.

DTI installs turnkey systems and publishes about a dozen applications that provide order entry and makeup for classified and display ads; article tracking; page dummying; print spooling; wire-service capture; and photo editing. All the pieces can be linked through a Sybase database running on a Sun server, so that, for example, articles laid out on page 2 don't show

up in the queue again for page 3.

AdSpeed, SpeedPlanner, and PageSpeed are the flagship products. AdSpeed is a display-ad design package with such high-end features as color graphics rotation, trapping, four-color separation and stripping, and color calibration. SpeedPlanner is a sort of preprocessor for dummying pages, planning color assignments, and the like. It creates what DTI calls Smart Templates for incorporation in Page-Speed, where they automatically import, place, and format headlines, body copy, captions, and other elements from text files. PageSpeed is where you fine-tune the pages, place the ads, and print.

For Sybase installations, version 3.0 of PageSpeed and AdSpeed (due out this fall) will have a user-customizable interface to the database so that an editor can create a blank story and assign it to a reporter, or a production editor can see which designer is working on an ad.

Pricing will depend on configuration. For more information, contact Digital Technology International in Orem, Utah, at 801/226-2984.—**D.L.**

Search for Planet Earth

From the company that brought us Virtual Valerie comes a science fiction tale on a CD ROM. In Spaceship Warlock, you start out broke and wandering the streets of a dingy, dangerous planet. If you can grab some cash, you might be wise to sail away on a luxury starship and meet some interesting characters—on the other hand, if you go for the luxury cruise you might get kidnapped by space pirates. If you survive, you may eventually rediscover planet Earth, which was long ago captured and hidden away by imperial invaders.

Spaceship Warlock's graphics are a stunning blend of Swivel 3-D, Studio/8, Photoshop, and as Mike Saenz, one of the program's designers, puts it, "about every high-powered off-the-

shelf tool on the Mac." The pieces were assembled in MacroMind Director 2.0 with heavy use of Lingo, Director's animation scripting language.

Waiting for the CD ROM to read new scenes can get old, but you can save a sort of bookmark so you do not have to start from scratch each

Perhaps you were expecting a quiet cruise on a starship— how unfortunate: you've just been kidnapped by pirates.

time you get killed. Saenz's hot tip is, "Think about where you are and where you've been to figure out how to go to the next place . . . and ask questions of the various entities [you meet]."

Spaceship Warlock lists for $95. For more information, call Reactor in Chicago, Illinois, at 312/528-1600.—**D.L.**

With the Madding Crowd

Microsoft is jumping into the already crowded project-management field with Microsoft Project.

The program is designed to compete with Claris's MacProject, though at $695 Project is closer in price to Scitor's PS4. Instead of concentrating on the features and strict controls that complex projects may require, Microsoft concentrated on ease-of-use and making a project easy to grasp. *(continues)*
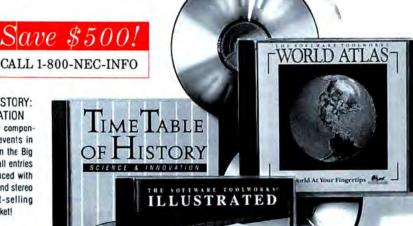

Carl Butler, head of financial control at McDonnell Douglas Electronic Systems, on MS Project: "Ease of use was a requirement."

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C&C Computers and Communications

NEC

You enter tasks into Project in a task form or an outline. Work breakdown structure codes are automatically assigned to tasks and subtasks based on their position in the outline, though only to five levels deep (there are no codes for resource and organization breakdowns).

Project provides almost unlimited tools for looking at a project. For example, using calculations and logic, you can create a filter that selects a set of tasks, such as all tasks performed by carpenters. To extract a few of Project's fields, such as normal and overtime pay rates, you define a table. Then create a view combining tables and filters with a Gantt chart or network diagram.

You can pick a single task and show all its dependencies in a network diagram. You can save up to four baselines (a historical look at your project) with a Project file to see when you got off track (MacProject has no baselining capability). Project provides both automatic and interactive resource leveling, and you can tell autoleveling to protect priority, date, or slack settings (MacProject and PS4 both provide automatic and interactive leveling). Project is not multiuser but, like most packages, can manage resource allocations across multiple projects; also like most packages, it cannot manage complex work-team assignments effectively. It lacks inflation adjustment, which PS4 has, and cannot derate resources (assign different productivity to resources that cost the same), which New Latitudes' forthcoming MasterPlan can do (see *Macworld News,* June 1991). Project also cannot calculate optimistic, probable, and pessimistic finish estimates, as PS4 can.
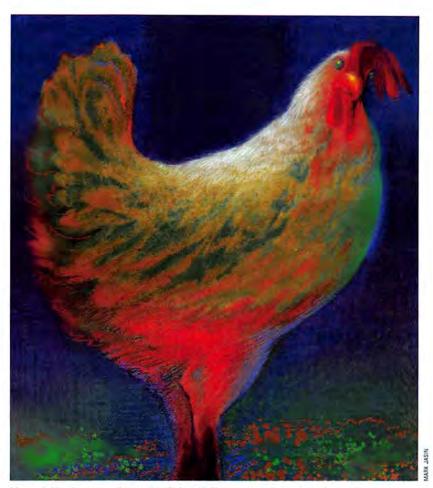
The Mac version of Project can share files with the Windows 3.0 version of Project. For more information, contact Microsoft in Redmond, Washington, at 206/882-8080.—**D.L.**

Art Supplies on a Disk

A criticism that artists often level at computers is slowly being addressed in a new generation of paint programs with life-like oil paints, charcoals, drawing pa-

Most of this piece was done using Painter's Chalk tool. Painter, from the authors of ColorStudio, is a big step toward merging traditional media with digital control.

MARK JASIN

pers, and other artists' materials. The most ambitious of these programs is Painter, written by the same guys who wrote Letraset's ColorStudio.

You can set four characteristics—radius, jitter, opacity, and color—of Painter's brushes to change as you alter speed, direction, or (for Wacom tablet owners) pressure in midstroke. For example, you might design a brush tip consisting of one color surrounded by a second color and set it so the inside color spreads out as you slow down.

There are about a dozen brush types, including charcoals, oil paints, calligraphy pens, felt pens, crayons, and other real-life artists' tools. The program even has Van Gogh and Seurat paintbrushes that let you imitate those painters' styles or apply them to a finished piece or a scanned photograph.

Painter has about 20 surfaces that simulate canvas and paper. They are

not modifiable, but Fractal Design plans to distribute more surfaces later. Oddly enough, the surfaces come out of the tip of the brush as you work, rather than filling up the page before you start. This saves on memory and file size and allows you to overlap surfaces, but leaves unpainted areas with no texture.

Painter provides a frisket tool for masking, and imports ColorStudio masks; the program's developers say it can also run all plug-in modules designed for ColorStudio or Adobe Photoshop. Painter saves in TIFF and in ColorStudio's RIFF format, so you can easily move back and forth between Painter and ColorStudio or Photoshop.

At press time, Fractal Design planned to price Painter at less than $300. For more information, contact the company in Aptos, California, at 408/688-8800.—**D.L.**

(continues)

Scan Words...

TYPIST PLUS GRAPHICS

Everyone agrees that the *Typist*™ is the best thing that ever happened to hand scanners. The ability to read words and numbers easily and accurately really makes a difference when you're pressed for time. Or like most people you simply hate to type.

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

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

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

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

In fact, when it comes to printed output, the *Typist Plus* includes *LaserGray*™, yet another proprietary technology from Caere. So you can print halftones that look just like grayscale images. The photos that

Now Graphics.

you modify on-screen have a crisp, sharper look and feel. A professional touch.

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

even invitations to company events.

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

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

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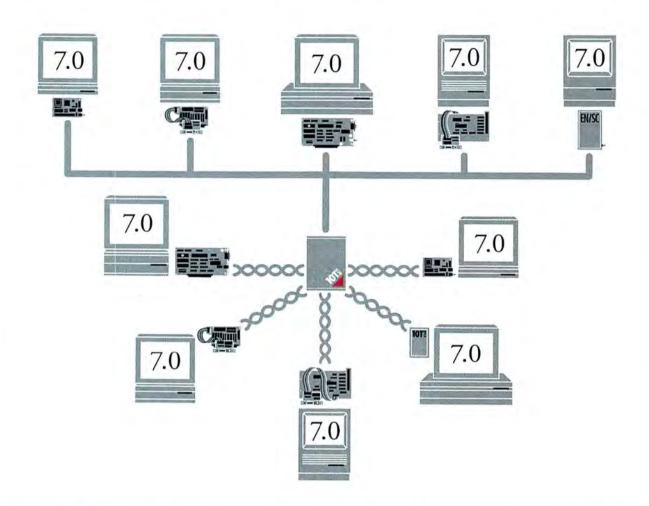
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Color Cousins

Adobe and Letraset are preparing new versions of their competing image-editing applications, Photoshop and ColorStudio, and it seems the two companies are thinking very much alike.

Photoshop 2.0's flagship feature is the ability to edit in CMYK, avoiding the guesswork of producing an image for four-color printing in a computer screen's RGB color space. A new pen tool lets you select regions by drawing bezier curves around them, and you can also convert the boundaries of an area selected with Photoshop's image processing tools into editable bezier curves. With the addition of vector graphics in Photoshop comes the ability to paste an Illustrator file into a Photoshop image and render it, as you can with ColorStudio's Shapes annex. Photoshop 2.0 provides tools for making duotones (as well as tritones and quadtones); filters for video and a videolegal palette; support for Wacom's pressure-sensitive tablet; and the ability to select and adjust individual colors or ranges of colors. For high-end users, Photoshop can calibrate colors based on user-definable tables describing a monitor's phosphor characteristics, as well as the brand of ink used on the press.

Like Photoshop 2.0, ColorStudio 1.5 has CMYK editing. It implements Photoshop's plug-in standard so that scanner drivers, calibrator drivers, and other add-ons written for Photoshop also run in ColorStudio. It includes a utility for printer calibration, undercover removal, and so on. Letraset is also developing a version for the Mac LC and IIsi that does not require a math chip.

Both upgrades will support True-Type. Photoshop will list for $895, and

ColorStudio will list for $995 and will include a copy of Shapes. Adobe is in Mountain View, California, at 415/961-4400; Letraset is in Paramus, New Jersey, at 201/845-6100.—**D.L.**

Extended Reach

Most simulation software is almost as difficult to grasp as the systems people try to model with it. A new version of Extend, the Mac's leading package for modeling discrete-event and continuous-flow systems, adds features that will make it easier for people with no technical training in simulation.

The key new feature is the ability to build blocks—parts of a simulation

Raster photo-editing meets object-oriented graphics. A staff artist at Adobe created this work in Photoshop 2.0.

—from a hierarchy of smaller blocks. This feature makes it easy for several experts to collaborate on a simulation. Each person creates a sub-block for some aspect of the simulation, which could involve serious programming in some cases. (Extend will include many generic blocks and sub-blocks.) Individual blocks are then combined to simulate an entire process. For example, to simulate a robot-run car factory, a machine-tool expert might create a sub-block simulating machine tools that stamp out parts for car bodies; and a networking expert might

Tricia Hoffman and Steve Claas collect samples for a mercury-level simulation at the University of Wisconsin's Trout Lake Station.

create a sub-block showing the network that runs the robots controlling the machine tools. The output of that combined metal-molding block might then move to a spraying machine and air purifier sub-blocks.

Other features new to 2.0 will be the ability to tear apart dialog boxes and reports and move buttons, parameter-entry boxes, graphs, and the like onto custom forms or even into other dialog boxes. For designing reports, there will also be drawing tools, text-format controls, and a grid. Animation will provide a view of what is actually happening as the simulation runs, showing, for example, an assembly line grinding to a halt because a critical part has not been delivered. To the block types representing queues or accumulation, Extend 2.0 adds a new block type, for equations, where you can stick logical or mathematical statements in the middle of a system.

Extend 2.0 will support locking and password-protecting blocks and, using IAC, will be able to share data with Claris's forthcoming spreadsheet, Resolve. There will also be a math-chip-specific version for greater speed.

Pricing and ship date were not set at press time. For more information, contact Imagine That in San Jose, California, at 408/365-0305.—**D.L.**

Ergonomics Lab

Multitudes of computer users currently suffer from tendinitis; carpal tunnel syndrome; thoracic outlet repetitive-strain injury (RSI); and other throbbing, shooting, or stabbing pains in the hands, arms, shoulders, or neck. *(continues)*

It's clear that computer keyboards can cripple, and seven class action suits are currently pending against manufacturers. So why hasn't Apple or any other leading manufacturer offered us a kinder, gentler keyboard? The answer, according to RSI expert Dr. David Rempel, is that "they'd be crazy to manufacture a new design before

Dr. David Rempel, left, in his ergonomics lab. Right, a test subject working with sensors attached to his arms.

they have scientific proof that it's going to be better." He also says that industries would be crazy to invest in new keyboards without rigorous science behind them. "When you talk about retooling industry and then replacing vast numbers of existing keyboards, you're talking about billions of dollars."

Rempel, who has a background in engineering and specialized in occupational medicine, heads the Ergonomics Laboratory of the University of California at San Francisco's Medical School. The lab is now conducting studies of keyboard prototypes— measuring muscle activity, joint posture, and movement repetition— with the funding and ongoing involvement of Apple and other manufacturers. At the annual American Industrial Hygiene Conference in May, Rempel announced his first conclusive findings—that even the current keyboards can require less muscular effort if the keys are given a different feel. Rempel expects to publish a series of scientific papers on ergonomics issues within a year, and says that by the end of that time, computer manufacturers should have sufficient scientific information to put new keyboards into production. When asked how long it will take before consumers see them, he says it's anyone's guess.

In the meantime, what about those of us who already have RSI, or hope to avoid it, and want new keyboards now? "There are many new keyboards coming to market with ergonomic claims," says Rempel, "but none of them have thorough scientific research behind them." He himself has a file filled with alternative designs by small independent manufacturers, and says that some of them look like they're on the right track. It seems that until we have scientific evidence that new designs are better, the best we can do is to look at what's out there and see what works for us. Rempel says we should also remember that no new design is going to be like a magic pill, and that taking breaks, reducing stress, and good desk design are as important as any keyboard will ever be.—**Ann Garrison**

Magic Conjures Up Animated Presentations

Paracomp is introducing 8-bit color presentation software, code-named Magic, that allows users to quickly assemble simple animated and interactive presentations. Designed to be easy to learn and use, the software lets the presenter import sound, graphics, and TV clips, and combine and mask (partially cover) them in animated presentation screens. The user then

Paracomp's Magic software creates animated and interactive presentations that can incorporate video clips.

links the screens to each other in the desired sequence, all without scripting. The sequence of screens can easily be changed at the time of presentation, and any object can be a button that leads to another screen.

The user creates an animation by defining paths for independent objects to follow over time. The paths and objects can be drawn with tools located on a floating palette. Paracomp is also including a series of templates for creating presentations quickly, and users can make and save additional templates. Once a presentation is complete it can be compiled to run faster at the time it's presented.

Magic is compatible with System 7 and QuickTime, Apple's extension to system software that supports animations and TV images. Magic requires a Mac LC or other color Macintosh with at least 2MB of RAM. Paracomp said it would begin shipping the software in August at a list price of $395. For more information, contact Paracomp in San Francisco, at 415/956-4091 or 800/877-7749.—**T.M.**

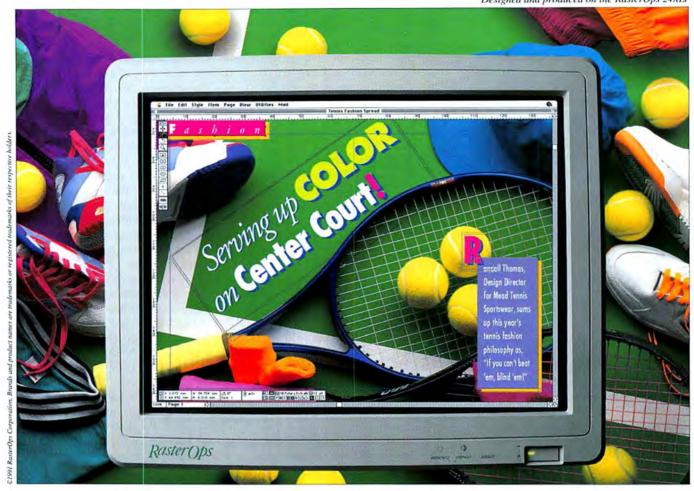**Shiva's FastPath 5 is a faster, easier-to-use version of its multiprotocol AppleTalk-to-Ethernet gateway.**

Shiva Opens FastPath 5 Gateway

Shiva Corporation has introduced the FastPath 5, the latest incarnation of its multiprotocol LocalTalk-to-Ethernet gateway. The new version is faster, easier to set up, and includes new network-management software.

The main improvement to the FastPath is the Shiva Net Manager software, which incorporates an improved interface and will eventually *(continues)*

be capable of controlling all Shiva products, according to the company. The network-management package shows the status of the network and other routers, logs network events, and diagnoses problems.

The new FastPath 5 has a dedicated LocalTalk I/O processor, a faster 68000 processor (10MHz instead of the 8MHz 68000 in the FastPath 4), and 512K of RAM, twice as much as its predecessor includes. Shiva has also made changing cabling media easier by making the Ethernet connector modular. Users can change from thick to thin Ethernet cables or twisted-pair 10BaseT or the Apple Ethernet Cabling System without reconfiguring the gateway or re-loading the routing tables.

Shiva hoped to ship the FastPath 5 in June. The suggested list price of the gateway will be $2799 for either of two configurations—one with a thin Ethernet connector, the other with a connector for 10BaseT. The thin Ethernet configuration will come with a spare connector for thick Ethernet. Shiva said it is also working

on a rack-mount version of the Fast-Path 5 and a rack that will accommodate eight of those gateways. At press time the company had not set an official announcement date or price for those products. For more information, call Shiva in Cambridge, Massachusetts, at 617/252-6300 or 800/458-3550.—**T.M.**

MicroSpeed Launches Versatile Ergonomic Trackball

MicroSpeed recently brought out the MacTrac II, an ergonomic trackball with Control Panel software that enables the user to program different functions for the trackball's three buttons. The ADB device's new micro-processor works with the software to support eight button combinations that can be either user-defined shortcuts or a choice of default functions provided by MicroSpeed.

A Swap button in the Control Panel software flips the functions of

MicroSpeed's MacTrac II ergonomic trackball lets the user define up to eight shortcuts or default functions.

the trackball buttons for use by left-handers or right-handers. It is also useful for people who, for ergonomics reasons, like to switch hands intermittently. The default functions of three buttons are the normal mouse-button effect, click-lock for highlighting and dragging an object, and click-shift for highlighting text blocks for cutting and pasting.

The eight button combinations are invoked by holding down one trackball button and clicking one of the other two buttons up to four times. Clicking once executes one macro, clicking twice activates a second macro, and so on. The user can quickly change the definitions of the eight functions. The trackball software also permits the usual settings for ballistic tracking speed and for double-click speed.

The MacTrac II was expected to begin shipping in June. Its list price is $119. The original MacTrac for non-ADB Macs lists for $99 and is not compatible with the new Control Panel software. For more information, contact MicroSpeed in Fremont, California, at 415/490-1403.—**T.M.**

Democracy's Software?

Arc/Info, the leading geographical information system for mainframes and minicomputers, has not been known for its ease of use. Now Arc/Info publisher Environmental Systems Research Institute (ESRI) is developing its first Mac product, ArcView (it also runs on the PC), a simplified tool for studying data in Arc/Info format.

ArcView provides a spreadsheet, statistical capabilities, and tools for searching and displaying tabular data from any SQL database in map layers (which ESRI calls *themes*). For example, you could create one layer showing all the houses in a neighborhood, another layer showing average property taxes by block, and then highlight the houses whose taxes are far above or below average. ArcView can display raster images such as satellite photos and overlay vector files on them. Completed maps can be saved in several formats, including Adobe Illustrator and TIFF. ArcView is not Arc/Info: it *(continues)*

ArcView provides a way for the average citizen to examine government data. Will governments provide the will?

can't figure out efficient bus routes based on traffic and neighborhood incomes, or select a corridor for new power lines based on surface terrain and land costs.

One potential application for ArcView—one that ESRI president Jack Dangermond considers especially important—is providing public access to government databases and other nominally public but generally inaccessible data. For example, when telephone companies request rate hikes, consumer groups could use ArcView to compare the rates of competing long-distance companies or different cities' local rates; or neighborhood organizations could use the software to scrutinize tax assessments. ArcView's existence will undoubtedly pressure government agencies and regulated companies to provide public access to their data. Private companies may also begin to sell ArcView-compatible data on CD ROM, in much the same way that medical and legal databases are now for sale.

Pricing was not set at press time, but ESRI claims it will be very inexpensive. ESRI is in Redlands, California, at 714/793-5953.—D.L.

The Global Jukebox

When a Soviet Georgian choral director visited Hunter College's Association for Cultural Equity, Alan Lomax, the association's president, played him a recording of African Pygmies singing their beautiful polyphonic music. The director was surprised to hear in this ancient song style the roots of the contrapuntal singing he had grown up with in the Caucasus. Lomax played the recordings on the Global Jukebox,

a Mac-based multimedia system for studying world dance and music.

The Global Jukebox is the result of Lomax's 30-year research project at Columbia University, a project devoted to linking patterns of expressive behavior—the ways people sing and dance—to other aspects of cultural life, such as the ways people govern themselves or gather food. The Global Jukebox represents more than 400 cultures and includes musical samples and video clips from all over the planet. HyperCard links allow users to travel through the Jukebox's databases, selecting samples of music and

Alan Lomax, Mike Del Rio, and Carol Kulig with a monitor displaying one of many dances archived on the Global Jukebox.

dance, translations of lyrics, and sociocultural background information and analysis. Academics can turn to more sophisticated menus for study and comparison.

Lomax says the Global Jukebox helps people make important connections between geography, history, and culture, and can reveal similarities in cultural responses to similar experiences. As an example, he points to melodic similarities between the old Mississippi blues and the traditional songs of people who suffered tyranny in India, Egypt, China, and Mesopotamia.

The project is receiving support from Apple and from the Rockefeller, Rex, and MacArthur foundations. At the association, Carol Kulig edited the Jukebox and did much of the HyperCard work, and Mike Del Rio did Pascal programming. CD ROM, laser disc, and multidisc versions are planned for sale to institutions and the general public, but no release dates have been set. For further information, contact the association at 212/268-4623.—Ann Garrison

Colby Totes Out a 5-Pound Notebook Mac

Colby Systems Corporation has introduced the Colby ClassMate, a 5.4-pound notebook-size Macintosh that's the lightest Mac portable to date. The ClassMate incorporates the logic board of a Mac Classic. The 5.4-pound version includes a 20MB hard drive; with an internal 1.44MB floppy drive, the system weighs 6.5 pounds.
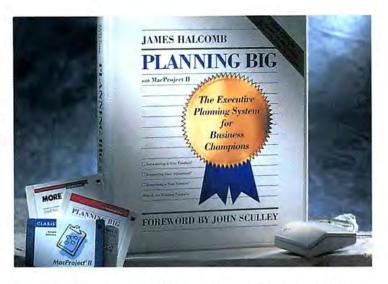
The ClassMate has a backlit LCD screen with 342 by 512 resolution. The system incorporates a trackball, but also comes with the standard Apple ADB mouse. Its keyboard is silent for use in meetings. Because it contains the Classic logic board, the ClassMate offers all the same ports.

The ClassMate accommodates Colby-supplied hard drives with capacities up to 105MB; a 200MB model is expected in the third quarter. Later this year Colby will offer an upgrade that allows users to insert RAM boards with capacities up to 16MB. The up-

(continues)

The Colby ClassMate, which has a pressure-sensitive membrane keyboard, is the lightest Mac portable to date.

In less than a week, you'll learn new management planning ideas and skills that will last a lifetime!

JAMES HALCOMB

PLANNING BIG
with MacProject II

The Executive Planning System for Business Champions

FOREWORD BY JOHN SCULLEY

MacProject II

Revolutionary five-step system simplifies executive planning process.

Now anyone in business, industry or government who is responsible for creating plans and strategies for reaching long-term objectives can do it faster, easier and better than ever before.

James Halcomb, one of the world's most respected management planning authorities for over 25 years, has perfected a unique Five-Step Planning System (based on two of the most powerful management techniques ever developed—PERT and CPM) that he describes in clear, easy-to-understand terms in his new book PLANNING BIG with MacProject II.

"...A valuable, concise five-step planning process...using the Macintosh and MacProject II."
—*From the foreword by John Sculley, Chairman and CEO, Apple Computer, Inc.*
"Well worth reading. Graphics oriented...recommended."
—*New York Times Review*

A wealth of practical information you can use immediately.

By combining Halcomb's easy-to-use Five-Step Planning Process with a Macintosh computer, MacProject II software and a large screen projector, you'll have the ideal group planning environment. One that allows you to successfully reach your goals and objectives in the shortest time and at the lowest cost.

No matter what your areas of responsibility may be, PLANNING BIG with MacProject II can make you—and your entire team—more effective in less than a week! Here's just a sample of how you'll profit:

• Top management can establish worthwhile objectives and develop enterprise-wide action plans to reach them.
• Marketers can capture a larger share of the market.
• Engineers can establish the best climate for creativity.
• Financial analysts can predict profits more accurately.
• Manufacturers can reduce operating costs, minimize downtime, and achieve major improvements in capacity.
• Entrepreneurs can launch new ventures with a thorough understanding of all factors affecting success.

For only $89.50, James Halcomb reveals the secret of successful planning in his new book that includes template software.

Order by December 2, 1991 and receive this special bonus:

The best time to start planning successfully for the future is today. And if you act now we'll include a powerful template disk of 12 sample executive plans, along with trial versions of both MacProject II and MORE software to help you get started.

We guarantee your satisfaction.

If for any reason you're not 100% satisfied with your copy of PLANNING BIG with MacProject II, simply return it and the template disk within 30 days for a complete refund. You keep the trial software!

To order your copy of PLANNING BIG with MacProject II, return the coupon below. We'll respond fast. In a hurry? Call toll-free:

1-800-456-7822

MacProject is a registered trademark of Claris Corporation and MORE is a trademark of Symantec Corporation.

HALCOMB ASSOCIATES

☐ **Yes, I want to Simplify the Planning Process.**
Please rush me James Halcomb's revolutionary PLANNING BIG. Be sure to include my MacProject II and MORE Trial software and the special bonus template disk. ____Quantity at $89.50 each. (In California add 7% sales tax).

Name_____

Title_____

Company/Organization _____

Address_____

City/State/Zip _____

We accept both VISA ☐ and MASTERCARD ☐   Card # _____

Expiration Date _____Signature_____

MAIL COUPON TO: Halcomb Associates, 510 East Maude Ave., Sunnyvale, CA 94086

Circle 183 on reader service card

grade, based on a new standard, can accept software on ROM boards, or data on static RAM boards or DRAM boards. The cost of the upgrade is not set, but is expected to be about $200, according to Colby.

The notebook computer can run from standard camcorder batteries or from a 12-volt cigarette-lighter adapter, which is included. The ClassMate comes with a port for driving Colby's $189 optional 14-inch monitor.

The company plans to offer a 68030 accelerator board for the ClassMate by the end of summer.

Colby expected to begin shipping the ClassMate by the end of July. It will be available, preconfigured with the Classic logic board, at a list price of $2999, including the Classic's 2MB of RAM, 1.44MB floppy drive, and internal 40MB hard drive. The Class-Mate will also come as a $1599 kit into which Colby-authorized dealers can plug a Classic logic board. The logic board can be from spare parts or from a customer's Classic. Customers can also send their Classic to Colby, which does the conversion for the same $1599 price. For more information, contact Colby Systems in Palo Alto, California, at 415/941-9090.—**T.M.**

Stingray Ergonomic Trackball

CoStar has introduced the Stingray Ergonomic Trackball, a low-profile pointing device that's easy on the hand. The Stingray was designed to fit under the hand with the wrist relatively straight because one cause of the potentially disabling carpal tunnel syndrome is constant movement of the fingers while the wrist is bent.

The Stingray's two low-swept buttons are extra large for easy clicking. The tracking ball is smaller and easier to move than the pool ball used in many devices. The Stingray's opto-mechanical tracking mechanism has a reso-

The Stingray Ergonomic Trackball was designed with a low profile so the user's wrist doesn't bend awkwardly.

lution of 200 counts per inch. Users assign the click and the click-lock function to either button by setting a switch on the base of the trackball. CoStar provides custom Control Panel software for setting different clicking speeds for different applications.

The Stingray was scheduled to begin shipping in July in platinum and black versions. The suggested retail price was not final, but was expected to be around $129. For more information, call CoStar in Greenwich, Connecticut, at 203/661-9700 or 800/426-7827.—**T.M.**

Reader Survey: Mac Clones

In this month's survey, our readers tell us if they would purchase a Mac clone and whether Apple should license its Macintosh technology to other com-

puter makers. On the subject of licensing, 62 percent of responding readers say that Apple should license the Mac's core technologies to other companies. On the topic of buying clones, 35 percent of respondents say they would select a Macintosh clone if it were 95 percent compatible with the Mac. Another 47 percent say they would not, and 15 percent are not sure. However, when asked if they would buy a 100 percent–compatible Mac clone, 78 percent of respondents say they would, and only 8 percent say they would not; 13 percent are unsure.

Predictably, the most important concern that readers have about Mac clones is software compatibility. Of all respondents, 52 percent rate 100 percent compatiblity with Mac software as extremely important, and another 44 percent say it is very important. Respondents consider 100 percent compatibility with hardware less critical: 31 percent of them call it extremely important, and 45 percent rate it very important.

In terms of specific applications, 78 percent of responding readers say that the most important programs that a Mac clone must be able to run are word processors and DTP packages. Word and Page-Maker were named most often. The second-ranked software area is spreadsheets, with 58 percent of respondents calling them most important. Graphic design software is next, with 29 percent, followed by databases at 18 percent.—**T.M.** Ⓜ

Readers to Apple: License the Mac!

Apple should license its Macintosh technology	62%
Would consider purchasing a 95%-compatible clone	35%
Would consider purchasing a 100%-compatible clone	78%
100% software compatibility extremely important	52%
100% software compatibility very important	44%
100% hardware compatibility extremely important	31%
100% hardware compatibility very important	45%

All respondents

Among readers who responded to this month's survey, 62 percent think that Apple should license its crown jewels—its Macintosh technology—to third-party vendors.

Tomorrow's Upgrade For Your Mac Is Only $59*

FREE! STEP-BY-STEP VIDEO INSTRUCTIONS**

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

MORE BRAIN POWER FOR YOUR MAC
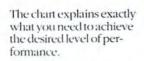
Never again will you have to quit your word processor just to answer a question about a spread-sheet. Install extra memory and you can leave your letter open while you refer to last month's sales figures. You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION

Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMS. Our FREE video will give you STEP-BY-STEP installation instructions. Every type of Mac is covered and we think we've made it a breeze.

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs - (2 @ $59 ea.).

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

To upgrade a 4-socket Mac Plus or SE to this amount of memory.	Do this: (Install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1 MB SIMMs, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256K SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four existing 256K SIMMs with four 1 MB SIMMs.

To upgrade an 8-socket Mac II, IIx, IIcx, oe SE 30 to this amount of memory.	Do this: (Install in multiples of four only.)
4 MB	Remove all four existing 256K SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1 MB in remaining sockets.
8 MB	Remove all four existing 256K SIMMs, install eight 1 MB SIMMs.

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

WHAT YOU NEED TO KNOW

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

Prices can vary a lot, based on quality, speed and demand. At press time our price for

1MB, 100ns SIMMs is $59. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor reads 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

OVERNIGHT DELIVERY

Place your order by 12:00 am (E), weekdays and we'll deliver overnight for just $3.00. There's never been a better time to consider a memory upgrade. Call our toll-free number now and tomorrow morning your Mac will be off to a brand new start.

MacWAREHOUSE
1-800-255-6227

Call toll-free
Twenty-four hours a day,
seven days a week.
Inquiries: 1-908-367-0440
Fax: 1-908-905-9279

MACWAREHOUSE 30-DAY MONEY BACK GUARANTEE

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

ONE YEAR WARRANTY. MacWarehouse also guarantees its Memory Kits against manufacturer defects for one year from the date of purchase. We will repair the item or replace it at our discretion.

Macintosh SE

* SIMMs prices vary. Call for latest information.
** Limited Offer! Free video with purchase of 2 or more SIMMs.

MWJ1P

QuarkXPress Delivers!

Powerful Tools for Your Most Creative Work

Whether you create brochures, advertising, magazines, newsletters, newspapers, or books, QuarkXPress® provides all the tools you need to realize even your most sophisticated designs. With QuarkXPress you can:

- Control font sizes, leading, kerning, and tracking to .001 unit

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- Import all popular picture formats into any picture box shape, then rotate the box and the picture within it

- Apply color to text, backgrounds, pictures, frames, and lines

- Precisely control color trapping

- Separate spot colors and print process color separations without add-on programs

- Use full-featured word processing power or import text from other programs into QuarkXPress page layouts

- Wrap text around irregular shapes, justify text vertically and horizontally, specify hyphenation and justification parameters, and check spelling for entire documents

No other program compares in precision, power, and ease of use for typography, graphics, layout and color. That's why QuarkXPress is the choice for publishing software worldwide.

Buy QuarkXPress 3.0 today and get a *free* upgrade to 3.1!

Because more than 40 new features and capabilities will be introduced in QuarkXPress 3.1, the suggested retail price for the program will increase by $100. *But you can receive a 3.1 upgrade package free when you buy and register your copy of Quark XPress 3.0 by October 31, 1991!*

MWJ1Q

TelePort, the ADB Modem (Global Village Communication)
❼ The perfect choice for powerful yet compact Mac communication. This 2400 baud modem with MNP5 data compression packs Hayes compatibility and error-free communication. TelePort plugs into your mouse (ADB) port and provides a pass-through connector for other devices. It uses no external power supply, and leaves your serial port free for other uses!
MOD0049 $139.

❼ Also, TelePortFAX includes SendFAX 9600 baud modem software. Hold OPTION as you drag FILE-PRINT to easily send FAXes worldwide.
MOD0058 $185.
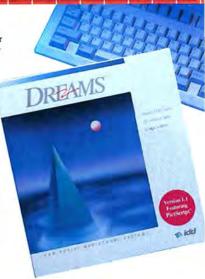
Dreams 1.1 (Innovative Data)
❼ A powerful precision drawing tool for scaled drawings, illustrations, presentations and general purpose graphics. Includes an array of drawing tools and advanced illustration features like parallel line tool, extend lines to intersection, glue and unglue, trim tool, fillet tool, true associative dimensioning and optional keyboard editing. **GRA0104 $419.**

Dreams Business Graphics Library
Professionally drawn vector images provide high quality PostScript printing. Images can be re-sized, edited and/or colored, such as the image shown, then copied and pasted into drawing, word processing or page layout programs.
Free with purchase of Dreams.

System 7 Compatibility: ❼ indicates that the product will run under System 7.

ACCESSORIES

Toner Cartridge
	LaserWriter II	105.

Basic Needs, Inc.
ACC0356	Dust Cover - Mac II & Extended Keyboard (grey nylon)	17
ACC0348	HardTops ImageWriter II Cover	17
ACC0347	HardTops Mac Extended Keyboard Cover	16
ACC0346	HardTops Mac Standard Keyboard Cover	15
ACC0466	MacIIcx/ci Monitor Stand	49
ACC0351	Utility Pac	15

B.A.S.F. (BASF)
| MED0030 | Disks - DS/HD 1.44 Meg (box of 10) | 22 |
| MED0029 | Disks - DS/DD (box of 10) | 12. |

Curtis
| ACC0459 | Command Center | 89 |

Ergotron
ACC0344	MacTilt II - 13" Color RGB	75.
ACC0128	MacTilt Plus/512 - Platinum	68.
ACC0009	MacTilt SE, SE/030 - Platinum	68

Famous Engineering Brand
| DAC0038 | DigiMatic | 179 |

I/O Design, Inc.
ACC0028	MacLuggage- Plus Carrying Case	64.
ACC1070	MacLuggage- SE Carrying Case	75.
ACC0327	Monitorware Apple RGB Case	79
ACC0427	Ultimate Classic/SE Ext. Carrying Case - Black	85.
ACC0440	Ultimate Classic/SE Ext. Carrying Case - Navy	85.
ACC0529	Ultimate Classic Carrying Case - Black	68
ACC0528	Ultimate Classic Carrying Case - Navy	68

Kensington
ACC0618	LaserStand	129
ACC0459	Maccessories SE Radiation Anti-Glare Filter	52
ACC0097	System Saver Mac - Platinum	63

Mobius Products
| ACC0055 | Fanny Mac QT | 55. |
| ACC0247 | SE Silencer | 39 |

OCLI
ACC0586	Glare/Guard Plus Portrait	85.
ACC0585	Glare/Guard Plus 13"	85.
ACC0448	Glare/Guard Profile Plus	85.

PowerUser™
| BND0013 | PowerUser Carrying Case w/Free Cap | 69. |

Sony
| MED0031 | Disks - 1.44 Mb High Density (3.5) | 24. |
| MED0003 | Disks - DS/DD (box of 10) | 13. |

Targus, Ltd.
ACC0438	MacIIcx/ci Carrying Case (black)	79
ACC0252	MacPlus/SE Carrying Case (black)	65
ACC0250	MacPlus/SE-Ext Keyboard Carrying Case	79
ACC0591	Premier Classic Mac Plus/SE Carrying Case	69
ACC0482	Premier Leather Case	185.

ACCOUNTING & PERSONAL FINANCE

Absolute Solutions, Inc.
| ❼FIN0086 | Computerized Classic Accounting | 225. |

Checkfree Corporation
| ❼FIN0088 | CheckFree | 19. |

Computer Associates
| FIN0044 | ACC PAC Bedford Simply Accounting 1.1 | 139. |

Inman
| FIN0116 | Business Plan Toolkit | 99. |
| FIN0013 | Business Sense 1.4 | 129 |

Intuit
| FIN0043 | Quicken 1.5 | 45. |

Meca
| ❼FIN0039 | Andrew Tobias' Managing Your Money 4.0 | 99. |

Nolo Press
| BUS0133 | For The Record 2.0 | 32. |

MacPro Plus (Key Tronic)
❼ Key Tronic's new MacPro Plus keyboard is compatible with all Macintosh computers. The enhanced 105-key layout includes Period/Comma lock capability, an interchangeable Caps Lock and Ctrl keys. Also, the connecting cable you need is offered at no extra charge. The keyboard is backed by a limited lifetime warranty and unlimited toll-free product support. Includes offer for Tempo II, a keyboard macro package from Affinity Microsystems a $149.95 value FREE! **INP0156 $145.**

| BUS0132 | WillMaker 4.0 | 35. |

Peachtree
| ❼FIN0059 | At Once! 1.2 | 189. |

Reality Technologies
| ❼FIN0068 | WealthBuilder (Mac) | 99. |

Softsync/BLOC Publishing
| ❼FIN0048 | Accountant Inc. 2.1 | 339 |

Teleware, Inc.
| ❼FIN0087 | M.Y.O.B. 2.0 | 139. |
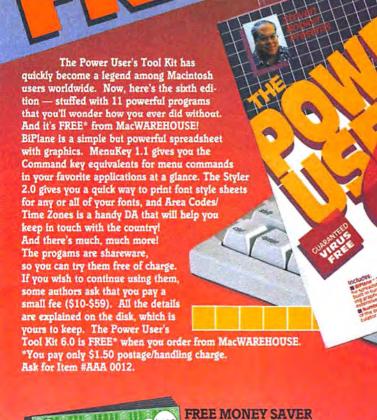
TimeSlips Corp.
| ❼FIN0129 | TAL | 55. |

BUSINESS & PRESENTATION

A Lasting Impression
| BUS0086 | ResumExpert Cover Letters | 49 |
| BUS0102 | Manager Edition | 49 |

BUS0103	Sales/Marketing	49.
❼BUS0087	ResumExpert (Word 3.0/4.0 version)	49.
BUS0107	Computer Science/Engineering	49.

Abacus Concepts
❼STA0006	MacSpin 3.0	185.
❼STA0008	StatView II 1.03	309.
❼STA0010	StatView SE+Graphics 1.03	199.
❼STA0022	SuperANOVA (MacII Family)	309.

Acius
| DAT0045 | 4th Dimension 2.1 | 489. |

AEC Management Systems
| BUS0129 | FastTrack Schedule 1.5 | 139. |
| DAT0055 | AEC Information Manager | 409. |

After Hours
| ❼DAT0076 | TouchBASE | 89. |

Aldus
| BUS0066 | Persuasion 2.0 | 329. |

ASD Software, Inc.
BUS0134	Planisoft	195.
BUS0146	Planisoft - 5 pack	579.
BUS0147	Planisoft - 10 pack	839.

Ashton-Tate
| DAT0042 | dBase Mac | SPECIAL! 59. |
| BUS0054 | Full Impact 1.1 | SPECIAL! 49. |

Avery Dennison
ACC0489	MacLabelPro	49
ACC0589	1st Impression: The Desktop Bindery	299
ACC0590	1st Impression First Pack	79

Baseline Publishing
| ❼BUS0149 | 1 Shot Worksheet | 56. |

Casady & Greene, Inc
| DAC0010 | QuickDex | 36. |

CE Software
| BUS0135 | Alarming Events | 85. |
| ❼GRA0070 | CalendarMaker 3.0 | 31. |

Claris
❼DAT0064	FileMaker Pro	215.
❼BUS0058	MacProject II 2.5	359.
❼BUS0065	SmartForm Designer	289.

DeltaPoint, Inc.
| ❼BUS0099 | DeltaGraph 1.5 | 129. |

512K Video SIMM Upgrade for the Mac LC
(Impaq) With the Impaq 512K video SIMM upgrade for the Mac LC, you can reproduce all of 32,000 colors your Mac LC was designed to produce. A single SIMM installation allows you to take advantage of all the latest software. All Impaq upgrades are Apple-approved, made in the USA, and backed by the manufacturer's lifetime warranty. **CHP0043 $149.**

The "ULTIMATE" SE Carrying Case (I/O Design, Inc.)
The "ULTIMATE" SE Carrying Case is designed with the same high quality standards as other MacLuggage products. This case offers internal, padded compartments for ANY Macintosh keyboard, mouse, external hard disk and cables also holds the new Macintosh Classic. It also features 2 additional exterior pockets for everything from disks to umbrellas. Combine these features with sturdy Dupont Cordura nylon and 1/2 inch high density foam padding and you'll see why this is the "Ultimate" carrying case for your Mac. Available in black and navy blue. **Black: ACC0427 $85. Navy: ACC0440 $85.**

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⭐ **PRODIGY.**
Interactive Personal Service

To access our on-line store, select **"JUMP"** from the menu and type **"MacWarehouse."**

MacWAREHOUSE®
1-800-255-6227

American English Writing Guide (Nova Development)
This unique desk accessory is a complete reference to style, punctuation, and better writing with rules and examples for a variety of writing topics, from capitalization to punctuation and spelling to bibliographies. **WRD0043 $39.**

American Handbook of Business Letters
Nearly 300 ready-made business letters for every occasion. From congratulating business associates to collecting on past due accounts. **WRD0044 $32.**

Instant Library of Quotations
This best selling writing tool offers more that 5000 contemporary, literary, and historical quotations on over 600 topics, plus the capability to add your own. **WRD0045 $32.**

ClickArt Color (T/Maker)
ClickArt Color Graphics for Presentations is a portfolio of more than 250 high-quality, full color images created especially for presentation. The images have been designed to deliver quick, clean, visual impact against the colored backgrounds typically used in presentations. The subject categories are appropriate for any type of business presentation and include time and money icons, people in office-related situations, maps, computers, flags, backgrounds, and logos, to name a few. **GRA0272 $99.**

ProModem Ultima
❼ Only 14,400 bps modem with Fax! Supports the new V.32bis standard for 14,400 transmissions plus V.42bis/MNP-5 compression and error correction. Also, a 9600 bps Send/Receive Fax with feature-filled Maxfax software. Includes MAcKNOWLEDGE software and cable. **MOD0064 $699.**

NewsletterMaker Vol.1

Metro ImageBase Electronic Clip Art
❼ Communicate more effectively with fabulous art and graphics from the world's largest publisher of clip art. Each of the 18 ImageBase packages contains at least 100 topic-related images drawn by professional artists. **GRA0169 $85.**

OffLine

Offline 2.0
The complete disk management system isn't just for floppies anymore! Catalogs hard drives, Syquest cartridges, even CD ROMs. Quick and flexible search engine lets you find any file on any disk, even if it's not mounted. Prints disk labels and exports to other applications. **UTI0207 $65.**

Praxitel		
❼UTI0211	Read My Lips	75.
Silicon Beach		
GRA0092	Digital Darkroom 2.0	259.
GRA0131	Super 3D 2.1	329.
HYP0027	SuperCard 1.5	199.
GRA0112	SuperPaint 2.0	135.
Solutions, Inc.		
DAC0002	SmartScrap & The Clipper 2.01	56.
Strata		
GRA0274	StrataVision 3D 2 0	469.
Strategic Mapping, Inc.		
GRA0227	Atlas MapMaker 4.5	369.
SuperMac		
❼GRA0253	PixelPaint 2.1	159.
❼GRA0249	PixelPaint Professional 2 0	519.

Applied Engineering		
❼INP0148	Quadralink	209.
Articulate Systems		
INP0160	Voice Navigator II	559.
CH Products		
INP0121	RollerMouse ADB	75.
Curtis		
INP0141	MVP Mouse	89.
Datadesk International		
INP0174	Mac101E Keyboard	129.
Digital Vision, Inc.		
GRA0145	Computer Eyes B & W	199.
GRA0154	Computer Eyes For Mac-Color	349.
ICD		
INP0095	Graflex	82.
Kensington		
INP0059	Turbo Mouse	109.

Business Sense 1.4 (Inman)
Critically acclaimed, all time favorite Macintosh accounting package for small business. Business Sense was designed exclusively for the Mac and is easy to learn and use. All the Major accounting functions such as GL, AR, AP, Payroll, and Sales Invoicing are integrated on a single disk. **FIN0013 $129.**

Business Plan Toolkit
If you need to write a business plan you need Business Plan Toolkit. MacUser gave the program 4.5 mice. Includes a sample plan on disk/paper complete with text, tables and graphs. Financial templates include all statements, forecasts, personnel plan and ratios. **FIN0116 $99.**

Tactic		
GRA0110	ArtClips 1st Edition	49.
GRA0160	ArtClips 2nd Edition	65.
T/Maker Co.		
GRA0039	ClickArt Business Image	32.
GRA0272	ClickArt Color	99.
GRA0088	ClickArt EPS Illustrations	82.
Zedcor		
❼GRA0199	DeskPaint 3.3	113.

HARDWARE & PERIPHERALS

Caere		
INP0143	Typist	479.
CoStar		
INP0091	LabelWriter	185.
Epson		
INP0167	Epson EPL-7500 Laser Printer	2599.
INP0168	Epson EPL-7000 Laser Printer	999.
INP0173	Epson PostScript Kit	1599.
Seikosha		
INP0041	Seikosha SP 2000 AP Printer	235.
Sharp		
COMP007	Wizard OZ 7000 (32KRam)	229.
COMP018	Wizard OZ 7200 (64KRam)	255.
COMP019	Wizard Oz 8000 (64 KRam)	329.
COMP023	Wizard Oz 8200 (128KRam)	399.
ThunderWare		
INP0116	LightningScan 400	385.
INP0007	ThunderScan Plus	199.

INPUT & OUTPUT

Abaton		
❼INP0157	Scan 300/Color	1899.
INP0164	LaserScript Printer LX	1759.

INP0060	Turbo Mouse ADB (SE or II)	109.
Key Tronic		
❼INP0156	MacPro Plus	145.
Koala		
INP0127	MacVision 3.0	269.
Kraft		
INP0094	Kraft ADB Trackball	79.
Microspeed		
INP0126	MacTRAC ADB	75.
INP0140	MacTRAC DB9	62.
Microtek		
❼INP0180	Microtek ScanMaker 600ZS	1699.
❼INP0176	ScanMaker 1850 S	2459.
❼INP0162	TrueLaser Printer	2019.
MicroTouch		
❼INP0084	The UnMouse	189.
Mouse Systems		
❼INP0132	Little Mouse ADB	75.
❼INP0134	Trackball / ADB	69.
Sophisticated Circuits		
ACC0535	Power Key	64.

MacGlare/GuardPlus
(OCLI) OCLI's filters are custom designed for all Mac monitors. They block 98% of ELF/VLF E-field radiation and eliminate static charge. Eliminates static charge, dust buildup and "flickers", enhances contrast for sharp, easy-to-read character, reduces 99% of the glare with HEA coating, and reduces the "halo" around images on the screen. Made of safety glass and comes with a SoftTouch chamois. Lifetime warranty against glass breakage. **ACC0585 $85.**

MEMORY UPGRADES & ACCELERATORS

Connectix		
DRI0385	MC73	159.
UTI0222	Mode32	99.
UTI0144	Virtual 030 2.0 UM3	113.
DRI0185	Virtual 2 0 PMMU	188.
Daystar Digital		
❼DRI0224	64K FastCache IIci	279.
❼DRI0288	40 MHz PowerCache (IIci)	959.
❼DRI0290	50 MHz PowerCache (IIci)	1699.
	PowerCard 030 (II,IIx,IIcx) .... starting at	1495.
Dove		
❼DRI0130	MaraThon 030 (MacII)	599.
❼DRI0198	MaraThon 030 - (Mac SE)	399.
❼DRI0197	MaraThon 030 - (MacPlus)	399.
❼DRI0152	MaraThon 030X (MacIIx)	599.
❼DRI0151	MaraThon 030-SE/030	599.
❼DRI0380	Marathon Racer For Mac II	1079.
❼DRI0378	Marathon Racer For Mac Plus	599.
❼DRI0379	Marathon Racer For Mac SE	599.
Impag		
CHP0043	512K Video SIMM Upgrade	149.
Micron Technology		
DRI0321	PicturePress Card (Xceed ICDP-II)	745.
MicroTech International, Inc.		
CHP0025	Mac Classic 1 Meg Upgrade	79.
CHP0026	Mac Classic 3 Meg Upgrade	179.
DRI0315	Mac Classic Upgrade K t 20-1	399.
DRI0317	Mac Classic Upgrade K t 40-1	499.
DRI0318	Mac Classic Upgrade K t 40-3	575.
PowerUser™		
❼CHP0013	1 Meg Simm 100ns PowerUser	59.
Total Systems		
❼DRI0295	Mercury 16MHz 68030 - Plus	519.
❼DRI0297	Mercury 16MHz 68030 - SE	389.
❼DRI0299	Mercury SCSI Module - Plus	209.
DRI0382	Enterprise 882LC 20MHz	259.
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THINK C
The Professional's Choice

Think C 5.0
(Symantec) ❼ Think C features an extremely fast 100% ANSI compiler, an even faster linker, an optional global optimizer, a multi-window text editor, and a powerful source-level debugger — all fully integrated for unsurpassed turnaround time. Think C gives you the power to develop any application, desk accessory, device drive or code resource. Your applications can take full advantages of new System 7.0 capabilities and support for object-oriented programming (OOP). **LNG0051 $209.**
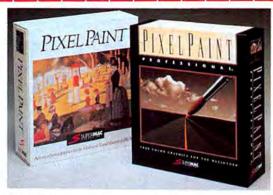
PixelPaint 2.1
(SuperMac)
The first color paint product for the Mac has set the standards all others are judged by. Create images, or import scanned images as templates. Alter sized, rotate images, colorized, and add special effects. Produce color separations from within the program. **GRA0253 $159.**

PixelPaint Professional 2.0 Uses virtual memory to open and scroll through large and multiple documents. All tools are now pressure sensitive and work like real-world tools. "Wet Paint" allows repositioning and editing of any shape or text. Image processing lets you adjust color, contrast, and brightness. Create textured canvases that simulate charcoal, paper, concrete, linen, slate, and more! **GRA0249 $519.**

DRI0384	Enterprise 030LC 20MHz	519
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❼DRI0301	Gemini 20 MHZ Card	799
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❼DRI0265	Gemini Plus Kit	135

MODEMS & FAX

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MOD0034	InterFax 24/96	349

Applied Engineering
❼MOD0054	DataLink/Mac	209

Best Data
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Dove
❼MOD0038	DoveFax Desktop	299
❼MOD0053	Dove Fax Plus	359

Global Village
❼MOD0049	TelePort 2400 ADB Modem	139
❼MOD0058	TelePort/Fax 9600	185

Hayes
COM0023	Smartmodem 2400	349
MOD0017	Smartmodem 9600 (V series)	589
MOD0060	Personal Modem 2400 w/Smartcom II	179
MOD0059	V-Series Ultra Smart w/ Smartcom II	799

Microcom
MOD0050	MacModem V.32 / 9600	689

PowerUser™
MOD0043	2400 BPS Mini Modem	99
MOD0047	Mini Send Fax 2400/9600	149
MOD0062	24/96 Mini Send/Receive Fax Modem	199

Prometheus
MOD0052	9600M Plus Modem	599
MOD0046	ProModem 24/96 MSR	299
❼MOD0064	ProModem Ultima	699
MOD0035	TravelModem	199

Shiva
NET0067	NetModem V.32 (9600)	1169

Supra Corporation
MOD0020	SupraModem 2400	119

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Coda Music Software
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MUS0004	Deluxe Music Construction 2.5	85

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MUS0036	MacRecorder® 2.0	174

Opcode Systems
MUS0083	MIDI Translator	43

Repertoire
MUS0034	Music Publisher	359

Tactic Software
	Sound Clips Vol. 1, 2, 3 & 4	ea. 49

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ASD Software, Inc.
UTI0135	FileGuard 2.7	139
UTI0130	FileGuard 2.7 - Office Pack 5	499
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Connectix MC73
(Connectix)
Plug the MC73 chip into your Mac II and you'll be able to run System 7.0 with Virtual Memory. The older 68020-based Mac IIs do not have MC 68851 Paged Memory Management Unit (PMMU) required to use Virtual Memory. Instead, they have a socket so you can add it. The upgrade kit includes the PMMU, a grounding strap, and a detailed installation manual. **DRI0385 $159.**
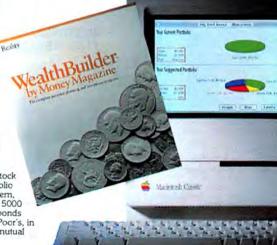
Connectix Mode32
Mode 32 allows older models of the Mac II and the SE/32 to use the full memory capabilities of System 7.0 — up to 128 MB of RAM, and 1000 MB of Virtual Memory (via hard disk). The ROMs in the older models do not have the more recently developed "32-bit clean" parts of the operating system, and Mode32 corrects this problem, allowing your Mac to run in 32-bit mode. **UTI0222 $99.**
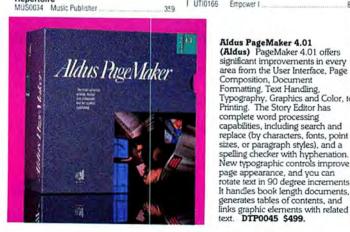
Fifth Generation System
❼UTI0120	DiskLock	118

Kensington
ACC0235	Apple Security Kit	34.
	PassProof	69

Kent Marsh
❼UTI0028	MacSafe II	107
❼UTI0064	NightWatch 1.03	86

Magna
UTI0166	Empower I	89

UTI0146	Empower II	155.

Microcom
❼UTI0093	Virex 3.0	59
❼UTI0150	Virex 10-pack	429.

Symantec Corporation
❼UTI0214	Symantec Antivirus for Mac 3.0 (SAM)	65.

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Advanced Software
❼UTI0192	Intouch	39

Affinity
❼UTI0198	Tempo II Plus	105.

