MULTIMEDIA: INTERACTING WITH INFORMATION
Fasten your seatbelts, Mac® fans. You're about to enter the Microsoft Zone.

Earlier this week I witnessed a demo of Microsoft's products that left me feeling as enlightened as the day I first set my eyes on a Macintosh®.

Here's a company with a reputation for singularly superior products. But what they showed me pushed the envelope of software productivity:

A complete line of products that all work together.

The significance of which hit me like a ton of bricks when I saw them in action.

For instance, I saw a chart in your very favorite spreadsheet and mine, Microsoft® Excel, updated from within Microsoft Word 4.0 using just a few keystrokes. And then pasted into PowerPoint® for an incredible looking presentation.

And with just as little effort, the ever-capable Microsoft Word 4.0 was merged with Microsoft's database application, File, for a mass mailing.

As if that wasn't enough, I saw their versatile integrated program Works share files with Microsoft Excel and Word.

What really blew me away is Microsoft Mail. You can send and receive information between members in your workgroup even if they're on a PC. Nice.

But the real beauty is that you can access Microsoft Mail directly from the File menu when you're in Microsoft Word 4.0. No other company can offer that kind of integration. Or this kind:

A product line that all works together.

With other applications on the Mac. And even with such PC standards like Lotus® 1-2-3®, Microsoft Word 5.0 and WordPerfect®.

What's more, every product is supported by on-line help and a comprehensive manual. Or you can call one number for unlimited technical support.

Obviously, I'm impressed. So much so, that I've asked Microsoft to send copies of their Macintosh product line brochure in time for our next meeting. If you can't make it, you can always get a free copy by calling (800) 541-1261, Dept. 192.

Fellow Macphiles, man your Macs. Because we're entering a new age of compatibility—or at least Microsoft is.

And I don't know about you, but I plan on going along for the ride.
soft user.

This workstation is running Microsoft Mail.

A person of great vision will come into your life.

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It takes a certain kind of person to be a Macintosh enthusiast.
Multimedia: About Interface
by John J. Anderson
Everyone agrees that the Mac interface is leading the way, but where is it going? Whatever the destination, interactive multimedia's sure to be an important part of the journey. 88

Multimedia Today: Four Paths Toward the Future
Enough talk. Let's see multimedia in action. Talking Macs are old hat; how about Macs that listen? Macs that let dancers listen to their bodies dancing? Macs that provide a limitless supply of dissectible bodies for medical students? Students using Macs to study Shakespeare from the inside out? These and other links in the multimedia maze are presented for you to explore. 92

Endview: Toward a Knowledge Navigator
by Andrew Himes and John J. Anderson
We gather the implications of our assertions, extend their flaps, open up our throttle, and lift multimedia off the runway. 133

Much Ado About Something
by Henry Bortman
Apple's new SE/30 — is this a Mac IIx in SE clothing or an SE with IIx power? The familiar footprint's still there, but with a 68030 microprocessor, color, and room for 8 megabytes of RAM. 174

The Never-Ending Storage
by Gordon McComb and the MacUser Labs Staff
With removable media, you can finally take it with you. We tested 17 units ranging from Bernoulli Boxes to hard-cartridge drives. Find out which boxes give the biggest bytes for your buck. 151

Between the Lines
edited by Aileen Abernathy
A roundup of clip art and more. 185

Putting It Graphically
by Salvatore Parascandolo
What you need to know if you're bothered by bit maps, miffed by TIFF, puzzled by PICT, or unacquainted with Paint. 189
You can swear on a stack of Macintosh Bibles, buy it off the stack at Bloomingdales, or finally get your HyperCard goodies neatly stacked. 197

SuperCard takes off where HyperCard left off, providing full (and full-color) access to the powers and interface features of the Mac in the bargain. 205

Fooling Mother Nature with fractal flora. 213

Mastery versus fiddling around. 75

An ounce of prevention. 79

The connection machine. 141

Upgrading SE memory, the incredible vanishing font, Lisa on the cheap, and failing floppies. 227

Booster shots. 302

Missed the last Hemingway write-alike contest? Here’s your chance to go after a real literary heavyweight: our own John Dvorak. 295
A To an architect, fine hairlines like ours are pure poetry.

B Auto-tracing built this banana from a scanned-in produce ad. In split seconds.

C Multi-point bezier curves make drawing a bunch easier. Colors are added in layers.

D Auto-resizing helped this VP of Sales display the fruits of his labor graphically.

E Smooth continuous color blending inspired this art director to new heights.

F What are mere words compared to WYSIWYG text with special effects?

G After he slipped away, we added rich Postscript gray scales to the gorilla’s leftovers.

H ow an architect, an MBA, and an art director developed instant talent in precision drawing. And a gorilla developed mild indigestion. Meet Canvas 20. The new top banana. Able to help even ordinary people draw extraordinary things.

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These unretouched drawings were created in Canvas 20 and output to a Mirrus film printer. Please circle 80 on reader service card.
PageMaker, Microsoft Excel, Illustrator, MultiFinder, and 4th Dimension. The second generation of Macintosh software is here now. The third generation is already beginning to arrive.

Your Macintosh SE alone can't keep pace with the ever increasing sophistication of Macintosh software.

But it can with a productivity system from Radius.

Totally compatible with your Macintosh SE, from its aesthetics to its electronics, there's a Radius System designed for your particular working style.

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Call 1-800-527-1950 ext. 84 for a brochure and name of your nearest Radius Authorized Dealer.

And get the most out of your Macintosh SE and its software. Today. And tomorrow.
PRESENTING THE WRITEMOVE PORTABLE PRINTER

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

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

WriteMove weighs a scant three pounds. It measures just 2 1/4 x 6 1/2 x 10 3/4 (Any smaller and you couldn’t get the paper in.)

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

As a result, you can use WriteMove to compose documents with word processing software like Microsoft Word, or desktop publishing programs like PageMaker. And then silently print them out at 192-DPI resolution. In other words, you get much higher print quality than the ImageWriter II, for not much more money.

Which could bring a whole new meaning to the phrase “freedom of the press.”

To exercise that freedom, see your authorized GCC Technologies dealer for a WriteMove demonstration. For the one nearest you, call (617) 890-0880.*

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INTRODUCING THE MOST INGENIOUS PORTABLE PRINTER SINCE THE PENCIL.

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Reality — what a concept!" Sometimes there’s more truth in comedy than comedy in truth. Take desktop presentations — please! Desktop publishing was the goose that laid the golden egg at a tense point in Apple’s history. Desktop presentations, Apple’s buzzword du jour, is its latest attempt to find (or invent) another goose to lay another golden cash cow. Since it’s new, it’s presumably more important and interesting. Interesting maybe. But important? Apple is pinning its hopes on desktop presentations, but I wonder if the company isn’t placing too much emphasis on it. At a time when the folks at Apple can hardly keep up with the company’s own rate of growth, they need to stay very focused on their primary goals — and reality.

About a year ago, when desktop-presentation products were first introduced, Apple held a big press conference at the Seybold desktop publishing shindig, and John Sculley proclaimed that desktop presentations represented a bigger potential market than desktop publishing. After the press conference, I spoke with Sculley and asked him whether that proclamation wasn’t a bit overstated.

I argued that judging market size by how much money is being spent, rather than by how many people are doing something, is far more important. By that measure, the publishing market is way ahead of presentations. In the total market area Apple serves, publishing is a more than $100-billion-a-year industry, and the printing-and-publishing industry employs more people than any other in the United States. A $10,000 Mac-based desktop-publishing system will be embraced if it provides 90 percent of the functionality of a $100,000 system for only 10 percent of the cost. But the nascent presentations market is dominated by commodity products such as $100 slide projectors, $1 overheads, and 79¢ felt-tip pens. The Mac solution for desktop publishing generally saves money, but the Mac alternative for desktop presentations usually means putting out more — not less — money than the old-fashioned approach. If you already have the Mac hardware, the software can be pretty useful and cost-effective. But Mac-based presentations don’t offer a compelling bottom-line motivation to buy the hardware in the first place, as desktop publishing does.

Desktop-presentation products are still much less developed than their DTP counterparts, while publishing products are fairly well focused on accomplishing specific publishing tasks such as page layout, drawing, image processing, and typography. The presentation products are less well defined. Theoretically, presentation products should address two main concerns: helping you create your presentation and helping you give your presentation. Most of the current crop of software products try to do some of both by combining outlining and display capabilities, but I think they offer more help with giving your presenta-

A Wild-Goose Chase?

By Frederic E. Davis

Alternative for desktop presentations usually means putting out more — not less — money than the old-fashioned approach. If you already have the Mac hardware, the software can be pretty useful and cost-effective. But Mac-based presentations don’t offer a compelling bottom-line motivation to buy the hardware in the first place, as desktop publishing does.

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At least for the moment, off-the-shelf multimedia presentations are a thing of the future.
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Announcing LightningScan, the new hand-held scanner for Macintosh. From Thunderware.

Now one quick pass is all you need to scan any image up to four inches wide. With resolution settings up to 400 dots per inch, LightningScan makes almost any scanning job easier to handle. And because LightningScan is controlled by the software that helped make ThunderScan® famous, you have the powerful tools you need to enhance and edit your images. As for graphics compatibility, you name it: from PageMaker® and Illustrator® to ImageStudio® and Digital Darkroom.

At its suggested retail price of $549, LightningScan makes the benefits of personal scanning very easy to grasp.

LightningScan is compatible with the Macintosh Plus, Mac II, and Mac II. The following trademarks are property of the companies indicated. LightningScan, ThunderScan, Thunderware, and ImageScan
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thought would lead to the stars. Instead, the new buzzword is multimedia, an area that’s seven more nebulous than presentations. Seen any “multimedia” software lately?

Innovation and new ideas are what keep healthy companies healthy. But throwing everything behind the latest craze at the expense of what’s already made you successful is like a Super Bowl-champion team giving up practices because it’s already won it all.

Overemphasizing desktop presentations could be dangerous because it takes valuable marketing, technology, and human resources away from the broader market of desktop publishing. It would be wiser for Apple to portray desktop presentations as part of desktop publishing; this strategy would play off Apple’s well-established position as the technology leader in desktop publishing, and it would keep marketing energy focused on the really big prize: publishing.

And when you get right down to it, desktop presentations really is part of desktop publishing. Desktop publishing involves combining typography and graphics to create pages, ads, and other printed materials. And that’s just what desktop presentations are all about, except that you show the material to people instead of letting them read it. Presentations and publishing are ultimately much more alike than they are different.

Desktop publishing gave Apple its first taste of credibility in the business market (and on Wall Street) and made a lot of money (for Apple and other companies, including, to Apple’s chagrin, IBM). To keep its sales growing, Apple felt it had two choices: get the goose to lay more golden eggs or find another goose. It seems to have opted for the second-goose approach, and what it’s come up with — desktop presentations — could turn out to be a real goose egg. It’s time to wake up and smell the eggs and to realize that they (like me) are mixing metaphors. They don’t need to try to convince the public to buy into a whole new egg; they need to realize that desktop publishing, desktop presentations, and multimedia technology are all just pieces of a bigger egg.
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If you design on a Mac II, a screen that's too small will cramp your style. That's why you should be looking into a SilverView from Sigma Designs.

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**3G Graphics ... NCP**

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**Think Educational ... CP**

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<td>4363</td>
<td>ClickArt Letters Vol. 2</td>
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4119 Crystal Quest w/Critter Editor (NCP) ......................... 42.
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2763 Fool’s Errand Hint booklet ......................................... 7.
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2743 Crossword Magic ...................................................... 30.
2745 Sega VU II ............................................................. 30.
4596 Shadowgate ........................................................... 30.
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2751 Uninvited .............................................................. 30.
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4122 MacCourses .......................................................... 29.
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Dear MacConnection,

I am writing to tell you that an item which I ordered beat me home. I was visiting my brother and his family who live about two hours from my home. While I was there, I decided to order an item for my Mac. Well, I ordered it before 8:00 PM and before I could drive home the next morning, the package arrived. To top it off, I live in a small Kentucky town, about an hour's drive from the nearest airport. What service! I don't know how you do it. Keep up the good work.

Sallie Evans
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Just when we thought the debate about the columnists' pictures — woodcut versus photo — had finally subsided, an anonymous reader in Los Angeles added this fuel to the fire. “Although he may not be a sex symbol, the editor-in-chief does have a nice FRED signature.” If you’re really into signatures, pry open your Mac Plus and feast your eyes on the inside of the case. When you’ve recovered, send your comments to Letters to the Editor, c/o MacUser, 950 Tower Lane, 18th floor, Foster City, CA 94404. All letters become the property of MacUser, and we reserve the right to edit any letters we print.

BUT WHAT DID REMINGTON STEAL?

Your use of Miss Remington’s picture in the opening artwork for Jane Berlis’ article “Tip for Type” (November ’88) reminds us all once again that the keyboard found on 99.9 percent of all computers dates back to 1873. However, a few clarifications are in order.

The QWERTY keyboard layout was not designed to slow typists down. The first typewriter, invented by C.L. Sholes, used type bars that hung upside down in a circle, swinging up to the paper for printing (which meant you had to lift the carriage to see what you were doing!). Type bars close to each other in this circle tended to clash when struck in succession. So Sholes took a statistical look at English spelling and assorted his letters in the circle so that common letter pairs would swing up from opposite sides of the machine, reducing the frequency of clashes. The intention was to allow fast typists to clatter along with fewer jams, thus increasing, not reducing, speed.

Once the Sholes keyboard appeared on the first commercial machines, other inventors tried to knock it down. The first notable attempt was by James Hammond, whose typewriter of 1884 had a keyboard arrayed in a radical two-row semicircle, with the most common letters clustered just to the right of the space key, to favor right-handed users. Hammond thought the keyboard curve would be more comfortable for the two-fingered typing of the day. The Blickensderfer typewriter of 1893 offered what it called the Scientific keyboard, which used some of the same ideas that Dvorak used years later.

By the way, both the Blickensderfer and Hammond were single-element machines, pre-dating IBM’s “revolutionary” golfball design by three-quarters of a century.

DARRYL REHR
LOS ANGELES, CALIF.

The writer is the editor of ETCetera, the newsletter of the Early Typewriters Collectors Association. If you’d like more information or a copy of their Beginner’s Guide To Collectable Typewriters, send an SASE to 11433 Rochester Ave. #303, Los Angeles, CA 90025. — JZ

GUARANTEED SOLUTIONS

The practice of magazines and advertisers of including a Not Copy Protected (NCP) statement seems to have played a major role in causing most software producers to stop using copy protection schemes. I would like to suggest that the same approach be used towards “encouraging” producers to provide a money-back guarantee for products that fail to meet advertised performance.

I recently read a letter from the president of Solutions International (published in the Boston Computer Society’s Active Window) stating that they have such a policy and they “have only been asked to return 11 people’s money in one-and-a-half years and 15,000 buyers.”

The letter further stated that people need not go through their dealers but can contact Solutions directly with proof of purchase. Responsible firms with quality products can only gain by openly proclaiming such a policy. I know where my money would go, given a choice.

BILL CHENault
SHALIMAR, FLA.

We like this idea and are discussing ways to include information about (unfortunately rare) product guarantees in future product reviews. — JF

UPTEMPO

Thanks for the excellent Quick Click on Tempo II in your December ’88 issue. We’re proud of our 4.5 mice here and perhaps this note will add a bit more mouse.

The reviewer bitterly lamented the cursor not returning to its origin after a macro play. If he had checked the box labeled “Return cursor after play,” the one shown in the Configuration dialog box in your article, his wish would be our command. We’ve received some real fan mail from graphic designers for that single feature.

As for his other concern, the speed of typing text, Tempo II also includes...
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Letters

Autopaste. Select any amount of text and turn it into an instant Autopaste macro. Instead of typing, the macro pastes into a document. It's instant.

Here's an example: While it takes Tempo II 3 seconds to type 100 characters into Microsoft Word, it takes 1.5 seconds to plan an Autopaste macro of 1,642 characters (this note) or more. Incidentally, Autopaste works with graphics as well.

RICK BARRON
PRESIDENT, AFFINITY MICROSYSTEMS

I hope that other Tempo II users have better luck than I did with the "Return cursor after play" box. For whatever reason, even with the box checked I could not always get the cursor to return. I do appreciate, though, that it's not happening to me because Tempo II's designers overlooked the problem.

As for Autopaste, while it's a nice feature, it's completely separate from the regular macro-building process, which makes it useful only for pasting in simple boilerplate material. These are minor quibbles, though. Tempo is a fine utility that neither I nor my keyboard would part with. — JB

Honorable mention goes to 4Mobile (another newcomer), because it's so comfortable. It compares favorably to a Cadillac in all areas but one — it has a top speed of only 5 miles per hour. But that's OK; next year's model will go somewhere between 25 and 200 mph. Trust me!

The Helixmobile comes in third for being so . . . well . . . different! It also has speed problems, and lacks amenities to boot — there's no way, for example, to shift gears. But it's running comfortably in its own lane — the slow lane.

Now, would you buy a used car from this magazine?

Incidentally, specifying fonts for a report to be printed to a LaserWriter is no more difficult to set up in Omnis 3 plus than it is in Microsoft Word. And you accidentally forgot to mention the fact that Omnis 3.3, our current release version, can share data directly with Omnis Quartz on the IBM PC in the Windows environment. Simultaneous multiuser database access between Macs and PCs might have been of passing interest to some of your readers.

STEVENS WELLER III
SR. TECHNICAL SUPPORT EXECUTIVE,
BLYTH SOFTWARE
FOSTER CITY, CALIF.

The general review of databases in your December '88 issue was most informative. But one general conclusion of the review is puzzling: Despite its generally excellent combination of features and speed, Omnis 3 plus is not listed as a worthwhile general choice for a small- to moderate-sized business.

I have been using a program written with this database for medical office billing for two years and it seems to perform rapidly and efficiently in a very complex configuration.

An omitted feature of interest in comparing relational databases, in addition to their speed, is the size of the files they create. This parameter seems to vary greatly. Some of these databases are true space hogs, while others use hard-disk space efficiently.

DR. A.M. FELDZAMEN
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9. Panorama can import your existing FileMaker data in seconds (over 10,000 records per minute). As an extra bonus, your files will actually shrink by 40 to 90 percent when converted into Panorama. Panorama can also convert data from 4th Dimension® Double Helix! Excel,” Works” and many more — all in seconds.

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Letters

JUST WHAT THE DOCTOR ORDERED

SOME in the Macintosh community may feel uncomfortable when you publish detailed autopsies of viruses. For the victims, however, that information gives the power of detection and repair.

The Macintosh I use at work began to balk unexplainably. Word quit or wouldn’t print. Since this was shortly after the System 6.0 upgrade (with known bugs), we assumed System trouble.

However, settling down one night to read my Macintosh magazines, I read your article “Razor Blades in Apples” (September ’88).

Ah.

Oh.

O0000.

Bad news. I wrote a note in the margin, next to the Scores virus symptoms: “Machine has a bad Scrapbook.”

The next day, we discovered that nearly all of the machines in our Graphics and Editing department had bad Scrapbooks and notebooks. Since these machines were semi-open machines used by other people in the building, we had no way of knowing how the virus arrived or where it had gone. Fortunately, since I only trade data and not programs, my machine at home remains uninfected.

We obtained Virus Rx and Interferon and cleaned our hard disks. We referred to the article and referred others to the article. “It is a problem, but not a disaster.” It went a long way towards controlling potential panic.

Sadly, since many of the reinitializations were done with the master disks, some of our master disks were infected. We now know to lock our disks before inserting them into a Mac.

Our discovery and recovery began with your well-timed article. Thank you again.

LOWELL HALVORSON
SALEM, MASS.

THE OUTER LIMITS

DO you think you could place Dvorak’s column any further back in the magazine?

STAN EPSTEIN
OMAHA, NEB.
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Suits and Excitement in London

The MacUser Show 1988

Over 13,000 business-oriented Macintosh enthusiasts attended the recent three-day MacUser UK Show in London. In a country where the state-of-Mac-art is nearly a year behind that in the United States, virtually all the attendees (both male and female) were conservative business suits, and the charged atmosphere was reminiscent of the first few Macworld expos. There was an electricity and excitement in the air often lost in the sheer hugeness of American shows these days.

More than 100 exhibits were divided very roughly into three categories: U.S. software products (usually represented by local distributors), British software and hardware companies, and local service and user group organizations. Among the readily recognizable products (to Americans) were Wingz, StandOut!, 4th Dimension, CAT 2.0, Claris CAD, Omni 3 Plus, MicroPlanner Plus, QuarkXPress 2.0, Timbuktu, Word, Persuasion, and, of course, Crystal Quest (which was written in England). Omni and MicroPlanner were shown by their original British developers, while 4th Dimension was shown by its original French developers.

WingZ made a big splash — Informix brought a version of its famous Space Shuttle booth to London. Informix is trying to take advantage of Excel's perceived overall weakness in Europe to get a foothold for its power whatever-they-call-it-now package (Microsoft's reputation and strength in Europe is nowhere near what it is in the US).

Among the new product introductions were two high-performance gray-scale image grabbers from Neotech (one for the SE — approximate U.S. cost $1,600; and one for the Mac II — approximate U.S. cost $2,300); the nice 20-inch Pictor 1 color monitor from ETAP (with a 1,024-x-768-pixel display); and the Honeywell T200 color thermal printer, which will be sold in the United States by Matrix Instruments for $5,590.

BBCC's Interactive Television Group demoed the best multimedia project I've seen. It's called The EcoDisc and it lets you tour and explore an English nature preserve. You can view the area in summer and winter, investigate whatever interests you in the region, make policy changes, and project the future of the area. It's altogether fascinating. This project uses a 12-inch videodisc for color imagery and high-quality sound and a HyperCard stack for user interaction. It was simply stunning and constantly drew crowds to the Apple. It generates real hope for the future of multimedia.

This year's show was held in London's Business Design Centre in North London. The BDC was originally built as the Royal Agricultural Hall and was used for livestock displays. It's a spectacular example of 19th-century English ironwork, and the most pleasant Mac exhibition hall I've ever been in. Though its location is somewhat out of the way, it was overrun by crowds each day and the organizers announced that next year's show would be held at the much larger (at least twice as big) Olympia Hall.

The dates, if you want to start planning now, are November 1 through 4, 1989.

— Steven Bobker

Announcing the 1988 Edwards

At a ceremony held in the posh and prestigious Barbican Centre in central London, the United Kingdom version of MacUser presented its annual awards for the best products of 1988. Like those of its U.S. cousins, these awards (and their accompanying statuettes) are called Eddies.

Felix Dennis, the original publisher of MacUser UK, opened the award ceremony. His introduction was followed by remarks from Phil Chauveau, the dynamic new managing director of Apple UK, who predicted a fivefold increase in Mac sales in the next year or two. And no one in the audience doubted him.

The Eddy for best business application went to Double Helix. Freeland took the prize for best graphics software, and its stablemate PageMaker 3.0 took the Eddy for best publishing software. The award for best utility went to DiskTop, while Word was named the best word processor. The best connectivity product prize went to TOPS 2.0. The DataPak 45 removable hard-disk system took the best hardware peripheral award. The editors also selected 4th Dimension for an Eddy for the best European product.

A special award for outstanding contributions to the Macintosh community went to Bill Atkinson. Bill couldn't be there in person, but an audiotape of him accepting the award and talking...
about his version of the Mac future was played to enthusiastic response. Finally, MacUser UK’s readers voted on what they thought were the best hardware and software products available. They picked PagesMaker for the software prize and the locally made MiniDisk hard-disk drive took the hardware prize. The readers also forced the editors to award Apple two special awards, for the Macintosh II and the LaserWriter II. [The recipients of MacUser USA’s 1988 Eddie awards will be announced in our May ’89 issue. — Ed.]

— Steven Bobker

NEWSLINE!

EDITED BY GIL DAVIS

Faster Color Coming

CUPERTINO, CALIF. — A new color QuickDraw imaging and accelerator card from RasterOps speeds up color image processing by one to two orders of magnitude, boosting Mac II performance to speeds previously attainable only with expensive graphics workstations. The 8-bit $2,300 Color Board 118 was due to be in production by February and appears to be targeted at CAD applications. RasterOps claims that imaging operations are typically 15 times faster than with Apple’s standard 8-bit Apple color card, while some functions, such as vector redrawing, show a 62-fold improvement in speed. In addition to the QuickDraw accelerator, RasterOps is also developing Display PostScript technology (currently only for Sun systems).

Three Lawsuits Hit Jasmine

SAN FRANCISCO, CALIF. — Management conflicts at Jasmine have resulted in three lawsuits being filed against the company. The first suit, for $2.5 million, came from Michael Mikel, a minority stockholder who alleged that Jasmine shipped products with high defect rates. A second suit came from Jasmine cofounders Mark James and Alan Brunner, who charged an unwarranted dilution of their stock shares. A third lawsuit came from a suspended Jasmine employee, Marcia Mason, who is seeking $2.5 million for defamation, breach of contract, and fraud. Jasmine president Dennis Chang asserted that a preliminary investigation found that the suits were without merit and that they would not affect the company’s day-to-day operations.

Ashton-Tate Sues to Protect dBASE

LOS ANGELES, CALIF. — Ashton-Tate has sued two competitors, Fox Software and Santa Cruz Operation, for allegedly violating copyrights of its dBASE products by duplicating their concept and visual appearance. Both defendants have denied the accusation and say they will continue to sell their FoxBASE products, which have been marketed since 1986.

Hard-Disk Prices Heading South

BOCA RATON, FLA. — A quantum jump in hard-disk technology announced by Rodime could drive prices for hard disks down substantially over the next few years. Rodime recently doubled the storage capacity of its 3.5-inch drives, taking them from just under 100 megabytes to 215 megabytes, resulting in a much lower per-megabyte cost. Rodime’s 215-megabyte drive has an 18-millisecond average seek time and features an integral controller for both Macs and IBMs.

A Better Perspective

Somewhere between 3-D art applications and dedicated CAD behemoths, there’s DynaPerspective: a 3-D modeling and design application that’s new to the Mac II, but a four-year veteran on PCs. Unlike some applications ported from DOS, this one feels right, partly because its interface was Mac-like from the start.

DynaPerspective features full color 3-D modeling, with a focus on architectural renderings. It has an icon interface for positioning the viewpoint, field of vision, and light source, with the number of options available for precise sizing and positioning. Object creation and editing is done in wire-frame mode. Most work can be done by mouse or numerical inputs, or by a mix of both. Up to four views, three orthogonal and one perspective, can be active.

The tool palette is chiefly dedicated to objects like stairs, roofs, and walls. You can also draw transparent solids, like glass panes or curtains, with variable degrees of transparency. Options for a standard grid snap or object snap help you draw adjacent solids in perfect alignment. Resizing is normally constrained so you don’t unwittingly warp objects when altering them from an oblique viewpoint.

You can “fly” your viewpoint, or camera, in and around a model using a dedicated control panel. DynaPerspective simplifies the process by letting you specify a sequence of starting and ending points and the frame of numbers between them. The program then creates and outputs the frames as video (with special add-on boards) or Scrapbook pages. The camera’s path also can be saved separately and used on any 3-D scene.

DynaPerspective can import 2-D graphics and extrude them into 3-D. It also has special management features to create and use parts libraries, both home-brewed and purchased. It can save any view in full color as a PICT2 document. DynaPerspective requires a Mac II with 2 megabytes of RAM and an 8-bit color or monochrome video card. A hard disk is recommended but not required. DynaPerspective ($1,885) is available from DYNAWARE, 1163 Chess Drive, Suite J, Foster City, CA 94404; (415) 349-5700.

— Salvatore Parascevando

DynaPerspective’s tool palette says it all, from basic lines and an all-purpose prism to walls, posts, stairs, and roofs.

MARCH 1989 MACUSER 31
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Speaking Out: How OS/2 Will Impact the Mac

The Mac could be in for some stiff competition from new applications running on IBM-compatible computers using Microsoft's Windows and Presentation Manager. To see if this pending battle will slow or halt the rapid growth of the Macintosh, we asked for comments from developers who work in both the Mac and Big Blue graphic environments:

"I think the Mac will continue to expand because of what's happening in programming, which creates applications. We used to have COBOL, Fortran, and other programming languages where the machine controlled the user. Now, primarily because of the Mac, we've all been led to programming graphically. Some people might think that the Mac will be hurt by programmers moving from the Mac to OS/2, but I think the number of graphic programmers will increase at an ever-rising rate. This will only enlarge the opportunity for the Mac."
— Mike Maples, Director of Applications, Microsoft Corporation

"Since the Macintosh now has a lot of leading applications for its graphic interface, you could say it has the lead. But in the long run, more and more applications will be coming out for OS/2 and the Presentation Manager throughout this year and into 1990. When people see these programs, they'll notice a lot less difference between the IBM environment and the Mac than they've seen in the past. We all hope that Apple will continue to develop innovations that will allow it to maintain its lead. But the gap has certainly narrowed."
— Edward M. Esber, Chairman and CEO, Ashton-Tate Corporation

"I think the Mac could actually benefit from new OS/2 applications, which we project will be 40 to 60 percent of the microcomputer market in 1993, with about 30 percent DOS and 10 to 20 percent Mac. The Mac is a big enough market to shoot for, but developers could abandon it for the bigger mark-ets. They don't have to if they use object-oriented languages, which can take graphical programs across different platforms. Using this capability, I'm bringing Harvard Graphics to the Mac because my corporate customers are demanding it."
— Fred M. Gibbons, President and CEO, Software Publishing Corporation

"The Mac IIx is a fantastic machine with great graphics and great screen resolution. It's more geared to DTP and engineering applications. OS/2 has a lot of strength in its LAN manager with the ability to have distributed processing that lets applications and data be spread around on various machines in an office setting. I see the Mac as having a good position and staying there and not being hurt tremendously by OS/2."
— Chuck Middleton, Manager of OS/2 Development, WordPerfect Corporation
next month’s Comdex could herald a major challenge to the Macintosh. A number of Mac look-alike programs will be introduced on IBM-compatible computers using two graphic environments: OS/2 Presentation Manager (PM) and Windows. (Windows was developed by Microsoft, and PM is a joint development of Microsoft and IBM.) These new applications will boast the kind of ease of use that has been the hallmark of the Macintosh and largely unavailable on IBM-compatible systems.

This long-awaited blooming of the Windows/PM world has led a number of market researchers and industry analysts to predict an end to rapid growth for Apple and its Macintosh. They argue that IBM’s push for OS/2 and PM adds up to trouble for the Mac.

Windows of Opportunity

Are the days of fast growth and rising market share over for the Macintosh? Will the accelerating acceptance of Microsoft Windows and the OS/2’s PM in corporations spell doom for the Mac? Will corporations lead the world back to Big Blue computing?

Not likely. I believe that the Macintosh is here to stay and that it will continue making inroads into corporate computing as well as into smaller businesses and homes.

Granted, the gap between what you can get on a Macintosh and what’s available on IBM-compatible computers has narrowed, now that the best software for Windows and PM compares favorably with what’s available for the Mac.

Granted, too, that the Windows/PM environment has diverted some Mac software developers to the Intel world of IBM and compatible systems. As a matter of fact, some of the PC’s best programs are ports of Macintosh products, as shown by Aldus’ PageMaker and, to a certain extent, Microsoft Excel.

Granted, further, that corporate heads are turned by IBM’s way of computing, and IBM is bombarding corporate customers with its vision of central control of computing resources. What’s more, information-systems professionals from the mainframe world are very responsive to the idea that they can regain control of personal computers with OS/2.

However, even granting all that, the facts simply do not add up to any real loss of momentum for the Mac.

The facts simply do not add up to any real loss of momentum for the Mac.

The first reason for this is that, Apple’s look-and-feel lawsuit notwithstanding, in reality Windows and the OS/2 Presentation Manager — while a big improvement over the DOS > command prompt — still fall far short of the Macintosh in ease of learning and ease of use. Even with the relatively more Mac-like features of New Wave or of the OS/2 shell interface, Windows and PM retain elements of their history that still leave them less intuitive and less user-friendly than the Macintosh.

Second, while the best of Windows/PM software may match what is available on the Mac, the variety and depth of software falls far short of what the Macintosh has to offer. It will be a long time before the Windows/PM software selection really matches that of the Mac.

Third, despite the burning desire of some computer managers to “take control” of personal computers in their organizations, that is likely to happen in only a small number of rigidly hier-

THE MACINTOSH ANALYST

BY WILLIAM ZACHMANN
"Power, power, and more power," says Ed Bomke, when asked why he chose THINK's LightspeedC to develop Digital Darkroom. "With its unparalleled power, it really deserves its reputation as "The Professional's Choice." Don Cone, his partner, agrees, "Its power really shows in the debugger. It lets us test code, debug, revise and rerun in one smooth, fast process. That's power. The benefit to us is faster turnaround time. So, it's easy to test out ideas while we're thinking about them. Then turn them into working programs sooner... without any wasted effort."

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THINK's LightspeedC is the industry leader. Its integrated multi-window text editor, compiler, linker, source level debugger, and auto-make facility make for a winning combination. It's the C that created winners like Digital Darkroom, FoxBASE + /Mac*, Aldus PageMaker®, Adobe Illustrator®, and Quark XPress® 2.0. Ed Bomke says its power and performance made developing Digital Darkroom "almost instamatic."

Call (800) 228-4122 Ext. 298F for more information, or visit a dealer near you.

The Professional's Choice.

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Big Frame Hunters

You don't need to scour the savannas of Kenya — or even to cruise the byways of Broadway — to capture a wild animal. Armed with either the ComputerEyes video digitizer from Digital Vision or MacVision from Koala Technologies and any National Television Standards Committee (NTSC) video source (VCR, camera, or videodisc), you can capture your prey for less than the cost of a safari.

With the ComputerEyes serial, 8-bit gray-scale digitizer, images can be scanned at a resolution of 320-x-200 pixels in 6 seconds, or at 640-x-480 pixels in 24 seconds. On the Mac II, images can be displayed in 256 gray, high contrast, dithered gray, and halftones. You can preserve your beast in TIFF, raster image file format (RIFF), Encapsulated PostScript Format (EPSF), and MacPaint and PICT formats. The software image editor lets you shrink, expand, mirror, or invert his pelt to suit your taste.

If you're tracking an Australian arboreal marsupial, you'll be glad to know that version 2.0 of Koala's MacVision serial digitizer is out of the trees. MacVision 2.0 captures NTSC video and produces a 640-x-480 pixel image in 256 gray levels that can be saved in RIFF, TIFF, EPSF, as well as PICT, PICT2, and MacPaint formats.

The Quick View option lets you preview the composition, lighting, and contrast of the image before scanning, and lets you save it in 4-, 6-, or 8-bit gray-scale format for display on the Plus and SE, as well as a range of image-enhancement features, including brightness and contrast controls.

ComputerEyes works with the Mac 512KE on up and is available for $249.95 from Digital Vision, 66 Eastern Ave., Dedham, MA 02026; (617) 329-5400.

You can snap MacVision 2.0 for the Mac Plus on up for $399 from Koala Technologies, 269 Mount Hermon Road, Scotts Valley, CA 95066-4029; (408) 498-0846.

- Michael Miley

RUMOR MANAGER

The recent spate of Mac-specific magazines that you've noticed is not about to stop. Indeed, even as we write this, the debut issues of several more magazines are being prepared. Part of the reason (or blame) is simply the very large number of Macs now in use. That number is not the Rumor Manager's concern except for its actual size — a closely (sort of) Apple-guarded secret. (By the way, we hear the 1989 shipment projections are 875,000 SEs, 476,000 IIs and IIx's, 65,000 laptops, and 50,000 — it doesn't have a name yet.)

Back to the new magazines. Recent months have seen a new weekly (at least they claim to be weekly), new monthlies, and new electronic publications. Expect to see soon (at the very least): one more pretty slick monthly (edited by a name that should be very familiar to the readers of another Mac monthly — not MacUser; we hasten to add). There'll also be a spat of nice-looking, well-written, and — so their publishers hope — extensively read newsletters. The desktop presentation, legal, medical, and desktop publishing newsletters already in publication will be joined by publications devoted to computer-aided design and manufacturing (CAD/CAM), DEC connectivity, IBM connectivity, LAN, electronic and voice mail, office systems, and music.

We've even heard of a cheap (less than $50 per year) entertainment newsletter, but we don't think that it will fly unless it sticks strictly to flight-simulator software (there's even more coming soon) and targets Mac-using pilots. Possible title: Fly by Mac.

Researchers on both the East and West coasts who are developing one of the new branches of artificial intelligence (AI) are doing all their work on Mac II's, both in stand-alone and networked configurations. Most of the work is being done under A/UX, and Apple is keeping the group supplied with versions more current than those the rest of the A/UX community sees. (We were about to say "than the general public sees," but "general public" has little meaning with regard to A/UX. Maybe next year. Or the year after that.)

The developers still don't feel that they can provide the necessary interface niceties within the A/UX framework, as versatile as it's become. So they've turned to HyperCard. We hear that several features of HyperCard 2.0 will be specifically aimed at facilitating this AI interface.

Speaking of HyperCard, the general release of version 2.0 is still a way off, and it seems unlikely that you'll see it before 1990. By that time, you might well see Europe's answer to HyperCard. No, it's not the excellent Guide reshaped and reformed, but an entirely new product being developed in the London area.

So far, the basic program is more of a personal information manager than HyperCard is, and its interface, while quite flexible and customizable, is more rigid than HyperCard's. Modeled very roughly, we grant you — after the famed Filofax organizers, it uses leaves (which come in pads), help points, meeting points, and check points. The version we saw had used particularly British terminology, which might not survive into the final product.

The groupware buzzword mania shows every sign of becoming a true plague. That's especially true since the more astute PR people (yes, you know who you are) have realized that virtually every product can be called groupware. The few that can claim the power word of early 1989 will generally be able to do so after minor modifications.

Have you heard any good rumors recently? Started any yourself that you'd like to take credit for? Can you share your "knowledge" with us? Does your legal department agree? Will you share anyway?

If we use your rumor, we'll send you a token of our appreciation and promise not to use your name. Anonymous contributions also accepted.

Our U.S. Mail address is Rumor Manager, c/o MacUser, 850 Tower Lane, 18th Floor, Foster City, CA 94404. Our electronic addresses are MacUser (on MCI Mail), 74208,204 (on CompuServe), and X0250 (on AppleLink). No calls please; the Rumor Manager has an unlisted number and much prefers it that way.
Whatever Macintosh-PC setup you have, MacLinkPlus — at $195 — provides the very best solution for transferring and translating files and documents between the two.

If you want to connect a single Mac to a PC or laptop, MacLinkPlus provides everything you need — a direct connect cable (you can use a Hayes or compatible modem if you prefer) and software, including translators, for both the Macintosh and the PC.

If you have a DOS disk drive, then the MacLinkPlus library of over 40 translators is the solution to accurate conversion of your files.

Formats and styles are retained during the conversion and there's no need to preconvert to ASCII or print files. This library also makes MacLinkPlus the perfect enhancement to Apple's new Apple File Exchange utility.

And if you have Macs and PCs on a network or AppleShare server, etc., the MacLinkPlus file translation capabilities are worth the price alone.

So, if you want to be really well connected, the size of your wallet really doesn't matter. Just call (203) 268-0030 for your nearest DataViz dealer. Because as Macintosh Today recently said, "MacLinkPlus was one of the first data translators and it remains the champ."

DATAVIZ
35 Corporate Drive Trumbull, Connecticut 06611

System Requirements: Macintosh Plus, SE and II. All IBM PCs and compatible systems.

Please circle 189 on reader service card.
Suitcases Two by II

It seems good things come in twos and threes these days, so it's no surprise that Suitcase is now out in a new version: Suitcase II.

This new version of the handy font/DA management utility is a major revision that makes up to 99 files as read-only for accessing on networks, and the capability to rename or renumber DAs and Fkeys without resorting to another program like ResEdit.

Suitcase II also comes with two new utilities: Font Harmony, which resolves font numbering conflicts automatically, and Font and Sound Valet, which compresses screen fonts and beeps up to 60 percent and then uncompresses them as they're read from the disk.

Suitcase II lists for $78; current owners can upgrade for $25. To order your new bags, contact Fifth Generation Systems, 11200 Industrialplex Blvd., Baton Rouge, LA 70809; (504) 291-7221.

—Russell Ito

MaraThon Mac

Speed isn't everything — it's the only thing, at least in computers. With this in mind, Dove Computer has launched the MaraThon series of accelerators and connectivity add-ins.

There are two 16-megahertz SE accelerators in the line, one of which, the MaraThon 020, is a renamed version of the company's earlier Mach II/SE board. The MaraThon 020 comes in four versions listing from $899 to $1,999. The MaraThon LAN 020 includes an Ethernet adapter, and it comes in four configurations that list from $1,499 to $2,499. The pricing depends primarily on whether the boards are equipped with an additional megabyte of 256K RAM, and/or a 68881 math coprocessor.

Mac II owners who need to break through to the Big Blue world can latch onto the MaraThon MC and SP serial/parallel adapters. The MC ($299) offers one Centronics parallel port and one RS-232-C serial port; the MC (S499) adds an RS-449 serial and an RS-530 serial port in addition to those available on the MaraThon SP. You can find out more from Dove Computer, 1200 North 23rd St., Washington, DC 20005; (919) 767-7118. Happy speeding.

—Russell Ito

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InBox, the powerful yet easy to use electronic mail system is now part of the family of TOPS networking products. Which makes InBox the most well-connected E-mail software you can buy.

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So either call your nearest InBox dealer or call us at 800-445-TOPS (or 415-769-8700 from outside the U.S. and Canada). Or write, TOPS, 950 Marina Village Pkwy, Alameda, CA 94501.
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See why hundreds of thousands of people have made PC Tools the best-selling utilities for personal computers like the Macintosh. For the dealer nearest you, or to order direct, call (503) 690-8090 M-F, 8:00 a.m.–5:00 p.m. (West Coast time). *Plus $5 s/h.

Optimize your hard disk for better performance.

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Anyone who read our NuBus article in last month's issue knows that OMA (Direct Memory Access) is a hot topic (if you didn't read it, you can take it on faith, or go back and read it now). DMA makes coprocessing possible, and since coprocessing is the computer equivalent of division of labor, that translates into more work getting done faster. With that in mind, Jets Cybernetics has begun shipping SurfBoard, a NuBus DMA card.

SurfBoard is a SCSI DMA device that takes over all SCSI I/O functions from the Mac CPU, thereby allowing simultaneous computation with SCSI I/O and increasing the SCSI data transfer rate from 0.95 to 2.5 megabytes per second. (Sounds like a Wang ad, doesn't it?) SurfBoard is compatible with A/UX and comes with an A/UX driver. In multitasking situations, SurfBoard can actually make less RAM seem like more by optimizing the paging process whereby a program regularly swaps segments of itself between disk and RAM. Using SurfBoard, disk access and computation can occur simultaneously, and with the increased swapping rate, it's possible to fit larger applications into the same amount of RAM — without a horrendous slowdown in performance.

You can buy your own SurfBoard for $995. So if it sounds like surf's up to you, contact Jets Cybernetics at 540 Bryant Street, Palo Alto, CA 94301; (415) 323-7070.

— Russell Ito

As the WORM Turns

We may live in the disposable society, but when it comes to data, we seem to hoard more than we throw away. With that in mind, Storage Dimensions has introduced the MacinStor (guess they couldn't afford the extra e) line of large-capacity SCSI hard disk drives, along with an 800-megabyte SCSI WORM drive.

The hard disk drives range in size from 45 to 630 megabytes, and in price from $1,240 to $7,999. They're available in both internal and external configurations, and three of the external models are designed to fit under a Mac Plus or SE.

LaserStor (still no e) is Storage Dimensions' WORM drive. It's an external model that comes with a single, removable 800-megabyte cartridge. Its suggested price is $4,999.

So to increase the size of your mass storage to the electronic equivalent of a landfill, contact Storage Dimensions at 2145 Hamilton Ave., San Jose, CA 95125; (408) 879-4330.

— Russell Ito
Cricket Chirps Again

Cricket Paint is a monochrome paint-only program that stays true to MacPaint’s comfortable painting interface but adds new tools and pleasant surprises under every icon.

Its flagship feature is the FreshPaint mode, which lets you treat the most recently drawn object as a separate entity that can be moved, resized, rotated, reshaped, and refilled until you “dry it.”

If you wish, you can “undry it” back to FreshPaint and edit it some more. This feature is available for most shapes, including the freehand line, and it’s worth its weight in SIMMS. But if you feel overwhelmed, you can turn it off.

Artsy features include Bezier curves, dithered graduated area fills in the four basic directions plus radial, a two-nozzle airbrush, and the ability gradually to lighten or darken a selected area.

Ellipses, rectangles, rounded-corner rectangles, and parallel lines can be rendered with anywhere from 1 to 16 border lines with variable spacing between them.

In the power tools section, you’ll find the Spiro Polygon (no, not the former vice-president), which can produce a huge variety of rosettes as you adjust three sliding scales.

Once you settle on a pattern, you can draw as many copies as you wish. Draw a shape with the Rotated Polygon tool, and Cricket Paint will replicate it around a central point, in increments you specify.

The Block tool draws a rectangular solid in the proper perspective based on its location on the document. You can even convert FreshPaint objects or lassoed selections into your own customized library of stamps, each with its own icon.

Cricket Paint can open multiple documents in sizes from 8-x-10 to 11-x-17 inches, in landscape or portrait orientation, and for those big high-resolution jobs, you can use a disk or RAM for working space.

Cricket Paint can open MacPaint, PICT, PICT2, and TIFF files, and can save Cricket Paint and TIFF paintings at resolutions of up to 900 dots per inch (dpi). It saves MacPaint and PICT files at 72 dpi only.