Aladdin Systems
UTI0145	Stuffit Deluxe 2.0	62.

ALSoft
UTI0132	DiskExpress II 2.07	55.
UTI0110	MasterJuggler 1.5	55.

Baseline Publishing
❼UTI0187	INIT Manager	34.
❼UTI0190	Personality	49.
UTI0183	ScreenShot	34.

Berkeley System Design
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❼UT10230	More After Dark	25.
❼UTI0231	More After Dark/ After Dark 2.0 Bundle	45.
UTI0074	Stepping Out II 2.02	55.

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❼UTI0188	Quickeys 2 v.2	97.

Connectix
UTI0148	Hand-Off II 1.1.3	56.

Custom Applications
❼UTI0136	Freedom of Press 3.0.1	255
❼UTI0185	Freedom of Press Light 3.0.1	55.

Dantz Development
❼UTI0118	Retrospect 1.2	148.
❼UTI0196	Retrospect 1.2 Remote	269.

Dariana Software
UIT0218	MacSlueth	89.

Dubl-Click
UTI0194	ClickChange	56.

Fifth Generation Systems
❼UTI0063	FastBack II 2.5	125.
❼UTI0087	SuitCase II 1.2.1	49.
UTI0035	SuperLaserSpool 2.02-Single User	93

Aldus PageMaker 4.01
(Aldus) PageMaker 4.01 offers significant improvements in every area from the User Interface, Page Composition, Document Formatting, Text Handling, Typography, Graphics and Color, to Printing. The Story Editor has complete word processing capabilities, including search and replace (by characters, fonts, point sizes, or paragraph styles), and a spelling checker with hyphenation. New typographic controls improve page appearance, and you can rotate text in 90 degree increments. It handles book length documents, generates tables of contents, and links graphic elements with related text. **DTP0045 $499.**

WealthBuilder by Money Magazine
(Reality Technology) ❼
WealthBuilder uses your financial data and your decisions about goals and acceptable risks to calculate the best investment strategy. It reads data directly from both Quicken and Andrew Tobias' Managing Your Money. It has a stock tracking and portfolio management system, and now includes 5000 stocks and 5000 bonds from Standard & Poor's, in addition to 1450 mutual funds. **FIN0068 $99.**

QUICKTIME
IN MOTION

Pasting movies into documents will be as easy as pasting graphics

BY LON POOLE

Eight years ago, the introduction of QuickDraw allowed Macintosh users to easily paste graphics into any text document; desktop publishing was born. By the end of this year, Apple intends to release QuickTime, an extension to system software that will allow users to paste time-based data—video, animation, and sound initially—into just about any document.

Sounds too good to be true, doesn't it? There are problems, to be sure, with storage, distribution, lack of prerecorded video, cost and complexity of digitizing video, and more. Also, what you read here describes a work in progress that will certainly change and change again before it becomes a reality. These caveats and limitations do not diminish the fact that QuickTime is an exciting, enabling new technology worth learning about now.

Exploring QuickTime

QuickTime provides the means for consistently incorporating time-based data into mainstream application programs. Initially it will be an extension to System 7 and an INIT (start-up document) for System 6.0.7. Someday it may be a standard part of system software. Quick-Time consists of four major parts: system software, standard data formats, user interface guidelines, and image compression software.

• *System Software* QuickTime adds three major pieces of new system software: Movie Toolbox, Image Compression Manager, and Component Manager. Application programs use these elements to record and play back video, sound, animation, and other time-related data, all of which Apple collectively calls QuickTime movies.

Movie Toolbox provides software tools that enable applications to create, edit, and play back QuickTime movies. Application developers can then add Copy, Paste, Resize, and Playback commands to existing programs with very little effort. In addition, QuickTime is designed to synchronize various kinds of time-related data regardless of system speed.

QuickTime at a Glance

SYSTEM SOFTWARE

Movie Toolbox

Allows developers to incorporate QuickTime Movies in any applications

Component Manager

Acts as clearinghouse for plug-in software components such as compressors and device controllers

Image Compression Manager

Allows applications to take advantage of various compression schemes

FILE FORMATS

PICT Extensions
- Compression and decompression
- Thumbnail previews

Movie

Contains any dynamic data—video, animation, sound, or a graph of lab data over time, for instance

COMPONENTS

Photo Compressor

JPEG-compatible algorithm; 5:1 to 100:1 ratios; compression or decompression of full-screen 24-bit image on IIfx, 4 seconds

Video Compressor

Apple proprietary algorithm; 5:1 to 25:1 ratios; compression of full-screen 24-bit image on IIfx, 1second; decompression, 1/s second

Animation Compressor

Apple proprietary algorithm; ratios and speed highly dependent on type of image

Other Components

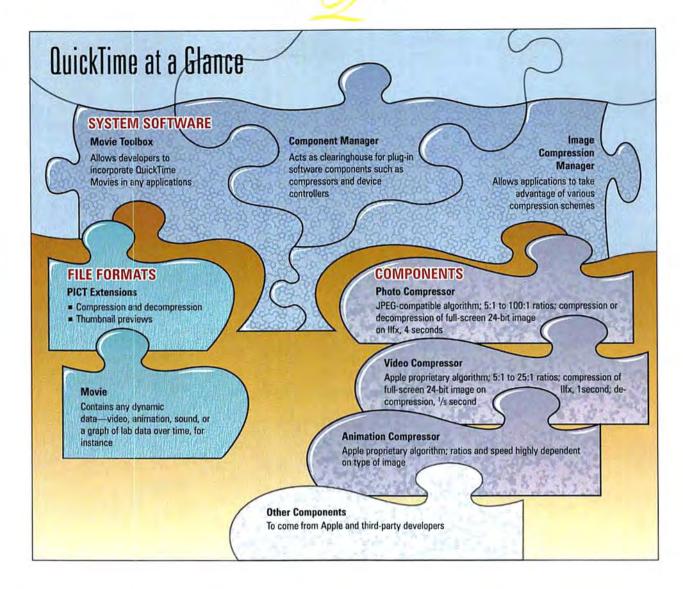To come from Apple and third-party developers

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Image Compression Manager controls image compression and decompression. When you compress an image in a program that uses the Image Compression Manager, you usually choose a compression method from a pop-up menu that lists the available methods relevant to the type of image you are compressing. When you use a compressed image, the Image Compression Manager automatically applies the correct compressor to decompress the image. If you later add or remove compressors, the Image Compression Manager automatically revises the pop-up menu.

The Component Manager provides a standard means for adding components such as compression and decompression; controlling video devices and other hardware; digitizing video and audio from VCRs, cam-

corders, and other sources; and recording QuickTime movies to videotape or other TV-compatible media. Apple plans to include three compressor components and a general-purpose video-digitizing component.
• *Standard Formats* QuickTime defines a Movie format that standardizes organizing, storing, and exchanging time-related data. A QuickTime movie contains one or many tracks, each with its own timing, sequencing, control, and data description. (The actual data to be played is stored separately.) QuickTime synchronizes the tracks and fetches the data to be played. The QuickTime Movie format also specifies a *poster*, which is a single image that represents the movie, and a *preview*, which is a brief excerpt of the movie like the trailers you see in a theater.

Not only does QuickTime define the new Movie format, it also extends the standard graphics format, PICT, to handle compressed still images and image previews. Using a program that knows about these extensions, you'll be able to compress a graphic image with any software or hardware compressor available on your computer. Any program that can now open a PICT image will need no changes to be able to open a compressed PICT; QuickTime will automatically decompress a compressed PICT image without changes to the application program. Updated application programs will be able to save a small (4K to 5K) thumbnail version of a PICT image along with the image itself. You can browse through thumbnails of image collections to find the image you want, and then access it by using a

standard Open command in any program that can open PICT images, as described below.

• *User Interface* With QuickTime, Apple is addressing not only the issue of how application programs include movies and compressed PICTs, but also how people use them (see "Movie Controllers" and "Compression Made Easy").

• *Image Compression* It's been possible, if not practical, to digitize video on the Mac for years. The problem is that digitized video involves so much data that it overwhelms disk-drive capacity and may even exceed the data-transfer rates of the fastest Mac. The solution is universal image compression, together with smaller frame sizes and slower frame rates.

Apple will supply three software compressors with QuickTime: a photo compressor, a video compressor, and an animation compressor. These compressors are meant for pixmap images created by scanners, digitizers, and paint or animation programs. None of these compressors will reduce the size of object-oriented graphics created by CAD, draw, or 3-D modeling programs, nor of EPS (encapsulated PostScript) graphics.

You can add other compressors by dragging software modules to the System Folder, installing adapter boards, or both. Several companies have already announced faster replacements for Apple's photo and video compressors, including Radius, Storm Technology, and SuperMac. Companies like Aladdin Systems and Salient Software, both known for lossless compression, may make compressors specifically for EPS graphics.

The photo compressor uses the standard JPEG (Joint Photographic Experts Group) algorithm. It is best suited to compressing digitized photographs and other natural images that vary smoothly and have few edges or other sharp detail. The JPEG

QUICKTIME PIONEERS PUSHING THE ENVELOPE

Earlier this year several intrepid pioneers around the world began incorporating QuickTime movies into their lives by using advance copies of the software. In Switzerland, multimedia designers Thierry Amsallem and Fulvio Massini created an information kiosk for journalists attending the annual Montreux Jazz Festival. For each artist the kiosk presents biographical text, photographs, and a one-minute excerpt of a prior year's performance. The designers used HyperCard, MacroMind Director, and QuickTime movies to create the program for the kiosk. They recorded the movies on an 8MB Mac IIfx with a fast 1.2GB hard drive and a RasterOps Video ColorBoard 364 for digitizing the video from an 8mm source. (They had hoped the movies would play at 16 frames per second, but their slightly oversize frames [about 175 by 130] slowed the frame rate to around 9 fps.) "With QuickTime, we can include sound and video without having to go through a video studio," says Amsallem.

Holland's Veronica Broadcasting has 12,000 video clips on analog videotape and hopes to someday put QuickTime movie versions of them on AppleShare file servers. Then its news directors will be able to use one of the company's 240 Macs to browse through the archive and quickly find just the right shot. Bert Mulder, director of information services, calculates the firm will need 25GB of hard drive storage—too costly right now. But his tests show the project is feasible. The company can play back its undersize 120 by 110 frames at 25 fps from a fast hard drive. Frame rates are slower but still acceptable across its EtherTalk network, and two Macs can play the same video clip from a file server at the same time. To expedite browsing, the firm plans to have keywords embedded on one extra track and time codes of the source video on another extra track in each QuickTime movie. While watching a video clip filmed in San Francisco, you might see a cable car and want to see another shot of a cable car. You'll click the video to stop it, and click another button to go to the related shot. "We're trying to create a work environment for the TV industry of the future," says Mulder.

At Northwest Airlines, QuickTime movies will help flight schedulers watch worldwide weather changes so they can make the best flight plans. Without QuickTime, schedulers can see only one weather image at a time and must remember the last image to figure out which way the wind is moving. With QuickTime, the airline's Operations Analysis and Automation team will be able to combine the images in a QuickTime movie and store it on a network file server. Schedulers watching the time-lapse animation on their Macs will be able to make flight plans that save fuel, reduce wear and tear on aircraft, and give passengers a smoother ride.

Don Sorensen, who works on special projects for Macintosh development at WordPerfect Corporation, has demonstrated several ways in which you might use Quick-Time movies in a word processor. Using an upcoming version of WordPerfect, he created an interactive newspaper whose static illustrations of movie reviews become movie trailers when you double-click them. In another example, a business letter describes a new helmet design and includes an animated 360-degree view of the helmet (you can use the movie controller to look at the helmet from any angle). The letter and the animation fit on a floppy disk (and can only be read by anyone else with a QuickTime-equipped Macintosh).

Other application programs in which you will be able to place movies include Acta, FileMaker Pro, LabView, Mariah, and Persuasion. LabView will let you record sound and instrument data to disk by using the QuickTime movie format. And Mariah and Multi-Ad Search will let you compress still images by using Apple's photo compressor.

algorithm spatially compresses an image by removing data that is redundant or imperceptible to the human eye. Compression ratios range from 5:1 to 100:1, depending on image content and size. Compressing or decompressing a 640 by 480, 24-bit

Animated Previews Users can define a short Quick-Time movie sequence as a preview of the larger file; simply double-click the image, and the segment springs to life; click again, and the movie stops. Developers can easily extend standard dialog boxes to include previews by using the Movie Toolbox.

Movie Controllers Apple is setting interface guidelines for VCR-like movie controllers (like the one above) that will help developers provide consistent means for playing, stopping, browsing, and stepping through QuickTime movies from within applications.

Compression Made Easy The Image Compressor Manager in QuickTime allows the user to choose from among the compression schemes available on a system. The Manager then automatically applies the appropriate decompression scheme when the file is opened.

image (millions of colors) takes about 10 seconds on a Mac IIcx, and about 4 seconds on a IIfx.

The video compressor uses a compression algorithm that Apple developed specifically for fast decompression of digitized video movies. It spatially compresses each image in the movie and can also perform frame differencing. You can adjust the degree of frame differencing to get different levels of image quality. Color depth can be 8-, 16-, or 24-bit (256, thousands, or millions of colors). The video compressor achieves compression ratios from 5:1 to 25:1 (5:1 to 8:1 without frame differencing); you can expect to store 10 to 20 seconds of compressed video per megabyte. Decompression ratios permit playing back small frames (160 by 120, or $\frac{1}{16}$ of the screen) at 10 frames per second on the Mac II, the slowest Mac that can use QuickTime. Faster models can play back at higher frame rates. Compressing a movie (while recording it) takes about five times longer than playing it back.

The animation compressor uses a compression algorithm that Apple developed for animation and other computer-generated images, such as sequences of screen images recorded by Farallon's ScreenRecorder, at any color depth (2, 4, 16, 256, thousands, or millions of colors). The compressor uses a lossless run-length encoding technique to spatially compress each image in an animation sequence. The animation compressor can also perform lossy frame differencing to achieve real-time playback (640 by 480 at up to 30 fps). Actual performance and compression ratios depend greatly on the content of images in the animation sequence.

Content, Content, Content
Having the option to access Quick-Time movies is great, but where will your video content come from, and how will you get the rights to use it? Sources of clip video are sure to become available, but bear in mind that most video is protected by international copyright laws unless it has been placed in the public domain. Legally you are required to get permission from the copyright holder before you record any copyrighted

video as a QuickTime movie.

You can record your own Quick-Time movies directly onto your hard drive, but you'll need a video-capture board such as the E-Machines Quick-View Studio 2.0, the RadiusTV, the RasterOps Video ColorBoard 364, or SuperMac's new VideoSpigot (due to ship in September). You will also need a video source: a VCR, camcorder, videodisc player, or professional video-playback equipment.

QuickTime movies can also be created entirely on the computer as animation. You will be able to directly save animation created by The Animation Stand 2.0 as QuickTime movies. Future versions of MacroMind Director and MacroMind Three-D will also support QuickTime.

Once you have QuickTime movies on disk, you can slice, dice, chop, mix, and bake them with video-editing and -composing programs like ReelTime, which SuperMac will include with its video-capture boards. The E-Machines QuickView Studio also includes a video-editing program. DiVA's recently announced Video-Shop software also lets you arrange and sequence QuickTime movies.

The QuickTime Future
QuickTime promises to make the inclusion of video, sound, and animation in your documents as easy as including graphics.

One of the best means now available for delivering documents with movies in them may prove to be a network. Because you can store Quick-Time movies on a network file server, you minimize the amount of storage space they require—adapted E-mail software will put QuickTime descriptions of movies in copies of the mail you send, while QuickTime movie data stays on the server. (Because E-mail containing video data will exceed the capacity of all but the smallest LocalTalk networks, however, users will probably have to install EtherTalk networks.)

Network file servers can also be used to store help systems containing QuickTime movies. System 7's balloon help can include movies, and so can HyperCard-based help systems. Here again, the help movies would be stored on a network file server, not

WHAT'S IN A MOVIE

Although Apple's QuickTime file format is dubbed Movie, it encompasses more than just visual data. In fact, it is designed to organize, store, and exchange any time-related data. Also, because Apple is publishing the specs for the format, developers will be able to incorporate QuickTime movies in non-Mac environments.

Each QuickTime movie contains one or more tracks; a simple movie might consist of one video track and several sound tracks, each in a different language, for instance. A more complex movie might have several video tracks controlling things such as monitor color depth and video acceleration.

Although each track specifies one type of data, it doesn't actually contain any data. Instead the track identifies where the data segments are stored, the order in which data segments are played, a duration for each segment, a playback speed, spatial properties such as image size, and a loudness level. Also, QuickTime correlates different time scales and synchronizes the tracks.

Storing data segments in separate modules rather than with the Movie description keeps the Movie file size small. The data required to play a movie can easily occupy several megabytes, whereas a complete movie specification takes up only a few kilobytes. This makes it practical to copy and paste or publish and subscribe Movies between documents. The modular approach also makes it easy and efficient to use one data segment several times in a single movie or in several different movies. On the downside, having a Movie file does not mean you can play the movie. For example, you might copy a Movie file to a floppy disk on your Mac at work, take the floppy home, and open the movie on another Mac. You wouldn't be able to play the movie at home because its data would be at work. Similarly, some data segments may be in files on an unavailable file server on your office's network. You can even throw away data files used by a movie without any word of warning from the system. Eventually the Finder and the file system will probably get smart about such linked files, but in the meantime, movie gaposis is sure to occur.

on the hard drive of each Mac.

You might use a network to send video mail and other multimedia documents, but large-scale multimedia productions such as a dictionary or encyclopedia with video clips will probably be published on CD ROMs. Imagine *Macworld* and other magazines with QuickTime movies on CD ROM; the distinctions between magazines and television begin to blur. When CD ROM prices fall below some critical threshold ($300?), this should help stimulate the production of digital video productions.

The advent of low-cost CD ROM drives will certainly broaden the base for QuickTime, but not as much as making QuickTime work on the Mac Classic, SE, Plus, and Portable. Those models have a 68000 microprocessor, which can't use the 32-bit QuickDraw system software that QuickTime 1.0 requires. Apple claims that a future version of QuickDraw will bring movies to the large disenfranchised population of black-and-white Macs. Those machines will need movies specifically designed for black and white (no shades of gray). QuickTime does a remarkable job of reproducing millions of colors in dithered black and white, but the process takes so much processor power that many frames are skipped. Movie producers can easily add a black-and-white track to a color movie, but lots of media—television and film, for example—cannot be rendered well in two colors. Thus some QuickTime movies won't be

well suited to the two-color screen, and others will have to be specially designed for two colors, as most HyperCard stacks have been to date.
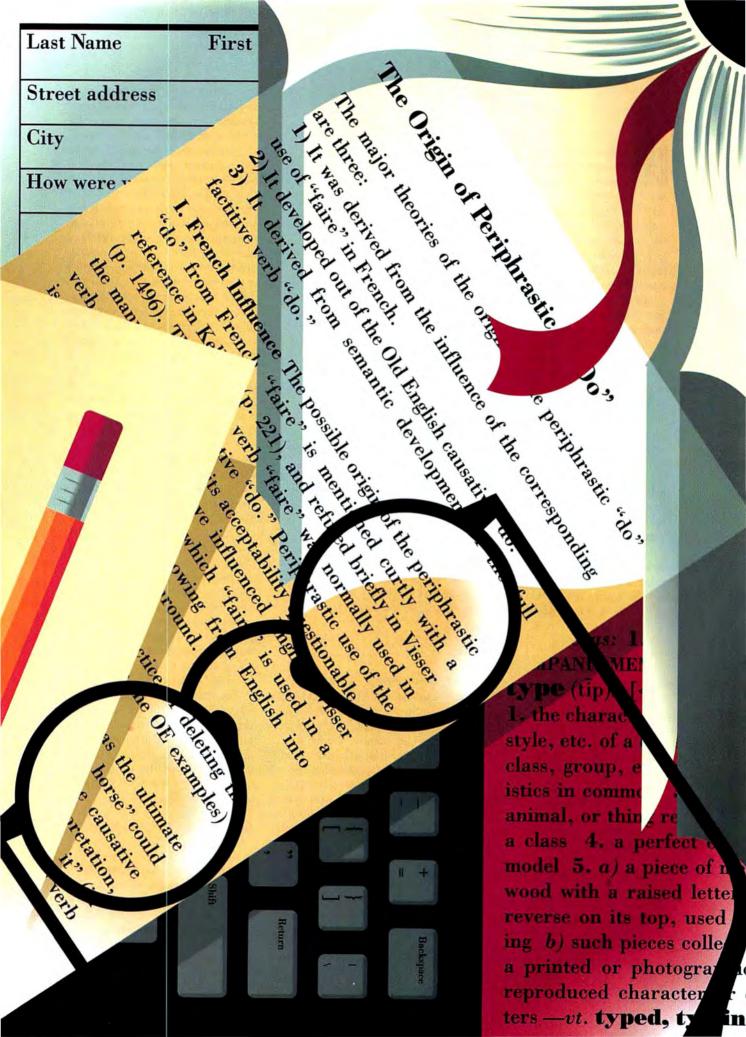
In discussing QuickTime's future, it's easy to get caught up in the glamour of movies and overlook the potential of components. Makers of scanners and other external devices are anxiously waiting for the Component Manager to become reality so they don't have to write a separate driver (controller software) for each application program into which they want to integrate a product. Further ahead, components are sure to lead to highly customized off-the-shelf products, with consumers adding and removing plug-in software modules to tailor an application program's capabilities to suit them. Many developers are already headed in this direction; components will certainly accelerate the trend.

QuickTime in Your Life

All this is not to say that QuickTime can't be enhanced. The playback speed and image quality of QuickTime 1.0 won't be up to broadcast-television standards or even VHS standards. That's not too discouraging when you remember the first desktop publishing efforts in 1984 with Mac 128Ks and ImageWriters. Now the magazine you're holding is desktop published. What mattered in 1984 was breaking from typewriter technology to styled text and graphics in any document. What matters today is breaking from static images to motion in any document. The frame rates and image quality will improve, as will the affordable computing power and data-storage capacity. QuickTime just might be the first step toward the integration of computers and television that futurists predict. **M**

See *Where to Buy* for contact information.

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*Contributing editor **Lon Poole** has reported on new Macintosh technology since the first issue of* Macworld. *His latest books are* The Big Book of Amazing Mac Facts (*Microsoft Press, 1991) and* Macworld Guide to System 7 (*IDG Books Worldwide, 1991).*

The Origin of Periphrastic "Do"

The major theories of the origin of the periphrastic "do" are three:

1) It was derived from the influence of the corresponding use of "faire" in French.

2) It developed out of the Old English causative do.

3) It derived from semantic development

1. French Influence The possible origin of the periphrastic "do" from French verb "faire" is mentioned briefly in Visser (p. 1496). The facitive verb "do." normally used in the manner of its acceptability with a reference in Kellner verb "faire," was questionable use of the verb "faire" (p. 221), and reflecting into is which "fair ... is used in a ... owing fr ... English into ... round ...

... tices ... deleting t ... as the ultimate ... OE examples) ... horse" could ... e causative ... retation, ... it" (... verb

type (tīp) [-
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istics in comm
animal, or thin re
a class 4. a perfect
model 5. *a)* a piece of n
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reverse on its top, used
ing *b)* such pieces colle
a printed or photogra
reproduced character r
ters —*vt.* **typed, ty**

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Choosing the word processor that's right for you

Word processing is something that virtually all of us do with a computer. And with nine Macintosh word processors available on today's market, how can you be sure you're making the right choice when you buy one? What goes into writing, after all, seems rather obvious. We all want to type, edit, format, and print our documents, and all word processors do all those things. So how do we discriminate among what's out there? How can we determine what we really need? As it turns out, although we all do generally the same things when we write, *what* we write differs quite a bit, so basing your choice on the kind of documents you need to produce is one good way of finding the right program for your writing needs. ¶ Although there are innumerable kinds of documents and countless variations on each kind, most documents can be categorized as one of seven basic types: personal and business correspondence (letters and memos); form letters; business reports; academic papers; forms and tables; structured documents (brochures and newsletters); and long documents (books and manuals). ¶ In the pages that follow, I consider which word processors are best for each of these major document types. The accompanying diagrams highlight the word processing features required for producing each kind of document. The word processors under consideration are the old familiars Microsoft Word 4.0, T/Maker's WriteNow

RON CHAN

2.2, and Claris's MacWrite II 1.1; old-but-unfamiliar WordMaker 1.01 from New Horizons Software; recent revisions FullWrite Professional 1.5s from Ashton-Tate, WordPerfect 2.0, and Paragon Concepts' Nisus 3.05; newcomer Taste 1.01 from DeltaPoint; and odd-man-out Microsoft Works 2.0, an integrated application that includes a word processing module.
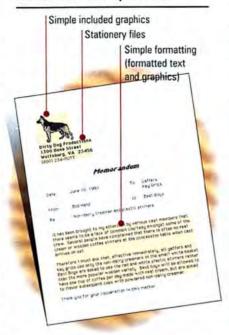
Personal and Business Correspondence

All Macintosh word processors have in common a skeletal set of features (multiple windows, on-screen rulers, basic Find and Replace commands) and formats (fonts, font sizes, paragraph justification and indents). Letters and memos, the simplest documents, require only a few additional attributes: a simple menu structure, uncluttered windows, and an easily navigated set of options; a spelling checker; easy-to-use online help; stationery files (such as ready-made letterhead) that can be created once and reused; and a clear and concise manual. (Regrettably, no word processor provides easy or convenient envelope printing, but you can add an envelope-printing desk accessory such as KiwiEnvelopes 3.) If letters and memos are all you write, you'll probably also want a word processor that's inexpensive and runs well on a low-cost hardware setup (1MB of RAM and, in a pinch, floppy disk only).

WordPerfect ($495) and Nisus ($395) are both too expensive for such simple needs. And both Taste ($149) and FullWrite ($249), with their abundance of high-end features, are overqualified for letter-writing jobs. Taste's cluttered window borders get in the way of a quick scroll, for example, and at 1290 pages, WordPerfect's manuals are about as compact as a steamer trunk.

WordMaker was created specifically for simple tasks like memos and letters, but despite its rock-bottom price ($124.95) and streamlined design, I can't recommend it, either. In an attempt to make the program as simple as possible, WordMaker's designers threw out the baby with the bathwater. Gone, for example, are page margin controls and a fully WYSIWYG (what-you-see-is-what-you-

Requirements for Personal and Business Correspondence

- Simple included graphics
- Stationery files
- Simple formatting (formatted text and graphics)

get) page view. As a result, page formatting is harder, not easier.

The word processors that best fit the criteria for writing letters and memos are WriteNow ($195), MacWrite II ($249), Microsoft Works ($295), and Microsoft Word (with the Short Menus option turned on). At $395 Word is a bit of an investment, but it offers something the other three only dream about: it can be upgraded to a high-end word processor merely by turning off the Short Menus option. Works brings extra attractions to the party as well: its database and spreadsheet modules dovetail nicely with the word processing module, and it sports drawing tools the other three lack.
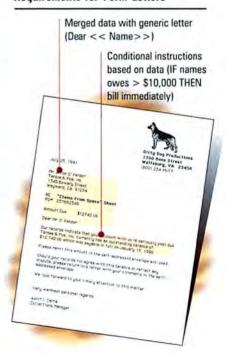
Word is a good choice if your other writing chores require high-end functions, and Works certainly makes sense if you also need basic spreadsheet and database programs. But MacWrite II and WriteNow are the ones that really shine at basic writing tasks. WriteNow costs a little less, feels faster under the fingers, and makes more modest demands on RAM and disk space. MacWrite II, though, is one of those rare programs that is obvious and easy the first time you use it, and I prefer its spelling checker and its manual to WriteNow's. Although MacWrite II is my favorite, ei-

ther one should keep a correspondent quite happy.
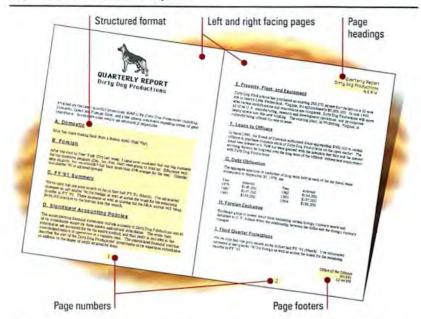
Form Letters

Mail merge—the ability to create dozens of form letters by merging a generic document with coded instructions and a data document that contains such information as names and addresses—is used by businesses for everything from overdue-bill notices to direct-mail solicitation. If form letters are high on your agenda, you should choose a word processor that automates creating the generic document with proper coding, readily accepts data from databases and spreadsheet programs, and offers a variety of conditional instructions (IF a client's income is astronomical, THEN insert a sentence asking for even more money, for example) and special instructions (such as to insert the contents of another file).

Mail merge is available in all Mac word processors. Many merge facilities are fairly basic; others (such as those in Taste and WordPerfect) make valiant attempts at offering more comprehensive features but nonetheless fall short. All together, the best mail merge facilities are in Word, WriteNow, Nisus, and MacWrite II. In all four programs you can easily use the raw data exported from almost

Requirements for Form Letters

- Merged data with generic letter (Dear << Name>>)
- Conditional instructions based on data (IF names owes > $10,000 THEN bill immediately)

Structured format | Left and right facing pages | Page headings

Page numbers | Page footers

any information-storage program. WriteNow (the least expensive of the bunch), Word, and Nisus have nearly identical merge facilities and offer the widest variety of conditional and special instructions, but creating the generic coded document is a tedious, manual affair in all of them. MacWrite II, on the other hand, automates the process better than any program I know of, although it lacks the variety of merge instructions found in the other three. If your merge needs are simple, go for MacWrite II; if you need all the bells and whistles, brace yourself and try Word, Nisus, or WriteNow.

Business Reports
Reports to the manager, to the board, to just about anyone and everyone, are an essential part of many businesspeople's lives. Because business reports are long and, one would hope, logically structured, they require document elements that letters and the like do not. They need, for example, a word processor that can generate page numbers automatically, in any of several styles (letters, Roman or Arabic numerals), and allow you to reset the numbering sequence or style anywhere within the document (say, reset the page numbers from Roman numerals to an Arabic 1 after the introductory material).

A word processor for business documents should also be able to

display headers and footers (repeated text or graphics that appear at the top or bottom of each page), different ones for right- and left-hand pages (such as the report title on the left and the quarterly period on the right) and for different sections within the report (such as document subdivision titles), and a special one (or, as is common, none at all) on the first page. It is also helpful to have an online thesaurus (to find, for example, a euphemism for "declining profits") and a collection of comprehensive editing tools that you can use to quickly incorporate all the boss's changes.

Overall, WordMaker, MacWrite II, Works, and Taste prove to be disappointments when it comes to reports. Of course, for the programs that lack a thesaurus, you can buy a thesaurus desk accessory, such as Word Finder or The Big Thesaurus. And the lack of editing shortcuts can be considered a minor inconvenience. But in all these programs, a document must be numbered from beginning to end in a single sequence, and a document must use the same single header or footer or right-left pair of headers or footers throughout. Equally inconvenient, some of these programs can't prevent a header, footer, or page number from appearing on the first page. Although WriteNow and Nisus offer more for the report writer (es-

pecially Nisus, with its many editing shortcuts, including a ten-compartment Clipboard and multiple undos), both are hobbled by inflexible page numbering.
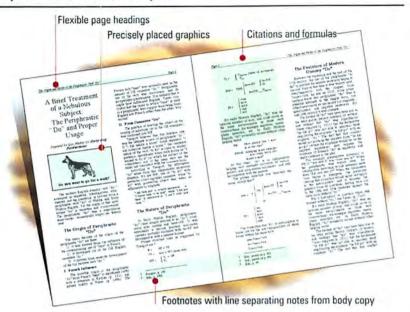
The best choices for report writing, though not without their shortcomings too, are Word, FullWrite, and WordPerfect. All three offer thesauruses, either built in or as a companion desk accessory. More important, all three have very flexible page numbering and header and footer options. If I had to pick a favorite, it would be Word because of its many editing shortcuts and midlevel price. My least favorite of the three is WordPerfect: it's the most expensive, it has a poorly designed thesaurus, its editing shortcuts (if shortcut is, in fact, the right term) are awkward, and it doesn't automatically eliminate the extra space when you double-click on a word and press the delete key.

Academic Papers
Whether you're writing a paper for a class, an advanced degree, or the *New England Journal of Medicine,* your document will most likely require the kind of special touches only an academic could love. Foremost among these are every writer's vision of hell: footnotes and endnotes. Most word processors these days position footnotes and endnotes automatically, renumber them when notes are added or deleted, and permit symbol references (such as asterisks) and reference numbers. Fewer programs can restart footnote numbering with each new page or section, draw a line between footnotes and main text, add a notice when a footnote is continued on the next page, offer reference-number format options, and automatically format every footnote with a custom style (see "Writing More Efficiently: Glossaries, Style Sheets, and Macros" for more about custom styles).

Also important in academic papers is the ability to display imported graphs, charts, and illustrations. All Macintosh word processors allow you to add graphics to a document; where they differ is in the variety of graphics formats they accept and how the graphics can be manipulated (resized or cropped) and positioned on the

Requirements for Academic Papers

Flexible page headings

Precisely placed graphics

Citations and formulas

Footnotes with line separating notes from body copy

page. The biggest differences are in graphics positioning. In Taste and WordPerfect you need only drag the image to the desired location. Full-Write, Nisus, and Word all offer even more flexible positioning options, but they require multistep processes to position graphics. In MacWrite and WriteNow you must adjust the amount of text or blank spaces above and below the image and if and how text wraps around the graphic. To speed up scrolling through the text, it's also helpful to be able to hide graphics temporarily as you can in MacWrite, Taste, and WriteNow.

Because many academic journals charge authors a publication fee based on the length of the article, a word counter is also handy. All the programs can count words. Very few, however, provide help for two other common academic albatrosses: citations and mathematical formulas. Only FullWrite offers a bibliography-reference function, and it's not a very useful one. And only Word has built-in tools for creating mathematical formulas; but these tools are limited in scope and difficult to use. No matter what word processor you use, if your papers are loaded with citations, you'll

want a stand-alone bibliographic utility such as EndNote Plus or Pro-Cite. And if you are mathematically inclined, an equation editor such as Expressionist is essential.

Citations and equations aside, WordMaker, Works, and WriteNow can be ruled out for academic papers. WordMaker and Works don't support footnotes or endnotes of any kind, and WriteNow allows you to create footnotes but not endnotes. MacWrite II and Taste offer only basic footnote and endnote automation, although Taste gets extra points for its custom footnote and endnote styles and graphics capabilities.

The programs that top the dean's list are FullWrite, Word, WordPerfect, and to a lesser degree, Nisus. Word and WordPerfect provide the best options and controls for footnotes and endnotes. (Word allows only one or the other in a single document; WordPerfect allows both.) Word-Perfect and FullWrite offer the best combination of simplicity and power when it comes to imported graphics. Overall, WordPerfect is probably the best—and alas, the most expensive—choice for academic writing.

Forms and Tables

Forms and tables are often used by both ivory-tower and real-world inhabitants. Academics frequently display data in tabular form and create application forms for admissions to conferences and the like; business-

WRITING MORE EFFICIENTLY: GLOSSARIES, STYLE SHEETS, AND MACROS

Whether you're writing a brochure or a book, a number of word processing extras can save you time and effort. Take glossaries, for example. A glossary stores often-used graphics or text (from a few words to many paragraphs). You type one or two keystrokes or invoke a simple command, and the corresponding glossary entry is instantly inserted in the document. Type *wwf*, for example, and a glossary will replace it with World Wildlife Fund. Nisus, Word, and FullWrite offer more or less equally capable glossaries.

A custom style defines a combination of formats frequently called upon for a specific purpose (such as 12-point Helvetica bold for section heads). A simple style command is all it takes to apply a style, and if you change a style's definition, text

already formatted in that style changes as well. FullWrite, WordPerfect, Taste, Word, and Nisus all support styles, but the custom-style functions in FullWrite and especially in Word are the best designed, easiest to use, and most thoughtfully integrated with the rest of the program.

The ability to find words or formats and replace them with something else is always handy, and all word processors have at least a simple find-and-change function (the simplest can find and change text only). The ones in MacWrite II and Taste are both highly versatile and easy to use; those in WordPerfect and FullWrite are also versatile, but not so easy to use. The find-and-change function in Nisus far outstrips all the others, but it requires considerable effort to understand and use.
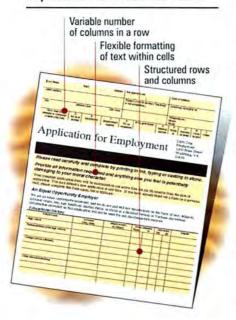
Macros replay one or more previously recorded actions (text entry, menu commands, or a combination of the two) in much the same way that a videotape replays recorded words and actions. Macros come in handy when you want to automate repetitive tasks, and they can substitute for a glossary when one is not available. Nisus, WordPerfect, and Works have built-in macro facilities, and Word is bundled with AutoMac III, a separate macro program. Any word processor, however, can be outfitted with a commercial macro utility, such as MacroMaker (on the Macintosh System Utility disk), QuicKeys, or Tempo II. Unlike built-in macro facilities, commercial macro utilities can save you a lot of time and effort in all your applications.

people generate a myriad of product and price tables; and bureaucrats are undisputed masters of forms of all kinds.

Although the family resemblance is sometimes hard to see, forms and tables are actually close relatives. Crudely put, a form is just a partially empty table dressed up with black borders. Thus the editing and formatting tools required for both tables and forms are essentially the same. And more than any other word processor, Word offers the best tools for tables and forms. FullWrite is bundled with Tycho Table Maker, a stand-alone application specifically designed for table creation. But Tycho Table Maker is not especially convenient: the kinds of tables you can create is quite limited; you must convert a table into a graphic and then copy it into your FullWrite document; and to edit a table once it's in FullWrite, you usually have to copy it back to Tycho Table Maker.

In contrast, Word's table tools are more convenient and far more adaptable. For example, the number of cells (columns) in each row is independent of the number of cells in the rows above and below; tables can be symmetrical or asymmetrical in design, and rectangular, triangular, or polygonal in shape. In addition, because you can freely format the way the cells appear on the page and format the text in each cell separately, you can

Requirements for Forms and Tables

create almost any kind of ruled, bordered, or boxed entry form with a Word table.

In programs with no table tools you can always create lists or simple tables with the judicious use of the tab key, of course. FullWrite, Nisus, Word, WordMaker, and WordPerfect can all sort the items in a list or table—in ascending or descending order—according to the characters at the start of each row. A few, such as Word and WordPerfect, can also sort the rows by the contents of any column within the table (such as the zip code at the end of each address row). Word can also add a column of figures for you, even if it's in a multicolumn table. (In Works you can accomplish these tasks if you move the table into the database or spreadsheet module.)

Brochures and Newsletters

Although there's nothing like Frame-Maker, PageMaker, or QuarkXPress when it comes to complex layouts or book-length manuscripts, it is quite possible to put together many kinds of brochures, newsletters, even entire books with a word processor alone. For brochures and newsletters, the problems your word processor must overcome pertain mainly to layout and design. Primary among them is multiple columns. Almost all word processors can divide a page into equal-width, equally spaced columns. Few, however, can create columns that are irregularly spaced and/or of unequal width. Rare, too, is the ability to change from one column format to another in the middle of the page.

In newsletters and other publications intended for public consumption, justified text is commonplace. That and the narrow line width dictated by multiple columns make automated hyphenation essential. Sidebars containing pull quotes (large-type excerpts) and supporting text are also common elements in newsletters and brochures; a word processor's ability to create and manipulate sidebars is thus a definite advantage. Built-in graphics tools and kerning are also useful; the former makes it easy to add minor graphic elements, and the latter enables you to tighten up letterspacing. Finally, if you have a complex layout, it's help-

Requirements for Brochures and Newsletters

ful to be able to see a full page (or two complete side-by-side pages) on screen without having to scroll. This means that unless you have a full-page or two-page monitor, the word processor must be able to display a reduced-size preview of the document.

For complex layouts with multiple columns, sidebars, and graphics, it's difficult to choose among FullWrite, WordPerfect, and Word. Taste also has a lot to offer, including flexible column controls, hyphenation, kerning, built-in graphics tools, and a variety of enlarged and reduced views—and for all that it's surprisingly inexpensive. But Taste lacks some of the important document elements discussed earlier, including headers, footers, and page numbers, so it doesn't quite make the cutoff.

FullWrite, WordPerfect, and Word all offer hyphenation and reduced-size full-page views. FullWrite, the least expensive of the three, has a good selection of built-in graphics tools and an excellent sidebar feature, but its column controls are relatively weak. Word costs more than FullWrite, and for the extra money you get flexible and powerful column controls and the ability to create sidebars (although these require a great deal more effort than in FullWrite). Graphics tools are
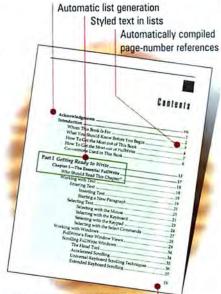
not available within Word, so you'll have to use your own. WordPerfect, however, exceeds the other two in both price and performance; its column controls surpass Word's, and its sidebar and graphics tools are equal to or better than FullWrite's.

Books and Manuals

With long documents such as manuals and books, the layout is usually fairly straightforward and, in most instances, the least of your worries. Far more troublesome are the lists that appear at the beginning of many long publications—the table of contents, list of figures, list of graphs and tables, and especially the index at the end. A word processor should allow you to indicate the items you want listed and then compile the list (eliminating duplicates and alphabetizing it too, if it's an index) and add the page numbers for you. Ideally, a word processor should also be able to keep track of several different lists within a single document so you can have, for example, a table of contents and a list of figures. It should also automatically format the entries in lists or indexes with custom styles for easy formatting later on.

Marking entries to be included in lists or an index is always tedious, but

Requirements for Books and Manuals

Automatic list generation
Styled text in lists
Automatically compiled
page-number references

Flexible page and chapter numbering

the amount of effort it requires varies significantly depending on the word processor. In some programs you must mark entries rather laboriously, by manually entering codes; in others you simply select the desired options from a dialog box. The arrangement of the finished list or index also varies from program to program. Some word processors can generate

multilevel lists and indexes with subentries beneath main entries (and sometimes subentries beneath subentries), while other programs make no provision for subentries.

In most word processors, cross-references to specific pages must still be entered and updated the old-fashioned way—by hand. A few, however, update cross-references automatically, eliminating the need to check and cross-check right up until the moment you print. A few can also number one or more groups of items, such as tables or figures. As you add or delete tables or figures, the word processor automatically updates the item numbers in the text (such as the figure caption numbers); and if the program is really smart, it can also update item numbers in cross-references and lists of figures or tables.

For sophisticated tasks such as these, the top contenders are Word, WordPerfect, Nisus, and FullWrite. Nisus, which automatically updates cross-references, is the only program that can create several different indexes for one document (product and vendor indexes, for example), and of the four, it's the one that most easily generates standard index format. I rank it last of the four, however, because it generates only single-level

UPGRADES COMING SOON

By the time you read this, Apple's new System 7 should be shipping. Frankly, we expect *all* the word processors to support a minimum of new System 7 features, including balloon help, access to Publish & Subscribe linking, and support for TrueType fonts.

The new MacWrite Pro, due out by late summer this year, supports basic System 7 features and includes improved formatting capabilities such as support for multiple headers and footers, style sheets for paragraphs, detailed character/word/line/paragraph counting, support for 81 colors, and a multilingual spelling checker for the internationally literate.

MacWrite Pro's new features for desktop publishers will include support for importing graphics in Color, PICT2, and EPS formats; easier multiple-column creation; bordered frames; text wrap around frames (including asymmetrical objects); and the ability to change the spacing between characters for better copyfitting. Finally,

MacWrite Pro will include new feature modules called ADDits, which work within frames and allow the addition of external features like audio notes and table editors to MacWrite Pro's new features. MacWrite Pro will retail for $249; owners of any previous version of MacWrite will be able to upgrade for $65.

But that's not all: Nisus 3.06 will take advantage of System 7 features through a special module, Nisus XS, available for $75. In addition to support for AppleEvents, which provides for interapplication communications, Nisus XS adds all the document import/export features of Claris's XTND technology, allowing more flexible importing and exporting of documents. The Nisus Sound Navigator, included in the upgrade, lets users add sound notes and attach them to paragraphs, sentences, or words.

Microsoft's most recent upgrade of Word 4.0 includes a new INIT—for use with Apple's new Personal LaserWriter LS and

StyleWriter—that eliminates most printing problems reported by users without MultiFinder. Also included are two new WordPerfect conversion utilities that enable users to import and export WordPerfect for DOS 5.0 and 5.1 files using Apple File Exchange. Upgrades are available free to registered users.

WriteNow 3.0, due out in the fourth quarter of 1991, will add, among other things, character and paragraph style sheets; support for EPS graphics; up to 25-column documents; an enhanced spelling checker; online help; and direct support for PC WordPerfect, MacWrite II, and Microsoft Works documents.

Finally, newcomer WysiWord, from Microsystems Engineerng Corporation, due out in mid-September, will offer word processing with technical-drawing and business-plotting capabilities for $795. It will also provide cross-platform compatibility for VAXstation and IBM PC versions of WysiWord.

lists and indexes, its list creation is a more complex process than it needs to be, and it doesn't automatically assign styles to every entry in compiled lists and indexes. FullWrite ranks third. On the positive side, it creates multilevel indexes and tables of contents, automatically applies the appropriate custom style to index and list entries, and craftily combines automatic item-numbering with its cross-reference and list-generation facilities. On the negative side, FullWrite can create only one list per document; it places the compiled list as well as the index in separate sections that are frustratingly off-limits to standard editing and formatting techniques. Moreover, index size is limited by the number of graphics, table-of-contents entries, and other formatting elements within the document.

Both Word and WordPerfect are good choices for long-document writ-

ers, but Word takes top honors. Word automatically applies built-in styles geared to the appropriate level for all index and list entries, can create a larger number of different lists than WordPerfect can, and can generate a table of contents from an embedded document outline. Word also permits a greater number of levels in both lists and indexes, can generate an index in small chunks if it is too large to compile in one pass on a low-memory Macintosh, and compiles each list separately.

WordPerfect, to its credit, automatically updates cross-references, provides a much easier system for marking list and index items, and, like Nisus, can generate an index of a document from a concordance (a separate list of words). In WordPerfect, however, lists and the index have to be compiled all at the same time, replacing all previously compiled

lists and any changes that you might have made to them. If you've painstakingly added extra formatting to your table of contents, for instance, and then add compelling information to your book at the last minute, recompiling that table of contents wipes out all of your previous formatting. I prefer Word's flexibility, but if you don't need all its options, you may prefer WordPerfect's relative ease of use.
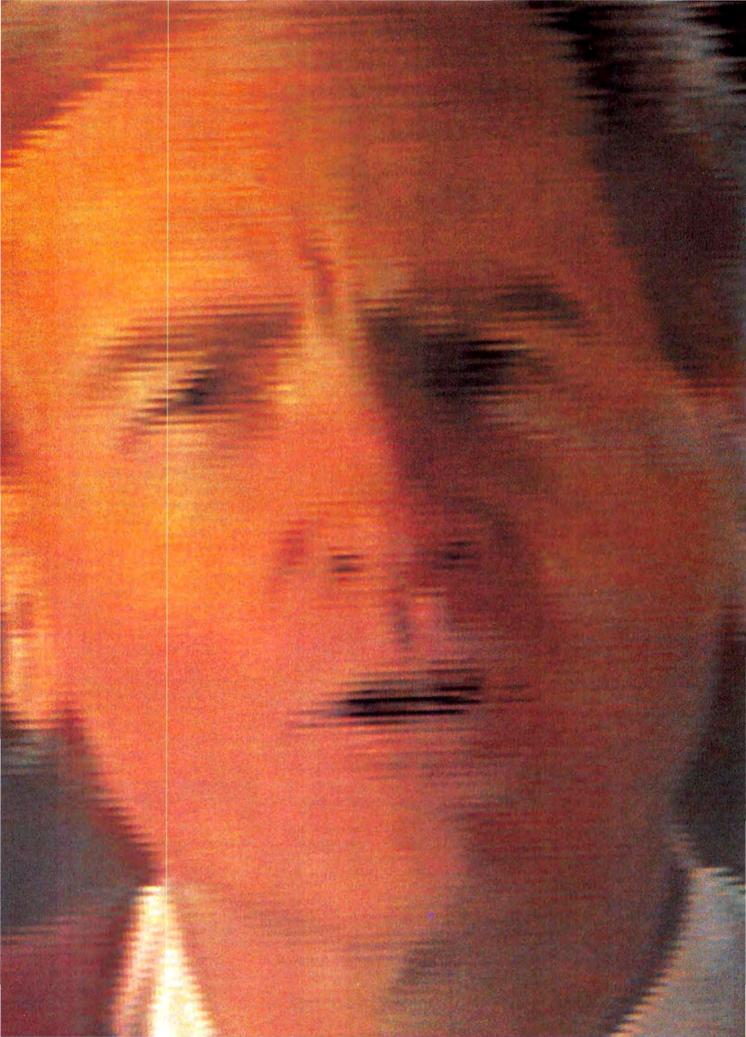
Something to Write Home About

If you base your purchasing decision solely on the kinds of documents that you most often produce, you can't go wrong with either MacWrite II or WriteNow for general correspondence, and Microsoft Word for business reports, manuals, books, or anything that contains tables. For the academic writer, or those with a yen for desktop publishing newsletters and brochures, WordPerfect will do the job well.

But this kind of isolated task analysis doesn't tell the whole story. It doesn't tell you, for instance, that you still have to deal with annoying embedded codes in some parts of WordPerfect (a legacy from the PC version), or that Word still archaically identifies fonts by ID number (instead of by name), creating potential printing problems. It also doesn't tell you that FullWrite can add sound notes to your documents, that WordPerfect has a suite of file-management commands, that Nisus can make sure that all your parentheses are properly paired, or that Word can send E-mail. In short, it doesn't tell you about all the little beauty spots and blemishes that reveal themselves as you become more intimate with a program. But it does tell you whether or not you can get a particular writing job done, and in the end that's probably what matters most of all. ■

See *Where to Buy* for contact information.

. . . .

Robert C. Eckhardt *is a* Macworld *contributing editor and has written two books about word processing on the Macintosh. He is coauthor of* The Publish Book of Tips, *due in October from Peachpit Press.*

THAT
VISION

Low-cost Macs have transformed Apple. For the better?

THING

by Cheryl England

The three Macintosh computers Apple introduced last October, the Classic, the LC, and the IIsi, didn't seem that special. They ran the same system software and applications as previous Macintoshes, but there was a difference—price.

The trio has had mixed success as a group, but up to March, the Classic was selling 100,000 units a month. In the six months after Apple introduced the low-cost Macs, U.S. market share more than doubled, rising to almost 20 percent, and price-sensitive foreign markets, such as those in Asia and South America, expanded.

Revenues, too, continue to grow. By the end of March, worldwide revenues were up 19 percent from the same quarter a year ago. With total sales of $5.6 billion, Apple is still the largest personal computer company, ahead of IBM, Compaq, and Tandy.

Apple has a strong balance sheet, with lots of cash and virtually no debt. The bad news is that profitability is sharply down, and operating costs are up.

As a result, Apple underwent a large-scale reorganization in the first half of 1991, which resulted in its first significant round of layoffs since 1985; up to 10 percent (1500 employees) of its worldwide work force is expected to be cut. To reduce operating expenses further, the company also consolidated its five U.S. regional sales divisions into three units, eliminating regional headquarters in San Jose, California, and Chicago, and made plans to move some departments out of leased buildings in Cupertino, California, to lower-cost areas in other parts of the western United States. Apple USA was reorganized—for the fifth time in as many years. Even engineering and ad-

vanced-technology staffs are facing cuts, and development projects are being squashed. Morale is plummeting, and many people, both inside and outside Apple, are questioning whether CEO and chairman John Sculley has the savvy to lead Apple into the next decade (see "The 16.7-Million-Dollar Man—Is He Worth It?").

Why the turmoil amid the success? The answer lies partly in Apple's history. A company with remarkable products and inspired engineers, Apple historically offered premium products at premium prices, yielding one of the highest profit margins in the industry.

But by late 1990 Apple was in a bind. Its U.S. market share had plummeted to 9 percent—down from a high of 15 percent in 1987. Fast-paced sales in Europe and Japan kept the company's overall

profits from dipping (see "The Global Competitor"), but developers, the press, and customers were hounding Apple to offer more affordable options. The resultant low-cost Macintoshes were not so much an inspired vision as a reaction to market demand.

Apple was clearly unprepared for the success of the new machines.

likely brings the real average down to 35 percent or less.

As profit margins drop, Apple must become increasingly cost-conscious—operating costs in the second quarter of 1991 accounted for an overwhelming 37 percent of Apple's revenues. Besides cutting employees from the payroll, Apple is slashing budgets for travel, conferences, and

Oiling the Supply Chain

Apple must also increase its manufacturing capacity and improve its forecasting abilities. During the first two quarters of fiscal 1991, Classics were on back order. "We were going into a recessionary period with products that were nice but not revolutionary," says G. Frederick Forsyth, Apple's general manager for Macintosh hardware and worldwide manufacturing. "We underestimated how well received they would be."

To eliminate the back orders, Apple ran its manufacturing plant in Singapore 24 hours a day, 7 days a week. Plants in Fremont, California, and Cork, Ireland, were already running at capacity. Although Apple had experience with high-volume manufacturing on the Apple II production line in Singapore, the company was taking a huge risk. But the production system held—so well, in fact, that Apple ended up with a surplus of Classics as it headed into its third fiscal quarter, a time when sales are traditionally flat.

APPLE SPENT A WHOPPING $750—ALMOST

THE PRICE OF THE CLASSIC—MARKETING

EACH MACINTOSH SOLD IN 1990

Sales far exceeded the company's projections. By November 1990, Apple had back orders for $525 million worth of computers. Those accelerated sales for the low-cost machines meant lower profit margins. Net income increased while profits plummeted.

Problems that have languished beneath the surface—insufficient manufacturing capacity, high marketing costs, trouble with sales channels, and a lack of key products—have become glaringly obvious. To deal with these new dynamics, Apple is attempting to transform from a vendor of low-volume, high-profit products to one of high-volume, low-profit products. But does Apple have the vision and ability to adapt?

Cost Consciousness

The heart of Apple's current woes lies with its falling profit margins. Traditionally Apple has fared extraordinarily well against its competition. While IBM PC–clone manufacturers such as Compaq survive with profit margins of little more than 40 percent, and second-tier companies such as Dell run lean on profit margins of 30 percent or less, Apple has enjoyed profit margins as high as 53 percent. "The days of averaging 50 percent gross margins are gone," says Joseph A. Graziano, Apple's chief financial officer. Apple publicly states a drop to the low 40 percent range, but the Classic's 30 percent margin most

bonuses. Research and development projects are being curtailed.

Lavish product introductions and glitzy promotions must also be scaled back. In 1990 Apple spent a whopping $750 marketing each Macintosh it sold. That's almost the retail price of the Classic.

Apple hopes to reduce marketing costs by introducing products in batches—much as it did with the low-cost trio. But some products scheduled for introduction in late 1991 are already slipping into 1992 and beyond. Product introductions are increasingly plagued with costly missteps, changes, and delays. The long-rumored 68040-based workstation is yet to be seen, and no one at Apple will commit to a ship date for a laptop, even though one has been promised by the end of the year. Plans for a Sony-manufactured CD ROM player have been delayed.

The company can't afford to make marketing mistakes, either. Although the LC was introduced at the same time as the Classic and IIsi, it didn't ship until three months later, a delay that hurt its sales. Compounding the problem, customers didn't understand why they should purchase the LC over the IIsi. As a result of these missteps, U.S. sales of the LC are well below Apple's projections. With a huge inventory of unsold LCs sitting in warehouses, Apple was forced to relaunch the product with a costly advertising campaign.

Still, the risk they had taken threw a scare into Apple. In a record 90 days, Apple's board of directors approved the purchase of a new U.S. manufacturing site; the company scouted locations; and it signed a contract for a 400,000-square-foot plant in Colorado Springs, Colorado. Once the new plant is running—sometime in early 1992—Apple can manufacture its U.S.-bound low-cost products there rather than in its Fremont plant, where operational costs are higher.

Why couldn't the company predict the Classic's popularity? After all, shortly before the roll-out, Apple had initiated a special European promotion—SEs were offered to the German, Danish, and Spanish education markets for about $1500—and the machines sold like the proverbial hotcakes. Apple desperately needs to refine its understanding of its customer base.

Dealers Beware

Macintoshes have generally been sold through Apple-authorized dealers, but the overhead associated with supporting the dealer channel has become too costly. "Apple was one of the founders of the retail sales con-

cept for personal computers," says Graziano. "We did it because the traditional model of selling mainframe products was too expensive. The irony is that over the years our model has become as expensive as theirs."

In an attempt to make the dealer channel more profitable, Apple has changed its authorization requirements and sales quotas for dealers at least three times in the last few years. The strategies haven't worked. Instead dealers are confused and frustrated. Recessionary times haven't helped either. In the last two years the number of Apple dealers in the United States has dropped from 2000 to slightly more than 1500. In 1990 Apple demanded that dealers meet a $350,000 minimum-sales quota. This move cut sales outlets throughout the rural United States.

Sculley says that Apple won't abandon the retail channel. Still, the company is openly looking for new ways to sell the low-cost Macintoshes. Superstores—large warehouse-style stores that cater to knowledgeable computer buyers—are one option. Unlike authorized dealers, superstores operate on low overhead and offer little in the way of customer hand-holding.

Apple has been quietly experimenting with selling Macintoshes through two Micro Center superstores—one in Columbus, Ohio, and one in Atlanta—for several months. In early June Apple announced that it had struck a more substantial deal with CompUSA, a superstore chain with 20 outlets in the United States, to sell the low-cost Macintoshes and Apple's personal printers. More announcements will surely follow—of the 200 retail outlets Apple may add this year, half could be superstores.

Superstores, however, could be potential land mines for Apple. In order to successfully sell products through mass merchandisers, Apple must ensure product availability—something it was unable to do with the Classic at first—and it has to ensure product demand—something it could not do with the LC. And Apple risks alienating its dealers, potentially causing much damage in international markets where dealers are traditionally very important. "I'm a fanatic

THE 16.7-MILLION-DOLLAR MAN—IS HE WORTH IT?

On the sixth floor of De Anza 7— a modern tinted-glass building in Cupertino—sits a typical Silicon Valley high-tech office. It's small and has no windows that open to the outside. The decor is clean and modern: shelves and desktops are a chic black; oversize red-plastic paper clips and bright-pink folders add hints of color. A round, wooden table with red leather chairs dominates the middle of the room. Several Macintoshes, including one custom-painted to look as though it were made of marble, take up most of the desk space. In the background are aquarium sounds, which turn out to be the electronic gurgling of fish moving across a computer screen.

Welcome to the world of John Sculley, the man who's been at the helm of Apple as it has grown from $982.8 million to $5.6 billion in revenues. He's done well and deserves to be rewarded. But many people are questioning the size of the reward, especially in light of Apple's recent raft of financial problems and layoffs. One of the highest-paid CEOs in America, Sculley reportedly made $16.7 million last year in salary, stocks, and bonuses.

A soft-spoken man with a casual, easy manner, Sculley doesn't come across as a dynamic leader. Analysts and the press are unimpressed with him; employees criticize his salary and his growing inaccessibility. But some who work closely with Sculley have a higher regard for him. Albert A. Eisenstat, an executive vice president and Apple's secretary, who is often credited with serving as Apple's stabilizing force over the years, claims that Sculley has brought a more orderly marketing perspective to Apple, as well as a genuine love for technology. Others such as Bill Campbell, former head of Claris and

current president of Go Corporation, became cynical about Sculley's leadership over the years, complaining about his penchant for second-guessing his staff's decisions and changing his mind on decisions agreed upon long before.

Still, many people credit Sculley for forcing the hard, quick decisions that brought the low-cost Macintoshes out of the prototype stage and into the market. "John should be given a lot of credit for things that work," says David C. Nagel, vice president of the Advanced Technology Group. "He actually does do more than he is credited for on the outside when it comes to making things work technically."

But Sculley frequently seems to lose his grasp of reality. He speaks of Apple's plans to introduce products in all major market areas by the year's end; yet by midyear he was still creating breaks in the company's current organization and groping to define goals for Claris. At a time when Apple needs to work closely with third-party developers to create new products, Sculley has aggravated a generally touchy situation. The low-cost Macintoshes have not helped developers sell products, and Apple continues to compete with developers by selling more of its own peripherals and software.

When speaking in public now, such as at the developer conference in May, Sculley's speech is halting and nervous—he seems uncertain. There's little he can do to stem the current hostility—even though he cut its salary by 15 percent, most people deem the move too little too late. Only by pulling Apple out of its current dilemma and coming up with a workable plan for the next few years can Sculley redeem himself. And with the state Apple is in, that's a job worth $16.7 million.

about supporting our resellers," says Ian Diery, president of Apple Pacific. "I would hate to add in volume merchandisers without planning it with the resellers."

While superstores may help Apple distribute low-cost products, they won't help Apple raise sales to cor-

porations. Therefore, Apple has reached an agreement with CompuCom that allows the chain to sell not only Apple's entire product line to corporations, but also installation, training, and support services.

Even if the superstores and the unbundling of services are a success,

THE GLOBAL COMPETITOR

While Apple's U.S. market share has had its ups and downs over the last few years, the company's international sales have been growing at an astounding pace. During the second fiscal quarter of 1991, over 50 percent of Apple's revenues came from international sales. The European market alone accounted for 31 percent of Apple's revenues during that period. Other countries such as Japan are just now beginning to take off—1990 revenues were $240 million, and Apple expects fiscal 1991 revenues to skyrocket to $350 or $400 million.

Certainly much of the explosive growth can be attributed to Apple's introduction of the low-cost Macintoshes. Customers in some countries, such as those in Europe and Asia, are buying the low-cost Macintoshes for the same reason customers in the United States are—they recognize a bargain. In financially troubled countries such as Australia and Canada (where a recession has forced resellers out of business and the personal computer market is shrinking), low-cost products have helped Apple maintain impressive market shares of 18 percent and 17 percent, respectively. And in countries such as those in Latin America and the Far East, where homespun, sub-$2000 personal computers reign, Apple is finally beginning to compete. Currently 65 percent of the units Apple ships to Latin America and the Far East are low-cost Macintoshes.

The rate of international growth shows that Apple is making a conscious effort to understand and operate as an insider in international markets, rather than simply viewing those markets as supplemental income. One indication of this outlook is Apple's success in a difficult market such as Japan. After four false starts, Apple has finally earned a reputation as a serious business in Japan. Apple became the first NASDAQ company to be listed on the Tokyo Stock Exchange, developed KanjiTalk, and hired Japanese nationals for top positions at Apple Japan. Apple's market share in Japan is now 5 percent and growing.

Apple is working to earn respect in many other countries as well. A few years ago Apple localized its system for only a few select languages; today the company supports 38 different languages. The company designs new products with international requirements in mind—for instance, designing monitors that work correctly in the magnetically different Southern Hemisphere, producing peripherals in countries that have import/export quotas, and localizing keyboards. Product roll-outs, such as the one for the low-cost Macintoshes, are also made simultaneously worldwide—international markets no longer play second string to the United States. "Apple introduced the new Macs in 15 countries in Europe at the same time as they did in the U.S.," says Soren Ölsson, president of Apple Europe. "And they shipped the products at the same time. They didn't wait to localize products for the international markets later."

As Apple becomes a more sophisticated player across the globe, it is starting to take world dynamics into account. For instance, Apple initially priced products differently in various European countries because each country had a different cost of doing business. This system, however, created a gray market and left an opening for multinational companies to purchase products wherever they were least expensive. Both to forestall these practices and to prepare for 1992, when Europe may adopt a single currency and ameliorate trade barriers, Apple began implementing a consistent pricing structure across Europe two years ago.

Admittedly, lower profit margins have forced many international subsidiaries to cut costs, and political unrest prevents Apple from opening branches in some areas such as South Africa. The Soviet Union's slowness to convert to a market economy also prevents Apple from having any near-term success there. Yet Poland, Hungary, and Czechoslovakia look promising—Apple is setting up resellers in those countries.

Government restrictions sometimes hinder Apple's ability to exploit potentially hot markets such as those in Brazil and India. Still, Apple keeps working to open the markets—the company actively lobbies the Brazilian government to open trade, and it has won India's approval to sell dedicated desktop publishing systems. Apple's recent entry into Mexico shows how important easing of restrictions can be. When the Mexican government instituted a free-trade agreement with the U.S. a year ago Apple entered the market, easily garnering a 4 to 5 percent market share.

Apple may have problems, but right now international growth isn't one of them.

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they are not a long-term solution. Both technology and the buying habits of customers are changing rapidly. "The channels are not static," says Robert L. Puette, president of Apple USA. "Superstores are a 1991–1992 phenomena." Apple's challenge is to anticipate the changes and wisely prepare for them.

Pushing the Product Envelope

At the same time that Apple is attempting to expand its manufacturing capacity and guarantee distribution for its product lineup, the company plans to accelerate new-product development. The schedule calls for new products every eight months.
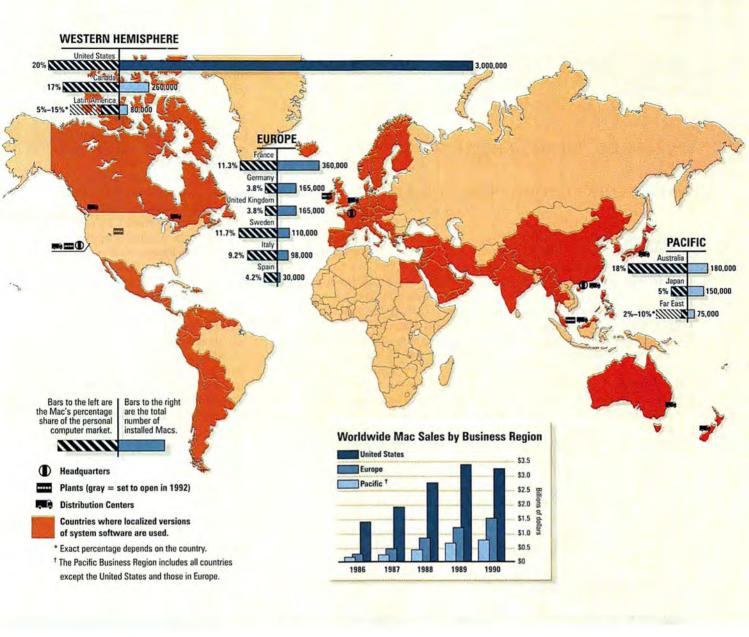
Apple's real challenge will be to produce technologically advanced products—on time—and to fill in the gaps in its current product line. Some product decisions will be easy. A faster version of the Classic is slated for this October and should take only a few months to ship.

Other product decisions will not be so easy. How will Apple configure its RISC machine, currently slated for 1992? Whose chip should the company use? What type of imaging model should replace the aging QuickDraw? Should Apple invest in non-Mac, consumer items? Apple is working on a pen-based system, but in-house fighting over product design already threatens the timeliness of its introduction.

And then there's the laptop question. "The most important product for Apple's financial health is one we don't even have out yet—the laptop," says Graziano. Sales for laptops had already topped $7.5 billion by early 1991. Because they come in one package, require little or no configuration, and need little after-sale support, laptop computers appeal to mass merchandisers.

Strategic Alliances

Apple has a reputation as a company determined to remain self-sufficient, but if product development is to follow Apple's proposed schedule, the company must build alliances. Rumors—which Apple neither confirms

WESTERN HEMISPHERE

United States
20% — 3,000,000

Canada
17% — 260,000

Latin America
5%–15%* — 80,000

EUROPE

France
11.3% — 360,000

Germany
3.8% — 165,000

United Kingdom
3.8% — 165,000

Sweden
11.7% — 110,000

Italy
9.2% — 98,000

Spain
4.2% — 30,000

PACIFIC

Australia
18% — 180,000

Japan
5% — 150,000

Far East
2%–10%* — 75,000

Bars to the left are the Mac's percentage share of the personal computer market. | Bars to the right are the total number of installed Macs.

◑ Headquarters

▦ Plants (gray = set to open in 1992)

🚚 Distribution Centers

▮ Countries where localized versions of system software are used.

* Exact percentage depends on the country.

† The Pacific Business Region includes all countries except the United States and those in Europe.

Worldwide Mac Sales by Business Region

- United States
- Europe
- Pacific †

(Billions of dollars: $0, $0.5, $1.0, $1.5, $2.0, $2.5, $3.0, $3.5)

1986 1987 1988 1989 1990

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nor denies—abound that the company is talking to IBM about using its rival's RISC chip in a workstation. Other, more long-standing, rumors say that Apple is working with Sony to produce a laptop.

Whether Apple can successfully negotiate with either company remains to be seen. IBM and Apple have been heated rivals for too long, and Apple's business with large Japanese conglomerates has been restricted to the purchase of components. Perhaps hedging its bets, Apple is considering RISC chips from Motorola, Hewlett-Packard, and Acorn, as well as custom silicon solutions. As for the alliance with Sony, Sculley claims that Apple is designing several laptops by itself.

On other fronts, Apple has begun aggressively licensing AppleTalk and its Data Access Language to third-party developers, thereby leveraging its research and development efforts. The company has also spearheaded an effort to petition the FCC to reserve a portion of the radio broadcast spectrum for data communication. Apple's system software group pushed to join a consortium composed of the major computer vendors promoting a universal standard for encoding text. All of these efforts could benefit the entire industry.

In spite of such bold moves, Apple still carries vestiges of its traditional snobbery about proprietary technology. A much ballyhooed alliance be-

tween DEC and Apple three and a half years ago has yet to yield any real connectivity solutions. Apple's numerous lawsuits will hinder its efforts to work with other companies.

A botched deal with Hewlett-Packard may have cost the company market share in the printer realm. "We formed a partnership to produce a printer," says John P. Moon, Apple's vice president of imaging products. "That lasted until we sued them. There went two years of work down the drain." Apple finally released the StyleWriter early this year, but Hewlett-Packard had already shipped its version of the contested printer, the hot-selling DeskWriter.

In another aborted exchange of

WE FORMED A PARTNERSHIP WITH HP TO PRODUCE A PRINTER; IT LASTED UNTIL WE SUED THEM. THERE WENT TWO YEARS OF WORK DOWN THE DRAIN.

technology, Apple announced last year that it would work with Microsoft to support TrueImage (a clone of Adobe PostScript, the language Apple uses in its printers). Apple and Adobe's partnership subsequently split, but when the alliance with Microsoft came to nothing, Apple renewed its partnership with Adobe.

A New Apple

All these pressures—the decreased profits, the manufacturing and distribution problems, the lack of key products, the need to nurture strategic alliances—are taking their toll. Apple's reorganization broke the company into smaller groups in an attempt to facilitate accountability for expenditures and deadlines.

Michael H. Spindler, president and chief operating officer, now con-

trols Apple USA, Apple Europe, Apple Pacific, and worldwide manufacturing. In addition, he heads three new groups—Macintosh Hardware, Macintosh Software, and Enterprise Systems (a group devoted to guaranteeing that Macintoshes can connect to other systems). John Sculley has taken on the role of chief technology officer, heading up the Advanced Technology Group as well as two new groups—Object-Based Systems and Consumer Products. "John trusts Michael to run the operations," says Apple's general manager Forsyth. "John can explore other areas and help define Apple's future. That's hard to do when you have operational problems to pull you back in."

The new Apple may be short on such visionaries as Steve Jobs and Jean-Louis Gassée, but its managers

and pragmatists promise to implement standard business controls that will rein in spending and speed up production. For instance, Spindler now holds monthly business-forecasting and manufacturing-planning meetings—meetings that were never held regularly before.

Some people bemoan the structure as a sign of Apple's creeping stodginess. Others believe Apple can stand a bit more control. John Moon has a favorite analogy. "Apple," he says, "is like a football team where the players won't play their positions." Amusing, and typical of the Apple myth, but does Moon like playing a game in which the rules go unheeded? "Well," he says, "it gets in the way sometimes."

More than just get in the way, Apple's nontraditional structure and frequent reorganizations sometimes mean serious financial blunders. Take, for instance, one of Apple's biggest goofs—the Macintosh Portable. At one crucial point during the Portable's design, the marketing department was too busy reorganizing to offer feedback. One of the engineers forgot to add a door to access the battery, no one caught the mistake until late in the process, and the Portable was set back nine months.

THE CUPERTINO CAMPUS

1. Fitness Center
2. Valley Green 4: Human Resources Systems
3. Valley Green 1: Hardware Engineering
4. Bandley 6: Documentation
5. Bandley 5: Quality Assurance; Documentation
6. Stevens Creek 3: Telecom; Contractors
7. De Anza 8: Human Resources
8. Bandley 2: Creative Services
9. Bandley 4: Apple TV
10. Bandley 8: Library; Company Store
11. Mariani 2: Engineering Software Support
12. Mariani 1: Software Engineering
13. De Anza 7: Corporate HQ; Legal
14. De Anza 6: Apple Developer Group
15. Bandley 3: Hardware Engineering
16. Bandley 1: Data Center
17. Lazaneo: Telecom Center
18. De Anza 3: Networking and Communications; A/UX
19. De Anza 1: Apple University
20. De Anza 2: Manufacturing
21. De Anza 4: Finance
22. De Anza 5: Apple Pacific
23. Child Care Center

Shaking Down

For the most part the setup under Spindler makes sense. Apple has reduced redundancy in some operations and has moved projects to the areas where they fit best. "The reorg is good because previously the AppleTalk drivers and server software were all part of the networking group," says Dave Feldman, a software engineer on the System 7 team. "Now the server software is part of the system group where it belongs."

But the Enterprise Systems group, which is important for Apple's success in large businesses, still lacks a leader and a clear plan for products. Apple's communications products have a reputation for being weak, not working properly, and being consistently late to market. Many people fault Gursharan Sidhu, the head of the networking and communications group, which was disbanded and folded into the Enterprise Systems group during the recent reorganization. "The people who work for Sidhu think he's incredibly good, incredibly bright. They think he's right for the job," says Hazel Holby, a former employee who worked at Apple for nine years. "But it's hard to get products out through him. It's the not-invented-here syndrome."

24. City Center 3: Apple Developer Group
25. City Center 4: ATG; Portables
26. City Center 1: Apple USA
27. City Center 2: Apple USA
28. Stevens Creek 4: Layoff Center
29. Torre 3: Distribution
30. Stevens Creek 1: Education

Many of the engineering groups are also in disarray. Working teams have been split up, managers are scrambling to line up the best people for new teams, and some jobs are in jeopardy. With Apple's heavy product-introduction plans for late 1991, engineering can't afford to lose much working time to this sort of turmoil.

Sculley's groups are faring worse. Even the Advanced Technology Group (ATG) is succumbing to cuts, downsizing, and changing goals—normally Apple's research and development groups are spared hardships. The Consumer Group is only vaguely defined—Apple originally thought it would introduce the first of its consumer products in late 1991 or early 1992. But the low-cost Macintoshes proved that Apple is not ready to become a consumer company with profit margins of only 5 to 8 percent and readily available products that are attractive to mass merchandisers. In addition, consumer products must be introduced at a much faster pace than Apple is accustomed to. "Sony introduces five products a day," says Sculley. "If we do five a quarter, we are having an outstanding quarter."

Sculley also controls two spin-off companies, General Magic and Claris Corporation. General Magic is led by two of the most innovative members of the original Macintosh team, Andy Hertzfeld and Bill Atkinson. The duo is rumored to be working on either a pen-based computer or a programmable software interface for consumer products. Apple funded the group, and Sculley sits on its board of directors, but the company is quite separate from the rest of Apple. "We want to isolate entrepreneurs," says Forsyth. "We don't expect revenue from them, but ideas. The other part of the organization has to deliver predictably, boringly good products."

Claris, with its successful application products, is a more curious case. Originally, Apple planned to spin off the company to appease developers who felt threatened by the competition. Apple changed its mind, apparently after only a couple of days of deliberation. Most people speculated that the reintegration of Claris was a knee-jerk reaction to the fear that Microsoft Windows' popularity would lure application developers away from Apple, with Claris leading the way.

The toll that rapid decision is taking is only now becoming apparent. Seven of the nine executives who originally formed Claris have either left or are planning to leave the company. According to one insider, Claris's president and former head of Apple's venture capital group, Dan Eilers, is standing up to Sculley in an effort to run Claris as he sees fit. Along with the infighting, plans are under way to cut paint, forms, and CAD products from Claris's line, and product development has ground to a halt. Claris is at a complete standstill.

Can Apple Adapt?

Apple is no stranger to market fluctuations, rapid growth, and leadership turnover. The layoffs, restructuring, and cost-cutting efforts may well help Apple to cope with its current crises.

This time, however, Apple may be trying to do too many things at once. The company touts its self-sufficient creativity, but it lags behind in major markets such as laptops, workstations, and now pen-based computers. Is the company stretching itself too far? Like IBM, Apple competes in hardware and networking solutions; like Microsoft, Apple competes in system software and applications; and like Sun, Apple competes in development tools and UNIX systems.

To grapple with this multiple personality, Apple is still reorganizing to clarify divisions and make internal communication and planning more effective. Yet much of the reorganization is not clearly thought out, engineering is in disarray, and Apple's ability to resolve its many problems is being hampered. Sculley seems to realize that Apple needs a more practical organization and a focused plan, but just how clear Apple's future is to him no one seems to know.

Clearly, Apple has a tough few years ahead. If the company can throw away old perceptions, catch up on the technology, and fix its organizational problems, it can buy the time it needs to come up with a clear plan for the next decade. If not, Apple may well become a bit player in tomorrow's technology market. ▥

INSIDE

A slice of life at the Cupertino campus

APPLE

by Erfert Fenton
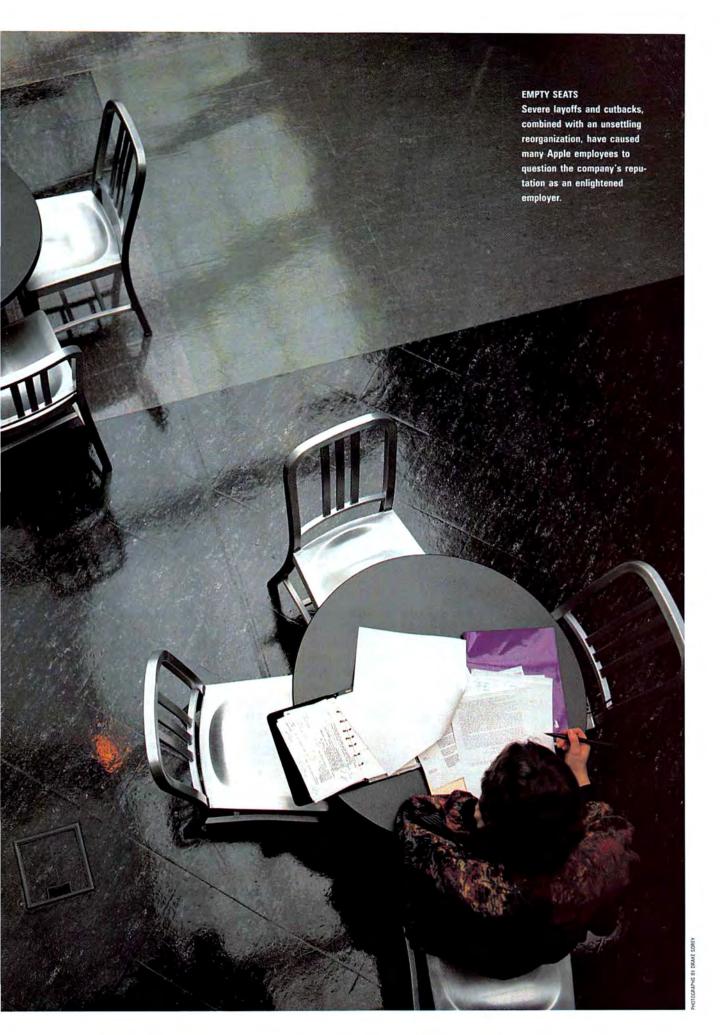
Someone once described Apple as a cross between a public utility and a cult religion. Not a bad analysis. Apple employees often sound like bumper stickers, spouting such aphorisms as "change the world" and "empower the individual." But as Apple evolves into a Fortune 100 company and begins to focus on garnering market share, it is becoming less insulated.

Apple has always watched its bottom line, making sure to stay highly liquid. With the lower profit margins the low-cost Macintoshes recently caused, however, Apple is being forced to watch expenses, as it did during troubled times back in 1985. This time, however, the cutbacks are much more severe, and Apple employees are feeling the loss—layoffs, reorganizations, and the trimming of perquisites have damaged morale.

BUYING INTO THE MYSTIQUE
Mugs, T-shirts, bumper stickers, and mouse pads—all bearing the Apple logo—abound on the Cupertino campus. Employees and visitors wishing to broadcast Apple's corporate identity can purchase items in the company store.

PHOTOGRAPHS BY DRAKE SOREY

Yet, Apple employees are a stubborn lot.
Most refuse to leave Apple in spite of the
hard times, and many still put in long hours.
What inspires Apple employees? Is the com-
pany's fabled culture still alive, or have these
people turned into corporate drones, rather
like the hapless *1984* masses and the hu-
man lemmings in Apple's commercials?

Perk City
Apple salaries are decent, but not spectacu-
lar by industry standards (unless you're a
high-level executive). And the cost of living
in the Bay Area is astronomical. Meanwhile,
long hours and constant reorganizations
threaten morale.

The secret seems to lie in a healthy
amalgam of mystique and generous perks.
Financial pluses such as stock options, profit-
sharing, and discounts on computers
complement niceties such as first-class caf-
eterias and well-equipped fitness and day-
care centers. And the company works hard
at being an equal-opportunity employer.
Around 45 percent of its employees are

women—a much larger ratio than you might
expect at a computer company. Twenty-one
percent belong to minority groups, and
Apple has appointed a manager of multi-
cultural and affirmative-action programs.

Apple is widely regarded as a desirable
place to work; the company receives 5000
to 9000 résumés per month. In dozens of
interviews of Apple employees—and a few
ex-employees—about their attitudes toward
their jobs, responses ranged from "I love my
work; there's nothing I'd rather be doing," to
"Sometimes I almost believe all the Apple
hype—but then I realize it's just a job." An
employee who complained, "What I'm do-
ing is trivial and meaningless. I'm looking for
another job," was, interestingly enough,
looking for another position within Apple.

The Cupertino Campus
Apple Cupertino is more like a city than a
company. The sprawling complex has its
own restaurants, store, library, transporta-
tion system, newspapers, television station,
and community events.

The first thing you notice upon entering the lobby of an Apple building is the striking decor. Apple hired a San Francisco architecture firm to give its buildings their distinctive look, and even if you don't like the postmodern/neoclassical look (lots of pediments and sconces and bright colors), you have to admit that it livens up the place.

Apple's work areas are unlike most Silicon Valley computer companies, with their seas of gray cubicles, dying ferns, and the occasional poster. The eclectic decorations in Developer Technical Services, for example, feature walls of Mountain Dew cans, a Ping-Pong table, a couple of doll heads, a hanging straitjacket, and a rubber chicken. You can't help noticing the numerous depictions of the department's mascot, the Dogcow (the critter that appears in the Page Setup dialog box under Options).

The decor in the Network Engineering group tends toward the flamboyant, with torches, electric guitars, and suspended inflatable sharks and pterodactyls. There's even a touch of old-world charm, such as the cubicle with its armchair, floor lamp, and stuffed owl. Curiosities in other departments range from rosebushes to a pair of airplane seats. A few departments, such as Human Resources and Corporate Public Relations, look relatively normal, but these are the exceptions.

Community and Communication
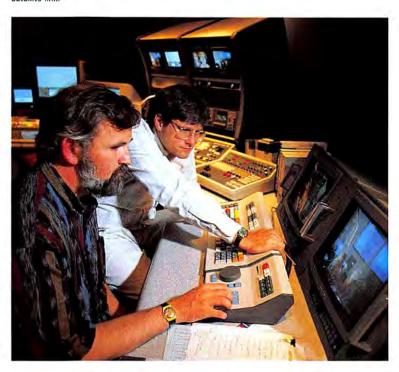
Clearly Apple provides its employees with pleasant surroundings and plenty of benefits, but similar pluses weren't enough to keep the fellow in the TV show "The Prisoner" from wanting to escape. There must be something else.

When I asked employees what they liked most about working at Apple, they generally answered, "The people I work with." As Apple has grown and departments become isolated, maintaining a sense of community becomes more of a challenge, but employees still keep in touch in a variety of ways.

Apple executives speak regularly at Hearsay Cafe luncheons, and there's the weekly in-house newspaper, the *Five-Star News.* It's not unusual to see Apple TV crews filming on location at conferences or other events, and employees can order videotapes of Apple TV productions. Employees can also join one of the many Apple-sponsored clubs and organizations. Besides groups devoted to soccer, tennis, aviation, scuba diving, skiing, horseback riding, bicycling, aikido, French, and toastmasters, there's a professional women's group, a Hispanic organiza-

EDITING REALITY
Apple, like an island amid the Silicon Valley sprawl, has its own TV crew that roams the campus, taping scenes for promotional pieces. Once the shots are taken, Doug Doyle and Dean Whitlow edit video in Apple's full-fledged studio complete with satellite link.

EARTH DAY
Nearly once a week the Cupertino campus hosts a fair such as Earth Day. At these events, Apple distributes information on its conservation efforts—the company plans to eliminate ozone-harming chemicals from its manufacturing process and work toward more environmentally responsible packaging materials, for instance. David Skinner (center), of Apple Recycles, heads an aggressive program for recycling glass, aluminum, and paper.

tion, a Black-networking organization, a gay employees club, and even a group for parents of twins or triplets.

For those wearying of endless voice-mail messages, there's AppleLink, an online service. Using their Macs, employees can check upcoming events or send personal messages to other employees. They can also use AppleLink to participate in a variety of discussions in an online forum called "Can We Talk?" Subjects range from the silly (spotting Apple computers in movies, TV shows, and so on) to the serious (debates on the

APPLE LANDMARKS

1) **Cupertino campus** - main headquarters
2) **Networking and communications**
3) **Bubb Campus** - product development
4) **Maude** - Apple University operations, training
5) **Sunnyvale** - support center
6) **Claris** - software applications
7) **Laurelwood** - distribution

8) **Monroe campus** - peripherals (printers, scanners, hard drives, monitors)
9) **Fremont** - manufacturing plant
10) **Fremont** - Pacific region distribution and logistics
11) **Riverpark** - field sales and western operations
12) **Century Plaza** - field sales
13) **Campbell 1 & 2** - dealer support, technical support, warehouse, repair center
14) **Campbell 3** - Apple Information Systems

Gulf War). Other topics include vegetarian food (discussing restaurants, cookbooks, and recipes, including dissenting opinions from carnivores); Apple's beer busts (debating their worth and whether they lead to drunk driving and/or dissipation); and Apple's maternity-leave policy (gauging its adequacy and how it compares to those of other companies).

In April, Apple employees began using AppleLink to line up other employees for ride-sharing. A new department, Transportation Demand Management, encourages employees to use alternatives to cars for commuting. Apple is implementing a number of transportation options, including shuttles from a nearby train station, on-campus shuttles, vouchers for emergency taxi rides, and discounts on mass-transit passes. In May, Apple made 130 bicycles available for employees to travel from one part of the Cupertino campus to another. A pilot telecommuting program is also in the works. Eligible employees will be encouraged to work at home one day a week, using a home-based Mac, phone, and modem.
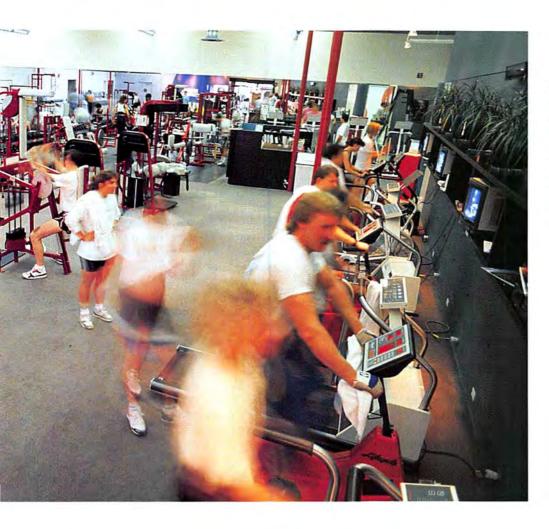
Wear and Tear

Perks and niceties aside, many Apple employees are willing to put in 50- or 60-hour weeks because they still believe that the Macintosh is the One True Computer. They honestly want to see it succeed.

"The quintessential moment at Apple is the party after the product ships," says Chris Espinosa, Apple's current marketing manager for Macintosh System Software and one of the original Apple II designers. "The fun thing about the party is that there isn't much reminiscing or nostalgia. The excitement is around what's coming up next. People ask each other 'What are you working on now?' or 'Remember that great idea we couldn't do in this product? Well, we're going to do it on this other product.' "

Apple tends to hire bright, motivated people who don't mind working hard for something they believe in. Many can't take the pace, however, and sooner or later they move on. The average tenure at Apple is about three years. As one employee put it, "Don't write about how easy we have it; one year at Apple is like seven years at any other company." Stress takes its toll—a recent issue of the *Five-Star News* had an ad for a stress-management class, and the massage facility next-door to Apple is booked solid these days.

Apple employees aren't shy about criticizing Apple. After watching a TV clip of the Mac Portable (notorious for its heftiness) on a space shuttle mission, one employee commented that a weightless environment was probably the best place for a Portable. Other complaints are less good-natured. Some employees lament the amount of time spent in meetings. Some feel the company could do even better in hiring more minorities and promoting women (only four women are department vice presidents).

Others have become disenchanted with Apple's often murky middle-management structure. As one former employee com-

mented, "Sometimes decisions simply don't get made; relatively simple matters get deferred because nobody wants to take the heat for making a stupid decision." Interestingly, most people I talked to take Apple's frequent reorganizations in stride; they feel that, in general, the reorgs are disruptive but necessary as the company evolves.

Although most workers at Apple seem to like their jobs and enjoy the benefits, many can't help but roll their eyes at the sky-high salaries of the company's top execs, especially in light of layoffs and cutbacks (see "That Vision Thing"). When I asked one employee what he'd do if he were John Sculley for a day, he replied, without missing a beat, "I'd cut my own salary." In June Sculley cut his salary by 15 percent, but most felt it was only a token gesture.

AppleLink provides a major forum for airing such complaints. Employees can comment—anonymously if they wish—on any policy that concerns them. Online discussions are often as heated as any face-to-face argument. When Apple changed its

profit-sharing formula last year to one of "growth-sharing," diminishing the amount each employee received, a very popular profit-sharing discussion began.

Some employees do more than complain on AppleLink, however. In early 1990 Apple went through a rough period of layoffs and cutbacks that were less substantial than the ones today. One group formed Employees for One Apple (as opposed to two Apples—one interested in the journey, the other in the reward), a coalition whose members met with top executives to discuss the current problems. Members were concerned not with financial matters, but with issues such as employee morale and maintaining an environment that values and promotes the innovations and contributions of the individual.

The organization has its work cut out for it. Morale took a nosedive in May when profits from the new machines fell below Apple's expectations and the company announced that up to 10 percent of the work force would be laid off. Other money-sav-

THE PARTY'S OVER
Until recent cutbacks forced an end to a long tradition, Apple employees could look forward to the company's Friday evening beer bust. The days of free food, beer, wine, and sodas are gone, however, and employees will need to find new ways to wind down at week's end.

ing measures were under consideration in June, including the suspension of such perks as the day-care and fitness centers and the beer busts.

"Apple management panics every time quarterly profits don't meet their expectations," said an exasperated employee who was expecting to be laid off or reassigned to another department. "Apple should pay attention to its long-term goals, not to what Wall Street thinks this month."

Although there's some communication between the rank-and-file and upper management, many employees feel that Apple is losing the vision that drove the company in the old days. Some resent the influx of "MBA types" into middle management. "If you bring corporate people into Apple," commented an employee, "they will transform it into a more corporate environment. I think some of the new managers should have learned the Apple environment instead of trying to remake it."

Recent Events

Apple certainly has its ups and downs, financially and otherwise. In the few months I was working on this article, Apple experienced yet another reorganization; stock rode high in March and took a dive in May, going from a high of $73.25 to $44.25; substantial layoffs occurred in June.

On the upside, in the same few months Apple implemented its new transportation alternatives program, experienced generally favorable reviews of its new low-cost Macs, doled out healthy profit-sharing checks, and finally released System 7. And some employees feel that Apple's management wants to keep the spirit alive. "Sculley is willing to speak to people," said an employee of three years. "But when he shows up at beer bashes most people just stand there and stare at him. Part of the responsibility lies with us—the employees—to tell him what we're thinking about."

Apple is certainly not the same company it was when the Macintosh was introduced, but a sense of history survives. "We're a bunch of fanatics working for the same reason—the underlying thread is a belief in what the company's doing," says Mark Johnson, the manager of Developer Technical Services. Let's hope Apple continues to do the right thing. **M**

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Macworld *contributing editor*
Erfert Fenton *is a free-lance technical writer living in San Jose, California.*

INDIVIDUAL STYLE
Networking engineer Joe Balboa is a member of the Chinese-lantern-and-hanging-shark school of interior design. Some employees complain that Apple is aping the rest of corporate America, but idiosyncrasy still reigns in private areas.

HELP CENTRAL
Jeff Garaventa, a technical support engineer in one of Apple's newest departments, the Assistance Center, helps dealers with Mac-related questions. The center recently added a host of phone-support personnel to handle System 7 questions.

The top-rated drives include, top row from left, the iDS Wip 50, FWB PocketHammer100, and Apple 40SC; bottom from left, the GCC Technologies UltraDrive 50S and the EMAC Metro 80.

BUDGET STORAGE

BY JIM HEID

In a world of complex color graphics, digital audio, and other space-craving applications, a 40MB hard drive may seem like a cubbyhole. But consider this: A 40MB drive selling for as little as $249 holds the equivalent of thirty-three 1.4MB floppy disks (the kind used by newer Macs), or about 26,000 double-spaced pages of text. The 80MB to 120MB drives reviewed here don't cost much

more, yet they can handle all but the most grandiose multimedia or pre-press jobs.

If the number of drives on the market is any indication, 40MB to 120MB is ample storage for most people. We tested 73 drives—a figure that would have gone far higher if we hadn't limited each vendor to 5 models to save Macworld Lab from a testing meltdown.

These small drives are ideal for anyone who has a Macintosh Classic, Plus, or SE equipped with only floppy drives, which lack the speed and space today's Mac software demands. Small drives also make fine couriers for transferring files between Macs, although removable cartridge drives are a more convenient, if costlier, option (see "Expansion Made Easy," *Macworld,* May 1991). Low-end hard drives are also an inexpensive way to supplement or back up the built-in hard drives in many Macs. And if you have a laser printer equipped with a hard-drive connector, one of these drives can store hundreds of type fonts that would otherwise have to be transferred from the Mac.

Fierce competition has pushed prices lower than ever. The cheapest
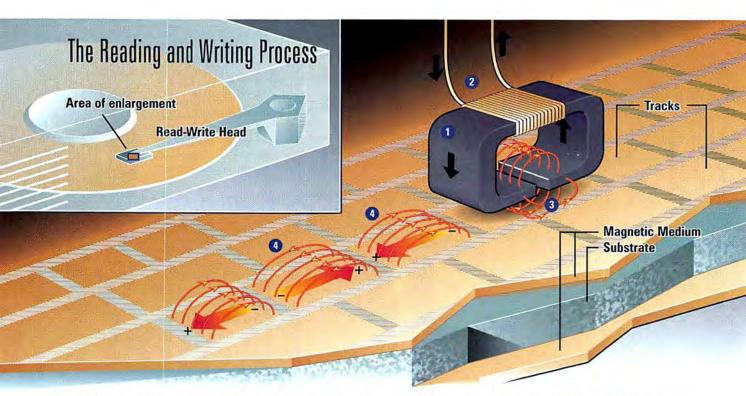
The drive on the left shows a well-shielded power supply, while the one on the right uses no shielding. Shielding is important because all power supplies generate electric and magnetic noise that can get into SCSI cabling and cause data-transmission errors.

drive we tested retails for $249, which is $150 less than Apple's retail price for a second *floppy* drive. But you usually get what you pay for. Some of the bargain-basement drives we examined had poorly designed cases, cheap components, abysmal documentation, or mediocre software. And when a hard drive goes south, programs and documents go with it.

Does that mean you can't buy a good drive without paying top dollar? Not at all. Many top-rated drives are reasonably priced. But it does mean you should also consider quality, bundled software, performance, documentation, and support.

Inside the Box

Knowing how to shop for an external hard drive begins with understanding what's inside. At the machine's heart is the drive mechanism—a combination of magnetic media platters that record data, and heads that read from and write to the platters (see "The Reading and Writing Process"). Nearly

The Reading and Writing Process

Area of enlargement

Read-Write Head

Tracks

Magnetic Medium

Substrate

Hard drives operate by creating and interpreting magnetized microscopic spots on a platter. This platter is composed of a nonmagnetizable substrate with a magnetic medium layer on each side. The head is a microscopic component embedded in the tip of the read-write arm (see inset). The head is a magnetizable core with a gap on one side and a wire coil wrapped around the other (1). The head skims along on a thin layer of air as the platter rotates at thousands of revolutions per minute. The magnetized spots are organized in concentric tracks on the platter. To write, the drive sends an electric current through the head's wire coil (2), magnetizing the core and creating a magnetic flux at its gap (3). This flux magnetizes a spot on the platter to one of two polarities (4), depending on the direction of the current flowing through the head. The head leaves narrow *transition* regions between magnetized spots, so that each spot can be differentiated. To read, the head senses the polarity of each spot and relays the information to the drive circuitry, where the driver software decodes the magnetic signals and reconstructs the data.

MW LAB Drive Times—100MB+

Percent slower than fastest

Color	Range
■	Up to 10%
■	11%–20%
■	21%–29%
■	30% or more

To determine ranking, we indexed overall performance numbers against the fastest drive, the FWB PocketHammer100. For application tests, we measured each drive's average speed in duplicating 10MB folders and 3.2MB files; searching for a specific record in a 4000-record database; opening and saving files from such applications as PageMaker, Excel, Word, and Photoshop.

In the noise tests, the lower the decibel level, the quieter the drive. Because decibels are a logarithmic unit of measurement, if a sound increases by 10dB, it sounds approximately twice as loud as it did before. The human ear does not respond to sound changes of less than 3dB. To put these numbers in perspective, a quiet bedroom has an average sound level of 25dB, an average office, 65dB. We found that drives measuring about 48dB were noisy enough to be irritating in our office environment. Among all the drives tested for this article, only the MacProducts MagicDrives were above that level. See "Hard Drive Details" for mechanism key.

	Overall Fastest	Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MB/second)	SCSI Evaluator Write (in MB/second)	Noise (in decibels)
1.00	FWB PocketHammer100 (QL)	59.9	70.5	40.4	48.9	86.3	1.05	1.09	39.7
0.99	Third Wave Computing 105x (QL)	69.9	69.4	42.2	48.6	83.1	1.10	1.11	36.3
0.98	La Cie Tsunami 100Q LPS (QL)	69.1	69.3	43.7	48.3	82.3	1.07	1.10	40.0
0.98	Total Peripherals QL105X (QL)	69.3	69.6	44.5	48.7	82.6	1.10	1.10	45.7
0.98	MacAvenue Protegé 105 LPS (QL)	69.7	68.5	42.4	47.7	79.3	1.07	0.99	42.7
0.98	PCPC MacBottom 105 (QL)	69.7	69.8	43.4	47.5	84.4	1.05	1.06	42.7
0.97	GCC Technologies UltraDrive 100S (QL)	59.2	71.2	41.0	49.5	85.1	1.01	1.01	40.2
0.97	Ehman 105 (QL)	59.6	68.9	45.5	49.8	85.4	1.09	0.99	42.0
0.97	La Cie Cirrus 100Q (QL)	69.6	71.5	43.3	48.5	82.7	1.07	1.06	44.3
0.96	Deltaic Systems Server 100Q (QL)	69.5	68.9	42.9	48.4	85.3	1.07	1.00	40.2
0.96	Liberty Systems Liberty 105QL (QL)	71.1	69.1	44.4	48.5	82.2	1.07	0.99	37.6
0.96	APS 120 (Q)	69.0	67.2	43.6	49.9	83.4	1.08	0.96	38.1
0.96	Cutting Edge 105 (QL)	60.7	70.7	45.5	49.5	88.8	1.04	0.95	42.5
0.95	Microtech International Athena 100 (QL)	70.1	70.2	43.6	48.5	82.1	1.01	0.95	40.9
0.94	Microtech International Nova 120 (Q)	69.1	68.7	44.9	50.3	85.1	1.04	0.94	39.4
0.94	Relax Technology Vista 120 (Q)	71.5	67.9	46.4	52.4	87.3	1.07	1.02	44.5
0.91	Jasmine DirectDrive 100 (QL)	75.5	71.3	45.7	49.1	84.4	0.92	0.93	42.8
0.84	Hard Drives International PowerDrive 105Q (Q)	84.8	78.3	45.6	50.6	86.5	0.80	0.80	45.3
0.84	MacTel Index 100 (Q)	84.7	79.1	45.3	50.4	86.4	0.80	0.80	38.5
0.84	MacProducts USA MagicDrive 105 (Q)	84.3	79.9	45.3	50.7	86.1	0.78	0.79	49.5
0.83	Advanced Gravis HardPac 105 (Q)	85.2	78.7	46.2	50.2	87.0	0.78	0.79	37.9
0.83	Club Mac Q100 (Q)	84.5	77.7	45.2	50.4	88.0	0.77	0.79	41.4
0.83	DJK Development MS-105 (Q)	84.6	78.4	46.5	50.2	88.5	0.79	0.79	34.5
0.83	Rodime Systems Cobra 100e (R)	82.3	74.0	50.3	53.6	90.1	0.79	0.79	44.3
0.82	Mirror Technologies M105 LPS (QL)	87.9	77.9	45.5	50.2	86.1	0.73	0.73	40.1
0.82	Ruby Systems StarDrive 100DX (Q)	86.9	77.7	44.8	50.4	89.0	0.73	0.73	39.5
0.82	Relax Technology Vista 105 (Q)	86.4	81.6	47.3	52.2	87.5	0.75	0.78	43.4
0.81	APS 105 (QL)	87.1	80.3	45.6	50.5	88.8	0.74	0.74	44.0
0.81	EMAC Metro 105 (Q)	87.2	80.9	45.4	50.2	89.1	0.73	0.73	42.2
0.81	La Cie Cirrus 120Q (Q)	90.7	68.8	44.4	50.0	87.6	0.62	0.63	45.3
0.81	Deltaic Systems SuperBaby 116 (C)	88.8	74.0	58.8	49.1	91.4	0.78	0.75	40.2
0.80	PLI PL Quantum 105 (Q)	92.7	82.4	49.2	49.6	87.3	0.73	0.73	44.4
0.80	La Cie Tsunami 120Q (Q)	93.6	66.9	44.9	50.5	87.2	0.60	0.60	40.2
0.79	Procom Technology MD 100 (Q)	90.4	79.7	53.3	50.8	93.8	0.73	0.74	39.5
0.74	CD Technology HD Porta-Drive 100 (C)	97.0	80.5	53.8	59.4	99.7	0.68	0.67	38.1
0.68	iDS Systems Wip 120 (C)	97.7	100.6	68.4	85.6	114.7	0.81	0.81	32.0

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all hard drive vendors buy mechanisms from another manufacturer, usually Quantum Corporation in this capacity range, but sometimes Maxtor, Conner Peripherals, Rodime Systems, Seagate, or Toshiba.

Many economy-drive vendors claim their drives are identical to costlier ones because the lower-cost drives use the same mechanism. Don't believe it. The better vendors test new mechanisms more stringently than other vendors, or have performance specifications that exceed the original manufacturer's. Drives that don't measure up to one vendor's standards are generally returned to the manufacturer, which may sell them to less-demanding vendors, sometimes through third-party distributors. One company representative told me his dealers have seen mechanisms bearing his company's reject sticker in other firms' drives.

The Drive for Power

The power supply, which converts power from a wall outlet into the voltages the drive requires, also affects a drive's reliability and longevity. A high-quality power supply provides a clean, steady stream of juice even if the power from the wall outlet drops below the normal 120 volts—as may happen when a hard drive shares a circuit with a large appliance. The supply must also withstand the electrical surge needed to get the platters spinning each time you switch on the drive. That surge stresses a cheap supply's components; a robust supply takes it in stride.

All power supplies generate electrical noise that can interfere with nearby radios, televisions, and even the drive mechanism itself. Noise can also hurt data transmission between other add-ons, such as scanners, which use the small computer systems interface (SCSI), the Mac family's standard expansion system.

Indeed, the more SCSI devices connected to one Mac, the more susceptible they are to noise. Costlier drives, including those from Apple, Rodime, and EMAC, trap noise by surrounding the power supply with metal shielding, and in some cases by placing braceletlike *ferrite beads* around the wires that weave between drive,

Company	Method of Sale	Warranty (in years)	Extended Warranty Available	Toll-free Technical Support	Repair Turnaround (in days)	Data Recovery on Request
Advanced Gravis	dealer/direct	1	○	○	7–10	charge
Alliance Peripheral Systems	direct	2	○	●	2	charge
Apple Computer	dealer	1	●	○	NA [1]	○
CD Technology	dealer/direct	1	●	○	7	○
Club Mac	dealer/direct	2	●	○	2–3	free
Cutting Edge	dealer	2	●	○	5	○
Deltaic Systems	dealer/direct	1 (2 for servers)	●	●	3	charge
DJK Development	dealer/direct	2	○	○	7–10	free
Ehman	direct	2	●	○	5	○
EMAC	dealer	2	○	○	3	○
FWB	dealer	1	●	○	2	free
GCC Technologies	dealer/direct	2	○	●	2–3	charge
Hard Drives International	dealer/direct	2 (1 on non-Quantum)	●	●	2	○
iDS Systems	dealer	2	●	●	5	○
Jasmine Technologies	direct	2	●	○	5	○
La Cie	direct	2 [2]	○	●	2	charge
Liberty Systems	direct	1 [3]	○	○	1	charge
MacAvenue	direct	2 (Quantum); 1 (Seagate)	○	●	3	○
MacLand	direct	2	○	●	2	free
MacProducts USA	dealer/direct	2	●	○	1–2	free (within warranty)
MacTel Technology Corporation	direct	2	○	○	2–3	free
Microtech International	dealer	5 (Athena, Nova); 2 (Europa)	○	●	2	free
Mirror Technologies	direct	2	●	○	2	charge
PCPC	dealer/direct	2	●	○	3	charge
PLI	dealer	1	●	●	2	free
Procom Technology	dealer	2	●	○	2	○
Relax Technology	dealer/direct	2 (1 on Seagate)	○	●	2	charge
Rodime Systems	dealer	2	○	○	1	○
Ruby Systems	dealer/direct	1	○	●	2	free
Storage Dimensions	dealer	2	○	○	1–2	○
Third Wave Computing	dealer/direct	2	●	●	1–2	charge [4]
Total Peripherals	dealer	2 (Quantum); 1 (Maxtor)	○	○	2	free

● = yes; ○ = no. [1] Turnaround time depends on dealer that services drive. [2] La Cie drives repaired or replaced during warranty are given another two-year warranty. [3] Two years if carrying case is purchased at time of drive purchase. [4] No charge if recovery takes less than one-half hour.

supply, and SCSI connectors. Low-cost drives, including offerings from Club Mac and DJK Development, generally contain little or no shielding.

Several of the portable drives we tested take the easiest approach to noise prevention; they have no power supply. These drives tap into the Mac's power supply by attaching a second cable to the Mac's external floppy-drive connector. This approach eliminates a noisy fan (needed to cool the power supply) and makes for a petite package. But not all Macs can reliably power a hard drive through the floppy port (see "Problems with Floppy-Port Power").

Another power point worth noting: nearly all drives have universal power supplies—operable in any country, whether it supplies 120-volt or 220-volt current (see "Hard Drive Details"). Finally, Club Mac, Cutting Edge, and Ehman are among the firms that include convenient rear-panel power outlets into which you can plug additional hardware.

SCSI Details

Like all external hard drives, SCSI units communicate with the Mac via its rear-panel SCSI connector. To operate a new drive with other SCSI devices (including an internal hard drive), you need to visit the exasperating realm of SCSI addressing and termination. Since all SCSI devices connect to a single port, each device needs a unique *address*, from 1 to 6, to communicate with the Mac. The Mac's ID is 7, and 0 is reserved for an internal hard drive.

When the Mac sends data to a SCSI device, it transmits the device's ID along with the data via the SCSI *bus*—the wiring system that connects

the Mac's internal and external peripherals. All devices on the bus constantly listen for data, responding only when their ID is called. This feature lets you connect, or *daisy-chain,* multiple devices to a Mac's single SCSI connector.

For the SCSI bus to work properly, the Mac must know where the SCSI chain begins and ends. *Terminators* create these boundaries by absorbing SCSI signals, preventing them from echoing within the cabling and causing data-transmission errors.

Procom Technology's MD45 and the drives from PLI and La Cie can be terminated by flicking rear-panel switches—a handy feature. But most of the less-expensive drives we tested use internal terminators mounted on a circuit board on the underside of the drive mechanism. These centipede look-alikes perform the same job as an external terminator but cost less (which explains why most low-priced drives use them). Internal terminators can be difficult to reach and remove, and even harder to reinstall because their small pins tend to bend during removal.

In drives from Ehman, Club Mac, Cutting Edge, Hard Drives International (HDI), MacTel Technology Corporation, and Third Wave Computing, you remove a small cover on the bottom of the drive to access the terminators. In some drives the cover is transparent, enabling you to see whether the terminators are installed.

Termination Torture

Some vendors compound the frustration of internal terminators by neglecting to provide convenient access to them. You must remove the upper half of the drive's case, and then remove the drive mechanism itself to get to the terminators—work involving delicate components that are sensitive to static electricity. What's more, you can damage the drive mechanism during reinstallation by overtightening its mounting screws. No drive should put you through this ordeal, given that a trap door costs next to nothing. The worst offenders include DJK Development, Advanced Gravis, Microtech International, Ruby Systems, Total Peripherals, Rodime Systems, and Del-

MW LAB Drive Times—70MB-84MB

Percent slower than fastest
- Up to 10%
- 11%–20%
- 21%–29%
- 30% or more

To determine the rankings, we indexed overall performance numbers against the fastest drive, the Apple Hard Disk 80SC. See "Hard Drive Details" for mechanism key.