You’ll need a Macintosh Plus, SE, or II, with at least 1 megabyte of memory. A hard disk is recommended for the program, but is not required.

You can become a monochrome Matisse for $195. Cricket Software, Great Valley Corporate Center, 40 Valley Stream Parkway, Malvern, PA 19355; (215) 251-0800.

— Salvatore Parascandolo

Some of Cricket Paint’s more unusual tools were used to produce this museum-quality piece.
**Milo, a Minderbender**

In most word processors, words and mathematical expressions coexist about as comfortably as Run-D.M.C. at the Met. Solving this dilemma has generally meant getting a dedicated math program to supplement your word processor, but Paracomp has just released an all-in-one solution: Milo.

Milo is a mathematics processor with some basic word-processing features as well as graphing capabilities. Unlike some programs, Milo is completely WYSIWYG, so you don't have to learn any complicated programming protocols to create your expressions. And since Milo is also a math processor, it can not only write your equations, it can solve many of them, too.

Among the functions supported are trigonometric, definite, and indefinite differentials and integrals; ordinary and partial derivatives; limits; and Taylor's series. It also comes with tables of formulas that you can modify or extend. And for those occasions when Milo's text blocks aren't big enough, it's also compatible with MacWrite, WriteNow, Word, and FullWrite Professional. (See "Information, Please" in the December '88 issue for more information, please.)

Milo ($249.95) is available from Paracomp, 123 Townsend Street, Suite 310, San Francisco, CA 94107; (415) 549-3848.

— Russell Itò

**Touch and Feel**

Everyday, the Mac reaches out to more of mankind. And, with help from Berkeley System Design and TSI, the blind can reach out and interact with a Mac. Using inTOUCH software from Berkeley System Design in conjunction with TSI's Optacon II, blind users can feel what's on their screen.

Optacon, first developed in the early '70s, is a system that uses a hand-held camera to scan a document and display words, one letter at a time, on a pad of vibrating pins. Optacon II includes a built-in computer interface that works with inTOUCH, a utility that

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You can create sophisticated graphics and logos right in the program. Or copy art from other programs and paste it into your forms.

You can design complex multipart and multipage forms. And custom forms up to 20" x 35".

In fact, you can do everything on a Macintosh that a professional forms designer does on a drafting table. Only faster, easier and without paper cuts.

But you won’t have to redraw the forms you’re currently using. Just scan them in.

You can even give your forms “intelligent” features like automatic calculating and instant help.

Then, SmartForm Assistant lets everyone else in your company fill in your forms on a Macintosh. Quickly and accurately. But it won’t let anyone tamper with your designs.

With the SmartForm system, all your forms are stored on a Macintosh. You don’t print a copy until you’ve filled one out.

That can save you a bundle in shipping and storage costs. And when you move to a more prestigious address, the price of success won’t include thousands of dollars’ worth of outdated forms.

Finally, SmartForm will integrate with your other Macintosh software. So you can easily transfer information from forms to spreadsheets or databases.

If all this sounds like great form to you, call 800-3CLARIS, ext. 500, for more details. And learn how you can turn a paper loss into a real gain.

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Tools of the Trade

You can always do a job better and faster if you have the right tools. The same is true with your Mac. PC Tools Deluxe, by Central Point Software, is a tool-cabinet-sized collection of utilities and data recovery applications that can help you recover your files when your hard disk crashes — or back up your hard disk quickly and easily before it crashes.

PC Tools Deluxe includes FastCopy, MacTools, Mirror, Optimizer, PC Backup, Locate, and PC Secure. FastCopy formats and copies disks faster than the Finder, and its Track Editor can diagnose and repair damaged disks.

MacTools provides pull-down menus and features like automatic calculating and instant help. And sets the screen ready for new files or hard drives.

PC Tools' MacTools lets you select the best recovery method for your lost files. Among PC Tools' other goodies are: FastCopy, Mirror, Optimizer, PC Backup, Locate, and PC Secure.

or incremental backup, as well as full or selective restore.

Files can be found quickly with the Locate desk accessory, which permits searches by filename or key words or phrases. The Locate function can work in the background under both Finder and MultiFinder.

You can copy and paste, add text to the Clipboard, and create a list of found files. And your confidential files can be kept safe with PC Secure, which encrypts, compresses, and hides sensitive files on your desktop.

All this help and protection is available for $395. For more information about PC Tools Deluxe, contact Central PC Software at 15320 N.W. Greenbrier Parkway #200, Beaverton, OR 97006; (503) 690-8000.

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Kristi Coale

Laura Johnson
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Symantec Utilities for Macintosh (SUM) is Corporate America's #1 choice for fail-safe hard disk protection. Because in addition to six other indispensable utilities, SUM features Guardian, the ultimate software for protecting your Mac's hard disk before a crash. Just like an air bag in a car, Guardian stays out of sight, loading automatically every time you turn on your Mac. It protects invisibly by updating a "map" of your hard disk data. So that, in a crash, your data is safe. Because Guardian uses the "map" to locate and recover it. In minutes.

Seven smart utilities. 5 Mice, MacUser magazine's highest rating. Tens of thousands of satisfied customers in hundreds of companies. No wonder Corporate America is turning to SUM for hard disk safety...in numbers.

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Guardian—protects and restores hard disk data and deleted files, Disk Clinic—easy-to-use troubleshooting interface, Restores lost hard disk data in case you have a crash before you can install Guardian, Virus Protection—protects systems against "viruses," HD TuneUp—optimizes hard disks, Symantec Tools—views and edits data and resource forks of a file or volume in HEX or ASCII, QuickCopy—makes fast floppy copies, HD Partition—separates hard disks into separate volumes which can be encrypted.

Five Mice, MacUser Magazine's Highest Rating
Quick Clicks

Swivel 3D

Along the spectrum of 3-D programs, Paracomp's Swivel 3D is on the artistic end, as opposed to the micrometrically precise CAD end. But wrapped in its artsy exterior are excellent rendering speed, modeling accuracy, and a unique ability to link 3-D elements in a machinelike structure. Swivel 3D forms fully shaded solids quickly on the Mac Plus and SE, and on the Macintosh II it's very swift, smooth, and shows full color. Swivel 3D can cast true shadows of objects onto other objects, and it can project color graphics onto their surfaces to give them texture. It can easily serve as a multipurpose tool for pure graphic design, visualization, presentation, and even animation.

You do much of your work using its unintimidating tool palette, the Shift, Option, and Command keys, and good ol' double-clicking. To create a new object, you draw its basic cross section, top, and side views, which Swivel 3D converts into a solid. In Swivel 3D's concept of cross section, size means nothing; only shape matters. Whether you're creating a ball, a bat, or a bottle, you start with a circle of a fixed size. The other two views that you trace determine how that basic cross-sectional shape will be repeated, resized, and distorted to form the object's true cross sections. My early attempts with this scheme produced some pretty weird stuff, but practice bred predictability. Now when I outline a fuselage, I don't wind up with a flounder. (Paracomp promises that version 1.1 of Swivel 3D will make this mode less confusing.)

You can move an object's center of rotation anywhere, even outside the object, letting you set up a wide variety of pivoting relationships. Three-dimensional shapes can be rendered as wire frames, unshaded solids, contour maps, and as fully shaded objects. You can select a different rendering mode for each object. There's a single diffuse light source that you can position anywhere on your side of the 3-D world.

The Five-Mouse Rating

EXCELLENT

VERY GOOD

GOOD

FAIR

POOR

DOESN'T WORK

Quick Clicks are short reviews of released products — not beta release, prerelease, or vaporware. If it appears here, it is available commercially.

This is Swivel 3D's simple palette and a few of my Swivelite acquaintances. Note the mixed rendering modes. The carousel horse is part of an art collection that comes with the program. I tinkered together the rest in my desktop garage.
for example, the swing of a door to 80 degrees or permitting a piston to travel no more than 1 inch in either direction. To aid in placement or mechanical simulation, each object can have its own custom grid to control its position and attitude. All aspects of an object are editable at any time. Even while linked, objects can be reshaped, resized, colored, and substituted. This feature set alone lets you create models that you and others can operate without fear of tearing them apart. The link feature can also be used effortlessly to make offset duplicates such as wheel spokes and progressively mutated copies of an item.

Swivel 3D also has tween animation, in which you specify a start and end point of a movement and how many frames to create between those two points. Swivel 3D fills in the rest. You can select a mode in which the camera moves through the scene under tween control. You can thus fly the viewer around your 3-D space. It understands a command language with which you can create and animate a 3-D scene using a text file prepared with such applications as spreadsheets and word processors. Swivel 3D can save animation frames and scenes as individual files or as scrapbook pages, in bit-mapped or object-oriented format.

The package includes two versions of Swivel — one for single-megabyte Macs and one for multimeggers. They're functionally identical, but one manages memory differently to live within the confines of less RAM. You also get enough ready-made art to get you started or inspired — sets of alphabet letters in both uppercase and lowercase, a human figure with swivel-jointed torso, head, and limbs, items that show Swivel's forming talents, and assemblies that showcase its mechanical abilities.

Swivel better than something else? Is air better than water? It all depends on what you need, and how comfortable you'll be with its interface. Each Macintosh 3-D application is vastly different from every other, and it's difficult to compare them objectively feature for feature. Swivel 3D outshines Super 3.10 in the color and speed categories, and its priceless mechanical links have no counterparts in other software in its class.

Not to rave, but if you're a graphic artist, designer, modeler, or sculptor, you should add Swivel 3D to your tool kit before daybreak tomorrow.

— Salvatore Parascandolo

Swivel 3D

List Price: $395
Published by: Paracomp, 123 Townsend St., Suite 310, San Francisco, CA 94107; (415) 543-3848.
Version: 1.0
Requires: Mac Plus with 1 megabyte (2 megabytes recommended).
Compatibility: Mac II and MultiFinder friendly.
Application Size: 362K
Copy Protection: None
MasterJuggler

The first do-it-all font- and DA-enabling programs have been available for almost two years now. Those programs, including MasterJuggler's direct ancestor, Font/DA Juggler Plus, seemed to have all the features you could ever want. MasterJuggler, a member of the latest generation, works even more smoothly and transparently and adds many new and useful features. In fact, the older programs now seem very plain and bland — although they're really not — by comparison.

As you'd expect, MasterJuggler allows constant access to hundreds of fonts, DAs, Fkeys, and sounds. You don't have to install them in your System file or deal with the System's limits. MasterJuggler can open up to 12 files (each of which can contain numerous DAs, fonts, sounds, and Fkeys) at a time. The files don't have to all be in the same place or even on the same disk volume. They can be anywhere, including on your network file server.

Considering how many features MasterJuggler offers, access to all of them is easy. Most MasterJuggler features can be accessed in a variety of ways; you select what's best for you in an extensive Options dialog box. For example, if you desire, you can access all of MasterJuggler's features via pop-up menus.

To help you make the most of MasterJuggler, there are commands to let you examine the contents of your suitcase files both before and after opening a file. Fonts and sounds can be automatically compressed to save space. They're opened on the fly as they're required. The space savings are typically 35 percent for fonts and somewhat less than that for sounds. The savings can be significant, since sound and font files tend to be large.

MasterJuggler also lets you open an application or document from within any application without returning to the Finder. In MultiFinder, the Application list also lets you switch to other open applications and hide, if you want to, the current application's windows before switching.

Those are just some of MasterJuggler's features. The DA list lets you open any DA directly from the keyboard. The Font list can display the names of installed fonts as the fonts actually appear.

You can also make any font the default application font. The Fkey list lets you open Fkeys from the keyboard by name, thus avoiding numbering conflicts. The Sound list allows you to play sounds and to choose a sound to play in place of the standard System beep.

The number of features in MasterJuggler is enormous. The files with your DAs, fonts, and so on have to be opened only once. After that, MasterJuggler remembers them and automatically reopens them whenever the Mac is started.

Considering how many features MasterJuggler offers, access to all of them is easy. Most MasterJuggler features can be accessed in a variety of ways.
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Tables and graphs are easy to add, too. Persuasion automatically generates practically any kind of graph right from the program's data sheet. Or from imported data from spreadsheets such as Microsoft® Excel. And if you want to generate organization charts, Persuasion can do them instantly right from the outliner.

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Quick Clicks

MasterJuggler’s Font List can show font names in the fonts themselves, and FontShow (shown here) can display actual samples of your fonts in any size or style.

al with such collections, there are some gems and some bland programs, but overall it’s a nice selection.

MasterJuggler is normally accessed through the submenu of a hierarchical menu. I found that method a bit awkward. However, there are so many other ways to get to the features that this wasn’t a problem. My preferred method is to hold down the Shift key as I select MasterJuggler from the Apple menu. That causes the normal DA list to be replaced by the MasterJuggler submenu. You might prefer a keyboard equivalent of your own choosing.

The only real limitation I found (and it’s well documented) is MasterJuggler’s inability to use laser printer drivers other than Apple’s. Thus, if you want to use downloadable PostScript fonts with, say, PageMaker, FreeHand, or Persuasion, you’ll need to install them as though MasterJuggler wasn’t there (or use Suitcase II).

Comparisons between MasterJuggler and Suitcase II are inevitable. Both are world-class programs that do roughly the same things. MasterJuggler has a clear lead in the number of useful features it provides, while Suitcase II has a slightly more slick, elegant, and intuitive interface. The MasterJuggler utilities will be very useful for both average and powerful users and are the sort of utilities that you tend to use frequently. The Suitcase utilities are aimed more at power users who have lots of sounds and fonts and use them heavily but much less frequently.

Ultimately your decision will be one of personal choice (unfortunately, you can’t run both programs at the same time). I’ve waffled. I have two Macs that I use regularly. One has MasterJuggler installed; the other runs Suitcase II.

Remembering the days of 15 DAs and lots of fonts in the System, I’m still amazed and awed by programs like MasterJuggler. I wonder how I got along without one. Yet I’m certain that this superb program will have to be down-rated next year to allow the next version to take over at the top of the utilities heap.

— Steven Bobker

List Price: $79.95
Published and Sold Exclusively by: ALSoft, P.O. Box 927, Spring, TX 77383-0927; (713) 353-4090.

Versions: MasterJuggler, 1.0; Resource Resolver, 1.0; Font/DA Utility, 1.12; Sound Converter, 1.00; FKey/Sound Mover, 1.10; Single-user version reviewed; multiuser versions that allow multiple copies of MasterJuggler to run on a network at the same time are available.

Requires: 512K RAM

Compatibility: All Macs, MultiFinder, friendly.

Application Sizes: MasterJuggler, 20KB; Resource Resolver, 24K; Font/DA Utility, 28K; Sound Converter, 25K; FKey/Sound Mover, 27K.

Copy Protection: None
OmniPage

Optical character recognition (OCR) has grown up with a vengeance recently, and no program better exemplifies OCR's new maturity than OmniPage. OmniPage takes in whole pages at a gulp and spits out the text it finds with speed and accuracy.

It's an exceptionally intelligent program straight out of its very slick and attractive packaging, requiring none of the laborious teaching most OCR programs require. Install it, launch it, scan, and read the resulting text file. It really is just about that simple.

And it really works, more often than not. Of course, it's a picky eater, recognizing only plain fonts and nice, not-too-shiny paper. OmniPage can't read type larger than 72 points (1 inch high), nor will it deal with italic, boldface, or any styled font. It can't even be taught these fonts. It also refuses to read most dot-matrix output, so you can't scan in ImageWriter printouts.

The paper that is being scanned is surprisingly important. Even a moderate gloss can throw OmniPage off. At least there's a simple solution for this problem. Photocopy the material on any plain-paper copier, and OmniPage will have no trouble. This is an annoyance but not an irreconcilable limitation like the inability to read styled fonts.

OmniPage makes heavy hardware demands. It wants a Mac II, IIX, or SE with a 68020-based accelerator, and it wants that machine to have at least 4 megabytes of RAM. If you need to add memory to run OmniPage, then OmniPage becomes a very expensive program. It wants all this computing power and memory so it can keep you from falling asleep at the keyboard. It does that by keeping the whole file it's working on in memory. And it works on uncompressed TIFF files that frequently exceed 1 megabyte in size. Since it also creates large temporary files as it works, you need to allow for at least 3.1 megabytes if you plan to run it under MultiFinder (I'm not kidding; its SIZE resource is set at 3,072K).

Caere, OmniPage's publisher, offers a special version that runs on a normal (unaccelerated) SE. You still need the 4 megabytes of memory, however. If you elect to use this option, be prepared for some substantial waits as pages are processed. If you plan to handle any volume at all, you're better off adding the accelerator card and using the full-speed version.

The version of OmniPage reviewed works with the Apple Scanner and the Hewlett-Packard ScanJet. Caere should have drivers for the DEST and Microtek scanners by the time this review appears, and a driver for Agfa scanners is also being developed. If you have another scanner, you can still use OmniPage but the process is cumbersome. You have to create and save the page as an uncompressed TIFF file using the scanner's native software and then open it from within OmniPage.

Basic operation, assuming you're using one of the supported scanners, is simple. Place your document on the scanner, set the contrast and brightness (or use the defaults for the first pass), and scan. While you'll get better results if you take some time to optimize the scan, I found most material worked well (if it worked at all) with the default settings. The preview scan should appear sharp, but without any extra "dirt" that might confuse the program.

After the scan is completed, a thumbnail of the page appears in the upper-left corner. Select the area from which you want OmniPage to extract the text. An actual-size, zoomed view that allows very precise selections is available to help you precisely define the selected area. Then, if you've selected the Manual Galley mode, indicate the order in which the text blocks are to be scanned. This handy feature lets you omit material like captions and pull quotes that don't belong with the text.

Now tell OmniPage to read the scan. It does this rather quickly, generally picking up speed as it moves through a page. However, it will slow down on lines of partial characters as it tries to make sense of them. The solution to this problem is to exclude carefully that kind of material when picking the areas of the image to work with. On-screen highlighting shows the program's progress.

The results appear in an editable file. That file can be preset to be a text file, a text file without Returns, a MacWrite file (essentially unformatted), or an Excel-compatible (tab-delimited) file, which can be read by most spreadsheet and database programs.

Characters that can't be read are replaced with the tilde (~) character. As with all OCR programs, you have to check the results carefully for accuracy. It'll sometimes miss and not know it. But when OmniPage is doing well, it's more accurate than any other OCR I've used; expect about 98 or 99 percent accuracy. When OmniPage is off, it's very obvious, and you should go back to step one (the original scan).

One problem with the resulting files is that each covers only a single scanned page, and there's no way to append new material to it. That means that long files must be hand-joined at
Wet Paint

Wet Paint is a full-featured graphics program for the Macintosh. It includes a complete set of drawing tools, including brushes, erasers, and layers. It also includes a full-featured paint mode, allowing you to create elaborate designs and illustrations.

BUNDLE (Symmtry)

Wet Paint includes a variety of pre-designed templates, including maps, holiday and restaurant graphics. It also includes PictureBase reports, advertising and business forms. Includes a wide range of tools for creating professional-quality graphics.

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Word 4.0 adds new page design capabilities! Create newsletters with multiple columns. Automatically wrap text around graphics. Tables are a breeze. Use Style Sheets to create tables with self-calculating columns. Word 4.0 has a spelling checker, hyphenation, glossary, mail merge, and automatic indexing. Word 4.0 also includes SuperPaint 1.1 at no extra charge, (word processing) $69.

Centron Software, Inc.

BlackJack or CrapsMaster ........................ ea 27.
CasinoMaster (6 pack) ........................................ 55.
Discovery Software

Arkano7 ...................................................... 27.
Electronic Arts

Casanova 2000 (deluxe chess) .... 28.
Patton vs. Rommel (strategy) .... 15.
Starfleet I: The War Begins .... 37.

Epyx

Sub Battle Simulator .......... 29.
Infocom

Leder Goddess of Photos ........................................... 15.
Micro Sports

MEFL Pro League Football .................................... 32.
Mindscape

Shadowgale, Uninvited - ea 20.
Nemesis

Go Master .......................................................... 49.
Sokal Tutor ...................................................... 30.
PCAI

MacCourse .................................................... 32.
MacGolf 2.0 .................................................... 32.
MacGolf Classic ................................................ 54.
Road Runner .................................................. 45.
Sierra ON-Line

Leisure Suit Larry ........ 23.
Silicon Beach

Apache Strike, Dark Castle - ea 27.
Beyond Dark Castle .............................................. 27.
Simon & Schuster


Spectrum HoloByte

Falcon 2.0 .................................................... 32.
PT109, Gato .................................................... 26.
Solidare Royale or Tetris - ea 20.
The Software Toolworks

The Hunt for Red October .... 29.

MacTax Federal 1988 (Softview)

This sophisticated, easy to use income tax preparation program allows you to organize, store, and print out income tax information. Includes 74 IRS forms, schedules, statements and work-sheets. Links forms automatically to reduce input errors. Program features the IRS instruction booklet on-line. All forms can be printed, complete with data onto blank paper or preprinted forms. Both IRS approved, (finance) $69.

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The Software Toolworks

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The Big Thesaurus

Inserts replace word definitions into your document. Compatible with Multifinder and Hypercard. (spelling) $53.

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20MB Raw Int. Drive Kit ........................................ 379.
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Mobius MultiScreen Video Card .................................. 349.

PCPC

MacBottom HD21 (SCSII) - Call for TuffBottom HD32 (SCSII) - Special Price .......... 859.

MacBottom HD45 ................................................. 779.

More II (Symantec)

From reports to speeches you're a pro with More II. Use the outline to capture and organize your thoughts. Plan the presentation by using the full-function word processing section. Finish with a stunning presentation, graphics, formatted handouts and a self-running slide show. More II's graphics tools help you create and import charts, graphs, diagrams and illustrations to make your points. It reads PCT, PICT2 and EPS files. (business) $235.

MediaMate

Have all your programs at your finger tips! MediaMate holds 10 3 1/2 inch disks in an easy access design. When not in use, it folds up for easy storage. (accessories) $12.

MAC - 101 Keyboard (Data Desk)

Features 101 keys including a numeric keypad, a separate T-shaped cursor keypad, Cancel Key, Option and Command keys at both ends, definable function keys, plus scrolling, page control, and zooming keys. Comes with free macro software and manufacturer's two year warranty. (input/output) CALL.

MacBottom HD32 w/Modem ................ 829.
MacBottom HD45 w/Modem ................ 979.
WSI (With SCSI Interface) .................. 269.
Peripheral Land, Inc.

Impact Hard Drives (Everex)

The EMAC Impact Hard Drive series features high speed 19 ms performance, external SCSI addressing, whisper quiet operation and a compact, slim-line chassis. (drive) EMAC Impact 60 MB or EMAC Impact 40MB Plus. CALL.

Impact Hard Drives (Everex)

The EMAC Impact Hard Drive series features high speed 19 ms performance, external SCSI addressing, whisper quiet operation and a compact, slim-line chassis. (drive) EMAC Impact 60 MB or EMAC Impact 40MB Plus. CALL.

 blond medium... 149.

USB Robotics

Courier 1200 Modem ........................................ 199.
Courier 2400 Modem ........................................ 349.

BLANK MEDIA

B 1 3 A 5 1 3 5 (box of 10) ......................... 17.
Sony

DS/DD (box of 10) ....................... 19.
SS/DD (box of 10) .......................... 13.

INPUT/OUTPUT

Asher Engineering

TuffKeyboard (SCSII or SE/I) .............. 69.

Cutting Edge

OE-105 ADB Keyboard ....................... 125.

DataDesk

Mac 101 Keyboard ............................. Call.
Kensington


KOALA

MacVision 2.0 ............................... 225.

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MacToography's got type!

Quick Clips

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Part of a text file generated by OmniPage. Note the tilde ('') characters where it couldn’t read some characters, and notice the error in the last line (rite for fire and lip for up). All OCR results must be carefully proofread.

This is OmniPage's Format Selection and Options dialog box.

OmniPage

List Price: $695
Published by: Caere Corp., 100 Cooper Court, Los Gatos, CA 95030; (800) 535-SCAN, (408) 395-7000.
Version: 1.0
Requires: Mac II, IIX, or SE with 68020-based accelerator; scanner; 4 megabytes of RAM.
Application Size: 599K
Copy Protection: None

some point, which seems unnecessary.

The manual is good but appears more aimed at the casual user than the heavy-duty user. There’s also a good tutorial in HyperCard-stack format. Caere also sends registered owners a stack called QuickCard. QuickCard reads any plain text file (up to 30K long) into a scrolling field on a HyperCard card. It can also search the text fields of any stack for any word or string of characters.

If you already meet OmniPage’s stringent hardware requirements, it’s reasonably priced and very useful to have around. I use it several times a day just to create note files. It would be a much better program if it had some sort of teaching module and could learn at least some styled or italic fonts.

OmniPage makes OCR technology a lot more accessible to a whole new group of users and has enough horsepower to get it through most simple data entry tasks. It’s a good way to get going in OCR.

— Steven Bobker
From the company with a famous name...

**EMAC**

What a guy that Marco Polo. The original traveling man. Went over to the court of Kublai Khan, opened up the world and brought back paper, spaghetti and Polo shirts. All major breakthroughs in Western civilization.

We at EMAC like to think we’ve one-upped Mr. Polo. Sure we’re both voyagers for better worldwide communications. Marco gave us his trade routes to the east and we give you the MD2400 modem. But Mr. Polo’s friends grew old waiting for a postcard from him. With our 2400bps modem, no one’ll have to wait for word from you.

And with all its features, it’s as convenient as fast food. Which brings up another thing. If Marco brought spaghetti back from China, was it cold when he got home?

The EMAC-MD2400. A hot communications idea for the Macintosh® world.

EMAC – a full line of products and support from the company with a history of success.

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48431 Milmont Dr., Fremont, CA 94538 For more information call 800/821-0806 ext.2222 (in CA 800/821-0807 ext.2222)
Until now, most word processing programs limited your creativity and vision. And ultimately your communication.

But now there's FullWrite Professional from Ashton-Tate. A new powerful word processing environment that helps you express your thoughts in ways you could only imagine before. Because with FullWrite™ you can do more than word processing.

FullWrite is the next generation of word processing that you've been waiting for. With advanced page layout features, graphics and powerful word processing capabilities in one easy to use writing environment. There's no hassle. You don't have to switch between several programs to create more than a simple letter. Even if you're designing the letterhead at the same time.

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ON THE FLY
6308 Troutmask Lane, Stillwater, Montana
A Memo On The Lures Of Trade

Lure, line & sinker.
Our On the Fly authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

<table>
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<th>PROJECTED SALES FOR 1989*</th>
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Lure, line & sinker.
Our On the Fly authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

We at On the Fly, want to ensure that the wily, sighted after creatures of the wacky world are as captivated with our fishing customers as our customers are with our fine lures of natural, organic hand-fed flies. The line of lures we offer this year will, indeed, red in customers as never before.

Tackle your fancy.
For the young novice angler looking to launch the hobby with easier game, On the Fly will offer a range of smaller, lighter, less intricate lures, such as the Peewee Picker, the Pumpkin Puff, the Weedy Wiggle and the Puddle Jumper. These lures are designed for easy handling, both on and off the hook. For the reel man who chairs for larger catch, the new additions to our 1989 product line include the Chimmer Swizzle, the FishDog Fighter, the Mr-Ray Bicho and the Beany Bottom Bonanza. These additions for 1989, plus the full line of wind-and more On the Fly lures are on the following pages.

Hold the anchovies.
For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.

* SALES FIGURES FOR 1989 ARE JUST A WILD GUESS.
We at On the Fly lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

Tackle your fancy.
For the young novice angler looking to launch the hobby with tamer game, On the Fly will offer a range of smaller, lighter, less intricate lures, such as the Peanut Piper, the Pumpkin Puff, the Weedy Wiggle and the Puddle Jumper. These lures are designed for easy handling, both on and off the hook. For the reel man who chums for larger catch, the new additions to our 1989 product line include the Chimmer Swizzler, the FinchDog Fighter, the Man-Boy Behemoth and the Brassy Bottom Bonanza. These additions for 1989, plus the full line of tried-and-true On the Fly lures are on the following pages.

Lure, line & sinker.
Our On the Fly authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

Hold the anchovies.
For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.

PROJECTED SALES FOR 1989*

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*Sales figures for 1989 are just a wild guess.

Because all parameters are controlled in picas, points, centimeters, pixels, or inches. Right down to 1/10,000 of an inch. And that's important whether you're controlling a typesetter or a LaserWriter.

To make it even easier to keep your eyes on the screen, your hands on the keyboard and your mind on your work, FullWrite has the most complete dictionary, thesaurus and outlining system for the Macintosh. Not to mention every other feature you expect in the next generation of word processing software for the Macintosh.

See The Next Generation of Word Processing.

For our one-on-one demonstration of what FullWrite Professional can do, visit your Ashton-Tate dealer. Or call 800-437-4329 Ext. 3400* for more information.

Because without FullWrite, you're only as good as your word.

This document created with FullWrite Professional.

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**Mac II Workstation**

It’s big, it’s gawky, it’s expensive, it’s heavy, it comes in lots of pieces that you have to assemble. It’s awkward when disassembled. It doesn’t even photograph well.

That sure sounds like a damning indictment for a computer stand. But the Mac II Workstation is the best, strongest, most versatile computer station you’ve ever seen. The Mac II Workstation’s purpose is twofold: It frees your desk space of computer components, and it makes monitors a lot easier and more pleasant to use.

Having your monitor floating on an arm may not sound like much, but it’s by far the best way to mount a monitor. The arm lets you move the screen from side to side, forward or backward, up or down, and you can swivel and tilt it. This sort of control makes finding the best, most glare-free position simple. And if you need to show the screen to someone to one side or the other, just turn it. The arm is so well built and damped that all movement requires just the pressure of a finger or two. However, no matter how hard I shook the frame, the arm never moved on its own. It’s real nice work.

The Mac II Workstation, like any semicustom metalwork item, offers a bewildering variety of options. The specific unit reviewed here is a basic vanilla unit. It’s a floor-standing, 70-inch-high unit (64- and 78-inch units are also available). Its 30-inch-wide shelf (25-inch-wide shelves and frames are options) is just under 15 inches deep (the only choice). It has one Model A monitor arm (a second arm can be added; there’s also a Model B arm for heavier monitors) and a type I (or smallest size) monitor carrier — a caddy, in Ergotron’s terminology. Two larger caddies are available for bigger monitors (or a Plus or SE). The largest caddy can hold up to 62 pounds.

The Mac II Workstation can be mounted directly to a wall or desk, or you can order it with an integral rolling table (called the Ergotron Design Station). You can elect to add power strips and task lighting. Casters can also be added to any standard freestanding frame. Caddies can be easily swapped for larger or smaller sizes. Ergotron also offers acoustic panels and a keyboard/copy holder that mounts on the front of the caddy.

The unit arrives in several boxes and requires a screwdriver and allen key for assembly. A soft-tipped hammer also helps. Assembly is straightforward and takes 15 to 30 minutes. The main frame and shelf are of heavy steel. The unit is exceptionally solid and well made.

The shelf is adjustable over a 6-inch vertical range. Its rated load capacity is 300 pounds. I was a bit skeptical of that claim, so one of my first tests was to (gingerly and carefully) sit on the shelf. I’m not a little guy, and the Mac II Workstation didn’t even quiver.

There’s plenty of room for a Mac II and peripherals on the shelf. The only thing to keep in mind as you place your Mac II is that its cooling system needs a couple of inches clearance on the left side. It’s tempting to just shove the II up against that left-side wall, but don’t do it. The slot for the 800K drive is easy to reach, but you’ll have to stand up to reach the programmer’s switch on the right side.

If you want your cables to be neat and out of sight, you’ll need extra long keyboard, monitor, and power cables. You can buy them from Ergotron or another supplier. The cables can be placed in plastic cable troughs that mount to the uprights (or to the wall for wall-mounted units). These cable troughs are not as well finished or as strong as the rest of the Mac II Workstation, but they do the job.

You’ll need to add shipping costs to the prices noted in this review. The best thing to do is to call Ergotron and let them quote a price. Single units can cost as much as $75 to ship.

The Mac II Workstation is a solid, space-saving unit that is the best possible home for a Mac II.

— Steven Bobker

---

**Quick Clicks**

The Mac II Workstation is a big, solid unit. It looks strong; it is strong. It can mount a second arm that will hold a second monitor.
Never before has this level of Reliability and Durability been available in floppy disks. Introducing the new RD Series from Maxell. Twice the durability of the disks you're now using. Twice the resistance to dust and dirt. And the RD Series is ten times more reliable than conventional floppy disks. The Gold Standard has always meant maximum safety for your data. Now it means even more.
The fastest way to get here.

Claris CAD can reduce the huge number of two-dimensional drawings it takes to get a plane off the ground. But it makes them a lot easier to do.

Claris CAD supports ANSI Y14.5 and other drawing standards. So those who design parts can share with those who design wholes.

Accurately drawing graceful curves like these becomes a simple matter of point and click.

Claris CAD can help you design everything from electronic schematics to the boxes they come in.

Claris CAD is the epitome of "less is more." Less time learning. More time creating.

With the ability to draw in layers, you can hide essential details like wiring and plumbing just a click beneath an elegant exterior.

Draw the lines of fine design as finely as you wish: from 1.5 inches to .0001 mm.

Is to start here.

Claris CAD is the first professional 2-D design and drafting tool to fully utilize the intuitive Macintosh way of working. So it takes hours to learn, not days.

Fillet, tangent, keyboard entry, double lines and automatic dimensioning turn your ideas into realities with exacting precision.

Customizable pens, dashed lines, hatch patterns and dimension appearance give you a new level of versatility.

Claris CAD makes it easier to sell your inspirations. Plot your plans, concept sketches, schematics and working drawings exactly as you see them, turn them into slides or overheads, or cut and paste them into proposals and reports.

Keeping the vision in your revisions is easy. Because you don't have to redraw from scratch.

Claris CAD integrates with other CAD software via optional IGES and DXF conversion programs. So you can move them to larger CAD/CAM systems for 3-D modeling and prototyping.

Here's the next step: order the Claris CAD Starter Kit, just $29.95 (refundable when you buy the complete program). To order call 800-628-2100. And see how intelligent design begets intelligent design.

Introducing Claris CAD.
Copy II for the Macintosh

Copy II for the Macintosh has improved immensely over the years. No one should doubt Central Point's commitment to this program. Copy II belongs in your box of tricks. At a street price around $20, it's a steal.

— Jake Paden

**Quick Clicks**

**Utilities**

**Copy II for the Macintosh**

Copy II for the Macintosh goes back a long way in Mac history. It was originally called Copy II Mac, and when it first appeared about three years ago, the emphasis in the package was on Copy. Now, with the virtual demise of copy protection on productivity software, should you be interested in a new version of such a program?

The answer is yes, because Copy II is now a utilities package whose components are powerful, useful, and, best of all, easy to use.

The actual Copy II application is even more powerful than it was several versions ago, and when used with the complex, detailed information in the manual, it should be able to copy virtually any program. Copy II's most valuable ability might well be its ability to quickly and efficiently copy unprotected disks. Disks that appear damaged can sometimes be recovered by simply sector-copying them. In any event, when attempting to recover a damaged disk, you should always be working on a copy. And Copy II is the best way to make that copy.

Along the way, Copy II has added a Track Editor that can often repair damaged disk sectors and can also find and examine copy-protected sectors. This feature is complex and not that easy to use effectively. It's intended for advanced users; if you don't understand exactly what it can do, don't use it. And if you choose not to heed this warning, be aware that you can easily destroy your disk.

The Copy II disk includes an application that shows which applications Copy II will copy. The current version lists hundreds of programs and suggests how best to copy them.

The centerpiece of the package is MacTools, a versatile file-editing utility that works on any disk. MacTools isn't as feature-laden as FEdit Plus but is easier to use and can work in places where FEdit Plus can't. MacTools can do many of the things the Finder does, including copying, deleting, and renaming both files and disks. It can also initialize disks, lock and unlock files, and more.

MacTools can also do a lot that the Finder can't do: verify both files and disks on your command, make invisible files visible and visible files invisible, recover some deleted files, and repair some damaged disks. The file and disk editor portion of the program lets you see all the information on the disk, and, if you know exactly what you're doing, change it. The editing and recovery features are very powerful, if not all that easy to use.

Recovery of deleted files is greatly aided by an INIT (which you place in your System folder) called CPSavDelete. This works much like the Shield-Guardian combination included in Symantec Utilities for Macintosh (SUM). The package also includes the CPTaggerFix, which fixes some problems with the ROM in Mac 512Kes and Pluses. It shouldn't be used on SEs or IIs — just be sure to use the current System software.

A new addition to Copy II is the Locate DA. This DA can search, at high speed, for specific filenames, up to three specific text strings inside files, or any combination of filenames and text strings. It can also display its hits in context in the lower portion of its screen. It's as quick, if not quite as versatile, as Microlytics' GOfer.

Locate works in the background, under either MultiFinder or the Finder. And it works well in both environments. That's important, because as fast as Locate is, searching for text strings can be slow.

The manual says that Locate must be installed directly in the System file. It warns against installing it via Suitcase or MasterJuggler. Presumably that's necessary to enable the background searching. However, the publishers of both of these programs thought Locate would work correctly when installed via their programs, and all my testing indicated that Locate works well no matter how it's installed.

There's one other minor problem with Locate (and all programs with similar functionality). If you ask it to search for a filename and a null (blank) or single character string, search progress will be glacial. If you're searching for just a filename, be sure that the cursor remains in the filename box and isn't in the first string box.

By far the weakest part of the entire package is the manual. It's not organized well enough for the amount of information it contains. And it's not well written. For the most part, it appears that the publisher has simply added to older versions of the manual. And finally, this 140-page tome doesn't have an index. That's inexcusable.

Another underwhelming component of Copy II is Copy II Hard Disk, an application that automatically copies selected software to hard disk. (It can also be used to move protected software to floppies or RAM disks.)

Built into the program is a list of copyable programs — only 22 total — and all of the productivity applications are old, totally obsolete versions that no one should be using anymore. Only one or two of the games are current. This application, once very useful, should be dropped.

Copy II for the Macintosh has improved immensely over the years. No one should doubt Central Point's commitment to this program. Copy II belongs in your box of tricks. At a street price around $20, it's a steal.

— Jake Paden

**Copy II for the Macintosh**

**List Price:** $39.95
**Published by:** Central Point Software, 15220 N.W. Greenbrier Parkway, #200, Beaverton, OR 97006; (503) 690-8090

**Version:** 7.2, except 1.1 for Locate DA.
**Requires:** Any Mac except original 128K Mac.
**Compatibility:** Mac II and MultiFinder friendly, but don't use MacTools with MultiFinder.
**Application Size:** Copy II, 64K; MacTools, 106K; Locate, 34K; Copy II Hard Disk, 31K.

**Copy Protection:** None
"The best backup solution should offer reliable, fast, convenient, affordable storage of data..."

"The 45 MB removable were among the fastest backup solutions I tested. In fact, they're so fast that it is tempting to use them as hard disks—which is what they are..."

— Rob Hahn, MACWORLD November 1988

"...the medium (DataCarts) offers better value for your money than the MegaDrive (Jasmine) or the Totem (Iomega Berriotuli) cartridges."

— Rob Hahn, MACWORLD November 1988

"The DataPak is a first-rate drive that I recommend without hesitation!"

— Jim Heil, MACWORLD September 1988

"I've had good luck with the many (45 MB DataCarts) I've been using."

— Rob Hahn, MACWORLD November 1988

"...you will be overjoyed at how painless backing up can be. They offer the ultimate in flexibility, speed and reliability."

— Rob Hahn, MACWORLD November 1988

"This technology will revolutionize the way people look at hard disks."

— Thomas L. Massie
MASS microsystems founder
MACWEEK, Jan. 26, 1988
WillMaker

Living well may be the best revenge, but dying without a will is one of the worst. Whatever you want to happen to your property after you die probably won’t, and your heirs will be left with a lot of unnecessary cost and confusion.

Not many of us like to think about writing a will, and even fewer like to pay a lawyer to do it; unless a friend will do it for nothing, the tariff will be $75 “and up,” as the advertisements say. WillMaker is a simple, but legally fairly sophisticated, program designed to let you generate (and, as necessary, update) a basic will without consulting an attorney. Viewed as a Macintosh program, it’s no great shakes. But it does its job reasonably efficiently, and for most people, it can produce as good a will as a lawyer would, in less time and for less money.

Viewed as a Macintosh program, it’s no great shakes. But it does its job reasonably efficiently.

You really do have to read the lengthy but unintimidating manual. It clearly explains who can (and who can’t) safely use the program to prepare a will, the important choices the program makes, and some aspects of estate planning that the average person might well overlook. It won’t take you more than a few hours, at most, to go over this.

Once you’ve read the manual, you’re ready to run the program. It’s a BASIC program (complete with Run-Time Microsoft Basic) jazzed up slightly with a few buttons here and there, but the screens are not very attractive and the program might as well be running on an MS-DOS machine. However, it’s simple to operate and works as long as you provide it with accurate information. Entering that information will take from ten minutes to half an hour or so, depending on how many specific bequests you want to make, how many children you have, and so forth. It’s simple (although sometimes tedious) to correct errors, and equally simple to update a pre-existing will if, for instance, you have another child. The prolific, however, should know that the program cannot handle more than sixteen children.

When you’re done, WillMaker takes the information provided and produces a complete will using standardized language, some of it taken from the Uniform Probate Code. The will produced can be viewed on-screen or printed out (on an ImageWriter or LaserWriter). However, it can’t be saved as a text file and edited — a deliberate (and sensible) choice in a program designed for nonlawyers. An attorney could use the program to prepare modest wills, but people qualified to practice in the field would do better to devise their own forms and work up the final product on a word processor or a program like Legalware’s Document Modeler.

I compared the will that WillMaker produced with my own (simple) will, written by an experienced Trusts and Estates law teacher with an active practice. The computer-generated version was a little longer, just as clear, and in one or two cases added language that was (in the event of some unlikely but impossible circumstances) a slight improvement.

Wills are important, and if you don’t have one, you should. You should consult an attorney if you have a very large estate (say, half a million dollars or more), if you want to make conditional bequests (“$5,000 to my daughter Mary if she renounces motorcycle riding”), or if you have any potential family problems (say, you’re uncertain about the existence of illegitimate children, or you’ve had a foreign and potentially invalid divorce). But if you’re an average, middle-class American with a Macintosh and without a will — and you don’t live in Louisiana, which has unusual laws that the program can’t handle — WillMaker can save you time and money and help ensure that your property goes where you want it to after you die.

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You have to believe that Apple thinks it has a mighty fine bunch of computers in its Macintosh line. It probably sinks enough money into print and TV advertising to restore the economy of any emerging third world country. It employs a large number of people who presumably do much more than sit around thinking up new system numbers. Why, then, do I walk out of Apple press announcements convinced that the people doing the presentations don’t have a clue about what the Mac can do?

When you go to Apple for a press briefing, every Apple person involved walks in with a file folder full of transparencies. You are handed photocopies of what appear to be MORE bullet charts. Then someone takes the original transparencies and projects them on a screen and reads them to the attendees. The level of excitement generated is somewhere between watching grass grow and a coma. Even if you want to get excited, you find yourself more involved in just staying awake.

Case in point: The most recent Apple hardware announcement (as of this writing) was for the Mac IIx. It took place in San Francisco in a very nice auditorium in the opera complex. Randy Battat proudly announced at the beginning that the charts and slides we would be seeing were done in Cricket Presents. You know Cricket Presents; it is notable for — among other things — color. About the only thing you’d learn about it from the Apple presentations is that Cricket Presents does an outstanding job at importing MORE black-and-white bullet charts — which MORE II can do, and it can add color as well, for that matter. Well, let me be perfectly fair. There were two or three tree charts of the Mac product line that were in at least two colors: washed-out red and (if memory serves me) undistinguished green.

Now I could go into a politically correct tirade about how this is what Apple has come to by ignoring (and then actively repudiating) all those T-shirted hacker types whose creativity kept the Mac alive while Apple and third-party companies fumbled around trying to get software for it. But there’s a perfectly good “suit” argument in favor of Apple executives and public relations people making full use of their own platform. It’s good business. Everyone, both press and users (corporate or otherwise), is interested in a company that’s excited about its product. Apple representatives should be up there putting the Mac through its paces — breaking the sound barrier instead of doing a few boring loops. The one thing about the Mac that everyone knows of, even if they’re unregenerate PC users, is its graphics ability. Amazing graphics. Mind-boggling graphics. Animated graphics. And with the Mac II, color graphics. Let’s see some of that from Apple, who should be able to do it best. To a lot of people, MIS directors among them, a computer is just a computer. If your computer does something that distinguishes it from the rest, you ought to be making sure everyone knows it.

If the people who should know the Mac best don’t seem to be impressed, why should anyone else?

COMDEX IN BRIEF

Speaking of businesses and presentations, I saved myself a little time at the Las Vegas Comdex by avoiding booths manned by scantily dressed models — of either sex — busting out of the tops of their costumes. In this respect, Comdex looks more like the Consumer Electronics Show every year. Maybe in Las Vegas these companies think they have to compete with showgirls and clubs. (No company is crazy enough to think it can compete with the casinos.)

Comdex news included a rash of optical storage media, a welcome side effect of the NeXT announcement. But the thing I heard people discussing most often was the “ghettoizing” of Macintosh products at the next Comdex. At the spring Chicago Comdex, there will also be a MacDEX. This idea might have seemed like a good one about two years ago. Finding the Mac-only vendors was an arduous task when they were few and far between. Many Mac vendors stayed away from the show because of the Mac’s low visibility.

The problem now is that there are a number of vendors, including key players such as TOPS, Borland, Microsoft, and Ashton-Tate, that produce both Macintosh and PC products. Where do they exhibit? Two booths is not an elegant investment even for companies that can afford it.