Overall Fastest		Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MB/second)	SCSI Evaluator Write (in MB/second)	Noise (in decibels)
1.00	Apple Hard Disk 80SC (Q)	68.3	79.8	46.0	49.9	87.9	0.73	0.73	46.5
0.99	PCPC MacBottom 84 (Q)	84.7	78.1	46.0	50.1	89.6	0.79	0.80	41.2
0.99	Hard Drives International PowerDrive 80 (Q)	83.8	79.2	45.2	50.5	88.7	0.79	0.79	44.0
0.98	Cutting Edge 80 (M)	69.7	71.8	51.0	54.1	95.7	0.77	0.72	43.2
0.98	Ehman 80 (M)	69.5	72.1	51.4	54.1	95.1	0.77	0.72	43.0
0.97	Rodime Systems Cobra 70e (R)	83.5	73.8	49.9	53.7	92.3	0.78	0.78	40.5
0.96	APS 80 (M)	84.3	72.2	50.4	53.2	83.1	0.77	0.72	39.8
0.85	Hard Drives International PowerDrive 80S (S)	96.2	96.3	60.7	73.1	116.3	0.79	0.79	45.7
0.76	GCC Technologies UltraDrive 80 (S)	89.7	97.9	66.1	74.7	118.5	0.62	0.56	44.5
0.75	Procom Technology MD80 (S)	110.4	97.1	61.5	73.7	113.9	0.60	0.59	39.5
0.75	MacAvenue Protegé 80 (S)	111.3	96.7	63.8	74.0	114.3	0.59	0.59	37.2

taic Systems' SuperBaby 100 (how about that name?).

Rodime is a misdemeanor offender: you don't have to remove the mechanisms to access the terminators, but you still have to take apart the case. If you anticipate changing termination often—to move a drive between Macs with various termination schemes and SCSI devices, for example—think twice before buying any internally terminated drive.

The Ultimate Terminator

Jasmine Technologies and iDS Systems offer the best escape from termination torture. Their drives contain additional circuitry that automatically activates or deactivates termination based on the other SCSI devices you have. It's called *active termination,* but it might be better to think of it as automatic termination. This first-rate solution should surface in future Apple products as well.

As for connecting to the Mac, the majority of the 73 tested drives have the 50-pin connectors that are standard on nearly all SCSI devices. La Cie and Advanced Gravis use 25-pin connectors identical to the Mac's SCSI connector. These smaller connectors are ideal for portable drives, but they tend to pick up electrical noise. A 50-pin connector provides better electrical grounding, reducing the chance that noise will cause data-transmission problems.

PCPC's MacBottom drives offer a unique feature—a permanently connected 25-pin SCSI cable. You'll love this convenience when connecting the

drive directly to the Mac. But to connect it in the middle of a SCSI chain, plan to buy a 25-to-50-pin SCSI adapter cable.

All but two of the companies whose drives we tested provide rear-panel switches for changing SCSI addresses. Only PCPC and FWB hide address switches on the bottoms of their drives. That's an inconvenient spot, especially for the PCPC Mac-Bottoms, which are designed to sit underneath the Mac. And although La Cie provides rear-panel address switches, it loses points for using DIP switches—an awkward alternative to the thumb or rotary switches other drives use.

Fit and Finish

Most external-drive vendors use the *zero footprint* design: the case has the same width and depth as a Classic, Plus, or SE, allowing the drive to sit beneath the Mac without taking up additional desk space. If you have a different-size Mac, you may want to

use the drive in a vertical position. Drive mechanisms generally operate well whether placed horizontally or vertically, although only EMAC and Procom Technology provide removable rubber feet that stabilize the drive and ensure that air can enter through side-panel vents.

If you need easy portability, check out offerings from Liberty Systems, CD Technology, and FWB—the only compact drives we reviewed that sport their own power supplies. The Cirrus and Tsunami drives from La Cie are also reasonably easy to tote. And although MacAvenue's shoebox-size Protegé drives are too stocky to fit in an average briefcase, the company sells a carrying case separately.

Portable drives requiring floppy-port power (or separate power sources—see "Problems with Floppy-Port Power") include Jasmine's Direct-Drive Portable line, Advanced Gravis's HardPac series, iDS's Wip 120, Microtech's Athena line, or Deltaic's SuperBaby 100, which looks more like a modem than a hard drive.

Most drives include another feature—a front-panel activity light. This is especially valuable if you use System 7's *virtual memory.* If the light blinks more than half the time while you are running a few programs simultaneously, the Mac is spending too much time *swapping* software between drive and memory, and could probably use a memory upgrade.

Other good drives include, from top to bottom, the MacAvenue Protegé 40, Mirror Technologies M40, and Jasmine DirectDrive 100.

HARD DRIVE DETAILS

Company	Product	CAPACITY / MECHANISM / PRICE				Dimensions (h × w × d, in inches)
		40-45MB [1]	52MB (QL) [2]	60-90MB [1]	100MB+ [1]	
Advanced Gravis	HardPac	—	$495	—	100 / Q / $695	2 × 4.5 × 7
APS	hard drive	40 / M / $329	$339	80 / M / $389	105 / Q / $469; / 105 / QL / $499; 120 / Q / $669	3 × 10 × 10
Apple Computer	Apple Hard Disk SC	40 / Q / $1299 [4]	—	80 / Q / $1799 [4]	–	3.1 × 9.7 × 10.5
CD Technology	HD Porta-Drive	—	—	—	100 / C / $999	2.2 × 6.7 × 8.4
Club Mac	Q series	—	$299	80 / QL / $429	105 / QL / $459; 120 / Q / $639	2.5 × 10 × 10
Cutting Edge	Cutting Edge	40 / M / $559	$629	80 / S / $609; 80 / M / $649	105 / QL / $969	2.5 × 9.75 × 10
Deltaic Systems	Server	—	$499	—	105 / QL / $699	2.3 × 9.7 × 9.7
	SuperBaby	40 / C / $399	—	—	116 / C / $899	1.25 × 5.75 × 8
DJK Development	MS		$429	—	105 / Q / $629; 120 / Q / $729	3.5 × 10 × 11
Ehman	Ehman series	40 / M / $329; 45 / S / $309	$359	80 / S / $379; 80 / M / $399	105 / QL / $539	2.5 × 9.75 × 10
EMAC	Metro	—	—	—	105 / Q / $1129	2.8 × 9.7 × 10.7
FWB	PocketHammer	—	$849	—	100 / Q / $1299	6.5 × 3 × 9
GCC Technologies	UltraDrive	45 / S / $549	—	80 / S / $699	–	2.75 × 9.5 × 10.75
	UltraDrive S	—	$639	—	105 / QL / $829	2.75 × 9.5 × 10.75
Hard Drives International	PowerDrive	40 / Q / $299	—	80 / Q / $439	105 / Q / $399	2.5 × 9.75 × 9.75
iDS Systems	Wip	40 / C / $399	$499	—	100 / Q / $699; 105 / QL / $699 120 / C / $699	1 × 5 × 8
	Pro	40 / F, C [3] / $399	—	80 / C / $599	105 / QL / $599; 120 / F, C / $799 C [3] / $799	2 × 5 × 8
Jasmine Technologies	DirectDrive	40 / F / $369	—	80 / F / $499	120 / F / $599	2 × 9.5 × 10
	DirectDrive Portable	40 / F / $299	$399	80 / F / $399	120 / F / $499; 105 / QL / $539	2 × 5 × 8 2 × 5 × 8
La Cie	Cirrus	—	$499	—	105 / QL / $849; 120 / Q / $999	6.5 × 3 × 9.25
	Tsunami	—	$649	—	105 / QL / $849; 120 / Q / $1099	6 × 2.25 × 8.75
	ZFP	—	$399	—	105 / QL / $799; 120 / Q / $949	2.4 × 9.75 × 9.75
Liberty Systems	Liberty	40 / Q / $649	$749	—	105 / Q / $999	2 × 5 × 7
	Liberty	—	$799 [5]	—	105 / QL / $1049	2 × 3.5 × 7
MacAvenue	Protegé	40 / S / $395	$479	80 / S / $525	105 / Q / $669	9.5 × 5 × 4.5
MacLand	MacLand	—	$419	—	105 / Q / $479; 120 / Q / $779	2.5 × 9.5 × 10
MacProducts USA	MagicDrive	40 / Q / $299; 40 / C / $299	$369	80 / Q / $495	105 / Q / $495; 105 / QL / $542	2.5 × 9.5 × 10
MacTel Technology Corporation	Index	40 / Q / $349	$369	—	105 / Q / $439; 105 / QL / $589	2.25 × 9.5 × 9.75
Microtech International	Europa	40 / S / $569 [4]	—	—	100 / S / $999	2.5 × 9.5 × 10
	Athena	—	$899	—	100 / Q / $1549	1.75 × 4.5 × 7.5
	Nova	—	$649	—	100 / Q / $1099; 120 / Q / $1249	2.5 × 9.7 × 10.5
Mirror Technologies	M series	40 / SO / $297; 45 / S / $327	$397	80 / S / $447; 80 / M / $397	105 / Q / $497; 105 / QL / $497	2.5 × 9.7 × 10.8
PCPC	MacBottom	40 / Q / $399	$449	84 / Q / $569	105 / QL / $599	9.5 × 9.5 × 2
PLI	PL Quantum	—	$699	—	105 / Q / $899	2.4 × 9.8 × 9.8
Procom Technology	MD series	45 / S / $639	$829	80 / S / $1059	100 / Q / $1199	2.25 × 9.7 × 10.25
Relax Technology	Vista	45 / S / $249	$339	90 / M / $399	105 / Q / $429; 120 / Q / $659	2.5 × 10.1 × 11
	Sierra	46 / S / $249	—	90 / M / $399	—	5.5 × 2.2 × 7
Rodime Systems	Cobra	45 / [4] / $999	—	70 / [4] / $1299	100 / [4] / $1499	2.4 × 9.7 × 10.4
Ruby Systems	StarDrive	—	—	—	105 / Q / $950	2.25 × 10 × 10.5
Storage Dimensions	MacinStor	—	—	60 / M / $859	120 / M / $1159	3 × 9.7 × 10
Third Wave Computing	Third Wave x	—	$370	—	105 / Q / $530; 120 / Q / $730	2.5 × 9.75 × 9.75
Total Peripherals	Hard Disk	40 / M / $469	$519	—	105 / QL / $729	2.5 × 9.75 × 9.75

● = yes; ○ = no. [1] C = Conner; E = Epson; F = Fujitsu; M = Maxtor; Q = Quantum; QL = Quantum LPS; S = Seagate; SO = Sony; T = Toshiba. [2] All drives contain Quantum mechanisms, except as noted. [3] AP = Aldus Persuasion (Aldus Corporation); AS = AutoSave II (Magic Software); C = cache utility; E = Eureka; FC = Floppy Copy (PCPC); HDD = Hard Disk Deadbolt (FWB); MT = MacTools Deluxe (Central Point Software); NU = The Norton Utilities (Peter Norton Computing); NW = Now Utilities (Now Software); OL = On Location (On Technology); OP = disk optimizer; QE = Quick Envelope (GCC); RD = Redux (Microseeds Publishing); ST = SerialTalk serial-device sharing (La Cie); SU = Sum II (Symantec); SW = shareware; T=tutorial software (Jasmine/iDS); TR = Total Recall (Centa Systems). [4] Company ships this drive in a variety of mechanisms. [5] External available for $15. [6] Cutting Edge says its drives will be externally terminated by the time you read this. [7] External termination available at no extra cost.

The Software Side

SCSI drivers are the software that hard drives use to communicate with the Macintosh. This software accounts for much of the often-significant performance variation among drives containing identical mechanisms (see speed tables).

In addition to SCSI drivers, all drives include software for testing and formatting, a process that creates the magnetic tracks and sectors that hold data, and reserves the disk areas the Mac uses to start up and locate files. Many drives also include utility software that enables you to back up and

partition the drive—electronically divide it into several *logical drives,* each of which acts as a separate drive, resulting in more-convenient file management and more-manageable backup sessions.

GCC Technologies, Storage Dimensions, La Cie, Rodime Systems,

Termination/ Connectors	Universal Power Supply	Partitioning/ Password/ ProDOS Support	Backup Utility/ Spoolers/ Other Software[3]
internal / two 25-pin	NA	●/●/○	○/○/○
external / two 50-pin	●	●/●/○	○/○/ SW
external / two 50-pin	●	●/○/○	●/○/○
external / two 50-pin	●	●/●/○	○/○/ SW, AP
internal [1] / two 50-pin	●	●/○/○	○/○/○
internal [1] / two 50-pin	●	●/○/○	○/○/○
external / two 50-pin	●	○/○/○	○/○/○
internal [1] / one 50-pin	optional ($49)	○/○/○	○/○/○
internal [1] / two 50-pin	●	●/●/○	○/○/○
external / two 50-pin	●	●/○/○	○/○/○
external / two 50-pin	●	●/●/○	●/○/ NU
external / two 50-pin	●	●/●/○	●/○/ HDD
external / two 50-pin	●	●/●/●	●/●/ QE, SW, SU
external / two 50-pin	●	●/●/●	●/●/ QE, SW, SU
internal / two 50-pin	●	●/●/○	○/○/○
active / one 50-pin	optional ($44.95)	●/○/○	○/○/ SW
active / two 50-pin	NA	●/○/○	○/○/ SW
active / two 50-pin	●	●/○/○	○/○/ SW, T
active / two 50-pin	NA	●/○/○	○/○/ SW, T
active / two 50-pin	●	●/○/○	○/○/ SW, T
switch / two 25-pin	●	●/○/●	○/○/ NU, ST, SW
switch / two 25-pin	●	●/○/●	○/●/ NU, ST, SW
switch / two 25-pin	●	●/○/●	○/○/ NU, ST, SW
internal / two 50-pin	optional [12]	●/○/○	○/○/○
internal / two 25-pin	optional [12]	●/○/○	○/○/○
external / two 50-pin	●	●/●/●	○/○/ OL, NW
internal / two 50-pin	●	●/●/○	●/○/○
external / two 50-pin	●	●/○/○	○/○/ SW
internal / two 50-pin	●	●/○/○	●/○/ SW, AS
internal / two 50-pin	●	●/○/○	○/○/○
internal / two 50-pin	optional ($195)	●/○/○	●/○/ NU, SW, TR
external / two 50-pin	●	●/○/○	●/●/ NU, SW
external / two 50-pin	●	●/●/●	●/○/ SW [11]
external / one 50-pin [12]	●	●/○/○	○/●/ E, SW, FC
switch / two 50-pin	●	●/○/○	●/●/ CU, SW, OP
switch / two 50-pin [13]	●	●/●/○	○/○/○
external / two 50-pin	●	optional /○/○	○/○/○
external / two 50-pin	ext. incl. must specify	optional /○/○	○/○/○
internal / two 50-pin	●	●/●/●	●/○/ RD
internal / two 50-pin	●	●/●/○	●/○/○
external / two 50-pin	●	●/●/○	●/○/ MT
internal [1] / two 50-pin	●	●/●/○	○/○/ SW
internal / two 50-pin	●	○/○/○	●/○/○

[1] May be shipped with either mechanism. [2] This drive uses a Quantum, not a Quantum LPS mechanism. [10] These drives ship with a standard 110 volt supply; a universal supply is available for $50 extra. [11] In addition to shareware, Mirror's MP40 includes CE Software's QuicKeys Lite, MockPackage Plus, and DiskTop. The MP100 includes these, plus HyperCard 2.0. [12] A 25-pin SCSI cable is permanently attached to the MacBottom drives for connection to the Macintosh. [13] MD45 tested by Macworld Lab had 25-pin connectors, but a 50-pin connector will be used by the time you read this. [14] External available for $19.

operating system popular in the university and engineering worlds. But because A/UX and the software that runs under it command vast amounts of disk space, A/UX partitions make little sense for 40MB to 120MB drives. Some partitioning utilities, however, also support ProDOS, the Apple II family's system software. That's a plus if you have a Macintosh LC with an Apple IIe emulation board to run IIe software.

To sweeten the pot, many companies bundle popular drive-management and file-recovery utilities, such as The Norton Utilities for the Macintosh, Symantec's SUM II, or Central Point Software's MacTools Deluxe. MacAvenue's Protegé drives include ON Technology's On Location text-retrieval utility, and Rodime bundles Microseeds Publishing's Redux, a powerhouse backup program. CD Technology throws in Aldus's Persuasion presentation program with its HD Porta-Drive 100—an unusual choice, but why not?

Manual Labor

Setting up a SCSI hard drive can be hard work, especially for the novice. Step-by-step instructions and explanations of SCSI termination and addressing can help you get up and running faster. If documentation is meager, it makes you wonder where else the vendor cut corners.

The best manuals come from Apple, GCC, Rodime, Mirror Technologies, Cutting Edge, EMAC, Ehman, Third Wave, Storage Dimensions, Jasmine, and La Cie. On the other hand, Procom, FWB, Total Peripherals, PCPC, CD Technology, Relax Technology, APS, and MacProducts provide manuals that suffer from one or both of two key deficiencies—the omission of such important instructions as how to remove internal terminators, or the use of confusing generic formats that cover a full range of internal and external drives with various termination and addressing schemes, and sometimes even covering both Mac and IBM drives.

The Thanks for Nothing award goes to Club Mac, which supplies a single, poorly photocopied page that is short on details and long on inaccuracies. The paragraphs explaining

CD Technology, and MacAvenue supply particularly elegant utilities—although the last three lose points for failing to include a backup utility. Storage Dimensions' MacinStor utility supports *mirroring*—if you have two drives, you can specify that data be written to both simultaneously. If one fails, the other kicks in. Most bargain-price drives come with On Track's generic SCSI utility, called Disk Manager Mac, which is powerful but can be daunting to use.

Most partitioning programs let you create partitions for use with Apple's A/UX, a version of the UNIX

Percent slower than fastest

- Up to 10%
- 11%–20%
- 21%–29%
- 30% or more

All these drives use a Quantum mechanism. To determine rankings, we indexed overall performance numbers against the fastest drive, the GCC UltraDrive 50S. See "Hard Drive Details" for mechanism key.

	Overall Fastest	Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MB/second)	SCSI Evaluator Write (in MB/second)	Noise (in decibels)
1.00	GCC Technologies UltraDrive 50S (QL)	60.1	72.2	43.5	49.4	86.6	1.05	1.06	42.0
0.98	iDS Systems Wip 50 (QL)	59.4	72.2	48.5	48.6	85.0	1.06	0.96	34.1
0.97	MacProducts USA MagicDrive 52 (QL)	75.3	70.8	49.0	48.2	84.1	1.06	1.07	51.7
0.97	La Cie ZFP 50Q (QL)	75.5	71.0	49.2	49.1	85.8	1.07	1.08	38.9
0.97	Third Wave Computing 52x (QL)	75.6	72.7	49.0	48.3	84.8	1.07	1.07	36.4
0.96	Club Mac Q52 (QL)	75.2	70.9	48.9	48.0	85.9	1.05	1.06	41.1
0.96	Ehman 52 (QL)	63.2	73.2	50.7	50.0	95.1	1.10	1.00	43.8
0.96	PCPC MacBottom 52 (QL)	75.8	70.5	50.3	48.0	85.2	1.06	1.07	39.6
0.96	FWB PocketHammer50 (QL)	65.4	71.9	45.9	49.3	87.9	0.93	0.99	38.3
0.94	Liberty Systems Liberty 52Q (QL)	80.9	71.5	48.9	48.6	86.1	1.06	0.96	37.8
0.94	MacAvenue Protegé 50 LPS (QL)	76.6	71.1	49.8	48.5	85.0	1.03	0.95	44.4
0.93	Cutting Edge 52 (QL)	54.7	72.2	51.3	50.0	95.4	0.97	0.90	42.1
0.92	APS 52 LPS (QL)	75.9	72.1	49.1	48.3	83.3	0.91	0.86	40.6
0.92	Total Peripherals QL52X (QL)	77.9	72.4	50.0	49.2	86.8	0.95	0.92	46.4
0.88	Jasmine DirectDrive Portable 52 (QL)	84.1	73.0	51.3	49.5	89.6	0.89	0.86	34.5

how to install an internal drive in an SE or Classic tell you to remove the cover according to the instructions in the Mac's manual. The only thing my SE manual says about removing the cover is that I should never do it.

Speed Thrills

Most of the drives we reviewed can supply data at least as fast as a Mac Plus, Classic, or SE can accept it, so if you have one of those three machines, don't get bogged down in comparison-testing for speed. In everyday use, there is no significant variation in performance between the fastest drive in a given category and the slowest one.

On fast Macs, fast drives such as FWB's PocketHammer100 do indeed deliver better performance than sluggish models such as CD Technology's HD Porta-Drive 100. But even when testing fast drives on fast Macs, the finish line is often crowded. In Macworld Lab's tests (conducted on a Mac IIcx), speed differences were small among the top several drives in each capacity category.

Because the higher-capacity drives—in the 80MB to 120MB range—are generally faster than 40MB or 50MB units, we broke the products into capacity categories before comparing performance.

- Among the fortysomething set, we saw a photo finish, with Ehman and Hard Drives International just ahead of the next closest six. The slowpokes: MacAvenue's Protegé 40, GCC's UltraDrive 45, Procom's MD45, and

Microtech's Europa 40. Macworld Lab found the greatest performance variations among these low-capacity drives; the hares often finished nearly twice as quickly as the tortoises.

- All the 52MB drives use the same Quantum mechanism, so it isn't surprising that they performed similarly—but they did not perform identically. GCC's UltraDrive 50S tops the list, followed closely by iDS's Wip 50. Jasmine's DirectDrive Platinum Portable brings up the rear.

- Among 70MB to 84MB drives, Apple's HD80SC placed first, followed closely by several other drives. The losers: the Procom MD80 and Seagate-based MacAvenue Protegé 80.

- The 100MB-and-up class contains the all-around performance champ: FWB's PocketHammer100. The top 16 drives in this group all performed quite well. The disappointments were the Conner-based iDS Wip 120 and CD Technology HD Porta-Drive 100 and the Toshiba-based HDI PowerDrive 100.

And what about the big picture? While the drives based on Quantum or Maxtor mechanisms turned in the best times in their classes, those con-

taining Seagate, Conner, or Toshiba mechanisms turned in the worst. (Quantum recently discontinued its 40MB, 80MB, and 105MB half-height Pro Line mechanisms. Some vendors are still selling drives containing these mechanisms while supplies last; if you want a drive with that mechanism, don't delay.)

PROBLEMS WITH FLOPPY-PORT POWER

Before buying a portable hard drive that draws power from the Macintosh floppy port, consider the capabilities of the particular Mac you plan to use it with.

- The Mac II, IIx, LC, and IIfx lack an external floppy port. Advanced Gravis and iDS sell a NuBus expansion board (both are called Mac II adapters, and list for $30 and $15.95, respectively) for Mac II's. The board draws from the voltage available to a NuBus slot—an acceptable solution, unless you need to move the drive to another Mac that has no floppy port.

- The Mac Classic's power-on sequence provides full power to the floppy port only after a short delay. Therefore, you could strain the Classic's supply by connecting a portable hard drive. And a Classic with an internal hard drive won't allow you to designate the external drive as a start-up device.

- Portable drives generally draw no more current than an external floppy drive, but I would think twice about hooking up a portable drive to a Mac Plus, with its lightweight power supply.

You can solve all these problems by purchasing an external power supply. But if you have to lug a separate box around, how portable is the drive? All in all, drives powered from the floppy port work reliably and conveniently only with the Mac IIci, IIcx, IIsi, and Portable.

MW LAB Drive Times—40MB-45MB

Percent slower than fastest

▮	Up to10%
▮	11%–20%
▮	21%–29%
▮	30% or more

To determine rankings, we indexed overall performance numbers against the fastest drive, the Ehman 40. See "Hard Drive Details" for mechanism key.

Overall Fastest		Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MB/second)	SCSI Evaluator Write (in MB/second)	Noise (in decibels)
1.00	Ehman 40 (M)	70.9	73.4	53.4	54.5	98.1	0.74	0.70	43.1
1.00	Hard Drives International PowerDrive 40 (Q)	91.0	73.4	50.1	50.4	91.3	0.78	0.78	44.5
0.99	Cutting Edge 40 (M)	71.4	73.5	53.7	54.7	101.9	0.74	0.69	42.7
0.99	MacTel Index 40 (Q)	92.3	80.0	50.1	50.6	91.5	0.77	0.77	38.9
0.99	PCPC MacBottom 42 (Q)	90.9	81.0	50.9	49.9	93.1	0.77	0.77	40.5
0.98	Apple Hard Disk 40SC (Q)	73.8	84.0	52.9	50.9	98.0	0.71	0.72	43.2
0.98	Relax Technology Vista 40 (Q)	92.0	81.4	51.7	51.9	93.7	0.76	0.76	47.0
0.76	GCC Technologies UltraDrive 45 (S)	93.5	103.5	75.6	82.7	130.7	0.60	0.60	42.2
0.75	Procom Technology MD45 (S)	117.6	100.2	70.0	77.4	125.9	0.58	0.58	39.4
0.73	MacAvenue Protegé 40 (S)	119.5	101.3	76.3	76.3	129.2	0.57	0.57	34.9
0.60	Microtech International Europa 40 (S)	165.4	108.7	90.2	75.8	146.9	0.47	0.33	42.6

Stand by Me

"Here today, gone tomorrow" has been a refrain of the Mac hard drive market for the past few years. Short of crystal gazing, there's little you can do to determine whether a bargain-basement mail-order vendor will be around to honor the two-year warranties that more and more firms claim to provide (see "Service and Support"). But you can determine the quality of a vendor's customer support by checking with friends and user groups, and by keeping an eye on *Macworld*'s *Conspicuous Consumer* column.

What about long-term reliability? Another tough call, yet it often separates bargain drives from costlier ones. It's impractical to test a drive's performance over the long haul in a lab. We can, however, tell you how the drives behaved during our tests.

Most performed well, but there were some delinquents. Relax's Vista 120, HDI's PowerDrive 100, and FWB's PocketHammer100 refused to act as the start-up drive when used with a Mac IIcx with an internal hard drive. Mirror's M 100 had problems coexisting with an internal hard drive. APS's Alliance Drive80 gave us the most grief, repeatedly reporting errors when we formatted the drive.

Best Bets

If you want a top-quality drive and can pay top dollar, look to Apple. Apple's drives may not be the fastest, but they're definitely built to last—with hefty Sony power supplies, and mechanisms that meet some of the industry's most stringent requirements. (Apple is among the few vendors that participate intimately in the mechanism design process. Apple also helps develop the mechanism's low-level ROM-based software. Other firms' drives don't contain this software, even if they use the same mechanism.) Alas, Apple has yet to apply its new low-cost philosophy to its external hard drive line—you have to pay a several-hundred-dollar premium for an Apple drive.

If you want quality and relative affordability, try GCC, Procom, La Cie, EMAC, Mirror, FWB, iDS, Jasmine, or MacAvenue. Drives from Cutting Edge, Ehman, Third Wave, and Rodime have a solid track record, too, but they're internally terminated. (Cutting Edge says its drives will be externally terminated by the time you read this, however.)

When portability counts, look to Liberty and FWB for solid performance and built-in power supplies; the slower HD Porta-Drive 100 from CD Technology earns third place. If you're willing to let the Mac supply power to the hard drive, consider the iDS Wip. The Jasmine DirectDrive Portable is smaller and lighter than most, but it's slower than most, too.

Budget-Drive Folly

I recommend cut-rate drives only with great reluctance. But if your budget is tight, try PCPC's MacBottom line. Despite some annoying design characteristics, these are swift machines, and PCPC has been around longer than any of its roommates in the bargain basement. Although products from Club Mac and DJK performed well enough during testing, I don't recommend them, given their minimally shielded internal construction and overall generic look and feel. (Club Mac's alleged documentation doesn't help, either.)
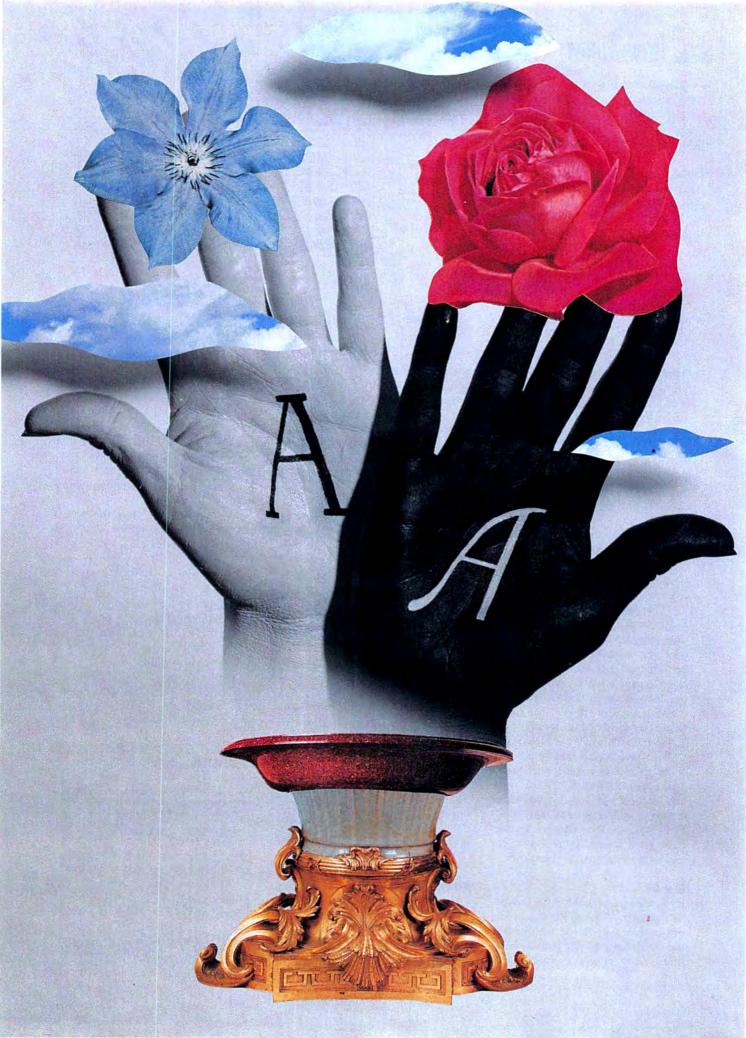
The bottom line: Buy the best hard drive you can afford. Economize on a printer or even a monitor if you must, but if possible avoid buying a second-class hard drive. No other component can destroy weeks, months, or years of work in one painful moment. And no other product area has produced more problems with support, reliability, and company stability.

Finally, whatever hard drive you buy, back it up often. The only thing more foolhardy than skimping on a hard drive is blindly trusting one. ▣

See *Where to Buy* under Budget Hard Drives for contact information.

At press time, three of the drives photographed for this article—the EMAC Metro 80, Jasmine DirectDrive 100, and Mirror Technologies' M40—were no longer available.

Contributing editor **Jim Heid** has been working with Mac hard drives since the days when they connected to the modem port. His latest book is the Macworld Complete Mac Handbook (IDG Books Worldwide, 1991), an updated and expanded collection of his Getting Started columns.

POSTSCRIPT
versus TRUETYPE

Which font format should you choose?

BY JAMES FELICI

HIS IS THE THIRD IN A FOUR-PART *MACWORLD* SERIES ON DIGITAL TYPOGRAPHY. THE FIRST, "TYPE RENAISSANCE," WAS A PRIMER ON THE HISTORICAL EVOLUTION OF PRINTING TECHNOLOGY AND PRINCIPLES OF DIGITAL TYPOGRAPHY (JULY 1991). THE SECOND ARTICLE, "DESKTOP FOUNDRY," EVALUATED TODAY'S TOOLS FOR DESKTOP TYPE DESIGN AND DESCRIBED THE DIGITAL TYPE-DESIGN PROCESS (AUGUST 1991). THE FOURTH, "TOP-NOTCH TYPE," WILL BE A GUIDE TO THE TOOLS AND TECHNIQUES FOR ACHIEVING HIGH-QUALITY TYPOGRAPHY ON THE MACINTOSH.

Apple's 1989 announcement that it was developing a new font standard, now known as True-Type, left many in the audience wondering why Apple had bothered. Who needed a new font standard? PostScript—Adobe Systems' page-description language—was already the de facto standard and had helped spawn an entire industry. By using a PostScript application on the Macintosh to create page layouts, PostScript fonts for high-quality characters, and a PostScript device to print those pages, desktop publishers were already producing text and graphics on a wide variety of devices, at the highest possible resolution. What could TrueType possibly offer?

Nothing, countered Apple, except that it would be an open font format, rather than one controlled by Adobe; it would create screen type faster than PostScript can; it would program much of the controlling intelligence directly into the font, so it could work with inexpensive printers; its type would be aesthetically superior to the best PostScript type; and it would allow type designers finer control over the nuances of letterforms.

Adobe quickly published its closely held type-format specifications, silencing critics who

Photograph by Geof Kern

chafed at Adobe's monopoly over key type technology. Apple then released little more news about TrueType until the company unveiled the format in March of 1991 with a new line of printers and made the format part of System 7 in May. At about the same time, Adobe announced enhancements to PostScript fonts in the form of Multiple Master technology, the company's new technology that addresses some of the features of TrueType that Apple originally touted—but that are still not implemented in first-generation TrueType fonts. Multiple Master promises nonlinear scaling, which is the ability to modify the proportions of the character's outlines as
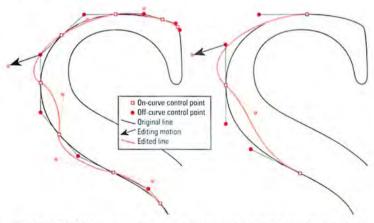
it's scaled (resized) at various point sizes.

Although it used to be easy to figure out which fonts to buy, now you have to balance the competing claims of Apple and Adobe. But the bottom line is simpler than you might think. Today TrueType fonts enjoy no quality advantage over PostScript fonts on the Mac's screen or on the printed page, so anyone who has invested time and money in building a PostScript library can rest assured there's no need to start over. New users, however, will get TrueType as a part of the Mac Operating System, and can enjoy the benefits of scalable outline fonts without buying any extra software from Adobe.

The Trouble with Bitmaps

Behind the scenes of this struggle, both Apple and Adobe were trying to improve the Mac's primitive method of handling screen type. Under all operating systems prior to 7, the Mac put type on the screen by using bitmapped screen fonts—72-dots-per-inch characters that were hand-drawn to look good on screen at select sizes (usually 9-, 10-, 12-, 14-, 18-, and 24-point). For an application to use a particular font, at least one of these sizes of screen fonts had to have been loaded into the System file by using the Font/DA Mover. If you specified type in a size for which a screen font was loaded, the type looked crisp and clear on screen. But if you specified a size that wasn't loaded, the Mac system would attempt to scale the nearest bitmapped font, usually with awful—or at least hard-to-read—results.

A more elegant solution to this problem is to generate screen type and printer type from a single font, but creating bitmapped fonts on demand takes some sophisticated high-speed computing. Adobe's initial answer was Display PostScript, which used PostScript to create the computer's screen image as well as the printed page, assuring absolute fidelity between the screen and paper versions.

Display PostScript didn't use the bitmapped screen fonts that the Macintosh system did. It scaled the outline font files used by the printer to create a unique bitmap for every size requested. But to do this at speeds required by a computer screen calls for more computing power than desktop computers can muster. So Adobe developed Adobe Type Manager (ATM), a subset of PostScript that works from within the Macintosh (or IBM PC) system to generate smooth screen type, on demand, at any size. ATM, however, works only with Type 1 fonts, a PostScript font format that contains special *hints* (modifications to a character's outlines) for improving type legibility at low resolutions.

Apple also wanted a way to create high-quality characters on both screen and paper, but the company wanted it to be Apple technology

WHY IT'S EASIER TO EDIT POSTSCRIPT CURVES

TrueType
74 control points

PostScript
54 control points

TrueType and PostScript use on- and off-curve control points differently to define the curves in letterforms. Although it is possible to mathematically define the same curve in either TrueType or PostScript, it takes more control points to do so with TrueType. Each control point is used to calculate the slope of a section of the curve. The *S* shown above, for example, requires 74 points in TrueType's quadratic curve format (left), and only 54 points using PostScript's cubic bezier format (right).

☐ On-curve control point
● Off-curve control point
— Original line
— Editing motion
— Edited line

The difference in the number and placement of control points is most evident when you are editing a curve. Editing a TrueType curve can be unpredictable because adjusting a single off-curve control point affects the position of many other control points, both on and off the curve, as shown above left. This can cause a ripple effect around the perimeter of the letterform.

With PostScript's curves, each off-curve control point controls the slope of the curve in one discrete section only. As shown above right, a single change made to one off-curve point will not ripple around the letterform; editing changes are easier to predict and control.

and for it to be an integral part of the Macintosh Operating System. Enter TrueType.

Dumb Fonts and Smart Fonts

TrueType fonts, like PostScript fonts, consist of mathematical outlines that describe the curves and lines in a letterform. When an application calls for type—say, Times Roman at 12-point—the system's Font Manager looks for that font in that size. If you've installed a hand-tuned bitmap, the Font Manager grabs it and hands it back to the application for screen display. But if there are no bitmaps available for the requested size, a TrueType font passes its outline information to the Font Manager's rasterizer. The rasterizer is really three separate programs: a scaler that resizes an outline to the desired size; a hint interpreter that carries out (interprets) special instructions contained within the outline information to create the best possible letter at the resolution of the display device; and a scan converter that turns the hinted outline into a bitmap. Because a TrueType font's hints can be very detailed and complex—they can tell the Font Manager's rasterizer exactly what to do at various resolutions—they have been dubbed *smart fonts*.

By implication, this makes PostScript fonts "dumb," since they contain only simple hints. These simple instructions define the letterform and depend on intelligence built into the PostScript interpreter (located in the printer or in ATM) to decide how to render letters best at various resolutions. The appellation doesn't bother Adobe. In fact, they proudly wave the flag of dumbness: "The less intelligent the outline, the better," says Kevin Wandryk, font product manager at Adobe.

From Adobe's point of view, software continuously evolves, so there's no point in putting elaborate programming into the font, as you do when you create a TrueType font. Adobe prefers to have the font describe the outline and its hints—nothing more. Thus, when new technology comes along, it's introduced into the printer's interpreter—the central, shared resource—and all the fonts continue to work as before. For an office with five printers but hundreds of fonts, this logic is appealing.

The developers at Apple have turned this logic on its head. They put all the conditional instructions about how to render a font within the font itself, and all the responsibilities for creating the letterforms (rasterizing) on the shoulders of the computer, which then simply dumps a bitmap of a page to a dumb, inexpensive printer. In this scenario you need a powerful computer and smart fonts. Apple claims that this method gives control over how the font behaves to the font developer, who no longer

As in the early days of PostScript development, TrueType font development is suffering from the lack of tools to automate the procedure, especially tools for adding hints. But that won't last long, according to Jeff Level, type director at Monotype Typography: "I think people forget how difficult it was five years ago to create a PostScript font, and how easy it is now in comparison."

There is a cycle involved in developing tools, Level says, just as there is in developing fonts from those tools. "The development of TrueType tools is in that cycle now," he points out. "We're at the beginning, and things that in six months or a year will be easy aren't so easy now."

Just as with PostScript faces, then, Level believes that we can expect the trickle of early font releases to give way to a torrent of typeface designs as development becomes easier. Simple conversion tools can create crude TrueType fonts today, yielding fonts that work fine at high resolutions and to a large degree even on 300-dpi printers. "But the full implementation of a TrueType font also means [getting] a good screen representation, and that—at this point—is what's taking quite a bit of labor-intensive development. Any foundry can pump out hundreds of printer-quality fonts, but ultimately you want to have a good screen-rendering as well."

Level sees TrueType fonts being marketed in the early days mostly to the low end of the market—to offices, not graphic artists—and much of Monotype's early efforts will focus on selling its core fonts as replacements for existing PostScript fonts. But once the TrueType library catches up with the size of the PostScript library, the formats you choose to work with shouldn't limit the availability of typefaces you want.

Normally, a side effect of competition is lower prices, but this doesn't seem to be the case with

MONOTYPE TYPO-

GRAPHY'S JEFF

LEVEL FORESEES

EARLY TRUETYPE

FONTS BEING SOLD

TO THE LOW END

OF THE MARKET.

SETH RESNICK

As soon as good tools are available for TrueType development, there will be a torrent of new TrueType fonts

TrueType and PostScript fonts. Type 1 PostScript fonts could theoretically be made less expensive if Adobe cut the royalty fees they charge their licensed font developers, Level points out, but vendors in general seem satisfied with prices as they are, so no price wars are in sight.

has to rely on an Adobe-built PostScript interpreter to decide how a font will look when printed at various resolutions.

Putting Them to the Test

I approached testing the font formats by looking for the answers to six basic questions:

TYPE—WHAT'S THE DIFFERENCE?

Although the differences between PostScript and TrueType font formats can be subtle, those differences can affect the appearance of letters. Shown here are a few representative examples of the kinds of differences noted during the testing for this article. In each case, the PostScript fonts and the TrueType fonts were created by the same foundry, Bitstream, from identical outline data, and have the same names.

Disappearing Serifs PostScript did a better job of preserving the serifs of text faces at low resolutions. To see what Bitstream Amerigo really looks like, take a look at the high-resolution example in the center. In the version created by PostScript/ATM at the left, it is easy to see the serifs (horizontal finishing strokes) on the characters *klmn*. Those serifs disappear in the TrueType version on the right—although some might argue that this makes the characters more legible at 72-dpi screen resolution.

klmn **klmn** **klmn**

PostScript/ATM (on screen)   1200 dpi   TrueType (on screen)

Bolder Faces In general, TrueType fonts printed slightly bolder on both PostScript and non-PostScript printers. Shown here are 10-, 14-, and 18-point Times Roman in PostScript and TrueType, both printed at 300 dpi on a LaserWriter.

10-pt.	abcdefghijklmnopqrstuvwx	abcdefghijklmnopqrstuvwx
14-pt.	abcdefghijklmnopqr	abcdefghijklmnopqr
18-pt.	abcdefghijklmn	abcdefghijklmn

PostScript (300-dpi printer)   TrueType (300-dpi printer)

Better Detail TrueType's extra hinting capabilities preserved more detail in decorative faces such as Bitstream's American Text shown here. Look at the center illustration to see what the face looks like at high resolution, where all of its details can be clearly shown with either format. At 72-dpi screen resolution, the TrueType sample on the right shows much more detail than the PostScript/ATM version on the left. In the TrueType sample the engraved lines in the uppercase letters are correctly formed, while in the ATM version, the engraved lines in the *A* are plugged at the ends, and nearly nonexistent in the *T*. TrueType also did a much better job of displaying the ornate lowercase letters.

AmTx **AmTx** **AmTx**
abcdefghijklm abcdefghijklm abcdefghijklm
ABCDEFGHI ABCDEFGHI ABCDEFGHI

PostScript/ATM(on screen)   1200 dpi   TrueType (on screen)

Which is fastest on screen? Which looks better on screen? Which prints faster? Which looks better on the printed page? Can they be mixed effectively within a single document? Which is easier to use?

To test the fonts' performance on a variety of CPUs, I ran my tests on both a Macintosh IIcx with 5MB of RAM and a Mac Plus with 2MB of RAM. The PostScript printer was a LaserWriter IINT; the TrueType printer was the Personal LaserWriter LS. I used ATM 2.0 and System 6.0.7 (System 7 was in beta form during the research for this article). Tests were run later with final System 7 software to confirm the performance comparisons listed here.

On-Screen Speed

Speed is always an issue where software is concerned, and in this regard there's a flaw in the elegance of the TrueType and PostScript/ATM solutions for creating smooth screen type: they perform dismally on older Macs, such as the Mac Plus. These older computers, with their Motorola 68000 microprocessors, are just too slow to conjure up the screen type fast enough. On a Mac Plus, TrueType took over a minute and a half simply to draw an all-text screen image for some files. Scrolling from the bottom to the top of a simple unillustrated newsletter page took up to 40 seconds. With these machines, I recommend sticking with good old-fashioned bitmapped screen fonts, which are much faster than either TrueType or ATM.

Both Adobe Type Manager and TrueType bitmap the characters needed on the screen and then store them in a cache in the Mac's memory. When those characters are needed again on screen, they're quickly copied out of memory. On the Mac Plus, TrueType was better at this caching than ATM (even when ATM's memory cache was expanded in the Control Panel). As soon as the characters had been drawn once, TrueType threw them up on the screen slightly faster, on the average, than ATM did. But TrueType's time for first painting the screen was horrendous: often a minute or more, compared with ATM's 10 seconds. But even 10 seconds is a long time to wait, especially considering the small size of the Mac Plus screen.

On a Mac IIcx, however, TrueType and ATM both performed well. Yet, in almost all cases, ATM put text on the screen faster, especially with common text sizes. For sizes over 20-point, TrueType caught up somewhat but rarely outpaced ATM. The difference was most dramatic the first time a screen filled with text, with ATM often performing at twice the speed of TrueType. After the screen bitmaps had been cached, this edge was reduced, but ATM was still 30 to 40 percent faster on the average.

On-Screen Legibility

The quality differences in the screen type generated by TrueType and ATM are not so clear-cut. Certainly, legibility of the type you see on the screen is of primary importance, but the faithful rendering of particular typefaces is also important. In general, ATM reproduces the features of typefaces more faithfully, while the TrueType fonts evaluated here create more-legible screen type. In other words, the TrueType fonts seemed willing to sacrifice the features of characters—serifs, for instance—in deference to creating a crisper screen image.

I've compared screen bitmaps face-by-face, size-by-size, and character-by-character; sometimes TrueType does a better job than ATM, and sometimes the reverse is true. On the whole—and after much squinting—for type sizes up to 12-point (which includes most common text sizes), ATM produces more-legible characters than TrueType. From 12-point to about 18-point, TrueType produces smoother characters, and above 18-point you're arguing about the placement of individual pixels—both do a good job.

Finally, but less important, is TrueType's tendency to relinquish typeface features for the sake of a clear bitmap. In the case of Bitstream Amerigo, a serifed face, this meant that sizes below 22-point shed their serifs completely. ATM, by comparison, shows serifs with no character distortion at 16-point and above.

Printing Speed

The longest-standing criticism of PostScript has been that it's too slow—hanging around the printer has replaced hanging around the office water cooler. Well, TrueType isn't the answer. In fact, as often as not, ATM prints faster with PostScript fonts on the non-PostScript LaserWriter LS than TrueType does with TrueType fonts. You may still want one of Apple's new printers, but they'll work as well, if not better, using ATM and whatever PostScript fonts you already own.

When printing to a PostScript printer, like the LaserWriter NT, there are times when a TrueType file prints faster than its PostScript equivalent, but usually the reverse is true. And if you permanently download the fonts to the printer there's no contest: PostScript is far faster than TrueType, sometimes by three or four times.

This speed difference is due to the division of labor that distinguishes these technologies. If all the image rasterizing takes place in the computer—as with TrueType—caches of screen bitmaps and printer bitmaps compete for the same memory space. When you print to a True-Type printer, the TrueType scaler scales the page-type bitmaps it creates, just like the PostScript scaler does in a PostScript printer. But in True-Type's case, it writes the page-type bitmaps into

According to Ernie Brock, TrueType has beaten PostScript at its own game. In fact, the developer of Letraset's FontStudio and vice president of Ares Software (maker of FontMonger) says, "TrueType is more like PostScript than the Type 1 format is." Brock finds that both font formats create good results for type designers who understand how to work with them, but he prefers the extra control that TrueType gives the font designer and programmer.

"When PostScript first came out," he explains, "everyone heaved a sigh of relief because they weren't stuck with a fixed set of drawing calls, as with all the previous drawing languages. But with the Type 1 rasterizer from Adobe, it's back to a fixed set. [In building a Type 1 font] you have to conform exactly to what Adobe's said, and there's no room for creativity—whereas with the TrueType format, it's just a matter of how much time you want to put into the programming to design better and better fonts. It's put the tools back in the hands of the font foundries rather than in the hands of the people who designed the rasterizer."

"With the Adobe fonts," he continues, "we have to wait for them to improve the rasterizer [the font-rendering software in ATM and Post-Script printers] before we can do anything better. With Apple's approach, the font foundries—as they dream up better and better ways to render the characters—can do some programming and all of a sudden have better-looking characters. They don't have to wait around for Apple to improve the rasterizer."

Today the differences on the printed page are very subtle, but Brock thinks that TrueType has the potential to create the superior type at laser-printer resolutions. From what he's seen so far, "if you've got a good eye and a loupe," PostScript

ARES SOFTWARE'S ERNIE BROCK THINKS THAT TRUETYPE HAS BEATEN POSTSCRIPT AT ITS OWN GAME.

MAX AGUILERA-HELLWEG

TrueType gives font designers extra control by putting the tools back in the hands of the font foundries

curves can look a little bit more jagged than they do in TrueType. "But I think they're both good formats," he's quick to point out, "and each has its pluses and minuses. Technically they both do the job, and we can digress into things that are increasingly nit-picky from there."

the same memory space it uses for the screen bitmaps, overwriting them. Therefore, when you've finished printing and want to scroll around the screen again, the screen slows to a crawl while TrueType bitmaps all the screen characters again—and overwrites the page bitmaps, assuring slower printing.

ATM and PostScript divide this caching, with ATM storing the screen bitmaps in the computer, and the PostScript printer storing the page bitmaps in the printer. One never cancels out the other. The exception to this is when you use ATM to print to a non-PostScript printer, in which case it suffers the same problem as TrueType: page and screen bitmaps vie for the same memory space. Tests with various settings for the Mac's RAM cache and ATM's bitmap cache failed to show any dramatic improvements in performance.

Downloading fonts is another problem for TrueType. The sample newsletter I created originally contained a family of four faces for the text and captions, one headline font, and another font for the logo—not an unusually high number of fonts for a newsletter. But even with almost 400K of free memory for downloaded fonts, the LaserWriter IINT bombed when it tried to print the TrueType version of the newsletter. Between the bigger-than-PostScript TrueType fonts and the TrueType rasterizer that gets downloaded every time a TrueType file is printed on a PostScript printer, it was too much even for that 400K. With that much printer memory, a PostScript newsletter could contain eight or nine fonts and still print successfully.

The only way to get the TrueType newsletter to print was to check Unlimited Downloadable Fonts in the Page Setup dialog box, but this meant that the first page of the newsletter alone took almost half an hour to print using a Mac IIcx. With the more compact PostScript fonts, the same page printed in just 3 minutes; and when the fonts were downloaded to the printer first, it took just 50 seconds.

This means that if you print multiple-font TrueType pages on LaserWriters with only 1.5MB of RAM, you almost always have to check Unlimited Downloadable Fonts and suffer stupefyingly slow printing times, during which the Mac is tied up processing the page images. On an older Mac and an older printer, printing the company newsletter with TrueType fonts can take hours.

For owners of older or less powerful Macs, the argument for a smart printer—one that holds its own fonts and does its own rasterizing—is compelling. Files from a Mac Plus that took 3½ minutes to print on a PostScript printer took 13 to 18 minutes to print on a TrueType printer. And the PostScript file held up the computer for only 20 seconds—the rest of the processing was done by the printer, leaving the Mac Plus free to do more work. The TrueType rasterizer doesn't release the computer until the job is nearly done—after all, it's doing all the brain work and spoon-feeding bits to the printer.

Making your computer think for your printer takes the computer out of your hands every time you print. And on the Mac Plus, TrueType print times were routinely three times as long as PostScript print times. Because the PostScript printer does the lion's share of image processing for a page, print times for the Mac Plus and the Mac IIcx were very close.

Printed Quality

Determining the differences in print quality can be tricky. A typeface's look is greatly determined by the output device used, and print results vary according to typeface. In a script face like Embassy—or in Bitstream's black-face American Text, with its engraved details—the superior detail of TrueType's hints seems to make the telling difference. These instructions, programmed into the font, tell the rasterizer how to hold various character details at various point sizes. The best printed version of Embassy was, thanks to ATM's superior interpreter, produced using a PostScript font interpreted by ATM and printed to the LaserWriter LS.

In more traditional faces—those normally used for text and display purposes (for example, Times and Helvetica)—the results of PostScript's hints seem to be at least as good if not better than TrueType's. Only time will tell whose hints are the most effective.

Because I performed this font testing so soon after TrueType was released, less than a dozen fonts were available in both TrueType and Post-Script Type 1 format, and most of these were display or decorative faces—hardly the fonts people use most often.

Mixing Font Formats in a Single Document

At this point, Apple claims that users will have no problem freely mixing fonts of different formats in the same document. But since there's as yet no way to differentiate between the two formats on the Font menu, having a font of the same name in two different formats can create incredible confusion. In general they behave the same. But not always. In the test documents I created, lines broke identically in a newsletter when it was formatted with a TrueType font or an equivalent PostScript font; but when I respecified TrueType-formatted fonts as PostScript text, the spacing changed subtly and lines broke differently, changing the layout of the newsletter.

To see how the two formats coexisted in a document, I formatted a sample newsletter using Amerigo and Amerigo Italic in PostScript format,

and Amerigo Bold and Bold Italic in TrueType format. When I printed this hybrid on a Laser-Writer LS, with both ATM and TrueType loaded into the system, only the TrueType faces printed, even though ATM prints perfectly well to the LS by itself. On the PostScript LaserWriter IINT, all the fonts showed up, but large gaps appeared in the text after italic passages, and the justified margin became scrambled and ragged. Some lines were pinched and some were loose. Gaps appeared in midword in the display type.

Until Adobe and Apple come up with a way to help users differentiate between PostScript and TrueType fonts in a font menu, it's best to load either one kind of font or the other into your system, or at least keep a record of which fonts are in which formats so you can avoid mixing formats in the same document.

Current Advantage: PostScript

Weeks of testing and many hundreds of test pages have convinced me that there's no compelling reason to invest in TrueType fonts. In my tests ATM was faster at rendering screen type; ATM's screen type is as good as or better than TrueType's; PostScript's print quality is as good as or better than TrueType's; PostScript prints faster on PostScript printers; ATM prints faster on non-PostScript printers; having two kinds of fonts on the Mac at the same time can cause formatting confusion.

PostScript and ATM, however, have only a slight edge over TrueType, and System 7's seamless integration of TrueType into the operating system will certainly enable all new Macintosh users to take advantage of higher-quality screen fonts and easier font installation than was previously possible.

However, Apple's claims for TrueType still fall short of PostScript's current performance. And Apple's early claims that TrueType would fit into a larger cross-platform strategy with Microsoft have certainly been downplayed since. We haven't, for instance, heard a word about a new Apple line of laser printers based on Microsoft's PostScript-clone TrueImage. And we've yet to see TrueType implemented under Windows 3.0, although Microsoft claims we will by the end of 1991. Apple, meanwhile, continues to create new PostScript printers, and unidentified sources at Apple claim to be developing a new imaging model altogether.

TrueType is an important new addition to the Macintosh Operating System, but don't rush out and replace your PostScript font library. ■

. . . .

James Felici, a former managing editor of Publish *magazine, is a free-lance writer living in* Fontès, France, just north of Béziers.

Jim Von Ehr, president of Altsys Corporation (developer of Fontographer and FreeHand), sees a surprising relationship between TrueType and PostScript. He expects that designers will prefer to create new fonts in PostScript format and convert them to TrueType fonts later, a practice that would coincidentally encourage the simultaneous growth of both font libraries.

But this forecast has more to do with working methods than with savvy marketing tactics. "[At Altsys] our feeling is that it's probably better to design in PostScript with cubic beziers than it is to design with quadratic B-splines, which TrueType uses," he explains. "You need fewer points with beziers, and the curves are more intuitive." In addition, editing outline points in TrueType fonts can create a nasty ripple effect: moving one point can throw off the positions of adjoining ones all around the outline of the character. While it's possible to create virtually identical character outlines with both kinds of curves, with TrueType's quadratic B-splines "you don't have the control of the slopes and positions you have with beziers."

Minimizing the number of curve segments used to create a TrueType font is also a challenge, says Von Ehr: using too many curves makes the font unnecessarily large and slows down rasterizing speed. Reducing the number of curves has been a challenge for Altsys as the firm upgrades its font-conversion program, Metamorphosis, to convert PostScript fonts to TrueType format. "If we're lucky we can get a bezier curve in one quadratic curve. But typically we have to split it into two quadratics, and in the worst case we have to split it into three."

Von Ehr and others are working on tools that automatically add hints to TrueType fonts, so soon a lack of these tools won't be any more of a prob-

ALTSYS'S JIM VON EHR EXPECTS THAT DESIGNERS WILL PREFER TO CREATE NEW FONTS IN POST-SCRIPT FORMAT.

HOLLY LINDEM

It's probably better to design with PostScript's cubic beziers than with TrueType's quadratic B-splines

lem than it is with PostScript fonts. But he's concluded that optimizing the TrueType outlines for size and speed is a problem best left to the software engineers, so that type designers can focus on aesthetics instead of wrestling with the intricacies of quadratic B-splines.

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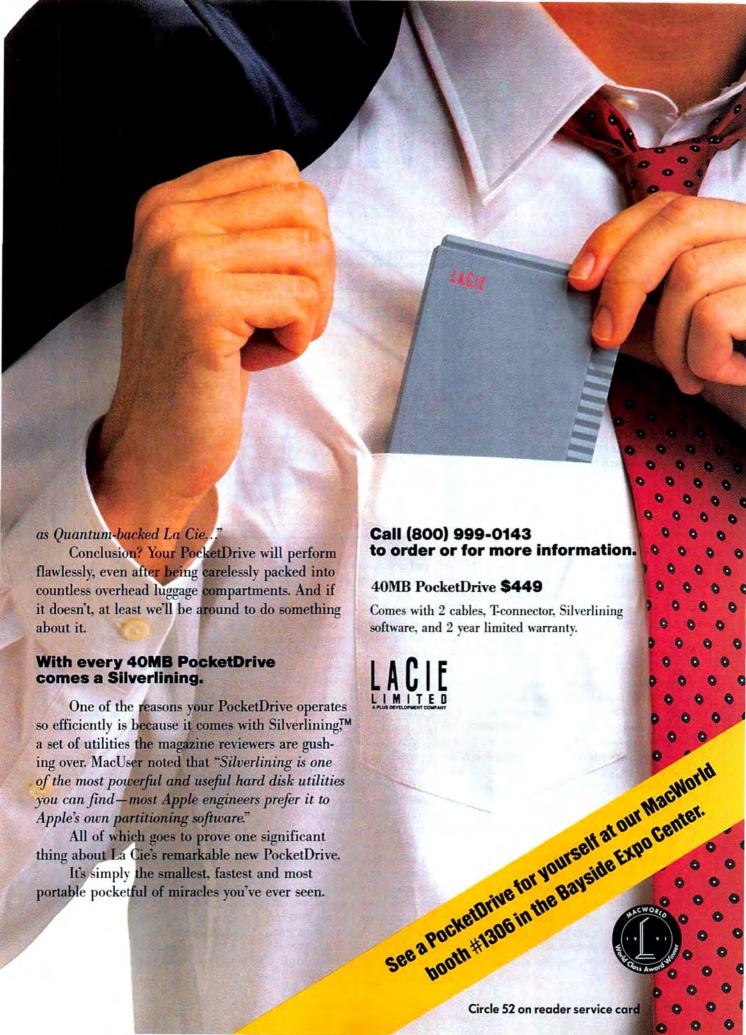
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REVIEWS
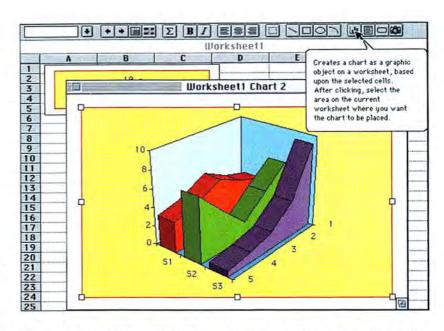
MICROSOFT EXCEL 3.0

Pros: Catches up with its competitors; Solver and System 7 support add convenience. **Cons:** Slower at large-scale numerics than version 2.2; some color and chart features missing. **Company:** Microsoft Corporation. **Requires:** Mac Plus; System 6.0.2; hard drive. **List price:** $495 (upgrade $129).

You have, of course, heard of Excel, since there's a 65 percent chance you have a copy. It's been among the three best-selling Mac programs since 1985—the other two are Microsoft's Word and Works, which have been playing a seemingly endless game of musical chairs with Excel.

It must be difficult for a product manager to plan new features for a product that's apparently invincible in the market, but Microsoft chose the release of a System 7–ready version of Excel to deign to acknowledge the existence of competitors. The developers of Full Impact, for example, will, one hopes, be flattered to see their innovative icon bar honored by incorporation into Excel 3.0, and the staff at Informix Software will likewise undoubtedly be gratified to see Microsoft confirm the wisdom of their choices in chart styles for Wingz. In fairness to Microsoft, Claris may be forming many of the same opinions in its new spreadsheet, Resolve. Nonetheless, 3.0 now includes nearly everything you could want in a spreadsheet, and it's still recognizably good old Excel.

There are three categories of goodies in this package: enhancements you can use on a stand-alone Macintosh Classic, treats for bigger

---

Worksheet1

Creates a chart as a graphic object on a worksheet, based upon the selected cells. After clicking, select the area on the current worksheet where you want the chart to be placed.

Worksheet1 Chart 2

Macs, and necessities of life for business Macs on a network.

Small Favors

If you are preparing annual budgets on a 9-inch screen (or typing away on the Portable on the road), the new outlining feature will soon become one of your favorite items. You can group columns or rows and collapse them, leaving titles in place; the result is that you can quickly toggle between an outline overview of your work and the fully expanded view of particular sections (see "Squish"). The outlining function can be called from the Tool bar, another sure favorite.

The Tool bar contains icons for two sorts of tasks: one set of icons lets you perform common types of formatting and charting with a single click, and the other set implements new features—text boxes and drawing functions and manipulations thereof. The selection of items for the Tool bar was quite astute, and you will find that you can cover a wide range of typical tasks without ever pulling down a

menu. Autosum, a Tool bar function that lets you sum a row or column by double-clicking on an icon, is particularly convenient. You'll find out just how much of your spreadsheet work (an amazing lot, it happens) amounts to using your Macintosh as an adding machine.

Since text, drawings, and imported PICT files float in their own layer as objects, it's easy to lay out reports of mixed tables and graphics in Excel 3.0. Another benefit of object-based graphics is that objects such as charts can be copied from the graphics layer and pasted into Word 4.0, for example, still retaining handles for scaling.

The other feature most likely to be helpful on smaller Macs (Excel 3.0 can run—barely—on a 1MB Mac but needs 2MB for MultiFinder and System 7) is Solver, essentially a separate application linked to Excel through a macro. Using Solver, you can define a goal (maximize return from a set of three possible investments, for example) and see how various cells in a spreadsheet would have to be modified to meet the

goal. Although in business creating the right model for goal-seeking can be tricky, Solver also has numerous non-speculative and engineering uses and would be worth a few hundred dollars on its own.
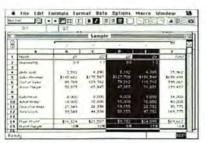
Big Macs with Everything

If you have a multislot Macintosh with a color monitor and System 7, Excel 3.0 has many new features to make your work look magnificent (they are available to smaller Macs too, of course, but you see the full impact, so to speak, more clearly on a bigger screen). You can now assign Styles to worksheet documents and define a style-formatted worksheet as a template; this formatting can include all sorts of color and font information, as well as incorporated logo graphics and other "image" essentials. On a big screen you can also see some of the new types of 3-D graphs Microsoft has finally added (see "Standing Out"), plan attractive picture charts (bar charts made of picture elements), and read the small print in Balloon Help. The direct manipulation of margins in the long-awaited Print Preview feature also makes sense on a large screen. You can also see the little red dots that now identify cells with attached Cell Notes; and you can attach macros to graphic objects in worksheets, thereby making flashy icon-driven single-page miniapplications.
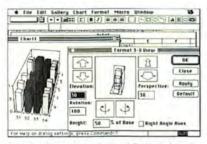
Another important feature for Macintosh users tracking big jobs is worksheet consolidation. Excel has taken a database-style approach: data elements on different worksheets are identified by name across different worksheets rather than by cell location, so the summary worksheet can pick data from sources regardless of their structure (even when their structure is modified). For other data-collection tasks Excel supports the Publish and Subscribe features of System 7, but with some idiosyncratic deficiencies: publishers and subscribers are not identified by the recommended gray borders in documents, and charts publish and subscribe through cell arrays rather than directly.

Data Everywhere
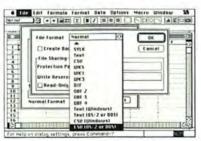
Excel incorporates features designed to make it the best choice for PCs as well as Macs—much of the documentation is the same for Mac, Windows, and OS/2. The function list is the same across all platforms, and the not particularly friendly macro language has scarcely been enhanced in 3.0. But Microsoft, believing that the data table in a spreadsheet will be a central unit of communication in offices, has introduced a Data Access Macro, a major enhancement, to let other computers pass data to Excel. Excel can generate SQL queries to mini and mainframe databases, dialing up, logging on, and capturing remote data through a series of dialog boxes. Apple's recommended Data Access Language (DAL) is implemented as SQL manager, but experienced database workers can also generate SQL queries directly. Thus, in a well-managed Microsoft-based office, all corporate data can be brought into Excel, analyzed, and reported in graphic splendor, no matter what type of computer sits on a worker's desk.

Squish Microsoft Excel's new outlining function, called from the tool bar at the top, lets you collapse sets of rows and columns for an overview of your work.

Standing Out You manipulate 3-D charts through a dialog box rather than via direct controls; still, the 3-D capability for deception by perspective, long demanded by power users, is easy to use.

Out in the Open Microsoft plans to make every data table from any source on Earth available to Excel. This screen shows the range of formats it proposes to gobble for breakfast over networks or phone lines.

It Adds Up

This product is formidable. It offers real improvements to all Excel users, from those laboring at home over an ancient Plus to corporate IIsi users wired to Oracle databases on a VAX downtown.

My complaints about 3.0 are not particularly serious: (1) compared with 2.2, it takes more memory in a world where memory is cheap; (2) it's slightly slower at array manipulation and some function calculation (but overall recalc on normal worksheets is generally improved); (3) it gives you a choice of only 16 colors and leaves out some 3-D chart types that are useful in engineering; (4) the macro language still looks more like assembler than English; and (5) some System 7 features are odd, verging on buggy. None of these are likely to cost Excel much market share, and the last will doubtless be fixed at the familiar leisurely pace. Excel 3.0 has basically reaffirmed Excel's *right* to be the leading Mac spreadsheet, a solid success in both marketing design and programming effort.—**Charles Seiter**

*See **Where to Buy** for contact information.*

SPREADSHEET BENCHMARKS (in seconds)				
	Open SYLK	Insert Column	Recalc: Numeric	Recalc: Budget
Excel 3.0	100	3.2	6.2	4.1
Excel 2.2	103	2.9	5.1	5.2
Wingz 1.1	34	1.3	4.5	3.8

Under Recalc *numeric* refers to a 500 by 10 array of functions; *budget*, to a 100K spreadsheet with computations interspersed with text blocks (it tests efficiency of the "intelligent" recalc method).

★

DVA-4000/ MACINTOSH

Pros: 24-bit video display; 256-color genlock control plus 256 degrees of transparency; independent video-image and window scaling; self-contained video processing; exclusive filtering capabilities; audio output control. **Cons:** Requires two NuBus slots; graphics displayed at 8 bits only; no composite video output. **Company:** Video-Logic. **Requires:** Mac II; 2MB of RAM; video-input source; audio receiver. **List price:** $2995.

MEDIATOR

Pros: Simple to install; works with Macs and PCs; overscan and underscan options; freeze-frame capability. **Cons:** Limited to 640-by-480-pixel image area; expensive. **Company:** Video-Logic. **Requires:** Mac II; video receiver. **List price:** $2995.

Newest among the ranks of hardware products bridging the gap between the Mac and the analog empire are the DVA-4000/ Macintosh video-input board and the Mediator video-conversion box, both from VideoLogic. Each of these products converts the Mac into a real-time video-display and -editing system.

Two-Card Draw

The DVA-4000 input board connects to a modified 8-bit graphics board by a short ribbon cable. The DVA-4000 board receives composite video signals that it displays in 24-bit color and mixes with RGB graphics images that are processed and communicated by the 8-bit board. Having two boards means you can hook up two monitors, one for standard Mac graphics and the other for video editing. (However, keep in mind that for the single-monitor user, having two boards presents a variety of problems. First, except for a slot to accommodate the ribbon cable, you gain no additional functionality over the Mac's existing graphics board and built-in video port.

Second, the two boards occupy two NuBus slots.)

Because the 8-bit graphics board operates independently, it provides access to superb video and graphics mixing capabilities. Some boards allow you to designate one color from the 256-color indexed spectrum as transparent. This makes video images show through every occurrence of that color on screen, whether at the Finder level or in any other application, an effect called *genlocking*. The DVA-4000 genlocks better than the rest. It lets you select several indexed colors to be transparent—and you can indicate the degree of transparency for each color—enabling you to create sophisticated graphics-to-video overlays and fades. Not only can you specify that a range of pixels are to be translucent, you can also assign a physical boundary to that range. For example, you could have video images playing through translucent blue titles at the top of the screen while the same blue is opaque elsewhere on the screen.

Scale and Speed

Better still, video windows can be scaled dynamically to any size from 4 by 4 pixels to 640 by 480 pixels proportionally or nonproportionally. In addition, the video image can be scaled independently of the window, allowing you to zoom in on items of special interest. Imagine a small window panning, wiping, and fading video images in one corner of the screen while credits scroll against a subtle gradient background.

And because the DVA-4000 handles all video processing unaided by

the Mac CPU chip, video images run seamlessly in the background, without interrupting—or being interrupted by—any program operating in the foreground. So you can file records and watch the Frugal Gourmet on the same monitor penalty-free, or mix live video with Mac animation without affecting the display speed.

Software Controls

The DVA-4000 MIC (Multimedia Interactive Control) System II software includes a video-capture utility that digitizes images either at 24 bits or as 8-bit dithered PICT graphics. A cdev offers easy access to much of the DVA-4000's complex functionality. You can isolate even and odd scanning passes, toggle between the American NTSC and European PAL television standards, and choose between composite and higher-resolution S-Video input. The MIC System II software also offers special filters for accurately interpreting colors and for better tracking of camcorder footage.
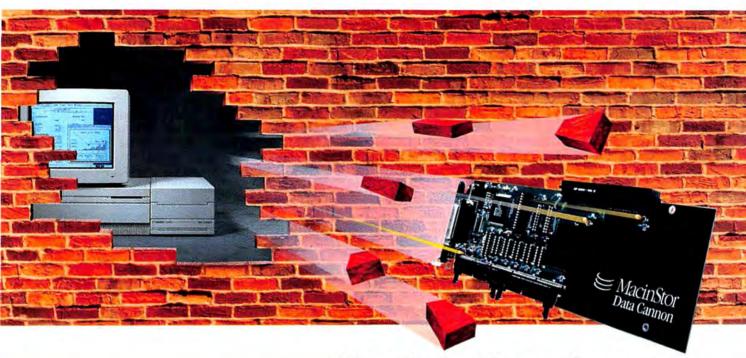
Though the DVA cannot digitize sounds to disk, you can control the volume and pitch of stereo-audio portions of a video source with the cdev. The processed audio is output as analog sound through a standard stereo headphone jack; from there it can be cabled to a stereo receiver, mixing board, or video recorder.

A third utility (poorly documented) is a collection of simple commands that gives access to all the DVA-4000's capabilities. This utility makes it possible to freeze video images on screen and control left and
(continues)

DVA-4000/Macintosh and Mediator from VideoLogic

ANNE NADLER

right audio channels independently. Many of these commands are packaged into external control files—such as XCMDs and XObjects—for use with HyperCard, Authorware, MacroMind Director, and MediaMaker.

The Video Way Out

If you want to record video and graphics images together on tape, you must use a separate encoder, like the Mediator box. The stand-alone Mediator unit provides both VGA and Mac RGB conversion and is compatible with PCs and PS/2 machines. No software is required to run the Mediator; in a matter of minutes you can have the box hooked up and ready to go. It has both composite and S-Video output jacks, the latter for use with Super-VHS and Hi-8 recorders.

A window at the front of the Mediator box displays a simple menu. Most users will find the default settings satisfactory. Normally the Mediator converts a 1-to-1 version of the 640-by-480-pixel image area to a video recorder. This results in overscanning, so that about ⅛ inch of information is lost around the edges. If you need to retain certain Mac elements, such as menu bars and scroll bars, Mediator can underscan the image area, slightly reducing its size so that the entire image can be displayed with a thin black border on a standard television screen.

Other menu options affect flicker control, picture sharpness, gamma correction, screen alignment, and output standard (NTSC or PAL). The Mediator also provides a test pattern so you can experiment with menu settings—particularly useful when you're adjusting gamma correction or sharpness. At the touch of a button you can freeze the video display so that you can make edits and transitions on screen that are not recorded or displayed by the video-out device.

Sure, $6000 is a lot to spend on video input and output, especially when you consider that all you're really doing is converting an NTSC signal to RGB and back again. But together, the DVA-4000 board and Mediator box provide a level of mixing and editing control that you will not find using less-expensive hardware.—**Deke McClelland**

See Where to Buy *for contact information.*

ANIMATION WORKS 1.0

Pros: Superb cel-animation features; outstanding program design; well-selected feature set; inexpensive. **Cons:** Manual needs improvement; animations extremely memory- and processor-intensive. **Company:** Gold Disk. **Requires:** Mac Plus; System 6.0.5. Recommended: 2MB of RAM; hard drive for long color movies. **List price:** $199.95.

Mac programmers have always seemed to have a curious definition of the word *animation*. VideoWorks, MacroMind Director, FilmMaker—all have been designed to move, rotate, or resize static images on the screen, rather than permit true *cel animation*—Disney-style animation, in which an image changes shape slightly on each frame, creating movements like a dog walking or a mouth opening.

At last there is Animation Works, the first Macintosh program under $2000 for creating stand-alone color cel animations. Even with a computer you have to paint every frame individually; but Animation Works automates that task as much as conceivably possible. The only limit to your imagination is the computer itself—but that's a big limit.

How Animation Works Works

The best thing about Animation Works is its strong, simple interface. There are no conceptual models you have to learn, as with Director's Score or FilmMaker's wire-frame mode. Instead, you work exactly as a Disney animator might: you create a background, then you create the actors that move in front of it.

You draw the actors in a color MacPaint-like window called the Cel Editor. The usual tools are there—pencil, airbrush, eraser, and so on—but they've all been improved. There are some great image processing commands (Perspective, Rotate, Resize, and so on, handily indicated by minidrawings right in the menu) and a dazzling gradient fill option.

But the real genius of the Cel Editor lies in its special frame-by-frame animation features. Suppose you're drawing a woman's face and you want her to break out in a smile over the course of five seconds. In cel animation you draw the smile a little bit bigger on each successive frame. But to create smooth movement, the image can't change by more than a few pixels from frame to frame; therefore, if you can't see the preceding frame, you're liable to paint the smile too big, too small, or even in the wrong place on the face. That's where Animation Works' brilliant Show Previous Cel command comes in. It displays a grayed-out ghost of the previous cel behind the current one, and it works like gangbusters. (There's a Show Next Cel command too.)

The Cel Editor has dozens of touches that make the process easier still: when you copy something from frame 1 and paste it into frame 2, the program places it in the same screen location as in the preceding frame, thereby eliminating the need to redraw part of your actor. Options and brushes are in floating, closable windows, so they're always available. And you can turn any selected part of the painting into a brush—a powerful feature borrowed from Studio/1. The only weak features: Rotate, which auto-creates cels, turning the image slightly on every frame; and Resize, which enlarges the images over time, producing unduly jaggy results.

Putting It Together

The backgrounds are PICT files. You can make them in any graphics program, although Animation Works' own Background Editor is perfectly adequate—it's the Cel Editor minus the animation commands.

You put the actors and backgrounds together in the Movie Editor, using a slider to move among the frames of the movie. At any frame you can insert an event—a MacRecorder-made sound, a change of background, or a change in playback speed, for example. The interface design for these events is amazingly smart; you can jump immediately from one event to the next, modify or delete an event, add annotations, and so on.

Once you've created a mini-

Friendly Ghosts In the Movie Editor you can double-click on an actor to view its entire path—a line showing the actor's movements, with nodes marking its position on each frame. You can turn on Ghosting to see where the actor is on preceding frames; whether you want this strobe-light effect to show in the finished movie is up to you.

animation of an actor—a bicyclist pedaling one time, for instance—you're back on Director and FilmMaker turf, as you define the actor's movement across the background. For most movements it's as simple as drawing a line to indicate an actor's path. You tell the program how long you want this travel to last, in frames, and the program cycles through the actor's independent motion (the biker pedaling) along the path. Other, more sophisticated path-definition tools include a Gravity option that realistically accelerates falling bodies, for example, and a Registered Motion tool that intelligently tracks an actor's anchor point as it moves across the screen.

The program has a number of extras: a flexible annotated-storyboard generator, a movie player for presentations, and a complete set of XCMDs to incorporate your work into HyperCard. There's even a half-instructional, half-commercial video. Unfortunately, everything needs editing. The narrator on the video keeps talking about "hierar-kee-al motion," the program's menus misspell *shear*, and the manual's author needs a crash course in the use of apostrophes. Speaking of the manual, it starts out splendidly, with a series of well-constructed tutorials. But halfway through, it lapses into one of those annoying feature lists that don't explain what you use the features *for*.

Memory Problems

A full-fledged, beautifully designed, fun-to-use animation package for un-

der $200 . . . so what's the hitch? Memory and speed—the bugaboos of all Mac animation programs. Storing full-screen color graphics takes incredible amounts of memory; displaying several per second nearly overwhelms most Macs. For example, a Mac IIcx with 5MB of RAM can play a full-screen, black-and-white, one-actor Animation Works movie no faster than 20 frames per second (fps)—not even the film-standard 24 fps. And in 256-color full-screen mode, forget it: Animation Works crawls along at a top speed of 5 fps.

Memory is a problem too. The more actors you have, and the more complex the backgrounds, the more memory is required. I created a movie that was about a minute long and involved four actors in full color; as it was nearing completion, I started getting out-of-memory messages. I solved the problem by installing Virtual, a virtual memory program from Connectix that tricks the Mac into thinking the hard drive is extra memory. That way, with "13" megabytes available, I had no further problems with my movie—except that now it played back at a dismal 2 fps, since Animation Works had to read everything from the disk.

Gimme the Works

Gold Disk has an accelerator program under development that the firm describes enthusiastically, claiming that it will add an incredible speed boost to any animation—and that it will read movies from disk instead of memory, meaning that your animations can be much longer and more elaborate than they can be now.

For a first-release program, Animation Works is remarkably smooth, stable, and polished. Its economical design incorporates a few choice tools that in combination are capable of generating extremely sophisticated animations. And it's cheap: $122 by mail order. Until the accelerator program appears, you'll have to make movies that go easy on color, screen size, length, or complexity. In the meantime, the brilliant Cel Editor alone is worth the price; when you see it, you'll smile at 100 frames per second.—**David Pogue**

See **Where to Buy** *for contact information.*

PIXELPAINT PROFESSIONAL 2.0

Pros: Precision painting control; can reshape most recent object; kernable text; visual effects can be applied with any tool; supports Photoshop filters; PixelPaper feature provides surface textures; enhanced PostScript printing and separation capabilities. **Cons:** Transformations applicable to marqueed areas only; can't add or deselect portion of a selection; documentation relies heavily on unindexed release notes; slow when accessing hard drive; can't change document size. **Company:** SuperMac Software. **Requires:** Mac II; 4MB of RAM; color monitor; hard drive; System 6.0.5. **List price:** $799.

A full-color paint program provides a perfect environment for combining photographic images and original painted backdrops with precise labels, lines, and schematic renderings. The new PixelPaint Professional improves and implements several alignment controls, including rulers, grids, and cursor crosshairs. You can also move a selected image in 1-pixel or 10-pixel increments using the cursor keys.

After you create an object with one of the precision tools—which include common line, shape, and bezier curve tools—PixelPaint displays an outline of the object surrounded by handles, enabling you to move, resize, recolor, and reshape it. For example, immediately after you create a line, you can adjust its length and angle by dragging the handle at either of its ends, without affecting other images in the painting. You can manipulate type in the same way. After you enter a line of type a handle appears at the base of each character, allowing you to drag a letter to a new location. Press shift and drag to kern characters. (Changes must be made before you incorporate the text into the painting and antialias its edges.)

Effects and Defects

Being able to view and manipulate the outline of an image before making it *(continues)*

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part of the painting is useful. It is ironic, therefore, that PixelPaint Pro does not provide enough visual information to manipulate images. For example, suppose you want to freely rotate a selected portion of a painting. As you rotate an image, a rectangular marquee denotes its orientation. You can adjust the angle of the marquee as much as you like before incorporating the image into the painting. But because PixelPaint does not display a detailed outline of the image, you can't accurately gauge how the rotated image will look until the rotation is completed. At that point, if you don't like what you see, you're out of luck. Despite the fact that the rotated image remains selected, it cannot be further rotated, since a complex transformation—scaling, free rotation, perspective, and so on—can be applied only to an image surrounded by an *upright* marquee. Incidentally, PixelPaint Pro's transformation restrictions also exclude lassoed images, preventing you from transforming a free-form selection, something even a basic paint program can do.

One new feature, MeshWarp, stands out. It allows you to subdivide a marqueed area into a network of vertical and horizontal guidelines. Dragging the point located at a grid intersection bends the corresponding portion of the selected area independently of the other portions. The result is a controlled warping effect, allowing you to perform highly specialized distortions on an image.

PixelPaint's most exciting manipulation features are accessed in the new Visual Effects pop-up menu. These effects can be applied to any selected image, and can be applied using the airbrush and paint can. In addition to providing built-in effects that let you adjust an image's contrast and colors, PixelPaint Pro supports all filters compatible with Adobe Photoshop, including Pinch, Twirl, and ZigZag. (No external filters are shipped with PixelPaint Pro 2.0.)

Pattern, which provides access to a collection of naturalistic textural backgrounds called PixelPaper, is perhaps the most exciting visual effect. PixelPaint's masking feature allows you to use a masked area to simulate a textured background such

Facing Effects After scanning a gray-scale photograph of a man's face, I colorized and enhanced the image using a combination of built-in visual effects and external Photoshop filters. The clothlike pattern behind the right-hand image was created using the pastel tool against a PixelPaper mask. I pasted two rows of eyes against a marble PixelPaper backdrop. When I added the yellow highlights to the right-hand image using the Paste Control window, Pixel-Paint left a ghost version of the face near the center of the painting. The ghost is the result of a software bug, but like Man Ray, I accept that it was meant to be that way.

as concrete or slate. After you import the texture file to the mask layer, drawing over the texture with the mask turned on creates a grainy image that looks as if you are rubbing a pastel stick over a rough surface.

Tight Structure

PixelPaint Professional 2.0 offers better control and is more versatile, and ultimately easier to use, than version 1. For example, to create a translucent brushstroke, PixelPaint offers a single transparency controller that can be set independently and applied using any drawing tool. You can apply layers of paint using a variety of tools. Unexpectedly, however, the transparency setting affects everything, including pasted images, visual effects, and even objects moved to a new location. Eventually the new interface begins to make sense and even becomes predictable, but be prepared to make some mistakes and maybe even ruin a painting or two in the experimentation process.

A new path-selector option enables you to control how the painting tools work. For example, you can restrict the paintbrush to creating freeform polygons, use the charcoal tool to draw bezier curves, or paint dashed lines with the airbrush. My favorite is

the Random Path setting, which allows you to create speckled lines within a strictly contained area.

Ironically, the selection tools are the most isolated. Unlike in Photoshop, where different selection tools may be used to add to and deselect portions of the current selection, in PixelPaint Pro you can use only one selection tool at a time. And of those tools, only the new magic-wand tool can add to a selection; you cannot specifically deselect portions of a selection using any tool, severely undercutting PixelPaint's value as a photo-editing program. In fact, when compared to those of Studio/32 and Photoshop, PixelPaint's selection capabilities might be a complete write-off if it weren't for the Paste Control window. The Paste Control window lets you determine how colors in a selection interact with existing colors in the painting. You may specify that any number of colors in the selection become translucent or masked. Finally, you can blur the edges of a selection using the Vignette slider bar.

Final Dress Version

Ultimately, the new PixelPaint Professional is a well-designed program offering several unique features. Its printing capabilities have been improved, making them comparable to Photoshop's and ColorStudio's. The masking feature has been made more powerful without sacrificing simplicity. But PixelPaint Pro has been rushed. The manual is excessively inaccurate due to last-minute changes to the program. Although 24 pages of release notes document the changes, the release notes are not indexed. Most surprising, the notes list more than 25 known bugs that affect version 2.0. Of these, more than 20 qualify as real problems, some of which I encountered, and 3 of 20 cause system errors. Although I must extend some credit to SuperMac for having the courage to acknowledge the program's faults, I still can't understand why the company didn't remedy the known bugs; isn't that what the beta process is for?

Outside the realm of bugs, the program suffers from other problems. Though it offers virtual memory for opening and editing large documents, *(continues)*

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M150 Mac Portable	22855	$519

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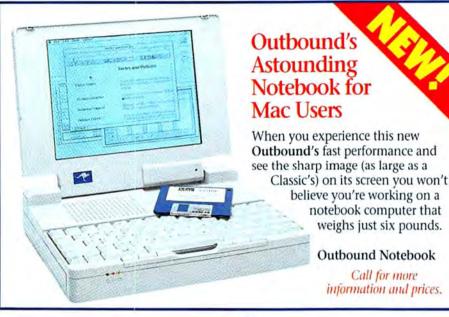
PowerKey (Sophisticated Circuits) 25030 $64

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Label Printer	22852	$189

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No matter what kind of fun you might be in the mood for, **MacAvenue's** new **Fun Pak II** has just what you need! Take your pick — from Apache Strike's fast-paced action to the calmer strategies of Shanghai. You'll be a winner every time! Also includes Solitaire Royale, Talking Moose and Dark Castle — more than $200 worth of software for only $49.95.
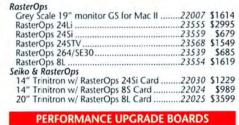
MacAvenue Fun Pak II 29410 $49.95
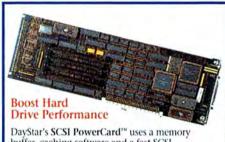
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Teleport Modem	22311	$135
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Protegé 2400 External w/ Software	22315	$99
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Enhanced microLaser

Texas Instruments has added 16 page-per-minute printing speed to their popular line of **microLasers**, the printer that was awarded 4½ mice from *MacUser*. The **microLaser XL** offers the same quality output as the original microLaser and it offers added upgrade flexibility.

TI microLaser XL
35 font w/ AppleTalk	22859	$2989
17 font w/ AppleTalk	22858	$2689

TI microLaser
35 font w/ AppleTalk	22851	$1689
17 font w/ AppleTalk	22856	$1389

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the program is slow when accessing the hard drive. Paintings saved in the native PixelPaint Pro 2.0 format are enormous, up to four times the size of the same paintings saved as PICT or TIFF files. Unlike with the previous version, you cannot control the size of an existing document; you must either crop it to a smaller size, or merge it with a new document to create a larger painting. And while PixelPaint Pro supports pressure-sensitive input, there are no pressure-sensitive preferences or options.

PixelPaint Professional 2.0 remains a top-of-the-line paint program. The enhanced feature list helps the program stand out when compared to the competition, but much of the implementation is flawed, especially when you consider the elegant environments available in Studio/32 and Photoshop. If your work involves creating naturalistic images on the Macintosh, you owe it to yourself to try the new PixelPaint, but you might want to wait for version 2.01 before you commit yourself.—**Deke McClelland**

See **Where to Buy** *for contact information.*

★

| Strategy Game |

ROBOSPORT

Pros: Humorous, playable, and challenging; multiplayer, modem, and network options; can save animations of games. **Cons:** Copy-protection scheme; incompatible with Ethernet, zoned networks, and most network software. **Company:** Maxis. **Requires:** Mac Plus; System 6.0.2; 2MB of RAM and hard drive for color. **List price:** $59.95.

Some people believe that war will soon become the province solely of fighting machines. Nations will quickly progress from smart weapons to robot warplanes and tanks. Supercomputers will displace generals. One day, in a flash of artificial insight, supercomputers will reject the absurdity of war, and proclaim planetary peace. Then, sharing an irony that dates back to the Pax Romana, the supercomputers will institute RoboSport, in which surrogate robot holograms stage battles

that satisfy the innate brutality of humans but without any destructive consequences. Whether or not you buy this politically correct packaging of game violence, RoboSport is good, clean fun—full of the kind of wanton violence humans love.

But first a warning: RoboSport is not for everyone. It's easy to misunderstand the game at first. RoboSport looks like an arcade game but it's really a strategy game. This is not a criticism so much as an observation— if you like arcade games and you don't like strategy games, don't buy RoboSport. But for strategy-game enthusiasts, I highly recommend RoboSport.

Robot Fire Teams

Up to four teams of robots oppose each other within one of the walled arenas: ancient ruins, suburbs, or an oversize computer circuit board. Walls, bushes, clearings, and rough ground afford varying degrees of mobility, visibility, and protection. Each team is made up of two to eight robots. Robots warp in from holding pens to their home areas and proceed to maneuver and engage opposing teams in combat. Robots expose themselves to varying degrees of danger by hopping around in a crouching, ducking, or upright posture. Robots rely heavily on their scanners, which must be aimed in the appropriate direction to sight an approaching enemy.

Individual robots vary in firepower and toughness, and they are named after their weapons. Rifle is the toughest robot, but it can only fire twice a second (although with great accuracy). In comparison, Auto's equalizer is a nasty automatic rifle that fires six times a second. Other robots include Burst, a mix between Rifle and Auto, and Missile, a robot that delivers a bazooka-like wallop. Depending on the scenario you choose, robots also carry grenades, time bombs, and zap weapons.

Program and Play

At the beginning of each turn, you program robots individually to maneuver and fight. The basic objective is to survive while destroying the enemy, even though you can play such game variations as capture the flag,

Battle in the Burbs Two teams of opposing robots mix it up in this suburban arena. The laughing robot is Missile, who has just decimated the enemy robot who screams "Arrgh."

treasure hunt, and hostage rescue. It takes about an hour of practice before you begin to get a handle on the game. Robots are relatively simple to program once you acquaint yourself with the controls. I found no stumbling blocks to learning the game, thanks in part to a manual that is thorough and well organized.

After programming the robots, you watch the action unfold in an animated "movie." Although you can't modify a robot's program during the movie, you can study the consequences of tactical decisions. Movies of entire games can be saved and played back in a separate application called RoboPlayer. More games should have this feature. Movies are a little difficult to decipher at first because of the game's amusing but vague graphics (however, the more I played RoboSport, the more I liked the understated graphics, which help simulate the fog of war).

You can play RoboSport against any mix of up to three computer or human opponents. You can play another person by modem or up to three other people on a network. You must do this on a rather primitive LocalTalk network because the game is incompatible with zones, Ethernet, and most network applications.

The real joy in RoboSport comes from mastering the nuances of battle tactics. RoboSport is closest in structure and character to a war game, and it comes close to simulating small-unit, house-to-house combat. It is more playable than most war games, however, combining as it does serious tactical planning with the feel of a wacky ant colony.—**Adrian Mello**

See **Where to Buy** *for contact information.*

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LOCALSWITCH

Pros: Isolates traffic among 16 networks; easy to install; software offers easy monitoring of network traffic; can be rack-mounted. **Cons:** Cannot assign zones; limited to LocalTalk networks; limited to total of 254 devices for all attached networks; expensive. **Company:** Tribe Computer Works. **Requires:** Mac Plus; LocalTalk network; PhoneNet cabling. **List price:** $3495.

There's been a glut of routers for LocalTalk networks in the past few years, but no vendor has ever stepped forward with an easy-to-install, easy-to-use LocalTalk bridge. Until now, that is. Tribe Computer Works has introduced the first bridge for LocalTalk networks, called the LocalSwitch. And it has done it in spades, offering a 16-port bridge.

Installation

Installing the LocalSwitch is pretty simple, especially if the network is already wired in a star topology. If you have a Farallon StarController or Nuvotech TurboStar hub, you just unplug the current hub from the punchdown block in the wiring closet and replace it with the LocalSwitch. However, if you're replacing a Star-Controller, you cannot take advantage of the LocalSwitch's additional four ports unless you rewire the network by adding some branches to the punchdown block. The manual clearly explains the relationship between the ports of active hubs and the LocalSwitch, as well as how to wire a punchdown block.

Once the LocalSwitch is attached to the punchdown block, you simply plug it in and turn it on. The LocalSwitch monitors traffic and automatically updates its routing table for the 16 ports.

The front-panel display includes lights for each port indicating which ports are disabled and which are handling traffic. The only problem I found was that the display uses colors (green, red, and orange) to indicate port status, but the legend on the front panel uses symbols.

Software

The SwitchMonitor application serves two major functions—configuring ports and monitoring traffic. You need to use SwitchMonitor if you want to disable some LocalSwitch ports. You also use the program to add text comments describing each port. The LocalSwitch configuration, including comments, is stored in a text file on the same Mac as SwitchMonitor.

SwitchMonitor also includes a dynamic display of activity from each port (for switching purposes) or the network attached to each port. You can set the display to be dynamically updated over any time period, starting with a minimum of one second. The port statistics can be saved to a text file; data is saved when you update the display and can be acquired when SwitchMonitor is running in the background.

Performance

I set up a number of simultaneous file transfers between Macs, each located on a different port. (I did not have enough Macs to test more than six ports at a time.) I detected little if any difference in transfer times between a single session running on an isolated LocalTalk network and two or three sessions running through the Local-Switch at the same time.

Network Design

Prior to the introduction of the Local-Switch, the common way to divide a network (or join smaller networks together) was to use a router. Once you installed a router, you could isolate the traffic of one network from that generated by another; you also could create zones to make it easier for users to find and access network resources like file servers and printers. Since the

LocalSwitch is a bridge, it does not provide the option to create zones. Also, since the LocalSwitch connects LocalTalk networks, you're still limited to a maximum of 254 nodes per LocalTalk network.

You can think of the LocalSwitch as a series of 16 LocalTalk routers attached to a common backbone; the major difference is that the Local-Switch backbone is faster and has less processing overhead. The LocalSwitch can have a network attached to each of its ports, and it will ensure that the traffic local to each network is isolated from the other 15 networks. Although I did all my tests with a single Local-Switch, you can install multiple Local-Switches and connect them.

The LocalSwitch isn't for everyone. Small networks of six to ten users probably don't need one. A Local-Switch won't give you more than 230kbps per session, but more people might be able to use the network at the same time for greater effective throughput.

If you're thinking about switching to Ethernet, keep in mind that it can cost about 33 percent more than a LocalSwitch, if you assume $300 per board for 16 users. (10BaseT Ethernet with UTP wiring costs even more because of the price of the hub.) But also consider that Ethernet can give you three to five times' improvement in file-transfer speeds.
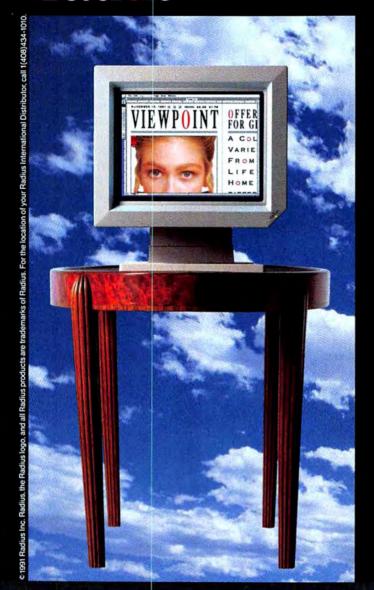
Large networks where LocalTalk nets are isolated from an Ethernet backbone via routers can benefit from the LocalSwitch, since the LocalTalk net users can benefit from their added "network bandwidth." I think the LocalSwitch deserves serious consideration in many network situations. Check it out.—**Dave Kosiur**

*See **Where to Buy** for contact information.*

The LocalSwitch from Tribe Computer Works is an easy-to-use LocalTalk bridge.

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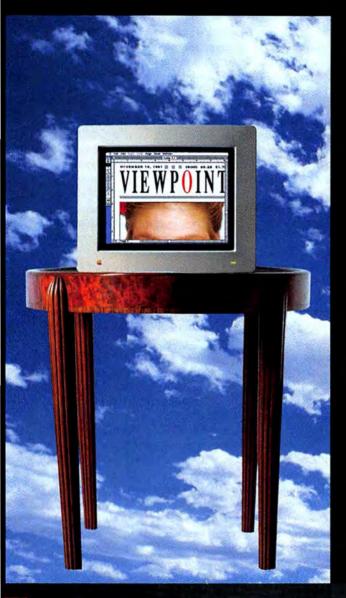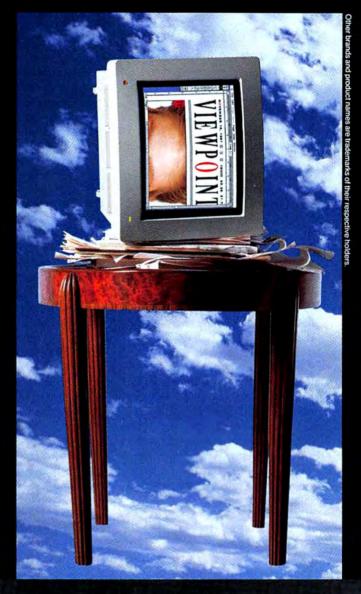
THE NEW COLOR PIVOT SHOWN IN LANDSCAPE AND FULL-PAGE MODE.

The comparison you see above is really no comparison at all. ● If you live in a world where things are all middle with no top or bottom, or where the year has only six months, you might choose the Apple. But if you would like to see a full page of color graphics, and see twelve months of spreadsheet instead of merely six, and be able to go from portrait to landscape with swift and deft ease, *and* own the only color full-page display on the

THE APPLE 13" SHOWN IN LANDSCAPE AND...UH...PAPERWEIGHT MODE.

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3-D Graphics Package

INFINI-D 1.0

Pros: Extensive texture options; excellent image-mapping control; fully integrated animation, including texture tweening. **Cons:** PICS file–mapping feature incomplete; modeler weaker than rest of program. **Company:** Specular International. **Requires:** Mac II; 4MB of RAM; hard drive; 8-bit video board; System 6.0.4; 32-bit color QuickDraw. Recommended: 5MB of RAM; 24-bit video board; color monitor. **List price:** $895.

The Macintosh 3-D software market has traditionally been a small and vertical world: engineers and architects. Gradually, programs with simplified interfaces, such as Paracomp's Swivel 3D Professional and Enabling Technologies' Zing, extended the market into the realm of artists and designers. Infini-D is one of a new generation of programs that incorporate features found in the CAD world, as well as more-creative options that are of interest to animators and multimedia artists. The program has an impressive array of controls and effects, and while it shows some rough edges typical of a first version of a complicated program, its potential is astounding.

Make My Object

Infini-D is really a single application containing multiple modules that work in unison: the modeler, the rendering attributes editor, and the animation sequencer.

The modeler has basic primitive shapes (sphere, cube, cone, cylinder, and torus) and can create extruded and lathed objects. The special-object tools include free-form shapes (similar to the standard Swivel 3D editable shapes), a terrain tool (for making digital mountains), and an infinite-plane tool (for flat surfaces stretching to the horizon). These tools link together basic shapes to make more elaborate models. You also have full control over smoothing and point selection when you're editing outlines meant for extrusion or lathing, or those created in free-form mode.

The extrusion editor allows you to import a PICT image to use as a reference template: you draw over the image with the drawing tools, and when complete, the drawn outline is extruded. You can adjust the depth of the extrusion effect by using the stretch and scale tools. The lathe is used to revolve an outline around its vertical axis—good for bottles, wineglasses, and other symmetrical cylindrical shapes.

After the object is created, you can place and manipulate the object in 3-D space with extreme precision. There are tools to spin an object on any axis. An Object Floater windoid displays the scale, orientation, and scaling information for a selected object. The windoid updates the values displayed as you drag the object with the mouse, and you can manually enter values for increased accuracy. And you can lock any attribute to a specific value, a great feature that helps you create consistent animation movement and manipulate complex linked models.

Infini-D has a variety of options for linking objects, making it possible to create complex hierarchical models. One option is the ability to specify the type of link, including position and pivot locks, which helps create elbow joints and complex relational animation. You can display the links as lines drawn between the parent and child objects when editing a model. And for Swivel 3D users, Infini-D can import Swivel files, complete with hierarchical linking and keyframe information.

One complaint about the modeling tools in general: as do many Mac 3-D programs, Infini-D has some limitations for modeling complicated organic and irregular shapes. While this might not be a problem for many potential Infini-D owners, the modeling tools are the weakest part of the software and should be improved.

View Modes

You can work in either single-view mode or multiple-view mode. Each window can be set to a separate default shading mode, and you can move the view, or *camera*, to any location to see other viewpoints. Infini-D allows you to change the focal distance of the cameras, making it easy to simulate any lens-distortion effect, from fish-eye to telephoto.

You can create both point lights and spotlights in Infini-D. You can position lights just like any other object, and they can be any color. Spotlights have an adjustable focus and beam angle.

Infini-D's rendering controls are quite robust: there are a variety of rendering-quality options, including standard bounding-box and wireframe modes, a fast solid view (Z-Buffer), Gouraud and Phong shading, and ray tracing (a full simulation of light effects, including shadows and reflective surfaces). Ray tracing can be specified either for the entire image window or for a selected area (which allows you to judge the effects of surface and lighting attributes on an isolated portion of a scene). You can also display image windows with dithering (good for running Infini-D on an 8-bit display) and supersampling (another display-quality enhancement).

Incredible Textures
A sampling of Infini-D's textures. These are all included with the package. Note the shadows.

Textures

The texture options in Infini-D are, in a word, incredible. The built-in procedural textures include wood, marble, noise, fractal types, and the most flexible tiling options I've ever seen in a Mac 3-D program (all of these attributes are fully programmable via a highly graphic interface). Add to this the ability to specify transparency, diffusion, specular highlights, shininess, metallicity, glow, reflectiveness, and refraction index, as well as bump maps, corrosion maps, and wave maps (you can create rippling water, cross-modulated complex waves, and more), and you can create a staggering variety of natural and synthetic surface attributes. Infini-D ships with an enormous collection of predefined texture and surface maps that are easy to edit and modify. You can also create libraries of textures and save them as sets. Unfortunately, Infini-D doesn't support RenderMan RIB file output, which would complement its texturing potential.

The Surface Composer enables you to easily mix a variety of texture, bump, and surface maps with fully controllable layers and masks. Using the Surface Composer, you can map an external PICT image onto an object surface with an astounding degree of control over position, projection, and scaling. You can also use an imported PICT as a glow, reflection, or bump map.

I did find an annoying drawback: although the program allows you to import a PICS file for use as a surface map, you can only select a single frame of the PICS file to be applied to the object. You would hope that the whole PICS file would be "played back" onto the surface of the object, thus making it possible to create dynamic, animated texture maps. This feature needs to be fixed.

Another point that deserves mention: ray tracing is a slow process (in just about any Mac 3-D software), but Infini-D lets you preview your work before committing to the lengthy rendering times required for ray tracing complex images (though all rendering modes work in the background under MultiFinder; I'm rendering a frame in the background as I write this very sentence in Microsoft Word).

Animation

Infini-D deals with animation as a series of parameters changing over time. An object's position, size, shape, color, and texture can be animated by simply dragging the objects around and recording keyframes; the program creates the in-between frames. The position, orientation, color, and intensity of lights can also be animated. You can specify acceleration and deceleration factors, and record the animation sequence to disk as a PICS file, with control over the maximum file size and desired bit depth. You can even animate wave maps.

Infini-D is a powerful and intuitive do-it-all 3-D program that belongs in the toolbox of any multimedia artist. I can imagine that a future version of this program might be called Godzillaware.—**David Biedny**

See Where to Buy *for contact information.*

※

Fax Modem and Telephone Answering Machine

DOVEFAX+

Pros: Automatically switches between data mode and fax-and-voice mode and between fax and voice modes; excellent fax software. **Cons:** No power switch; answering software lacks some basic features.
Company: Dove Computer Corporation.
Requires: Mac Plus; 2MB of RAM; hard drive; System 6.0.2 or later. **List price:** $549.

The DoveFax+ modem reminds me of the old "Saturday Night Live" routine in which a couple is arguing about a new product. "It's a dessert topping!" the husband claims. "No, honey," insists his wife, "it's a floor wax!" The announcer steps in and informs the hapless couple that they're both right: "It's the floor wax that's just right on your dessert!"

The DoveFax+ is a 2400-bps, Hayes-compatible data modem, a 9600-bps send-and-receive fax modem, and for added measure, it works as a telephone answering machine. It performs the first two functions very well; the answering machine part still has a few rough edges.

Putting It Together

The DoveFax+ is easy to set up. The modem unit is about the size of a hand and about 1½ inches thick. The front sports the usual modem LEDs, plus two lights to indicate fax or voice mode. The rear of the modem has two RJ-11 phone jacks, the power input from the separate power supply, and a jack for the included microphone. It connects to the Mac's modem port via a 3-foot wire permanently attached to the DoveFax+. The unit lacks a power switch—an annoying omission. Sometimes modems just lock up, and the best way to reset them is to turn them off and then back on. In fact, the DoveFax+ locked up a few times during testing, and I was forced to unplug the modem from the power supply.

To install the fax and voice software, you run the Installer program and copy two desk accessories (DAs) to your hard drive. The software takes up about 1.5MB.

Data Facts

The DoveFax+ works almost flawlessly as a data modem, connecting easily to CompuServe, America Online, and a local BBS. And the modem switches automatically to the data mode from the fax-and-voice mode when you start up a telecommunications program, then switches back when you quit the program—a nice feature. There are two things that the data mode lacks, however. First, the unit has none of the error-correction or data-compression protocols, such as MNP Classes 4 and 5, or the newer V.42bis compression. Modems costing far less commonly include at least some of these protocols, which are valuable because they can help save time and money by increasing data throughput when downloading files. The second, more esoteric, problem is that the modem accepts dialing strings up to only 38 characters, making it difficult to make calls with a credit card. The combination of the local access number, the phone number, and the credit card number is too long; the modem returns an error mesage and refuses to dial. I'd like to see Dove address both of these shortcomings.

(continues)

Fax Facts

The Dove Installer puts a fax driver called FaxPrint in the System Folder, which you access via the Chooser. The FaxManager application lets you set preferences, and view and print received faxes, and it keeps a log of all fax activity.

You fax in the same way that you use any printer: you pick FaxPrint in the Chooser, choose Print from the application, and then specify the recipient from the Print dialog box. You can define a new fax recipient right from the Print dialog box, and the entry gets saved in the fax phone book. After you address the fax, you have the option of sending the fax right away or saving it on disk for later transmission. When a fax is sent or received, the FaxStatus DA opens and gives you an animated play-by-play of the transmission process.

The fax software handles incoming faxes in the background, with or without MultiFinder. To receive a fax, the Mac and fax modem have to be turned on, and the fax software needs to be waiting for a call.

I Can't Come to the Phone Right Now

What Dove calls the "voice modem" portion of the DoveFax+ is the most interesting part of the product. With it the Mac becomes a telephone answering machine. The modem digitizes incoming and outgoing messages, storing them as sound files on the hard drive. You can assign a Caller ID for your frequent callers and record a personal message for each one.

You start out by using the Dove-Fax+ Manager software and the modem's microphone to record several outgoing messages. The first is the Initialization Message. This greets the caller and then pauses for 4 seconds to let the caller enter a Caller ID, or if it's a fax machine calling in, allows time for the fax tones to kick the DoveFax+ into fax mode. If neither of these things happens, the Answer Message plays, inviting the caller to leave a message. If the caller enters a Caller ID, a User Message customized for that caller plays, and the caller can leave a message. If the hard drive is full, or if the caller runs out of recording time, the No Resources Message plays, telling the caller to try again later.

You can pick up your messages remotely, and the software can even forward your messages. For example, if I had my message forwarded to me at a friend's house and I got a call from someone, my friend's phone would ring, and when he answered the phone, he'd hear (in my voice), "Hello, this is Tom's Macintosh. I have messages for him. Would you get him, please?" The modem would then wait for me to enter my password and then play back my messages. The modem also switches automatically between voice and receive-fax modes, so if a fax machine calls in, the fax is received, and then the modem returns to voice answering.

The DoveFax+ can set up any number of different Answer Messages, and the software will automatically switch between them, depending on the time of day, day of the week, or some specified time.

An icon of an off-the-hook phone pops up on the desktop when you have messages waiting. To play messages back on the Mac, you need the DoveFax+ Manager—an intuitive and convenient program to use. You click on the message and then on the Listen icon. To delete a message, drag it to the program's Trash icon.

Trouble, Right Here in Modem City

The DoveFax+ is a new type of product for the Mac market, and the voice modem software suffers from Version 1.0 Disease: some features that seem obvious are missing, and others don't work well. A glaring example is that incoming voice messages are saved in a DoveFax Voice folder inside the System Folder, and this folder can't be

Away We Go The DoveFax+ fax software couldn't be easier to use. You simply select the quality of fax transmission (here, set to Best), drag the destination address into the Send To box, and click on OK. The document is converted into fax format and sent.

put anywhere else. Also, the Dove-Fax+ Manager application has some items in the Voice menu, such as Call Screening, that don't work yet and are grayed out. Dove says it plans to activate these features in a future version of the software.

Incoming messages are limited to 40 seconds each, clearly not enough time. And the DoveFax+ lacks some common answering-machine features that even my eight-year-old Code-A-Phone has, such as the Tollsaver, which instructs the phone machine to wait to answer until the fourth ring if there are no messages, and pick up on the first ring if messages are waiting. (Dove may add this feature in a future release.) And there's no way to kick the DoveFax+ into record mode after listening to messages, so I can't leave a message for my wife without calling back. On the other hand, I can delete individual messages, so that when my wife calls in she doesn't have to listen to messages meant for me.

One final caveat has less to do with the DoveFax+ than with your way of working. A programmer friend pointed out that while his phone machine has never crashed on him, his Mac has, and besides, he's not comfortable with leaving his computer on 24 hours a day. My Mac is on all the time, so that's not a problem for me. You have to decide for yourself.

Triple Threat

The DoveFax+ is very good as a data modem, excellent as a send-and-receive fax modem, and good in the new category of voice modem. The voice software's kinks need to be worked out, and Dove has outlined plans for at least one software revision, to be released by the time you read this. I'd like to see data-compression and data-correction features added to the data-modem mode, but it's still usable just as it is. In a recent comparison of fax modems ("Fax Modem Facts," August 1991), Macworld Lab found the DoveFax modem and software to be at the top of the heap in both speed and ease of use. If you're in the market for a fax modem, and you would like to take advantage of the voice modem features, then the DoveFax+ is a good buy.—**Tom Negrino**

*See **Where to Buy** for contact information.*

Gray-Scale Image Editor

ALDUS DIGITAL DARKROOM 2.0

Pros: Improved interface; better painting capabilities; lots of new features. **Cons:** Slow; buggy; lacks important features. **Company:** Silicon Beach Software. **Requires:** Mac Plus; hard drive; System 6.0.4. Recommended: Mac II; 2MB of RAM; System 6.0.5; gray-scale or color monitor. **List price:** $395.

Who will write the Photoshop of gray-scale image processing programs? Who will publish the gray-scale scan-retouching program that's fast, powerful, flexible, and easy to use?

Well, it won't be Silicon Beach. The biggest problem with Aldus Digital Darkroom 2.0 is the same one that plagued version 1.1: it can't handle even moderately large files of, say, a megabyte or so. (For reference, a 5-by-7-inch image scanned with a high enough resolution to be reproduced at 133 lines per inch on an imagesetter takes up about 1.35MB.)