And what about a company like Cornerstone, which produces one- and two-page display monitors? About 40 percent of its business is
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c and sounds may be a feat for some utilities—but not for Font/DA Juggler Plus.

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• View font faces and sizes in a file before or after opening the file
• Display and print name or number conflicts among the available fonts, DA’s, Fkeys and sounds
• Set the default application font
• Assign sounds to seven different Macintosh operations and assign application- and alert-specific sounds
• Play random sounds and continuous sound
• Convert digitized sound files into Macintosh and HyperCard sound resources

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MacDEX is an idea whose time has come and gone. That it exists at all is clear indication that the promoters are out of touch not only with what’s happening in the Mac market but also with the personal computer market as a whole.

Macintosh: not enough to warrant the cost of two booths, but too much to ignore entirely.

This is an idea whose time has come — and gone. Macs are beginning to have a real corporate presence. More than that, the Macintosh can reach out and touch almost every other kind of computer, from PCs to mainframes. Mac-only and PC-only vendors still exist, but they are rapidly becoming

the minority. MacUser editors went by few non-Macintosh booths in which someone didn’t start talking about plans for a Mac product or connecting to a Mac — including Hewlett-Packard. Mac-only companies and products are not by any means the whole market anymore. People have learned that different computers sometimes have different virtues, and the one-brand office is becoming obsolete.

The MacDEX decision could make more money for Comdex organizers, but otherwise the idea has little to recommend it. It looks like a clear case of failure to reality-check.
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they knew needed any training on the Macintosh. Which is, I think, a good part of my point. The world isn’t full of people who are, like you and me, Mac zealots, Mac fanatics, Mac junkies.

The world, however, full of perfectly sound people who, given an opportunity to make an informed choice between using a Macintosh and using another kind of computer for most office work, would choose the Mac — if they could then count on getting some help in learning how to use it. And really learning how to use a computer — which in this case means learning how to use a software package, or two, or three — isn’t just a matter of picking up the basics and then plodding along, but rather a matter of learning how to use it well.

Which is the second big issue here, and the point at which training can make all the difference in a corporate setting. Granted, most of us can pick up the basics of Mac use by ourselves. The training materials Apple packs in the box with the Mac aren’t very good, of course. but mercifully they don’t need to be very good, because the basics of using the machine are pretty easily grasped.

For a lot of us, who came to the Mac in the days when the software choices were principally MacWrite and MacPaint, the learning curve is today a lot steeper, so we tend to underestimate how much work is involved. But that’s another column.

Mastery versus Diddling Around

Well, excuse me.

In the October issue of MacUser, I wrote here about what I called “The ‘Big Lie’ TV Spot.” That was the Apple commercial that shows an earnest female manager being interviewed by her manager, who is unhappy about the company’s rising personal-computer training costs. One of the company’s offices doesn’t have that problem, he says. Yeah, she replies: They have a different kind of computer system there. And the people seem to be able to train themselves. I said that spot was a big lie, because to deny the existence of training costs is deceptive and shortsighted.

Introducing any new system to an office setting always has associated training costs, and denying those costs doesn’t make them go away. You can reduce your training costs, but you’re fooling yourself if you think you’ll eliminate them.

I got a lot of nice letters from businesspeople who’d found from their own experience that this is how it works. Even with Macs, where the relative program-to-program consistency of the interface means there can be some economics — the old “once you know how to use one program, you’ll know how to use them all” routine is an overstatement but is built around a kernel of truth — there are substantial startup training costs and continuing, in-service training costs.

But I also got another basketful of angry letters from Mac lovers who thought I had fouled my nest with that kind of nonsense. How could I be such a traitor to the Mac cause? Did I really think anyone needed anything so mundane as training on a Mac?

And at Comdex in Las Vegas the next month, what seemed like most of the Mac-using community who hadn’t written to me came up to tell me in person how far off-base I was. No one
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System requirements: Macintosh Plus or better. Supports COLOR display with a Mac II and a COLOR monitor, and COLOR output with an ImageWriter II or LQ.
The media coverage of computer viruses has a lot in common with the media coverage of AIDS. It is sensationalized and overblown, pandering to the fears of the general public, and it is appallingly lacking in substance and basic facts. As a result, computer users often react with the same kind of hysteria that accompanied the beginnings of the AIDS epidemic. Thanks to the diligence of many organizations in the fight against AIDS, the public is much better informed now about AIDS, and the hysteria level has dropped considerably. The same sort of education is needed on the subject of commercial service or BBS that you know checks its submissions, and be discriminating. As one of the sysops of MAUG on CompuServe, I have seen many messages from people saying things like, “I downloaded this INIT and installed it, but what does it do?” Needless to say, it is not very smart to install software on your machine if you don’t know what it does.

**Protection:** For a little extra safety, acquire and use programs such as Vaccine, from CE Software, and Interferon, written by Robert Woodhead. Vaccine constantly monitors your system for suspicious behavior and warns you if a program is about to do something irregular, allowing you to stop it. Interferon performs after-the-fact checking, scanning your disks for evidence of known viruses and other tampering. These programs don’t offer absolute protection, but some protection is better than none.

**Backup:** If you’re using your Mac for business, you should already know the importance of performing regular backups. For protection from viruses and other tampering, you may want to perform generational backup, making new backups instead of reusing the same media. It’s more expensive, but there may come a time when you have to go back days or weeks to retrieve an unaffected copy of a file.

You should also take special care of your backups, locking them up for safety and storing some of them off-site. Remember, someone on the inside could destroy the backups if they’re left out in the open.

It’s also a good idea to keep a separate backup of your System folder in a pristine state. Besides viruses and tampering, there are many problems that can damage System files, and restoring your System folder will sometimes stop recurring system bombs.

**Never Cry Wolf:** If you do suddenly start experiencing prob-
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**MAC-101 Keyboard by DataDesk**

If you are looking to replace your Mac's keyboard, the MAC-101 by DataDesk is the way to go. It comes in an ADB version for the Mac SE and II, and a non-ADB version for the Mac S12 and MacPlus. The positive tactile, firm feel 101 includes a full numeric keypad, 15 function keys, 6 page control keys, and a T-style cursor pad.

Keyboard status indicator lights let you know when everything is going smoothly. Includes 101-keys desk accessory software, a powerful macro utility which allows you to exploit the full power of the function keys with almost any Macintosh application.

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MacKids Educational Programs by Nordic Software

**MacKids** is a complete series of twelve quality educational software products for the Mac specifically designed to teach and entertain kids. Whether your children are preschoolers or young adults, there's a MacKids package that will give them the learning edge.

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**INQUIK** 33  
**Special** 33  

Macinware SE Ext. Carrying Case by I/O Design

The Macinware SE Ext. Carrying Case protects your Mac SE, Plus, or S12K and its extended keyboard in safety and style. It's made of rugged 1000 Denier Dupont Cordura nylon, and surrounds your machine with a full half-inch of high-density foam padding. There's room for an external hard drive, a mouse, cords, and disks, so your complete system travels with you in one compact unit. All stress points are cross-box stitched for added safety. A convenient shoulder strap is included, and you can choose platinum grey or navy blue colors.

**SE Carrying Case** 75

Visit us in the Electronic Mall on CompuServe - GO PP
SuperSpool, SuperLaserSpool, DiskFit & Sentinel by SuperMac Software

Sooner or later you'll find that you have to spool-up, back-up or lock-up your data and it's a safe bet that SuperMac has just the programs you'll be looking for. SuperSpool and SuperLaserSpool return control of your Mac to YOU while your printer is busy printing. DiskFit is a utility that lets you quickly backup your hard disk to floppies keeping your data protected from electronic tribulations. And, Sentinel allows you to lock up your private documents by encrypting the data, keeping it safe from prying eyes!

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- Read-H OCR 2.1 (for Image Scanners)
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- Softworks
- Stack Cleaner
- SuperMac Software
- SuperSerial 2.0
- disk14 1.0
- Sentinel 2.0
- Computer Utilities for Mac (S.U.M.)
- Williams & Mclachlin
- myDiskLabeler w/Color
- myDiskLabeler w/LaserWriter Option
- Writing Software
- FindDisk 2.0 (Document Finder)

**Printers & Digitizers**

- Salkosha
- SP1000 (ImageWriter Compu.
- Summographics Bit Pad Plus
- ThunderWare
- SunSphere LaserJet
- Intelliflash
- Microlytics, Inc. GOLier
- MicroTools Redux
- ScreenGen

**Stepping Out II by Berkeley System Design, Inc.**

*Stepping Out II* is a program designed to expand the capabilities of any standard Macintosh display to give it the same feel and features as a full page display. Now you can choose the screen size which is most comfortable for you. Working with large spreadsheets and full page layouts becomes easy since your Mac is no longer limited by small windows and slow scrolling. For detail work on small areas you can enlarge any portion of the big screen up to sixteen times. Handy features and ease of use makes *Stepping Out II* the ultimate viewing tool for any Mac.

**Disk Drives/Hard Disks/Upgrades**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacSnap 548 (512K to 2MB w/SCSI)</td>
<td>599</td>
</tr>
<tr>
<td>MacSnap Plus 2 (Max Plus to 2MB Non Expandable)</td>
<td>439</td>
</tr>
<tr>
<td>MacSnap 2SE or 1024 Option (1MB or Max! Memory Exp.)</td>
<td>439</td>
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<td>109</td>
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<td>Everex</td>
<td>200</td>
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<td>MacDrive 2 Deluxe</td>
<td>585</td>
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<table>
<thead>
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<th>Product Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ars Nova Practice Musicica</td>
<td>79</td>
</tr>
<tr>
<td>Electronic Arts Mavis Beacon Typing</td>
<td>38</td>
</tr>
<tr>
<td>Benson &amp; Barros SAT</td>
<td>35</td>
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<tr>
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<td>165</td>
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<tr>
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<td>49</td>
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<td>Shing Quartz. Country or Heavy Metal</td>
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<td>157</td>
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<tr>
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<td>20</td>
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<tr>
<td>Where in the World is Carmen Sandiego?</td>
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<tr>
<td>Mac OE Deluxe</td>
<td>58</td>
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<tr>
<td>Speed Reader II</td>
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</tr>
<tr>
<td>Math/Brain or Word Attack!</td>
<td>27</td>
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</table>

**Quicken by Intuit**

*Quicken* is the fastest, easiest way to cut through personal and small business paper work. In minutes you'll get a handle on your finances without having to bother with any of the burdensome terminology and repetitive entry that most accounting packages require. *Quicken* is flexible; it lets you enter an unlimited number of transactions, expense and income categories, and checking accounts. *Quicken* lets you write checks, make and track budgets, manage cash flow, and even reconcile unbalanced accounts. Now *Quicken* links directly with MacinTax to save you even more time at tax time!

**DataBase Management**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute 4th Dimension</td>
<td>469</td>
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<tr>
<td>4D Runtime</td>
<td>239</td>
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<tr>
<td>Fox Software For Basic Plus</td>
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<tr>
<td>Activation Reports for Hypercard</td>
<td>75</td>
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<tr>
<td>Focal Point &amp; Business Class Bundle</td>
<td>65</td>
</tr>
<tr>
<td>City To City</td>
<td>30</td>
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<tr>
<td>Odetta Double Helix II</td>
<td>339</td>
</tr>
<tr>
<td>Apple Computer HyperCard</td>
<td>42</td>
</tr>
<tr>
<td>Ashtonate ISHASE Mac 1.0</td>
<td>295</td>
</tr>
<tr>
<td>Bythe Software Omius 3 Plus Express</td>
<td>129</td>
</tr>
<tr>
<td>Borland FlexPlus</td>
<td>165</td>
</tr>
</tbody>
</table>

**Studio/8 by Electronic Arts**

Professional artists and amateurs alike will enjoy the power that *Studio/8* reveals in the Mac II. *Studio/8* is the first full-color, full-feature user friendly paint program designed specifically for artists. It features versatile airbrush, paintbrush, icon-based drawing tools, and color routines that you can customize. You'll be rid of hassles with custom type settings because *Studio/8* supports full text-editing features in the same text box and allows you to dynamically resize and redline blocks of type, plus shear, rotate, and skew text. *Studio/8* comes bundled with on-line help, a slide show program with built-in production features, a free font disk, and a library of backgrounds and textures.

**Studio/8**

<table>
<thead>
<tr>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>319</td>
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</table>
Cutting Edge 800K External Drive by Cutting Edge

The Cutting Edge 800K External Disk Drive is the solution for Mac owners who are tired of swapping disks when using large programs or files. This external drive does everything that Apple's does, at a much more reasonable price. It's fully compatible with the Mac 512K, MacPlus, SE, and II. Use of the drive is exactly the same as for the internal drive you already own, so there are no new keyboard commands or other tricks to learn. Increase your computing efficiency economically with the Cutting Edge 800K External Disk Drive today! Cutting Edge 800K External Disk Drive

Graphics Software

3G Graphics Images With Impact 55.
Images With Impact Business 1 75.
ABA Software Draw It Again Sam 200 75.
Graph It 223.
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Aldus FreeHand 129.
Allysys Corp. Fontastic Plus 20 129.
Fontographer 2 122.
Ashton Tate Full Paint 309.
Broderbund Print Shop or Clip Charts 115.
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(Disk-ups to 250MB) (Includes Desk Accessory) (Hypercard or Paint) (Various volumes) (ea)
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(Disk-ups to 250MB) (Specifications)
Cutting Edge BOOK LP-3 External Drive 175.
(Disk-ups to 250MB) (Specifications)
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Sony 3.5" SS/DD Disks (box of 10) 19.
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1/0 Design Mac: Luggage in Navy 64.
MacIntosh II Carrying Case Special 75.
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Raleight Design Teakwood Top-Off Disk Cases: Micro Cabinet holds 45 disks 14.
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Micro Cabinet (holds 135 disks) 31.
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Mouseway (Moused) 6.
Grappler II or ImageWriter II Cover 9.
Macintosh Plus/SE Dust Cover 9.
Macintosh SE extended Kyob Cover 9.
Mouse Cleaning Kit w/Pocket 17.
Disk Drive Cleaning Kit 17.
Tilt/Swivel 22.
Deluxe MacPlus-XIB/XIB 69.

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Use the desk accessory any time or work in the application (they use the same files.)

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Thinking, planning, organizing... success is built one step at a time. For any endeavor, your best first step is the simple outlining method of Acta Advantage. Macworld editors named Acta their "favorite desk accessory." MacUser gave it 4 1/2 mice as "one of the absolute best outliners available."


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**Symmetry**

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AutoCAD has been refined through ten major upgrades. You get menus full of powerful, high-precision drawing and editing commands, numerous drawing entities, and a multitude of easy-to-use features. You can window, zoom, fillet, scale, layer, annotate and associatively dimension, hatch, stretch and scale. And a simple click can undo anything or everything.

AutoCAD on the Macintosh also supports the features that have made Apple the acknowledged leader in user interface design, offering pull-down, tear-off, and pop-up menus, complete support for MultiFinder™ and the Mac windowing system, along with file dialog boxes to make access to your drawing files quick and easy. Clipboard support allows the transfer of AutoCAD drawings to a wide variety of Macintosh applications software.

A Better Perspective. AutoCAD is an advanced three-dimensional modeler that helps you solve design challenges on your Mac the way you would with physical prototypes. AutoCAD makes 3-D easy with user-defined construction planes, dynamic viewing and multiple viewports.

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For even greater utility, AutoCAD provides entity handles that allow external applications to associate alphanumeric information, such as part numbers and capacity ratings, with graphical elements in the drawing. This associativity is creating an entirely new generation of useful third-party applications software.

A Reflection of You. AutoCAD is an open-architecture system including AutoLISP, an embedded programming language that lets you program AutoCAD to reflect your way of doing things. Add your own menus to enter your own commands, write macros, develop custom symbols and drawing functions, or program standard procedures for document production and management.

Hundreds of third-party programmers have used AutoLISP to develop entire systems that make AutoCAD perfect for applications ranging from chemical engineering to technical publishing. Many of these programs run on the Mac II and more are on their way.

Maintain Your Standards. AutoCAD is the most extensively used, most broadly supported, widely taught design software in the world. AutoCAD is backed by over 1,400 highly-trained dealers and 150 Authorized Training Centers in 60 countries. We'll make sure you get what you expect from your CAD investment. That's what standards are all about.

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About Interface

It has been said that knowledge is power, and subsequently that the personal computer is a prime mover toward empowerment. Once that empowerment belonged exclusively to an elite programming priesthood, but those days are over. Today teachers, artists, doctors, filmmakers, dancers, biologists, and a broad spectrum of other folks are harnessing the power of the computer as a fresh medium of expression, of experience, and of learning.

Remember the first time you saw a Macintosh? Remember when you first grabbed the mouse and watched the cursor move around the screen? For most Mac users the graphic interface came as something of a revelation. It offered a new, visual means of interacting with a computer. Instead of requiring cryptic, typed command codes, the desktop metaphor allowed you to manipulate data intuitively. It made using a computer much easier than it had ever been before. For the first time, the computer itself was largely subservient to the tasks it performed.

TENETS, ANYONE?

Before there was an electronic desktop, there was a command line interface (CLI). When a person sat down at a computer employing CLI — and we’re not mentioning any names — the user spent a lot of time staring at a greater-than sign, known in those early days as a prompt. Believers in CLI thought this was a wonderful way to communicate with a computer. They called the desktop metaphor things like gimmick and fad.

They were incorrect.

There is a rich history behind the desktop metaphor, and it has been justly pointed out that the Mac owes much to its forebears. Xerox Star begat the Lisa, the Lisa begat the Macintosh. The conceptual framework of the Macintosh interface precedes even that of the Star, dating back to the pioneering work of an insightful group of people, including Doug Englebart, Adele Goldberg, and Alan Kay. These people and many others made a very basic realization about personal computing: The way a user interacts with a computer is as important as the computation itself; in other words, the human interface, as it has come to be called, is as fundamental to computing as any processor configuration, operating system, or programming environment. The evolution of icons, point-and-click, overlapping windows, dialog boxes, pop-up menus, and click-and-drag grew directly from these tenets.

This philosophy further postulates that the ultimate goal of computer technology is, in a sense, to make the computer disappear, that the technology should be so transparent, so invisible to the user, that for practical purposes the computer does not exist. In its perfect form, the computer and its application stand outside data content so that the user may be completely absorbed in the subject matter. In its perfect form, the human interface is entirely that — it allows a person to interact with the computer just as if the computer were itself human.

Consider for a moment that the Macintosh interface really is a graphic simulation of abstract data components. Here's a folder; there's an application; they reside on a given volume. By providing the user with a picture of these components and by allowing these components to interact intuitively, the components become tangible, concrete, real. In a single leap even a naive user is able to explore, under-
stand, and effectively use a Macintosh in a short period. An "electronic desktop" is a very effective metaphor when you are seeking a visual organizational structure on a personal computer.

**FIXING METAPHORS**

Now let us expand the visual metaphor to a learning structure. The goal here is to provide a metaphor for a different kind of leap that allows a naive user to explore and understand some manner of information very quickly. Isn’t that the task a computer should do best? Imagine the vast numbers of simulations and visual structures that could lend themselves to a learning process. And what if in the process you could harness the power of digital audio, full-motion video, and multiple tracks of exploration?

That’s multimedia.

Multimedia can be used for as many tasks as there are imaginative people to create them. Multimedia takes on many meanings; depending on whom you talk to, you might even find it called by an entirely different name, such as hypermedia or interactive video. But at its heart, multimedia revolves around the concept of the ongoing development of the human interface within the computer. And in so doing, it provides interested users with a new and powerful medium for presenting information.

**Interactive multimedia** looks, sounds, and behaves like a buzzword. As such, it’s a term that lends itself exceptionally well to pontification, pie-in-the-sky, and gee-whizism. At MacUser we have gone around in circles trying to slip a definition around the term that fully describes it without unnecessarily circumscribing it. When we say **interactive**, we mean that the user is more than a mere observer, but is a part of the communicative process. When we say **multimedia**, we mean a combination of text, pictures, diagrams, animations, sounds, and animated and/or live-action video.

But the problem with the term is at its core a simple one: The process of definition nearly always consists of breaking a term down into its component meanings. However, in the case of multimedia, we are speaking of a term that and of itself denotes a convergence rather than a divergence. The visual computer (including the Mac), the CD-ROM disc, the CD-audio disc, the laser videodisc, the graphic digitizer, the audio digitizer, the writable-optical disc, and several other emerging technologies are all heading for the same place at the same time. There’s likely to be an explosion when they hit.

Whatever else you care to call it, interactive multimedia is the place where TV, movies, audio, computers, and publishing meet. This is where our exploration begins.

**INTUITION HIKE**

With multimedia, the postulate remains that an intuitive approach is superior to a nonintuitive one: Mac users are ahead of the game in this respect, as knowingly or not, they have accepted the notion as soon as they’ve mastered the use of a mouse. Add to this the corollary that a human being learns and retains best when looking at a map, hearing a sound, watching a moving picture, or choosing a path. Multimedia offers exactly this capability.

In the most minimal sense, the Macintosh interface has always provided a multimedia experience: The Mac beep from the outset has been used as an admonishment for an errant mouse click, and so combined audio with visual information. Today, new technologies have built dramatically upon that most primitive of beginnings. Digitized audio and fast hard disks have brought high-quality sound to the
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Mac. Scanners and video digitizers offer clear, crisp graphic input. The Macintosh II brings color to the graphic interface. Mac-controlled laser videodiscs usher in a new realm of potential via random-access National Television Standards Committee (NTSC) video. Speech recognition products now emerging will bring voice input to the human interface. Body-tracking products currently in development will anticipate your wishes by detecting exactly where your eyes are looking or how your hand grasps objects depicted on-screen.

In general, however, two technological advances have made multimedia possible. The first is in the area of storage: The advent of optical discs containing computer data as well as video images and audio has been critical to the realization of multimedia. Videotape, though proven in its ability to record moving pictures and sound, is extremely limited in its capability for random access. Laser videodiscs, in contrast, offer random access to more than 54,000 frames of still or moving video, with optional stereo sound, in a matter of seconds. Magnetic media, though among the most widely used peripherals in the computer world, are limited in their size. A single, removable CD-ROM disc can contain nearly ten times as much data as a 60-mega-byte hard-disk drive. If even that won't

Lippman on Interactivity

**DEFINING INTERACTIVITY IS A GAME ONLY THE COURAGEOUS SHOULD PLAY.** Andy Lippman, head of the Paperback Movies Project at MIT's Media Lab, once bravely obliged Stewart Brand by offering a preliminary definition, which we paraphrase here. Using a conversational model, Lippman opposed his model to a lecture. Thus, in any conversation, interactivity is simply made up of the give and take of two participants, often — but not always — working toward some common goal. In order for this model to work, several things must be built in:

- **Interruptibility.** Each individual in the conversation has to be able to interrupt the other. It must be a mutual, simultaneous interchange. It can’t be merely alternation between fixed choices. Therefore, avoid building a system that has a limited number of fixed default paths that you have to go down in order to get anywhere.

- **Granularity.** What’s the smallest size of the building blocks of a project that determine whether the system succeeds at being interactive or fails? Is it the word or phrase in a conversation? In a play, the act is too big to interrupt, so is it the scene? In the play, it could be what Stanford professor Larry Friedlander calls the beat, a unified moment in the unfolding of a scene, like the cycle of a breath.

- **Limited look-ahead.** You can’t have precomputed everything you’re going to say, but how far ahead of where you’re talking are you thinking? Since the goal of the conversation is one that arises interactively, you don’t know how far you’re going to digress.

- **Graceful degradation.** If a request is made that can’t be answered, it’s gracefully deferred; it doesn’t annihilate the system.

- **The appearance of infinitude.** At the same time you can’t precompute everything in the system, you still have to give the impression of an infinite database. For example, in the Movie Map of Aspen, Colo., you have many choices: You can drive through the city, back up, change your view, change the season, go into any one of ten buildings, and talk to people that you find there. You have the illusion of an infinite exploration. (From *The Media Lab*, Penguin Books, 1988.) — MM
suffice, just change discs.

**HYPERSPECTIVE**

The second technological advance to make multimedia possible concerns hypertext delivery systems. The advent of HyperCard and other interactive authoring systems for the Macintosh heralds the emergence of a new type of software, which is not a word processor, nor a spreadsheet, nor a database, nor a game, though it may combine certain elements of all of these. In even the humblest HyperCard stack we may discern a quick glimpse of this emergent software category—a category that combines the interactivity of the Macintosh interface with text, graphics, animation, and sound in interactive multimedia. Most importantly, these elements are linked dimensionally so that their relationships with each other are physically embodied in the structure of the

---

**MULTIMEDIA TODAY: FOUR PATHS TOWARD THE FUTURE**

**Electric Cadaver**

The Electric Cadaver is a teaching tool for students of physiology and anatomy. Text, graphics, and stereoscopic videodisc-resident images provide the student with a dynamic medical text that can be explored however the student wishes.

**The Shakespeare Project**

The Shakespeare Project at Stanford University is a multimedia approach to teaching the Bard. The system combines graphics, computer animation, filmed performances on video, a large database, simulations, and word processing. Students can compare performances, study stagecraft, create their own simulated staging, and write an analysis that includes links to the video material.
multimedia presentation. But the real potential of the computer is in offering the user alternate paths; interactive multimedia transforms the user from passive observer into active participant, greatly heightening the impact of a presentation. For the purpose of discussion here, the term multimedia will refer in nearly all cases to the interactive variety.

So what are the goals of multimedia? One is to link and to present information in a manner more nearly like that we employ inside our own heads. That means pictures, sounds, words, and multidimensional links. Another

---

**The Voice Navigator**

The Voice Navigator, from Articulate Systems, is a voice-recognition system that lets the user perform most keyboard and mouse operations simply by speaking into a microphone. It can be used with any application.

---

**MidiDancer**

MidiDancer uses position sensors, radio transmitters, a radio receiver, and MIDI instruments, such as synthesizers, to convert motion into music. A video interface has also been developed, so dancers can simultaneously create visual effects on videotape.
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significant goal of multimedia is to provide a learning environment dramatically richer than any that has come before. Among other benefits, multimedia provides the potential for a learning experience once possible only through personalized instruction. By providing both vivid presentations and individual paths of discovery, multimedia transforms you into your own best teacher.

**STUFF LINKS**

We've taken steps this month to convey the essence, as well as the significance, of multimedia. First, we've attempted, insofar as it is possible in this 2-D magazine medium, to depict graphically the dimensionality of links, the emphasis on interrelationship, the power of push buttons, as well as the nested levels of explanation possible with multimedia. You'll enter this section next. There you'll be able to browse through a cross section of projects, each representing a specific set of multimedia potentials. You'll get a feel for the hardware, goals, methods, authors, and potentials of each. We'll then return to a linear format to present our conclusions, along with a look at the future of the human interface.

Second, we've devoted a portion of this month's Hyperspace installment to a preview of SuperCard, a new multimedia environment from Silicon Beach Software. Educators and potential multimedia programmers will not want to miss this section. In addition, this month Michael Swaine explores fractal generation with HyperCard in Card Tricks.

Third, and perhaps most significant, we are announcing the formation of the *MacUser* Media Laboratory. Its premier release, concurrent with this issue, is the HyperCard stack Discovery by Design, itself a further exploration of the topic of interactive multimedia. The disk is available by mail to all interested readers (see the Hyperspace section for details). It picks up the discussion where this issue leaves off, offering in the process an actual taste of the synergy of graphics, sound, animation, and interactivity that only a Macintosh can deliver.

— *John J. Anderson*
The Joy of Cooking inhabits two dimensions; our minds inhabit at least three

in organizing information much more powerfully than can ever be conveyed in the linear manner of the printed page. This new, extralinear means of representing information is a potent newborn medium. Its final destination is not a piece of paper but an electronic screen. This endows it with certain unalienable rights. There are wrongs as well. But the potential has yet to be recognized, yet to be explored in a systematic fashion.

Expositions like the one you are reading now follow a linear form of argument. P posits hot, P posits cold. But the mind is more than a mere linear device. The mind is an associative device — a multidimensional device. Think of the word corn: a handful of associations may come to mind almost simultaneously. You might think of painful feet, Orville Redenbacher, a cob pipe, Thanksgiving decor, the Green Giant, Halloween candy, the films of Frank Capra, or a summer barbecue. Your mind "images" on the dimensionality of your experience. Aspects of this geography are linear, other aspects are not. No one image is any more "likely," any more "right" than another. It is up to context to narrow the field.

PUMPING IRONY

Now, we're not here to knock DTP. Paper has proved itself quite a handy medium for the past 5,000 years or so, and it's unlikely to slip out of fashion anytime soon, despite the pronouncements of yesterday's computer pundits. Trees may quiver their branches in fear, but the paperless society is as far away today as it ever has been. If we are indeed committed to pumping out reams of paper, the least we can do is to pump out smart-looking pieces of paper.

But to miss the colossal irony here is fatal to an understanding of the subject matter we embrace. Our context: The idea of using a computer to create books, periodicals, and memos has assuredly helped popularize the computer — and seriously shortchanged it in the process. For the real power of a Macintosh (or any other computer) is grilled or roasted, 273
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This entry is followed by lengthy entries for corn meal and corned beef. The entries are in themselves linear, with the idea that the reader will reach for the book's index with a relevant context at hand. But where's the popcorn?

We have all experienced the disappointment of having an index let us down — by failing to include the entry we are looking for, or by treating that entry in a manner we were not expecting. The information inside the book The Joy of Cooking inhabits two dimensions; our minds inhabit at least three. Our disappointment is caused by happening upon the limits of the medium. It never feels good to hit the wall. At least the index saves us some time: Otherwise we might have to read the entire book merely to discover there's nothing in it concerning popcorn.

REACHING THE KERNEL

Linear media represent wholes as the sums of their parts. This seems entirely reasonable, as it fairly represents cause and effect. A causes B, which in turn causes C, and that's how we explain the trout in the milk. But linearity, while critical to mathematics and logic, is only one component of knowledge. The magic of an extralinear structure is that it mimics the mind in the creation of wholes that are more than the sums of their parts.

But what is it that makes something more than the sum of its parts?

When we envision component parts of a system in a three-dimensional rather than a linear relationship, it becomes immediately clear that the
proximity, linkage, and relationships between these component parts are literally “thrown into relief.”

Linear media are best at empirical tasks, such as causal argument and definition. Definition is the naming of things, the assignment of chunks of meaning necessarily short on context, information as viewed in two dimensions. Knowledge, in contrast, is always about context, always about perspective. It is more than a mere “count” of features or facts. Knowledge is about linkages and relationships. Knowledge has a terrain — a topography — associated with it. The sum of a group of parts results in a list. This is linear. The linkage between those parts results in a multidimensional map of their interrelationship. This is extralinear.

**RUBBER MEETS THE ROAD**

Let’s take a ride. We’ll get in the car and drive to a new place, a place we’ve never been before. A map will certainly help, but we’re going to require some hours behind the wheel, some real experience on these new roads before we can claim we know them. Much of this experience will come from approaching the same landmarks from different directions, to develop a feeling for how the roads interconnect: how pieces of the puzzle we’ve already come to know fit with pieces of the puzzle on which we’re about to get a grip.

This is how the mind learns. As a pattern-recognition machine, the mind is without parallel. Learning the roads in an area consists of creating linkages in your mind. Make a left here, follow the one-way street up past the corn dog stand, and you’ll get to the wide boulevard where the designer popcorn store is. Particle physics is learned in exactly the same way. Stay in the middle lane when you see the electrons orbiting the nucleus, follow the neutrons down the ramp to the quarking garage. Get the nucleus to pop, and you can destroy the world. To learn anything, you need to create a geography for the subject area in your mind. The more complete, the more accurate your internalized terrain, the greater your knowledge in a given subject area.

This mental geography we describe consists of several components. It consists of pictures, of words, of metaphors, of contrasts, of digressive stories, of mnemonic devices, and, yes, of linear descriptions. We may refer to these components as levels of explanation. A book may contain maps, diagrams, indices, and glossaries, but it is necessarily weak at representing the relationships between nested levels of explanation.

Now, we’re not here to knock books. Books have proved themselves quite a handy medium for the past 3,000 years or so, and they’re unlikely to slip out of fashion anytime soon. And books can depict multidimensional links, too, make no mistake about it. It would be a gaffe to infer from what you’ve heard about hypermedia that it’s something new. If you doubt this, take a close look at the Talmud. The only thing that is new is the delivery system. With HyperCard we can clearly link all manner of media in all manner of directions: That is something a book simply cannot do.

**CORRECTIONAL INSTITUTION**

We should note that without exception mental geography also consists of irrelevant linkages, erroneous linkages, and omitted linkages. A big part of the discipline of learning is developing an automatic reflex to prune these away the moment they are isolated. This very means of error correction is itself an engine of learning. Its partner is discovery. Discovery is a learner happening upon a link, an insight, an “aha,” however humble, with something of the rush of emotion of Columbus sighting land.

In his book *The Media Lab*, Stewart Brand quotes Albert Einstein as saying, “‘Love is a better teacher than duty.” If it’s platitudes we’re trading, we’ll take it a step farther.

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The Body Electric

“Does it hurt here?” asks a medical student while moving the mouse to a specific spot on the Mac screen.

By clicking, the student pokes the depicted patient’s hand with a “pin” to determine where nerve damage has occurred by laceration. The patient answers, with a “yes,” “no,” or “ouch!”

This is medical multimedia, made possible by The Electric Cadaver, created and developed by Dr. Stephen Freedman and Dr. Robert Chase at the Stanford University Medical School. The Electric Cadaver is a media fusion of graphics, text, and images of the human body designed to aid medical students in their physiology lessons. Students can learn anatomy by scanning through images of bones, muscles, tendons, and internal organs. In addition to images, there are textual explanations of concepts (such as bone development) and systems.
The Electric Cadaver is more than an anatomy primer. For instance, a student can examine bone development in a person over a number of years. Within this same context, he can also look at the makeup of an individual bone.

If a student wants to have a labeled diagram of the nerves in the hand, for example, he can bring it up with a click of the mouse. There's also animation to demonstrate how muscles and tendons work to bend and straighten the finger.

Freedman himself de-emphasizes the terms multimedia and hypermedia in the description of his project. "Those are buzzwords," he says. "The project is really an electronic book." According to Freedman, The Electric Cadaver and projects like it are merely the technological embodiment of something that has been going on for thousands of years - the cross-referencing and synthesizing of information from many sources into one.

Dr. Chase is interested in computers only insofar as they can help him teach medicine. He sees the project as a learning tool that goes well beyond anatomy for medical students. "Not only can students study the skeleton and internal organs of the body," he says, "but they can also learn the physical effects of nerve damage or the bone development of the hand from infancy to 19 years. And at every point, text descriptions are just a click away."

THE BARE BONES

The typical workstation includes a Mac II or SE; industrial laser-disc player; a laser disc; a large-screen, high-resolution color monitor; and software written in HyperCard. If you don't have access to the laser-disc player, you can still work with a scaled-down version of the project using just the Mac SE or II and The Electric Cadaver software. Dr. Freedman indicated that a CD-ROM version was also in the works.

The stack - which contains many scanned images of anatomical systems along with textual information - also acts as a video controller for approximately 7,400 images on the laser disc, by tagging appropriate frames or sequences depicting high-quality still photography. Users can reverse, fast-forward, scan, or just run through a sequence of related diagrams at the click of a button. A mini-editor capability gives students the opportunity to make their own playlists (akin to placement of numbered bookmarks in a book) by arranging images in the order they want to present them.

Access for third-party developers' applications to The Electric Cadaver is made possible by a custom tool box included with the stack. This tool box contains the pieces necessary to create entirely new access systems. The stack itself is a port from an IBM HyperText version of the project, though you wouldn't know it. The stack is beautifully constructed, and though it fails to resemble the Mac or even a traditional HyperCard interface in places, it works smoothly and intuitively. If you have a Mac II, you can call up high-resolution, digitized color images directly to the Macintosh monitor. Getting these drawn, however, is a rather slow process (five sec-
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MULTI MEDIA

Context Sensitivity

TYPICALLY, A DEVELOPER BUILDSCONTEX

sensitivity into a system by creating hot spots, points in a presentation or program where help screens can be called up that are pertinent to the operation in question. In an interactive multimedia project, context sensitivity has a broader utility: It’s the engine of transmutation, the way information in one form is transmuted to another. In the context of a video presentation, say, of an anatomy lesson, the collar bone can be displayed concurrently with data; click on a part of the collar bone on-screen and a short, technical description could appear. Other programs can use running text along with a videodisc presentation: On a two-monitor system, you see the film running by on the video display, while commentary scrolls along with it on your Mac screen. You stop the videodisc, click on an annotation button, and more information comes up on what you’re viewing. In the digital world, sights become sounds, sounds become words, the word duck becomes a mallard flying across your screen. — MM

EYE AM A CAMERA

Interestingly, the superlative photos on the laser disc were taken by Bill Gruber, the inventor of the ViewMaster viewer. In photographing the dissections, Gruber used his three-dimensional camera system, using dual lenses positioned at the average distance between human eyes. He hoped to show that by studying three-dimensional images, students could train their eyes and brains in a manner superior to any two-dimensional system.

Dr. Chase imagines a day when the three-dimensional images themselves might be viewable from laser disc.

IS THERE A DOCTOR IN THE HOUSE?

While in medical school, Freedman noticed how he and his peers studied their information — reading and taking notes, synthesizing information from multiple sources into a single form. He concluded that, in the course of readings and synthesis, medical students in effect write their own textbooks. He figured there had to be an easier way to synthesize information from as many as ten books covering the same topic but conveying different pieces of information.

After starting a company to publish electronic textbooks, Freedman met up with Chase. By the time the two had developed a working model for The Electric Cadaver project, Bill Atkinson had finished a prototype of HyperCard. Although he originally used SmallTalk as the engine for The Electric Cadaver, Freedman knew that he had to transfer the project over to the Macintosh.

Freedman also points out that, because HyperCard is so widely distributed, it is a very attractive driver for multimedia projects. Freedman believes that Apple has done a great service for projects like The Electric Cadaver by pushing HyperCard and simplifying the process by which development takes place. — KRISTI COALE

MULTI MEDIA

Expert Systems

A GOOD EXPERT SYSTEM IS DESIGNED AS AN adjunct to, not a replacement of, human knowledge. What’s more, in a multimedia project, it should encourage and not hinder interaction. In some future electronic newspaper, for example, your expert system would know your likes, dislikes, and what you habitually read, and it could help you sift out the rest. Or in an interactive medical program, a knowledge base of previous diagnoses could help doctors in the treatment of a rare disease. Doctors could x-ray the suspect area and scan it onto a Mac. Then, they could work up an analysis of the examined area in a word processor. Using the image as an interactive “template” along with an authoring system, they could then paste hot spots on the image as notes for the attending specialists and compare what they have found with earlier X-rays of like symptoms, calling up texts of previous case histories.

Asking IF/THEN questions, based upon certain rules for inference and known constants based on a database of previous cases, doctors could build prognozes with a greater probability of accuracy.

On the basis of all this, they could prescribe paths for treatment. In short, the interactive project, in conjunction with an expert system, would become another diagnostic tool. — MM
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From 2001's HAL 9000 to Star Wars' C-3PO, Hollywood has always loved talking computers. Anthropomorphism softens technology and makes it easier to accept, but it also reveals something fundamental: Next to facial expression and gesture, the most basic form of human communication is speech. If people are ever to communicate freely with their computers, those computers must recognize and "understand" the human voice. Speech recognition is a cornerstone of a next-generation human interface, and Articulate Systems' Voice Navigator is the first effective, commercial Macintosh implementation of a key component.

Understanding what the Voice Navigator does, however, requires a certain amount of downshifting. It will be a long time before a computer can hold a conversation the way we've seen it happen in the movies. It will take computing horsepower and artificial intelligence programming well beyond the reach of today's mainframes.

Voice Navigator is a combination of hardware and software, simply designed so that across applications, those functions best suited to voice are in fact voice-driven (selecting menus, commands, tools, and some cursor control). Those operations best suited to the keyboard and mouse (text entry and precision cursor control) are left to those input devices. In this way, speech can become an essential part of the human interface long before the technological evolution required to create HAL 9000.

FIRST NOISES
The principals of Articulate Systems, Incorporated (ASI) began investigating voice recognition on the Mac in 1986, but even among the design team, which included programmers experienced in the writing of sophisticated Mac code, there was some skepticism about the practical use of such a device. Other companies had tried voice systems before, but the approach had always been vertical: a specific in-
interface for a specific application. ASI opted for a more ambitious course, aiming for a general interface that would work within any application, including the Finder. Decisions were also made about how the Voice Navigator would recognize speech. Dictation was dropped at the outset, because the Mac isn't powerful enough to make dictation viable (no personal computer is yet). The platform also meant that recognition would have to be based on discrete utterance, that is, commands separated by minimum silences, as opposed to continuous recognition, which poses greater challenges still.

There was also the question of form — whether the hardware portion of Voice Navigator would be a box or a board. While a NuBus implementation would have been cheaper to build, ASI didn't want to limit its market to the Mac II, so they decided to make it a SCSI box.

**YOU SAY IT, MAC DOES IT**

Voice Navigator's work starts with microphone input (from an external mike, its own internal mike, or even a telephone). This signal passes through an analog/digital converter and is then sent to an internal digital signal processing (DSP) chip for filtering and compression. This compressed signal is then passed to the Mac for recognition. As powerful as the Voice Navigator hardware is, it's actually the Mac CPU that still does most of the work.

For recognition to take place, the user must have already "taught" the Voice Navigator how he pronounces each discrete command (this training can be done from within an application, but the majority of commands are recorded beforehand). ASI's system is speaker dependent and will work with any language or accent. The user says the word, and the Voice Navigator's software creates a template of that utterance. If a word is repeated several times during the teaching session, the template becomes more generalized, increasing the recognition.

Computer had come into its own, albeit remaining horrifically expensive, and the idea of an intuitive interface was way off, though
rate. Command sets, which are saved like any other file, are application specific, but they can be transferred between programs that have similar commands (MacDraft and MacDraw, for example). To keep the command files as small as possible, ASI compresses the signal, reducing an average word to 400 bytes and a 1,000-command file to 400K.

Once the templates have been set up, the program looks for a best match and then executes that command. But since not every utterance will match perfectly, the user can specify a "minimum confidence level" required for a command actually to be carried out.

Earlier speech-recognition systems often failed because of their limited vocabularies; ASI's solution is a hierarchical system. Voice Navigator's command vocabulary is only limited by level, so depending on which model you use, you can have 200 (or 1,000) usable commands at the menu level, another 200 (or 1,000) if one of those menu commands has a dialog box or pop-out menu, and so on. This approach increases flexibility and lets the user place any command at any level. So a frequently used dialog box option, even if buried three or four levels down, can be placed on the main menu level, making it instantly available.

The unlimited vocabulary also permits synonyms, so "Undo," "Scratch that," and "Forget it" could all do the same thing, which, conversationally, is much more natural.

The wide vocabulary also permits a certain amount of context sensitivity. For example, in the Finder, saying "Left" can mean "move the cursor continuously to the left," but "Move left" can mean "move the cursor ten pixels to the left," while "Scroll left" can mean "scroll the window to the left." The modifiers provide the context.

**TALKING TO THE FUTURE**

ASI's Voice Navigator is the first commercial example of a voice interface for the Macintosh, and its implications are staggering. For interactive systems, it could swiftly become the interface of choice, freeing the user from the keyboard and even the mouse. Voice recognition will increase computer accessibility among the disabled, and it could even change the conventional notion of what a file is.

The Voice Navigator isn't restricted to command execution. It can also be used as a record and playback device, so voice annotation is now possible. A doctor updating a patient's record, for example, could digitize his comments and save them as an appended file that could be played back with just a click.

While it isn't HAL 9000, the Voice Navigator is a major advance in the humanization of computer technology — the ultimate goal of a next-generation interface. — RUSSELL ITO

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The Voice Navigator’s Voice Options dialog box is where you set the input parameters for your voice-training sessions.

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The rudiments were devised by visionaries in the late ‘60s, who foresaw the day of an easy-to-use personal computer with...
The Inter-Play's the Thing

"... Soft you now. The fair Ophelia!
— Nymph in thy orisons Be all my sins remembered."

Pouting Ophelia greets Nicol Williamson's Hamlet and returns some of his gifts. He turns on her, accusing all women of infidelity and treachery while at the same time expressing his longing for her and calling himself unworthy. Williamson's Hamlet plays with her feelings because he wants to seduce her. Click. A somber, Russian Hamlet broods under a stairway. He humiliates and terrifies a fragile Ophelia. He's not teasing or lascivious, as Williamson was. He's violent, paranoid, suspects her of treachery and resents the attraction he feels for her. This is Stanford University's Shakespeare Project, a HyperCard-based interactive multimedia system designed by Shakespeare professor Larry Friedlander and HyperCard programmers Michael Korcusca and Charles Kearnes, with support from Apple Computer. Using a HyperCard-controlled videodisc player, students can stop, start, view, and review selected sequences; compare and contrast different versions of a particular scene; design their own versions of a crucial...
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episode on a computerized, digital stage; peruse an archive of hundreds of historical photographs and drawings of sets, costumes, and props, choosing those that suit their own interpretation; and create their own "case study" of a character's motivation and psychology. The project is a result of Friedlander's longstanding efforts to teach Shakespeare, but its implications go well beyond the Bard.

LAY ON, MACDUFF
Books take words and pictures out of "real time," letting readers approach the material at their own pace, without regard for its original order. The Shakespeare Project lets you handle a filmed performance the same way. You can take it out of real time, examine it, analyze it, annotate it, rearrange it, and put it back together in different ways. Teachers of theater now have a multipronged approach to a complex topic. Combining the three traditional ways of teaching drama—reading the text, watching a performance, and working on a production—the Shakespeare Project encourages students to see the text as a skeleton for widely varying interpretations. The project offers five linked approaches: performance, study, a theater game, browsing, and a notebook.

THE PLAY'S THE THING
The current version of the Shakespeare Project contains major scenes from Hamlet, King Lear, and Macbeth, each with two actors' interpretations on videodisc. As the video rolls, the student examines Shakespeare's text, the subtext (what the student or teacher imagines the characters are thinking, as opposed to what they're saying), beats (discrete moments or "breaths" in the tempo of a performance), and blocking (the actors' stage position). As a scene unfolds, two synchronized fields scroll with it on the Macintosh screen. The first shows Shakespeare's play, as well as the blocking information. The second contains the subtext, which can also be played over the original sound track. While watching the performances, a student (or teacher) can take and compile notes, as well as add, change, or delete annotations. You have complete control over what you're viewing, and because the system is linked horizontally as well as vertically, you can even bring up a parallel version of a scene and toggle between them. A Camera button lets you tag a portion of the video material and save it to a file for inclusion in an essay written with the program's word processor. When the Snapshot icon has been pasted into such a document, a click replays the sequence.

THE BOOK AND VOLUME OF MY BRAIN
The Study area is the conceptual heart of the program and is based on work by Shakespearean actors, directors, and theoreticians. Various tutors take the student through a wide range of materials, using a variety of techniques including playing games, giving show-and-tells, building film montages, acting a sequence, writing an essay, and conducting a simulation. The Study area avoids question-and-answer drills, emphasizing that there is no "last word" on a performance.

ALL THE WORLD'S A STAGE
If Ophelia is in love with Hamlet, how does her body language change in reaction to Hamlet's curse: "Get thee to a nunnery?" In the theater game, a student can construct animated simulations and plan the actors' positions on the stage. The object is to give as concrete a sense as possible of the choices a director must make in physically blocking out a scene. The student is given a choice of stage types in which to place the props: a traditional Elizabethan set, a proscenium with doors and windows, and a blank stage that's divided up on a grid for exact placement. Drawing upon a database of furniture, beds, rocks, trees, columns, and a file of ten characters—five in traditional dress and five in modern dress—the student then sets the stage. To build an animation, the student places a character on stage and moves it around with the mouse by clicking on its feet and dragging. The character can be moved stage left, right, up, or down and can be made to sit down, stand up, kneel, or lie down by clicking and dragging on its waist. The head

appearance of the two Steves, the affordable microcomputer became a reality. Xerox executives failed to realize the importance
and body can also be rotated. A recording device lets the apprentice director build an animated sequence out of the figures' movements. Editing is possible, provided a figure starts and finishes in the same location as in the first take.

MORE THINGS THAN ARE DREAMT OF

The Browsing area houses the system's database. The current version contains over 5,000 images from films, photos, and drawings, though not all of them may be used in the final version since the copyright laws covering interactive multimedia aren't on the books yet.

The Browsing area also contains discussions on theater history, costumes, and props for staging simulations.

I AM FOR WHOLE VOLUMES IN FOLIO

The Notebook is the student's personal workspace, and it contains a word processor. Notes taken during any of the foregoing performances, tutorials, stagings, or browsing can be stored here.

AND THEREBY HANGS A TALE

The Shakespeare Project was originally designed on an IBM system. Friedlander began an early PC version of the project using touch screens but gave it up upon being plagued by registration and alignment problems — sometimes you'd touch the screen and nothing would happen. The key to the port was the greater flexibility and control the Mac interface and HyperCard offered. HyperCard allows the teacher and user to modify contents and structure continually, as well as to add or subtract elements.

So the work goes on. Friedlander is already investigating how to incorporate some of the advantages of a single-screen system — such as graphic overlays, hot spots on the video itself, and zooms and pans that are built into the film experience — into the Shakespeare Project. With so much possible, the field finds its voice in Prospero's closing words: "Let your indulgence set me free." — MICHAEL MILEY

MULTIMEDIA

Simulation & Animation

Real-time simulation and animation will help move the computer beyond awkward interface models and will be a critical component of interactive media. To simplify, what computer simulations attempt to do is to project some operation forward, based upon some series of constants and variables. A simulation can be anything from an economic one projecting inflationary trends, to a geological one measuring seismic activity should an earthquake occur, to a psychological simulation based upon some known factors of how people behave in certain circumstances. Some simulations are extremely precise renditions of "what if" situations, requiring the calculation of thousands of difference equations run on a Cray supercomputer. Others — like the blocking simulation in the Shakespeare Project, in which you plan actors' positions onstage — require nothing more than that you escort some animated characters around a computer stage and record their motion. — MM
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he music is the master, and the dancers are the slaves. The partnership isn't dynamic. But if that immutable score were replaced with a computer that could interactively generate a score from the dancer's choreography, the tyranny of the written note would be broken. And that is exactly what Mark Coniglio — with the assistance of a toy store — sought to do with his experimental MIDI system, MidiDancer.

TIMESTEPS
Coniglio, a student at the California Institute of the Arts' Music School in Valencia, began the project three years ago under the impetus of famed electronic music composer Morton Subotnick. At the time, Subotnick was trying to find a way to trigger a synthesizer during the performance of a composition entitled Hungers. The problem Subotnick faced was that he wanted a MIDI synthesizer to respond dynamically to the human musicians on stage, rather than the conventional response — wherein the people are at the mercy of electronic playback. The notion of combining live musicians and technology wasn't particularly new. But most previous attempts had used magnetic tape as part of the process, which was inherently limiting because tape is rigidly linear. If you want to change tempo without changing pitch, pick a new voice, or skip a passage, you simply can't do it easily enough to make it feasible in a performance. And the same holds true for electronic instruments. All the necessary musical information can be prepared and stored in memory, but unless there's a musician on stage to operate the system, there still isn't any interaction with the musicians.

At the time, Subotnick and Coniglio had begun experimenting with an electronic instrument called Airdrums: a pair of wired drumsticks with built-in position and velocity sensors that could be used to generate MIDI signals simply by beating the air. At Subotnick's suggestion, Coniglio took that technology and applied it to Subotnick's problem. And when Hungers was given its premiere two years ago, it was indeed the answer.

SOUND AND MOTION
The fact that Airdrums could successfully turn motion into music encouraged Coniglio to explore further possibilities. Specifically, he wanted to apply the principle of those electronic drumsticks to his compositions for dance. The fruit of his labors was MidiDancer, a MIDI system that uses position sensors, radio transmitters, a radio receiver, and a Mac to play MIDI synthesizers, thus turning motion into music.

To use the system, two position sensors are attached to a dancer's arm and leg joints, and each sensor is connected to a small transmitter that's also attached to the performer. The transmitter then broadcasts the sensors' positions back to a radio receiver at fifty times per second. The receiver translates the radio signals into MIDI and passes along the MIDI signal to the Mac, which in turn sends it out to the various MIDI instruments on line. Each of the sensors transmits on one MIDI channel, so each performer can transmit two MIDI channels simultaneously. But the system configuration actually determines the number of MIDI instruments being controlled. For example, MIDI channel 1 might be feeding three synthesizers. Coniglio
has four sets of transmitters with two sensors each, so his dancers can control up to eight MIDI channels. (A future version may raise that number to the maximum of 16. Coniglio has also said that a workaround could take the number even higher.)

The restriction to elbows and knees is a result of the sensors measuring angular rather than absolute positioning. The sensors themselves are simple potentiometers that look like small knobs. The sensor is attached to the elbow or knee and then connected to anchor points above and below. As the dancer opens and closes an arm or bends and straightens a leg, the potentiometer senses angular position and sends this value to the transmitter. At present, Coniglio is working on a sensor for head positioning as well.

The decision to abandon Airdrums’ wired approach was made fairly early in MidiDancer’s development. Coniglio realized the impossibility of ever applying his creation to choreography if it wasn’t done wirelessly. But that decision created new problems. Working without the enormous financial support of the MIT Media Lab, which had already developed a wired full body-tracking suit, Coniglio then had to find off-the-shelf radio transmission, receiving, and position devices that were small enough to be concealed on a dancer’s body, inexpensive enough to buy, and reliable enough to be free of radio interference. He found his answer in a toy store.

Coniglio discovered that by modifying the electronics in some radio-controlled toy cars, he could have his interface at a very low price. Not only that, the system proved to be completely free of radio interference.

### Transparent Interface

**As interfaces evolve, transparency will remain a prime issue.** As the computer interface has evolved from a linear, command-based system to the desktop metaphor and now to voice-recognition and eye/body-tracking systems, interactive media extend the human interface with graphics, color, and videos, thus aiding people in finding, using, and remembering information. A computer interface should let the user work or play without having to think about the technology being used. It’s almost the counter to McLuhan’s dictum: When an interface is working, the medium is not the message; it’s only the message when it’s still a problem. The medium should be the invisible host in the machine, delivering up the message you’ve asked for as if on a pane of glass. — MM
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The most significant change he had to make was converting the receiver output into MIDI.

But naturally the hardware is only half the story. There's the software, too. Coniglio's program, which he calls Interactor, is the heart of MidiDancer. Before the concert, the performer/composer must program the voices, rhythms, and so on that will be triggered during the performance. MIDI musicians can actually do this well beforehand in the application Performer and then import that file into Interactor.

Interactor works by dividing the full range of an arm or leg extension into 64 discrete parts that are then related to specific tones, notes, chords, rhythms, and so on. For example, an arm movement that stops in the range of divisions from 0 through 10 might generate a flute, while the same motion extended into the range from 25 through 30 might produce a ragtime piano. And since the software is velocity sensitive, the speed of a motion can create a pitch or volume change.

Because Interactor is structured as a series of conditional IF/THEN/ELSE statements, a wide variety of MIDI events can be produced. So, for example, a performer can trigger a patch change by performing the same motion several times in a row or simply by doing nothing for a specified period of time.

ON POINT

MidiDancer is still an experimental project, but it was scheduled to have its public debut at a series of CalArts concerts on February 17 through 19, 1989. Meanwhile, Coniglio continues working on it, and he expects to have an icon-driven version of the software finished sometime in 1989.

For users who aren't involved in music or choreography, MidiDancer might seem pretty arcane, but the implications of Coniglio's work are extraordinary. What he has done is to explode the familiar two-dimensional interface into a three-dimensional one. Instead of being confined to a screen, users can now use physical motion as their interface — no keyboard or mouse required. And he's already working on a video interface that will let the dancers trigger video effects during a performance. Given that, it's not unreasonable to see figurative animation a short step away. But there are implications even beyond that. Consider this: You could learn sign language by actually making the gestures and seeing the text appear on screen — without ever touching the computer. Robotics, which up to now has required incredibly tedious hours of point-by-point programming for motion and positioning, could be greatly accelerated with a robotics motion recorder. And at some time in the near future, you could find yourself in a computer simulation in which you walk through rooms, open doors, and pick up objects simply by walking and making the appropriate hand and arm motions. MidiDancer is obviously not this sophisticated yet, but it is an important first step on the path to a new level in the sophistication of the interface.

— RUSSELL ITO
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Back in 1976 at the Massachusetts Institute of Technology's Architecture Machine Group (AMG), the Mac progenitor was a room-sized personal computer you'd direct from an Eames chair. Your arm was the cursor, tracked with sensors, and your voice the keyboard. You sat in the chair and pointed at a wall-sized electronic map of the Caribbean and issued commands: You'd say "Put that" and point at a ship; the system would ask "where?" and you'd point "there." The ship would vanish from its former spot and reappear at its new location. In its present-day incarnation, the "Put That There" project has migrated into the pilot's helmet, where in real or simulated flight over a computer-enhanced landscape, the pilot issues voice commands and points with his eyes.

The "Put That There" project is just one of many that has captured the energy and imagination of Nicholas Negroponte over the past 15 years. Current director of MIT's Media Laboratory, the immediate successor to the AMG, Negroponte sees a convergence of broadcasting, publishing, and computers redefining media research: What were once studied as discrete technologies must now be understood as a single topic, developed as a single project.

At the crux of it all, spurring media development, is the human-machine interface. The exploration of human cognition, sensation, and interaction is the means to develop these technologies, an idea that Negroponte has managed to convey to key players in the relevant industries. The Media Lab is generously funded by scores of major corporations involved in media, film, and computer technology, as well as the U.S. military. To name a few: all the major networks, RCA, 3M, General Motors, the Defense Advanced Research Projects Agency (DARPA), IBM, major Hollywood studios, major newspapers, Japanese corporations, and Apple Computer. The Media Lab receives a $2-million-a-year grant from Apple for Alan Kay's Vivarium Project, a study in simulated ecosystems.

"The Media Lab was founded on original work in the man-machine interface," says Negroponte. "Put That
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Its effects were deep and far-reaching. Throughout the 1970s, design ideas and people bandied back and forth between Negroponte’s AMG and Alan Kay’s teams at Xerox Palo Alto Research Center (PARC). The desktop metaphor for a more human interface to computers, and Apple’s decision to go with it, began with AMG’s theories on spatial data management and ruminations on the ways people remember best. “Concurrently, at Xerox PARC, the notion of direct manipulation of screen objects was being developed. Part of their thinking took into account our theories on spatiality,” Negroponte remembers. “These technologies met in the Macintosh.”

In 1977, the research at MIT formulated some crucial interface concepts. Negroponte and coresearcher Richard Bolt — author of the 1984 text The Human Interface and director of the Human Interface group at MIT, which investigates the use of eye tracking in computer interface — noted that “two individuals, arguing a topic in front of a blackboard, will refer each other to diagrams, equations, and terms on the basis of where they had been written, even long after they have been erased.” Back in ancient Greece, Simonides, a poet known for his feats of memory, had discovered something similar. He created a memory palace where he stored memories in rooms. The rooms served as mental cues, and at Xerox PARC the notion of cues was combined with spatial data management on the Star computer. These develop-
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The Media Lab’s body-tracking suit, worn here by director Nicholas Negroponte; hand and body movements are immediately reflected onscreen.

ments helped set the agenda for the study of multimedia at the Media Lab.

“When we gave the lab a name in 1980, we had to agonize over it,” says Negroponte. “Of all the words in the English language, ‘media’ has such terrible connotations. In Webster’s, it’s positive. It means ‘channels of communication.’ But in general, when you say media, people mean mass media, one-way communication. It has a Madison Avenue tone, a kind of lowest common denominator to it. We mean the opposite of all those things.” Interactivity is central to Negroponte’s thinking about multimedia.

The Media Lab divides its labors between the study of computers in education (the work of Seymour Papert), the development of media technologies, and the human-machine interface. The projects are legion, and the latter two categories are “deeply intertwined,” to use Ted Nelson’s phrase. Projects include: computers that can read your lips and eyes; touch screens and touch-sensitive world globes showing a wide range of geographical and geophysical display—the obverse side of the data-glove concept; phones that recognize the voices of your friends through voice-pattern recognition; electronic musicians that can jam with you by learning your style; and a large, Sesame Street-like fuzzy interface named Noobie, with a computer in his belly, that children can embrace—part of Alan Kay’s Vivarium project.

In one of MIT’s sensor projects, Negroponte wears his own version of punk black attire: a full-body, optical-tracking suit. The goal is to make computers sensitive to the nuances of human gesture. Infrared LEDs on the suit’s gloves and joints permit optical tracking of the wearer’s motion. With the use of such techniques (see “Audible Motion”), computers can be taught highly complex human move-
ments, an endeavor that will have profound effects on the development of such things as computer animation, human agency, and robotics — anatomical research that formerly required painstaking studies in calculus and structural anatomy.

On the technology side of things is an early, impressive interactive multimedia project that is now a standard demo at the Media Lab: NewsPeek. In this project, an electronic newspaper culls its information from daily newspapers, TV news broadcasts, and online data banks like NEXIS. Using a touch screen, you can zoom in on a topic and have illustrations come to life in full-color newsreels culled from TV. In the ideal NewsPeek project, a key piece of artificial intelligence was to be built in: The newspaper learned about your tastes, helping you sort out the big, buzzing confusion of random world news.

THE MAN IN THE MACHINE

“What needs to be articulated, regardless of the format of the man-machine relationship, is the goal of humanism through machines,” says Negroponte.

To some, that sounds like a prescription for Brave New World. Key results, however, point in the direction of making the computer transparent and more accessible to a wide variety of human agendas. In Alan Kay’s Vivarium project, children are taught what it means to develop a complex ecosystem, with significant implications for understanding how children learn as well as for ecology. In Papert’s Henning School project in Boston, inner-city children (of whom 40 percent are black, 40 percent Hispanic, 18 percent are white, and 2 percent are Asian) are exposed to computers on a daily basis. The result is that children are learning advanced computer, mechanical, and musical concepts at an early age. — MICHAEL MILEY

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Ted Nelson's contention that filmmakers are best equipped to deal with the demands of multimedia isn't as off-the-wall as it might sound.

Just a few miles north of Ted's houseboat, a major film company has already taken up the challenge. In close collaboration with Apple, Lucasfilm, creator of the Star Wars and Indiana Jones movies, has begun work on several educational projects under the aegis of the company's Games Division.

In the past, companies using HyperCard have created data-driven stacks that control a videodisc player, essentially providing HyperCard annotation to videodisc-based visuals. The Lucasfilm projects are pushing the envelope by blending the company's experience in filmmaking and entertainment with interactive multimedia. Steve Arnold, general manager of Lucasfilm's Games Division, describes the company's approach:

"We believe that the combination of technology with the principles of good storytelling and the addition of engaging entertainment dimensions will make for some really exciting and fascinating educational projects. They must engage today's very media-literate kids, who aren't as easily hooked by a teacher standing in front of a blackboard."

To achieve that emotional engagement, Lucasfilm's designers are incorporating many familiar cinematic techniques. For example, a HyperCard flip-book animation on the Mac screen moves off the Mac monitor to continue on the video monitor — only this time it's live video, not animation. Custom highlighting simplifies button arrays, and sound effects as well as multiple soundtracks are used to create a new educational medium.

Because this medium is interdisciplinary and Lucasfilm is at heart a production company, creating multimedia projects has presented new challenges — beginning with assembling a design team. "We've not only collaborated with Apple and their folks at the Multimedia Lab, but we've also gathered together the expertise of our own organization in interactive design, software programming, art, music, film production, and post-production," Arnold says. "We also needed expertise in the subject area. So one of the real lessons that we've learned is how you structure a project like this. We've learned how to assemble an interactive production team to go along with a linear production project and get the material that we need to do an interesting, engaging, interactive piece. We can see how to supplement something that's being shot conventionally — either a film or a television show."

The challenges extend beyond the software itself. There are hardware considerations as well. Since Lucasfilm's creations are designed for off-the-shelf components, the designers have had to make sure that the videodisc-player drivers and features built into the stacks are compatible with as many videodisc players as possible. Then there's the video material itself. Lucasfilm's projects have been created in conjunction with organizations like the Smithsonian Institution and the National Audubon Society that contribute not only their knowledge of a given subject but also the requisite archival images and film or video footage. So the multimedia process is not only interdisciplinary — it's also interindustry.

INTERACTIVE SINGULAR

The irony of all this cross-industry cooperation, however, is that the cur-
current state of multimedia still limits interactivity to a single individual working with a single system. Arnold sees this as a limitation that has to be overcome. "In order to make these things work in the classroom," he says, "they've got to work in all three formats: as an individual workstation, a presentation system for a class, and a small-group activity, so that a small group of students can sit together and do a particular thing. So one of our design philosophies is to figure out ways to let hypermedia do all those things better and better. The interface problem is a significant one when you're asking people to make inquiries — and you want a system that responds. We've been playing around with principles of remote control, for instance, so that this could be something that a group of people could do in a classroom, rather than one person sitting down with a mouse." But since Lucasfilm is creating projects with off-the-shelf components and is not about to enter the hardware business, any new interface devices are likely to come out of some future alliance with Apple and videodisc-player manufacturers.

MEANING OR NOTHINGNESS

As the Lucasfilm team continues developing interactive multimedia projects, two concepts remain foremost in Arnold's mind: significance and accessibility. Unlike game design, where irrelevancies are intentionally inserted as part of the fun, effective multimedia projects can be seriously damaged if the material presented isn't entirely cogent. "Interactivity has to be meaningful to the user in order to be worth being there," Arnold says. "Choices which aren't significant are not intrinsically valuable. And to the extent that designers are thinking about hypermedia, the watchword is make sure the choices you give them matter." Arnold believes that meaningful choices increase emotional involvement, which in turn makes the experience more resonant.

And just as in moviemaking, where the goal is to persuade the audience that the images on the screen are real, the multimedia designer's goal is to make the presentation accessible while keeping the technology invisible. "We want you to have a good, engaging media experience and not get hung up on the fact that a computer is delivering it," Arnold explains. "If people can forget about how the presentation is getting there — you know, it's Alan Kay's thing about making the technology transparent — and just be engaged by what they hear, what they see, what they feel, and what they can do, in relation to the presentation, then we've done a good job." — RUSSELL ITO
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The Future:

Toward a Knowledge Navigator

et's review. We've tried in the preceding pages to dust the hype off of hypermedia. We've made a conscious effort to avoid pronouncement, to remain enthusiastic yet skeptical, and to stick to concrete examples of multimedia potentials as they are, as opposed to as they will be some day real soon now.

We kept our feet on the ground. Meanwhile we've asserted that the development of multimedia potentials will move ahead hand in hand with the development of the human interface.

Now perhaps you'll forgive us as we gather the implications of our assertions, extend their flaps, open up our throttle and lift multimedia off the runway.

SOAR SPOT

We have spoken more than once of a coming convergence of technologies: Body tracking, for one, will extend our reach literally into the computer. Data gloves will allow us to feel as if we are actually manipulating screen objects in three dimensions. Eye-tracking devices will anticipate the sphere in which we wish to act, perhaps automatically activating whichever window we look at. Other human input devices will aid health and fitness.

New 3-D technologies will provide stereoscopic views of 3-D shapes. Today there is a 3-D laser disc system capable of interfacing with the Macintosh by means of liquid crystal shutter eyeglasses that separate left- from right-eye views. New delivery systems will provide 3-D images without the need for special glasses.

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Voice recognition is destined to change the way we interface with computers even more dramatically than the advent of the mouse has. With some add-on hardware, even today a Mac can be "trained" to do some of the things we'd like to have it do by "listening" to our instructions. When it is working smoothly, the primitive voice interface of today is as much of a revelation as that legendary first encounter with a Macintosh was.

In the future your computer will be able to respond to hundreds of individually programmed responses, throughout every application you run. A unidirectional microphone will listen for voice commands and act accordingly. Voice input will not render the mouse obsolete, but rather augment its use.

Together they can form a powerful team.

CALL YOUR AGENT

Working in tandem with voice input will be the concept of the anthropomorphic software agent or guide. This is a simulated secretary, librarian, and teacher, seemingly living inside your computer. It would talk and listen to you and then act for you at your behest. Such an agent would be a kind of artificially intelligent alter ego, a software reflection of its user, knowing something of your style, your interests, and your work habits. It could learn to guess the kind of information you need to complete a project and respond intelligently to your desires, almost before you've expressed them.

Developing an effective software agent isn't just a matter of improving artificial intelligence technology. It means taking advantage of a brand-new discipline called knowledge engineering: a craft situated at the location where computer science, the social sciences, and artificial intelligence converge.

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Timeline of Amazing Prognostications for the Future • The main problem with understanding multimedia is finding a way

FUTURE

1989

Bill Gates marries Molly Ringwald

1990

Look-and-feel lawsuit trial stated

1991

MeXt machine ships

1992

Gorbachev visits Apple

1993

Close-captioned voice input

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3-D Knowledge Navigator video Expo

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<td>20 Megabyte</td>
<td>CMS Enhancements 20</td>
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<td>CMS Enhancements 60</td>
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<td>Crate 60</td>
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<td>Irwin 40</td>
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agent will be cooperative partners, working together creatively to solve problems and accomplish tasks, even as the nature of those tasks evolves. You will be engaged in an ongoing conversation with the “person” in your computer, each of you able to interrupt the other, make suggestions, and ask questions.

You will tailor your agent to suit your tastes; your agent will attempt to tailor itself to accomplish the same. You will have the impression of being able to access information from a vast and apparently seamless source of data and applications. Wherever possible, you will have the opportunity to make meaningful choices from a range of possibilities. The agent’s job will be to narrow down the alternatives so that your decision really can be meaningful and intelligent.

**NO MORE BLIND DATA**

With such a tool, a user will have gained an engine for transforming information into knowledge.

Apple CEO John Sculley, in his autobiography, *Odyssey* (Harper & Row, 1987), said, “A future generation Macintosh, which we should have early in the twenty-first century, might well be a wonderful fantasy machine called the Knowledge Navigator, a discoverer of worlds, a tool as galvanizing as the printing press. Individuals could use it to drive through libraries, museums, databases, or institutional archives. This tool wouldn’t just take you to the doorstep of these great resources as sophisticated computers do now; it would take you deep inside its secrets, interpreting and explaining — converting vast quantities of information into personalized and understandable knowledge.”

Miniaturization will likely act to transform the Mac by the time these developments take hold. The Knowledge Navigator might be a console interface to your home entertainment center, a small package the size of today’s electronic calculators, or it might look like a high-tech pair of sunglasses. It might even be entirely invisible to you, small enough to be sewn into your clothing, or it could simply be a part of the furniture.

It will matter less what the Knowledge Navigator looks like than what it does. And while predicting the future is always risky, it’s a good bet that today’s Macintosh will seem like an antique cathedral radio next to the slim, intelligent computing engines of the early 21st century.

The Knowledge Navigator will leave the desktop metaphor far behind, and you will be multitasking almost all the time without even being aware of it. The key aspect of the operating system and its interface will be seamless.

You’ll work within a single and apparently simple computing environment without any artificial distinction between one application and another. You will work in multiple windows simultaneously, on various tasks, with any number of tools readily at hand for developing still or animated graphics, creating and processing documents, or tapping into a text or visual database on the other side of the world.

You will be able to browse through enormous and rich databases, making your own personal links between disparate pieces of information. You’ll be able to customize any aspect of your computer environment easily. Your machine will also be capable of acting as a media processor, letting you assemble multimedia smoothly from any source format.

**MIS-MING PIECES**

It will take some rather sophisticated hardware to make all this happen. The first major piece of the hardware puzzle is processing speed. In order to access large amounts of information very quickly — a requirement for any truly interactive computer — you need a very fast clock: at least as fast as a 1989-vintage supercomputer. And in order to respond very quickly to what you, the user, want to do from second to second, the Knowledge Navigator will need a very wide bandwidth (bandwidth is the size of the electronic pipe through which information is pumped; the wider the bandwidth, the more information per second you can pump into the system, and the fuller the reservoir you have to work with).

The Knowledge Navigator will likely be a parallel processing, or transputer-based computer. In other words, instead of having a single microprocessor, or CPU, that runs the whole processing show and does all the work itself, a future computer will have a number of parallel chips, or transputers, that divide the processing tasks among themselves and thereby get the work done a lot faster. An interesting by-product of transputer architecture is that when you increase the number of processors working on a calculation, you also multiply the computer’s bandwidth: with four processors instead of one, you can bring four times as much information into the system at the same time — likely a basic requirement for the multimedia workstation of the future.

One result of this stride will be the potential for a real-time full-motion interface. Among the possibilities here is a flight simulator that uses realtime, photographic, full-motion video but which is entirely under your control through the hype and irresponsible prognostication surrounding it. While speculation is interesting, a skeptical view is advised.
Another is an animated cartoon in which your agent is a real-time, active participant. In addition to making information come out of the screen, in other words, you’ll be able to climb in as well.

The last piece of the hardware puzzle is storage media — a large, safe place to keep all that information, to access it quickly, and to be able to change it at will. The solution will probably be a supercompact, large-capacity, optical read/write/erasable drive — a technological descendant of the magneto-optical drives recently announced by various makers. Unfortunately the AppleCD SC will be ancient history by the time this piece of the puzzle is in place. Throughput on CD-audio-based technology as it stands is simply too slow for the kind of ante we’re postulating here. And the need to rewrite is obvious. Once this piece of technology exists, you won’t need a laser disc player to store video images and sound anymore. Any medium you can represent digitally can be stored on the one source.

THUMBING YOUR KNOWS

The most magnificent (and possibly ironic) facet of the promise of Knowledge Navigator is that by the time it arrives, the computer may finally have replaced the opposable thumb as the greatest influence on the development of the human brain. By that time, we likely won’t use the word computer anymore. And we probably won’t think of the Knowledge Navigator as something we use. We’ll think of it simply as something we do.

— Andrew Himes and John J. Anderson

Kudos

THE MACUSER FEATURES STAFF WOULD LIKE TO THANK THE FOLLOWING PEOPLE FOR THEIR INVALUABLE CONTRIBUTIONS TO THIS PACKAGE: Elizabeth Haslam, Ph.D., Senior Instructional Designer for the Software Developer Reality Technologies and Associate Professor at Drexel University. Andrew Himes, Mac Futurist and Editor of the Fondly Remembered Mac Horizons Magazine. Tony Reveaux, a San Francisco-based Writer and Consultant, Editor of Computer Publicity News, Columnist for Computer Currents, and Contributing Editor for Artweek.

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The Connection Machine

When the Model T Ford first came out, there was an article in The London Times that said something like, "Well, there goes the neighborhood. How are we going to survive when every member of society is going to have to spend so much time learning how this thing works?" Society had not yet created the filters to buffer itself from the overwhelming impact of its technology. Now that we have the filters — like garage mechanics and diagnostic centers, in the case of the automobile — we can drive our cars without worrying too much about how they work.

The filters and buffers for the information age are the kinds of hypermedia systems discussed in this issue. They provide ways in which we can go on expanding human knowledge but at the same time prevent it from overwhelming us or leaving us isolated or totally ignorant because we don’t happen to have a doctorate in a particular subject.

It’s all Descartes’ fault. He gave us the reductionist way of dealing with information and fragmented knowledge beyond anybody’s grasp. The Renaissance man is long gone, but with things like HyperCard applications and expert systems, there’s a chance we can pull ourselves out of the avalanche of fragments of information and survive.

When I was a little kid, I used to play a game with the encyclopedias. I’d look up something and see what it linked to. Then I’d look that up and see what that linked to — from Aristotle to the trajectory of cannon balls, from cannon balls to the Eniac computer developed for ballistics calculations — pretty soon I’d find myself after five o’clock with my mother asking if I’d done my homework. That’s how powerful hypermedia can be.

Everything links to everything else. If you don’t believe it, try a little experiment. Take a thesaurus (like Word Finder on the Mac, or Roget’s in the old-fashioned paper edition). Pick any two words at random — like horse and rotate — and see how long it takes to chain from the first to the second, using a trail of synonyms. From horse to nag (“an old horse”), from nag (as in “pester”) to ride (as in “ride roughshod”), from ride (as in “go for a ride”) to spin (“take it for a spin”), and on to rotate. Only four links in this particular chain.

If we could ever plumb the depths of language, it would create an altogether new type of human-computer interface. But natural language is such a gigantic problem that even those geniuses up at MIT are beginning to say, “Well, maybe not just yet.”

If you try to work out even what simple statements apparently mean or could mean, or the number of ways somebody could mean something by a relatively simple statement, you realize how unbelievably vast the phenomenon of natural language is.

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If you try to work out even what simple statements apparently mean or could mean, or the number of ways somebody could mean something by a relatively simple statement, you realize how unbelievably vast the phenomenon of natural language is. If I say “Johnny got some new toys today. He was opening the box when you came in,” there’s absolutely nothing in that statement to tell you what the box is, but you know with absolute certainty what I mean.

Where’s the data? It’s not there — and yet it is.

James Burke is a renowned historian of science and technology who has produced such BBC television series as "Connections" and "The Day the Universe Changed." He was also, until his recent acquisition of Apple III, one of the few but proud owners of an Apple III. This article is based on excerpts from an interview with Senior Editor Jon Zilber.

By James Burke

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The Shaman's Laptop

Actually, icon-based computing devices are nothing new. In fact, they may have played a role in humans' evolutionary transformation from Neanderthal to Homo sapiens. Paleontologists have unearthed bones and antlers on which very small carvings have been made. These artifacts date back more than 30,000 years. The earliest ones had meanders — wiggly parallel lines with apparently ritualistic meaning. Between 30,000 and 15,000 B.C., the meanders gave way to much more sophisticated systems of notation.

One such artifact, called the Montgouard Baton, has what appears to be a calendar from March to November, the months between the thaw and the freeze when you could get out of the cave. It also has a number of carvings of salmon and seal. For a
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TWO BITS!

time, no one could figure out why there would be salmon and seal in Montagudier, a hundred miles from the sea. Then they looked closely at the salmon carvings; they were tiny little things, and the shape of the fish showed that they were in the spawning stage. And, of course, in spawning they come up the rivers. The seals chase them up the rivers, so that's how somebody 100 miles from the sea saw salmon.

And 30,000 chronological years and a light-year of culture away, we can make sense of the user-friendly Montagudier Baton, even without a manual.

These devices made it possible to hunt more efficiently and to tell others of the capabilities they had. So they survived because they could communicate in a more complex way. They could also say, "The next time the moon comes up, fellows, that's when we go out and get the salmon."

That way you eat salmon instead of berries. Next week, caviar.

These extraordinary devices are the closest thing you can get to proof that Homo sapiens had arrived. They indicate a cognitive ability on par with the modern brain. In other words, Homo sapiens had come and displaced Neanderthal because of greater cognitive abilities.

The disappearance of Neanderthals suggests a parable for modern people. There's a place in Israel where Neanderthals and Homo sapiens apparently lived close enough together to breed, but they didn't. Homo sapiens were clearly different from Neanderthal. Homo sapiens' linguistic and cognitive abilities allowed them to pass on their knowledge culturally through the use of language. The Neanderthals weren't granting apes: They had rituals that indicated their belief in life after death, they took care of the young, and they paved their own hearths against damage by fire. But they were superseded by a species that was better equipped to store, communicate, and use information to help it withstand the hazards of life in the Ice Age.

BACK TO THE PRESENT

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systems, we’ll be heading towards a similar split between two classes of society: the information-rich and information-poor. Even well-intended efforts to teach children to write computer programs are absurdly going about things in the wrongest possible way.

Imagine if in Gutenberg’s time we had been teaching children to type instead of to read, and yet here we are doing just that. Computer-program-writing skills will soon be as unnecessary as printing skills. Even though there are already programs that write programs, we’re still treating computers as if they were things for which people should learn to write programs, instead of learning to demand of them what people demanded of books when they came out. And I believe that the coming revolution in multimedia computing is going to make what happened with Gutenberg look like nothing.

TECHNOLOGIES OF FREEDOM

For educators, the potential of interactive video working together with HyperCard is a very exciting thing. The job of the educational system up until now, it seems to me, has been to fail people, not to educate them. Fail the majority so you can teach a few. Society simply has not been able to do more than that because it hasn’t had the tools and systems to do much more than what they did in the Middle Ages: Teach a few people and fail the majority.

In modern times, the majority aren’t failed in the sense of receiving failing grades; they’ve been failed in the sense of not being encouraged to live up to their potential. I have this utopian dream that is born of the fact that neurophysiologically we are all about equal. We all have, give or take, a hundred billion neurons in there, and unless we have some kind of disease or other defect, most of us have roughly the same kind of brain that Einstein had.

Hypermedia systems could enhance, liberate, and augment human intellect, act as releasers and facilitators of what people already have in their heads. But first we’ve got to develop the hardware and software and get this stuff into the
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To keep up, we'll have to recycle our knowledge every 10 years.

Hypermedia will also have an impact on larger sociopolitical structures. These changes could be more massive than anything in history. Back in the late 1960s, I interviewed the man who ran the Soviet space effort. At one point, he said, "I have a nightmare," and he used a term that we would now call a personal computer. That was his nightmare, because once the technologies of freedom start to leak, you can't get them back in the bag.

Could a monolithic state structure withstand hypermedia? I doubt it. It invites too much thinking. It invites too much dissent, because that's precisely what it's for. It says, "See what you can think of. See how many ways you can go."

Until modern times, the evolution of life on the planet — including humans — was driven by our ability to cope with and exploit the energy and natural resources around us: to adapt to the environment, create tools, and perpetuate the species. In the future, the ability to navigate and use information will be the hallmark and future of humankind.
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The
Ending
Storage
Removable mass storage means never having to say "Disk full."

“Disk full.”
The words stare at you obscenely, like a party joke scribbled on a restroom wall. You’re sure it must be a flake, a technical glitch, an enigmatic hobgoblin. You haven’t seen that dreaded message since you bought a 40-megabyte hard-disk drive two years ago. No — it couldn’t possibly be!

Could it?
A quick check with the Finder confirms your frenzied panic: Your hard disk has runneth over; its tank is topped off; it has posted the ultimate “No Vacancy” sign in the Lost Land of Mammoth Megabytes.

Time to buy another hard-disk drive? Whoa there. Think twice before you take the plunge. If you managed to top off one hard-disk drive, you’re likely to fill another, then another, and another....
Wouldn't it be nice if you could just eject the full disk and pop in a fresh, blank one? That's exactly the idea behind the removable mass-storage drive. You needn't be a data glutton to appreciate removable mass storage. You may share gobits of computer-aided design or spreadsheet data with coworkers or clients, and instead of shipping a horde of floppy disks around the country, you can trade one compact and easily transplanted high-capacity disk.

You'll also appreciate removable mass storage if you deal in sensitive data, like plans for the Stealth Bomber — stuff you don't want falling into anyone else's hands. Or if you need a quick and effective way to back up one or more fixed (non-removable) hard-disk drives.

MacUser Labs subjected 17 removable mass-storage drives to exhaustive and comprehensive tests. (The removable mass storage we're extolling here is the random-access, fully recordable anderasable kind. It doesn't include streaming tape, CD-ROM, or write-once, read-many (WORM) drives.) Though many of the models share common traits and specifications, there are marked and unexpected differences.

What's more, removable mass-storage drives use three distinct technologies, and each has its pros and cons. You must first choose a technology, and then decide on the best model in that group. You'll want to weigh all the factors carefully before making an investment.

**Dueling Formats**

At a very basic level, a removable mass-storage drive is like a hard-disk drive but with one important difference: You can remove and replace the magnetic recording disk. The catch is that some removable mass-storage drives use flexible disks instead of "hard" ones, and others are engineered so that you remove the entire drive mechanism from a central chassis unit. Removable mass-storage drives use three basic technologies to pack portable megabytes:

- **High-capacity flexible drives** use a floppy disk enclosed in a vinyl or hard-plastic shell. They're similar to the floppy-disk drive already installed in your Mac, but the recording medium is bigger and the disk holds at least 12 times as much data.
- **Removable hard-cartridge drives** are the most like conventional hard-disk drives but with a twist. Press a button, and the hard-disk platter ejects from the drive. The platter is enclosed in a hard-plastic cartridge for protection.
- **Removable hard-disk drives** use self-contained, modular hard-disk mechanisms that can be removed from a host chassis. The chassis contains the controller electronics (which communicate with the Macintosh) and a power supply.

A fourth pseudoremovable mass-storage drive is the compact, shock-mounted model. These are orthodox hard-disk drives, but because of their small size and weight — offer many of the same advantages and capabilities as removable mass storage. We've dubbed these units *totables*. For more information about these diminutive drives, see sidebar, "Totable Hard-Disk Drives."

**WHAT GOES ON INSIDE**

Regardless of the actual system used to implement removable high-capacity data storage, the 17 contenders in this Lab Report conform to the same basic data-recording techniques shared by all computer disk drives.

A disk, coated with a magnetically sensitive layer, spins at high speed inside the drive. A magnetic pickup head, similar to the recording heads in a tape deck but much smaller, contacts or hovers over the disk medium as it spins. Data is recorded in discrete circular tracks, and each track is further divided into sectors. By partitioning the disk into distinct track and sector domains, the Macintosh is able to store and retrieve data more efficiently. Note that each concentric track begins and ends at the same place; the read/write head does not record a single, long track that spirals from the outside of the disk to the inside like a phonograph record.

Conventional hard-disk drives for the Macintosh and other computers often use...
more than one recording disk to store large amounts of data. Except for the Bernoulli Box II/20 and the removable hard-disk drives, the models detailed in the following pages use a single disk. This disk may be single- or double-sided; when double-sided, the drive has two read/write heads, each positioned on one side of the disk.

**HIGH-CAPACITY FLEXIBLE DRIVES**

Can a floppy disk really hold 20 megabytes or more of data? You bet. The Mac’s floppy-disk drive uses a stepper motor to inch the read/write head over the surface of the disk. Though stepper motors are reasonably accurate, they move only in discrete steps: finite increments that limit the number of recordable tracks. The fewer the tracks, the lower the capacity. High-capacity flexible drives use a
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</table>
**Capsule Reviews**

**High-Capacity Flexible Drives**

**Infinity 10**
A 10-megabyte 5.25-inch floppy-disk drive. Can also read both 360K and 1.2-megabyte IBM disks. Unfortunately, it can’t write files to an IBM format. **Pros:** Very low cost per megabyte. **Cons:** Slower than traditional hard-disk technology.

Peripheral Land, Inc.
47800 Westinghouse Drive
Fremont, CA 94538
(415) 657-2211
Drive, $1,195
Disk, $25.

**MegaDrive 20**
Codeveloped by Data Technology Company (DTC) and Kodak/Verbatim. Stores 20 megabytes on a 5.25-inch floppy disk. **Pros:** Comes bundled with lots of good software like Symantec Utilities for Macintosh, Redux, and DEScryptor. Low cost per megabyte for cartridges. **Cons:** Much slower than conventional hard disks. Only one source for obtaining disks.

Jasmine Technologies, Inc.
1740 Army St.
San Francisco, CA 94124
(415) 282-1111
Drive, $99
Cartridge, $89

**RM20**
Uses the same DTC drive as the Jasmine MegaDrive 20, although it costs $100 less. Bundled software isn’t as good as Jasmine’s. **Pros:** A bit faster than the Jasmine drive. Prompt and knowledgeable technical support. Attractive case. **Cons:** Much slower than conventional hard disks. Only one source for obtaining disks.

Mirror Technologies
2944 Patton Road
Roseville, MN 55113
(612) 639-4450
Drive, $99
Cartridge, $89

**Bernoulli Box**
Original Iomega Bernoulli Box, first marketed in 1982. Has since sold many thousands, mostly for the PC. **Pros:** Very reliable, proven technology. Interchangeable with IBM cartridges and compatible with A/UX. **Cons:** Bulky chassis and cartridges. Slow.

Iomega Corp.
1821 W. 4000 South
Roy, UT 84067
(800) 777-8054
Single drive, $1,599
Cartridge, $125 (20 megabytes)

**Bernoulli Box II/20**
Same Bernoulli technology but much smaller than its predecessor. **Pros:** Very reliable and “crash-proof” technology. File interchangeability with IBM Ber-

---

sophisticated closed-loop servo system to position the read/write head accurately over the surface of the disk. The head is mounted on a voice-coil actuator that can position the head anywhere along the radius of the disk. High-frequency servo signals are recorded by a precision formatter at the factory when the disk is made. This ensures that the head stops directly on each track.

Without these servo signals, which are not erased even when the disk is reinitialized, the drive won’t work. That’s why you should never use a bulk eraser on a high-capacity flexible disk. The process will destroy it. This warning applies to all the high-capacity-drive media discussed in this report because all of them use closed-loop servo systems.

The high-capacity flexible drive category is actually composed of two technologies: Bernoulli and high-density floppy. Let’s look closely at each one.

**BERNOULLI DRIVES**

Bernoulli drives use an 8- or 5.25-inch flexible disk enclosed in a hard-plastic cartridge. The cartridge slips into the drive like an audiotape cassette into a typewriter. Once the cartridge is inside the drive, its protective doors open and reveal the disk. Bernoulli drives derive their name from Daniel Bernoulli (1700-1782), a Swiss physicist who developed a complex aerodynamic principle involving fluid pressures and velocities. Very simply put, the Bernoulli principle states that when the velocity of a fluid (including air) increases, its pressure decreases. It is the Bernoulli principle that accounts for the ability of an airplane to fly.

The flexible disk in a Bernoulli drive spins at 1,500 to 2,000 rpm, depending on the drive type (traditional hard-disk drives spin at 3,600 rpm). This spinning induces a stream of air to move over the surface of the disk. As that air passes over the tiny magnetic read/write head, the air molecules speed up slightly just as air speeds up when it passes over the top of an
Bernoulli Box II/44

This is a preproduction unit due to be released by March '89. Bernoulli technology with high capacity and fast access times makes this drive a major contender. **Pros:** Low cost per megabyte, same Bernoulli reliability. **Cons:** Can't read 20-megabyte Bernoulli cartridges. No IBM interchangeability yet, though planned for the future.  

**Iomega Corp.**

1821 W. 4000 South
Roy, UT 84067
(800) 777-6654
Single drive, $1,650
Cartridge, $83

SuperMac XP 60+B

Combination Dataframe 60-megabyte hard-disk drive and one Bernoulli drive. Superior driver software allows it to outperform other Bernoullis. **Pros:** Comes bundled with lots of good software: speaker, encryptor, and backup utility. **Cons:** Rather expensive because of hard-disk drive. If you need a hard-disk drive, it's worth it.  

**SuperMac Technology**

295 N. Bernardo
Mountain View, CA
94043
(415) 964-8884
Drive, $3,495
Cartridge, $80

Totem

Another 20-megabyte Bernoulli drive, with a lower price than Iomega's. Bering Industries is owned by Mountain Computer, which was just acquired by Nakamichi (of high-end audio fame). Dual unit has drives stacked on top of each other, rather than side by side as in Iomega. **Pros:** Virtually the same drive as Iomega's but cheaper and faster. **Cons:** Cartridges can't be removed with power off.  