What do I mean by "can't handle"? For one thing, the program crashes frequently. This is a case-by-case thing; maybe Digital Darkroom doesn't crash on all machines, but it crashed a dozen times on me in five days of use.

Another annoyance is the maddeningly slow operating speed. Waiting for big processing operations is bad enough, but you have to wait for the small things as well: deselecting a file can take 5 to 7 seconds—and I was using a IIcx with 8MB of RAM installed.

I tested Digital Darkroom 2.0 against Adobe Photoshop (more costly, but a well-known standard). I recorded how long it took each program to open a file, rotate a file, and drop a selection (deselect). In all cases, Digital Darkroom was slower.

Another shortcoming is that the program takes advantage of virtual memory only under System 7. The manual admits that the program can require up to *four times* the size of your image, plus the size of your System and the program (about 200K minimum) to complete certain functions. In reality, even this isn't enough;

with 8MB installed and 5MB allotted to the program under MultiFinder, I was unable to rotate a 550K image file.

A final shortcoming is that Digital Darkroom can't work in 1 or 4 bits; all files are automatically translated to 8 bits—and therefore can take up 3 to 12 times more memory than 1- or 4-bit images.

Feature Fumbles

Digital Darkroom 2.0 also lacks a masking channel. There's no way to save a selection you've created except by copying it to the Clipboard.

Antialiasing—the process of blurring jaggies so that object edges appear smooth—is another omission. Digital Darkroom 2.0 does offer feathering, which lets you surround a selection with a gradient of a specified number of shades. Although feathering helps blend pasted objects into their backgrounds, it doesn't eliminate jaggies. In addition, you can't apply feathering to text.

Some of the program's controls for adjusting gray levels were improved, but you are still required to draw gamma curves freehand with a pencil. Over the years I've gotten pretty good at using this tool, but I still hate it. I don't want to draw freehand; I want to see numerical data instead of just a dotted line on a graph. The program does offer a new, numerical tool, a modified gray map with associated numerical readouts. The problem with this tool is that it isn't interactive—you build the curve, save it, close the dialog box, open another dialog, and apply the curve. If you don't like the effect, you have to start over.

Digital Darkroom 2.0 still displays only every other gray shade on screen—128 as opposed to 256. This doesn't matter unless you're trying to do subtle retouching, such as fixing a scratch or (ahem) antialiasing a selection by hand.

Too Little Too Late
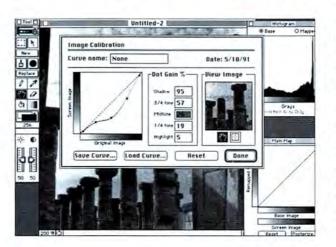
Most of the improvements are features we take for granted—such as tear-off control palettes and the ability to open multiple documents. The program also provides a flexible gradient-painting tool, a clone tool, and a colorization mode that lets you add a 24-bit tint to selected areas.

The program has painting tools that provide most of the controls you can think of, including an antialiased brush mode (though the paint bucket lacks opacity controls). To my mind the painting tools are complicated. In a single session you could easily have to work with half a dozen or more dialog boxes or palettes to get the effects you want.
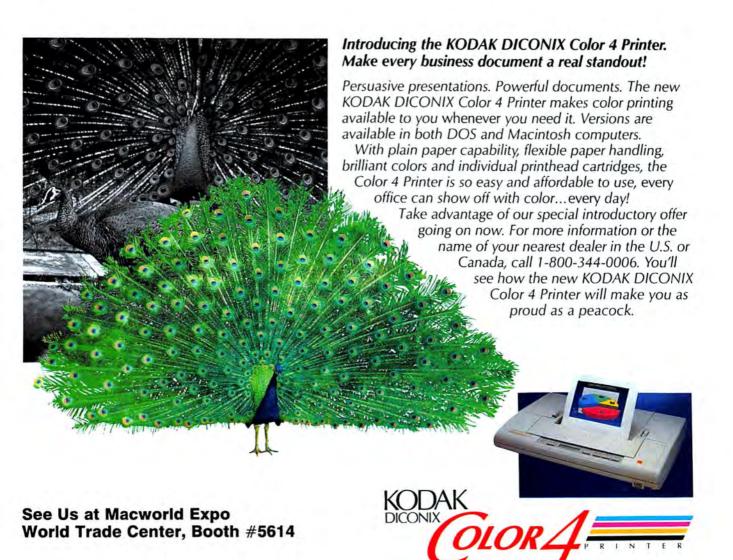
Two new features are quite nice as well as unique among gray-scale programs. You can see the results in real time when you stretch, slant, or rotate selections. The new search-selection controls work with the magic wand and paint bucket. You can set tolerance à la Photoshop, or you can specify a range of values.

Digital Darkroom 2.0 costs $75 to registered users of 1.1 or 1.0. If you always work on small files at low resolutions—for on-screen or LaserWriter purposes only—then the upgrade is probably worthwhile.—**Joe Matazzoni**

See **Where to Buy** *for contact information.*

Almost Cool Digital Darkroom 2.0's new calibration dialog box lets you build and save tonal correction curves. You can make image measurements in the View Image window, but the image in the window doesn't change when you alter the curve. You must close and go to a new dialog to apply changes.

Keyboard

MACPRO PLUS

Pros: Adjustable key feel; adjustable height and slant; interchangeable control and caps-lock keys; period and comma locking; works with any Mac; limited lifetime warranty; free Tempo II macro software available. **Cons:** Some IBM-key labeling; to switch caps-lock and control-key functions requires resetting a DIP switch. **Requires:** Mac Plus. **Company:** Key Tronic. **List price:** $179.

Keyboards are like background music: you don't notice them until they start to irritate you. I started looking for a new keyboard when the one that came with my Mac Classic (the 81-key Apple Standard Keyboard) started to make my hands ache after a few hours of work. I decided that I didn't like the feel of the keyboard, the lack of function keys, the angle of the keyboard, or the arrangement of the arrow keys along the bottom row of keys. Luckily, alternative keyboards are available. They don't sport the Apple logo or match the Mac's plastic platinum, but they do offer greater customization features, lower prices, and longer warranties. I used Key Tronic's MacPro Plus keyboard for a few weeks and found that it met all my needs, and it made working at my computer easier and far more comfortable.

The Key Differences
The MacPro Plus is similar to the 105-key Apple Extended Keyboard. They both have a numeric keypad, a row of 15 function keys, and a diamond-shaped arrow-key array. But there are a few obvious distinctions. The MacPro Plus's return key, for instance, is larger than the one on the Apple keyboard and is shaped like a reversed L, making it easier to hit. The letter keys are light gray, while the control keys are a darker gray, and a red LED light on the keyboard lights up when the computer is turned on. The shift key on the right side is one key closer to the center than it is on the Apple keyboard. And the little reference nubs for touch typists are on the F and J

keys (as they are on my typewriter) instead of on the D and K keys, as on the Apple keyboard.

The MacPro Plus has tilt-up legs on the back. When they are extended, the keyboard is as high as the Apple keyboard, 2¼ inches. With the legs folded up, the MacPro Plus lies flat on the table, at only 1¾ inches. A half-inch variation doesn't seem like much, but over the thousands of keystrokes it takes to write a story, it makes the difference for me between aching hands and comfort. Obviously this is a personal preference, but at least the MacPro offers two height settings. Owners of Macs from the 128K to the 512K will appreciate the RJ-11 jack on the MacPro (the RJ-11 cable is available for free from Key Tronic). And if you send in the registration card, you also receive a free version of Tempo II, a macro-making utility that normally sells for $149.95.

Adjusting the Touch
The MacPro Plus keyboard lets you change the feel of the keys. The keyboard comes with 2-ounce rubber domes that sit under each key. After you hit a key, the little domes bounce back to their full height. That bounce signals touch typists that they've actually struck the key. To change this bounce you can order Rubber Dome Kits from Key Tronic for $15 each. You get a plastic bag containing little rubber domes and a pliers-like tool. Pulling off the keys with this tool is about as hard as opening a can of soda pop, and a whole lot easier than, say, cracking walnuts. You pull off the plastic key, and underneath is the standard rubber dome. You can replace it with either a 3-, 2.5, or 1-ounce

MacPro Plus from Key Tronic

dome. With the heavier domes the keys feel harder to press; with the lighter ones they feel easier to press.

After you change the domes, you snap on the keys with a resounding click. All in all, this is a well-designed option. For the mechanically intimidated, it is impossible to replace the keys sideways or upside down (I tried it). The pieces only snap together the right way. The rubber domes of each weight are also slightly different colors, so if you get up to answer the telephone in the middle of replacing the domes, it is easy to see where you left off.

Controlling the Keyboard
You can switch the position of the control and caps-lock keys. You open a small switch cover, located on the back of the keyboard, and turn on a tiny DIP switch. You don't have to switch the keys on the keyboard, though, because their alternate function is printed on the facing edge of each key, but Key Tronic does provide alternate keys that say Ctrl and Caps Lock on the top.

Holding down the right-hand control key and escape key at the same time allows you to temporarily interchange these keys' functions. They stay in their switched settings until you restart the Mac or hit the control-escape key combination again. Pressing together the right-hand control key and the F15 key allows you to turn on the period/comma lock. This lets you lock out the < and > symbols, for example, when you type abbreviations in all capitals; only periods and commas will appear.

Keying In a Choice
My problems were relatively minor. I dislike minuscule and hard-to-see DIP switches on the back of peripheral devices; and some of the MacPro's keys, like Print Scrn and Scroll Lock, are labeled for PC functions—I'm too used to Apple's impeccable industrial design not to be bothered by PC labels. But the MacPro Plus lets me adjust the feel of the keyboard and customize some key positions, and it offers a limited lifetime warranty and a free macro package. It's a keyboard I can easily recommend.**—Liza Weiman**
*See **Where to Buy** for contact information.*

DYNOPAGE 1.0

Pros: Provides many print options not available with standard printer driver; extremely flexible; easy to use. **Cons:** Takes practice to master; incompatible with some common applications. **Company:** Portfolio Systems. **Requires:** Mac Plus; System 6.0.3; PostScript or QuickDraw printer. **List price:** $125.

With a wealth of easy-to-access printing options built in, the Mac's printer drivers seem at first glance to leave little room for improvement.

DynoPage, a new print utility from Portfolio Systems, adds entirely new printing options in the Page Setup and Print dialog boxes.

Starting at Page One

To install DynoPage you double-click on the DynoPage icon to unstuff it, drag the DynoPage utility (a combination Control Panel device and printer driver) and a template folder into the System Folder, and restart the machine.

DynoPage comes with dozens of layouts, including templates for printing standard letter-, legal-, tabloid-, and A4-size pages. Other templates enable you to print Thumbnails —reduced documents—from 2 to 16 pages on a standard sheet of paper, either horizontally or vertically. Still other templates let you print on custom sheets for the most popular daily-planner notebooks, including Dynodex, Day-Timer, Day Runner, Franklin, and Filofax. The package includes a generous supply of laser paper for pocket-size six-hole binders. If you can't find the template you need in the package, DynoPage has instructions for creating your own.

Paging through the Manual

DynoPage is intuitive and easy to use, but you need to spend some time working through the tutorials in the manual to learn the program's basic concepts and procedures.

Before sending a document to DynoPage for printing, you must choose Page Setup and pick portrait or landscape page orientation to match your layout. When you click on OK in the standard Page Setup dialog box, DynoPage's own Page Setup dialog box pops up, offering additional options, including layout choices. The layout determines the paper size, the number of document pages per sheet, and the orientation of the final output. Other options let you choose single- or double-sided printing, increase the side margin to accommodate binder-ring holes, and reduce or enlarge the material to be printed. If you choose Maintain Pagination, DynoPage automatically calculates the reduction required to keep page breaks as they were at full size.

Similarly, when you click on OK in the standard Print dialog box, the DynoPage Print dialog box pops up. Here you can preview your pages and

DynoPage Dialogs DynoPage's Page Setup dialog box (top) lets you choose the layout and the degree of reduction or enlargement of the document you wish to print. The DynoPage Print dialog box (middle) lets you choose print-queue order and a page preview. The Page Preview dialog box (bottom) switches between reduced- and actual-size previews.
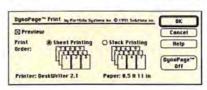
choose the order in which they are to be printed.

When you specify double-sided printing, DynoPage first prints every other page; after the front sides of the pages are printed, a dialog box tells you to reinsert the pages to print the backs. This can be tricky—especially if you're printing double-sided multipage documents to be collated into book form. Since the process depends on the printer's feeding habits, it's possible to waste a lot of paper doing it by trial and error. Fortunately, the manual contains clear instructions for most popular printers.

A Few Page Breaks

DynoPage works well with both PostScript and QuickDraw printers, including popular models from Apple, GCC, QMS, and Hewlett-Packard, although the manual suggests that it works best with 300-dpi models. It also works with a variety of software applications and utilities, although a few programs have unusual printing habits that cause DynoPage problems. For example, DynoPage and SuperLaserSpool don't get along because both programs need to control the printer driver functions. Aldus PageMaker is compatible only if you bypass Aldus's nonstandard printer prep utility, Aldus Prep. Programs such as FileMaker Pro and 4th Dimension print each page as an individual file; DynoPage misinterprets this and prints only the first page. Most of these limitations are documented in the manual or in one of the 15 on-disk Read Me files.

The Last Page
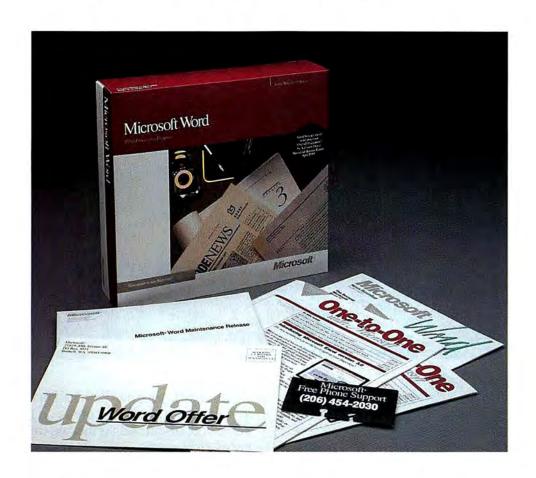
DynoPage is great for producing individual pages, but it doesn't automatically collate double-sided multipage documents in the right order for a standard saddle-stitched booklet. At press time, Portfolio Systems is working on an upgrade that will include this capability.

If you always print single-sided 8½-by-11-inch pages, DynoPage has nothing to offer you. But if you ever need nonstandard pages, thumbnails, double-sided pages, or other unusual printouts, DynoPage has no equal.
—George Beekman and John Lee

*See **Where to Buy** for contact information.*

We've tried just about everything to get in touch with Microsoft Word users.

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Microsoft Mouse Pad.

Yes, it's true. Now you too can point and click your way through your Microsoft® Word documents in style, with the exclusive Microsoft Mouse Pad. But why, you may ask, are we *giving away* this fabulous designer original? It's quite simple, really.

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And here's a little background on me as a Microsoft Word user:

The version of Word I use is: _____

My signature below certifies that I am a Microsoft Word user and have not yet registered my copy of Word

User's Signature _____ Date _____

The other Microsoft applications I currently use are:
☐ Microsoft Excel ☐ Microsoft Works ☐ Microsoft PowerPoint* ☐ Microsoft Mail

PMS - G

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Name _____ Title _____

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PMS - H

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Name _____ Title _____

Company _____

Shipping Address (No P.O. boxes, please) _____

City _____ State _____ ZIP _____

( ) _____
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- Free application notes
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- Free product information

Plus the fabulous Microsoft Mouse Pad— yours Free.

★
Personal-Contacts Database

TOUCHBASE 1.0.2

Pros: Supports multiple users across a network; user-definable fields; automatic formatting; easy-to-use import and export features; custom label and form generation. **Cons:** Minimum file size is 154K; broad searches can be slow; permanent sort requires separate application; sorts by only one field at a time. **Company:** After Hours Software. **Requires:** Mac Plus; second disk drive; System 6.0.5. Recommended: Hard drive. **List price:** $125.

The instructor of an ergonomics workshop I recently attended, who mildly resembled Chuck Barris of "The Gong Show," suggested a simple way to spend less time at the computer, thereby breaking up your workday and reducing strain on the hands and wrists: "You don't have to use your Mac to do everything," he said. "There's nothing wrong with using conventional business tools such as daily planners, handwritten envelopes, address books, and the like." This is heresy to serious Macintosh users. But it did make me wonder— how indispensable *are* all the gadgets and gizmos I have jammed into my System Folder?

This internal monologue led me to purge my system and to resolve henceforth to scrutinize all new DAs and INITs with a jeweler's eye, and to curb my habit of downloading tidbits of code from online services, I was doing quite well until TouchBase came along. This new offering, a souped-up address-directory program from After Hours Software, threatened to topple my resolution to maintain a lean and mean Apple menu.

Database Relations

TouchBase is a flat-file personal-contacts manager with enough sophisticated features to make it more akin to a full-blown database-management system than to most address-directory programs. It offers advanced search and sort functions, flexible import capabilities, and a variety of ways to output information from your own

and network files. And since it's a desk accessory, TouchBase is accessible from the desktop and from within any application.

After Hours has given TouchBase a clear, functional design. The DA provides a convenient way to organize all the names, addresses, phone numbers, fax numbers, online addresses, and random notes I have for the people I contact regularly. The problem, though, was to distill all this random data into TouchBase form, a potentially daunting task.

In Short, Import

As it turns out, entering new records in TouchBase couldn't be easier. The List view displays records in table format, showing just the company, full name, and phone numbers for each entry. If you select the Auto-format Fields option in the Preferences dialog box, the first letters in the name, address, title, city, and country fields are automatically capitalized when entered. This takes a little getting used to, but it really saves time. To enter states, you just type the postal abbreviation in lowercase, and TouchBase converts the letters to capitals. You can also set a default area code and style for phone numbers; TouchBase enters parentheses, dashes, and slashes as you like them. The Detail view, which displays each record in its entirety, one at a time, has a pull-down minimenu to the left of the name field with a list of standard titles. The one you choose becomes a separate exportable field.

I like all these features, but I wish TouchBase's automation went a bit further. For instance, why not allow a default city and state? Also, the phone-number fields should be definable. I had a tough time remembering which number was for work and which for home.

Importing records from other programs is for the most part straightforward and intuitive. Database programs that create delimited text files are highly compatible with TouchBase, which lets you define the delimiting characters for fields and records. An ASCII-conversion table in an appendix to the manual gives you the appropriate code for nonstandard delimiters (such as the bullets used

They Call Me Mr. Tibbs In the Detail view, titles can easily be entered from a pull-down menu to the left of the name fields. Using the Copy Label command under the TouchBase menu, you can take a snapshot of the information displayed on the card icon in the upper right corner and paste it into any other program. Clicking on the clock icon puts a time-and-date stamp in the notes field.

by QuickDex); standard delimiters are listed by name in the import dialog box. It can be tricky to match up fields that you import into TouchBase from other programs. If you make a written list of the order of fields in the file you are importing, it will be easier to put them in the correct fields in TouchBase.

My file conversions went smoothly, except when it came to a 200-record QuickDex file. Because Casady & Greene's QuickDex has only one field per record, this file was only partially delimited. Fortunately, TouchBase's Read Me file contains extensive instructions for dealing with QuickDex; unfortunately, these amount to importing each record into TouchBase's notes field and then cutting and pasting until your fingers bleed.

Sowing Your Fields

TouchBase has five fields that you can label with your own headings, and two check boxes that you can define. You can also mark any record and sort or search for marked records. All fields can be used simultaneously in searches, but sorts are limited to one field at a time. To retain the sorted order, you need to use the TouchBase application, which resaves the data file after a sort.

Once your personal file is up to speed, grabbing information from it is easy. You can print personalized fax forms and mailing labels, complete with your own imported graphics, or generate lists and forms to use in your personal organizer, give to friends, *(continues)*

hang on the wall—whatever. If you use MultiFinder and keep TouchBase open in the application layer, you can just click on its window to bring your address file to the front. TouchBase has a nice command that allows you to copy an entire address from your database with one keystroke and then paste it as text into the current application. This is handy if you want just one entry and don't need a complex merge file. You can also dial numbers at the touch of an icon through the Mac's speaker or a modem.

One quirky feature of the program is its zoom box. The zoom box just toggles between full-size and half-size windows, instead of switching to full size and returning the window to its original size and position, the way a normal zoom box does. If you are like me and pull windows to the bottom of the screen to get them out of the way, this aberration is slightly annoying. I also occasionally had trouble getting the zoom box to respond at all (moving the window slightly seemed to wake it up).

Networking Your Network

TouchBase's real strength lies in its support for network use. Many users on a network can access and manipulate the same file at once if it is located on a shared volume. While one person is modifying a particular record in a shared database, others can view the record, but they get a message telling them the record is currently in use and cannot be modified. Those users see the changes soon after they are made, since the file is updated even while the altered record is still in use. Bringing up a file on a network can be slow, though. One other warning: Version 1.0.1 has a conflict with Microsoft Excel, so make sure you get version 1.0.2, the currently shipping version.

TouchBase hits the mark for simplicity and functionality (I might even recommend it to the ergonomist), but could improve in the speed category. It's very handy as is, but the next version, which the company says will be faster, will have smaller data files, and should address most of my gripes, is probably worth the wait. It is due to ship in early August.—**Evan Cooper**

*See **Where to Buy** for contact information.*

LAST RESORT 1.0

Pros: Brilliant concept, excellent implementation; indispensable; inexpensive; concise, careful manual. **Cons:** May present security risk. **Company:** Working Software. **Requires:** Mac Plus; System 6.0.2. Recommended: Hard drive. **List price:** $49.95.

Isn't it funny? You can buy a half-dozen hard drive recovery programs, all designed to recover data in the event of a hard drive failure. But if you experience a far more common *system* crash—a freeze, a bomb—you're out of luck. The work you've done since the last time you saved flits into the ether. No matter how many SUMs and Norton Utilities you have installed, you have to shut down and restart the computer and start over.

That's why Last Resort is the year's best idea. It's beautifully simple: it lurks in the background, recording everything you type. You're likely to forget all about it, until your system crashes. Last Resort pays for itself because you can open the text file it's quietly been maintaining in the background, and there's the unsaved text—safe. The whole thing is so easy to use—you don't do *anything* to use it—that you wish it could also work with graphics and music programs.

Aptly Named

The program's brief, crystal-clear manual goes out of its way to point out all the drawbacks to the system. Last Resort records every keystroke, backspaces and all. And it stores them sequentially, even if you're clicking around different places to edit a doc-

Typo Heaven When you open the Last Resort file, you see everything that you have typed, including backspaces (represented by the small rectangles).

ument. When you open the file Last Resort's been maintaining, you see a lot of little rectangles (symbolizing backspaces) and text that's out of order, so the file needs some cleaning up. Formatting and pictures are lost forever. Pasted text doesn't get recorded (although, for some happy reason, the contents of QuicKeys text macros do). Passwords do, too, so be aware that you are essentially bugging your own computer.

But the thing is called Last Resort, for heaven's sake; it's not supposed to be a file-backup system. It's a safety net, and as such, it's sensational. Even if you only lose a few paragraphs, it's still much simpler to open the Last Resort file than to rack your brains trying to remember what you wrote.

Needless to say, system crashes aren't the only strokes of bad luck Last Resort protects you from. People do, on occasion, accidentally close files without saving; the power cord inadvertently gets unplugged; and programs sometimes unexpectedly quit. In these situations, Last Resort is the one and only chance to recover text.

Last Resort, a cdev, has only two or three features, all well done. For example, it stores its keystroke-log file in the Preferences folder in the System Folder, so it doesn't add its own clutter to the system. And it doesn't just mash all the text into one gigantic file; instead, it creates multiple log files, each neatly labeled with the day's date. It's easy to trash these files as they get old; the cdev itself has a Delete button to make that process easier. You can also turn the keystroke-saving function on or off at any time by clicking on Pause in the Control Panel.

First Resort

Why is a small, simple, one-trick pony like Last Resort worth getting so worked up about? Because even though a Mac is a Mac, it's still a computer. Some people's instinctive fear of computers is legitimate; even in 1991 a computer glitch can vaporize some of your work, even if you've been playing by all the rules and saving regularly. Last Resort, in a way, protects your emotions as much as your data. Anybody who types deserves that peace of mind.—**David Pogue**

*See **Where to Buy** for contact information.*

LITESHOW II

Pros: Allows presentations to be created from Mac and IBM-compatible computers; computer unnecessary for editing and displaying presentations.
Cons: User interface is primitive by Mac standards; expensive. **Company:** In Focus Systems. **Requires:** Macintosh II and/or IBM-compatible computer for creation; monitor or projection device for editing and presentation.
List price: $1995.

For many teachers, trainers, managers, and salespeople, the time-honored packet of overhead transparencies has been replaced by presentation graphics software combined with a color LCD projection panel like the In Focus PC Viewer. The Mac has many advantages over traditional audiovisual hardware, including the ability to incorporate visual effects, animation, and interactivity. The downside, of course, is the physical burden; it's no small feat to transport a Mac II, a monitor, a PC Viewer, and an overhead projector. The LiteShow II from In Focus provides a potential solution to this problem. With this clever little device you can pack an entire presentation on a disk and take it with you, leaving your computer behind.

Taking Pictures behind the Screens

The LiteShow II is a plastic box about the size of a large book—6 inches by 8 inches by 2 inches—and weighs 3.7 pounds. You run it via a hand-held remote controller that nests in the top of the LiteShow II when not in use.

The device captures screen images by intercepting them as they're sent from the computer's video board to the monitor and storing them in TIFF-P format on standard 3½-inch disks, using its own internal 1440K disk drive. Images can contain up to 256 colors, and a LiteShow disk holds between 20 and 50 slides, depending on the image's complexity. If a presentation fills a disk, it can be continued on other disks. To display a presentation, you just connect the LiteShow II to a monitor or to a PC Viewer, which you use with an overhead projector, and insert the presentation disk.

Before you create a presentation with the LiteShow II, you must install the box between the computer's video port and the monitor, and insert the LiteShow system software into the LiteShow disk drive. The procedure is simple and the instructions are clear. Once installed, the LiteShow II takes control of the monitor; what you see is determined by the contents of the disk in the LiteShow drive. If the disk contains no "slides," the LiteShow goes instead into Live mode, passing the computer's video signals through to the monitor so you can build a presentation. (You can always switch into Live mode by clicking the Live button on the remote.)

In Live mode, the LiteShow sits quietly in the background waiting for instructions. When you press the Grab button on the remote, the LiteShow freezes the action, captures and compresses the screen image, and returns control to you. Because it can capture virtually any screen image, the device enables you to create presentations using any software package. And since the LiteShow II is also IBM-compatible, you can mix IBM and Macintosh screen images in a presentation; they're all the same to the LiteShow.

The 16-Button Editor

Once the slides are stored on disk, they can be rearranged, edited, and displayed without the computer, using the LiteShow's built-in editor. You can move, delete, or copy slides; add dissolves, window shades, translucent colored slides, and other visual effects for transitions between slides; control the presentation with automatic (timed) or manual advance, or even repeat loops through a group of slides.

You Can Take It with You

The LiteShow remote has five buttons for controlling the slide show in Present mode. Buttons enable you to go forward and backward through slides, pause during automated presentations, and lower or raise window shades to reveal points on bullet charts sequentially. The remote also has five buttons for controlling compatible In Focus PC Viewers, making it easy to adjust contrast and brightness without leaving the podium.

The LiteShow isn't for everybody. But for applications where the same presentation is given over and over in different locations—sales presentations, lectures, and unaccompanied monitor displays, for example—the LiteShow is just enough computer to do the job. While it lacks the true interactivity of a computer-based presentation, a LiteShow presentation offers a lot more visual excitement than can be achieved with 35mm slides or overhead transparencies. Furthermore, the LiteShow's simplicity makes it ideal for presenters who don't normally work with computers. If In Focus can keep the price competitive after the release of the Apple laptops, the LiteShow should find a home in many a briefcase.—**George Beekman**
See Where to Buy *for contact information.*

LiteShow II from In Focus Systems enables you to create presentations using a Macintosh or an IBM PC–compatible.

★

MACPHONEBOOK 3.0

Pros: Unlimited phone books; records and displays important dates; can make subsets of records based on categories or search string; prints phone books and labels. **Cons:** All records indexed by first address line; comments limited to 40 characters; no format for printing envelopes.
Company: Synex. **Requires:** Mac Plus; printer; modem (for dialing). Recommended: hard drive; 32K RAM cache. **List price:** $49.95.

If you own HyperCard and a modem, you've probably discovered that the Address stack can dial telephone numbers from the Macintosh. Keeping Hyper-Card running or launching it just to dial a number, however, is impractical. It makes more sense to have this capability in a desk accessory like MacPhonebook.

MacPhonebook 3.0 lets you store addresses, phone numbers, dates, and brief comments; dial through a modem; and print out elaborate phone directories and labels. MacPhonebook comes as both a desk accessory (DA) and an application.

Creating a Phone Book

Before entering data in a new phone book, you specify up to eight categories for records—friends, businesses, services, and so on; set the pop-up menus for office, home, or fax numbers; and note important dates, such as meetings, birthdays, or anniversaries. You can create as many phone books as you like and include different information in each one. Mac-Phonebook also lets you configure the modem by specifying a dialing prefix and suffix, your area code, the modem speed, volume, and touchtone or pulse dialing. There's even a place to store personal information such as credit card and bank-account numbers; this information then becomes automatically available to all phone books.

Each record can include a complete mailing address, three phone numbers, a date, and two lines of comments (the comment field is restricted to 40 characters). You can import existing address files relatively painlessly. MacPhonebook supports tab-delimited, return-delimited, merge-file, and MacPhonebook formats for both importing and exporting files.

Once you've created a file to be imported, you define the order and placement of the fields, which ones are to be ignored at print time, and optionally, the field on which to sort the database.

If you don't select a sort field, MacPhonebook automatically sorts on the first field in each record. This is where I ran into a problem. Mailing labels are normally written as name, company, street, city, state, and zip code—the order I indicated in the import instructions. But I prefer to sort the addresses by the company name rather than by the person's name (companies tend to be more permanent than their personnel). When I opened my MacPhonebook database, the records came up just as I wanted—with the contact name first, followed by the company name, and the record-selection box displaying a scrolling list of company names. Unfortunately, whenever you save a new record or one you've edited, Mac-Phonebook insists on indexing it according to the information entered in the first line of the address—the person's name, not the company's. The result is a very messy record-selection box. The only solution is to put the person's name on the second line (for example, ATTN: William Henderson) and the company name on the first line.

Anytime you edit a record, you must verify that you want to save the changes, so you'd be well advised to

Main Window Once you've configured a new phone book, you enter all data from this screen. You locate records either by using search commands or by selecting directly from the scrolling list on the right. Radio buttons indicate the categories that apply to the current record.

do any major editing before you import a file, rather than after. In particular, avoid long address lines, since they may be truncated or overwritten during printing. Also, because Mac-Phonebook indexes are based on the contents of the first line, if you alter that line the program assumes you've created a new record and saves it in addition to the original. If you make changes only to fields other than the first, MacPhonebook asks if you want to replace the original record with the edited one.

MacPhonebook at Work

MacPhonebook gives you several ways to list and locate records. You can show all records, select categories (business contacts, for example), or create a list from a search—such as that of a given area code or state. To find a particular record, you can scroll through the alphabetical index in the record-selection box, use the Go To command to find the closest match in the first line of each record, or use the Find command to locate a text string that appears anywhere within a record. Once you've found the desired record, you can click on the appropriate telephone-number field and then on the telephone icon to have the program dial. After dialing, Mac-Phonebook switches off the modem automatically so that the modem doesn't interfere with the call.

A View Dates command brings up the next five upcoming dates you've entered, along with the activity or comment you've noted for each one. These dates are automatically displayed when you launch MacPhone-book. You can store only one date with each record, though, so unless you create duplicate records, you cannot use this feature to track, say, your next three meetings scheduled with XYZ Corporation.

Printouts for All Occasions—Almost

MacPhonebook's greatest strength is its printing capabilities. If you need to create a phone book you can carry around, it's very likely that the program can print it in the font and format you prefer. MacPhonebook offers seven preexisting formats to choose from (you can't create your own), *(continues)*

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ranging from the Little Black Book (2½ inches by 4¼ inches) to a full-size, 8½-by-11-inch directory. Formats for such popular travel-along phone books as the Day-Timer, Day Runner, and Filofax are also supplied.

You can save your style preferences for each of the seven formats for future use. MacPhonebook supports most popular printers, including the ImageWriter, LaserWriter, Desk-Writer, HP LaserJet, and most other PostScript and QuickDraw printers.

MacPhonebook also includes about 40 printable label formats, as well as formats for rotary index cards and postcards. Unlike with the phone books, you can specify the font size for labels, and you can design and save custom label formats. There's no provision for printing directly on envelopes, though you can do it with a little experimentation. Some users, I suspect, will not be so quick to forgive this obvious oversight.

Still Looking

Finding the perfect address-book program threatens to become a life-long project for me and several of my friends. If you need to print telephone directories or mailing labels, Mac-Phonebook is a good choice. However, its restricted sort options and lack of support for envelope printing leave MacPhonebook short of meeting my needs. The search continues.
—Steven A. Schwartz
See Where to Buy *for contact information.*

★

Flat-File Database

MYADVANCED-DATABASE 2.0

Pros: Well designed; good selection of templates; extremely simple operation. **Cons:** Slow on large files; no color or graphics support. **Company:** MySoftware Company. **Requires:** Mac 512K. **List price:** $59.95.

The name MyAdvanced-Database sounds like it was dreamt up by the people who create little Hello Kitty products for kids. Furthermore, considering its list price of $59.95 (mail-order price

Pushing the Buttons The MyAdvancedDatabase screen features a set of self-explanatory buttons that enable the user to bypass the menus for most common tasks. If you spend just a few minutes poking around the buttons with a supplied sample database, you'll be ready to operate the program—it's that simple.

around $40), you would be justified in wondering whether this program really is a toy. Please don't let the name or the price discourage you. This is a serious product, even a great product, within its limitations. If you don't have a database but think you might need one someday, you should buy this program simply to educate yourself painlessly about the functions of flat-file databases. It is without question the fastest database to learn.

Screen Test

The MyDatabase 2.0 screen contains most of the controls you need to perform most database functions without referring to the menus (see "Pushing the Buttons"). This is an outstanding feature, and a good bit of ingenuity has gone into the selection of the controls. You can learn to use it with a few minutes' experimentation.
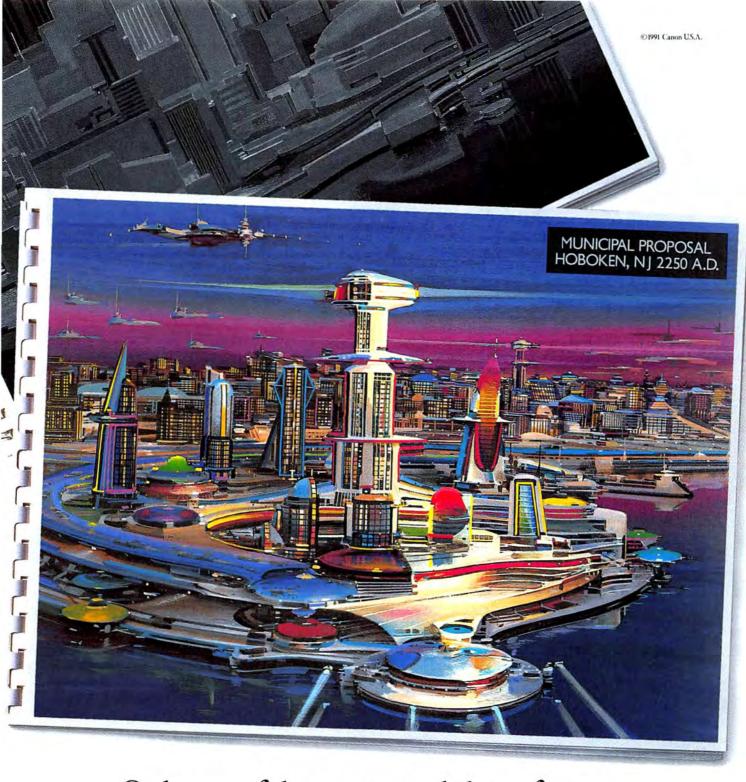
When you start the program, it prompts you to select a database. You may find at the beginning that the set of 14 prepared templates has anticipated 90 percent of common uses, but if you select New, the program gives you a generic template with a set of fields to name and define. There are 12 field types, including Pop-up menu and Telephone (Telephone fields actually dial the number for you). When you have named and set types for the fields, you enter the data, perhaps making use of dittoing, sequencing, or increment/decrement functions, all of which help with alphanumeric data that's repeated from one record to the next, or changed in some simple way (up by one, down by one). The program also has a pass-

word scheme that can protect both records and formats.

The manipulations available range from simple sorting and record browsing to finding records by using calculations and conditions on fields. Note, in "Pushing the Buttons," the Sort and Order buttons at the lower right of the screen, with the reminder note specifying the selected sort fields; for most typical operations these buttons, along with the Find set, are all you need for data processing. MyAdvancedDatabase has a standard set of statistical functions for use in reports, financial and math functions for advanced types of calculations, and a host of other novel touches (you can attach a History text box showing a date-stamped set of changes to a field, for example). MyAdvancedDatabase has a superior mail merge interface to common word processors, and can produce form letters with its own editor as well. Another nice surprise is the completeness of the program's printed-output formats, including such items as Filofax, Wallet, and Day-Timer. There's a Print Preview function to check your custom outputs; it's necessary because the crowded screen presentation is not WYSIWYG.

Yours?

The limitations of MyAdvancedData-base are all implied in its name. It's not OurNetworkDatabase or Our-CorporateDatabase. On files of a few thousand records, Sort and Find become fairly slow—six to ten seconds. There are no macros or links between files. You can't use imported graphics or color to impress your friends. The program has, however, been carefully designed to make it easy to use and understand for most of the functions for which a database is actually useful. And it's inexpensive enough that you could consider it a training program for database use, although a single or small-business user would be unlikely to outgrow its capabilities any time soon. It's an authentic bargain, it's as friendly as a database gets, and it runs on modest hardware (it takes only 360K). Take a serious look at My-AdvancedDatabase before spending several hundred dollars on a bigger package.**—Charles Seiter**
See Where to Buy *for contact information.*

★

RAY DREAM DESIGNER

Pros: Easy to learn; elegant implementation of solid textures; background rendering. **Cons:** Lacks consistent rotation and magnify tools; supports only 3DGF file format. **Company:** Ray Dream. **Requires:** Mac SE/30; 4MB of RAM; System 6.0.5; 32-bit Quick-Draw 1.0.2; hard drive. Recommended: 8- or 24-bit video board. **List price:** $895.

Ray Dream Designer makes realistic three-dimensional illustration easy, taking the complexities of applying perspective and shading out of your hands. From simple outlines, using simple concepts, you create the building blocks of a 3-D scene. For example, after designing a wineglass that looks like a wineglass and an apple that any worm would love, you can combine them in a cleverly lit still life with an appealing background. Once rendered, the picture is complete with all the shadows, textures, reflections, and colors you specified. Refining the scene is relatively easy; you adjust the placement and design of lights or objects and render the picture again, or you can touch it up with another program.

Ray Dream Designer consists of two programs. With LightForge, you work with simple shapes or curves to define the elements that will appear in a scene. Once you have developed all the elements, you assemble and render them with SceneBuilder.

Making It Easy
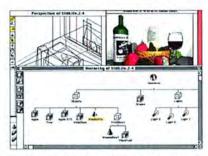
LightForge, a straightforward building-block approach to object design, is based on two types of elementary forms. *Extrusions* are used to trace a shape and the line it will follow. For example, a cylinder is simply a circle lying on a plane (such as the surface of this page) and stretched out along a line rising straight out of the plane. *Lathes,* on the other hand, rotate a shape or line around a center line. A sphere, for example, is created by rotating a half circle around its diameter; a drinking glass is made by rotating

half of its outline around an imaginary line that rises through its stem.

Both extrusions and lathes are achieved with two windows. Extrusions are created by drawing a cross section in the Cross Section window and a path, which the cross section will follow, in the Elevation window. Lathes are created by drawing a profile, then rotating it around the central axis in the Profile window after specifying the amount of rotation in the Lathe window. Cross sections, elevations, and profiles can be drawn with standard polygon tools, as well as with a spline or a bezier tool found on each window's Tool palette; they can also be imported from a PICT file with an autotracing feature called Extract Contours. More complicated objects can be created by using special features such as Scale Factors, which reduce or enlarge the relative size of a cross section at specific points, thereby changing the girth of the extruded form; another special feature is Polygonal Lathing, which reduces the number of points through which a lathe is rotated.

A perspective outline of the constructed object, displayed in the Perspective window, gives you a rough idea of how the object will look. However, because you cannot change the viewpoint, aspects of the object may be hidden.

Before giving you artistic control over lighting or textures, LightForge calculates a mesh—the mathematical description of the object's surface and volume. You can specify a high, medium, or low resolution to the mesh depending on how smooth you want the surfaces of the object to appear. Low resolution speeds the generation of the mesh and is helpful for preliminary sketches; select medium resolution, at least, for the final picture. Disk memory can be a problem if you design complicated objects at high resolution. For one object I created, the medium-res file used only 34 percent of the disk space the high-res file used.

Lighting, textures, and surfaces give each object its distinctive appearance. Ray Dream Designer makes applying these complicated features simple by replacing confusing dialog boxes with slider-based modules.

The Hierarchy Window Objects can be grouped in boxes in the Hierarchy window, then moved or hidden.

The lighting panel is uncluttered and straightforward. As you change the reflectivity or transparency of an object, the Display window shows a preview of your changes—in real time on 24-bit monitors. A pop-up menu of predefined refraction indexes for materials such as glass and crystal removes any need for knowledge of optics.

Textures, known in most 3-D packages as surface maps, can be applied, resized, and positioned using labeled guide points. For example, the label on a wine bottle is a texture in Ray Dream.

A feature called Solid Textures defines characteristics of an entire object, even of its center. Solid Textures can be loaded from either a built-in (and unfortunately, fixed) library or a previously saved object, and can be modified through simple modules specialized for certain materials. Sliders allow you to change the number, spacing, and convolution of veins in the wood and marble modules. Surface bumps are included in another module.

Putting Together the Pieces

When all the objects are completed, you combine them using Scene-Builder. You drag elements of the scene from the Objects window into either the Perspective window, a three-walled cutaway of a box, or the Hierarchy window, a Finder-like tree of objects as icons (see "The Hierarchy Window").

The Perspective window is the most confusing part of SceneBuilder. Objects are represented in the scene by boxed outlines. There are four projections of each object, one of the object in perspective, called the

Bounding Box, and one on each wall. At first, only the Bounding Box is visible; to see the wall projections you must activate one or more of the wall's Visualization icons on the Perspective window tool palette. When a wall projection is activated, the box outlines appear on the corresponding wall as if you were looking at the object from that plane. To move or rotate an object, you click on its outline on one of the walls. In a scene with many objects, you must meticulously activate and deactivate walls, or the window becomes cluttered. In tight corners with small objects, you have to guess which line is correct. Sometimes you must select the desired object in the Hierarchy window, then click on the Perspective window bar to avoid automatically selecting another object. The absence of an adequate zooming tool makes manipulation tedious. Grouping and hiding objects by using tools in the Hierarchy window helps but does not alleviate the confusion. Also, the axis of rotation is automatically chosen depending on which line you select.

Lighting is uncomplicated. You define ambient light intensity and color through a menu choice; you change the color and angle of spotlights in a dialog box.

There are a number of ways to view a scene. Crude color previews, from the position of the camera or any spotlight, give a rough idea of position and lighting. A Draft of the scene, rendered in three passes, begins to reveal shading, reflection, and detail. Drafts cannot be rendered in the background, but the final image can, allowing you to do other work or experiment with new scenes. You can also determine the size of the picture, composite two images, and eliminate jagged edges.

SceneBuilder uses a batch queue that lets you add or delete pictures while others are being rendered. Because objects in the scene are loaded at the outset, memory can be a problem; complicated scenes require a lot of RAM. For extremely complicated scenes, use the Finder instead of MultiFinder to give SceneBuilder the maximum memory available. (Ray Dream has announced a System 7–savvy version of RDD that will take

advantage of IAC for features like textures, and offer virtual memory, purportedly shipping at summer's end.)

Rendering takes time. A simple scene can take as little as three minutes on a IIfx with 8MB of RAM, and a complicated scene can take as much as three hours. The size of the picture—there are several predefined sizes as well as a custom size option—is also a factor. I worked mostly on a IIcx, and progress was slow but tolerable. Results were very good.

Not All Perfume and Roses

Ray Dream Designer is easy to understand, but the simple interfaces and short learning time are achieved at the expense of a few things.

Perhaps the two greatest problems with the Ray Dream Designer package are the absence of a rotating tool in LightForge and zooming tools in both modules. In LightForge, a free rotate tool in the Elevation and Profile windows of extrusions and lathes, respectively, would make designing natural shapes much easier. Adding a true zooming tool to the palettes of each window would make fine adjustments possible, especially in extremely complicated scenes.

Ray Dream Designer has grid lines you can use as guides and measurements to show the size of an outline, but a true ruler system with pointer coordinates, especially in Scene-Builder, would be more helpful. The way bezier handles are manipulated should be consistent with other professional illustration packages. Modifiable info boxes showing position, scale, and rotation would also be helpful. And a way of substituting one object for another in a scene would be useful. Finally, more robust support of 3-D file formats—currently only MacroMind's 3DGF is supported—and encapsulated PostScript would increase RDD's utility.

Ray Dream Designer is unquestionably an illustrator's tool, though fancy features like object databases and animation are absent. Despite its shortcomings, RDD's simplicity, its relative speed, and the quality of its results make this program well worth the price.—**Tim Warner**

See **Where to Buy** *for contact information.*

LOOM 1.0

Pros: Beautiful sound, music, and graphics; entertaining story line.
Cons: Game ends in the middle of the story, requiring a sequel; code-book protection scheme. **Company:** Lucasfilm Games. **Requires:** Mac Plus; System 6.0.3; System 6.0.7 for enhanced music. Recommended: Hard drive. **List price:** $59.95.

Loom, from Lucasfilm Games, is the finest Mac adventure game I've seen to date. The color graphics are always interesting or arresting. The excellent sound and music suit the story, and the simplified interface means that you don't have to type *look at rock* a hundred or so times.
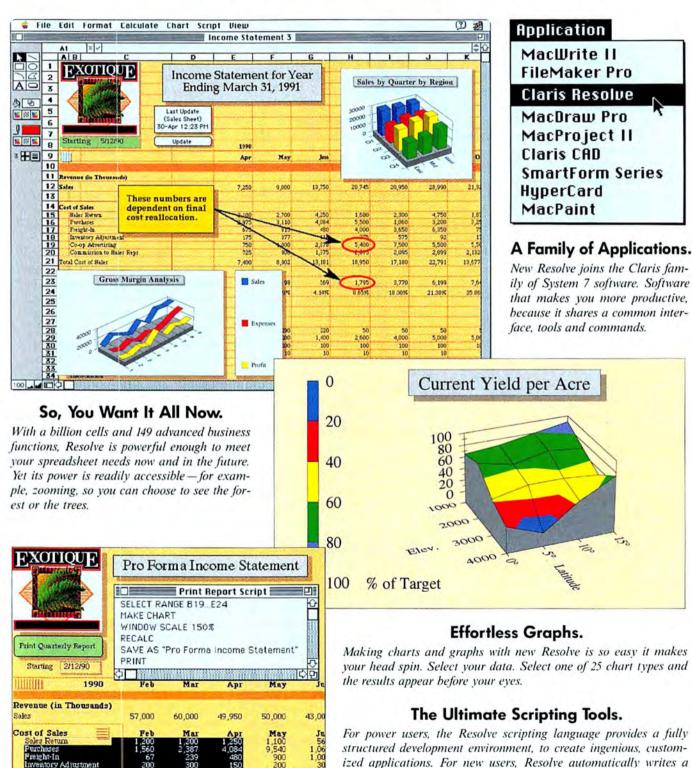
You start out as 17-year-old Bobbin Threadbare, who lives on Loom Island with the Guild of Weavers. The Weavers use sequences of musical notes to spin powerful magic *drafts* (spells), but they have inexplicably excluded you from their teachings. Suddenly catastrophe strikes the Guild, and all the Weavers disappear. You must then assume the magic staff of the elders to learn their fate and to find your long-lost mother. At the beginning you can use only a few notes of the staff's magical scale; but as you explore, gain knowledge, and solve problems, you learn to use more notes and spin more powerful drafts.

Romancing the Tones

An important difference between Loom and text adventure games is that with Loom you don't have to type any text. You point and click to move the character through his perilous encounters with an evil cleric, a rather eccentric dragon, and Chaos himself. To play the four notes you click on the specific part of the magical staff that produces the appropriate tone (or you can type the letters of the musical scale). If you've seen an animation before, you can bypass it by pressing ⌘-period.
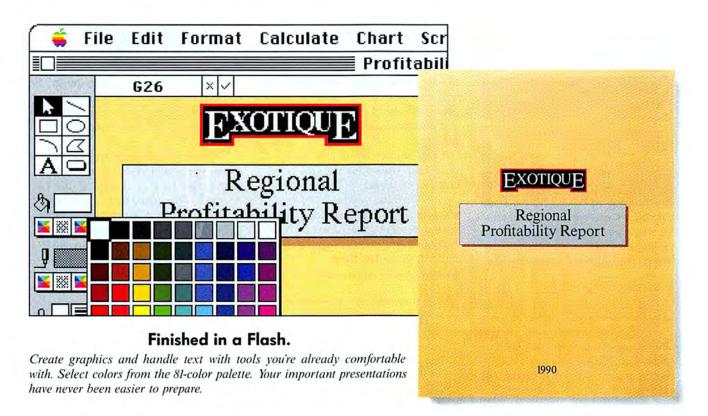
Compared to some adventure games, Loom's a pleasure to play: you *(continues)*

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Resolve is packed with clever, interactive features that help people quickly get their footing. Like context-sensitive help. Automatic scripting. One-step charting. Instant zoom-in and zoom-out. Even a built-in spell checker.

But lurking just beneath the surface are enough tricks to inspire any power user. 149 built-in functions to help solve any business problem. 25 kinds of charts and graphs to excite the most jaded audience. Elegant, built-in database functions so you can swiftly access your data. And advanced analytical solutions to impress the math wizards.

Here's just one example of the outstanding design of Resolve. With Resolve, you can modify graphs directly in your spreadsheet. You don't have to switch back and forth between spreadsheet and

chart modes. Think of the time savings. Not to mention the ease.

Yet, perhaps the most shining quality of Resolve is how it exploits System 7's most powerful functionalities – *Publish & Subscribe* and *Inter-Application Communication*. With Resolve, you can put charts in other documents and files and link them dynamically – so when you change any information in the spreadsheet, all the linked charts change as well. What's more, you can create *hybrid solutions,* like creating a HyperCard® program to access a database, send data to Resolve, and create and display a chart. All automatically.

New Resolve is the latest addition to the Claris family of software for System 7 – a new generation of applications that work together more simply, more powerfully, more gracefully than any software for the Macintosh ever has before.

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In the City of CrystalGard You must figure out a way to get past the workers in the tower. The window in the bottom right shows an enlarged view of significant objects as the cursor passes over them.

don't have to spend time trying to pick up or push every rock and twig, and it's unlikely that you'll have to start the game over from the beginning because you forgot to dot an *i* somewhere along the way. Power adventure-game players may object that every useful object is highlighted in a separate box when you place the cursor over the object, thereby reducing the thrilling "Eureka!" experience, but it also reduces the frustrating "Where the $*#@% is that magic wand!" experience, and it eliminates a ton of typing.

It's clear that Lucasfilm designed Loom to tell a story more than to pose a tremendous mental challenge, although there are plenty such problems to suit most tastes. Also, the character is nonviolent; you occasionally startle the heck out of some folks, but you don't intentionally hurt anybody.

In the Green Glass City

Once I figured out how to leave Loom Island, I particularly enjoyed exploring the city of CrystalGard, where you can sometimes see through several layers of the green glass walls. Eventually I decided to leave CrystalGard even though I had not solved a few mysteries that are apparently insolvable in this first game. That leads to my main criticism of Loom, which is that it ends with a cliff-hanger and is not a complete, self-contained adventure. Its title should have been something more like First Thread in the Loom. I felt let down at the end of the, shall we say, episode, because there was no feeling of closure in several senses of that word. Multiple hints in the game indicate that there will be a "Return of the Loom," or "The Chaos Strikes Back" in our future, and yes I'm

looking forward to it. The company also includes the hint book with the game, instead of charging $15 or $20 and making you wait for it to come in the mail.

The bottom line is that Loom is great fun. It has a high degree of enchantment, some sweet mysteries, a simple interface, and beautiful graphics, animations, and music. If you like adventure games, and especially if you have a color system, I highly recommend Loom.—**Tom Moran**

See Where to Buy *for contact information.*

★

Photo-Editing Program

ADOBE PHOTOSHOP 2.0

Pros: Opens Illustrator EPS files at any resolution; reorganized and enhanced filtering capabilities; new bezier selection tool; Wacom tablet control; Pantone, Focoltone, and Trumatch color-matching support; enhanced four-color separation, trapping, and support for PostScript Level 2; video-input and -output filters. **Cons:** Unsatisfactory support for non-Illustrator EPS files; bezier selection tool cannot create open paths; not enough text-creation options. **Company:** Adobe Systems. **Requires:** Mac SE; 2MB of RAM; hard drive; System 6.0.2. Recommended: Mac II; 4MB of RAM; color monitor; scanner. **List price:** $895.

Since I first discovered this program, it has surged in popularity beyond anyone's original expectations. With version 2.0, Photoshop has grown up to become a graphics standard, with a whole host of third-party developers offering dedicated support.

The Format Factor

Unlike its object-oriented cousin, Adobe Illustrator, Photoshop has always gone the extra mile in supporting images created in other programs and on other platforms. In addition to the previous array of file formats— which range from the widely accepted PICT and TIFF to the product-specific PixelPaint and ThunderScan to the device-specific Scitex CT and Amiga IFF—version 2.0 now supports the

256-color PCX format used by PC Paintbrush and other DOS programs, and exports images to the Amiga Hold and Modify (HAM) compression format.

In light of Photoshop's history, having spent its formative pre-Adobe alpha days as a dedicated format-translation program, there's nothing so extraordinary about this expanded document support. Photoshop 2.0 opens and rasterizes an Illustrator-generated EPS image at any resolution. Unlike other programs that read the bitmapped PICT screen representation only, Photoshop reads and interprets the PostScript-language description of the illustration. This feature offers enormous potential. If you can't get an illustration to print exactly the way you want from Illustrator or from a program that supports the Illustrator format, such as Canvas 3.0, you can open it in Photoshop, tweak it to absolute perfection, and then try printing again. Good-bye trapping errors, good-bye banding. The only drawback is that Photoshop can't render tile patterns, stroked text, or placed artwork; and what it does to FreeHand EPS files is not fit for discussion in a family periodical.

Filter Skelter

For the image-editing enthusiast, Photoshop has reorganized its filters, grouping them by type rather than strictly alphabetically, as was previously the case. Among the five new external filters is Pointillize, which turns a selection into something out of *Sunday in the Park with George*, and Radial Blur, which blurs an image by spinning it around its center.

Photoshop also includes sample filters from Andromeda Software and Silicon Beach. And the filter included on the Aldus Gallery Effects disk even provides you with a preview window so you can test an effect before devoting the several minutes required to apply the filter to a large image.

Hands-On Enhancements

Photoshop's selection capabilities have always been superb, better by far than those of any paint package, with the exception of Studio/32. For example, its magic-wand tool for select-
(continues)

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New Business Plan

A Company Policy and Personnel Workbook

ing similarly colored areas is now a staple among color paint programs. The newest craze may be the bezier selection tool. This tool, which operates exactly like the pen tool in Adobe Illustrator, enables you to create freeform outlines by defining precise, editable points. Once you complete the path, you can save it to disk for later use or apply it to the current image as a selection. The selected area can be manipulated or stroked and filled, just like a traditional bezier path. This technique works the other way around, too. After selecting an area using the lasso, marquee, or magic wand, you can convert the selection to a bezier path. You can make precise adjustments to the points and handles in the path, and then change it back to a selection.

Unfortunately, the bezier selection tool falls just short of outstanding. Because it isn't designed to be a drawing tool, it doesn't allow you to create an open path (that is, a line that flows from one point to another without closing to form a complete outline). If this were possible, you could create curved lines that end in arrowheads and various other practical items.

Photoshop provides specific controls for determining how a tool reacts to variable stylus input when you're using a pressure-sensitive tablet. Dragging softly may decrease the thickness of a line, lessen the intensity of the color applied, or both. And better late than never, the blur/sharpen and rubber-stamp tools also support pressure-sensitive input.

Prepress Delight
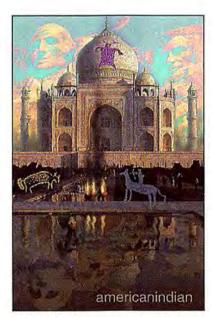
Photoshop 2.0 has also improved four-color printing, providing support not only for the frequently overrated Pantone standard, but also for the Focoltone and Trumatch process-color–matching systems. Developed entirely by using personal computers and commercial imagesetters, the Trumatch system has 2000 predictable colors in 1 percent increments at 150 lines per inch. The swatch book must be purchased separately ($85 retail), but I fully expect Trumatch to become the four-color standard that desktop publishing sorely needs.

Photoshop's separation capabili-

ties have also been enhanced, providing exacting control over generating color plates. You can likewise specify automated color traps and adjust transfer functions to bridge traps between colors to avoid problems associated with dot gain. Photoshop 2.0 provides a Use Accurate Screens command that you use to eliminate moiré patterns when printing to devices equipped with PostScript Level 2.

If that isn't high-end enough for you, Photoshop 2.0 is the only program on any personal computer to support the display of CMYK of bitmaps. What you see is closer than ever to what you get. Cyan, magenta, yellow, and black are each split off into their own channels of 8 bits per pixel. Using a complex algorithm, Photoshop translates this 32-bit image to 24-bit RGB on the fly.

As you might imagine, the translation slows down Photoshop's performance, thus limiting its potential benefit for low-end systems. But it's a boon to users who have access to state-of-the-art CMYK scanning systems like Crosfield or Scitex, and who therefore can import artwork into

Rushing the Taj Using Photoshop's precise selection and pasting controls, I was able to augment an Indian relic with sacred images from Mount Rushmore and Canyonlands' Newspaper Rock. The reflection in the pool was enhanced by applying the Ripple filter. Fire and smoke effects were created using a Wacom tablet.

Photoshop, modify it, and export it for separation without diminishing the quality of the image. Even moderate users will benefit by converting artwork to CMYK before separating it. You can view the image as it prints, eliminating colors that have no CMYK equivalent, and you can fine-tune each separation independently.

Often computing introduces a new feature that most of us never knew we wanted. This might end up being the case with duotones. Duotones are gray-scale images printed using more than one ink. The result is a colorized black-and-white image with an expanded range of tonal values. In Photoshop, duotones don't require any sacrifice in speed or efficiency because they are treated internally as gray-scale images. You can combine any two inks, not only the standard process colors but also Pantone spot colors.
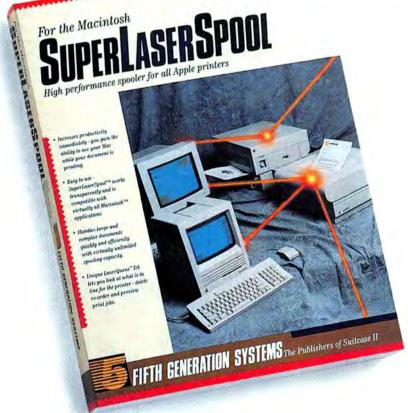
If printing is less important than video input and output, Photoshop still fits the bill. A De-interlace filter removes even or odd scan lines from a video image, interpolating the remaining pixels to create a smoother image. An NTSC output filter narrows the range of colors used in the current painting to those that reproduce most accurately to videotape.

And finally, if you are trying to combine diverse images for simultaneous display on a 256-color system, Photoshop 2.0 allows you to map colors to a customized palette, ideal for output to videotape when using video input equipment limited to 8-bit graphics.

I have only a few complaints about Photoshop 2.0. Certainly, its text capabilities could be improved. For example, to kern letters, you still have to select them individually and move them around by hand. Also, Photoshop allows only one style and size per text block. Editable text would be nice, as would editable objects. But these and any other objections I might make are easy to overlook in light of Photoshop's complete mastery of the bitmapped, continuous-tone environment. In fact, if you make your living in graphic art, Photoshop is worth the price of the Mac itself. It's *that* good.—**Deke McClelland**

See *Where to Buy* for contact information.

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───── ★ ─────

KALEIDAGRAPH 2.1

Pros: Feature-packed; programmable
calculator; macro support; new plot types
and graph scripts. **Cons:** Not all
user operations are intuitive; fluency with
package takes time; no 3-D graphs.
Company: Synergy Software.
Requires: Mac Plus; 2MB of RAM. Rec-
ommended: Hard drive.
List price: $249 (includes separate
version for Mac II series).

KaleidaGraph has long been
known as an everything-but-
the-kitchen-sink graphing
program. In version 2.1, it expands
even more. In fact, so much has been
added that it requires a 100-page
bound addendum just to list and ex-
plain the new features.

Enhanced Capabilities

You can now use KaleidaGraph's
macro feature to create macro librar-
ies containing special variables that
you can define for use in other equa-
tions. Whenever you write a formula
that uses one of your predefined vari-
ables or macro equations, Kaleida-
Graph automatically substitutes the
macro's definition. An Edit Macros
command that has also been added
pops up a text editor to let you modify
any selected macro. Finally, you can
now define macros as protected,
keeping anyone—including you—
from ever viewing or modifying them.

There are new plot types, includ-
ing high/low plots (useful for graph-
ing financial data) and text-only plots
(containing text, tables, lines, boxes,
and pictures). You can add lines to
horizontal bar and column plots to
make combination plots. You can now
control how duplicate values are
treated when data is plotted. Finally,
two new types of curve fitting have
been added—smooth and interpolate.

One of KaleidaGraph's most use-
ful new features is the plot script. If
you frequently create a graph with a
particular set of fonts and a specific
look, you can automatically generate
a script that lets you create the same
style plot with different data sets.

The KaleidaGraph method of
building a new plot script is exacting,
however. When you choose Plot
Script, you see an oversize dialog box
with four pull-down menus, two check
boxes, and seven buttons. The pur-
pose of these gizmos is to enable you
to specify one or more data sets, set
the variables for each, change and/or
specify the graph type, set titles and
legends for the new graphs, and
specify whether the new graphs
should automatically be saved and/or
printed. These features can be used
to build precisely the type of graph
or graphs desired (necessitating little
or no after-the-fact cleanup); but a
good deal of work is required to set
options, and the user is presented
with a cluttered interface to decipher.

It would be easier to generate a
plot script by generating a graph, se-
lecting a Plot Script menu option, and
having the program automatically
generate a script from the base plot—
making the script available for re-
loading or replay whenever you like.
All you should have to do is specify
the data set and choose the variables.
Minor modifications, such as chang-
ing the axis titles and legend, could
be done after the graph was created.

Help Is on the Way

The KaleidaGraph Help facility has
been unbundled from the application.
Help can be accessed from within
KaleidaGraph or from the desktop by
double-clicking on the Help icon or
one of the Help files. Because Help is
a standard text file, you can create
your own help, following a simple
format. When you access Help from
within KaleidaGraph, the menus re-
main active. Selecting a menu item au-
tomatically displays help for that par-
ticular item.

Other Changes and Fixes

Plot clipping has been changed so that
exported graphs can be read by a
drawing program. The Show Page
command now attempts to match the
size of the current display, and sup-
ports 9-inch, 13-inch, and 19-inch
monitors. The Summary Stats macro
is now a menu option, allowing you
to easily calculate basic statistics for
all data columns. The calculator has
18 new commands. Calculator pro-
grams can now contain comments. A
period is now acceptable as an empty
cell indicator when you import data,
thus allowing KaleidaGraph to import
mainframe SAS data. There's also an
option to assign ⌘-*key* equivalents to
menu items, giving you fast access to
frequently used commands.
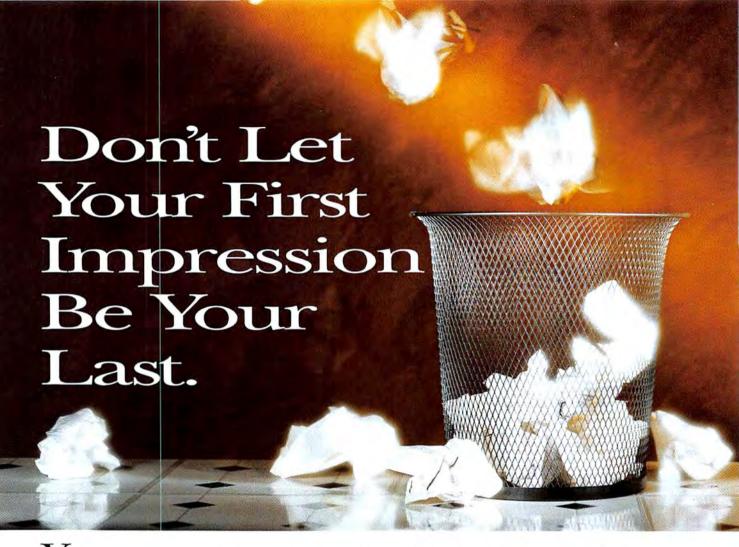
Once you've created a plot, you
can double-click on most graph ele-
ments to access the appropriate dia-
log box to make changes. Still, Kalei-
daGraph's many options, scores of
dialog boxes, and about 600 pages of
documentation require a significant
investment of time to really take ad-
vantage of the program's capabilities.

KaleidaGraph has always been a
powerful graphing package, and it's
getting more powerful with every re-
lease. Although KaleidaGraph can
generate a wide number of plots that
are appropriate for business (pies,
bars, columns, lines, and high/low
charts), its advanced macro capabili-
ties, programmable calculator, and
function-plotting options are overkill
in most business settings. Market re-
searchers, statisticians, mathemati-
cians, and engineers, however, will be
hard put to find a package better
suited to their plotting needs.

The fee to upgrade from an earlier
version of KaleidaGraph to version 2.1
is $20, and should be accompanied by
the serial number (if you're a regis-
tered user) or a photocopy of your
floppy disk (if you're not registered).
—Steven A. Schwartz

*See **Where to Buy** for contact information.*

Statistics:	1967 (K)	1968 (K)
Minimum	57.7	79.8
Maximum	133.1	159.1
Sum	1268.3	1483.5
Points	12	12
Mean	105.69	123.63
Median	118.15	133.45
RMS	108.6	125.84
Std Deviation	26.973	24.533
Variance	727.52	601.85
Std Error	7.7863	7.082
Skewness	-0.63155	-0.75068
Kurtosis	-0.85932	-0.57581

OK   Copy To [Clipboard] ☐ Transposed

Statistics When dealing with large data sets in
KaleidaGraph, it's nice to have ready access to
summary statistics. The Statistics menu option au-
tomatically calculates these statistics for every
variable in the data set. Because both Statistics
windows scroll, you can easily place any two vari-
ables side by side for comparison.

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THE SLOW REVOLUTION OF CD ROM DISCS

BY DAVID POGUE

The list of ingredients for a CD ROM disc can make your mouth water: music, speech, animation, color, and text—in any combination. You'd think the sky would be the limit. Most CD ROM discs are simply collections: fonts, clip art,

shareware. The exciting ones—those that use the medium to its juicy full potential—are much rarer. They don't just cram 600MB of stuff onto those silvery tracks; they address form as well as content. They establish some consistent, attractive framework for all that data, so that accessing it is more than just a Dewey-decimal grope.

In separate reviews, *Macworld* has covered some of these well-integrated discs: the amazing Discis Books (illustrated, self-reading storybooks), the provocative symphonic exploration discs (Beethoven's Ninth, the Magic Flute), and so on. So for this column's debut, here's a new batch. These have been culled from the well-stocked catalogs of Educorp and the Bureau of Electronic Publishing. Note that as with most software, you will pay less through distributors than the prices listed here (some of these CD ROMs can be purchased only through distributors).

Ecodisc

Don't worry, it's not another environmental guilt trip. You're plunked down in the middle of a nature reserve in England somewhere. You're surrounded by teeming miniecosystems: reed beds, a lake, woods, even a nearby village. You walk through the reserve, and the Ecodisc HyperCard stack (ESM, $295) shows you a photo of what you see at each point. (On a

color machine the photos are awesome.) At any point you can actually look around; as you pivot, your view (the photo) changes. You can even change the season. Or you can zoom up into the air to 1000 meters and look down. Digitized sounds bring to life the crickets, or rustling reeds, or (if you're up at 1000 meters) helicopter engines. Through it all, a guy narrates from the Mac speaker in your choice of nine other languages.

Then you can plan the reserve's future, opting to dredge the lake or trim the sycamores. Immediately, hilariously realistic letters pour in from the community. You quickly learn that you can't please everybody when it comes to environmental management. Ecodisc is a terrific integration of form and function, of sound and visuals—even if the topic strikes some as less than gripping. (Works with HyperCard 1.2 only.)

Dictionary of the Living World

Nice idea, so-so execution. It's another HyperCard-based disc, consisting of a dictionary of all things biological—plants, animals, parts of the body, and so on. You search for a term, and the associated card pops up, usually with a photo. Occasionally there's a sound associated with an entry, and, rarer still, an animation.

The trouble is that Dictionary of the Living World (Media Design Inter-

active, $300) is too zoologically technical. You can look up *Sittidae* (nuthatch) or *Gasterosteiformes* (nine-spined stickleback), but there is no entry for *pig* or *cow*. That scientific bent is just right for the research community, but it effectively cuts out the under-20 audience. And you'd think somebody would have cleaned up the typos and grammatical errors before committing them to the laser beam. (Doesn't work with System 7; requires 2MB of RAM.)

Sherlock Holmes on Disc

The Sherlock Holmes (CMC Research, $49) disc's best and worst attribute is its navigation software—something called DiscPassage. It has fast searching capabilities, you can change the font, and you can save or print anything. But DiscPassage doesn't let you change the line spacing, doesn't have word wrap, and doesn't scroll right. When you click on the gray part of the scroll bar, the text jumps by a couple of inches instead of a full screen. You then spend ten seconds trying to find your place *(continues)*

(which is now somewhere in the middle of the screen).

Otherwise, Sherlock is his usual madcap self, although the amateurish 1960s illustrations surely aren't the best available. And there's a weird collection of mediocre modern medical poetry on the disc, too. "Why was this included with Sherlock Holmes?" says the manual. "Ask the great detective himself." Thanks a bunch.

U.S. History on CD-ROM

Uh oh . . . another disc that uses DiscPassage. U.S. History on CD-ROM (Bureau of Electronic Development; $395) is a collection of interesting books and articles on aspects of American history. It's by no means a systematic survey; there are gaping holes in its coverage of, for example, the arts (a search on "Leonard Bernstein" draws a blank).

Even so, this scattershot assemblage holds some gems. There's a transcript of the Watergate tapes, for instance, and a superb book on the Wright brothers, complete with photos. The disc has good browsing potential, but it's too incomplete to be a good stand-alone study aid.

The Orient

You've never seen a CD ROM with such stunning graphics or music. The Orient (InterOptica, $249), the first of a series of travel guides, has a dark, lush graphic feel. Every screen is introduced by a slick animation and synthesized overture music.

The disc features 16 Asian countries, north to the Koreas and south to Indonesia. Click on a country or region name on the area map to zoom in to a more detailed map; travel, lodging, and other information is provided on a handful of major cities in each country. The photos are gorgeous; the text is literate and helpful.

Unfortunately, the novelty of the animation and music snippets wears off fast, since the same ones introduce each city or aspect. Still, this disc is rich and delicious. (Requires 5MB of RAM and an 8-bit color monitor.)

Birds of America

Birds of America (CMC ReSearch, $99), John James Audubon's historic 1840 survey of North American birds,

ECODISC   Nirvana for nature nerds. Click on the compass to look around in various directions.

DESERT STORM   For almost every topic, you have a choice of these four media. A few topics also include crisp, informative on-screen maps.

includes a text file for each species detailing mating habits, plumage, and everything else. For some entries you can also view a color painting (from Audubon's books) or play a recording of the bird songs.

Only two things mar the experience. First, many entries don't include a painting, and relatively few include a recording; the disc would be much more satisfying if those materials were consistently available. And second, the disc is driven by the irritating DiscPassage software; once again, the scroll bars drive you nuts.

Learn to Speak Spanish

Terrific idea: a textbook. But the HyperCard-driven CD ROM format of Learn to Speak Spanish (HyperGlot Software Company, $99) has a couple of nice twists: you *hear* the dialogs read, the verbs conjugated, and the vocabulary pronounced. The actors who recorded the material won't win Tony awards for their enthusiasm, but their enunciation is just right. There's also Learn to Speak English, for native French speakers; it's enlightening to see American idiosyncrasies (we pronounce a phone number as a string of single digits, for example).

These programs are aimed at the tourist who wants some conversation practice; they assume you already know basic grammar and vocabulary. Unfortunately, the lame writing in the manual doesn't do much to inspire confidence in the creators' mastery of language. ("We're rewriting it," says HyperGlot.) On the other hand, this is light-years more engaging to work with than a traditional textbook.

Desert Storm: The War in the Persian Gulf
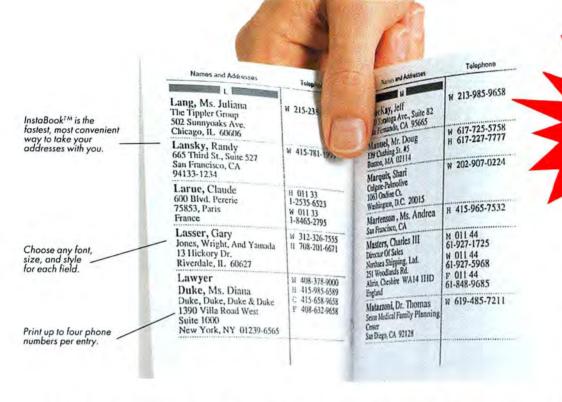
Once again Warner New Media has produced an incredibly relevant, intuitive, appealing CD ROM. It appeared only six weeks after the U.S. war with Iraq ended, yet this disc still manages to strike a balance between design and content.

Produced in conjunction with the editors of *Time* magazine, Desert Storm (Warner New Media, $39.95) presents each week of the war through four media: the raw, typewritten, fascinatingly unedited reports filed by *Time*'s correspondents; the resulting toned-down, polished articles as they appeared in *Time;* striking photos, with excellent "captions" spoken from the Mac speaker; and sound bites, where a caption on the screen identifies the speaker.

Still, the disc's few flaws stand out. Some topics offer only one of the four media. Others seem to offer all four— but when you click on the button for sound bites, you're told there's "no audio available." You can't copy, print, or save anything. And the paragraphs are neither indented nor open-spaced, making it hard to identify where a new one begins. And quotation marks are only curly on the left side of a quotation, "like this."

But that's quibbling. The disc is great. At your command, Stormin' Norman Schwarzkopf reiterates his famous assessment of Saddam Hussein's talents: "He is neither a strategist . . . nor is he a general, nor is he a soldier. Other than that, he's a great military man." Gritty, dramatic, and colorful, Desert Storm delivers important information in an interactive and useful package—the way CD ROM was meant to be. ▥

See Where to Buy *under The Desktop Critic for contact information.*

Mirror's 35 Watt Power Supply Gives Its Hard Drives An Unusually Long Life.

NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

Access CD/6 Pak for the Macintosh

CD ROM changer for the Mac that provides online access for up to six data or audio disks. Comes with a removable magazine, stereo audio capabilities, and a dual 50-pin SCSI interface. Can be connected to an AppleShare file server to provide an alternative to daisy-chaining multiple CD ROM drives. $1495. Optical Access International, 617/937-3910.

Access CD/6 Pak for the Macintosh

Address Express

Label printer with online addressing software for workgroups using any Apple-compatible network. Can be used from the application to print envelopes, mailing labels, and postcards. Can create POSTNET bar codes, and has a layout editor to produce preformatted address layouts for envelopes, labels, and postcards. 1MB min. memory. $1195. Tidemark, 415/490-5583.

Address Express

DS-3000 Color Scanner

Overhead scanner that can be used to scan flat and three-dimensional objects. Bundled with image-editing software that has controls for contrast, brightness, hue, and saturation. Scans in 4096 colors and 256 levels of gray. Includes SCSI adapter, scanner cable, and AC adapter. Gray-scale $895; color and gray-scale $995. Chinon, 213/553-0274.

Personal Label Printer

This compact desktop label printer is a nonimpact thermal device that prints labels at 137 dots per inch resolution. Comes with Avery's MacLabelPro

Personal Label Printer

software, printer driver, and a starter 130-label roll of Avery's Label Printer Labels. $279.95. Avery, 818/915-3851.

RAM PowerCard
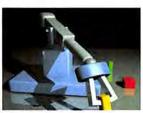
Board that can be expanded with up to 16 SIMMs. Enables automatic loading of system software and applications on RAM disk at start-up. Saves automatically on shutdown. Plugs into NuBus slot. Without memory $999; with 8MB of RAM $1999; with 16MB $2999; with 64MB $8999. DayStar Digital, 404/967-2077, 800/962-2077 ext. 305.

RAM PowerCard

ScreenStar

Film recorder that uses analog RGB input for picture data and microprocessor control for film exposure. Works with optional interchangeable cameras for instant prints and overheads. $3995. Presentation Technologies, 408/730-3700.
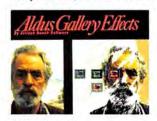
ScreenStar output

SOFTWARE

Aldus Gallery Effects, Volume 1: Classic Art

Application and desk accessory that enable users to work with scanned or original bitmapped images from within Aldus Digital Darkroom, Aldus SuperPaint, Adobe Photoshop, and other applications that support plug-in filters. Compatible with Aldus Super-Card and HyperCard 2.0 via the supplied XCMD. Capable of opening TIFF and PICT2 files. 2MB min. memory. $199 new. Aldus Corporation, 619/695-6956.

Aldus Gallery Effects, Volume 1: Classic Art

Control II

Order- and invoice-management system bundled with ACIUS's 4D-Write. Provides customer, lead, and activity management. Consists of a 4D database that can produce charts, reports, invoices, and purchase orders. Tracks direct mail and sales commissions. Includes runtime version of 4D. 2MB min. memory. Single-user version $1495; multiuser $2795. Diamante, 214/341-6711, 800/223-2165.

(continues)

Control Classic

Database that helps track business contacts. Designed for marketing and sales departments that need to manage customers, contacts, leads, and related activities. Capable of searching multiple fields; importing and exporting text fields; and globally updating records in the database. Includes a word processor and mail merge. 2.5MB min. memory. $595. Diamante Software, 214/341-6711, 800/223-2165.

EZ Résumé

Résumé-writing software that prompts the user to enter relevant data in fields corresponding to the individual's career and life experiences. Résumés can be printed in a variety of formats. 1MB min. memory. $48. EZ Way Out Enterprises, 313/663-8031.

FM/ProMed

Software and templates for producing forms and simplifying management of medical offices. Includes patient database; provides automated fee schedules with pop-up lists of diagnosis and procedure codes; tracks accounts receivable; creates daily summaries and monthly statements. Automatically completes Medicare forms when billing statement has been produced. 2MB min. memory. $1250. MedCenter of Normal, 405/360-0474.

Galaxy Plus Editors

Software for storing and editing sounds for a variety of MIDI instruments. The librarian is compatible with more than 100 MIDI instruments, and included editor modules support more than 45 MIDI instruments. Universal Librarian section of the program allows for the storage, organization, and retrieval of sounds and setups for more than 100 different synthesizers and other MIDI devices. 1MB min. memory. $379. Opcode Systems, 415/369-8131 ext. 225.

Galaxy Plus Editors

Hot Keys

F-key macro system for combining multiple Mac functions into one keystroke or simple combination of keystrokes. Comes with more than 140 predefined macros that replace routine functions in 12 major applications, including Microsoft Word, MacWrite, Aldus Page-Maker, and Personal Press. 1MB min. memory. $39.95. Go Technology, 702/831-3100, 800/468-5391.

Hot Keys template

The Illustrated Civil War

Collection of 740 scanned gray-scale illustrations culled from Frank Leslie's *Illustrated History of the Civil War*, a book of newspaper photographs that was published in 1895. Includes digitized sound effects such as that of a battle, horses, and rain. Text from the original book accompanies each image. 2MB min. memory.

The Illustrated Civil War

$99.95. IT Makers, P.O. Box 730152, San Jose, CA 95173-00152.

Instant Update

Network message- and document-handling software for workgroups. Enables user to send messages and documents to selected recipients or to an entire workgroup. Copy of original document is stored on the server, and workgroup members can make changes to local copies. Stores text, pictures, and tables in an object-oriented database. 1MB min. memory. Two-user pack $495; five-user pack $995. On Technology, 617/876-0900.

JAG

Utility software for anti-aliasing (removing jaggies from) 8-bit and 24-bit images and animations. Generates PICT and PICS output file formats. Opens 8-, 24-, and 32-bit images. 1MB min. memory. $99.95. Ray Dream, 415/960-0765.

JAG

Last Resort

Text-retrieval software utility that records all keystrokes to a file on a hard drive. Text can be retrieved using any word processor. User can configure the number of keystrokes to be typed before saving them to the keystroke file, set the number of seconds that the Mac remains inactive before saving keystrokes that are not yet saved, and disable the program by clicking on the Pause button. Any word processor can open files saved by Last Resort. 1MB min. memory. $49.95. Working Software, 408/423-5696.

Legal Letter Works

Collection of 165 legal forms and agreements for business and personal use. Comes with 460-page softcover book and companion computer disk, plus instructions on how to complete the included forms and agreements. 1MB min. memory. $79.95. Round Lake Publishing, 203/431-9696.

PGA Tour Golf

Tournament golf game licensed by the PGA Tour. Simulates real tournaments on courses used in actual PGA tours. Players compete against 60 PGA Tour pros in four-round tournament play. Players track their own statistics in such PGA Tour categories as driving accuracy, par breakers, and putting average. 512K min. memory. $59.95. Electronic Arts, 415/571-7171.

PGA Tour Golf

ReadingEdge

OCR software; works with any page-scanning sys-*(continues)*
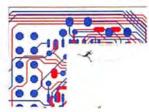
tem that saves images in TIFF or PICT format. Program reads proportionally spaced, typeset, and kerned characters, and has an optional teaching mode that allows it to learn unusual fonts and retain them for future use. 1MB min. memory. $99. Prism Enterprises, 301/604-6611.

Run Assistant

Addition to the Run electronic-design software series for printed circuit boards and schematics. Comes in two versions, Schematic Capture and PCB Layout. Schematic Capture provides integrated library editor; functions for loading, saving, and duplicating macros; automated bus routing; and automatic orthogonal routing of nets. PCB Layout can import net lists of eight different vendors with For-

ward Annotation, and can multilayer up to six layers plus special layers such as component print and silk screens. Has adjustable aperture file and unlimited Undo/Redo. 2MB min. memory. Schematic Capture $1250; PCB Layout $3000. GmbH, Spittlertorgraben 47, 8500 Nurnberg, West Germany.

Run Assistant

ShiftWorker

Employee-scheduling software that creates schedules based on individuals' seniority, preferences, availability, absences, maximum hours, and overtime

choices. 1MB min. memory. $495. Expert Systems, 407/242-0140.

Skyclock Solar

Application that functions as a clock, calendar, telephone aid, and guide for travelers. The Skyclock Window displays a sky map for any given day and location on Earth, along with the current local time. Citybase is a customizable database of more than 400 cities around the world with latitude, longitude, area and airport codes, and the number of hours offset from Greenwich mean time. Time Control Window enables user to select any date within the valid Skyclock date range and display the resulting sky map in the Skyclock Window. The Solar Events Window gives a text view of all the information avail-

able through the other three windows. 512KE min. memory. $64.95. Skyclock Company, 313/684-2632.

StatView Student

Statistical analysis program that performs operations such as descriptive statistics, frequency distribution, T-tests, Pearson's Correlation Terms, simple multiple and polynomial regression, one- and two-factor ANOVA contingency tables, and two-group nonparametric tests. Can also produce scatterplots; boxplots; line, pie, and bar charts; histograms; and more. User can customize graphs. 512K min. memory. $99. Abacus Concepts, 415/540-1949.
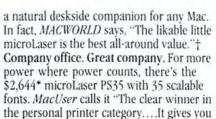
Visual Delights

Collection of 60 sets of floppy disks containing 300-dots-per-inch black-and-white TIFF images whose

Visual Delights

wide selection includes Chinese and Japanese images, special borders, plants and trees, sea life, animals, and holiday themes. Each set comes with catalog of thumbnail sketches. Compatible with most desktop publishing and graphics programs. 2MB min. memory. Each set $39. SunShine Graphics, 512/453-2334.

Visual Magic

Database of art and animation for use with Macro-Mind Director and Macro-Mind MediaMaker. Each volume contains more than 12MB of animated titles, charts, transitions, and sequences that can be integrated into interactive presentation, desktop video productions, and other forms of multimedia communications. Images are saved in MacroMind Director Movie format, and can be opened only from Macro-Mind Director or Media-Maker. Requires Mac II or later model and 32-bit QuickDraw. 5MB min. memory. $249. Barrington Stephens, 619/238-1893.

Visual Magic images

Apple Protected Data Switches

Manual peripheral-sharing switches that protect peripherals from in-line electrical surges and spikes. Constructed with metal-shielded enclosures and bidirectional switches; can be configured for two to four peripherals connected to one CPU, or two to four CPUs connected to one peripheral device. Two-way switch $139; four-way switch $179. Bravo Communications, 408/297-8700.

Disk-Pick

Spring-loaded disk library system that stores 3½-inch disks. User touches a disk, and spring mechanism pops it out. Disks are replaced by pushing them into the storage slot until they lock in place. $13.95.

GP Technologies, 201/722-7165, 800/523-1809.

Disk-Pick

ELF Alert

Portable device that measures potentially harmful *(continues)*

ELF Alert

extremely-low-frequency (ELF) radiation generated by CRTs, power lines, and other electrical devices. $99. Teslatronics, 904/462-2010.

Jet-Master

Family of ink-jet-cartridge recharge kits. Kits available for use with Hewlett-Packard's PaintJet, DeskJet, and ThinkJet printers and compatible non-HP printers. Inks are available in brown, green, blue, purple, orange, and bright red. $24.95 to $49.95. Computer Friends, 503/626-2291.

LaserStand

Printer stand that holds and organizes paper trays, extra paper reams, envelopes, and other accessories. Comes with cable-management system to hide and protect power and network cables, and

has a storage area to accommodate network interface boxes such as AppleTalk and PhoneNet. Rubber feet raise the stand ½ inch to allow room for channeling cables underneath the printer. $189.95. Kensington Microware, 415/572-2700, 800/535-4242.

MasterStand

Combination keyboard holder and monitor stand made of heavy-gauge steel with smooth-gliding runners. Supports monitors of up to 85 pounds, and raises monitors 3¾ inches off the desktop. $89.95. Kensington Microware, 415/572-2700, 800/535-4242.

The Tracer

Hand-held magnetic-radiation monitor that indicates presence of pulsed magnetic fields around com-

puter video display terminals and other equipment with possible magnetic-field emissions in the extremely-low-frequency (ELF) and very-low-frequency (VLF) ranges. Unit can be pointed at a device to register the strength of its magnetic-field radiation. $149. Radiation Technology, 216/666-7710.

The Tracer

Wacky Vac

Vacuum cleaner attachment for cleaning screens, computer keyboards, pleated lampshades, and bookshelves. Comes with two adapters to enable it

to fit on all major brands of vacuums. Made of unbreakable plastic; has 25 small suction pipes with soft filament brushes. $9.99 plus $2 s/h. Ideaworks, 619/773-2653.

Wacky Vac

Collier's Rules for Desktop Design and Typography

Typesetting and design guide. Explains page layout and gives advice for achieving professional-looking page design, headlines, *(continues)*

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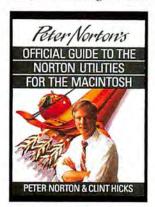
grids, and style sheets. Written by David Collier. $14.95. Addison-Wesley Publishing, 617/944-3700.

Peter Norton's Official Guide to The Norton Utilities for the Macintosh

Covers computer basics; essential terminology; Mac operations; disk organization; unformatting the hard
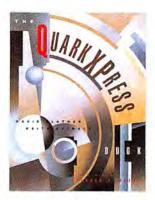
Peter Norton's Official Guide to The Norton Utilities for the Macintosh

drive; determining, reporting, and repairing disk errors; accelerating disk and file access; avoiding common disk problems; restoring destroyed, lost, or deleted files; using The Norton Utilities. Written by Peter Norton and Clint Hicks. $24.95. Bantam Books, 212/765-6500.

The QuarkXPress Book

QuarkXPress 3.0 handbook written for beginners and professionals. Discusses every feature in the program; covers some capabilities not included in the program's documentation; gives step-by-step procedures for creating design elements by combining several QuarkXPress features. Written by David Blatner, Steven Roth, and Keith Stimley. $24.95. Peachpit Press, 415/527-8555, 800/283-9444.

The QuarkXPress Book

The System 7 Book
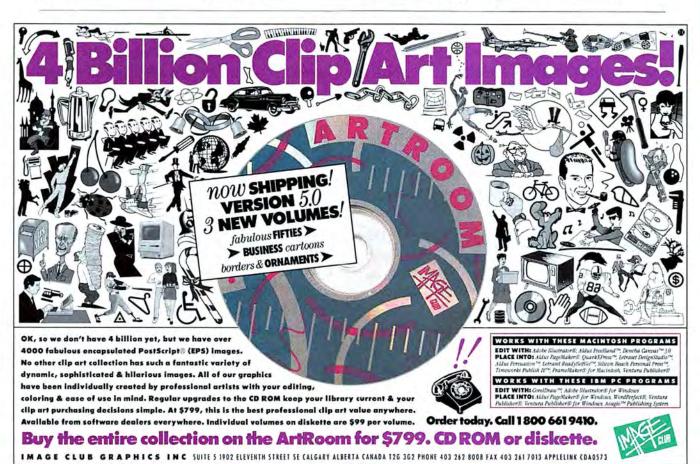
Overview of Apple's System 7. Gives system installation instructions; covers the Finder's enhanced desktop commands and menu features; discusses the new System Folder, TrueType font technology, and file sharing over a network; and gives money-saving tips for using virtual memory and 32-bit addressing. Written by Craig

Danuloff. $22.95. Ventana Press, 919/942-0220.

The System 7 Book

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Quick Tips

NETWORKED FILE TRANSFER BETWEEN MACS AND PCS, BACKGROUND PRINTING WITH A STYLEWRITER, PATTERNED TEXT WITHOUT POSTSCRIPT, AND MORE

BY LON POOLE

System 7's multitasking capabilities are always active (you can't turn them off as you can MultiFinder with older system software), which means you may find yourself working with more programs open than you used to. With several programs open,

you can spend lots of time waiting for inactive programs to redraw portions of their windows, as dialog boxes in the active program come and go. This delay is particularly protracted when you use virtual memory because the window redrawing may require disk access, or when an inactive program contains a complex graphic or chart that takes a long time to render. You can eliminate all the delay by choosing Hide Others from the Application menu at the right end of the menu bar. Hidden windows don't require updating. When you switch to another open program (by choosing it from the Application menu), its windows reappear. To simultaneously hide the active program's windows and open a new program, press the option key while choosing from the Application menu or while clicking the desktop to switch to the Finder.

SimEarth Secrets

If you're a SimEarth or SimCity fan, you probably know that typing **FUND** gets you an infusion of cash (although money is useless in SimEarth). But while learning how well known that tip is, I got some some lesser-known SimEarth tips from Sally Vandershaff of Maxis (publisher of the two programs). Typing **joke** displays a joke from the program's coauthor Will Wright; typing **smoo** smooths coastlines; and typing **erad** eradicates all

plant and animal life. SimEarth also has an undocumented life-form: robots (see "Artificial Life").

Cross-Platform File Transfer

Q I'm thinking about getting my toes (maybe one toe) wet in the area of networking different machines in our office. I thought I'd start with buying an AppleTalk card for the PC clone next door and hooking it into my LaserWriter IINT. That should allow printer sharing.

I'd also like to send files between the PC and the Mac. Is there a dumb/cheap/simple way of doing that without going to full-scale networking software? I think I'm asking about electronic-mail software that works for both PCs and Macs over a LocalTalk network.

Al Bloom
Blacksburg, Virginia

A Using electronic mail to transfer files among networked Macs and PCs is convenient, but it takes some work to set up and administer and is far from the cheapest cross-platform file-transfer method. For example, QuickMail from CE Software (515/224-1995 or 800/523-7638) lists at $339.95 for five users.

To exchange mail, which can include attached files, Macintoshes on the network use the QuickMail desk accessory, and PCs equipped with

AppleTalk boards use the QuickMail PC client software. You must set up a Macintosh on the network as the mail server; it stores, forwards, and delivers the mail throughout the network. The mail server must be a Mac Plus or better (not a PC) with a hard drive, and if you plan to use it for other work, it needs at least 2MB of RAM (2.5MB with System 7).

If all you want to do is transfer files between one Mac and one PC, you can save several hundred dollars by using file-transfer software such as MacLink-Plus/PC ($199 from DataViz, 203/268-0030) or LapLink Mac ($149.95 from Traveling Software, 206/483-8088). They're both less expensive than electronic-mail software, and neither requires network connectors, cables, or an AppleTalk board for the PC. However, file-transfer software lacks electronic mail's store-and-forward convenience; both the sending and receiving machines have to be actively engaged in file transfer at the same time. Also, you have to juggle cables if the computers already have devices connected to their serial ports.

(continues)

ARTIFICIAL LIFE Robot life evolves in SimEarth if an atomic test occurs at a nanotech-age city.

If one Mac in your office has a SuperDrive floppy disk drive (all currently shipping models do), you can also transfer files by exchanging floppy disks. Use the Apple File Exchange utility software (included with the Macintosh system software) to copy files to and from a PC-format floppy, or install a control panel (called a Control Panel device, or cdev, if you're not using System 7) such as DOS Mounter ($89.95 from Dayna Communications, 801/531-0600) to make PC disks appear on the Mac's desktop.

By the way, simple file transfer among networked Macs is dirt cheap. Claris's Public Folder software is free (though unsupported); get it from a user group or online information service. Also, be aware that System 7's many capabilities include file sharing.

Irregular Line Spacing

Q When changing fonts while maintaining the font size in MacWrite 4.6 and Microsoft Word 4.01, strange things seem to happen to the line spacing. For example, changing just one word in a line of text from Times 12 to Symbol 12 increases the amount of space between that line and the next line. Is this a bug, or aren't 12 points always 12 points?

Gunnar Hult
Stockholm, Sweden

A For each font, designers assign a standard amount of *line space*— the space between baselines (imaginary lines that letters appear to sit on in text). This space, which differs from font to font, keeps the tops (*ascenders*) of letters like *h* and *k* from running into the bottoms (*descenders*) of letters like *y* and *g* in the line above. But many word processors let you override those standard settings.

When a line contains multiple fonts, most word processors adjust to accommodate the font with the largest amount of line spacing. In Word, you can keep that from happening by entering the exact amount of line spacing you want as a negative number in the Paragraph command's dialog box. For example, entering −12 would prevent the line spacing variations you're experiencing when you have Times and Symbol characters in the same line. If you do this, keep an eye out for chopped-off descenders and ascenders above and below characters that are in a larger type size than the surrounding text.

To adjust standard line spacing in MacWrite II and MacWrite Pro (MacWrite 4.6's successors), select one or more lines and click the line-spacing icons in the formatting ruler or use the Paragraph command in the Format menu. In Microsoft Word, select text in the paragraphs whose line spacing you want to change, choose Paragraph from the Formats menu, and enter the line spacing in the space provided.

Printers of Yore

Q With all the attention on the newest printer technology, I feel left out as the owner of a utilitarian, faithful ImageWriter II purchased less than two years ago. I devoured the articles in the May 1991 issue on printers and fonts but remain puzzled about what utility software to use with my ImageWriter. What can Adobe Type Manager really do for us? Is Freedom of Press something we should stretch to purchase to improve the appearance of the dot matrix printer's output? Are there other products that will improve the printout from an ImageWriter? What about System 7? Should we dot matrix printer owners realize our printers are obsolete and set our sights on one of the newer ink-jet or low-end laser printers?

Barbara N. Passman
Chicago, Illinois

A The products you mention increase an ImageWriter's versatility: ATM gives you hundreds more font and font-size options (you must also buy the fonts, and they are expensive); System 7's TrueType fonts will do the same when a wide selection of fonts *(continues)*

becomes available (at prices yet to be determined); Freedom of Press lets your ImageWriter print PostScript graphics and page images. None of those products, nor any other product, can make an ImageWriter's 144-dpi resolution look like a StyleWriter's 360 dpi or a laser printer's 300 dpi. Any of these products gives you 144-dpi quality across a much wider range of documents. You still get the best-looking text on an ImageWriter by using installed sizes of bitmapped (fixed-size) fonts that were specifically designed for it, such as Boston II (available from user groups and on-line information services).

Obsolete? Only you can decide when the indisputably sharper, crisper output of today's printer technologies is worth the cost. Don't be surprised if you face the same kind of decision two years hence.

Shrunken Database Archive
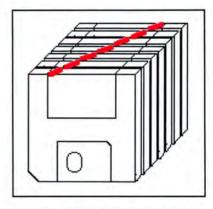
TIP: You can save a lot of time (and money) when transmitting or archiving a FileMaker database by first compressing it with the Compressed Copy option of the Save A Copy As command. To save even more, export the data to a text file and make a clone of the database (a copy with no records). The text file and the clone together take up less space than a compressed version of the database. To restore the database, you copy the empty clone to a disk with enough free space for the uncompressed database and use FileMaker's Import command to fill the clone with data from the text file.

You can squeeze the database even more by using a file-compression utility, such as StuffIt, on the File-Maker-compressed database. For maximum compression—80 percent or more—use StuffIt to compress the text file and clone.

Mark Alan Cirino
Burlingame, California

Grouped Disk Labels

TIP: People often use floppy disks in groups—an archive or a set of public exchange programs, for example. To quickly flag all disks as members of the same group, put them in order, stand the group upright with their metal shutters down, and draw a diagonal

BRANDED   Marking a color line diagonally across the top of a group of disks helps you keep them together and in the right sequence.

line across the tops of the disks with a color marker (see "Branded"). Now you can tell at a glance when a disk is missing from the group, and can easily reorganize the group if any disks get mixed up. You can use different colors to categorize different groups, of course.

Chan Lane
Winston-Salem, North Carolina

StyleWriting in the Background

TIP: The StyleWriter does not print fast, so a print spooler is a very attractive option. My Apple dealer did not know of any spooler that works with the StyleWriter, but I discovered that SuperSpool 5.0 from Fifth Generation Systems (504/291-7221 or 800/873-4384) spools documents headed for a StyleWriter automatically and transparently. Of course, performance for both printing and other work on the Mac is degraded with slower machines such as the Mac Plus. But at least you have your Mac back.

Although the StyleWriter's print quality is very impressive, the paper you use can make a big difference. To my surprise, I found that cheap 20-pound photocopier paper produces more solid blacks and generally crisper images than ink-jet paper and is fine for everyday use. Bond paper containing 50 percent cotton has given me the best results to date. Blacks are black instead of dark gray; large areas of black show no banding; and 3-point text and hairlines are extremely crisp.

Denis Chabot
Calgary, Alberta, Canada
(continues)
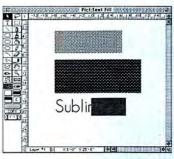
PATTERNED TEXT WITHOUT POSTSCRIPT
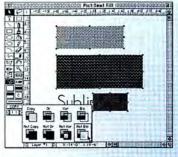
A nice feature of PostScript drawing programs is that they allow you to set a fill pattern for text. With this tip, submitted by Robert Vasquez of Greeley, Colorado, you can simulate this effect on most Quick-Draw printers by using any drawing program—such as Canvas or DeskDraw—that lets you specify a copy mode. When it comes to printing this patterned text, you must use an ImageWriter I or II, StyleWriter, LaserWriter SC, or other non-PostScript printer. This trick doesn't work with an ImageWriter LQ or, ironically, with true PostScript printers, which don't recognize alternate copy modes.

1. Type the text you want to fill. For maximum flexibility in choosing font sizes, use TrueType fonts or PostScript fonts and Adobe Type Manager.

2. Draw a rectangle that covers the text, and fill the rectangle with the desired pattern. Optionally, you can use a pasted bitmap (paint-style picture) for the pattern.

3. Select the filled rectangle and change its transfer mode to Not BIC or White Erases (the name varies from program to program). The transfer mode specifies which of eight ways QuickDraw should combine an object's black dots (foreground color) and white dots (background color) with objects behind it. The Not BIC (Not Black-Is-Clear) transfer mode makes an object semitransparent; its foreground color (black dots) becomes transparent—so objects behind show through—and its background color (white dots) stays the background color. The standard transfer mode is Copy, which makes an object opaque. You set the transfer mode in Canvas, for example, with the Ink Manager pop-up menu and in Ultra-Paint with the Pen Mode pop-up menu.

4. The white parts of the patterned rectangle erase the black parts of the text they cover. The Not BIC transfer mode makes the black parts of the patterned rectangle transparent so the text shows through.

Coprocessor Not Installed?

TIP: Some programs don't work on a standard Mac IIsi or LC because those models lack a floating-point unit (FPU), a coprocessor that accelerates computations. To work around FPU-related incompatibilities, some people have adopted John Neil's Software FPU, a control panel that emulates the absent hardware FPU. (Formerly known as PseudoFPU, the product is available from user groups and online information systems, or by paying the $10 shareware fee to John Neil & Associates, P.O. Box 160699, Cupertino, CA 95016-0699.)

Software FPU itself is incompatible with some INIT managers, including INITPicker. The symptoms: Software FPU shows a normal (installed) start-up icon, but the control panel indicates that the software FPU is disabled because a hardware FPU is present, even though none is. As a work-around, rename Software FPU and the INIT manager so that Software FPU is first alphabetically. For example, rename Software FPU to !Software FPU and INITPicker to #INITPicker. (INITPicker's name can't be changed directly, so rename a duplicate copy.)

Michael Rose
Pittsburgh, Pennsylvania

John Neil says Software FPU 2.01a (fully compatible with System 7) works with INITPicker's latest version without requiring renaming.—L.P. **M**

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We pay from $25 to $100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702) or MCI Mail (294-8078). All published submissions become the property of Macworld. Due to the high volume of mail received, we're unable to provide personal responses.

Lon Poole answers readers' questions and selects their tips for this column. His two most recent books are Amazing Mac Facts *(Microsoft Press, 1991), a collection of the best published tips; and* Macworld Guide to System 7, *IDG Books Worldwide, 1991).*

More System 7 stuff than you

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Getting Started with Print-Output Media

A GUIDE TO MATCHING THE MEDIUM WITH THE MESSAGE

BY JIM HEID

A printer without paper is like a camera without film. And there are almost as many types of paper as there are types of film. But the real fun begins when you explore the world of alternative print media. Just a few of the unorthodox uses you can find for your printer: printing peel-and-stick labels for envelopes, floppy disks, and audio and video cassettes; creating business cards on stiff card stock; producing laminated ID cards and name badges; putting a company name and logo on T-shirts and coffee mugs. And if your print medium of choice is paper, analyzing the wide range of available stock is essential—the right type of paper means the difference between so-so and striking results.

From paper, file cards, and transparencies to T-shirts and mugs—you'll find a huge range of output alternatives to print on.

strips, fold them back and forth a few times before tearing. Even then, most papers leave little nubs behind, a dead giveaway that the document was printed on fanfold paper. To get cleaner edges, use high-quality fanfold paper with finer perforations.

Paper and computer supply houses often use terms like *invisible perf* or *satin edge* to describe such stock.

Besides white and off-white colors like ivory and gray, fanfold paper comes printed with horizontal bars of green or blue alternating with white—which supposedly help lead the eyes across lines of numbers. You'll also find fanfold paper with sheets prepunched to fit in standard three-ring binders. And Lyben Computer Systems (313/649-4500) is one source for Banner Band, 45-foot-long rolls of paper with perforated sprocket edges but no cross-perforations. Available in several colors, Banner Band teams up well with Brøderbund Software's BannerMania program (see *(continues)*

Today's Paper

Although the selection of alternative print media is growing, paper remains the preeminent output medium. ImageWriters and their ilk accept single sheets, which you load as with a typewriter. The ImageWriter II accepts a $225 *sheet feeder* that eliminates having to hand-feed page by page. A less-expensive alternative is to use *fanfold*, also called *pin-fed*, paper. Fanfold paper is a single long sheet of paper that's perforated and folded to lie in a stack. The left and right edges of the sheets have perforated strips containing holes that are grasped by sprockets in the printer. After printing a document, you separate the sheets and tear off the perforated strips. This chore is sometimes called *bursting*, but *boring* would be more accurate. To cleanly remove the

Reviews, Macworld, May 1991).

One advantage dot matrix printers have over ink-jets and lasers is that they're *impact* printers, and can print on the carbon or carbonless *multipart* paper used for invoices and other forms. Most supply houses sell blank multipart forms; you can also buy forms printed with your company name and logo from mail-order business-form houses like New England Business Services (800/225-6380).

Because dot matrix printers are impact printers, you can also use them to create stencils for mimeograph machines. AB Dick's 2060 stencil masters (available from office-supply stores) are designed for dot matrix printers. You can also use AB Dick's less expensive F-1960 masters if you remove their plastic backing before printing. (Use ribbon when printing the masters to avoid gumming up the ImageWriter's print head with stencil wax.) You get better mimeos if you avoid printing solid black or dark patterns on the masters.

Paper for Lasers

Laser printers use photocopier-like mechanisms, so any paper designed to run through copiers gives satisfactory results. Like fanfold paper, photocopier bond is available prepunched for three-ring binders.

When you want more than just satisfactory results, use paper such as Hammermill's Laser Plus, CG Graphic Arts Supply's Laseredge series, or Georgia Pacific's Nekoosa Laser 1000. Available through most large office-supply outlets, these papers have a smooth, bright-white finish that makes them ideal for printing camera-ready documents to take to the print shop. If you'll be mounting the output with wax or spray adhesive, use Hammermill's Laser Plus, which contains a *wax holdout* that allows the wax to adhere without soaking into the paper.

Premium typewriter bond such as Eaton's 28-pound Impressions series delivers fine results with most laser printers. And if you're feeling green, you'll be glad to know recycled paper is available for dot matrix and laser printers. Inmac (800/446-6224) and Lyben Computer Systems are two sources for recycled fanfold paper in white or with green bars. And Paper Direct (800/272-7377) sells a large selection of white, color, and special-finish recycled stocks.

A staggering selection of specialty paper is available for laser printers, and the best source I've found for it is Paper Direct. Its mail-order catalog lists speckled-granite, parchment, linen, and marble finishes, along with pinstripes and borders. The Electrix and Firebrites series come in vibrant fluorescent colors. The Perfs and Scores collection comprises several types of perforated and scored stocks. One is scored so that it folds three times, and has a perforated area that makes an ideal tear-off reply card. Another is similarly scored but contains a perforated rotary-file card. Still

another has a slot for a business card. At $19.95 for 75 sheets, they're an economical way for a small business to produce expensive-looking brochures. Lyben Computer Systems stocks colored and textured paper by The Legacy Company (413/737-4770). Letraset's Copy FX collection also sports several specialty stocks.

But buying exotic paper is one thing; getting it to run through a printer without jamming is another. Most laser printers can automatically feed paper ranging from 16 to 28 pounds. (Most photocopier bond is 20-pound stock; the measurement refers to the weight of 500 sheets, or a *ream,* of 17-by-22-inch paper.) To print on heavier stocks, use the manual-feed slot, which provides a straighter, less jam-prone paper path. (For a Personal LaserWriter, a Laser-Writer II, or another printer with a fold-out, face-up paper tray, open the tray for the straightest paper path.) The printer's manual specifies its paper-handling limits.

Unless you've got an optional envelope tray, you'll also want to use the manual-feed slot to print envelopes. Check your printer's manual for the right margin settings or just experiment. Once you find settings that work, save them in a template or stationery document that you can reuse. Electronic address book programs such as Portfolio Systems' DynoDex also have features that simplify envelope printing.

Paper for the Ink-Jet Set
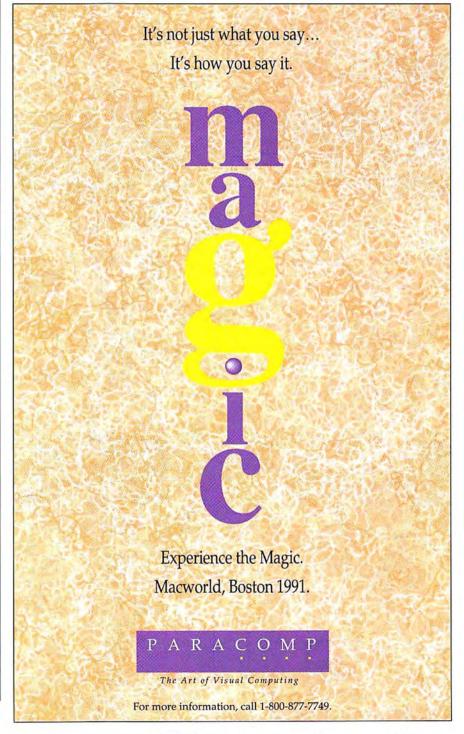
Ink-jet printers are finicky about paper: it must be absorbent enough to allow the ink to dry without smearing, but if the paper is too absorbent, ink seeps into the fibers, giving the output a ragged-edge look. Some photocopier bonds work well, but others absorb like a paper towel (see "Personal Page Printers Arrive," *Macworld,* May 1991).
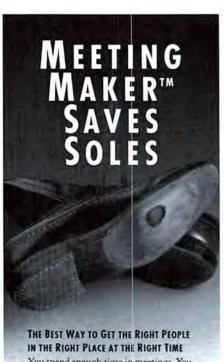
Because ink-jet printers are vulnerable to variations in room temperature and humidity, the best way to find the ideal paper is to experiment in the room where you print. When you find a paper that works well, stock up. Many users of the Hewlett-Packard DeskWriter swear by 24-pound Classic Crest in the Solar

White color (catalog number 04631). Apple recommends the same paper for its StyleWriter. Other DeskWriter users report good results from Pro-Tech Laser Bond White (catalog number 94161), from James River Corporation (800/521-5035).

Regardless of the paper you choose, you get better results if you print on the correct side—the *felt*

side, which is smoother than the *wire* side. Most paper manufacturers indicate the felt side on the label attached to the paper's wrapper. If you've removed the paper from its wrapper (a bad idea because it exposes the paper to humidity), you need to print some tests. The side that gives the sharpest results is the felt side. If *(continues)*

you're using watermarked bond, hold a sheet up to the light—if the watermark's text or design is reversed, you're looking at the wire side. (This felt-side-versus-wire-side issue applies to laser printing, too, but print quality doesn't degrade as dramatically if you laser-print on the wire side.)