**Bering Industries, Inc.**

240 Hacienda Ave.
Campbell, CA
95008-8807
(408) 379-6900
Drive, $1,295
Cartridge, $85

Bernoulli Box II/20

- The original Bernoulli Box, designed for 8-inch media that can store either 10 or 20 megabytes.

- The Bernoulli Box II/20, engineered for 5.25-inch media and capable of a 20-megabyte reserve on its two cartridge-encased disks.

- The Bernoulli Box II/44, which has 5.25-inch media and a 44-megabyte storage capacity. We tested a preproduction unit, and it looked very promising.

Other Bernoulli models are the SuperMac Technology XP 60+B, a combination 60-megabyte fixed and 20-megabyte Bernoulli removable drive, and the Bering Industries Totem, with a 20-megabyte capacity. Both the SuperMac and the Bering use disks compatible with the Bernoulli Box II/20.

Users of Bernoulli maintain an almost fanatical devotion to their drives, and they eagerly jump to the defense at the first sign of adverse comment. Nevertheless, we found that the Bernoulli drives were among the slowest and most expensive in the crowd. In our Macintosh SE DiskBasher tests, all the Bernoulli drives we evaluated ranked 50 to 200 percent slower than competing removable hard-cartridge or removable hard-disk drives. Much of this slowness can be attributed to the disk speed of 1,500 to 1,800 rpm. The slow rotation limits disk performance; after all, the head can retrieve data only as fast as the disk can shuttle it by.

As an example of performance, the Bernoulli II/20 had a MacUser Labs DiskBasher benchmark speed of 96.6 seconds on the SE. The Mass Microsystems DataPak, typical of the removable hard-cartridge units, boasted a speed of just 45.2 seconds, more than 50 percent faster.

If Bernoulli technology is somewhat slower than that of rival systems (and new II/44 driver software speeds performance considerably), its reliability is unmatched. Yes, the flexible media in Bernoulli drives eventually wear out, but head crashes are infrequent to nonexistent. You can always anticipate the wear of a Bernoulli cartridge in time to replace it with another. But you never know when the next head crash will occur. For this reason alone, the Bernoulli drives are worthy of your consideration.

**HIGH-DENSITY FLOPPIES**

High-density floppy-disk drives pack airplane wing). According to the Bernoulli principle, air pressure therefore decreases, and the disk is drawn to— but does not touch—the magnetic head.

The disk flexes slightly as it passes over the head, which contributes to some wear of the media over time. Most Bernoulli drive manufacturers estimate media life of five years, a reasonably long period considering the inconstancy of computer data.

Though it is separated from the disk by a distance of less than 10 millionths of an inch, the head still becomes dirty after several dozen hours of use and requires a thorough cleaning. Most Bernoulli drives come with cleaning kits. The biggest selling point of Bernoulli drives is their relative immunity to head crashes. A crash occurs in hard-disk drives when the magnetic head touches the delicate surface of the disk. In a Bernoulli drive, air pressure prevents the head from touching the disk. Even if the drive is turned off and the disk comes to a stop, the media floats away from the head as the lift pressures are relieved.

The champion of Bernoulli mass storage is Iomega, holder of the Bernoulli-drive patents. It currently offers three drives:

- The original Bernoulli Box, designed for 8-inch media that can store either 10 or 20 megabytes.
## Table 1: Main Summary of Features with Benchmark Results

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<thead>
<tr>
<th>Available removable disks</th>
<th>High-capacity flexible disk</th>
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<td>Bernoulli Box</td>
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<td>Suggested retail price</td>
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<td>Cost per megabyte</td>
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### Glossary

**access time** — The amount of time from when a hard disk receives a "retrieve data" command to when the data is actually fetched and delivered.

**automatic park** — A system whereby the heads of a hard-disk drive return to a safe area after a certain amount of time or after the drive is powered down.

**caches** — A hardware or software method of temporarily storing data retrieved from a hard-disk drive. The cache stores copies of the data most recently retrieved from the disk — either in a reserved portion of the Mac's RAM or in RAM located within hard-disk drive controller electronics. If the data stored in the cache is needed again, it is recovered from the cache rather than from the drive. This speeds up drive operation, in some cases quite substantially.

**controller** — An electronic circuit that directs the specific operations of a hard-disk drive. On the Macintosh, controllers are built into drives themselves.

**data encoding** — Any one of several techniques used to record and later play back data on a hard-disk drive. The encoding technique greatly influences the amount of data that can be stored on the disk, and it also partly determines the reliability of the recording. Popular approaches include MFM and RLL (see those entries).

**head** — That part of a hard-disk drive that records data on the magnetic surface of the disk, then reads it back again. Many hard-disk drives have two or more heads. Because the heads in a hard-disk drive are used to both record and play back computer data, they are often referred to as read/write heads.

**MFM** — An acronym for "modified frequency modulation" recording, the recording technique used by most older Macintosh hard-disk drives.

**microsecond** — One millionth of a second.

**millisecond** — One thousandth of a second.

**park** — A process whereby the read/write heads of a hard-disk drive are placed in a "safe" area on the surface of the disk so that, if the heads contact the disk, little or no important data will be lost.
### Removable hard-disk drive, stationary chassis

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<th>UniPak Mass Microsystems</th>
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### Rigid disk in cartridge

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<td>44-based systems</td>
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### Plated media —
Magnetic media used in hard-disk drives. Very thin layers of metal alloys are laminated to make a high-quality and durable recording surface. Plated media offer an increase in data capacity and reliability over the older iron-oxide coatings.

### Platter —
The actual recording disk in a hard-disk drive.

### RLL —
An acronym for “run-length-limited” recording, an enhanced recording technique that packs 25 to 50 percent more information on the same size disks as the older MFM technique.

### SCSI —
An acronym for “small computer system interface,” the interface used on the Macintosh to connect to hard-disk drives and other types of input/output peripherals.

### Seek time —
The average time for the read/write heads to move from one track and lock onto another track.

### Servo positioning —
A system found in some hard-disk drives (particularly the removable mass-storage type) whereby special signals previously recorded on the disk aid in accurately positioning drive heads for read/write operations.

### Stepper motor —
A type of motor that moves in discrete steps instead of complete revolutions.

### Track —
A collection of sectors spaced in a circular pattern on the surface of the disk.

### Track-to-track access —
The average time for the read/write heads to move between adjacent tracks.

### Transfer rate —
The amount of information, usually expressed in kilobits or megabits, that can be passed between one device and another in one second.
Removable Media

In Focus

Removable Hard-Cartridge Systems

If you've decided to buy a Syquest-type drive, you're in luck. Essentially the same drive engine is sold by a number of companies, so you get to concentrate on what might be most important to you: the price. Half a dozen companies buying from the same manufacturer have driven prices low. Nonetheless, there are differences between the systems.

What distinguishes one Syquest drive from another? Well, packaging for one thing. The Mass Microsystems unit has a nice ergonomic tilt that angles the screen of an SE more into your line of sight. DPI's drive chassis is a vertical mounting that looks good and fits nicely next to a Mac II. On the back of its model, Relax Technology has put additional AC plugs that are switched from the front. Each manufacturer builds in its own power supply. All the models reviewed use switching power supplies, and all have some form of surge and noise suppression. If the warranty is good, the power supply shouldn't be a major consideration.

The drivers appeared outwardly similar, and when test results came in, their performance was pretty much the same. Peripheral Land deserves mention for its caching scheme, which speeds data transfer considerably. But do you really trust a "write" cache where data to be written to the drive is actually stored in memory? Remember, if you lose power, you'll wave goodbye to that data.

Mass Microsystems includes Padlock software that performs encryption, formatting, partitioning, and password protection. Relax Technology includes a backup program, a formatter, and a desk accessory that lets you mount a new cartridge. DPI gives you a formatter — and not much else — while Bay Microsystems gives you FWB Software's Hard Disk Utilities and a formatter. InfoTechnologies does Bay Microsystems one better and offers all of FWB Software's programs, including a formatter.

After all is said and done, you may well ask if all the Syquest drives are equal. The answer is yes, basically. Therefore it seems that price, reputation, warranty, and the bundled software package should influence your decision. The most important of these considerations is probably price, closely followed by the vendor's reputation for service and support. While all the companies are relative newcomers, Relax and Peripheral Land have been in business the longest and that might give them the edge. However, since the guts of all these drives are basically the same, why not take a chance with a newcomer? We don't have a problem recommending any of these systems, and until magneto-optical (or something better) becomes a standard, we'll be using these as our removable medium.

more data in a given area than regular floppy-disk drives, thanks to their voice-coil-actuated read/write heads, precise closed-servo feedback system, and data-compression techniques. Rather than use the 3.5-inch media familiar to Mac users, high-density floppy-disk drives embrace the older but larger 5.25-inch format.

We reviewed two disparate high-density floppy-disk drive systems. One system, marketed by Jasmine and Mirror Technologies and developed in part by magnetic-media giant Verbatim, uses a 5.25-inch floppy disk packed inside a hard-plastic cartridge. Data capacity is a respectable 20 megabytes. The magnetic head touches the media, which spins at 600 rpm — roughly twice as fast as ordinary floppy disks. To prevent excessive wear on any one portion of the disk, the drive forces the head to roam over the surface of the media when not actually logging or fetching data.

Peripheral Land offers a high-capacity floppy-disk drive, the Infinity 10, that uses a flexible-vinyl outer jacket instead of a hard-plastic one. The disk looks exactly like the 5.25-inch floppy you'd use in an Apple II or IBM PC, but it holds 10 megabytes of Mac data. How? As with the other high-capacity floppy-disk drives, servo signals — previously recorded on the disk at the factory — are used to position the head accurately.

Because the Infinity 10 can accept regular 5.25-inch floppydisks, its dual personality allows it to read data recorded on IBM PC or PC/AT disks. Alas, it can't record data in PC format.

Removable Hard Cartridges

Despite warnings of doom by competing manufacturers, the removable hard-cartridge, high-capacity drive has become the most popular of the bunch. Its engineering is deceptively simple but superbly workable: a rigid metal platter, coated with magnetic gunk, permanently housed
### Table 2: Features of Removable Hard-Cartridge Drives

<table>
<thead>
<tr>
<th>DataPak Mobile 42 Plus DPI 44Repack- Removable Info 42R Infinity 40 Turbo</th>
<th>Peripheral Land</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested price for drive chassis</strong> $1.799 $1.695 $1.599 $1.149 * $1.199 $1.795</td>
<td><strong>Suggested price for additional cartridge</strong> $149 $195 $129 $108 * $119 $149</td>
</tr>
<tr>
<td><strong>Cost of each additional Mb of capacity</strong> $3.5 $4.6 $3.0 $2.5 $3.5 $3.5</td>
<td><strong>Lab-tested Finder capacity</strong> 42.6 Mb 42.6 Mb 42.6 Mb 42.6 Mb 42.6 Mb 42.6 Mb</td>
</tr>
<tr>
<td><strong>DiskBasler benchmark on SE (sec)</strong> 45.2 46.2 48.8 45.8 45.6 45.3</td>
<td><strong>DiskBasler benchmark on Mac II (sec)</strong> 38.6 38.7 38.7 38.8 38.8 38.6</td>
</tr>
<tr>
<td><strong>Duplicate 6-Mb file on SE (sec)</strong> 69.5 69.4 65.5 73.3 78.3 69.6</td>
<td><strong>Duplicate 6-Mb file on Mac II (sec)</strong> 58.3 57.7 82.5 58.6 58.6 59.3</td>
</tr>
<tr>
<td><strong>Orientation of drive slot</strong> horizontal horizontal vertical horizontal horizontal horiz or vert</td>
<td><strong>Dimensions L x W x H (in.)</strong> 10 x 10 x 3 10 x 10 x 3 12.5 x 3.5 x 6.5 10 x 9.5 x 3.5 10 x 9.5 x 3.5 10 x 10 x 2.5</td>
</tr>
<tr>
<td><strong>Location of externally set SCSI switch</strong> rear rear rear front front rear</td>
<td><strong>SCSI switch</strong> push digital DIP rotary rotary rotary</td>
</tr>
<tr>
<td><strong>SCSI connector</strong> 50-pin DB-25 50-pin 50-pin 50-pin 50-pin 50-pin</td>
<td><strong>Circuit breaker or fuse</strong> fuse circuit breaker nonaccessible fuse fuse fuse</td>
</tr>
<tr>
<td><strong>Power indicator light</strong> front on power switches none front front none</td>
<td><strong>Power switch</strong> rear rear rear front front rear</td>
</tr>
<tr>
<td><strong>Switched outlets</strong> two on rear far on rear none none none</td>
<td><strong>Miscellaneous</strong> <strong>Wedge shape</strong> can bit Mac for easier viewing. <strong>Outlet system is great.</strong> System looks clean. <strong>Bulky appearance.</strong> Support is responsive. <strong>Bulky appearance.</strong> Nice software. <strong>Bulky appearance.</strong> Nice software. <strong>Fast turbo-cache software.</strong> Useful option for vertical/horizontal orientation. *Fast turbo-cache software. Useful option for vertical/horizontal orientation.**, but vertical is best.</td>
</tr>
</tbody>
</table>

* Bay Microsystems sells only directly to users. **All manufacturers have a 1-year warranty.**

---

**Hard-Cartridge Drive Manufacturers**

| Bay Microsystems | Mass Microsystems DPI Peripheral Land, Inc. Info Technologies Relax Technology |
|------------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 210 Columbus Ave., 550 Del Rey Ave. 47800 Westinghouse Dr. 550 Taraval St. | Sunnyvale, CA Fremont, CA San Francisco, CA | 500-839-3932 (408) 949-1850 (800) 829-1850 | (408) 967-2211 (800) 848-1313 | (415) 763-1222 (415) 763-1222 |
| Ste. 100 San Francisco, CA 94133 | Milpitas, CA 95035 | 94538 | 94119 | (415) 471-6112 |
| (415) 563-8392 | (415) 563-8392 | (800) 522-1200 | (800) 848-1313 | Mobile 42 Plus |

---

in a clear, hard-plastic cartridge. The 44-megabyte cartridge plugs into the drive mechanism, which includes one pair of read/write heads.

The recording platter in the cartridge is precision-polished aluminum coated with layers of thin-film metal alloys for improved data capacity and material hardness. Over the thin-film coatings is a protective overcoat and a sheath of synthetic lubricant. The lubricant serves two purposes: to prevent serious damage if the heads should ever touch the surface of the disk and to prevent foreign matter from sticking to the surface of the media.

As in a regular hard-disk drive, the read/write head is levitated by a cushion of air above the 3,200-rpm spinning disk. The clearance, or flying height, between head and disk is exceptionally small, on the order of seven to nine millionths of an inch — just a fraction of the width of a human hair. The cushion of air normally prevents the head from touching the disk, but the cushion is lost when the disk stops spinning or when the drive is subjected to energetic movement. Removable hard-cartridge models are as susceptible to head crashes as ordinary fixed hard-disk drives, so they deserve the same care and consideration.

Removable hard-cartridge drives employ a locking system to prevent the heads from gouging into the disk when the cartridge is removed and inserted. When the drive is empty or turned off, the heads normally rest on a plastic wedge, located off to one corner. After the drive is turned on and a disk is inserted, the heads are nudged off the wedge and gently float over the surface of the spinning media. The drives also employ an automatic parking and locking system that is activated when the disk is ejected or when power is suddenly lost.

The removable hard-cartridge drive market is monopolized by Syquest, the manufacturer of both the disk cartridges...
<table>
<thead>
<tr>
<th>Accessories</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abaton</td>
<td>113.00</td>
</tr>
<tr>
<td>Pro Point (Mac SE/II)</td>
<td></td>
</tr>
<tr>
<td>Ocean Wesley</td>
<td>29.00</td>
</tr>
<tr>
<td>Inside Macintosh, Vol. 1:4</td>
<td></td>
</tr>
<tr>
<td>as ea. 21</td>
<td></td>
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<tr>
<td>Inside Macintosh, Vol. 5</td>
<td>23.00</td>
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<tr>
<td>Asher Engineering</td>
<td>12.00</td>
</tr>
<tr>
<td>Turbo Trackball ADB (Mac SE/II)</td>
<td>85.00</td>
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<tr>
<td>Benchmark Books</td>
<td>19.00</td>
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<tr>
<td>Add-In Illustrator Handbook</td>
<td>19.00</td>
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<tr>
<td>Hypercard Handbook</td>
<td>23.00</td>
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<tr>
<td>Benko-Wren</td>
<td>75.00</td>
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<td>MacStation II</td>
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<td>Datadisk</td>
<td>149.00</td>
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<td>Hyper Diaper</td>
<td>29.00</td>
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<tr>
<td>Mac 101 Keyboard</td>
<td>149.00</td>
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<td>Ergotron</td>
<td>72.00</td>
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<td>Mac SE-512/Plus</td>
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<td>Mouse Cleaner 360</td>
<td>12.00</td>
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<tr>
<td>Golden Ribbons</td>
<td>4.00</td>
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<tr>
<td>ImageWriter Ribbons - Block</td>
<td>4.00</td>
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<td>Kaldman Designs</td>
<td>19.00</td>
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<tr>
<td>Teakwood Disk File Cabinet</td>
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<tr>
<td>Holds 45 Disks</td>
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<td>Cabinet</td>
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<tr>
<td>Holds 90 Disks</td>
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<td>Kermit Microphone</td>
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<td>System Saver Mac Fan</td>
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<td>Turbo Mouse</td>
<td>119.00</td>
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<td>Kraft</td>
<td>39.00</td>
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<tr>
<td>Joystick (Quickstick) ADB</td>
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<tr>
<td>Mac Packs - Grey Wine/Navy</td>
<td>68.00</td>
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<tr>
<td>ImageWriter Bag</td>
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<td>Mac Plus/SE Bag</td>
<td>68.00</td>
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<tr>
<td>Mac SE Bag Extended Keyba</td>
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<td>rd</td>
<td>74.00</td>
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<tr>
<td>Mac Zone</td>
<td>19.00</td>
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<tr>
<td>Noise &amp; Surge Protector</td>
<td>24.00</td>
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<td>800 Disk Drive</td>
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<td>Mouse Pad</td>
<td>6.00</td>
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<td>Tool Kit To Open Mac</td>
<td>20.00</td>
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<td>MSC Technologies</td>
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<td>A+ Mouse ADB (Mac SE/Mac II)</td>
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<td>Orange Micro</td>
<td>85.00</td>
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<td>Graffar Printer</td>
<td>78.00</td>
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<td>Graffar Mac LQ</td>
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<td>Graffar Mac LS</td>
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<td>Scancolor</td>
<td>37.00</td>
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<td>Mac Table With Cabinet</td>
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<td>Smith &amp; Bellows - Odyssey Church</td>
<td>95.00</td>
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<tr>
<td>Mahogany (Holds 96 Disks)</td>
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<td>Sony Disks</td>
<td>15.00</td>
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<td>Double Side - 10 Pack</td>
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<td>Double Side - Bulk</td>
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<td>Single Side - 10 Pack</td>
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<td>Sopriris SoftWorks</td>
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<td>Game Publisher/Writer</td>
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<td>Triple Bag</td>
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<td>Mac Plus/512/Plus Bag</td>
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<td>Doug Chop's Word Tools</td>
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<td>DBase Mac</td>
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<td>Full Write Professional</td>
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<td>Borland</td>
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<td>Reflex Plus</td>
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<td>ComputerWorks</td>
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<td>ComputerReserve Starter Kit</td>
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<td>Cricket Software</td>
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<td>Cricket Graph</td>
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<td>Davatix</td>
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<td>Mac Link Plus W/Cable</td>
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<tr>
<th>Ordering Information</th>
<th>Shipping Information</th>
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<tr>
<td>The Mac Zone is a trademark of Multifun Zones International.</td>
<td>The Only Macintosh Source That's Completely Operational On Macintosh.</td>
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<tr>
<td>7162 18th Ave. N.E. Bldg.</td>
<td>1810, Redmond, WA 98052.</td>
</tr>
<tr>
<td>206-883-1975.</td>
<td>Our phone lines are open for orders: Monday - Friday: 6AM to 9PM PST</td>
</tr>
<tr>
<td>A return must have an authorization number.</td>
<td>Monday - Friday: 6AM to 9PM PST</td>
</tr>
<tr>
<td>All returns must be in new, unused condition.</td>
<td>We accept VISA, MASTERCARD, AMERICAN EXPRESS &amp; Opus Card.</td>
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<tr>
<td>Defective hardware is replaced or repaired at our discretion.</td>
<td>All items subject to availability.</td>
</tr>
<tr>
<td>Free Software charges are subject to change without notice.</td>
<td>* All items subject to availability.</td>
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</table>
Microsoft
Flight Simulator ............................................. 36.
Miles Computing
Downhill Racer ............................................. 21.
The Fool's Errand ........................................... 27.
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• Colony - Crossword Magic ......................... 34.
Deja Vu - Snapshots ......................................... 40.
Uninvited - Trust & Betrayal ....................... ea. 30.
Deja Vu II (lost in Las Vegas) .................. 32.
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Mac Course ................................................. 35.
Mac Racquetball ............................................ 36.
Road Racer .................................................... 40.
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Beyond Dark Castle ................................. each 27.
SirTech
Wizardry .......................................................... 40.
Sphere
Pit 109 ......................................................... 32.
• Gato 1.4 • Orbiiter .......................... each 28.
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Hardware
All hardware items with memory chips - Prices are subject to change on a daily basis.

External Hard Drives
 CMS - SCSI External Hard Drives
 MacStack 20 Meg ......................................... 529.
 MacStack 30 Meg ......................................... 615.
 MacStack 43 Meg ......................................... 785.
 MacStack 90 Meg ......................................... 849.
 MacStack 981 Meg ........................................ 1235.
 MacStack 140 Meg ........................................ 1495.
 MacStack 170 Meg ........................................ 1695.

Everex
EMAC 20D ....................................................... 439.
EMAC 20-ID ................................................. 470.
EMAC 400 Internal ....................................... 730.
EMAC 500 Internal ....................................... 899.
EMAC 500 Internal ................................. 1180.

Seagate
Zone 81-II ..................................................... 998.

Tape Back Up Systems
CMS
Tapestack 60 Meg ......................................... 725.

Everex
EMAC 40.60 DTL Dlx ..................................... 1795.
EMAC 60.60 DTL Dlx ..................................... 1895.
EMAC 60T Tape Back Up ............................ 845.

DAT/ADAM
Mac 101 Keyboard ......................................... 149.

Memory/Accelerator Boards
Dove
MacSnap 25E ................................................. 439.
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MacSnap 524e (512k to 1meg) .................... 284.
MacSnap 524s (512k to 1meg) .................... 378.
MacSnap 548 (512k To 2meg) .................... 575.
MacSnap 548e (512k To 2meg) ............... 539.
MacSnap 548s (512k To 2meg) ............... 598.
Marathon 200: Ms/e2 ................................. 975.
Marathon 200: Ms/e3 ................................. 774.
Marathon 200: Ms/e4 ................................. 1154.
Plus 2.0 (upgrade. Plus Only) ................. 429.
SCSI Port Adapter ........................................... 115.

Daystar Digital
33/030 Accelerator II .................................... 4680.
Navy Mac 240k-16meg (SE+) ................... 699.

Macintosh
256k SIMM Module (120 Na) .................. CALL.
2 One Megabyte Surface Mount SIMMs (120 Na) ........ CALL.

Hayes
Smartmodem 1200 ....................................... 299.
Smartmodem 2400 ....................................... 467.

Incomm
Turbo 1200 Baud Modern ................................ 99.
Turbo 2400 EC Baud Modern .................... 274.
Turbo 4800 EC Baud Modern .................... 339.
Turbo 9600 EC Baud Modern .................... 599.

Megagraphics
2008 Bit Color Board III .................. 1369.
Megascreen 19" Display ....................... 1298.
Megascreen 2008 Color ....................... 3954.

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Turbo Net "PN-209" ................................. 30.

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Jr 450 Color Scanner ................................... 5995.

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Telebit
T-1000 9600 Bps Modem .................. 749.

Thunderwave
Thunderscan 4.0 ........................................... 199.

U.S. Robotics
1200 Baud Modern ................................... 199.
2400 Baud Modern ................................... 359.
9600 Hsi Baud Modern ....................... 799.

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Stepping Out 2.0 ....................................... 60.
Beyond
Mercents 2 Version 2.01 ....................... 31.
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Sidekick 2.0 ............................................. 65.
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Network Disk Fit ...................................... 245.
Sentinel ....................................................... 149.
Superspool 5.0 ............................................. 55.

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FAX# (206) 881-3421
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Removable Media

Of Drivers and Controllers

Macintosh disk drives — all kinds, removable and nonremovable — are virtually headache and hassle free, thanks to standardization in hardware and software. The typical Mac hard-disk drive is composed of three hardware components:

- The hard-disk mechanism itself, with disk platter, read/write heads, and motor.
- Controller electronics that provide both on-board smarts for the disk mechanism and a reliable connection to the Macintosh.
- A power supply to provide operating juice for the disk mechanism and electronics.

Controllers for Mac hard drives use a small computer system interface (SCSI) to connect the drive to the computer. The Mac has a matching SCSI interface; all you need is the right cable to connect the two. Mac hard drives use two types of SCSI connectors, one with 25 pins and another with 50. If your hard disk doesn’t come with a cable or if you need to get an extra, be sure you buy a cable with the proper drive connector. SCSI devices must also be properly terminated.

The SCSI port provides hardware commonality, so the only worry when physically installing a hard disk is identifying the particular address of the drive. The Macintosh supports seven SCSI devices, all daisy-chained to the connector on the back of the computer. The Mac differentiates between SCSI devices by using a numbering system from 0 to 7 (with the Mac itself as device 7).

The majority of removable mass-storage drives we looked at provided an easy way to change the SCSI address, though some — like the Mass Microsystems UniPak — required altering a set of soldered jumpers on the controller board. Ouch.

The Macintosh SE and the Mac II have almost identical SCSI ports. The Mac II has a faster clock and dynamic bus sizing; both features allow data to be passed between drive and computer more quickly. This higher transfer rate is one reason why hard drives perform better on a Mac II.

The Mac Plus SCSI port is slightly handicapped: It lacks some physical connections to the outside world (the buzzwords are “hardware handshaking”). The computer must make up for this by substituting software workarounds for these hardware connections. This lowers the SCSI transfer rate on the Mac Plus considerably.

The SCSI port exchanges data between drive and computer using either blind or polled transfers. In a polled transfer, the Macintosh waits for confirmation that data has been properly sent or received. Blind transfers dispose of the delay imposed by data confirmation; they send bits as fast as they can be funneled through the system. Apple claims the following transfer rates for its three Macintosh models:

<table>
<thead>
<tr>
<th>Computer</th>
<th>Speed</th>
<th>Transfer Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac II</td>
<td>1.4 megabits/sec</td>
<td>blind</td>
</tr>
<tr>
<td>Mac SE</td>
<td>656 kilobits/sec</td>
<td>blind</td>
</tr>
<tr>
<td>Mac Plus</td>
<td>263 kilobits/sec</td>
<td>polled</td>
</tr>
<tr>
<td></td>
<td>170 kilobits/sec</td>
<td>polled</td>
</tr>
</tbody>
</table>

Supporting the SCSI interlink between drive and computer is a software driver, an “invisible” program that tells the Macintosh how to use the hard-disk drive mechanism. Each manufacturer puts a driver on the hard disk, and the Mac loads this driver into memory when the computer is started. Most often, failure in a hard disk is the result of a damaged or erased driver. If you’re lucky, fixing it is usually as simple as rewriting the driver using the original utility disk supplied with the drive. Be careful not to reinitialize if you’d like to keep your data.

Though drivers for removable mass storage are written to accomplish the same ends, they are nonetheless seldom alike among drive manufacturers. Drivers contribute to the overall integrity, speed, and reliability of a disk drive. Though two hard drives may be physically identical, different drivers can result in wide variations in performance. This is readily apparent in the removable hard-cartridge drives, all of which are based on hardware made by Syquest. The benchmark tests differ (though only moderately) mainly because of variations in software drivers.

and the drive units. Other manufacturers buy the raw components from Syquest and build them into complete drives. That’s why the removable hard-cartridge drives we investigated proved to be virtual clones of one another. Except for details like price, driver software, packaging, operating manuals, and warranties, the drives are identical.

Our performance tests reveal this graphically: For the six removable hard-cartridge drives we looked at — the Peripheral Land Infinity 40 Turbo, the Mass Microsystems DataPak, the Relax Technology Mobile 42 Plus, the DPI 44 Removable, the Bay Microsystems 44Repack Removable, and the Info Technologies Info 42R — the benchmark results were consistently within a few percent of one another.

The performance of the six removable hard-cartridge models was constant among all the drives we looked at, with average SCSI Disk Basher benchmark times of about 46 seconds. Internal hardware caching (see sidebar, “Removable Hard-Cartridge Systems”) contributes much to the pleasing performance of these drives. The 8K cache also permits the drive to be formatted at an efficient 1:1 interleave, even if you own a Mac Plus or SE. If removable hard-cartridge drives offer so much performance and flexibility, why have they received bad publicity?

Dirt.

Not political dirt, but microscopic dirt that can contaminate the surface of the disk and cause a serious head crash. Fixed hard-disk drives are either sealed completely from the outside air or are buffered from it by a heavy paper filter. These methods of isolation prevent dust, dirt, and other contaminants from reaching the hard disk itself. In the microscopic world of magnetic read/write heads, remember, a particle of smoke from a cigarette is like a boulder on the Interstate.

Removable hard-cartridge drives rely
Capsule Reviews

Removable Hard-Disk Drives

UniPak
Comes in three sizes: 48, 84, and 102 megabytes, with higher-capacity units on the way. Nice interface makes it as easy to use as a floppy-disk drive. Unit looks remarkably similar to ProStor's. Pros: Very fast, 24-hour technical support. Cons: Units tested had no read/write activity light and no external SCSI ID switch. Formatting was very slow because of extensive verification. Mass Microsystems assures us that these deficiencies will be addressed in future models.

Mass Microsystems, Inc.
550 Del Rey Ave.
Sunnyvale, CA 94086-3528
(408) 522-1200
Chassis, 8600
Disk pack, $2,000 (102 megabytes)

TransPac
Looks just like Mass Microsystems' UniPak but features Quantum hard drive and 64K cache controller board; therefore it outperforms UniPak. Pros: Faster than UniPak. Optional removable key lock prevents disk-pack removal. Cons: Documentation virtually nonexistent. Technical support not much better. Difficult to set SCSI ID.

ProStor, Inc.
55 Hawthorne St., Ste. 530
San Francisco, CA 94105
(415) 974-6462
Chassis, 8285
Disk pack, $2,230 (84 megabytes). The first drive purchased is discounted by 50 percent.

Disk Pack P84
Extra shock resistance is added to the very fast Quantum drives, and the whole thing gets packaged in a small, sturdy plastic case. 21, 42, and 125 megabytes also are available, with a 200-megabyte model waiting in the wings. Pros: Very user-friendly, with well-thought-out software and documentation. Easy to set SCSI ID (although it uses two consecutive IDs).

Cons: The single unit is currently unavailable. No locking mechanism to prevent accidental removal.

MegaDrive Systems
1801 Avenue of the Stars, Suite 507
Los Angeles, CA 90067
(213) 556-1663
Chassis, 8799
Disk pack, $1,699 (84 megabytes)

Removable hard-disk drives (clockwise starting at lower left): the UniPak, the TransPac (bottom), and the Disk Pack P84.

on a blast of air circulating over the spinning disk and positive air pressure to clear away foreign matter. Because of the construction of the drive and cartridges, the incoming airstream is only moderately filtered before the disk is exposed to it. During our tests with the six drives, we experienced one disk failure — and we aren't certain of its cause. Members of the MacUser Labs team who personally use removable hard cartridges with their own Macs report no trouble. So while the threat is there, we could find no hard proof of its consequences.

REMOVABLE HARD-DISK DRIVES

If you prize the advantages of removable mass storage but are leery of the
snags imposed by other take-along systems, then removable hard-disk drives may be what you're looking for. Removable hard-disk drives are composed of two parts: a sealed module that houses the disk and read/write head mechanism, and a chassis containing the power supply. The module docks into the chassis during normal use, automatically completing the necessary electrical and power connections to operate the drive. To remove the module, just yank it out of the chassis. You expand the available memory by purchasing additional disk modules. With high-capacity flexible and removable hard-cartridge systems, the cost of the media is only a small percentage of the cost of the drive. But the main expense of a removable hard disk is the disk module itself. That makes these drives far more expensive to expand than the other systems we looked at.

Removable hard-disk drives may represent the most expensive solution to portable mass storage, but they offer a number of worthwhile benefits. Because the disk is sealed inside a solid module, it isn't as susceptible to damage caused by handling and dirt. Removable hard-disk drives are also fast, competing in performance with the best fixed hard-disk drives for the Macintosh. They also feature high capacities. Models are available with up to 120 megabytes of storage space.

And to some, expandable mass storage
**In Focus**

**Totable Hard-Disk Drives**

Unlimited data storage is the primary advantage of removable mass storage. When one disk becomes full, simply eject it from the drive and insert a fresh, blank one. A significant bonus of the removable mass-storage drive is its portability. You and your data are no longer tied to your workstation. You can have computing-to-go without sorting through a box full of conventional floppies.

But what if you don’t care for the removable part of removable mass storage? What if you just want a hard-disk drive that’s portable enough to lug between home and office?

Enter the compact portable hard-disk drive, or totable — mass data storage in miniature. MacUser Labs tested several drives that we consider eminently compact and portable. Our criteria for a "compact" hard disk were few and simple.

- Must weigh 5 pounds or less.
- Must have a footprint (width by length) smaller than that of a Macintosh SE.

We found six drives that fit the bill: the Plato Hardpac 20, the Liberty 80, the Cirrus 80, the Maxcess, the Pocket Hammer, and the Impact 80. With the exception of the Plato Hardpac 20 — which stores 20 megabytes — all these drives pack a whopping 80 megabytes.

For a drive to be truly portable, it must be capable of withstanding the shock and bustle of everyday transportation. Surprisingly, we found that only one drive, the Plato Hardpac 20, contained any appreciable shock protection. The drive mechanism is mounted securely to a metal plate, and both are encased in a hard plastic shell. This strategy doesn’t eliminate the small bumps and jolts that can disturb the drive during operation, but in the event of a dramatic drop, the plastic and metal frame absorbs much of the impact.

Making a hard-disk drive sturdy and shock-resistant has its disadvantages. The Maxcess and Pocket Hammer use a large quantity of metal around the drive mechanism. This metal adds considerably to the weight of the drive, reducing its portability (both drives push the 5-pound limit). The LaCie Cirrus 80 offers some protection during transportation with its padded carrying case.

Besides structural resilience, the totable hard-disk drives we looked at offer the standard safeguards, including shock-absorbing mounts (using resilient rubber to absorb vibration) and auto-parking heads. The delicate read/write heads return to a neutral zone over the disk when the drive is unmounted or turned off. By moving the heads to an unused portion of the disk, there is less chance that a head crash will disrupt important data.

Besides portability, compact drives offer another sterling advantage: speed. Leading the race for fastest Macintosh hard disk are the Liberty 80, Impact 80, Maxcess, Pocket Hammer, and Cirrus 80, with performance records that would leave the most jaded speed demon agape.

We found, however, that the Impact 80 drive was significantly slower in its write...
Table 3: Features of Tottable Hard-Disk Drives

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cirrus 80</th>
<th>Impact 80</th>
<th>Liberty 80</th>
<th>Maxcess Plato</th>
<th>Plato Hardpac 20</th>
<th>Pocket Hammer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal capacity</td>
<td>80 Mb</td>
<td>80 Mb</td>
<td>80 Mb</td>
<td>20 Mb</td>
<td>20 Mb</td>
<td>80 Mb</td>
</tr>
<tr>
<td>Suggested retail prices (US$)</td>
<td>1,099</td>
<td>1,950</td>
<td>1,255</td>
<td>1,077</td>
<td>695 or 790 for Mac II</td>
<td>80 Mb</td>
</tr>
<tr>
<td>Dimensions L x W x H (in.)</td>
<td>9.25 x 3.75 x 6.5</td>
<td>11.75 x 5.75 x 2.5</td>
<td>7 x 2 x 5</td>
<td>8.25 x 6.5 x 3</td>
<td>7 x 4.75 x 2</td>
<td>8.25 x 6.5 x 3</td>
</tr>
<tr>
<td>Weight (lb)</td>
<td>4.5</td>
<td>3.5</td>
<td>2.75</td>
<td>4.8</td>
<td>2.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Shock rating claimed</td>
<td>60 G</td>
<td>60 G</td>
<td>60 G</td>
<td>60 G</td>
<td>100 G</td>
<td>60 G</td>
</tr>
<tr>
<td>DiskBasher benchmark on SE (sec)</td>
<td>37.4</td>
<td>63</td>
<td>37.65</td>
<td>37.9</td>
<td>64.2</td>
<td>42.8</td>
</tr>
<tr>
<td>DiskBasher benchmark on Mac II (sec/26.7)</td>
<td>45.9</td>
<td>27.44</td>
<td>27.5</td>
<td>27.5</td>
<td>N/A ***</td>
<td>27.6</td>
</tr>
<tr>
<td>Duplicate a 6-Mb file on SE (sec)</td>
<td>36.2</td>
<td>33.5</td>
<td>53.6</td>
<td>57.4</td>
<td>92.3</td>
<td>60</td>
</tr>
<tr>
<td>Duplicate a 6-Mb file on Mac II (sec)</td>
<td>41.4</td>
<td>36.1</td>
<td>37.56</td>
<td>40.9</td>
<td>N/A ***</td>
<td>40.7</td>
</tr>
<tr>
<td>Warranty</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
<td>2 years</td>
<td>1 year</td>
<td>1 year</td>
</tr>
<tr>
<td>Read/write indicator light *</td>
<td>absent</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>power indicator blinks</td>
<td>absent</td>
</tr>
<tr>
<td>Method of setting SCSI ID switch</td>
<td>internal jumper</td>
<td>digital button on bottom</td>
<td>digital button on rear</td>
<td>rotary on front</td>
<td>inaccessible</td>
<td>rotary on rear</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Carrying case, lots of good software.</td>
<td>Nice case.</td>
<td>Nice, compact daisy-chain connector, Stand to keep drive upright is provided.</td>
<td>Annoying power-supply adapter.</td>
<td>Same good software.</td>
<td></td>
</tr>
</tbody>
</table>

* All totable drives tested have a power indicator light.
** On a Mac II, this requires an external power module.
*** The Plato Hardpac was not tested on a Mac II.

Times than the other drives. Everex Systems assures us that the problem will be fixed with a driver update.

On the basis of support software, all the compact drives proved similar. The only big difference was posed by the Plato drive, which came with no software at all. The Plato arrived preinitialized with a 3:1 interleave; Aristotle Industries says that, should the drive ever need reinitializing, you'll use the Apple hard-disk software.

With only one exception, compact hard-disk drives extract their power from an AC wall socket, just as your Macintosh does. To use the drive, you must first plug it in and then stretch a suitable SCSI cable between the drive and the Mac. This arrangement isn't as effortless as shoving a disk cartridge in a removable mass-storage drive, but the trivial weight of the average compact drive makes the task of installation more palatable. Most "totters" here at the Labs keep a connected SCSI cable at each location, making installation as painless as possible.

Standing apart from the crowd, the Plato Hardpac 20 derives its power from the external drive connector on the back of your Mac Plus or Mac SE (the Plato cannot be used with a Mac II unless you add an external power supply, an added-cost option). This makes the Plato slightly easier to install — you don't need to hunt down a wall socket — but it prevents you from using an external floppy drive with your Mac. You'll need to weigh these pros and cons for yourself.

Totable Tally

Of all the totables tested, we recommend Maxcess' drive of the same name and LaCie's Cirrus drives. The Maxcess drive costs $1,077 and includes FWB Software's Hard Disk Partition, a formatter, and a security program called Hard Disk Deadbolt. At $1,099, LaCie's Cirrus 80 is priced attractively and is accompanied by some very neat software: Silver-Lining and SilverServer. As another bonus, LaCie throws in a carrying case. FWB Software's Pocket Hammer drive has the same good FWB Software programs as the Maxcess but costs $1,995. The $1,950 Impact 80 from Everex Systems has a nice rugged case. The Liberty 80, a last-minute arrival from Liberty Systems, is the most compact and comes with some nice software (a licensed version of Mass Microsystems' Padlock). The only non-Quantum drive was the Plato Hardpac 20, from Aristotle Industries, which appears to have the most rugged packaging of all. However, its unusual cabling scheme, slow speed, low 20-megabyte capacity, and lack of software make it hard to get excited about — especially at $695.
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Magneto Optical

Mag-neat-oh is more like it. Here's one that could give the Syquest-type drives a run for their money. At Comdex/Fall, Verbatim (a subsidiary of Kodak) introduced a 3.5-inch (not 5.25-inch like the Sony and Canon) thermal magneto-optical (TMO)-type drive for the Mac. These drives won't be widely available until the summer of '89, but if you're not in a big hurry, it might be worth the wait.

The drive will cost about $3,000, with 60-megabyte cartridges available at approximately $100 each. Verbatim claims a 30-millisecond average seek time and a 12.5-millisecond latency for an access time around 40 milliseconds. In the 5.25-inch TMO arena, Sony, Canon, and Maxtor all have SCSI-equipped drives just waiting for someone to come along and add a Mac driver. These drives, which all will be in the $5,000 price range, hold from 512 to 650 megabytes and have reasonably fast access times of from 90 to 100 milliseconds. Canon's drive is currently available on Steve Jobs' NeXT machine—which incidentally makes merely half of its available 512-megabyte capacity available, as it uses only one side of the cartridge. Pinnacle Micro (Irvine, Calif.) will offer a Mac implementation of the Sony drive. This package, which should be shipping by the time you read this, sports a $5,995 drive and a $230 (650-megabyte) cartridge.

Magneto-optical technology, with its virtual immunity to environmental effects, will offer a reliable and cost-effective alternative to conventional, relatively fragile magnetic storage.

Write: A "write" relies on the Curie point, which is the temperature at which there is a transition between the ferromagnetic and paramagnetic phases. A small area on the medium is heated by a high-powered laser until the area reaches its Curie point. As the medium cools, the bit area takes on the magnetic polarity of the electromagnet. Writing a sector of data occurs in two passes: Os are written first, then seconds. In between passes, the direction of the electromagnet's field is reversed.

Read: A "read" relies on the Kerr effect. Low-powered laser light, which is polarized as it passes through the beam splitter, is reflected by the surface of the media. The Kerr effect states that polarized reflected light will be rotated either clockwise or counterclockwise, depending on the direction of the previously recorded magnetic field on the reflective media. The reflected light is run back through the beam splitter and, depending on the rotation of the polarization, is either stronger or weaker upon hitting the detector. The detector converts these variations in intensity into 1's and 0's.

In general the disk looks like a CD. But it's covered by a plastic case and is a darker color. To read the other side of a disk, you must flip it over like a phonograph record. As with a hard drive, the data is stored on tracks and sectors. Different manufacturers have different systems for moving the read/write mechanism to the proper track and for keeping the mechanism aligned with a given track. Some manufacturers use a concentric track structure; others use a spiral structure.

Making the Choice

Which high-capacity mass-storage drive is for you? Before you commit and sign that check, consider price, expansion cost, performance, reliability, and portability.

Price

Of the models we tested and detailed in Table 1, "Main Summary of Features," retail list price varied from a high of $3,495 for the SuperMac XP 60+8 (a combination fixed and removable drive) to a low of $899 for the Mirror Technologies RM20. Average price is about $1,800—that correlates to the typical cost of a removable hard-cartridge drive. These prices are for either single- or double-drive models, as noted, and include at least one blank disk.

On the whole, removable mass-storage drives cost 20 to 40 percent more than fixed SCSI hard-disk drives with comparable capacity. Keep that in mind.
EXPANSION COST

Removable mass storage assumes you want to add more capacity later on. Ponder the expense of additional disks to expand your memory, and consider the cost of the disk in relation to its capacity. That gives you a rough idea of the cost of long-term ownership. It’s similar to judging the overall cost of a car by adding in its annual fuel costs.

For example, 25 bucks buys one 10-megabyte disk in the Infinity 10; that’s a cost of $2.50 per megabyte. All in all, not a bad deal. The 44-megabyte media for removable hard-cartridge drives cost around $12.5. That equates to a per-megabyte cost of about $2.85. The 20-megabyte cartridges for the Bernoulli Box II/20 are among the most expensive: $4.20 per megabyte.

Removable hard-disk drives represent the most exorbitant means of storage expansion. Additional modules cost on the order of $1,000 — roughly $25 per megabyte (assuming a 40-megabyte disk capacity).

PERFORMANCE

MacUser Labs performed numerous tests to determine the overall performance of each drive, DiskBasher, our main benchmark, performs a sequence of reads and writes using the highest level of Macintosh hierarchical file system. It closely duplicates the disk-drive access of an application program but without tying up CPU time. The results, as shown in the benchmarks (Table 1), are shown in seconds. The lower the number, the better. Results are provided for both the SE (test machine equipped with 1 megabyte of RAM) and the Mac II (with 5 megabytes of RAM).

The winners? We discovered that the technology of the drive contributed most to its overall performance. The modular removable hard-disk drives won the DiskBasher performance race, with SE times under a respectable 40 seconds. These results compare favorably with or even exceed those of nonremovable hard-disk drives for the Macintosh. Removable hard cartridges placed a close second, with SE times ranging from 45.2 seconds (Mass Microsystems DataPak) to 48.8 seconds (DPI 44 Removable).