Another problem with ink-jet output is that it can smear, especially if it gets wet. StyleWriter output is more prone to smearing than that of an HP DeskWriter. Graphic Utilities (800/669-4723) has introduced a StyleWriter ink-cartridge-refilling kit (available in several colors) that the firm says makes StyleWriter output less smear-prone. Remember, you can always eliminate smear fears (and improve contrast) by photocopying ink-jet output. To protect the address on an envelope from smearing, cover the address with a piece of tape.
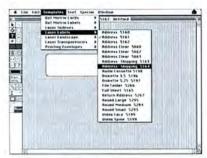
Relief for many of these printing problems may be near. In September, Paper Direct plans to begin shipments of its new InkJet Ultra, a 28-pound stock designed for ink-jet printing. Paper Direct claims that a special coating on its InkJet Ultra paper enables the ink to dry quickly without smearing and eliminates worries about which side to print on.

See-Through Output

Businesses and schools rely on overhead transparencies for presentations and instruction. *Transparency film* also makes attractive, see-through covers for reports, and it teams up well with peel-and-stick labels.

The only transparency film designed for dot matrix printers I've found is 3M Type 186 Impact Dot Matrix Transparency Film (order number 78-6969-6505-8). For HP DeskWriters, use Avery's 5277 transparency film. For StyleWriters, Apple recommends 3M CG3480 film. And for laser printers, there's 3M Type 154 Laser Printer Transparency Film (order number 78-6969-6085-1) and Avery's ColorFrames film, which has color borders in a variety of hues. James River's Pro-Tech line also has transparency film in several colors.

To protect transparencies, consider mounting them in cardboard frames such as 3M Type 9070 Transparency Mounting Frames or ICI

EASY LABELS Avery's MacLabelPro simplifies printing on Avery labels by combining basic page-layout features with predefined templates for most Avery label stocks. The Templates menu (top) lists the sizes and varieties of labels supported. A shipping-label template (bottom) comes complete with color graphic, return address, and mail-merge fields. The fields are replaced with customer names and addresses when the labels are printed.

Imagedata's Image Frame. Frames make transparencies easier to handle and sort, eliminate distracting light leaks around the transparency's edges, and provide an area where you can write notes. The Image Frame also protects the transparency with a layer of clear plastic that you can write on and erase, and it's prepunched for storage in a three-ring binder.

Output with a Peel

Peel-and-stick labels have a thousand and one uses, and nearly as many varieties are available for all types of printers. Avery has the largest selection, with everything from mailing labels to audiotape and videotape labels. Most labels are white paper, but several sizes of clear plastic labels are available for laser printers. Their matte finish makes the label stock nearly invisible when applied.

Avery labels have become so popular that many programs—including Aldus PageMaker, Claris FileMaker Pro, and Microsoft's File and Works—include templates designed for the

MAKING A TRANSFER

E asy Transfer Cartridges (ETCs) live up to their name. Simply replace the printer's standard cartridge with an ETC. Then, after choosing the Page Setup command, click on the Options button in the LaserWriter Page Setup window, check the Flip Horizontal check box, and print.

Although expensive coated paper tends to provide a higher-quality transfer, ETC claims cheap copy paper gives good results (Hammermill's Laser Plus worked beautifully for me). Don't be put off by the resulting output that appears black and white. The colors are released only at high temperatures.

You can transfer the output to fabric (such as T-shirts, mouse pads, leather) using a household iron, although a heat-transfer press (simi-lar to a dry-mounting press) gives better results with large images, which tend to blur under the movement of an iron. Set the press's temperature to between 300 and 400 degrees Fahrenheit. Alas, any fabric must contain at least 50 percent polyester, or the transfer comes out in the wash. ETC also sells a solution you spray onto fabric before applying transfers, to improve its durability.

To transfer an image to a coffee mug, you need a mug press. After you set the temperature (again, 300 to 400 degrees Fahrenheit) and let the press heat up, you secure the transfer on the mug with heat-resistant tape, place the mug in the sling (made of heat-resistant rubber with a Teflon coating), and wait approximately 2 minutes for the transfer process to be completed.

most common sizes. Simply open one of these documents and substitute its placeholder text with your own, then load up the printer and go.

The easiest way to print on Avery labels is to use Avery's own MacLabel-Pro software. MacLabelPro is essentially a bare-bones publishing program that includes templates for every label stock in Avery's line (see "Easy Labels"). But it also sports some unique talents, such as the ability to import color graphics and to print a different serial number on each label. And its powerful *print merge* feature lets you print labels from a database file.

If you print loads of labels, consider one of the tiny printers designed just for that purpose. Seiko Instruments' Smart Label Printer Plus was released in June. CoStar's LabelWriter II, developed in conjunction with Avery, is expected to ship in July, while Avery plans to market its own version, the Personal Label Printer, in August. CoStar's LabelWriter Plus, due to ship in September, will print two-across mailing labels, shipping labels, and floppy-disk labels.

By combining transparency film with full-sheet label stock such as Avery's 5353, you can create rugged laminated plastic cards in four simple steps. (1) After laying out the card, choose the Page Setup command and click on the Options button. (2) In the Options dialog box, check the Flip Horizontal box, and then click on OK. (Note that only the LaserWriter's Page Setup command offers the Flip Horizontal option. If you have a different printer, you must use a page-layout or graphics program that has its own horizontal-flip command or *mirroring* function. Most drawing and painting programs do, although in some—including the popular MacDraw II—the function works with graphics only, not text.) (3) Print the document on the transparency film. (4) Attach the label stock to the toner side (the side whose contents appear backwards) of the film and then trim. Because the toner is sandwiched between the label and film, it won't scratch off.

Card Games
Filing programs haven't completely replaced index cards and rotary card-files. Indeed, by printing a database on card stock, you can have the best of both worlds—electronic sort-

ing and revision along with the portability of hard copy.

ImageWriters can print on standard index cards; continuous-feeding fanfold cards are also available in several sizes and colors. Avery also makes rotary-file cards in fanfold form. For easier formatting and feeding, consider modifying the ImageWriter print driver so that its Page Setup dialog box offers an index-card option. You can use Apple's ResEdit utility or a free program called PREC Manager, available from user groups and online services. (For details on modifying resources, see "Getting Started with Resource Editing," June 1991.)

For laser printers, Portfolio Systems' DynoPage lets you print files to a variety of custom page sizes, such as personal-organizer or address-book pages. Paper Direct's Perfs and Scores collection includes several noteworthy card stocks. There's an 8½-by-11-inch sheet perforated into eight business-card-size rectangles, another perforated into four postcards, and a third divided into eight rotary-file cards. For a small mailing, consider the Postal Service's prestamped postcards. They roll through an Image-Writer well and can be used with most laser printers' manual-feed slots.

The Check's in the Printer
Tired of writing checks by hand to the same creditors every month? Automate the process using a personal finance program such as Survivor Software's MacMoney or Intuit's Quicken. In addition to helping you manage money and balance the books, both can print checks.

Quicken includes a catalog listing a variety of check designs; some come in fanfold form for dot matrix printers, others are single sheets designed for lasers and ink-jets. Intuit also sells personalized fanfold stationery, a 25 percent cotton bond in white or ivory with smooth-edge perforations.

Fruit of the Laser
I've saved my favorite alternative output medium for last. I had to—it was in the dryer. If you have a laser printer that uses a Canon CX or SX engine (these include the LaserWriter series, various HP LaserJets, QMS printers, *(continues)*

PHOTOGRAPHS BY LUIS DELGADO

COLOR TAGGING Letraset's Color Tag system lets you add color to laser-printed or photocopied output in three steps: (1) Position the foil over the area to be colorized; (2) drag the transfer iron across the foil at a smooth, steady pace; (3) wait a few seconds and then peel off the color strip. The color adheres to the toner the printer or copier applied.

and Canon printers), you can buy toner cartridges that let you create iron-on transfers for fabric, baseball caps, mugs, plaques, and a lot more (see "Making a Transfer"). Easy Transfer Cartridges, from a company of the same name (800/336-1599), are filled with *sublimation dye,* the same pigment used in the costliest color printers (see "Color Printers Here and Now," *Macworld,* February 1991).

If you're adventuresome—and if you have a graphics program that does color separations (Aldus FreeHand and Adobe Illustrator do)—you can get full-color images by printing them in four passes, once each for a cyan, magenta, yellow, and black cartridge. Accurately aligning the images for each pass is difficult, however.

Easy Transfer Cartridges are available in several colors. The cartridges cost $195 each; a sample transfer and literature listing compatible surfaces is free. By the fall, Easy Transfer Cartridges should be available for printers built around Canon's LX engine, including the Personal LaserWriter and the QMS-PS 410.
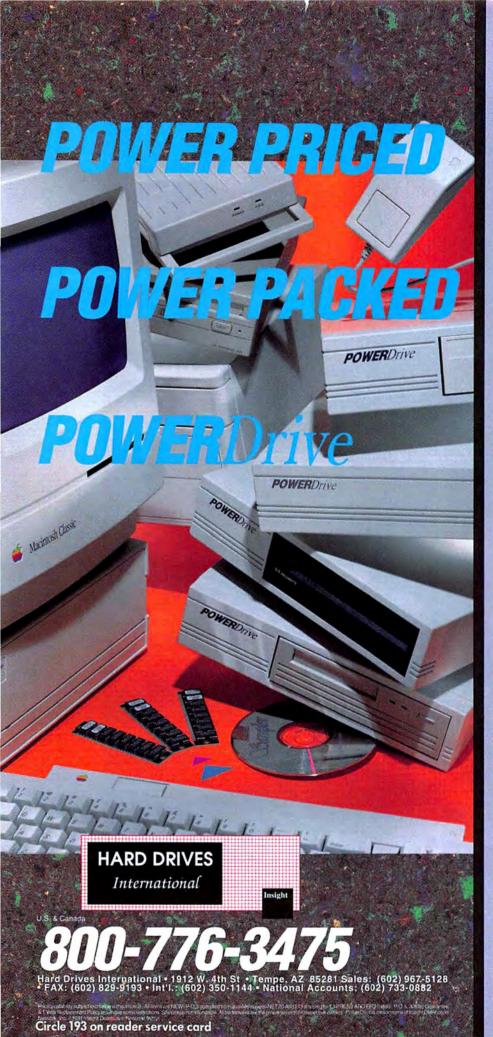
Finishing Touches

To brighten up laser-printed or photocopied documents, you can add color using Letraset's ColorTag system, a wallet-size electric iron, and heat-sensitive color foil, which comes in 72 colors and in metallic and matte finishes. The results are stunning (see "Color Tagging").

The best way to enhance and present a large document is to bind it. VeloBind (800/776-3355) offers binding equipment of all sizes, from the $60 Personal VeloBinder, which binds up to 45 pages, to the $3995 Model 750, which binds up to 750. The firm also sells attractive cover stocks and tab dividers. Bind-it Corporation's (800/645-5110) $699 Covermate 600, a thermal binding machine, produces *perfect bound* books of up to 2¼ inches thick. (*Macworld* is perfect bound, as are most books.) Bind-it's $550 Covermate 25 uses less-expensive, plastic-comb binding.

I've covered the most popular kinds of print media here; there isn't room to describe every kind of specialty paper and output accessory. Paper Direct sells a sampler kit containing hundreds of paper and envelope samples ($19.95 plus $2.50 for shipping, and the price is credited to your first order of $30 or more). And most office-supply stores stock a large selection of labels, paper, and binding equipment. Try them out. Classy kinds of paper and alternative output media offer creative ways to convey your messages—and give your printer a break from the same old stock. **M**

Contributing editor Jim Heid looks at a different aspect of Mac fundamentals each month. His latest book, Macworld Complete Mac Handbook *(IDG Books Worldwide), is an updated and expanded collection of more than 40* Getting Started *columns.*

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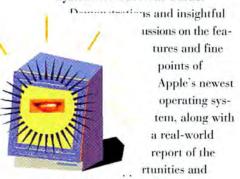
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D........... ıs and insightful ussions on the fea- tures and fine points of Apple's newest operating sys- tem, along with a real-world report of the rtunities and obstacles 7.0 is creating.

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information, innovation

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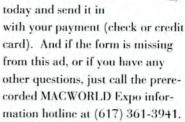
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badges will be held at the Preregistration Counter at the Better Living Centre for pick up beginning Monday, October 7.

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Please check one: ☐ Home Address ☐ Company Address

Last Name __/__/__/__/__/__/__/__/__/__/__/__/__/__/__/ First Name __/__/__/__/__/__/__/__/__/__/__/__/__/__/

Street Address __/

City __/__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/ State __/__/ Zip __/__/__/__/__/

Country(If other than U.S.) __/__/__/__/__/__/__/__/__/__/__/ Telephone __/__/__/ __/__/__/ __/__/__/__/

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Title __/__/__/__/__/__/__/__/__/__/__/__/__/__/__/

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02. ☐ Manufacturer (computer industry)
03. ☐ Distributor/dealer/retailer/service
04. ☐ Business
05. ☐ Legal services
06. ☐ Communications/publishing
07. ☐ Education
08. ☐ Government
09. ☐ Consultant
10. ☐ Transportation
11. ☐ Information services
12. ☐ Utilities
13. ☐ Engineering
14. ☐ Health services
15. ☐ Other (specify)

Your Title
16. ☐ CEO/president/owner
17. ☐ DP/MIS manager
18. ☐ Manager/department head
19. ☐ Network manager
20. ☐ Programmer/analyst
21. ☐ Engineer/research & development
22. ☐ Consultant
23. ☐ Marketing/sales
24. ☐ Educator
25. ☐ Art director/graphics
26. ☐ Editor/writer
27. ☐ Other (specify)

Size of Your Organization (number of employees national and international)
28. ☐ Under 50   31. ☐ 500-999
29. ☐ 50-99   32. ☐ 1,000-5,000
30. ☐ 100-499   33. ☐ Over 5,000

Which personal computer(s) do you own/use?
34. ☐ Macintosh Classic   41. ☐ Macintosh IIci
35. ☐ Macintosh Plus   42. ☐ Macintosh IIfx
36. ☐ Macintosh SE   43. ☐ Apple II Series
37. ☐ Macintosh II   44. ☐ IBM PC (or clone)
38. ☐ Macintosh   45. ☐ None
39. ☐ Macintosh LC   46. ☐ Other (specify)
40. ☐ Macintosh IIsi   _____

MW91

Insights on HyperCard 2

TIPS TO MAKE WORKING WITH HYPERCARD A LITTLE LESS MYSTERIOUS AND A LITTLE MORE FUN

BY GEORGE BEEKMAN

Version 2 of HyperCard includes a bevy of features not found in the original HyperCard. Most of these additions—the powerful new script editor, the built-in debugger, and all those new HyperTalk commands—are clearly aimed at HyperTalk programmers. But even if you never write a word of HyperTalk, you can take advantage of HyperCard 2's power.

I'd like to thank the following people for contributions to this article: Steve Maller and Mary Bushnell of the Claris HyperCard team, and Bill Sterner, Manager of Instruction, Research, and User Services at the University of Chicago.

Adding Frills to the No-Frills Version

HyperCard 2 comes in three forms. The Claris HyperCard Development Kit includes hundreds of pages of documentation and five disks full of useful and interesting stacks. The Claris HyperCard upgrade package lacks some of the tutorial manuals, but it's identical in every other way to the Development Kit. HyperCard still comes with every new Mac, but only in a one-disk, no-frills version with precious little documentation.

The bundled version is designed for casual HyperCard users only; the User Preferences card of the Home stack doesn't offer options for setting the user level to Painting, Authoring, or Scripting. That's easy to fix, though; see *Quick Tips* for instructions.

Tiling the Screen

If you're working with HyperCard on a large screen, like the 13-inch Apple monitor, you're likely to have extra screen space, since most stacks are designed to fit compact Mac screens. You can fill the surplus with the Tools palette, the Paint palette, the Scroll window, the Message box, and the Navigator palette without obstructing the view of the current card. Better yet, you can train HyperCard to arrange these windows for you on the

screen whenever you start up HyperCard. You need to modify the Home stack's script by adding a few lines of HyperTalk. (Even if you've never worked with HyperTalk scripts, stay tuned. It's easy, and I'll walk you through each step.) Here's how.

1. Open the Home stack's script window by holding down the shift key while you select Stack Info from the Objects menu.

2. Search the script for the line that says on startUp. It's probably visible near the bottom of the window on the small screen, and it's most likely followed by a couple of comment lines that begin with double dashes:

on startUp
-- Requires handler:
¬ getHomeInfo, ¬
checkForMissingFonts
-- gets and sets the
¬ user's preferences

These comments provide information for programmers about the start-up routine, so they should remain at the beginning of that routine.

3. Click to position the cursor at the end of the routine (right before the word line of the script that reads end startUp) and press return twice to insert a blank line. Then type the following script, pressing return at the *(continues)*

end of each line:
-- added for custom window display on
  ¬ 13" monitor
show card window at 8, 46
show pattern window at 520, -8
show tool window at 520, 136
palette "navigator", "520, 280"
show scroll window at 0, 357
show message at 102, 388
-- end of added statements

(If you make any typing errors, you can correct them just as you would with any word processor.)

4. Click on the Close box to dismiss the script window. When a dialog box asks you if you want to save the changes, click on Yes.
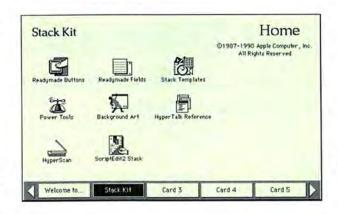
The next time you start Hyper-Card, the instructions you typed will be executed. (If you prefer not to have the custom window display each time you open HyperCard, you could put a variant of the script in a button in the Home stack instead of in the stack script.) The first instruction tells HyperCard to position the upper-left corner of the card window 8 pixels from the left edge of the screen and 46 pixels from the top. That location—the position of the card window's corner—becomes the reference point for positioning all other objects, so the remaining instructions tell HyperCard where to put the other palettes and windows in relation to that point. For example, the script puts the top-right corner of the pattern window 520 pixels to the right of, and 8 pixels above, the card window's upper-right corner.

You can test the changes without restarting HyperCard by typing startUp in the Message box.

If this layout doesn't fit your personal work style (or your monitor), modify it with different numbers or different window names. For example, here's a simplified version for compact-Macintosh users who like to have the Scroll window and the Navigator palette handy.

-- added for custom window display ¬
   on compact screen
palette "navigator", "412, 272"
show scroll window at 3, 272
-- end of added statements

If neither of these arrangements suits you, drag the windows where you want them and ask HyperCard to tell you their locations via the Mes-

Stack Kit — Home

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Readymade Buttons   Readymade Fields   Stack Templates

Power Tools   Background Art   HyperTalk Reference

HyperScan   ScriptEdit2 Stack

Welcome to...   Stack Kit   Card 3   Card 4   Card 5

MAKING FLOATING PALETTES HyperCard 2, from Claris, has a handy tool for creating a custom button palette. First click on the Stack Kit button at the bottom of the Home stack card, then click on the beanie button (left).

sage box. For example, position the scroll box and type the loc of scroll window into the Message box, press return, and the coordinates appear in the Message box, ready to be copied into a script.

The same techniques can be used to automatically position any window or palette. To find coordinates for the Navigator palette, put the cursor where you want the upper-left corner of the palette to be, type the mouseloc in the Message box, and press return.

Disappearing Trick

If you use MultiFinder on a compact Mac, you may be frustrated by one new feature of HyperCard 2: its refusal to completely disappear. A stack doesn't vanish when another application is active; it moves behind the windows of that application, waiting to be reactivated. The problem arises when you need to work with icons on the desktop—they're completely covered by a standard-size stack.

Fortunately, HyperCard 2 has a couple of features that make it easy to work around this problem. One is the Scroll window (available via Scroll

in the Go menu or by typing ⌘-E). This miniature window represents the entire card; superimposed on it is the currently open window for the card (in this case, the standard small-screen size and shape). When you put the cursor in the Scroll window, you get the grabber hand, which lets you drag the current card window around the surface of the larger card to see different parts of it.

The Scroll window can also shrink the card's window so it doesn't cover the entire screen. Dragging from any edge or corner of the Scroll window moves the edge of the current card window in the same direction. You can then move the shrunken window into a corner of the screen where it doesn't interfere with your desktop dealings. To restore the window's original size, double-click on the Scroll window.

If the Scroll window seems like a bother, simply type ⌘-shift-E. A size box appears in the lower-right corner of the active window. You can drag this box to shrink the window. When you're through, the size box vanishes *(continues)*

Power Tools

A collection of tools and techniques for scripters.

Use This Stack

Super Grouper   Search Container XFCN
Window Manager   ShowList XFCN
Paint Palettes   Multiple Scrolling Fields
Export a Stack's Scripts   Script Library
Function and Control Keys   Palette Maker
Stack Menus   Menu Maker
ListObjects   Resource Mover
Picture XCMD   Export to TextFile

Stack Overview

Click any title to   List of Tools

PALETTES, STEP TWO The beanie button on the Stack Kit card takes you to the Power Tools card. Once there, click on Palette Maker to become enlightened in the art of custom buttons that you can use without disturbing the active card.

and you can get on with your work.

If you prefer to make the whole HyperCard screen go away automatically whenever you leave HyperCard, you can insert the following message handler before the line that reads **on startUp** in the Home stack script by following the steps outlined in the previous section.

```
on idle
    if the suspended is true then hide ¬
        card window
    else show card window
end idle
```

Cycling through Windows

HyperCard 2 allows you to open several windows at once, and even intermix script windows and document windows. You can cycle between windows using the Next Window command in the Go menu, or by using the keyboard shortcut, ⌘-L. Holding down the shift key with this command takes you to the rear window so you can cycle in reverse.

Precision Printing

HyperCard's new and improved printing capabilities make it easier to create custom mailing labels. But it's not particularly easy getting the labels on the screen to line up with the label stock in the printer by dragging the corners of those boxes on the Report dialog's miniature page. For more precise positioning, hold down the ⌘ key while dragging or resizing the labels; mouse movements will now be tracked in ⅟₃₂-inch intervals.

Floating Palettes

The following tip works only with Claris's HyperCard, not the version bundled with the Mac. Here's a classic HyperCard problem. Suppose you've designed a stack that includes buttons for formatting text; the user selects some text and wants to click on a series of buttons to tell HyperCard what to do with it. Unfortunately, as soon as the user clicks on the first button, the text is no longer highlighted.

HyperCard 2 comes with a handy tool for solving the problem: the Palette Maker in the Power Tools stack. This tool lets you create a custom floating palette full of buttons that you can use without disturbing the active

card. To get to the Palette Maker, click on the Stack Kit button at the bottom of the Home stack screen. Click on the Power Tools icon, and from the selection of stacks you are given, choose Palette Maker. When you have opened Palette Maker, click on the light bulb in the upper-right corner of the screen, and you will see a scrollable list of instructions for creating floating palettes.

Eavesdropping on HyperTalk

HyperCard 2 includes a powerful debugger to help programmers find logic errors. But the debugger is also a great tool for demystifying the fascinating world of HyperTalk. Whenever you're working with HyperCard, a flurry of messages are being sent between the System and various HyperCard objects. You can monitor them via the Message Watcher window. To open it, type **mw** or **show message watcher** in the Message box and press return. Then as you go about your HyperCard business, watch the messages fly. Experiment with the check boxes that hide certain types of messages; try typing,

clicking, drawing, and navigating. You'll be surprised how quickly those messages start making sense.
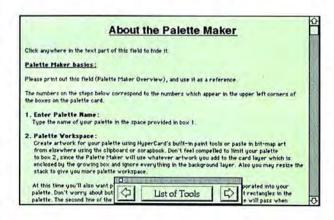
The Chooser Knows

The About HyperCard menu item no longer credits Bill Atkinson as the creator; instead, it randomly displays the name of a member of the HyperCard 2 development team. If you are on a networked Mac, hold down the option key while you select About HyperCard to see a special person's name in the place of honor. Try it! And in case you're wondering how it knew which name to use, it's all in the Chooser.

Sharing the Wealth

If you've found a tip or a shortcut not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. **Ⓜ**

George Beekman is the author of HyperCard 2 in a Hurry (Wadsworth, *1991) and a faculty member at Oregon State University, in Corvallis.*

PALETTES, STEP THREE In the Palette Maker card, click on the light bulb in the upper-right corner of the screen.

PALETTES, STEP FOUR After you've clicked on the light bulb, the Palette Maker goes to a card listing step-by-step instructions that tell you everything you always wanted to know about creating floating palettes.

Invest In Futures.

photo: Vasily Kozyreff

There's probably no greater return on an investment than when you give to the Boys & Girls Club. You'll be helping the Club provide the guidance and inspiration young girls and boys need to achieve success for themselves and progress for America. Make a contribution today, so they can make one tomorrow.

BOYS & GIRLS CLUB

The Club that beats the streets.

UPDATES

FreeFlow version 4.0 works with Apple-Share and TOPS LANs, and is compatible with VAX-based software that emulates Macintosh LANs. Includes unlimited definition length, a tool for diagraming cross-reference lists, and the ability to define data structures for primitive elements. Automatically adds component data flows to the dictionary when a definition is saved, and has global rename and delete functions. Iconix Software Engineering, 213/458-0092. Contact vendor for update price; $995 new.

HyperCard version 2.2 allows user to create stacks with card sizes from less than 1 inch square to 18 inches square, and to open multiple windows to view several stacks concurrently on one screen up to the limits of available RAM. Contains a new set of HyperTalk functions and improved printing capabilities. Apple Computer, 408/996-1010. $49; $199 new.

LapLink Mac III version 3.2 adds Mac-to-Mac file-transfer capabilities and four methods for transferring files between two Macintoshes, including direct cable, modem, AppleTalk, and SCSI connection for the Macintosh Portable. Also adds mouse support on the Mac and the IBM PC, and control of file transfer from either environment. Traveling Software, 206/483-8088. Free; $149.95 new.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
4th Dimension ★	2.1.1	1MB/6.0		Free
Aatrix CheckWriter II	3.02	512K/4.1		*
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant, Inc. Professional	2.1	1MB/6.0.3		*
AccuText	2.0	4MB/6.0.2		*
Address Book Plus	2.0	1MB/6.0.2		$25
Adobe Illustrator	3.0	2MB/6.0.3	2/91	*
Adobe Photoshop	2.0	2MB/6.0.2	9/91	$199
Adobe Type Manager ★	2.0	1MB/6.0.2		Free
After Dark	2.0	512KE/4.1	5/91	*
AgfaType	2.0	2MB/6.0.2		Free
Alchemy	1.1	1MB/6.0	10/90	$25
Aldus FreeHand	3.0	1MB/6.0.3	8/91	*
Aldus PageMaker ★	4.0.1	1MB/4.1		Free
Aldus Persuasion	2.0	1MB/6.0		*
AntiToxin	1.4	512K/3.2		$15
AppleShare File Server	2.0	512K/3.2		*
AppMaker	**1.2**	**1MB/6.0.5**		*
The Art Importer	2.0	1MB/6.0		$20
ArtRoom	5.0	512K/3.2		*
ASCII Bridge	4.0	1MB/6.0.3		*
Ashlar Vellum	2.0	4MB/6.0.2		$95
atOnce	1.2	1MB/6.0.5		*
A/UX	2.0	4MB/6.0.5		*
BackFax	1.5.1	1MB/6.0.3		$25
BackMatic	2.0	1MB/4.2		*
Bill-It	2.6	1MB/6.0.3		*
Bitstream Typeface Library	2.0	1MB/6.0		*
Business Sense ★	1.4.1	1MB/6.0		*
Business Session ★	3.2	512K/3.2		Free
CA-Cricket Presents	2.0.1	1MB/6.0		*
CanOpener	1.1	512K/3.0		Free
Canvas	2.1	1MB/6.0		*
Capture	4.0	1MB/6.0		$30
Carbon Copy Mac	2.0	1MB/6.0.5	10/90	*
Claris CAD	2.0.2	2MB/6.0		$79
Color MacCheese	2.07	1MB/6.0.5		$15

Product	V.	Req.	Rev.	Price
ColorStudio	**1.5**	**4MB/6.0.5**		*
CompuServe Information Manager ★	1.03	1MB/4.1	12/90	*
CompuServe Navigator	3.0.4	512K/4.1	12/90	*
ConcertWare	5.1	512KE/4.2		$35
Correct Grammar	2.0	1MB/4.2		$29.95
DataMerge	2.0.3	512K/3.2		Free
DataPrism	1.1	1MB/6.0		Free
DeltaGraph	2.0	2MB/6.0.5		$50
DeltaGraph Pro		2MB/6.0.5		$75
DeluxeMusic Construction Set	2.5	512K/6.0.2		*
D.E.S. Document Exchange System	4.1	1MB/6.0		*
DesignCAD	**3.0**	**2MB/6.0.5**		*
DesignStudio	2.0	1MB/6.0		*
DeskPaint ★	3.03	1MB/4.2		Free
Developer Stack	3.0	1MB/6.0		$15
Digital Darkroom	2.0	1MB/6.0	9/91	*
DiskDoubler	3.1	1MB/6.0.2	12/90	Free
DiskExpress II ★	2.07	1MB/6.0	11/90	*
DiskFit and Network DiskFit	2.0	1MB/6.0	7/91	*
DiskTop	4.01	1MB/6.0		*
Display AdBuilder	1.1	1MB/6.0.3		*
Dollars & Sense	5.0	512KE/3.2		$34.95
Double Helix	3.5	1MB/6.0		$99
Dreams	1.1	1MB/6.0.2		*
DynaPerspective	2.04	2MB/6.0.4		Free
DynoDex	2.0	1MB/6.0		$25
EarthQuest	2.0	1MB/6.0	4/91	*
Easy Color Paint	2.0	1MB/6.0.2		*
Empower II ★	4.01	1MB/4.2		*
Family Heritage File	2.7.3	512K/4.2		*
Fastback II	2.1	512KE/4.1		$30
Fast Forms	2.0	1MB/6.0	11/90	$25
FastLabel	2.02	1MB/6.0		*
FastTrack	1.5	512KE/5.5		$20

Product	V.	Req.	Rev.	Price
FaxGate	1.12	1MB/6.0		Free
FileMaker Pro ★	1.02	1MB/4.2	2/91	Free
Filevision V	1.1	1MB/6.0.2		*
FilmMaker	2.5	5MB/6.0.3	3/91	*
Finale	2.6	1MB/6.0.2		Free
Findswell	2.01	512KE/3.2		*
Fontographer	3.2	1MB/4.2		*
FontShare	2.2	1MB/6.0		Free
FontStudio	**2.0**	**1MB/6.0.5**	**10/90**	*
FoxBase+/Mac ★	2.01	1MB/6.0		Free
FrameMaker	3.0	1MB/6.0	1/91	*
Freedom of Press	3.0.1	2MB/6.0.3		Free
FreeFlow	4.0	1MB/6.0.3		*
Full Impact ★	2.0	1MB/6.0		$50
FullWrite Professional	1.5	2MB/6.0.2		*
Generic CADD	1.1	1MB/6.0.5		*
GeoQuery	2.0	1MB/6.0	10/90	*
Gofer	2.0	1MB/4.1		$25
GraceLAN	**2.0**	**1MB/6.0.5**		*
Grammatik Mac	2.0	1MB/5.0		$29
Great Gantt	1.4	1MB/6.0	12/90	*
Great Plains Accounting Series	5.35	1MB/6.0		*
Hand-Off II	2.2	1MB/6.0.5		$35
Help DA	3.1.1	1MB/6.0		Free
Hybase ★	2.0	1MB/6.0		*
HyperAnimator ★	1.5.2	1MB/6.0.3		*
HyperCard	2.1	1MB/6.0.3		$49
HyperDA	2.0	512K/3.2		*
HyperWindows ★	1.2	1MB/6.0.2		$20
Icon-It	2.1	1MB/6.0.2		*
if:X Forms Designer	1.1	1MB/6.0		Free
ImageStudio	1.5	1MB/6.0		$99
InfoLogic Envelope ★	1.1c	512KE/4.0		$5
Insight Expert Accounts Payable	2.1.1	1MB/6.0		*
(continues)				

Bold = first time the product is being listed.

★ = minor update.

Req. = min. RAM and system software required

Rev. = last time (in past year) reviewed this or an earlier version.

Price = cost for update to registered owners.

* = contact your dealer for update policy.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price
Insight Expert Accounts Receivable	2.2	1MB/6.0.2		*	MacAnalyst	2.0	2MB/6.0		$125	MacWrite Pro		1MB/6.0		*
Insight Expert General Ledger	2.2	1MB/4.2		$99	MacArchitrion	5.5	2MB/6.0.3		*	Managing Your Money	4.0	1MB/6.0.3		*
Inspiration	3.0	1MB/4.2	11/90	*	MacClassAds	4.0	1MB/6.0		*	MapGrafix	2.1.1	4MB/6.0.3		*
Instant-Expert Plus ★	2.0	1MB/5.0		Free	MacDraft	2.1	1MB/6.0.2	12/90	*	MapGraphX	2.0	4MB/6.0.3	4/91	Free
Interactive Physics	1.2	1MB/6.0.2		$29.95	MacDraw II	1.1	1MB/6.0		*	MarcoPolo	1.1	1MB/6.0		Free
InTouch	1.1	1MB/6.0.5	5/91	Free	MacEnvelope	5.0	512KE/3.2		$25	MarketMaster	II+	1MB/6.0.3		$25
JetLink Express ★	2.1	1MB/6.0		*	MacEnvelope Plus	2.0	512KE/3.2		$50	MarkUp	1.03	1MB/6.0		Free
KaleidaGraph	2.1	2MB/6.0.5	9/91	$20	MacInTax ★	2.0	1MB/6.0.5		$50	MasterFinder	1.1	1MB/6.0.5		*
KiwiEnvelopes ★	3.1	512KE/4.1		*	MacFlow	3.5	1MB/6.0.3		*	MathCAD ★	2.06	1MB/6.0.2		Free
LabView ★	2.1.1	4MB/6.0.5		*	MacFortran for MPW	1.1	2MB/6.0.2		Free	Mathematica	2.0	1MB/6.0		*
Language Systems Fortran ★	2.1	2MB/6.0.4		Free	MacLinkPlus/PC	5.0	1MB/6.0.2		*	MathType	2.1.1	512K/6.0.2		*
LapLink Mac III	3.2	512K/2.0		Free	MacLinkPlus/Wang VS	4.0	512KE/3.2		$45	MathWriter	2.0	2MB/6.0.5		*
LapLink Mac Plus III	3.0	512K/2.0		*	MacMoney	3.5	512KE/4.0		$12	Matlab	1.2	1MB/3.0		*
LaserPaint Color II ★	1.02	1MB/6.0.3		Free	MacPhonebook	3.0	1MB/6.0	9/91	*	MaxPage ★	1.2	512K/3.2		Free
LetraStudio	1.5	2MB/6.0		$45	MacProject II	2.1	1MB/6.0		Free	McCPrint	2.1	512K/4.2		$25
Light Checkbook Accounting	2.0	1MB/6.0.3		*	MacRecorder	2.03	512K/3.2		*	Metamorphosis Professional		1MB/6.0.3		*
Lightspeed Color Layout System	2.5	1MB/6.0.5		*	MacroMind Director	2.0	2MB/6.0.2	10/90	$100	MicroPhone II	3.0	512K/4.2		*
					MacSafe II		512KE/4.2	10/90	*	Microsoft Excel	3.0	1MB/6.0.2	9/91	*
					MacSchedule	2.5	1MB/6.0		$30	Microsoft File	2.0	512K/3.2		*
					MacTerminal	3.0	512K/3.2		$65	Microsoft Mail	3.0	1MB/6.0.2	8/91	*
LXR.Test ★	4.1	1MB/6.0		Free	MacTools Deluxe	1.2	1MB/6.0	1/91	*	Microsoft PowerPoint	2.01	1MB/6.0		Free
					MacTops	3.1	1MB/6.0.5		*	Microsoft Word	4.0	512KE/3.2		*
					MacWrite II	1.1	1MB/6.0		Free					

Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price
Microsoft Works	2.0	512K/6.0		*	Omnis 5	1.2	1MB/6.0		*	PropsForms	2.0	1MB/6.0.3		Free
MindLink	2.0	1MB/6.0		*	OnCue	1.3	512K/4.2		$10	Prototyper ★	3.0	1MB/4.1		$99
MindWrite ★	2.1	512KE/4.2		*	On Location	1.02	1MB/6.0.5		Free	Publish It	1.2	512KE/5.0		*
MiniCad +	3.1	1MB/6.0	7/91	*	On Schedule	2.0	1MB/3.0		*	Publish It Easy	2.0	1MB/6.0		*
MockPackage Plus Utilities	4.4	512KE/3.2		$15	PacerLink	5.3	512K/5.0		*	Publish or Perish	6.0	512K/4.2		$12.95
ModelShop II		1MB/6.0.2		$150	Panorama	1.5	1MB/4.2		$29.95	Pyro	4.0	512K/4.1		$15
More ★	3	1MB/4.1	12/90	*	Phonenet Liaison	3.0	1MB/4.2		$75	QuarkXPress	3.1	2MB/6.0.5	11/90	*
Multi-Ad Creator	2.0	2MB/6.0.3		*	PhotoMac	1.5	2MB/6.0.3		$75	Quicken	3.0	1MB/6.0.5		*
MultiClip	2.0	512K/6.0.2		*	The Phrase Thesaurus	2.0	1MB/6.0		Free	QuicKeys^2	2.1	1MB/6.0.2	1/91	*
MultiLedger ★	1.1	512K/3.2		$75	PICT Detective	2.0	512KE/6.0		$20	QuickLetter	1.1.5	1MB/6.0		$25
MusicProse ★	2.1	1MB/6.0		Free	**PicturePress**	2.0	**2MB/6.0.4**		*	QuickLock	2.0	512KE/4.2	10/90	Free
Music Publisher	2.5.2	1MB/6.0		$15	PixelPaint	2.1	2MB/4.1		*	QuickMail	2.5	512KE/3.2		*
MyDiskLabeler III	3.0.4	1MB/6.0		*	PixelPaint Pro	2.0	3MB/6.0.2	9/91	$125	QuickShare	2.0	512KE/3.2		*
M.Y.O.B.	2.0	1MB/6.0		*	Plains & Simple ★	1.06	1MB/3.2		*	QuickShot ★	2.1	1MB/4.2		$5
MyTimeManager	3.0	1MB/6.0		*	PowerDraw	3.0	1MB/6.0		*	RagTime 3	3.1	2MB/6.0		$150
NetMinder Ethernet	1.2	2MB/6.0		*	PowerStation ★	2.5.5	512K/4.1		*	Read-It OCR Personal	2.1	1MB/6.0.3		$29
Network Bundle	3.0	512K/3.2		*	Practica Musica	2.2	512K/3.2		*	Read-It OCR Professional	3.0	2MB/6.0.3		*
for the Mac					Pro-Cite ★	1.3.4	512K/4.1		*	ReadySetGo	4.5	1MB/6.0		*
Nisus	3.05	1MB/6.0.2	2/91	*	Prodigy	3.1	1MB/6.0		Free	Retrospect Remote	1.3	1MB/6.0		*
The Norton Utilities	1.1	**1MB/4.2**	2/91	$19	Professional Composer	2.3	1MB/6.0.3		Free	SAM	3.0	1MB/6.0	2/91	$29
Now Utilities	2.0.3	1MB/6.0.2	7/91	*	The Programmer's	2.1	1MB/6.0.5		$10	ScheduleMaker ★	3.01	1MB/6.0		$25
NuBase for the Mac	1.3	1MB/4.1		$75	Online Companion					Smart Alarms	3.06	1MB/6.0.2	12/90	$25
OmniPage ★	2.1	1MB/6.0.2		Free	Prograph	2.0	2MB/6.0		*	*(continues)*				

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price	Product	V.	Req.	Rev.	Price
Smart Alarms & Multi-User Appointment Diaries	3.06	1MB/6.0.2	12/90	*	SUM	2.0	1MB/6.0		$39.95	Timbuktu/Remote	2.0	1MB/4.1	2/91	*
					Super 3D	2.1	512KE/6.0.2		Free	Timeslips III	2.0	1MB/6.0.2		*
SmartCom III	3.3	1MB/6.0.5		*	SuperANOVA	1.1	1MB/6.0.2		Free	TypeReunion	1.01	1MB/6.0		Free
SmartForm Designer	1.1	1MB/6.0		Free	SuperGlue II with GlueNotes	2.1	1MB/6.0		*	TypeStyler	1.5	1MB/4.1		*
SmartScrap & The Clipper	2.01	1MB/6.03		*						UNITize ★	1.3.5	512KE/3.2		$20
Snap ★	3.1.3	1MB/3.0		*	SuperLaserSpool	2.0.2	1MB/6.0		$30	VersaCAD/Macintosh Edition	3.0	1MB/6.0		$395
SnapJot	3.0	512K/4.1		*	SuperPaint	2.0	1MB/6.0.2		$50					
SoftPC ★	1.3	2MB/6.0		*	SuperSpool	5.0	512K/4.1		$30	VersaTerm	4.5	1MB/6.0.3		$20
Sound Designer II	2.01	2MB/6.0.5		*	Swivel 3D	1.2	1MB/6.0.5		$49.	Virex	3.1	1MB/4.2		$15
Spelling Coach Professional	3.1	512KE/4.2		*	Swivel 3D Pro		4MB/6.0.5		$150	Virtual 2.0 for 030	2.04	1MB/4.2		Free
Spellswell ★	2.2	512K/3.2		$20	SYSTAT	5.1	2MB/6.0		*	Virtual 2.0 for Mac II	2.04	1MB/4.2		Free
Spinnaker Plus	2.0	2MB/6.0		$45	TaxView 1040 Professional	2.12	2MB/6.0.5		$250	Virtual 2.0 for Mac Plus	2.04	1MB/4.2		Free
Status Mac	2.0	1MB/6.0		*						Wall Street Investor	3.02	1MB/5.0		*
Stepping Out II	2.02	1MB/4.1		Free	Tempo II Plus	2.0.1	1MB/4.2		$39.95	White Knight II	11.12	1MB/6.0.2		*
StickyBusiness ★	1.4	512KE/6.0.3		*	TextPert ★	3.01	1MB/6.0		Free	WillMaker	4.0	512KE/4.2	3/91	$18.50
StrataVision 3d	2.0	2MB/6.0.3		$99	TextScan	3.08	1MB/6.0		$69.95	Wingz ★	1.1	1MB/6.0		Free
Studio/8	2.0	2MB/6.0.5		$30	Theorist	1.1	1MB/6.0		*	Word Finder	2.0	512K/3.2		*
Studio/32	1.1	5MB/6.0.5		Free	Think C	4.0	1MB/5.0		*	WordPerfect for the Macintosh	2.0	1MB/6.0.5	7/91	$89
StuffIt Classic	1.6	1MB/6.0		*	Think Pascal	3.0	1MB/5.0	11/90	$69					
StuffIt Deluxe	2.0	1MB/6.0	7/91	Free	ThunderWorks	1.0.5	1MB/6.0.2		*	WorksPlus Spell	2.0	1MB/6.0.3		$35
Suitcase II	1.2.6	512KE/4.1		$25	Timbuktu	4.0	1MB/4.1	10/90	*	WriteNow	2.2	512K/4.2		$49

To have products listed in this section, send upgraded software, an outline of changes since the previous release (indicate if it's a maintenance upgrade), upgrade price, minimum RAM and system software, suggested retail price, company name, mailing address, and phone number to *Updates, Macworld,* 501 Second St., San Francisco, CA 94107.

WHERE TO BUY

A Guide to Products Featured in This Issue

This listing provides companies and phone numbers for products mentioned in this issue.

Acta 7 Symmetry Software Corp.; 602/998-9106, 800/624-2485; fax 602/991-0572.

AddressWriter CoStar Corp.; 203/661-9700, 800/426-7827; fax 203/661-1540.

Adobe Photoshop Adobe Systems; 415/961-4400, 800/833-6687.

Adobe Type Manager Adobe Systems; 415/961-4400, 800/833-6687.

Aldus Digital Darkroom Silicon Beach Software; 619/695-6956; fax 619/695-7902.

Aldus Persuasion Aldus Corp.; 206/628-2320.

Animation Works Gold Disk; 416/602-4000; fax 416/602-4001.

BannerMania Brøderbund Software; 415/492-3200, 800/521-6263.

Bitstream Font Pack 1; Bitstream Font Pack 2 Bitstream; 617/497-6222, 800/522-3668; fax 617/868-4732.

BUDGET HARD DRIVES
Advanced Gravis 604/434-7274; fax 604/434-7809.
Apple Computer 408/996-1010.
APS 816/478-8300, 800/233-7550; fax 816/478-4596.
CD Technology 408/432-8698; fax 408/432-0250.
Club Mac 714/768-1490; fax 714/768-7307.
Cutting Edge 307/789-0582; fax 307/789-8516.
Deltaic Systems 408/441-1240, 800/745-1240; fax 408/437-1719.

DJK Development 313/254-2632; fax 313/254-1121.
Ehman 307/789-3830, 800/257-1666; fax 307/789-4656.
EMAC, A Division of Everex Systems 415/683-2222, 800/821-0806; fax 415/683-2151.
FWB 415/474-8055; fax 415/775-2125.
GCC Technologies 617/890-0880, 800/422-7777.
Hard Drives International 602/350-1128, 800/234-3475; fax 602/829-9193.
iDS Systems 408/752-2952, 800/733-0078.
Jasmine Technologies 408/752-2900, 800/347-3228.
La Cie 503/691-0771, 800/999-0143.
Liberty Systems 408/983-1127; fax 408/243-2885.
MacAvenue 800/888-6221; fax 512/250-2058.
MacProducts USA 512/472-8881; fax 512/499-0888.
MacTel Technology Corp. 512/451-2600, 800/950-8411; fax 512/451-3323.
Microtech International 203/468-6223, 800/626-4276.
Mirror Technologies 612/633-4450, 800/654-5294; fax 612/633-3136.
PCPC 813/884-3092, 800/622-2888; fax 813/886-0520.
PLI 415/657-2211, 800/288-8754.
Procom Technology 714/549-9449; fax 714/549-0527.
Relax Technology 415/471-6112; fax 415/471-6267.
Rodime Systems 407/994-5585, 800/588-9390; fax 407/997-6197.
Ruby Systems 408/735-8668, 800/888-1668; fax 408/735-8696.
Storage Dimensions 408/879-0300; fax

408/377-4988.
Third Wave Computing 512/832-8282, 800/284-0486.
Total Peripherals 508/480-9042.

ColorTAG Letraset USA; 201/845-6100, 800/343-8973; fax 201/845-4708.
Copy FX paper Letraset USA; 201/845-6100, 800/343-8973; fax 201/845-4708.
Covermate 25 Bind-it Corp; 800/645-5110; fax 516/234-3279.
Covermate 600 Bind-it Corp.; 800/645-5110; fax 516/234-3279.

THE DESKTOP CRITIC
Bureau of Electronic Publishing 800/828-4766; fax 201/808-2676.
CMC ReSearch 503/639-3395, 800/262-7668; fax 503/639-1796.
Educorp Computer Services 619/536-9999, 800/843-9497.
HyperGlot Software Company 615/558-8270, 800/726-5087; fax 615/588-6569.

DoveFax+ Dove Computer Corp.; 919/763-7918; fax 919/251-9441.
DVA-4000/Macintosh VideoLogic; 617/494-0530; fax 617/494-0534.
DynoPage Portfolio Systems; 914/876-7743; fax 914/876-7747.
Easy Transfer Cartridges Easy Transfer Cartridges; 415/621-5586, 800/336-1599; fax 415/552-6439.
FullWrite Professional Ashton-Tate; 213/329-8000, 800/227-4866.
HyperCard Claris Corp.; 408/727-8227.
Image Frame ICI Image-

data; 302/886-3000; fax 635-4639 ext. 8484.
ImagePak Still Compression Board RasterOps Corp.; 408/562-4200, 800/468-7600; fax 408/562-4065.
ImpressIt Radius; 408/434-1010, 800/227-2795; fax 408/434-0127.
Infini-D Specular International; 413/549-7600; fax 413/549-1531.
KaleidaGraph Synergy Software; 215/779-0522; fax 215/370-0548.
Last Resort Working Software; 408/423-5696, 800/229-9675; fax 408/423-5699.
LiteShow II In Focus Systems; 503/692-4968, 800/327-7231; fax 503/692-4476.
LocalSwitch Tribe Computer Works; 415/547-3874; fax 415/547-3928.
Loom Lucasfilm Games; 415/721-3300, 800/782-7927; fax 415/721-3342.
MacLabelPro Avery Commercial Products Division; 800/541-5507.
MacMoney Survivor Software; 213/410-9527; fax 213/338-1406.
MacPhonebook Synex; 718/499-6293, 800/447-9639; fax 718/768-3997.
MacPro Plus Key Tronic; 509/927-5515, 800/262-6006; fax 509/927-5224.
MacroMaker Apple Computer; 408/996-1010.
MacWrite II Claris Corp.; 408/727-8227.
Mariah Symmetry Software Corp.; 602/998-9106, 800/624-2485; fax 602/991-0572.
Mediator VideoLogic; 617/494-0530; fax 617/494-0534.
Microsoft Excel Microsoft Corp.; 206/882-8080,

800/426-9400; fax 206/883-8101.
Microsoft Word Microsoft Corp.; 206/882-8080, 800/426-9400; fax 206/883-8101.
Microsoft Works Microsoft Corp.; 206/882-8080, 800/426-9400; fax 206/883-8101.
Multi-Ad Search Multi-Ad Services; 309/692-1530, 800/447-1950; fax 309/692-5444.
MyAdvancedDataBase MySoftware Company; 415/325-9372; fax 415/325-3106.
Nisus Paragon Concepts; 619/481-1477, 800/922-2993; fax 619/481-6154.
Personal VeloBinder VeloBind; 415/657-8200, 800/776-3355; fax 415/770-1227.
PixelPaint Professional SuperMac Technology; 408/245-2202; fax 408/735-7250.
Quicken Intuit; 415/322-0573, 800/624-8742; fax 415/329-2785.
QuicKeys² CE Software; 515/224-1995, 800/523-7638; fax 515/224-4534.
RadiusTV Radius; 408/434-1010, 800/227-2795; fax 408/434-0127.
RasterOps 24STV RasterOps Corp.; 408/562-4200, 800/468-7600; fax 408/562-4065.
RasterOps 24XLTV RasterOps Corp.; 408/562-4200, 800/468-7600; fax 408/562-4065.
Ray Dream Designer Ray Dream; 415/960-0765; fax 415/960-1198.
RoboSport Maxis; 415/254-9700, 800/336-2947; fax 415/253-3736.
Smart Label Printer Plus
(continues)

Seiko Instruments USA; 408/922-5800, 800/873-4561.

Taste DeltaPoint; 408/648-4000, 800/367-4334; fax 408/648-4020.

Tempo II Plus Affinity Microsystems; 303/442-4840, 800/367-6771; fax 303/442-4999.

TouchBase After Hours Software; 818/780-2220; fax 818/780-2666.

VeloBind Model 750 VeloBind; 415/657-8200, 800/776-3355; fax 415/770-1227.

Video ColorBoard 364 RasterOps Corp.; 408/562-4200, 800/468-7600; fax 408/562-4065.

VideoShop DiVA; 617/491-2010; fax 617/491-2208.

VideoSpigot; VideoSpigot Pro SuperMac Technology; 408/245-2202; fax 408/735-7250.

WordMaker New Horizons Software; 512/328-6650; fax 512/328-1925.

WordPerfect for the Macintosh WordPerfect Corp.; 801/225-5000, 800/321-4566.

WriteNow T/Maker Company; 415/962-0195.

WysiWord Microsystems Engineering Corporation; 708/882-0111; fax 708/882-8397. Ⓜ

Public domain software, freeware, and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as EDUCORP (800/843-9497, 619/536-9999) or the Public Domain Exchange (800/331-8125, 408/496-0624 in California).

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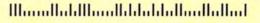
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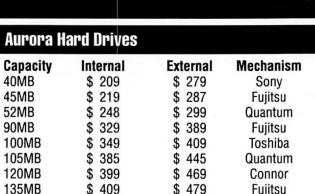
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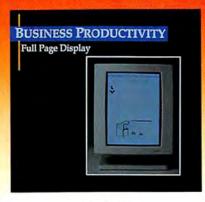
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264STV	$1,199	
364 Color Board	$	699

Scanners

Microtek 600ZS Color	$1,499	
Microtek 600GS	$1,199	
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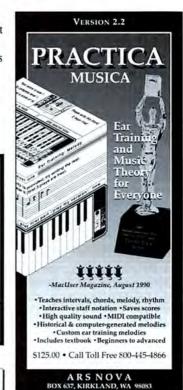
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BEST-SELLERS

Months on chart	Last month	This month	
▼	▼	▼	**BUSINESS SOFTWARE**
76	1	1	**Microsoft Word** Microsoft Corporation
67	2	2	**Microsoft Excel** Microsoft Corporation
55	3	3	**Microsoft Works** Microsoft Corporation
63	4	4	**Aldus PageMaker** Aldus Corporation
28	5	5	**FileMaker Pro** Claris Corporation
52	8	6	**MacWrite II** Claris Corporation
29	6	7	**QuarkXPress** Quark
28	7	8	**WordPerfect** WordPerfect Corporation
55	10	9	**MacDraw II** Claris Corporation
15	9	10	**Quicken** Intuit

			EDUCATION SOFTWARE
11	2	1	**Where in Time Is Carmen Sandiego?** Brøderbund Software
30	1	2	**Where in the World Is Carmen Sandiego?** Brøderbund Software
1	—	3	**Kid Pix** Brøderbund Software
43	3	4	**Reader Rabbit** The Learning Company
17	4	5	**Where in the USA Is Carmen Sandiego?** Brøderbund Software

			ENTERTAINMENT SOFTWARE
19	2	1	**Tetris** Spectrum HoloByte
21	1	2	**SimCity** Maxis
6	3	3	**SimEarth** Maxis
1	—	4	**Faces** Spectrum HoloByte
13	4	5	**Welltris** Spectrum HoloByte

			NETWORK/DATA COMMUNICATIONS
55	1	1	**TOPS** Sitka Corporation
50	2	2	**AppleShare** Apple Computer
9	5	3	**White Knight** FreeSoft
12	4	4	**Timbuktu** Farallon Computing
13	3	5	**MicroPhone II** Software Ventures

Months on chart	Last month	This month	
▼	▼	▼	**MASS STORAGE***
11	—	1	**Apple Hard Disk 40SC** Apple Computer
5	5	2	**MacStack SD45** CMS Enhancements
7	2	3	**UltraDrive 45** GCC Technologies
37	—	4	**Apple Hard Disk 20SC** Apple Computer
1	—	5	**DataPak 45MB Removable** Mass Microsystems

			ADD-IN BOARDS
10	1	1	**Macintosh Display Card 8•24** Apple Computer
11	3	2	**Pivot** Radius
5	2	3	**Macintosh IIsi NuBus Adapter Card** Apple Computer
1	—	4	**Radius Rocket** Radius
12	4	5	**Radius TPD Interface** Radius

			UTILITY SOFTWARE
17	1	1	**SAM II** Symantec Corporation
11	2	2	**The Norton Utilities for the Macintosh** Symantec Corporation
17	3	3	**SUM II** Symantec Corporation
4	4	4	**After Dark** Berkeley Systems
4	—	5	**Pyro** Fifth Generation Systems

PRODUCT WATCH

Recent or forthcoming products of particular interest.

Microsoft Flight Simulator for the Mac 4.0
Microsoft Corporation
Updated flight simulator adds color, on-screen flight instruction, and aircraft customization

Painter *Fractal Design Corporation*
Paints and paper textures that act like the real things

DS-3000 Macintosh Color Scanner *Chinon America*
Overhead color scanner that includes driver software and interface hardware for less than $1000

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during May 1991.

*Does not include hard drives installed at the factory.