The high-density floppy and Bernoulli drives placed third, with speeds as slow as 236 seconds.

RELIABILITY

Reliability is not an easy test for you or the MacUser Labs to perform; it consists of much more than mere torture-testing of a drive or ad hoc determination of whether it’s a piece of junk. Rather, you should consider the reputation of the company, the dependability of the media against accidental damage (a real possibility given the portability of the disks), and after-sales support.

PORTABILITY

The smaller the disk, the easier it is to carry with you or to mail across the country. The flat high-density floppy disks used by the Jasmine MegaDrive 20, the Mirror Technologies RM20, and the Peripheral Land Infinity 10 are perhaps the most portable of the bunch, and they seem the least liable to be damaged by crushing or dropping. They’re lightweight, and they’re small enough to carry around in a briefcase or to fit into any 5.25-inch disk drive. The 5.25-inch disks for the Iomega Bernoulli Box II/20 and the removable hard cartridges can be readily shipped by UPS, Federal Express, or U.S. Mail, and they stow easily in a briefcase or portfolio. Removable hard cartridges come in their own plastic storage cases, which afford some protection against accidental drops and the ravages of the environment.

But beware: Removable hard cartridges can be seriously damaged if dropped. One hard cartridge fell 3 feet to the linoleum MacUser Labs floor and suffered a crack in one corner. Impressively, the disk still functioned after the drop, but if this happens to you, back it up immediately. There’s no telling how long dropped media will last, even if it is never again subjected to abuse.

The least portable and most fragile media are the 8-inch Bernoulli Box cartridge and the modules designed to fit inside the chassis of a removable hard-disk drive.

OTHER CRITERIA

You may also want to consider these criteria in selecting a suitable removable mass-storage drive:

- **Sharing data with others.** Get the type of drive used by friends, associates, and clients so you can readily trade data.

- **Media for removable hard-cartridge drives are interchangeable among other Syquest-based makes and models, making them the most versatile.**

- **Using the drive for making backups.** To be effective in making backups, the removable drive should have a capacity roughly equal to that of your fixed drive. Or be sure the drive comes with a backup program that enables you to divide the contents of the fixed drive over two or more high-capacity disks.

- **Fitting a removable drive on your desk.** Unlike a fixed hard-disk drive, which can be implanted in a Mac II or tucked out of the way, a removable mass-storage drive must be easily accessible. Choose a drive that fits comfortably on your desk and allows easy insertion and removal of the disk.

JUDGING FOR YOURSELF

The MacUser Labs test results paint an accurate and objective picture of the performance of removable mass-storage drives. We tested each drive with both a Macintosh SE and a II. In some cases, you’ll note an unusual disparity between the test results.

This is primarily caused by how drivers and controllers interact with revised Mac SCSI software. Obviously, you’ll want to consider the best drive for your needs based on the type of Macintosh you own. If you have a Mac Plus, follow the test results given for the Mac SE. But add a few points to compensate for the slower speed of the Plus.

Equipped with a removable mass-storage drive, you can now dare your Mac to display its insidious “Disk Full” message — and live to tell the tale.

GORDON MCCLUNG IS THE AUTHOR OF A DOZEN BOOKS ON COMPUTER AND HIGH-TECHNOLOGY TOPICS.

KUDOS

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ERIC EIDERSDAN, TOM SONTAG, DAVE NELSON (Nuvo Labs)

CHRIS SCHAFER, ERIK HARNESSE
Removable Media

### Tester's Choice

In the high-capacity flexible arena, if cost is your main consideration, then go with Mirror Technologies, Jasmine, or Peripheral Land. **Jasmine's MegaDrive 20** comes with good commercial utilities, worth well over the hundreds of dollars you save by buying Mirror Technologies' RM20. Otherwise, the two drives are nearly the same. **Peripheral Land's Infinity 10** offers the cheapest way to distribute 10 megabytes of data. Its S.25-inch floppy disks are the lightest and least expensive.

On the other hand, if the shipping product matches the performance of the unit we tested, then **Omega's Bernoulli II/44** would be one removable system we could highly recommend. We looked at a preproduction unit that should be available by March '89. This drive should offer a very good mix of reliability and speed at a reasonable price. But don't plan on reading your old 20-megabyte cartridges with it — that's not going to happen.

As far as the removable hard drives are concerned, you do get a fast, quiet, and "sealed" drive, but we're still not sure how to justify the high recurring cost of additional capacity. In any case, if locking up 80 megabytes of data every night is your thing, then any of the three units we tested would fit the bill. But then you could do the same thing with any of the removable-media drives for less cash.

When it comes to removable hard cartridges, if you're willing to take a chance on a newcomer (we've got an answering machine when we called), consider **Bay Microsystems**; you can't beat the $1,149 price. Another newcomer, Info Technologies, provides a $1,199 price along with good service and support. This could make a big difference if you need to know that someone is there to help.

In general, we don't have a problem recommending any of the Syquest-type drives. If you're still not convinced that Syquest drives are the answer, you might consider waiting a few months for magneto-optical drives to appear (see sidebar, "Magneto Optical"). However, even then, it might be wise to wait a bit longer and see whose standard will prevail.

The total drive is perhaps the most practical solution for data on the go. An extra SCSI cable and AC cord are all that you need at the other end. The 3.25-inch Quantum Pr. Drive 80 appears to be the drive of choice for these manufacturers. Here we prefer Maxcess, which comes with a low price and FWB software. We also like LaCie's Cirrus 80 with SilverLining and SilverServer included at the quite reasonable price of $1,099.

---

### Performance Tests

<table>
<thead>
<tr>
<th>Name and cost of system (chassis and cartridge)</th>
<th>Performance (lower is better)</th>
<th>Transportability (lower is better)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer's suggested retail price</td>
<td>Normalized* (DiskBasher and file copy on SE and III)</td>
<td>Normalized (weight and volume) Weight (lb) in brackets</td>
<td>Cost in dollars per megabyte for a system with 100 MB, 300 MB, and 1 GB storage</td>
</tr>
<tr>
<td>RM20</td>
<td></td>
<td></td>
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<tr>
<td>MegaDrive 20</td>
<td>$655</td>
<td>[15]</td>
<td></td>
</tr>
<tr>
<td>Infinity 10</td>
<td>$1,195</td>
<td>[16]</td>
<td></td>
</tr>
<tr>
<td>ToteM</td>
<td>$1,205</td>
<td>[16]</td>
<td></td>
</tr>
<tr>
<td>Bernoulli Box</td>
<td>$1,650</td>
<td>[17]</td>
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<tr>
<td>Bernoulli Box II/20</td>
<td>$1,999</td>
<td>[17]</td>
<td></td>
</tr>
<tr>
<td>XP 60+R</td>
<td>$3,195</td>
<td>[17]</td>
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<tr>
<td>44Repack Removable</td>
<td>$1,140</td>
<td>[18]</td>
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<tr>
<td>Info 42R</td>
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<tr>
<td>DFI 44 Removable</td>
<td>$1,595</td>
<td>[19]</td>
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<tr>
<td>Mobile 42 Plus</td>
<td>$1,083</td>
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<tr>
<td>Infinity 40 Turbo</td>
<td>$1,795</td>
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<td>DataPak</td>
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<td>TransPac</td>
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<td>[20]</td>
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<tr>
<td>UniPak</td>
<td>$3,200</td>
<td>[20]</td>
<td></td>
</tr>
</tbody>
</table>

*Normalized vs. Syquest

The following tests were used to evaluate performance. Tests were repeated three or more times on both a Mac SE with 1 megabyte of RAM and a Mac II with 5 megabytes. To create the performance chart, we averaged all tests together.

**DiskBasher** — This is a test created in the MacUser Labs by Stephan Somogyi. DiskBasher is a simple test that stresses the ability of a drive and hierarchical file system to interact. Essentially, it measures a drive's performance as seen through the "eyes" of the file system. We selected a 10-megabyte test. First, a 10-megabyte contiguous space was allocated on disk. This guaranteed that file fragmentation caused no unnecessary overhead during the test. When the test began, a block was written and read right back again. The block size ranged from 10K to 200K; the size was determined randomly at run time for each read/write cycle. After the first iteration, a new block size was determined, and the block was written to disk and read back again. This process continued until the 10-megabyte file-size limit was reached.

**Duplication Test** — The last test was a real-time test that involved the duplicating of a 6,413K folder. The test began when we issued the Duplicate command from the File menu and ended when the copy was completed. The results were then displayed in total number of seconds required to copy the folder.
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Please circle 2 on reader service card.
Apple adds some X appeal to the SE with the SE/30, the second in a new line of 68030 Macintosh computers. It's fast, it's portable, and it supports Color QuickDraw. But it's still not a laptop.

Sometimes the loudest words are those that go unspoken. Take Apple's Macworld announcement, for instance. The biggest surprise was what wasn't announced. Still no laptop. No three-slot Mac II. And no full-page or two-page monitor, either. But Apple did unveil a new CPU, the Macintosh SE/30, a Mac IIx in SE clothing. Or is it an SE with IIx power? In any case, the new machine sports a 68030 microprocessor and 68882 floating-point numerical coprocessor, both running at 16 megahertz.

The presence of the 68030 chip and the IIx ROMs (in removable SIMMs, just as in the IIx) put this machine in a class apart from the old SE. With the advent of the Mac IIx and the SE/30, Apple begins a whole new family of computers based on the 68030 chip. This hardware platform represents the future of Macintosh computing.

With the 68030, you have a machine that is approximately four times as fast as the standard SE (see accompanying chart for further details), though you can also get speed from an accelerator board. Another noteworthy feature with the 68030 chip is that the PMMU (Paged Memory Management Unit) is integrated into the CPU. The IIx ROMs provide full support for Color QuickDraw, which means that you can add an external monitor — gray-scale or color — and still use the internal 9-inch. The internal screen, however, is neither color nor gray-scale. The people at Apple, feeling a sudden surge of price consciousness, said they "wanted to keep the price down."

Breaking the 4-megabyte barrier within an SE, the SE/30 has eight slots for RAM SIMMs. This is already common to the Mac II product line. Keep in mind, though, that the light at the end of the tunnel could be an on-
Much Ado About Something

With the SE/30, Apple ships the second in its line of 68030-based computers while maintaining portability and a small footprint. Note that all SE/30s contain hard-disk drives. There is no “slot” for a second internal floppy drive.

The SE/30 boasts a new design for the chassis. Now, instead of cards sitting parallel to the motherboard, they stand perpendicular to it.

coming train. With the SE/30, you can no longer upgrade two SIMMs at a time; you have to bite the bullet on four.

NUBUS OR NEW BUS?

And just how is Apple going to put a 68882 coprocessor, ROM SIMMs, and eight RAM sockets inside that box and stay compatible with existing expansion boards? Well, they’re not. Meet the 120-pin O30 Direct Slot, the successor to the SE’s 96-pin SE-Bus expansion interface. It’s not a NuBus slot. It’s a new bus slot. So if you have old SE expansion boards, you can kiss them goodbye as far as the SE/30 is concerned. They won’t fit. And if you could make them fit, they wouldn’t work. Kind of like plugging an electronic square peg into a round hole.

Direct Slot cards fit vertically inside the SE/30, not horizontally as expansion cards do in the original SE. To accommodate this, the chassis has been redesigned; it has a hole in it for the Direct Slot cards to stick up through.

There is, however, a method to Apple’s madness. The 96-pin connector in the old SE couldn’t support the full 32-bit addressing capabilities of the 68030. An interesting side effect of the new arrangement is that auxiliary cards plugged into the O30 Direct Slot may perform better than their NuBus counterparts. NuBus cards have to share use of the bus; that is, they are required to ask for “permission” before putting data on the bus. This slows things down a bit. For the most part, Direct Slot cards can be less polite and therefore can accomplish their work faster (no moral lesson implied here).

Dealing a Full Deck

Five companies let us know — in time to let you know — that they were planning to announce expansion cards for the SE/30 Direct Slot at January’s Macworld Expo. Here’s a brief rundown of the products we knew of at press time. We’ll be bringing you more complete information as the picture fills out.

Filling the video gap left by Apple, who chose not to offer any video cards for the Direct Slot — even for its own monitors — SuperMac Technology announced the Spectrum/SE. The Spectrum/SE will support the Apple 12-inch gray-scale and 13-inch color monitors as well as SuperMac’s own 19-inch gray-scale and Spectrum color monitors. As far as we could determine, no one had plans to announce a Direct Slot card that could support the Apple Workstation Display. Pricing had not been set by press time. SuperMac did say that it will deal out the card in the first quarter of 1990.

But what if you already have an SE with a SuperMac card and you upgrade your SE to an SE/30? Will SuperMac cut you a deal on a video-card upgrade? Don’t hold your breath.

Looking for Ethernet? Kinetics will provide a solution with a Direct Slot-compatible addition to its EtherPort line. It will be priced “comparably with other EtherPort products,” which means Kinetics couldn’t tell us how much it was going to cost. Again, no upgrade policy for existing EtherPort/SE owners. This is expected to ship in February.

If you want a 3270 connection to an IBM mainframe — there’s no accounting for taste — Avatar announced an SE/30-compatible implementation of its MacMainFrame product, priced “close to” the $795 list of the currently shipping MacMainFrame/SE. The new card, which provides a coaxial connection to an IBM controller, will come with the same MacMainFrame software currently available for the SE and II. It allows users to use their Macs as 3270 terminals and to transfer files between the Mac and IBM mainframes. A prototype was demonstrated at Macworld Expo; the real item will be available early in
Like the IIs, the SE/30 comes with an FDHD SuperDrive, capable of reading 1.4-megabyte MS-DOS and Apple II PRO-DOS disks, as well as Mac disks.

Even the ports on the back of the SE/30 are similar to those of the standard SE. The only difference is that the sound port is stereo.

A sound accelerator? Yes, because the Apple Sound Chip in the SE/30 is the same four-voice stereo variety as the one found in the Mac II and IIX. The sound port on the new Mac's back panel is, accordingly, also stereo. When hooked up to a pair of good speakers, it sings. Beautifully, I must say. Apple knows what it's doing in promoting the SE/30 as a music workstation.

Apple will offer the SE/30 in two configurations, an HD40 model and an HD80 model. Both will have a single 1.4-megabyte FDHD internal high-density floppy-disk drive (the SuperDrive). The SuperDrive supports 1.4-megabyte MS-DOS and PRO-DOS (Apple II) floppy disks as well as standard 400K and 800K Macintosh disks. The HD40 model will come with 2 megabytes of RAM and a 40-megabyte internal hard-disk drive. The HD80 will have 4 megabytes of RAM and an 80-megabyte internal hard drive. There is no two-floppy model, although an external floppy disk can be connected through the standard floppy-drive port on the back of the machine.

The SE/30 comes with a new version of System software, System 6.0.3 — nothing earth-shattering, just a few changes to support the new hardware platform. If you don't have an SE/30, you don't need System 6.0.3. And Apple promises that 6.0.2 and 6.0.3 will...
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And More . . .
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Introducing the MacinStor high-performance family from Storage Dimensions. MacinStor comes with everything you'd ever want in a storage subsystem. And a few things you never thought possible.

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<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>Motorola 68030 at 15.7 kHz</td>
</tr>
<tr>
<td><strong>Math coprocessor</strong></td>
<td>68882</td>
</tr>
<tr>
<td><strong>PMMU</strong></td>
<td>Integrated</td>
</tr>
<tr>
<td><strong>Memory expandability</strong></td>
<td>8 Mb (with 1-Mb SIMMs)</td>
</tr>
<tr>
<td><strong>ROM size</strong></td>
<td>256K (removable SIMM)</td>
</tr>
<tr>
<td><strong>Color QuickDraw</strong></td>
<td>Supported</td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td>Apple Sound Chip (four-voice stereo)</td>
</tr>
<tr>
<td><strong>Floppy drive</strong></td>
<td>FDHD (SuperDrive)</td>
</tr>
<tr>
<td><strong>Disk capacity</strong></td>
<td>400K, 800K, 1.4 Mb</td>
</tr>
<tr>
<td><strong>Disk formats</strong></td>
<td>Mac OS, MS-DOS, OS/2, PRO-DOS</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>ADB (2), LocalTalk, modem, SCSI, external floppy, stereo mini</td>
</tr>
<tr>
<td><strong>Expansion slot</strong></td>
<td>120-pin 030 Direct Slot</td>
</tr>
<tr>
<td><strong>Configurations</strong></td>
<td>HD40, HD80</td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>2 Mb, 4 Mb</td>
</tr>
<tr>
<td><strong>Internal hard-disk drive</strong></td>
<td>40 Mb, 80 Mb</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>$5,069, $6,369</td>
</tr>
</tbody>
</table>
The SE/30's ROMs are on removable SIMMs just as in the IIx. This will make future ROM upgrades relatively easy and inexpensive.

A new bus — not NuBus — is what you have with the SE/30. Apple calls the new 120-pin slot the Direct Slot 030. Shown installed here is SuperMac's Spectrum/SE board.

coexist very peacefully on the same network. (But they haven't tried it on our network, where Murphy's Law reigns supreme. We, too, have a promise: If it can break, we'll break it. Stay tuned.)

MAKING HEADS AND TAILS OF IT ALL

Faster than a speeding standard SE. More powerful than a Mac II. Whether or not it can leap tall, um, towers is another story. But with a machine that can do all this, the big question in our minds after this announcement was whether or not this would spell the end for the Plus. We were met with a vehement, "No, no, no!" from Apple executives as they emphatically insisted that they're not abandoning Pluses. "They're selling too well," they told us. But something is in the wind.

With the 68030 chip, it is clear that Apple is paving the way for its new multitasking operating system, which mortals may someday get to see. The future Mac OS will require a hardware platform containing two things at a minimum: paged memory management, provided by the PMMU, and lots of memory to manage (maybe you will be able to run it on 2 megabytes, but maybe you will really want 8 megabytes or more to fly). So while the Plus may still have a future on the low end, the days of the Mac II appear numbered. The 68030-based Macintosh IIX, with its built-in PMMU, is both faster and cheaper to produce than the 68020-based Macintosh II, which requires the addition of a separate chip to achieve paged memory.

Apple product managers also assured us that, while Apple will indeed continue to evolve its operating system (and, of course, certain hardware platforms will be required to take advantage of certain new features of that system), they will continue to support

MPW 3.0 — The Next Generation

N ot an announcement of a new laptop, but an incredible simulation. Well actually, it's Apple's latest release of the Macintosh Programmer's Workshop (MPW), version 3.0.

MPW 3.0 comes with a C compiler, a completely new product developed in-house at Apple. Its compilation speed is roughly twice that of the 2.0.2 compiler, and it also adheres to the latest draft of the ANSI C proposal. It also boasts a much better compile-time error detection than 2.0.2's C compiler.

Pending standardization by AT&T, the C++ language, which will come with MPW 3.0, will give C programmers the object-oriented programming paradigm. Until now, this has been reserved for MPW Pascal programmers. The C++ release will be a "precompiler" that outputs a token stream to the C compiler.

Another major enhancement is SADE, the Standard Apple Debugging Environment. SADE offers source-level debugging for MPW languages in addition to extremely powerful scripting capabilities. Essentially, SADE contains its own programming language. For those people familiar with the MPW Shell, SADE can be described as an MPW Shell designed for debugging. It is not meant to supersede MacsBug, rather to provide higher-level debugging facilities and a more comfortable debugging environment.

MPW 3.0 also includes a sophisticated source code management system, Projector, which allows large programming projects that involve many different programmers working with many different source files to be organized in a coherent fashion. Using the metaphor of a library, source code can be "checked out" and worked on by only one programmer at a time. Never are two programmers working on the same source file, although more than one programmer at a time can have read access to the same file. Projector tracks all changes to files and enables any version of the software to be reconstructed easily.

You can get more information on the pricing and availability of MPW 3.0 by calling APDA, the Apple Programmer's and Developer's Association, at (800) 282-2732.

— Stephan Somogyi
In testing the performance of the SE/30, we compared it with the standard SE, Mac II, Mac IIX, and several accelerator boards. Through an assortment of tests, ranging from a HyperCard sort to a MacDraw redrew, the SE/30 performed better than a Mac II and about as well as the IIX. The strangest anomaly occurred in the Curves test, a floating-point-intensive graphics application, which ran considerably slower on the SE/30 than on a Mac II or IIX. Even Apple's engineers were mystified. All results are normalized to the performance of a Mac SE (generally speaking, the taller the bar, the better the performance). SE performance in every case equals one; if the performance of another machine is shown as two, it means it ran twice as fast as the standard SE. Precise numbers are listed in the accompanying chart.
The SE/30 motherboard sports a 68030 CPU which, along with the IIx ROMs, establishes a new hardware platform for Macintosh computers.

Because of the new design of the motherboard, cards that fit into the SE will not work in the SE/30. Among the new cards available for the new machine is this Spectrum/SE from SuperMac. The Spectrum/SE supports Apple’s 12-inch gray-scale and 13-inch color monitor along with SuperMac’s 19-inch gray-scale and Spectrum color monitors.

the installed base of Mac Plus and SE users. Yeah, yeah, I know — as long as they keep selling.

Don’t get me wrong. I think this new box is a master stroke (although I would heap decidedly less praise on Apple’s decision not to simultaneously offer an 030 Direct Slot video card for its own monitors). The SE/30 may not be a laptop, but it is a portable IIx. The SE/30 crams the processing power of a 68030/68882 and scads of memory into a small box that travels easily and still lets you hook up a large-screen gray-scale or color monitor at the office. If you need lots of slots, this isn’t the machine for you. But if you don’t need the benefits of the NuBus, it’s a winner. It’s also a good choice as an AppleShare server.

Some people might think it would be a good choice as an A/UX workstation. Unfortunately, those people aren’t the ones making decisions at Apple. Although the company simultaneously announced the first major upgrade to A/UX, version 1.1 (see A/UXiliary Information in this issue), they did not announce that A/UX 1.1 would run on the SE/30. And for good reason. It won’t. Maybe someday.

So how much is an SE/30 going to cost you? The HD40 model goes for $5,069 — which is exactly what the old SE, similarly configured, used to cost. The HD80, with 4 megabytes of RAM, will set you back $6,369.

030 ENVY

Want one, but you already have an SE? There will be an upgrade, available in March, but the details — price, for example — weren’t available at press time. It’s expected to come in two parts. First, there’s the logic board and chassis swap (that’s one). You need a new chassis as well as a new motherboard because of the layout of the 030 Direct Slot.

You get 1 megabyte of RAM on your new logic board. But Apple couldn’t tell us whether you’ll get to keep the megabyte that came on your original SE board, or have to send it back.

The second part of the upgrade is the FDHD floppy drive. The logic board and chassis can be upgraded by themselves, and the old 800K drive will still work fine. But you must have the new motherboard to get the new floppy drive, because the chip that controls it isn’t on the old SE motherboard.

So with the SE/30, Apple is providing a clear upgrade path. If you want Color QuickDraw, you can get it. If you want more speed or power, you can have that, too. Perhaps the most important point of the advent of the SE/30 is that Apple is moving to this new generation of machines while maintaining the same footprint. That’s right. Apple does understand, with all the changes it is making in hardware, that it still needs to maintain the element of familiarity. The more things change, the more Apple needs to keep at least a few things the same.

WHILE APPLE PRIDES ITSELF ON THE SMALL FOOTPRINT OF ITS SE/30, SENIOR TECHNICAL WRITER HENRY BORTMAN HAS MANAGED TO FILL HIS DESK (AND CONSEQUENTLY HIS OFFICE) WITH SO MANY HARDWARE PERIPHERALS THAT HE CAN NO LONGER LOCATE HIS OWN MAC.

Directory

Avatar Corporation
65 South St.
Hopkinton, MA 01748
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Digidesign, Inc.
1360 Willow Road, Suite 101
Menlo Park, CA 94025
(415) 327-8811

Kinetics, Inc.
2540 Camino Diablo
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Micron Technology, Inc.
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This month DTP focuses on graphics. We help you sort through the alphabet soup of graphics formats in "Putting It Graphically," the first of a two-part series. Then we round up the latest clip art in Between the Lines.

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If you have a few tricks of the trade to share, send them to DTP, c/o MacUser, 950 Tower Lane, 18th floor, Foster City, CA 94404.

From the Desktop

The page-layout program we use at MacUser is PageMaker 3.0. Since PageMaker can't handle process color, you may well ask, how can we use it to produce a four-color magazine? Good question. Each finished page is saved as two files — a PageMaker file for text and an EPSF file for color elements. The actual four-color separations are then performed in Adobe Separator (Illustrator "88's companion program). Here's a step-by-step look at how we ready a magazine page for printing from the desktop.

First, each page is saved as a separate PageMaker document. Next, we create a PageMaker file containing just the text elements (otherwise the text would be color-separated along with the artwork). To do this, we remove all the color elements on the working page and master page, including keylines and tints. After proofing a printed copy to make sure all the color has been removed, we use the Print dialog box to select the settings for Linotronic 300 output and tabloid-sized paper so that crop marks will be displayed and extra negative film will be provided for the stripper. We save these settings by choosing Print and immediately canceling the job. The page is then saved as a new PageMaker document named nameType. This file can then be printed directly to negative film on the Linotronic.

To process the color elements, we reopen the original PageMaker file and remove all type and black lines on the working and master pages. The page is proofed on glossy paper to ensure that even light tints show up and is then saved as a PageMaker file called nameColor. This file isn't needed for the color separation process, but it serves as a backup in case something goes wrong. Using the Print dialog box, we save the page again as an EPSF file, making sure that the options for crop marks, tabloid size, and the Linotronic 300 are checked. Holding down the Option key while clicking on Print produces a PostScript dialog box.
For Art's Sake

Since the roundup of EPSF clip art in our August '88 issue, we've been buried under an avalanche of new products. Here's a sampling of new clip-art packages, some of which will be reviewed in upcoming issues.

- **Clip3D** is 3-D, it's in color, and it comes bundled with a program that lets you rotate, distort, merge, zoom in on, or add perspective to the images. The original images are Pro3D files, but they can be exported from Clip3D in various formats (Paint, PICT2, TIFF, and EPSF). Eight packages ($99 each) are available, with varying themes (such as fonts, geography, business, and people). Contact Enabling Technologies, 600 S. Dearborn St., Suite 1304, Chicago, IL 60605; (312) 427-0386.

- **Images With Impact, Business I** is the latest EPSF offering from 3G Graphics. This collection of 170 illustrations ($129.95) shows the same attention to detail as the previous Graphics and Symbols package, including the pregrouping of images, so you can easily move or eliminate their component parts using Illustrator or FreeHand 2.0. Also available from 3G is the Art of Persuasion, a collection of over 100 PICT images included with Persuasion. Aldus' new presentation software. Contact 3G Graphics, 11410 N.E. 124th St., Suite 6155, Kirkland, WA 98034; (800) 456-0234 or (206) 823-8198.

- **Clipatures** is business-oriented EPSF clip art from Dream Maker, Volume 1. Business Images (retailing for $129.95), contains 147 high-resolution illustrations on four 800K disks. These clean, professional-looking images can be used as is or can be edited with Illustrator or FreeHand. Volume 2, More Business Images, should be out as you read this. Contact Dream Maker Software, 4020 Paige St., Los Angeles, CA 90031; (213) 221-6436 or (800) 876-5665.

- **Vivid Impressions** contains some of the first color EPSF clip art. The debut collection, Special Events, contains 130 images — including more than 15 color montages — on six disks for $130. The modular images can be edited in Illustrator or FreeHand. Contact Casady & Greene, Box 223779, Carmel, CA 93922; (808) 624-8716.

- **Works of Art Laser Art**, from Springboard Software, is a business-oriented package containing over 125 EPSF images for $99.95. Springboard also has several Works of Art collections of bit-mapped art in both HyperCard and MacPaint formats ($49.95 each). Contact Springboard Software, 7800 Creek Circle, Minneapolis, MN 55435; (612) 944-3915.

- **Adobe Collector's Edition** ($125) is an excellent EPSF selection of 280 dingbats, 65 borders, and two editable alphabets. All the graphics are Illustrator outline files, which you can embellish to your heart's content. Contact Adobe Systems, 1585 Charleston Road, Box 7900, Mountain View, CA 94039; (415) 961-4400.

- **Hi-Tech Backgrounds** ($89.95) features 12 beautifully rendered background grids, horizons, and spheres in EPSF. These backgrounds can be combined with text and graphics to give a professional look.

Clip3D has color and depth, and you can customize it.
to any publication. Contact ARTfactory, c/o PageStation Network, 414 Tennessee St., Suite A, Redlands, CA 92373; (714) 793-7346.

• **Desktop Art** is a monthly collection of about 40 thematic EPSF images. Join the Designer’s Club and you get each package for $49.50; nonmembers pay $74.95 per package. Contact Dynamic Graphics, 6000 N. Forest Park Drive, Box 1901, Peoria, IL 61606; (309) 688-8800.

• **PresentationArt** by Image Club Graphics contains more than 300 images in PICT format for desktop presentations. This wide-ranging collection, which includes EPSF formatting, costs $199 for the three-volume set or $99 per volume. Image Club, which also markets Digital-Art, can be reached at 2915 19th St. N.E., Calgary, Alberta, Canada T2E 7A1; (403) 250-1969.

• **Metro ImageBase** ships its clip-art of the same name in TIFF. The theme-oriented packages, which cover topics ranging from holidays and sports to the business world, contain 100 images each, digitized at 300 dpi. The company has been supplying advertising art to newspapers for 75 years, and the graphics in the 14 packages available ($145 each) were culled from its inventory of more than one million images. Contact Metro ImageBase, 18623 Ventura Blvd., Suite 210, Tarzana, CA 91356; (800) 525-1552 or (818) 881-1997.

• **Centennial Classics** contains more than 500 illustrations from the nineteenth century. The images were scanned at 300 dpi from original woodcuts, drawings, and engravings. The Curator-compatible 37-volume set is available in several formats for $650, or for $19.95 per volume. Contact New Edge, Inc., Neone Falls, Peterborough, NH 03458; (800) 284-3330 or (603) 924-9100.

• **WetPaint**, the bit-mapped clip-art series from Dubl-Click, keeps rolling along. Recent releases include Island Life ($79.95) and MacTut ($49.95), a collection of Egyptian clip art that includes ProGlyph, a series of hieroglyphic font families. Contact Dubl-Click, 18201 Gresham St., Northridge, CA 91325; (818) 349-2758.

• **Graphics Warehouse** is a smorgasbord of more than 20 megabytes of bit-mapped art of varying quality. Nearly three dozen disks cover everything from celebrities and transportation to M.C. Escher. Organized in four-disk sets ($19.95 each), the collection is available from Showker Graphic Arts & Design, 15 Southgate Court, Harrisonburg, VA 22801; (703) 433-8402.

• **Pai, the Professional Art Library** is a massive collection of EPSF graphics from Multi-Ad Services. First released on CD-ROM a year ago, the art is now available on disks for both the Mac and PC. The initial offering, Potpourri, contains 300 images in 12 categories. It sells for $149.95 on CD-ROM, and it’s $189.95 for the 23-disk set. Contact Multi-Ad Services, 1720 W. Detweiller Drive, Peoria, IL 61615; (309) 692-1530.

**Aileen Abernathy**

---

**TIP**

**Clip and Paste**

EPSF is rapidly becoming the clip-art format of choice for many desktop publishers. But EPSF graphics do have one drawback: They can’t be imported into most word-processing programs or be cataloged by PictureBase, the art management program from Symmetry. You can circumvent this restriction, however, through a little-known option in Adobe Illustrator.

Use Illustrator to open the desired clip-art file. Then choose Select All from the Edit menu and hold down the Option key while choosing Cut or Copy. This causes both EPSF and PICT information from the image to be transferred to the Clipboard. You can then paste the art into any program that accepts PICT, but not EPSF, files. The entire process is explained in PictureBase Technical Note No. 4, available from Symmetry, 761 E. University, Mesa, AZ 85203; (602) 844-2199.
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Please circle 72 on reader service card.
Putting It Graphically

Once upon a time, moving images between applications was as predictable as sunrise. There were two (count 'em) formats for storing Mac graphics: PICT and Paint. Then along came scanners, gray scale, color, and a plethora of imaging options. The onslaught of new file formats for storing and transporting sophisticated images could confuse even the most hardened graphics guru. In Part 1 of this two-part guide, we discuss the various kinds of graphics and their storage formats, uses, and limitations.

First, let's distinguish between a file format, such as PICT or Encapsulated PostScript Format (EPSF), and the various types of graphics (bit-mapped, object-oriented) that applications can produce. A file format is the structure of the data used to record an image onto a disk. The same data structure can be used to record various types of graphics, and a given type of graphic can be stored in several data structures. With every combination of file format and graphic type, there are advantages and trade-offs that may not be apparent even to the seasoned mouser. Most graphics applications can now import and export images in several formats. Page-layout and presentation programs are forever under the upgrade surgeon's scalpel, gaining the abilities to read, scale, crop, display, and print the latest kinds of image files.

Explaining a Bit

One of the two basic types of graphics is the bit map. Its real-world analog is a painting, or more appropriately, a mosaic made from tiny colored tiles. In a bit-mapped image, the tiles are called picture elements, or pixels. Lines are depicted as rows of adjoining pixels, and all shapes are both outlined and filled with pixels.

For black-and-white bit maps, only one data bit is required to describe each pixel. Gray-scale and color graphics created by applications like PixelPaint and Studio/8, or photo-retouching programs like Digital Darkroom and ImageStudio essentially look and act like...
bit maps. However, a single bit per pixel doesn't provide enough information to specify a particular color or shade of gray. Images containing 256 grays or colors require 8 bits per pixel, and photographic-quality, full-color images require as many as 24. Thus, color and gray-scale files can occupy a vast amount of disk space.

As in a mosaic, you make changes by replacing tiles of one color with tiles of another color. The illusion of nonexistent colors or grays is achieved by dithering, or mixing, tiles of the available colors or gray shades. The mosaic nature of a bit map causes some unpleasant effects whenever an area of the graphic is moved, enlarged, or rotated. Moving part of a bit map entails literally ripping tiles from the surface and moving them elsewhere, leaving a hole (no tiles) behind. Whenever the shifted image lands, it replaces the tiles that were there, permanently erasing the overlaid portion. If you enlarge a bit map, it looks as though you replaced the small mosaic tiles that originally formed the image with larger tiles, resulting in a blocky and jagged appearance. Rotating part of a bit map rips the affected area off the surface and also causes the component tiles to shift slightly, producing a crumbly looking image.

When printing a bit map, printers (regardless of their resolution) are forced to reproduce the image exactly as it is stored, in its tiled form. The effective resolution of the printed image is directly dependent on the resolution of the bit map. Coarse bit maps print coarsely; fine bit maps print finely. Early MacPaint bit maps had 72 pixels per inch (ppi), but newer applications like Canvas, Cricket Paint, and SuperPaint can paint at 300 ppi and even higher resolutions (very small mosaic tiles), which lets you take advantage of higher resolution printers.

**1. Object**

Object-oriented graphics — like those produced with MacDraw, FreeHand, and Illustrator — overcome the limitations of bit maps in several ways. First and foremost, they are composed of mathematically described objects, as opposed to bit maps, which are collections of dots (see Figure 1). Object-oriented applications don't store your strokes as a collection of tiles on a surface, but rather as a list of drawing instructions compiled from your menu choices and mouse movements. Everything you draw, move, or change updates an internal database that lets the program keep precise track of each item on the drawing surface. Thus you can enlarge, reduce, rotate, reshape, and re-fill objects, and the program will redraw

![Figure 1](image_url)
them in their new state with no loss of quality.

Moreover, objects can be managed individually as if each were drawn on a separate transparent sheet. They are freely movable over the surface of a document and can be stacked and partially hidden by other objects without being permanently erased. They can be grouped into complex arrangements and later ungrouped.

The advantages of object-oriented graphics extend to the printing phase as well. Instead of dictating to the printer where each image spot should be, the program describes the object and lets each kind of printer render the image at its own best resolution. So, unlike bit maps, object-oriented graphics are resolution-independent.

What's In Store

A graphics application may be perfectly happy always to save its files in a generic format like PICT or TIFF. If, however, it has some unique imaging capabilities, the program may save graphics in a proprietary format, which is loaded with specialized information that (usually) only the creating application can interpret fully (see Figure 2). The proprietary format can be as radical as a new image-storing technique, or it may merely be an existing format that's augmented with data to support the program's special abilities for color management, gradients, effects, layers, or data compression. (Modern Artist, for example, stores images in rPIC, its own variation of PICT.) Be aware that when an application exports an image, converting it from its proprietary format to a generic format, some of the image's special attributes — and thus its flexibility — may be lost.

Now that we've laid the groundwork, here are the file formats, their fabulous features, and their frustrating faults. These are the formats in which most Macintosh graphics applications store or, more importantly, exchange their handiwork.

Paint

The Mac's most basic format holds only black-and-white bit maps at 72 ppi. MacPaint, of course, saves in this format, but other applications — SuperPaint, Canvas, Digital Darkroom, ImageStudio, ThunderScan, and PixelPaint, to name a few — have options to save their images as Paint files. Graphics saved in Paint format are stripped of their high-resolution, object-oriented flexibility, gray-scale values, and color.

PICT

PICT (not an acronym) is the oldest generic file format on the Mac. PICT can hold any mix of bit maps and resolution-independent objects. Objects and bit maps can be any of the eight QuickDraw col-

Figure 2: A gray-scale PICT2 file was saved in the various formats discussed in this article and printed at high resolution. The TIFF and EPSF versions preserved both the detail and the illusion of grays. The 72-ppi PICT and paint versions lost all subtlety of tone and detail.
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Suggested retail price $295.
The size of a graphic can vary tremendously, depending on which file format you use to save it. Each type of graphic stores compactly in some formats but not in others. For the results shown here, we used a gray-scale image from Digital Darkroom and an object-oriented graphic created with Canvas 2.0.

### Formats

<table>
<thead>
<tr>
<th>Format</th>
<th>Gray-scale graphic</th>
<th>Object-oriented graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>12K</td>
<td>9K</td>
</tr>
<tr>
<td>PICT</td>
<td>11K</td>
<td>2K</td>
</tr>
<tr>
<td>PICT2</td>
<td>123K</td>
<td>7K</td>
</tr>
<tr>
<td>TIFF (4 bits per pixel)</td>
<td>51K</td>
<td>28K</td>
</tr>
<tr>
<td>TIFF (8 bits per pixel)</td>
<td>100K</td>
<td>56K</td>
</tr>
<tr>
<td>TIFF (1 bit per pixel)</td>
<td>217K</td>
<td>21K</td>
</tr>
<tr>
<td>EPSF</td>
<td>211K</td>
<td>79K</td>
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The size of a graphic can vary tremendously, depending on which file format you use to save it. Each type of graphic stores compactly in some formats but not in others. For the results shown here, we used a gray-scale image from Digital Darkroom and an object-oriented graphic created with Canvas 2.0.

### Offering files in various formats to your applications

is an adventure in itself.

256 shades suffice even for high-quality work. As with gray scale, there’s essentially no limit to the number of colors TIFF can handle. Although the number of data bits per pixel varies, developers will probably settle on 24 as the standard, which means that a color TIFF file will be about three times the size of a corresponding 8-bit gray-scale file. (Raster image file format, or RIFF, is a gray-scale data-compression scheme used by ImageStudio, but it’s not a variation of TIFF.)

### EPSF

One EPSF file can contain two versions of an image: a resolution-independent PostScript (text) description that’s used for printing on a PostScript device, and an optional, bit-mapped version of the graphic — stored in PICT format — that can be displayed on-screen. This double-image scheme enables page-layout programs to import, crop, and scale high-quality images while using the quick-rendering PICT portion to provide feedback to the user. If an EPSF file has no embedded PICT version of the graphic, the importing application will display a rectangular placeholder to indicate the name, presence, size, and orientation of the image.

During manipulations like shearing, resizing, and rotating, the screen version of an EPSF image may start to look pretty ugly, but the printed version will be fine. If an object-oriented image is saved in EPSF, it will retain its resolution-independent printing quality, but when imported — even into the same application that created it — it can’t be ungrouped, refilled, or recolored. It can, however, be resized, distorted, or cropped as the application permits.

### PostScript

A PostScript file is a purely text-based description of an image, without the displayable PICT image that EPSF offers. In many applications (PageMaker, for example), pressing Control-F during printing will create a PostScript file of the image. This file can be opened with any word processor and modified (with proper forethought and courage). The PostScript file can then be sent to a print shop for output or fed directly to a PostScript printer, such as a LaserWriter or Lintronic, using a simple downloading utility.

Armed with the foregoing knowledge, you can make more educated choices when you’re about to Save or Save As... But take care. You’ll only be halfway out of (or into) the woods. Offering files in various formats to your applications is an adventure in itself. Some applications import perfectly, some semiperfectly, and others exhibit schizophrenic or allergic reactions when dealing with four-letter formats. Part two of this expose will concentrate on just such phenomena. Stay tuned.

Special thanks to Steve Carlsen, Aldus Corporation's principal software engineer and TIFF guru, and to Ed Bonke of Silicon Beach Software for revealing many of the secrets of the formatted universe.

Salvatore Parascandolo is a MacUser senior staff writer who didn't know how much he didn't know but now knows what he thought he knew and knows he doesn't know it all.
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This month, there’s an inside look at a significant new authoring environment, SuperCard, by Silicon Beach Software, which picks up where HyperCard left off. Get a handle on fractals generation and see HyperCard in full flower at Bloomingdale’s. There’s a tool for weeding out your stacks, and a review of The Macintosh Bible’s HyperCard sprout. Interested in learning more about multimedia? There’s no better way than with the disk Discovery by Design, new from the MacUser Media Lab. For more information, send a SASE to Kristi Coale, MacUser, 950 Tower Lane, 18th floor, Foster City, CA 94404.

Mirror, mirror, in the Mac. Show me what’s on sale at Bloomies; Here’s the card for Interplak — There’s plenty more to cure your gloomies.

**What’s in Bloomie’s Windows?**

It doesn’t look like a Mac and it doesn’t have a mouse or keyboard. But inside this box, which looks very much like a bank’s automatic teller machine, is a Mac SE, a LaserWriter printer, and a custom HyperCard stack full of information on fancy products sold in Bloomingdale’s Advanced Consumer Electronics departments in New York City and Chicago. The Safire Shopper Automatic Retail Machine, by Safire and Spalter Interactive Computing, has entered the marketplace and caused quite a stir.

To start the contraption, you select the type of product you want to see by touching one of 12 buttons (actually, you’re activating a HyperCard button through a touch-sensitive panel that overlays the Mac’s screen). In moments you’re viewing a series of product pictures, many of which are animated using a series of fast-cycling cards. For example, a slot machine spins its wheels, a motorized toothbrush rotates, and time passes on a clock.

When you see something you like, touch another button and a window of information opens up (often accompanied by a short burst of sound or music). If you want a more lengthy product description, touch the print button and out pops a product sheet, hot off the LaserWriter.

Bloomie’s customers seem to love it, possibly because it doesn’t look or act like a computer, according to Mark Safire of Safire and Spalter.

If you’re in New York or Chicago, head for Bloomingdale’s to see if you...
In 1968, in a small manufacturing area outside Bakersfield, California, Marshall Manufacturing was formed. Mitch Marshall perceived a growing market demand for electronic component boards for the burgeoning electronics and computer field. His perception proved right on target. Marshall Manufacturing, Inc., began production with a lean staff of 12. Today, with plants throughout North America and Europe, M.M. Inc. is the leader in providing hardware for the computer industry. As sales continue to grow, we will reach (cont. pg 4)

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—Mitch Marshall

**Our History**

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**Mitch Marshall, President & Founder**
think this HyperCard creation has a bright retailing future (or, at the very least, to see if some of its features might make their way into your stacks). Or, if retailing is your future and you want to know more about the machine, contact Safire and Spalter at 320 E. 22nd St., Suite 3F, New York, NY 10010; (212) 529-0634.

— Gil Davis

Clean Up Your Act

Last week, as I was trying to cram one more dress into my closet, I said to myself, “I can’t stand this any longer.” Out went all the clothes I would never wear again but had been saving “just in case.” The result was a neatly organized closet with all the clothes I needed and space to spare. This week I was trying to add one more HyperCard stack to a nearly full hard disk and was reminded of my closet. But I wanted to keep all those stacks. I could have transferred some of them to floppies, one way of cleaning house, but I really didn’t want to bother. So I sent Stack Cleaner to the rescue.

Stack Cleaner is a set of six utilities from Softworks that simplify the task of developing and modifying HyperCard stacks. You can tidy up your closet, er, disk, with Script Cleaner, which substitutes standard HyperCard scripting abbreviations for full-length commands (such as field, button, and message) wherever possible, thus reducing the size of your stack and often speeding up the application.

Save more than a split second with Split Stack, which utilizes a scroll field to display the cards and backgrounds in a selected stack and then lets you choose those you wish to copy and include in a new stack.

Other utilities that will help you to keep your house in good order and make your life easier are Merge Stacks (merge two stacks to create a new one) and Clone Stack (for copying stacks — a bonus is that it clears unwanted data from cards and deletes duplicate cards). With Menu Maker, you create and modify menus in the menu bar or as pop-up menus; ResCopy, licensed from Apple, lets you copy resources from one stack or application to another.

For more information about these household helpers, contact Softworks Inc. at P.O. Box 2285, Huntington, CT 06484; (203) 926-1116.

— Laura Johnson

Macintosh Bible: STAX! Edition

More than a year after HyperCard’s debut, you can still overhear conversations about “What exactly does HyperCard do?” One answer comes from the STAX! company. It has used HyperCard and three floppy disks to republish a book:

Sometimes it’s not so bad getting taken to the cleaners. Script Cleaner reduced this test stack from 164,698 bytes to 120,058 bytes.

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The Macintosh Bible, written by Dale Coleman and Arthur Naiman, is a collection of tips for using the Macintosh more effectively. The first edition of the book, on which the HyperCard edition is based, covers four areas: System software, applications, hardware, and consumer advice. Despite the tendency of the numerous, multi-optical tips to clog your mind and dilute retention, the book succeeds because much of the information is truly useful.

Whether the information is gleaned from paper or the screen, The Macintosh Bible deserves commendation for a number of reasons. Often books of this genre are sloppy and haphazard — quick and dirty efforts from an author who doesn’t take the time to craft a learning tool. However, Coleman and Naiman’s work shows a meticulous and heartfelt interest in covering issues that are important to Macintosh users.

The second printed edition of the book is over 700 pages and is culled not just from Coleman and Naiman’s knowledge, but from numerous contributors, duly credited, including user groups nationwide. The writing and layout of the book are clean and simple.

Examples of information to be found in The Macintosh Bible (all of which are followed by explanations) include: Press the Option key when choosing the Finder’s Clean Up command to align icons fully. Never put more than one System on a disk. To approximate the number of words in a document, divide the number of characters by 6. To open the original Mac case, you need a Torx T-15 screwdriver with at least an 8-inch shaft. And, if you’re looking to learn your first programming language, you’ll learn better habits from Pascal than BASIC.

Many of the tips and tricks in The Macintosh Bible relate to particular software programs, such as Microsoft Word, Excel, MacPaint, and PageMaker. Prospective buyers might want to browse through the book to see if the software they use is covered. (Of course, bookstore-style browsing is a feature that most software stores do not allow with their disks.)

The idea for a HyperCard disk-based edition stems from the desire to provide an alternative, if not always better, means of conveying the reference-like information. The direct transfer from book to HyperCard format allows a head-on comparison of how the two mediums deal with textual information.

The disks are lighter and smaller, though the book remains functional when taken to your neighborhood park or on an airplane. To use the disk-based version effectively, you must...
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transfer the disk contents onto a hard disk. This takes up nearly 2.5 megabytes of hard-disk space. The book uses an inch of bookshelf space.

The HyperCard interface for text retrieval uses some clever techniques, yet in places it is nonintuitive and graphically uninspired. Ultimately, if the information has been loaded onto a hard drive, clicking on the Table of Contents card and then the Section Contents card index can bring you to desired information in about as much time as using the book's table of contents or index. If you use floppies, the disks are slower than the book.

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A Wilder Card

Throw away your HyperCard wish list. SuperCard most likely gives you all you've been dreaming of and a lot more.

BY SALVATORE PARASCANDOLO

HyperCard offers the essential power of the Mac in a tool with comfortable handles — cards, buttons, fields, and paintings — and to manage it all, a slick programming language that looks a lot like English. HyperCard is soft and smart enough to coax card-based applications from the most unlikely individuals. But those cards are as confining as they are liberating.

HyperCard doesn't let you create genuine-looking Macintosh applications. You can't have your own menus, resizable windows, multiple open stacks, large pages, and objects that you can move around. Nor does it offer decent reports. However clever, valuable, and fun to program, HyperCard stacks are second-class software. They're placed in a subclass — stackware (yuck!), not real software, and stackware prices reflect just that.

It was both unlikely and inevitable that someone would develop a better product than HyperCard. Unlikely because HyperCard is free, which is a tough price to beat. Inevitable because the universe naturally responds to mounting pressures and to the outcries of nose-to-the-wall stack developers. Poof! SuperCard appears out of nowhere. This special report is a preview of its power, based on a week of hands-on internship at the offices of its developer, Silicon Beach Software.

SUPERHYPERCARD

SuperCard builds on HyperCard's capabilities, and the HyperTalk language, to give software authors practically full (and full-color) access to the powers and interface features of the Macintosh — the proverbial "all of the

This MacDraw-ish application was written entirely in SuperCard, using its HyperTalk extensions, built-in object consciousness, real menus, and members of its full line of window types.
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above.” Powerful as SuperCard is, it would be a mistake to dub it hastily the *high-end* or the *color* HyperCard. It can be just as tame as HyperCard, and color is not its only feature. It will run perfectly well on a Mac Plus or an SE.

Moreover, it’s neither a HyperCard clone nor a direct competitor. Since HyperCard comes with every Macintosh, we won’t see a sudden drop in HyperCard sales. What’s more likely to happen is a boost to *Macintosh* sales. Potential developers who find HyperCard too restrictive can now embrace the Mac and SuperCard’s wide-open authoring environment. Current developers, already well-versed in HyperTalk, can now pull out all the stops and create some awesome stuff.

**WINDOWS, NOT PEEPHOLES**

With SuperCard you can build applications that look and feel every bit like any application you pay good money for. Both developers and users should be ecstatic about that. Yes, there are cards, but these can be of any size — as big as billboards if you like. These cards can reside in any of the seven window types that the Macintosh System supports, including scrolling windows, floating palettes, and dialog boxes. You can even change the type and size of windows on the fly, based on the size of the screen, for example, or the longest line of text, or the location of other windows. There are options that allow the user to zoom, resize, and drag a window, depending on its type. You can have any mix of card and window sizes in one file.

Although each window can show only one card at a time, you can have any number of windows open. What’s so hot about that? One window may hold clickable tools, another a document on which the tools may operate, while yet another may contain reference information. If you’re conducting research, you can browse in one window, then select items from that window and copy them to your collection window — possibilities, possibilities.

**PICTURE THIS**

SuperCard has a full-featured, full-color, object-oriented drawing environment for creating objects that can be reshaped, resized, restacked, and moved freely throughout the document. Its Paint mode draws on floating easels — which are themselves objects, enabling you to reposition them easily on a card and make them dance to scripted motion. Each graphic, imported or new, can have its own color palette. There are commands to drive speed-controlled color cycling of a specific range of palette colors, providing another tool for conveying information. There are also tools for auto-tracing and gray-scale manipulation. SuperCard will import the same kind of plug-in tools that SuperPaint 2.0 accepts. What’s more, it can import PAINT, PICT, PICT2, TIFF and Encapsulated PostScript Format (EPSF) graphics files.

**A MOVING SUBJECT**

Because everything on a card is a floating object, it can be the subject of animation. SuperCard’s Move command lets you relocate an object to a specific place on a card, or shift it relative to its current position and specify how many steps to take along the way. You can instruct any object to move along the points of any polygon or freehand object, visible or invisible. That’s fancy animation with minimal scripting. Future releases of SuperCard look to be far more sophisticated. You can record your animation as a PICS file, which is a multiframe format that can be played back by SuperCard itself, by VideoWorks Professional, and by simple “projector” programs.

**HOT BUTTONS**

Of course, standard button types are available, with the addition of a *polygon button*, which can be of any size or shape. Any button can be assigned any font, color, or line thickness, and a shadow of variable offset, pattern, and intensity. You can even design your own button icons and cursors for pushing them. If you prefer, you can use anything as a button. For the same object-oriented reasons, anything on a card — including graphics — can be used as a button, with a real script associated with it.

**MENU CHOICES**

You have full control of menu installation and removal, menu names, text styles, what each menu item does, and whether a menu item is disabled or has a Command-key equivalent. Your menus don’t have to play second-banana to some mandatory set, but if you have no menus of your own you can opt to install a supplied set that enables stack navigation and editing, saving files, and the use of desk accessories. You can add to or subtract from those as you see fit, and you can change the menus even as your application is running.

**DATABASE POWER**

SuperCard lets you have any number of open stacks, and you can operate on any item of any open or closed stack without explicitly opening anything. The opening and closing does occur, but it’s handled transparently by SuperCard itself. SuperCard’s multi-
The Complete Works of William Shakespeare
Volume 82

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windowing talent simplifies data entry with the use of forms whose contents can be distributed among several databases, not necessarily into the card that's initially receiving the input. You can thus have a variety of entry-form cards for the same database or databases.

PRINTING
SuperCard unshackles you from HyperCard’s limited printing options and its low-resolution bit-mapped graphics. You can now design layouts of practically any size. These layouts can contain graphics and data from several databases, and take full advantage of LaserWriter-quality output. In many cases, SuperCard can serve perfectly well as a page-layout application with automatic page numbering, table of contents, calculation, graphing, and anything else you can script.

MAKING APPLICATIONS
SuperCard can produce two kinds of applications — those that must run in the presence of SuperCard, and those that can stand alone, requiring no supporting program to run. Stand-alone eliminate problems of compatibility with HyperCard, or even other versions of SuperCard. You’ll be able to produce a stand-alone program with its own custom icon and password protection so that users can’t modify it, ensuring both its integrity and its value. Silicon Beach requires no license fees for the stand-alone applications you distribute. Users of stand-alone applications don’t even need to own a copy of SuperCard.

The SuperCard package actually has two parts — SuperEdit for creating and fully editing an application, and SuperCard for running non-stand-alones. SuperEdit can open multiple SuperCard applications so you can copy and paste components among them. Components can be entire menu sets, windows (and associated cards), scripts, and resources. For editing card objects, there’s a selection tool for each object type and a universal tool that can select and operate on multiple objects of mixed types, even if some are on the foreground and some are on the background. Additional welcome features are the alignment tool to help card designs look neater, and the ability to group graphic objects and use a single script to control every member of the group.

SuperEdit can also import resources from HyperCard stacks, SuperCard applications, and other Macintosh applications. These include tool palettes, menus, icons, cursors, XCMDs, XFCNs, Sounds, and color lookup tables. Imported menus and tool palettes from non-SuperCard applications won’t carry their programming with them — you’ll need to develop your own scripts for them. SuperEdit can also import a HyperCard stack and output a SuperCard stack of the same initial functionality. This conversion doesn’t affect the original stack. All SuperEdit can’t do is execute scripts.

RUNNING, MAN
SuperCard, the runner, does all the executing, but it’s been wisely empowered with the ability to create and edit scripts, graphics, fields, buttons, cards, and windows. Except for offering script access when an error occurs, the runner has no built-in editing interface — that must be scripted. Luckily, Silicon Beach has already done it for you.

A script set can be automatically activated when you run any stack. It gives you HyperCard-like menus, tool palettes, a message box, and a hefty subset of SuperEdit’s punch. If this sounds a little roundabout, consider that you can modify that soft-editing environment to work any way you like, developing or buying a new one, or customizing it according to your needs and removing it partially or complete-
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THE "C" WORD

On the surface, concerns of compatibility with HyperCard stackware seem well-founded, but they quickly vanish. First, you need only to convert a HyperCard stack to a SuperCard stack if you want to increase its functionality. Second, Silicon Beach assures us that SuperCard will stay abreast of HyperCard developments, maintaining the ability to import HyperCard stacks. Third, even if compatibility is incomplete, several perfectly viable alternatives exist. The obvious option is to continue using HyperCard. Another alternative is to convert stacks to SuperCard and make any necessary one-time adjustments. The final route is to duplicate and improve the functionality of a HyperCard stack in a spanking-new SuperCard stack. As for the other direction, SuperCard’s language extensions, higher capabilities, and file formats preclude it from exporting its stacks to HyperCard. But why bother?

WHAT SUPERCARD MEANS TO YOU

If you’re strictly a user, you’ll benefit from this new hyperware that does far more, without using goofy workarounds, to compensate for a limited interface. If you’re an occasional scripter, you’ll find that familiar HyperTalk statements have gained numerous well-integrated SuperCard extensions, and every script window has pop-up menus containing the entire SuperTalk language. You can start with one-window/one-card applications and grow from there in the privacy of your own cerebrum. You experienced scripters, who have already bumped hard against the limitations of HyperCard, can now dispense with the mental wish lists and dust off those shelved project ideas.

Developers of HyperCard accessories, like reference stacks, canned scripts, external commands, and report generators, need not worry. The potential for SuperCard development is vast. There is always a market for software with true utility and a clear, appropriate interface. Not everyone can achieve that, but those who can will have the ideal tool to make and market real software. Experts in any field will be able to share their expertise and present their knowledge in practically any form and sequence they choose — without becoming programming hermits. The educational possibilities are immense. SuperCard should ship in the second quarter of 1989, and will sell for less than $200 — a small price for such a talented artist and capable servant. After all, it even does windows.

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Fooling Mother Nature with Fractal Flora

leaves as richly brachiated as the tree itself. On the other hand, natural objects also display a tantalizing unity of form; it’s clear at a glance that even the most distressed-looking tree grows according to some simple law of symmetry. Yet until recently, any attempt to model a tree with a symmetric form looked phoney.

The mathematical domain of fractals, named and charted by Benoit Mandelbrot, is providing a key to understanding these contradictory aspects of natural forms. Mathematicians, physicists, computer scientists, and photographers have contributed to the application of the mathematical theory to what Mandelbrot calls forgeries of landscapes and other natural forms. One classic example was created in the labs of Lucasfilm under the direction of Loren Carpenter: the transformation of the planet Genesis in the movie Star Trek II: The Wrath of Kahn. But that was seven years ago, and the fractal science/art has advanced in the interim to the point where the best fractal forgeries can pass a visual Turing test. They can pass for Mother Nature.

This verisimilitude comes at a cost: Carpenter has complained that Lucasfilm could not justify spending “twice as much money to improve the quality of the pictures by 2 percent.” It takes a lot of computation to generate many levels of a fractal image. BYTE magazine columnist Steve Ciarcia recently developed a parallel-processing system and showed how to use the power of parallelism to generate the archetypal fractal image, the Mandelbrot set, a demanding task on a sequential machine.

But it is possible to produce graphics that impressively mimic shrubs, coastlines, and other natural forms in less than geological time and on a Macintosh. You don’t need a custom computer to explore what is perhaps the most important development in computer graphics to date, the fractal. Your Mac is up to the task. And you can do it in HyperTalk, starting with the script at the end of this column.

Fractals deal with the contrary aspects of natural forms — infinite complexity and unity of design — by the principle of invariance under changes in magnification. No matter how much you blow up a fractal image, it remains complex; you don’t ever get down to the ultimate elements. And the pattern is the same pattern all the way down: The fractal image looks the same, essentially, at any level of magnification. This fact makes it possible to describe the infinitely complex image succinctly, because one simple formula describes it at infinitely many levels of magnification. Or describes it approximately; the formula only specifies a kind of Platonic essential form, and the fractal artist will typically enrich the realism of the image by introducing randomness within this mathematical design.

This turns out, apparently, to be the right way to do it. It is, apparently, the method nature uses. A line tracing of the coastline of a continent is not distinguishable from a line drawing of a mile of coastline viewed from a low hill, unless you happen to recognize the shape of that particular coastline. The same coastline-generating rule applies at any level of magnification. This same principle of invariance under changes in magnification applies to river courses, mountain ridges, and branching in plants. The deep complexity and essential unity of natural forms are well captured by this principle, and fractals are proving to be the first practical tool for generating convincing forgeries of natural forms.

Of course, it is neither practical nor even possible to produce infinitely articulated images in finite time, so computer-generated, fractal-based forgeries of natural forms are never more than approximations to the true mathematical fractals. But because the same mathematical generating function, the same design principle, applies at each level, an approximation to a few levels works. It captures the essence of the pattern, and
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**Further depth merely enriches the image.**

The HyperTalk script at the end of this column asks how many levels deep to apply the algorithm. The more levels, the more compute time and the richer and more natural the image it produces.

The algorithm used in the script, adopted from *The Science of Fractal Images* by M.F. Barnsley, R.L. Devaney, B.B. Mandelbrot, H.O. Peitgen, D. Saupe, and R.F. Voss (Springer-Verlag, 1988), is particularly well suited to the mimicry of trees and shrubs. It is also very general. By specifying a short generating function and running it through a few levels of processing, you can conduct your own experiments in floral forgery.

The HyperTalk script consists of two components that carry out the two phases of the task. The first phase reduces the mathematical formulation of the fractal—the generating function—to a series of turtle-graphic commands: *F* for one step forward, + for a clockwise turn, and − for a counterclockwise turn. The second phase is a miniature turtle-graphic language interpreter that performs the graphic commands and draws the figure. This separation into phases means that you can rework the drawing algorithm without worrying about the more mathematical portion of the code. It also means that you can fine-tune graphics by dumping into a field the command string generated by the first phase, where you can edit it before submitting it to the drawing phase.

You should key in the script as a stack or card script and create the specified fields for data entry. I used fields rather than a dialog for input because I wanted to be able to build and draw from a library of fractals, but this presents a small practical problem. Since you don't want the fields cluttering up the screen when you produce the fractal image, you need to hide them when you aren't using them. There are several ways to do this; I used an invisible button (not described here) so that I could bring up the fields for examination on demand.

To use the script, you need to specify the generator function. This is somewhat complicated, so you should begin with the examples I have supplied. You specify the generator function in terms of turtle-graphic commands, supplying a starting value (such as *F* for forward) and one or more transformation rules, which tell the script how to generate the commands at level 1 from the commands at level 1-1. The script then transforms the starting value according to the transformation rules to produce level 1, transforms the result to get level 2, and so on, for as many levels as you specify.

The transformation rules can be as complex as you wish, and you can have any number of them. You enter them into two fields: In and Out. At each level, the script will examine the string of turtle-graphic commands it is building, replace the expression in line 1 of field In with the expression in line 1 of field Out, wherever it occurs, and then replace line 2 with line 2 and so on. So each rule consists of two turtle-graphic command strings in two fields, and the transformation consists of replacing instances of the one string with the other, for example, replacing a line (command *F*) by a line with a zigzag (*F-*F+F+F-F*).

Along with the script itself I have listed the commands recognized by the turtle-graphic interpreter, as well as several interesting generator functions to use and modify. Some of these generator functions employ symbols (*X,Y*) not in the vocabulary of the turtle-graphic interpreter; these are temporary value-holders representing an abstract relationship between levels; they ultimately get interpreted in terms of turtle-graphic commands, and the first phase of the script takes care to see that none of these intermediate symbols gets through to the turtle-graphic interpreter, which wouldn't know what to do with them. In creating your own generator functions, it is less confusing to stick with pure turtle-graphic commands initially.

The two other items you must specify are the number of directions you want your turtle to recognize and the number of levels you want to see. If all turns are to be 90-degree turns, there are four possible directions, and that's what you should specify. But if you will let your turtle make 30-degree turns, the number of directions is 12.
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Running the script, once the fields are loaded, consists of clicking somewhere on the card and telling how many levels you want to see. The number of levels you specify will strongly influence how long it takes to produce the graphic, so it is best to experiment with very small numbers (1 to 3) for this parameter, increasing only when you are willing to wait hours to see the result.

Yes, hours. Some of these functions take days to produce impressive images when running on a Mac II. They also use up memory: The chief memory demand is the turtle-graphic command string, which can grow to hundreds of thousands of characters.

I have used this script to generate interesting graphics on both a Macintosh II and an SE, but the most complex of these, when run out to level 12 or so, may out-run the memory capacity of either machine. You may want to explore improvements to the script to make it use memory less wastefully, such as by eliminating turtle-twitching command sequences like ++- and ---.

In any case, I recommend that you try to estimate the memory demand before setting the script to a day-long computation. A safe benchmark for memory demand is to double the estimated command-string length; if it’s not more characters than you have bytes of memory free, you should be all right.

You can estimate the length of the command string by observing or calculating the rate of growth of the string from level to level and extrapolating. If command-string length seems to be doubling with each new level and the command string is 2,000 characters long at level 9, it will likely be about 16,000 characters long at level 12, requiring no more than 32K.
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-- A Fractal Generator Script
-- Released to the public domain
-- by Mike Swaine, December, 1988.
--
-- This is a card or stack script.
-- It is based on pseudocode by Dietmar Saupe
-- published in The Science of Fractal Images,

-- Turtle graphic commands recognized:
-- F Forward one unit
-- + Turn one unit clockwise
-- - Turn one unit counterclockwise

on mouseUp
-- Prompts for number of levels
-- and invokes the main handler.
ask "MaxLevel?"
if it is not empty
then
    put it into maxLevel
    set brush to 28
    choose brush tool
    PlotOLSystem maxLevel
    choose browse tool
end if
end mouseUp

on PlotOLSystem maxLevel
-- Main handler for fractal system.
global str, xmin, xmax, ymin, ymax
global tStackDir
put 0 into xmin
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put 0 into xmax
put 0 into ymin
put 0 into ymax
put empty into tStackDir
generateString maxLevel
cleanUpString
getCurveSize
turtleInterpretation
end plotOLSystem

on generateString maxLevel
-- Generates turtle graphic command string, -- iterating maxLevel levels deep.
-- Reads initial values from fields, along -- with transformational rules that tell how -- to turn the string at level i into the -- string at level i+1.
global axiom,kar
global str,xmin,xmax,ymin,ymax
put empty into str
put line 1 of card field "par" into axiom
put axiom into str0
put empty into kar
repeat with i=1 to the number of lines —
of card field "in"
  get line i of card field "in"
  if it is not empty
    then put char 1 of it after kar
  end repeat
put length(kar) into num
put empty into rule
repeat with i=1 to the number of lines —
of card field "out"
  get line i of card field "out"
  if it is not empty
    then put it into item i of rule
  end repeat
repeat with level=1 to maxLevel
  put empty into str
  repeat with k=1 to length(str0)
    put char k of str0 into command
    put level && command
    put 1 into i
    repeat while char i of kar
      add 1 to i
    end repeat
    if command=char i of kar
      add 1 to i
    end repeat
    if command=char i of kar
      then
        put item i of rule after str
      end if
    end repeat
  put str into str0
end repeat
end generateString
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on cleanUpString
-- Eliminates nonterminal characters from a string. These characters may legitimately appear in turtle graphic command strings, to be turned into terminal characters in the next level of analysis.

global str
repeat with i=1 to length(str)
    put char i of str into c
    if c is in "F+-|[]" then put c after str0
end repeat
put str0 into str
end cleanUpString

on getCurveSize
-- Scales curve to fit screen.

global str,command,co,si
global turtleDir,turtleDirN,turtleX,turtleY
global xmax,xmin,ymax,ymin

-- Number of possible turtle directions:
put line 2 of card field par into turtleDirN
repeat with i=1 to turtleDirN
    put cos(2*pi*(i-1)/turtleDirN) into item i of co
    put sin(2*pi*(i-1)/turtleDirN) into item i of si
end repeat
put 0 into turtleDir
put 0 into turtleX
put 0 into turtleY
repeat with i=1 to length(str)
    put char i of str into command
    updateTurtleState command
    if command="F"
    then
        put max(turtleX,xmax) into xmax
        put min(turtleX,xmin) into xmin
        put max(turtleY,ymax) into ymax
        put min(turtleY,ymin) into ymin
        end if
    end repeat
end getCurveSize

on updateTurtleState command
-- Updates the state of the turtle.

global co,si
global turtleDir,turtleDirN,turtleX,turtleY
global tStackDir

if command="F"
then
    add item turtleDir+1 of co to turtleX
    add item turtleDir+1 of si to turtleY
else
    if command="+"
    then
        put (turtleDir + turtleDirN - 1) -
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mod turtleDirN into turtleDir

else
  if command="-"
  then
    put (turtleDir + 1) -
    mod turtleDirN into turtleDir
  else
  end if
end if

end updateTurtleState

on turtleinterpretation
  -- Interprets the state of the turtle,
  -- drawing line segments for the turtle moves,
  -- scaled to screen dimensions.
  global factor, xmax, xmin, ymax, ymin
  global str, command, si, co
  global xsize, ysize -- screen dimensions
  globalturtleDir, turtleDirN, turtleX, turtleY
  put 512 into xsize
  put 342 into ysize
  put min((xsize-1)/(xmax-xmin), -(ysize-1)/(ymax-ymin)) into factor
  put 0 into turtleDir
  put 0 into turtleX
  put 0 into turtleY
  put xScreen(turtleX) into x
  put yScreen(turtleY) into y
  repeat with i=l to length (str)
    put x into oldX
    put y into oldY
    put char i of str into command
    updateTurtleState command
    put xScreen(turtleX) into x
    put yScreen(turtleY) into y
    if command="F"
    then
      drag from oldX, oldY to x, y
    end if
  end repeat
end turtleinterpretation

function xScreen turtleX
  -- Turns a turtle coordinate
  -- into a screen coordinate.
  global factor, xmin
  return round(factor* (turtleX - xmin))
end xScreen

function yScreen turtleY
  -- Turns a turtle coordinate
  -- into a screen coordinate.
  global factor, ymin
  return round(factor* (turtleY - ymin))
end yScreen
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THE HELP FOLDER

BY CHRIS ESPINOSA

Got a Mac problem? Something you'd like explained? Something you can't find the answer for anywhere else? Apple's Chris Espinosa will answer your questions every month in this space. When the questions are too tough or too esoteric for him, he'll get the answers from other members of the Mac team. So ask what you need to know and get your answers straight from the source!

Send your questions to Chris, c/o MacUser, 950 Tower Lane, 18th floor, Foster City, CA 94404. Chris will read all your questions, but, unfortunately, he may not be able to answer individual queries.

IN THE MAILBAG

Bunches of people turned me on to two utilities to change the icons for disk drives. I got a copy of Facelift, written by Greg Marriott and Scott T. Boyd at Apple, based on a program by Ron Aldrich. To use it, you drop it in your System folder, use ResEdit to add or edit icons (in the ICN# resource), and give each icon the name of a hard disk drive. Then save and close ResEdit and restart. Whenever a hard-disk drive (or server or CD-ROM) comes up on the desktop, Facelift sneaks in, checks its name, and substitutes the icon you had given that name. It's elegant and fast; I've also been told of another INIT called Facade that does much the same thing. Thanks to half a dozen people for bringing this to my attention. You can get both INITs in most of the standard shareware places (user groups and bulletin boards); Robert Taub sends in a plug for his own board, which you can call at (516) 499-8471 to download Facelift.

NO NAME FONT

I recently installed System 6.0 on my Mac and was reviewing the fonts with Font/DA Mover when I found two fonts named "No Name 9." The first was very similar to Monaco, and the second was the same but in italic. I had not installed either font on my Mac, so I attempted to remove them. As soon as I clicked on the Remove button, I got a message that said, "Sorry, a serious error has occurred." I had no recourse but to attempt restarting the System with the on/off switch.

On doing so, I found that the System would not boot. I got only an icon of a floppy disk with a question mark (where's the System?) To restore my Mac to working order, I had to initialize the internal hard disk and reinstall everything. I replaced System 6.0 with the older 4.2 and have had no problems since.

Any idea where No Name came from or why it destroyed my system when I tried to remove it?

J. A. WILLIAMSON
HOCKESSIN, DEL.

Font/DA Mover shows "No Name" when a font is present that doesn't have a name. Most do. Only special hidden fonts (like that for HyperCard's Tools palette) don't have names, because they're not for general use. But there are no such fonts in System 6.0, so the font you saw was probably a corrupted version of Monaco that had been damaged during the installation.

If it was a damaged font, I'm not surprised that Font/DA Mover blew up; most programs would. But Font/DA Mover is special in that it lets you change the System file as well as access it, and your System crashed in the middle of removing something from the System file — whose "parts are all over the floor" at that fairly delicate moment. So I'm also not surprised your System wouldn't reboot after the crash.

But you shouldn't have had to reformat your hard-disk drive. Whenever your Mac won't boot, take it one step at a time. First, start up from the most recent System Tools floppy disk. If your hard disk shows up on the desktop, then the hard-disk drive is fine and doesn't need reformatting. Try running an application from the hard disk. If you can then eject the floppy, and the Mac doesn't ask for it back, then even your System file is fine; you just need to replace the Finder.

It's probably a good idea to check out System 6.0.2 at some point. But if you're having no problems with 4.2, you have no reason to change.

HOW MANY MEGABYTES?

I want to upgrade the RAM in my Macintosh SE, which is now 1 megabyte, to either 2 megabytes or 4 megabytes. I am confused when I hear that the 2-megabyte upgrade is really a 2.5-megabyte upgrade. Does this mean that the 4-megabyte upgrade is really a 4.5-megabyte upgrade?

I am not an electronics technician, but I am a professional engineer, and I'm good with my hands. Could I do this job myself without ruining the computer? Where can I buy a book on the subject and get proper instructions and tools? I've been told that precautions against static electricity must be taken. How?

RICHARD G. HAWNERIE, PA.
Inside the Macintosh SE are four connectors for single in-line memory modules (SIMMS). A SIMM holds eight memory chips and snaps into one of the connectors. There are two kinds of SIMMs: 256K SIMMs (a quarter of a megabyte) and 1-megabyte SIMMs.

Your SE requires matched pairs of SIMMs, so here are your choices with four slots: one pair of 256K, two pairs of 256K, one pair of each kind, or two pairs of 1 megabyte. Multiplying it out, you can see that these four configurations give you 512K, 1 megabyte, 2.5 megabytes, or 4 megabytes, respectively.

Your Mac has the 1-megabyte configuration—two pairs of 256K SIMMs. To upgrade, you can buy one or two pairs of 1-megabyte parts. But you have to remove one pair of 256K parts for each pair of 1-megabyte parts you install, because there are only four connectors.

So, if you buy the 2-megabyte upgrade package (one pair of 2-megabyte SIMMs), you remove 512K worth of memory from your 1-megabyte Mac and add 2 megabytes, giving you a total of 2.5 megabytes. If you buy the 4-megabyte upgrade (two pairs), you remove both pairs of 1-megabyte parts and replace them, leaving you with 4 megabytes.

Either way, you'll have some 256K parts left over. Some people use those to upgrade a 1-megabyte Macintosh II to 2 megabytes, because the Macintosh II has eight SIMM connectors internally.

Removing and installing SIMMs is not difficult, but opening up a Mac SE is. You need a special Torx screwdriver, and it helps to have a "spreader" tool to open up the case. You have to take special precautions to discharge the excess voltage on the cathode-ray tube so you don't damage internal components (either the Mac's or your own!). And you should use grounded wrist straps and static-reducing floor and table mats in your work area when you're dealing with SIMMs.

Sams Books has a service guide to the Mac, which lists the tools necessary to do basic cleaning and maintenance.

MacWEEK, Mar. '88

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MACazine, Feb '88

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Panel. Also, moving the keys to different locations has proven less than satisfactory because the keys on different rows have different shapes. Do you know of any labels one could use instead (preferably coffee and sweat resistant)?

DENIS CHABOT
CALGARY, ALBERTA

I looked around for Dvorak keyboard layouts and found only two kinds: those that let you determine the layout automatically at boot but force you to reboot to change, and those that let you change at any time but can’t set up automatically at boot. (The latter is Mac-Qwerty, from Paragon Concepts, 4954 Sun Valley Road, Del Mar, CA 92014; (619) 481-1477.)

The tops of the keys are the part of the computer that’s subject to the most hostile environment: repeated pounding by sweaty fingers. Apple’s key labels are imprinted by a process called thermal sublimation, in which the “ink” is chemically bonded to the plastic so it won’t rub off or smear. (We tested several processes, one of which held up to almost everything — except Oil of Olay!). I’d try writing on the underside of little squares of acetate with a permanent marker, then using epoxy to attach them securely to the key caps. Test it first to ensure that the glue doesn’t smear the marker ink.

WASTING PAPER
Q. I have a Mac 512KE used with an ImageWriter II and Microsoft Works. The problem I encounter quite often is that when I print multiple copies of a document, after the copies are printed, the printer feeds the same number of blank pieces of paper through the sheet feeder. As a result, I am constantly replacing blank paper in my sheet feeder. How can I tell the printer to print only the required number of pages without the same number of blanks coming through? I even sometimes encounter this problem when printing only one copy of a document.

STEVEN WEINSTEIN
WAYZATA, MINN.

A. The printer is fine, but Microsoft Works thinks you’re working on a two-page document. It’s printing all the page 1s, then all the page 2s. (It does this because you only have 512K of memory; if you had 1 megabyte, you’d see alternating printed and blank pages. In low-memory situations, some programs “spool” a temporary image of each page to disk before printing, be-

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MacUser, Sept. ’88

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cause there’s not enough RAM to store the image.)

The most common reason for Works to think your document is longer than you do is that you have extra Return characters at the end. Open the document and drag the scroll bar all the way to the bottom. Is the screen blank? You’re looking at the blank page 2, the one the sheet feeder just fed through. Click in the blank space and press Backspace. Keep backspacing until you see the last line of your text appear, then backspace right up to that. That should eliminate the extra Return characters and reduce your document to its one-page length.

EASY ACCESS

Q. In the sidebar on page 146 in the November ’88 issue of MacUser, Jane Berliss mentions “Easy Access” but not how to obtain it. I have a tremor in both hands as a result of a stroke several years ago, and so I use a Dvorak layout that I find much better than the standard QWERTY. But with the tremor I need all the extra help I can get, so I’d really appreciate knowing more about “Easy Access.”

HAROLD F. CHEVALIER

A. Easy Access is a set of utilities built into the Macintosh system software that allows the user to modify the operation of the keyboard and mouse (See “Open Door Policy,” February ’88.)

Sticky Keys is a feature that allows single-finger operation of the keyboard. With Sticky Keys turned on, the “modifier” keys (such as Shift) can be pressed before the key they modify, rather than at the same time. Pressing the modifier key once modifies the next keystroke only; pressing it twice locks it on until it is turned off by being pressed again. Multiple-modifier key sequences (like Shift-Option) can be executed using Sticky Keys. An indicator in the menu bar shows you which modifier key is active.

MouseKeys is a feature that allows the keys on the numeric keypad to be used in place of the mouse.

Easy Access is included in the Macintosh system software update for all versions of the Mac system software since version 4.1.

LANDSCAPE DESIGN

Q. I wish to obtain information on software suitable for use in horticultural landscape planning. Some kind of CAD software might be ideal for this purpose. I would be using whatever I purchase in my Macintosh.

A. Landscape Design with a Mac

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You can put a little color in the cheeks of your company president next time you produce the newsletter. Or use color to distinguish multiple layers and objects in CAD drawings. Or create charts to transform complex numbers into easily understood color graphs.

Whatever you do on your Macintosh, you’ll do it more productively with a T16.
SE, which has 2 megabytes of internal memory and an external 40-megabyte hard disk. It also have a full-page display and a laser printer. 

MICHAEL W. L. PEASE ALGARVE, PORTUGAL

A. Since you mention CAD (computer-aided design), I assume you mean professional-level landscape design, not just putting in your garden. (If you want to just putter, there are plenty of clip-art packages with trees, shrubs, and so on, that you can use with any Mac drawing or painting program.) MGMStation is a professional-level, two-dimensional CAD design and drafting package that lets you draw lines, arcs, circles, fillets, intersections, splines (smooth curves), and shapes, and lets you move, rotate, mirror, dimension, and delete elements of the drawing. It gives you multiple drawing layers that you can show individually or simultaneously — for example, just the trees, or trees and flowers, or both on the background of the brick paths.

It’s made for use with a set of predesigned symbols and elements, and several are available: the Architecture package ($195) has some landscape symbols, though you might want to design your own and add them to the library.

MGMStation is pricey; its suggested retail price is $999 (black-and-white version). Contact Micro CAD/ CAM, Inc., 5900 Sepulveda Blvd. Van Nuys, CA 91411; (818) 376-0008.

BLINDED BY SCIENCE

Q. Where can I find a reference for hardcore science applications such as hydrogeologic modeling?

DAVID ORR COLUMBUS, OHIO

A. The best place is the Kinko’s Academic Courseware Exchange, which is a low-price software market operated by the Kinko’s Copy centers that are a fixture on many American college campuses. The catalog has liberal arts, education, science, computer science, and math applications written by professors and students. Some of the science applications include General Chemistry, GeoStructures, Huckel Molecular Orbitals, Rate Law and the reaction rates of chemical reactions, physics simulations including electromagnetism, and a Model Neuron.

You can get the Kinko’s Academic Courseware Exchange catalog at any Kinko’s Copy Center or by writing to Kinko’s A.C.E., 255 West Stanley Ave., Box 8000, Ventura, CA 93002.

We'd like to color your thinking. Of course we would—but you should decide for yourself if the T16 and T19 are as good as MacUser thinks. Go see one and conduct your own review. For details, write E-Machines at 9305 SW Gemini Drive, Beaverton, OR 97005 or call us direct for your nearest dealer: 1-503-646-6699.

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800, or you can call the Academic Courseware Exchange office (7 AM to 5 PM Pacific Standard Time) at (800) 235-6919; in California, (800) 292-6640. Outside the United States, you can call the A.C.E. at (605) 652-4158.

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**BAD FLOPPIES**

I’ve had an enormous number of floppy disk errors — more than 20 bad Sony disks this year alone. I didn’t have these problems with my original Mac (only a few bad disks over several years), but when I switched to the SE, bad disks started coming out of the woodwork. Most of the time, a disk will work great until one day — out of the blue — I’ll put it into my Mac, which will ask if I want to reinitialize it. At that point I click No and try to check it over with Mac-Tools. Sometimes the disk will seem OK until a Verify Disk is performed (revealing numerous errors). Other times I get the dialog box asking whether I want to mount, erase, view, or eject the disk. Even if I get it mounted, it still shows errors when verified.

I’ve had my computer and drives checked, and they all passed. Could the problem be dust or interference from magnetic fields? When they’re not in use, I keep the disks in cases, out of the sunlight, and away from obvious threats (magnets, cathode-ray tubes, speakers, and so on.) Do you have any ideas why the disks suddenly bomb?
and how it might be prevented?

JEFFRY WINDSOR
OAK RIDGE, LA.

First, I assume that when you switched to the SE, you switched to double-sided disks for the SE's 800K double-sided disk drive. (Single-sided disks may seem to work fine when formatted double-sided — but they tend to lose their information after a few uses.)

It sounds like you kept your disks safe from most of the magnetic disk devils, but when the disk's performance is sporadic, that tends to indicate that the damage is physical, not magnetic.

The oxide coating that's on the plastic disk can bend and flake off, resulting in "dropouts," just like on audio- or videotape. The difference is that on audio tape, dropouts sound like pops, and on videotape, they look like "snow." On floppy disks, though, they can result in an entire disk becoming inaccessible.

Dropouts can happen in droves if you buy a bad batch of disks. Check the manufacturing code on the back side of the disk, usually right above the molded "Made In Japan." If all the bad disks have the same manufacturing code, then it was probably a bad batch, and you may be able to get your money back (but not your data) if they were under warranty. Or it could be that you’re just using the disks a lot. When the Mac says a disk is unreadable, it means that the directory is damaged; since the directory is the most-used piece of information on the disk, you could simply have worn out the directory track. But that’s not supposed to happen for thousands of hours of total use.

The checks your dealer ran only test the electrical performance of the drive. You’re right in suspecting dust: If something got onto the disk head, it might be acting as an abrasive and scratching away the oxide from your floppies, causing them to wear out prematurely, and the electrical tests can’t uncover that. In that case, get a floppy-disk drive head-cleaning kit and clean up your drive heads. Drive safely.

WITHER LISA?

Q. I recently saw an ad for the Apple Lisa by a company that claims to have been authorized by Apple to sell the out-of-production Lisa. The company says that its Lisas will run “most” Macintosh software. Is this possible? Can I run current versions of Microsoft Word, Cricket Graph, or any major software?

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As a college student with large computing needs, yet without a large budget, this is a difficult offer to refuse — but only if the Lisa does deliver nearly 100 percent of compatibility with the Mac Plus. Please set the record straight on this important discovery. Although nothing is as promising as it first appears, perhaps just this once I can be spared a great expense without sacrificing my computing needs.

TODD HECHTMAN
HIGHLAND PARK, ILL.

The Lisa was originally designed to run its own set of applications. With the introduction of the Macintosh, however, Apple also introduced MacWorks, which was software that enabled the Lisa to emulate a Macintosh. Later, the Lisa was renamed the Macintosh XL (for "Ex-Lisa" or "Extra-Large") and the Lisa software was deemphasized; later, it was dropped altogether.

But a lot of Lisas were shipped, and many original Lisa owners have traded them in on Macintoshe's. A company called Sun System Remarketing refurbishes these Lisas and adds a newer version of the MacWorks software, called MacWorks Plus, that supports MultiFinder and multiple hard disks.

Before the Macintosh II was introduced, I was using a Mac XL with its built-in hard disk and 2 megabytes of AST RAM, and running Switcher on the Lisa's bigger screen — and printing over AppleTalk as well! So I had much of what my co-workers waited for the Macintosh II to get. The only problem is that although the Lisa uses the same 68000 microprocessor that the Macintosh Plus does, it clocks it at 5 megahertz instead of 8 megahertz, so software runs a little slower than on the Plus (and a good deal slower than on the II). I don't have a complete compatibility list for MacWorks Plus, but as with any question of compatibility, I wouldn't take anybody's word for it — you have to try it. Write to Sun Remarketing, P.O. Box 4059, Logan, UT 84321; (800) 821-3221 and find out where a local dealer is. Then try your key software on a Lisa running MacWorks.

Yes, you can save money by using a discontinued computer. But even if your software runs on it now, at some point the software vendors might revise the software, and you might find that it won't run on the Lisa anymore. So remember that the money you save now is money you'll probably spend on a mainstream Mac later.

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When you're sure of the software you want, buy it with our promise... if there's something you don't like, we'll take it back. We'll treat it as a trial purchase, and refund the difference between what you paid to buy the software, and what it would cost if you had taken it on trial (10-day minimum and we provide six free days for shipping). When you're not sure, ask about trial purchase. You can look at one or several competing programs, and save with our Try-Pack specials. Either way, we'll help you get Software That Fits.
SOFTWARE

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- 16 day rental period
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ACCESORIES

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- OT Mac 40 Tape Backup: 975

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- ThunderScan 4 with Par Port: 153

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Please circle 166 on reader service card.
In the evolutionary unity of the Mac, change is always apparent. Programs are constantly being reanimated with upgrades and new versions. For many, keeping up with these transformations isn't easy.

The following chart is an attempt to keep track of knowledge and Mac users up-to-date with upgrades and new versions (as of press time) of many popular programs. To see if you have the most current version, check the Advisor item at the top of the Apple menu when you run a program.

Those with the 512K, 512KE, or XL should be running System 3.2 and Finder 5.3. Everyone else should be running System 6.0.2.

Microsoft has updated Works 2.0, which includes new drawing tools, macros, and an integrated spelling checker, and a larger spread of Works. 2.0 also includes HyperCard computer-based training.

All programs listed here are HFS compatible. From this chart, you can extract the following information: CP or NCP, copy protected or not, programs we have found to be Mac II compatible (not yet a comprehensive list); and $s for shareware (try before you buy).

Changes and new listings are in bold. Programs that appear to be compatible with the Macintosh II may not actually perform 100 percent of the functions they do on other Macintoshes, nor do they necessarily take full advantage of the Mac II.
MINIFINDERS

Have you often wished for a personal assistant to help in picking software? These MiniFinders may not breathe and move, but they do tell you what products are hot and, better, what these products do. Each of these items has been carefully reviewed and selected by the MacUser editorial staff. Each has been rated in increments of half mice, from 1 to 5. Ratings are relative within categories, and they can change as categories expand and new products advance the state of the art. You won't see many low ratings or bombs, since we're telling you about the really bad products so that you don't spend your money on them. Red names indicate this month's additions. The letters at the end of the entries indicate whether a product is copy protected (CP) or not (NCP). If a product has been reviewed or Quick Clicked in MacUser, the date of the review is shown. Eddy (Editor's Choice) Award winners are noted with a * and the year in which they won prizes for an excellent product. Next time you have to find products you can count on, count on MacUser!

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BUSINESS ACCOUNTING

Accountant, Inc. integrates accounts payable, accounts receivable, general ledger, and inventory modules. Prints checks, purchase orders, invoices, customized reports. Bare-bones accounting system limited in size and scope, but ease of use and integration make it suitable for small businesses. Requires 512K+. Version 2.0, $399. SoftSync, 162 Madison Ave., New York, NY 10016. NCP (Oct '87)

Back to Basics Accounting is a powerful double-entry accounting software package for the small business user with GL, AR, and AP modules. Exhaustive manual with numerous examples. Report capabilities are excellent. $199. Peachtree, 4355 Shadeloft Road, Norcross, GA 30093. NCP (May '87)

BPI General Accounting is an easy-to-use system. Six journals, AR, AP, Payroll, and GL on one disk. Offset amounts automatically post to ledgers. Up to 8000 accounts. Detailed records, wide range of reports. Requires 512K+. $249. BPI Systems, 3001 Bee Cave Road, Austin, TX 78746. NCP (Aug '86)

Insight is a high-powered accounting program for the small-to-medium-sized business. Modules include Accounts Receivable, Payables, and General Ledger; others are in the works. Requires 512K and hard disk. $595. Laypered, 529 Main St., Boston, MA 02129. NCP (Dec '86) * Eddy

Rags to Riches integrates accounting modules (General Ledger and Accounts Receivable) uses Mac interface to the hilt. Information entered in one window automatically transfers. Detailed, flexible report options. Very easy to use, but it can be confusing with several windows on-screen. Requires 512K+ and printer, $199. NCP (Aug '85)

Rags to Riches Professional has tracking and bills professional services. Batch processing for individual timekeepers. Use as stand-alone, or integrate with R to R modules. Requires 512K+ printer, $399.55. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Feb '87)

Simply Accounting has six ledgers and eight journals to handle the needs of most small-to-medium-sized businesses. Better Mac interface than most. Payroll tax labels can't be modified, which forces you to subscribe to Bedford's yearly update service. Version 1.03. Requires 1 megabyte. $349. Bedford Software, 15311 N.E. 96th St., Redmond, WA 98052. NCP (Sept '88)

Strictly Business General Ledger features clear, well-outlined setup procedures and operations. Very flexible, up to 99 profit centers with up to 100 departments each, and customized reports. Program print spools. Requires 512K+ printer and external drive. $395. Future Design, 13681 Wilmette Drive, Westminster, CA 92683. NCP (Dec '85) * Eddy

Timeslips III tracks billing and expense information for people who charge by the hour. DA turns the clock on and automatically bills a client when a session is over. Version 1.06. Requires 512K and two disk drives. Mac II and MultiFinder friendly. $109.95. North Edge Software, 239 Western Ave., Essex, MA 01929. NCP (Sept '88)

PERSONAL FINANCE

Dollars & Sense is a bookkeeping program. Easy to use, with a good manual and excellent on-screen help. Will handle up to 120 separate accounts or money categories. Uses standard double-entry accounting techniques. Will work on 128K, $149.95. Monogram, 8255 S. La Cienega Blvd., Inglewood, CA 90301. CP (Mar '87)

MacInTax is an excellent tool for preparing tax forms. Intuitive, easy-to-use. Accepts data from leading personal finance programs. Good built-in help. Legal upgrade policy for owners of prior versions. California forms set also available. $11.19 federal; $65 California. SoftView, 4820 Adohr Lane, Suite F, Camarillo, CA 93010. NCP (Mar '87) * Eddy

MacMoney is a financial manager that uses information gleaned from your checks and deposit slips. Produces a variety of reports and graphs. Version 3.1 reviewed. Requires 512K and printer. $119.95. Survivor Software, 11222 La Cienega Blvd., Inglewood, CA 90304. NCP (July '88) * Eddy

Quickcheck if you write checks, then keeps a ledger showing you where all of your money goes. Tax information is automatically generated. Version 1.0. Requires 512K and printer. $49.95. Intuit, 540 University Ave., Palo Alto, CA 94301. NCP (Nov '88)


DATABASES

Business FileVision is a graphic database. Much more powerful than the original, accepts MacPaint graphics. $395. Marvelin, 3420 Ocean Park Blvd., Santa Monica, CA 90405. NCP (Feb '86)

C.A.T. is a dedicated relational database for managing contacts, activities and time. Links between types of data make it easy to keep track of important people and events. $329.55. Chang Laboratories, 5300 Stevens Creek Blvd., San Jose, CA 95129. NCP (Nov '88)

dBASE Mac is a relational DBMS that includes a structured programming language to develop stand-alone applications. Palette icons as alternatives to menu commands will help novice users. Requires 512K and compatible modem, and an I.P. Sharp account. $495. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90402-1319. NCP (Feb '88)

Double Helix II is a powerful database that supports a multiuser environment with an upgrade. Uses an icon-based development system for easy creation of databases. $595, single-user version. Odesta, 4084 Commercial Blvd., Northbrook, IL 60062. NCP (Apr '88)

EndNote provides database management for bibliographies. Designed to work in conjunction with a word processor. Allows for formatted in-text citations to be pasted directly into a word-processing document and then creates a bibliography from the citations. Version 1.0 reviewed. $125. Niles & Associates, 2200 Powell St., Suite 765, Emeryville, CA 94608. NCP (Feb '86)

FileMaker II is a multiuser version of the all-time best file manager for the Macintosh. New features include more flexible layouts, hierarchical menus, and color on the Mac II. Version 1.0. Requires 1 megabyte with...
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two 800K drives or a hard-disk drive. $299. Claris, 440 Clyde Ave., Mountain View, CA 94043. NCP (Dec '88)

4th Dimension is a versatile tool that creates stand-alone relational databases. Design and layout environments allow easy linking of information. Robust, Pascal-like procedure language. $695. Actus, 20300 Stevens Creek Blvd., Cupertino, CA 95014. NCP (Nov '87) ⚫ 87 Eddy


MacDewey is a cataloging program featuring the Dewey Decimal Classification system. Uses predefined fill-in-the-blank fields to create catalog cards. Suffers from bugs in search routines and the inability to distinguish first names. Not for professionals; home libraries might benefit. Version 2.5. $79.95. Mousetrap Software, 336 Coleman Drive, Monroeville, PA 15146. NCP (Nov '87)

Omnis 3 is a power database, featuring concurrent-multiple-file management. Can handle 24 files, 12 at a time, and is fully relational. Create custom environments, including user-defined menus, commands, and dialogs. $495. Sylte, 2329 Campus Drive, Santa Monica, CA 90403. NCP (Mar '86)

OverVUE is a power-packed relational database that has extensive sorting, summarizing, and report generation capacity. Has macros, and a charting function. Good manual. It can exchange files with a very wide variety of other programs (including IBM software). $295. ProVUE, 222 22nd St., Huntington Beach, CA 92648. NCP (Nov '85) ⚫ 85 Eddy

Pro-Cite is a complete database-management system for bibliographies. Almost unlimited flexibility in the formatting of bibliographies. Full-featured search and sort capabilities. Version 1.3 reviewed. Requires 512K +. $395. Personal Bibliographic Software, Inc., P.O. Box 4520, Ann Arbor, MI 48106. NCP (Feb '89)

Record Holder Plus is a flexible, easy-to-use, form-oriented data manager. Setup is particularly simple and the search features are powerful. $69.95. Software Discoveries, 137 Kraswki Drive, South Windsor, CT 06074. NCP (Apr '86) ⚫ 87 Eddy

Reflex for the Mac is a flexible relational database. Excellent report generator gives full control over appearance, style of output. Requires 512K +, second drive, or hard disk. $99.95. Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95069. NCP (Dec '88) ⚫ 86 Eddy

Reflex Plus is a relational database with "smart" entry, and report design, but no overall programming facility. Simple to set up, yet fast. Graphic capabilities are quite limited. Version 1.0 reviewed. $279. Borland/Analytica, 4585 Scotts Valley Drive, Scotts Valley, CA 95066-9987. NCP (Feb '88)

Writer's Workshop maintains orderly records for writers. It can track manuscripts, income, and publisher. Based on and includes Runtime Helix. $99.95. Futuresoft System Designs, P.O. Box 132, New York, NY 10012. NCP (Apr '87)

NUMBER CRUNCHING

Data Desk Professional lets you visually look at statistics with more ease than any comparable Macintosh program. Plots variables so you can analyze data to see what patterns develop. Version 2.0. Requires 1 megabyte and two 800K disk drives or hard disk. $495. Odesta, 4064 Commercial Ave., Northbrook, IL 60062. NCP (Nov '88)

Excel is THE power spreadsheet of the Mac. Has 256-column by 16,384-row capability. Features include a powerful macro function (with a recorder to make creation simple) and elaborate charting facilities. $12K + Mac and external drive required. $395. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (Prem) ⚫ 85 Eddy

MacCalc is a fast, competent, full-featured spreadsheet with impressive built-in functions, format control, on-line help, ability to expand columns and rows, and read/write SYLK or WKS files. The worksheet is 125 columns by 999 rows. A very flexible, pure spreadsheet. $139. Brava Technologies, c/o DPAS, P.O. Box 7, Gilroy, CA 95021. NCP (Sept '86) ⚫ 86 Eddy

MacSpin is a unique and powerful graphic data analysis program. Handles multivariate data in a highly visual manner. Nothing else like it for any micro. $199.95. D² Software, P.O. Box 9546, Austin, TX 78766-9546. CP(June '86) ⚫ 86 Eddy

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MacInTax Federal 1988

One look and it's easy to see why, each year, users give this program their highest rating.

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MINIFINDERS

MacSQZI compresses Excel files up to 88 percent of their actual size. Good to free up disk space. Also contains password utility. MultiFinder hostile. Requires Excel. Version 1.01. $79.95. Turner Hall Publishing, 10201 Torre Ave., Cupertino, CA 95014. NCP (Aug '88).

Mathematica is a powerful tool for doing all kinds of math. Offers arbitrary-precision numeric calculations, symbolic computation, PostScript graphics, and programmability. Version 1.03. Requires 1 megabyte RAM and a hard-disk drive. 2 megabytes RAM required to run kernel. $495, $795 for the Macll version. Wolfram Research, P.O. Box 6059, Champaign, IL 61821. NCP (Nov '88).

MathView Professional is an equation solver that combines two- and three-dimensional plotting with routines for matrices, differential equations and integrals, complex numbers, and the like. Interface leaves a lot to be desired. Version 1.0. Requires 512K and two disk drives. Mac II and MultiFinder friendly. $249.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Sept '86).

Microtemp Financial Calculators is a set of worksheets for Excel and Works that calculates common personal and small business financial problems. Includes cash flow, real estate, and rate of return calculators. Version 1.0. $79.95. Microtemp, P.O. Box 1208, Santa Rosa, CA 95402. NCP (Aug '88).

MindSight is a professional level, decision-support, and business planning package. Can work with IFPS on mainframes, and is able to transmit models in both directions. Powerful and easy to use. Requires 512K-+ $249. Execucom Systems, P.O. Box 9758, Austin, TX 78766. CP (Dec '86).


StatView 512+ is a very intuitive statistical analysis program with tools needed to understand any set of data. Holds data in a spreadsheet-like form. Full-featured, fast, and accurate. Extremely wide range of analyses possible. Requires 512K-+ and 800K of disk space to operate. $349.95. BrainPower, 24009 Ventura Blvd., Calabasas, CA 91302. NCP (Dec '86).

StatView II is a remarkably complete data analysis package. Essential for any kind of descriptive, comparative, or multivariate statistics. Works in color on the Mac II. Version 1.01. Requires Mac II or SE equipped with 68020 and math coprocessor, two 800K disk drives or hard disk. $495. Abacus Concepts, 1984 Bonita Ave., Berkeley, CA 94704. NCP (Oct '88).

101 Macros for Excel offers all the power of macros without having to learn how to write them. Some gems include a macro to transpose rows and columns, and a search and replace macro. Requires Excel. $69.95. MacroPac International, 19855 Stevens Creek Blvd., Cupertino, CA 95014. NCP (July '86).

GRAPHICS & DESIGN

ArtWare: Borders enables you to customize your own clip art disk. The border collection is the best package in terms of quality of art. Other packages available. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $129. Artware Systems, 37-41 Benson Drive, Raleigh, NC 27609. NCP (Aug '88).

Canvas is a Draw and Paint program that uses QuickDraw as its output language. Full of features, including free rotation and one-and-two-point perspective. Also has graphics macros commands, unusual in a program this inexpensive. $295. Deneba, 7855 N.W. 12th St., Suite 202, Miami, FL 33126. NCP (Jan '88).

Chart can easily create area, bar, column, line, pie, scatter, and combination charts. A total of 42 styles are provided. Limited to 100 data items (64 in a series) on a 128K Mac, approximately twice that on a 512K Mac. $125. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. CP

Click & Clip offers seasonal graphics packages. Of the two quarterly editions available. Requires a program that reads Encapsulated PostScript Format (EPSF) files. $39.95 per edition. Studio Advertising Art, P.O. Box 18432-52, Las Vegas, NV 89114. NCP (Aug '88).

Comic Strip Factory is an assembly program for creating comic strips. Includes a database of parts for various characters and backgrounds for panels. Good text editing in balloons. Can import and export in MacPaint format.

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MINIFINDERS

$69.95. Foundation Publishing, 5100 Eden Ave., Suite 307, Edina, MN 55436. NCP (Dec ’87)

Cricket Draw is an object-oriented drawing program that will produce stunning, high-quality output. Designed to print on PostScript-compatible devices, such as the LaserWriter, $295. Cricket Software, 40 Valley Stream Parkway, Malvern, PA 19355. NCP (May ’87)

Cricket Graph easily generates 12 graph types. Multiple windows can be displayed. Graph prints in up to eight colors with up to 18 patterns. Self-generated graph paper, coordinate and axis labeling, and a legend are available. $195. Cricket Software, 40 Valley Stream Parkway, Malvern, PA 19355. June ’86 ★ 86 Eddy

Cricket Presents is a presentation tool with strong emphasis on graphics. Good for marketing. Supports multiple clipart, Nexta, Version 1.2 requires System 4 or later. $695. Cricket Software, 40 Valley Stream Parkway, Great Valley Corporate Center, Malvern, PA 19355. NCP (Nov ’88)

Crystal Paint creates an electronic kaleidoscope. It is MacPaint’s Brush Mirrors gone wild in a small, simple, yet wonderful application. Does not work in color on Mac II. MultiPaint friendly. Requires 1251K+, $49.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Feb ’87)

Curator catalogs your art and graphics so it’s easy to see what’s what and where it is. Supports PostCUT, TIFF, EPS, PostScript, MacPaint, and more. Changes creator types. Requires 512K and an 800K drive. $139.95. Solutions International, 30 Commerce Street, Williston, VT 05485. Sept ’87

DeskPaint is a full-blown paint program as a desk accessory. Allows you to spruce up graphics, print them in another application, and experiment with Painter’s TIFF images. Great for DTP, but not enough features to rival the leaders in paint programs, Zedcor, $4500 E. Speedaway, Tucson, AZ 85712-5305. NCP (Mar ’88)

Drawing Board is a powerful illustration tool with no real focus. As an art package, this one is not very useful as you cannot alter any of the drawings. Requires a program that reads Encapsulated PostScript (EPSF) files. $129.95. T/Maker, 1973 Landings Drive, Mountain View, CA 94043. NCP (Nov ’87)

EZ Draft is a high-level CAD application. Does things usually only found on mini computer programs. Uses “pop-up” menus to supplement a full set of pull-down menus. Comes with an additional set of printer/plotter/monitor drivers. Avant, 98606 Sunnyvale, CA 95089. $550 for IESS module to link to other CAD programs. Bridgport Machines, 500 Lindsey St., Bridgport, CT 06060. CP (May ’87)

FastFormat Construction Kit is both a fast and efficient business forms creator (a complete, capable program. Groups, Dimension, Libraries, etc., are complete, capable program. Groups, Dimension, Libraries, etc., are included, as is a built-in catalog of elements and attach keywords for later search and retrieval. $69.95. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. NCP (June ’88)

EZ Plotter makes it easy to learn and use. Version 3.0, $249. Challenger Software, 18350 Kedzie Ave., Homestead, IL 60430. NCP (Jan ’87)

EZ Plotter is a digital cartographer that charts demographic and marketing information on a geographic basis. Wide variety of maps available, some at an additional cost. Version 3.0. Requires 512K+. $349. Select Micro Systems, 40 Triangle Center, Yorktown Heights, NY 10590. NCP (Dec ’88)

FMGS: Professional CAD for Macintosh offers more than 200 functions. Very complete, capable program. Groups, Dimension, Libraries, etc., are standard. Sometimes confusing — designed for experienced, professional CAD user, not the novice. Full plotter support. 512K+ - $799. MicroCAD/CAM, 3220 Overland Ave., Los Angeles, CA 90034. NCP (Nov ’87) ★ 87 Eddy

GraphicWorks 1.1 is a powerful drawing and painting program that creates high-resolution bit-maps. Easels contain graphics, balloons hold text, and both reside on panels. Graphic primitives are now a separate tool. $149.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. NCP (Oct ’87)

Illustrator 88 is a professional-level graphics program from the people who designed the PostScript language. Uses templates for precise drawing and detailed artwork. Requires 1 megabyte. $495. Adobe Systems, 1565 Charleston Road, Mountain View, CA 94039. NCP (Oct ’88)

Image Club is an overwhelming collection of EPS clip art available on disk and CD-rom. A wide variety of images, well-designed graphics, and a PostScript program that reads Encapsulated PostScript (EPSF) files. $95. Image Club Graphics, 2915 19th St. N.E., Calgary, Alberta, Canada T2E 7A2. NCP (Aug ’88)

Image Club is a photo-touching program on the desktop. Editable brushes let you modify digitized images in 65 gray levels. Version 1.0 reviewed. Requires 1 megabyte and two 800K disk drives. Mac II and MultiFinder friendly. $495. Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653. NCP (June ’88)

Images with Impact! brings clip art out of the turn-of-the-century woodcut style and into a modern graphic sensibility. “Graphics and Symbols 1” is the first in a series of graphics programs that reads Encapsulated PostScript (EPSF) files. $99.95. 3G Graphics, 11410 N.E. 124th St., Kirkland, WA 98034. CPM (Aug ’88)

Japanese Clip Art is a two-disk set of extraordinary Japanese clip art. Consists of 200 pages and 500 images, plus an additional set of 500 images. The $149.95 set. Qualitas Trading, 6907 Norfolk Road, Berkeley, CA 94705. NCP (Apr ’87)


MacPaint hasn’t lost its shine after all these years. Version 2.0 supports multiple windows, design templates, and a magic eraser for corrections. It lacks free rotation or distortion talents. Requiires 512K+ and second disk drive. Requires 1 megabyte and two 800K disk drives. $125. Clarity, 440 Cyde Ave., Mountain View, CA 94043. NCP (Aug ’88) ★ 87 Eddy

Mac3D is a feature-rich 3-D program with a MacDraw-like interface. PostScript resolution shading with six variable light sources, user-definable tools, many more features. Clumsy interface to rotate objects and camera. Version 2.0. $249. Challenger Software, 18350 Kedzie Ave., Home­wood, IL 60430. NCP (Jan ’87)

MapMaker is a digital cartographer that charts demographic and marketing information on a geographic basis. Wide variety of maps available, some at an additional cost. Version 3.0. Requires 512K+. $349. Select Micro Systems, 40 Triangle Center, Yorktown Heights, NY 10590. NCP (Dec ’88)

MiniCAD is a professional-level CAD package. Vast array of features, many accessible only through Command/Shift/Option key combinations. Works in 2-D or 3-D with easy transition from one to the other. MacDraw-like interface makes it easy to learn and use. Version 3.0, $249. Diehl Graphsoft, 8370 Court Ave., Suite 202, Ellicott City, MD 21043. CP (Oct ’87)

Modern Artist 2.0 is still an interesting color paint program and has added a few more features, but there’s not enough here to justify the substantial price increase. Requires Macintosh II. $495. Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229. NCP (Feb ’87)

PictureBase is a powerful graphic librarian. You can store paint and PICT formats, including standard TrueType fonts as well-defined fonts and images. Requires 512K+ and good DTP software. Version 2.0. $550. Letterform, 761 E. University Drive, Mesa, AZ 85203. NCP (Sept ’87) ★ 87 Eddy

Pixel Paint is a color paint program with customizable palettes and a lot of special effects. Slow Opera friendly. Requires 1 megabyte, and a 8-bit video card. $495. SuperMac Software, 295 N. Grant Ave., Los Angeles, CA 90043. NCP (May ’88)
**MINIFIENDERS**

**PowerPoint** is an easy-to-use desktop presentation tool. Good color schemes.

Can send presentations to Genigraphics to produce color 35mm slides.

Version 2.0. Requires System 4.1 or later. 1 megabyte and two 800K drives or hard disk. $395. Microtech, 1601 11th Way, P.O. Box 97017, Redmond, WA 98073-9717. NCP (Aug '87)

**The Print Shop** makes it easy to create greeting cards, signs, banners, and letterheads. Uses its own special graphics and can import Paint files. Hard-disk users get version 1.02 or later. $79.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (Sept '87)

**SpaceEdit** is a 3-D CAD program. Display shows top, front, side, and axonometric views of an object, all at once or one at a time. Has standard CAD features plus zoom, exploded view, animated flyover. Suppression of hidden lines is very slow. Requires 1 megabyte +. $625. Abvent, 9903 Santa Monica Blvd., Beverly Hills, CA 90212. CP (July '87)

**StandOut** is a presentation program built like a publishing program, with strong text and graphics support. Automatic text flow around graphics objects. Lacks good graphic examples. Version 1.0. Requires 1 megabyte and two 800K drives or hard disk. $395. Letraset, 40 Eisenhowter Drive, Paramus, NJ 07652. NCP (Nov '88)

**Studio/8** is a professional-level color paint application for the Mac II. Superior tool set, elegant interface, excellent performance, and speed. Version 1.0. Requires Mac II and hard disk; 2 megabytes of RAM recommended. $495. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. NCP (Jan '89)

**SuperPaint** is a powerful, easy-to-use graphics program with all the best features of MacPaint and MacDraw — and then some. LaserBits provides 300 dpi magnification and there are 40 editable brush shapes. Requires 512K + and 800K drive. $149.95. Silicon Beach Software, 9560 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126. NCP (Feb '87) *'87 Eddy

Super 3D is a high-power 3-D modeling program with an excellent integrated interface. Powerful time-saver. Features include animation, import/export of 3-D worlds as text files. Excellent for art, design, or technical work.

Version 1.0. Requires 1 megabyte. $295. Silicon Beach Software, 9560 Black Mountain Road, P.O. Box 261430, San Diego, CA 92126. NCP (Jan '89)

**TrueForm** takes a scanned image of a paper form and turns it into an electronic equivalent, complete with fields for entering data. It can automatically sum numeric fields. Requires external 800K drive. $495; run-time version, $295. Spectrum Digital Systems, 2702 International Lane, Madison, WI 53704-3122. NCP (May '88)

VersaCAD is a powerful CAD program that doesn’t show any of its MS-DOS roots.

Excellent element manipulation, fullplotter support. Library user interface is crude. Requires 1 megabyte +. $1,995. VersaCAD, 2124 Main St., Huntington Beach, CA 92648. NCP (July '87)

**VideoWorks II** is an easy-to-use animation tool — the best available on the Mac.

Has an Overview mode that acts as a slide show carousel for presentations. Works in color on the Mac II. $195. Requires 1 megabyte + and an 800K drive. MacroMind, 1028 W. Wofford, Chicago, IL 60657. NCP (Mar '88) *'85, '87 Eddy

**VideoWorks II Accelerator** compiles VideoWorks II movies to make them run more smoothly. Compensates for the QuickDraw screen display. Version 1.0. Requires 1 megabyte. VideoWorks II; hard-disk drive recommended. $195. MacroMind, 1028 W. Wofford, Chicago, IL 60657. NCP (Dec '88)

**VideoWorks II Clip Animation**, **Clip Charts**, **Black and White Movies**, and **Clip Numbers**

Sounds are four separate aids to help you construct movies and business presentations. Requires VideoWorks II. $49.95 to $59.95. MacroMind, 1028 W. Wofford, Chicago, IL 60657. NCP (Dec '88)

**WetPaint** consists of two three-disk volumes of very high quality clip art. Also includes the Art Roundup DA, a good art browser/editor. Volume 1 or 2, $39 each; both volumes, $59. Available in PictureBase format for $15 extra per volume. Dubli-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Sept '87)

**World-Class Fontes** comes in two volumes of three disks each. Includes all the Mac the Knife fonts and a lot more, including two useful utilities. This is now the best collection of ImageWriter fonts available. Each volume:
Interleaf Publisher is a speedy multuser layout system for producing large, complicated documents. It has strong global formatting ability but can't use downloadable fonts. Requires Mac II with 5 megabytes of RAM and 40 megabyte hard disk. $2,495. Interleaf, 10 Canal Park, Cambridge, MA 02141. NCP (May '88).

JustText is a professional-level word processor and page makeup program that generates PostScript output. Comes with a set of LaserWriter utilities that allow total non-administration of text. Requires LaserWriter and PostScript compatible output device. $195. Knowledge Engineering, G.P.O., Box 2139, New York, NY 10016. NCP (Dec '85).


Publishing Packs bundle together three Adobe typefaces that work well for a particular publishing project. The packages offer substantial savings over purchasing the typefaces individually, and the documentation has useful information on typeface characteristics. Newsletters, $395; Forms & Schedules, $475; Presentations, $475. Adobe Systems Inc., 300 Hystash Ave., East, Toronto, Ontario M4P 1K5, Canada. NCP (Aug '88).

QuarkStyle is a collection of 72 designer-created templates for "instant" desktop publishing. The templates, which convert your text from business cards to newsletters, let you concentrate on a page's contents rather than its appearance. Version 1.0. Requires 1 megabyte and hard disk. $295. Quark, 1983 Landings Drive, Mountain View, CA 94043. NCP (Feb '89).

QuarkXPress is a powerful page-layout program, with 24-bit color, style sheets, and search and replace of text attributes. Also does four-color separations. Layout is done using text and picture boxes, which improves control but is difficult to master. Version 2.0. Requires more than 1 megabyte as well as hard disk. $795. Quark, 1983 Landings Drive, Mountain View, CA 94043. CP until registered. (Jan '89)

Ragtime is an "Integrated Page Processor" with text, graphics, and built-in spreadsheet. Flow text automatically from one frame to another. Spreadsheet has a full set of functions. Excellent, easy-to-use program. Requires 1 megabyte +, $395. Letraset, 40 Eisenhower Drive, Paramus, NJ 07652. NCP (Feb '89) * '86 Eddy.

TeXtures is an implementation of TeX, the big daddy of typesetting programs. $95. Blue Sky Research, 534 S.W. Third Ave., Portland, OR 97204. NCP (Apr '88).

CONSUMER COMMERCE

AppleShare is the file sharer marketed by Apple. Software-based, AppleShare requires you to dedicate a Mac and a hard disk to run it. Allows users on the network to protect things from other users on the folder level. Interface to network is provided at a revised Finder. $795. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (May '87).

ComServe allows you to share a Hayes-compatible modem over an AppleTalk network. You can call out, but you can't call in. Works with most telecommunication packages. $195 per server, InfoShare, 4720 S.W. Macadam Ave., Portland, OR 97201. CP (Feb '88).

Desktop Express is a simple-to-use, semi-automated program for using MCI Mail and Dow Jones News/Retrieval. Performance is traded off for ease of use. Requires 1 megabyte +, $149. Dow Jones, P.O. Box 300, Princeton, NJ 08543. NCP (Jan '88).

InBox is an easy-to-use mail system. It's called up from a desk accessory. Has a very slick interface. Dedicated Mac not required. $350 for starter set, which includes the Administrator and the Administrator's Administration disk. Additional Connections cost $125 each. Tops, 950 Marina Village Parkway, Alameda, CA 94501. NCP (May '87) * '86 Eddy.
Nothing Makes An AppleTalk Faster Than DaynaTALK.

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**MINIFINDERS**

InTalk comes with its own communications command language able to do unattended sessions. Supports Xmodem and MacBinary. Has a macro key function. Many sample setup documents and command language files provided.

LapLink Mac quickly transfers data to and from the MS-DOS and Mac environments. Kit contains a cable and software. Control of transfers is on the IBM side. Version 1.2. Requires 512K. $139.95. Traveling Software. 19310 North Creek Parkway, Bothell, WA 98011. NCP (Aug '88)

MacWorkStation is a development environment and communications program that accesses custom mainframe applications through the Macintosh interface. Modular design allows for expandability. Mac II and MultiFinder friendly. Version 3.0. $2,500 for internal use license, $5,000 for commercial use license. Apple Software Licensing, 20525 Mariani Avenue, Cupertino, CA 95014. NCP (Oct '88)

MicroPhone is a high-powered terminal program that's easy enough for novices. Very powerful command language allows full automation of communications, if desired. $295. Software Ventures, 2507 Clarendon Ave., Berkeley, CA 94705. NCP (July '86) ★ 86 Eddy

Microsoft Mail is an electronic mail system that runs under AppleTalk. Supports file transfers across the mail system. Full on-line help facility. Also includes "Watch Mail" messages Desk accessory based. Prices determined by number of users licensed. One to four users, $299.95; five to 10 users, $499.95; 11 to 20 users, $749.95; 21 or more users, $999.95. Microsoft, 1601 N.E. 38th Way, Redmond, WA 98073-9117. NCP (May '87) ★ 87 Eddy

PC MacTerm/pcAnywhere III are two programs that work together to take control of an MS-DOS machine from the Mac keyboard. Versions: PC MacTerm 1.1; pcAnywhere III 3.0. Requires 512K, System 4.1 or later; 128K IBM compatible and MS-DOS 2.1 or later. PC MacTerm, $99; pcAnywhere III, $145. Dynamic Microprocessor Associates, Inc., 60 East 42nd St., New York, NY 10165. NCP (Jan '89)

Red Ryder is a full-featured telecommunications program that supports MacBinary, Xmodem, and Kermit. Has big screen-support, auto procedure creator, and up to 30 keyboard macros. This is the cream of the crop (in late '87). $80. Freesoft, 150 Hickory Drive, Beaver Falls, PA 15010. NCP (Dec '87) ★ 87 Eddy

Smartcom II balances power and ease of use. Capable of unattended operation and has a very powerful command language. Supports MacBinary, Xmodem, and Hayes Verification protocols. The large-screen buffer can easily be archived. $295. Microsoft, 1601 N.E. 38th Way, Redmond, WA 98073-9117. NCP (May '87) ★ 87 Eddy

VersaTerm-Pro is a very powerful terminal program with several special features. Does one of the best VT100 emulations available and specializes in high-resolution, Tektronix 4014 and 4051 emulation. A pro's tool. Requires 512K+ $295. Peripherals, Computers & Supplies, 2457 Perkiomen Ave., Mount Penn, PA 19068. NCP (Apr '87)

**WORD PROCESSORS**

ArchIText is a text processor with many hypertext capabilities, as well as the ability to include graphics, "Nodes" of text are accessed by means of different "maps." Very powerful. Version 1.0 reviewed. Requires 1 megabyte. $349.95. Brainpower, 24000 Ventura Blvd., Suite 250, Calabasas, CA 91302. NCP (Feb '89)

Document Compare allows users to compare any two MacWrite 4.5, ASCII, or MDS documents. Differences in spelling, punctuation, formatting, and wording are detected. Documents can be printed out with differences highlighted. $99. Legalarw, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (May '88)

Document Modifier can automate much of a professional office's correspondence. Comes in two parts: Template Maker and Document Maker. Initial setup requires time and is complex. $299.95. Legalarw, 33 Young St., Toronto, Ontario M5E 1S9, Canada. NCP (Mar '87)

Doug Clapp's Word Toolz is a useful punctuation and style-editing program. It won't turn you into a Proust, but it will help you make your writing cleaner and clearer. Word counts among different formats show discrepancies, if desired. Documents can be printed out with differences highlighted. $149. Hayes, 5923 Peachtree Industrial Blvd., Norcross, GA 30092. NCP (July '86)

Expressionist is a powerful DA that allows you to create complex mathematical equations from within an application. Equation manipulation has never been easier. $79.95. Allan Bonadio Associates, 1579 Doleste St., San Francisco, CA 94110. NCP (July '87)

FullWrite Professional combines outlining and word processing with page layout and drawing. Its many features translate into sluggish performance unless you have a lot of extra RAM. Impressive. Version 1.0. Requires 1 megabyte. $499.95. NCP (Sept '87)

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MINIFINDERS

megabyte. Mac II and MultiFinder friendly. $395. Ashton- Tate, 20101
Hamilton Ave., Torrance, CA 90502. NCP (Sept '88)

Graham Speller is a desk accessory-based spelling checker. Includes macro
feature. Good for small business or medium-sized office. $49.50. Micro-
soft, 16001 N.E. 36th Way, P.O. Box 97017, Redmond, WA 98073.
NCP (Sept '88)

Word 3.02 is the most useful-laden word processor around. Also has Microsoft's
somewhat unusual view of what the Mac interface is. Esoteric command
key combinations. Requires 512K +. $395. Microsoft, 1601 N.E. 36th
Way, P.O. Box 97017, Redmond, WA 98073. NCP (Sept '88)

WordPerfect is a good choice for offices needing compatibility, but not so
hot otherwise. Good internal file-management system and macro
maker. Uses hidden formatting codes, hierarchical menu system. Re-
quires Mac 512K +. System 2.1. $149.50. Activision, 3885 Bohannon
Drive, Menlo Park, CA 94025. NCP (Sept '88)

WorksPlus is a speedy spelling and hyphenation checker for Microsoft
Works. It includes a glossary for abbreviations and time/date stamping.
The biggest drawback is its limitation to one program. $59.95. Lundeen &
Associates, P.O. Box 30038, Oakland, CA 94604. NCP (Oct '87)

Write is a "beginner's" version of Word 3.0. More features than some word
processors in its class, but not all of the features work well. Poor value,
and expensive upgrade path to Word. $175. Requires 512K +. Micro-
soft, 1601 N.E. 36th Way, P.O. Box 97017, Redmond, WA 98073.
NCP (Sept '88)

WriteNow for the Macintosh has many of the features of MacWrite and then
some, including the ability to work in columns. Has built-in spelling check-
er with 50,000-word dictionary. $175. T/Maker, 1973 Landings Drive,
Mountain View, CA 94043. NCP (Mar '89)

SYSTEM SOFTWARE

HyperCard is a totally unique program for the Mac. It uses an index-card metaphor
and it contains a programming language, HyperTalk, Requires 1 mega-
byte +. Free with new Macs and bundled with many HyperCard stacks,
otherwise $49.95. Apple Computer, 20525 Mariani Ave., Cupertino,
CA 95014. NCP (Sept '88)

SoftPC puts an IBM PC XT inside your Mac without cracking the case to add any
special coprocessor boards. The emulation of an MS-DOS machine is
done entirely in the software. Version 1.2. Requires Mac II or SE equipped
with 68020 accelerator card; 2 megabytes of RAM. $59.95. Insignia Solu-
tions, 1255 Post St., Suite 625, San Francisco, CA 94109. NCP (Nov '87)

System Tools 5.0 is the Apple System upgrade for Mac Plus, SE, and II owners. It
contains MultiFinder (a multitasking environment), a LaserWriter spooler,
and a Control Panel resource to add color on the Mac II desktop. Requires
1 megabyte +. $49. Apple Computer, 20525 Mariani Ave., Cupertino,
CA 95014. NCP (Mar '88)

System Tools 6.0 contains an improved version of MultiFinder and new features
like IconView (for visually impaired users), Map, and MacroMaker. In-
compatible with many programs; lots of small bugs. Requires 1 mega-
byte. $49. Apple Computer, 20525 Mariani Avenue, Cupertino,
CA 95014. NCP (Nov '88)

HYPERCARD

Business Class is a HyperCard stack that contains world travel information and
itinerary planning. Uses maps to locate countries of interest, but it lacks
United States domestic travel information. Requires 1 megabyte + and
HyperCard. $49.95. Activation, 3885 Bohannon Drive, Menlo Park, CA
94025. NCP (Mar '88)

city to City imparts travel information on 31 U.S. cities including details on hotels,
restaurants, and nightlife. Helps plan an itinerary. Requires HyperCard,
two disk drives, and a printer. $49.95. Activation, 3885 Bohannon Drive,
Menlo Park, CA 94025. NCP (Sept '88)

Focal Point is a HyperCard stack that ties together a calendar, phone log, client
accounts, and more in one easy-to-use organizational tool. Requires 1 me-

HyperAnimator enables you to create talking heads for your HyperCard stacks.
Use MacTalk or provide digitized sounds. Easy to implement. Requires Hyper-
Card 1.0 reviewed. Requires 1 megabyte. System 6.0, HyperCard. $149.95.
Bright Star Technology, Inc., 14450 N.E. 29th, Suite 220, Bellevue, WA
98007. NCP (Feb '89)

HyperAtlas is a collection of U.S. and World maps that are networked to stacks
containing economic, political, and population data. Version 1.0. Re-
quires HyperCard and second disk drive or hard disk. $99. MicroMaps
Software, P.O. Box 757, Lambertville, NJ 08530. NCP (Oct '88)

HyperDA lets you browse through HyperCard stacks through a desk accessory.
A true equalizer for 512K Mac owners who cannot normally access stack-
ware. Doesn't support global variables. Requires 512K +. $69. Symme-
try, 761 E. University Drive, Mesa, AZ 85203. NCP (May '88)
Team up your Macs and PCs for LAN-based 3270 access.

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MINIFYNDERS

HyperTutor is a stack that teaches HyperTalk, HyperCard’s programming language. Uses an interactive Test Mac on each card to write scripts. A variety of windows makes it good for both beginners and advanced programmers. $49.95. DialogWare, 2909 Campus Drive, San Mateo, CA 94403. NCP (Apr ‘88)

Macintosh Bible: STACK Edition is a collection of Macintosh tips in a stack, based on the book by Calenin and Niven. Version 1 reviewed. Requires 1 megabyte, second disk drive, HyperCard 7.9.5. HyperTalk 7.9.5. STIXI, 8008 Shool Creek Blvd., Austin TX 78758. NCP (Mar ‘89)

Reports endows HyperCard stacks with the power to sort and impart information like a database. Customizing reports is difficult. Requires HyperCard, $99.95. Activation, Inc., 3985 Johannone Drive, Menlo Park, CA 94025. NCP (Aug ‘88)

ScriptExpert helps you generate HyperTalk scripts by leading you through the correct use of the language. Select a common command, and dialog boxes prompt you for necessary components. Version 1.0. Requires HyperCard. $79.95. HyperPublishing, P.O. Box 8243, Foster City, CA 94404. NCP (Oct ‘88)

VideoWorks II HyperCard Driver lets you play movies directly from a stack. OneNP (Jan) for animation to HyperCard. Version 1.0. Requires 1 megabyte, VideoWorks II, and HyperCard. hard-disk drive recommended. $99.95. MacroMind, 1028 West Wolfram, Chicago, IL 60657. NCP (Dec ‘88)

ORGANIZATIONAL TOOLS

Acta is an outline processor in desk accessory format. It has practically all the power of a stand-alone program, runs on the same. Can save files as Acta outlines, MacWrite files, or as an outline. Version 2.0. $79. Symmetry Corporation, 761 E. University Drive, Mesa, AZ 85203. NCP (Oct ’88)

Comment is an electronic version of Post-It Notes. A mini-word processor lets you attach notes to a spreadsheet cell, to words in a text document, or to a window on the desktop. Version 2.0. Requires 512KE. $99.95. Denebra Software, 3305 N.W. 74th Ave., Miami, FL 33122. (Dec ‘88)

Design is a powerful organizational tool. It goes beyond mere flowcharting. Graphically depicts relationships between systems. Complex, detailed program aimed at software pros. $250. Meta Software, 150 Cambridge Park Drive, Cambridge, MA 02140. NCP (Apr ’88)

FamilyCare is a “yuppie charmed book to childhood counselors. The rule-based expert system gives advice based on symptoms. Aliments and diseases run the gamut from acne and appendicitis to wheezing and yeast infections. Lacks graphics. Version 1.0. Requires 512K2. $99. Lundin Laboratories, 29461 Greenfield Road, Southfield, MI 48076. Mac II and MultiFinder friendly. NCP (Sept ‘87)

FlowMaster charts your ads spending in TV, billboard, and other mediums. $135. Analyzes cost/benefit of a campaign in terms that even jaded Mad. Ave. execs will find innovative. Includes bar-chart and tabular output. Requires 512K+ $495. Select Micro Systems, 1670 S. Amphlett Blvd., Suite 326, San Mateo, CA 94402. NCP (Jan ’88)

For the Record is a database specifically designed for legal, financial, and personal records. Allows you to lock records to prevent sensitive personal data. Version 1.0 reviewed. Requires 512KE. $49.95. Nofo Press, 950 Parker St., Berkeley, CA 94710. NCP (Feb ‘89)

FormSet: Business Forms Edition brings a wealth of business forms, such as expense reports and profit/loss statements, into the electronic arena. Fields are automatically calculated. Can’t be customized beyond adding logo. Version 1.0. Requires 512KE and two 800K floppy drives or hard disks. $95. SoftView, 4820 Adcor Lane, Suite D, Camarillo, CA 93010. (July ‘88)

GeoQuery puts your database on the map by accessing zip code information. Comes with maps of the U.S. Other areas available. Version 1.0 reviewed. Requires 1 megabyte and second disk drive. $349. Odost, 4084 Commercial Avenue, Northbrook, IL 60062. NCP (July ‘88)

Guide allows you to “cross reference” from within a document using hyperText. You can set up words or sections of the document so that double-clicking brings up explanatory material, graphics, and other useful items. The word processing and formatting functions, however, are limited. $135. 2D International, 14218 N.E. 21st St., Bellevue, WA 98007. NCP (Apr ‘87)

Inspiration’s flowcharting tools let you free-associate ideas visually, then automatically dump the flowchart into a text outline. Version 1.0. Requires 512K2 of RAM and a hard-disk drive. $149. Concepts Software, 9498 S.W. Barbur Blvd., Suite 103, Portland, OR 97219. NCP (Dec ‘88)

Instant Expert is an excellent way to learn the mechanics of creating an expert system. The inference engine (that ultimately finds the answer) is visible. Can save files as database, spreadsheet, and telecommunications functions. The telecommunication modules includes both background up- and downloading. $295. Microsoft, 16011 N.E. 36th Way, Redmond, WA 98073-9717. NCP (Oct ‘88) $85 Edy

SuperExpert is an expert system shell that induces rules from examples. Rules become unwieldy when many criteria and elements are used. Overpriced. Version 1.4 reviewed. Requires 512KE. $199.95. Software, 162 Madison Avenue, New York, NY 10016. NCP (July ‘88)

WillMaker is a simple yet valuable run-time BASIC program for creating simple wills. Not elegant, but it does the job well. Version 3.0 reviewed. Requires 800K disk, $39.95. Nofo Press, 950 Parker St., Berkeley, CA 94710. NCP (Mar ’89)

UTILITIES

AutoMac III is similar to Tempo II and Apple’sMacroMaker but is generally easier to use and comes with excellent documentation and a powerful Macro Editor. Version 2.0 reviewed. Requires 512KE. $79.95. Also distributed with Microsoft products (Word 3.02 and 4.0, File 2.0). Genesis Micro Software, P.O. Box 6236, 17124 N.E. Eighth Place, Bellevue, WA 98008. NCP (Feb ‘89)

AutoSave DA is insurance against system crashes. It saves your work automatically at intervals from 1 to 99 minutes. Compatible with many applications, but not recommended for use with databases. $49.95. Magic Software, 1706 Galvin Road S., Bellevue, NE 68005. NCP (Jan ‘89)

CalendarMaker creates monthly calendars in a variety of formats. Users can incorporate their art and daily notes. Daily files can be imported from a variety of DA calendars and outliners. Shareware and preensured versions available. $49.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Dec ‘86)

Capture saves any portion of a Macintosh screen to the Clipboard or as a PICT file. Works in color on the Mac II. Requires 512K+. MultiFinder friendly. $59.95. Mainstay, 5311-E Derry Ave., Agoura Hills, CA 91301. NCP (June ’88)

Colorizer adds pigments to the desktop and black-and-white applications. Also colors PICT graphics. System resources include saving and printing color screens. A useful novelty that’ll run its course as developers add color to apps. Requires Mac II. $49.95. Palomar Software, P.O. Box 2635, Vista, CA 92083. NCP (Jan ‘88)


DiskExpress optimizes hard-drive performance by reorganizing fragmented files. Best of its kind. version 2.0 reviewed. Requires 512K. $49.95. ALSort, P.O. Box 297, Spring, TX 77383. NCP (Jan ‘89)

DiskFinder searches disks for files as well as cataloging disks. Requires 512KE. $49.95. Williams & Mccas, South 3707 Godfrey Blvd., Spokane, WA 99204. NCP (Aug ‘88)

DiskFIT is a utility for backing up and restoring hard disk files. Creates a “Smart-Set” of floppy disks so incremental back-ups only update files modified since the last back-up procedure. Backs up to floppy’s or another hard disk.
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INTERNAL KITS FOR SE & II

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INTERNAL KITS FOR MAC II ONLY

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<tr>
<td>340Mb MiniScribe</td>
<td>16ms</td>
<td>$1955</td>
</tr>
</tbody>
</table>

These complete internal drive kits include the drive, UniMac formatting & partitioning software, hardware mounting kit, all necessary cabling, and How-To manual.

EXTERNAL DRIVES FOR MACINTOSH PLUS, SE & II

<table>
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</tr>
<tr>
<td>340Mb MiniScribe</td>
<td>16ms</td>
<td>$2075</td>
</tr>
</tbody>
</table>

External drives include drive, UniMac external case, power supply, cabling, formatting & partitioning software.

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MINIFINDERS

DiskQuick is an easy-to-use cataloging program. Criteria selection option for disks. Requires Mac, 512K+. $49.95. Ideaform, P.O. Box 1540, Fairlawn, IA 52556. NCP (Apr '87)

Disk Ranger is a speedy cataloging program that doubles as an efficient labelmaker. Comes with pinfed labels. Works with regular and hard disks. Can catalog file systems. $34.59. Graham Software, 8659 Ingalls Cir., Arvada, CO 80003. NCP (Mar '86)

DiskTools Plus is a set of eight useful DAs and applications. Earlier version was sold as Battery Pak. The DA DiskTools II is a Finder replacement. Also included are DrugCalculator, Phone Pad, and Calendar Manager. Requires 512K+. $49.95. Electronic Arts, 1830 Gateway Drive, San Mateo, CA 94404. NCP (Mar '88)

DiskTop is a disk accessory Finder replacement of extraordinary power and ease of use. Comes with the useful StatusDA and Widgets applications. Thru Montone an 056/02 the text. Requires 512K+. Upgrade from version 1.0, $7; $10 with new manual. $49.95. CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Aug '87)

Dubi-Click Calculator Construction Set lets users design personalized calculators with a variety of standard and special functions. Finished calculators can be saved as installable disk accessories or as downloadable applications. $59. Dubi-Click Software, 18201 Gresham St., Northridge, CA 91325. NCP (Apr '86)

Eureka: The Solver is a free-form numerical equation solver. Standard trigonometric and logarithmic functions are available, as is treatment of imaginary numbers. $1.95. Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95065. NCP (Mar '88)

Fastback for Mac is a hard disk backup program that is very quick, if not very efficient. Doesn't automatically exclude applications. Creates a separate catalog disk. $99.95. Fifth Generation Systems, 1322 Bell Ave., Tustin, CA 92680. NCP (Apr '88)

FedIt Plus is a disk editor for everyone, from newest Mac owner to oldie. It can do more for your disks and files than any other application. Can recover deleted MFS files. If you own a Mac, get it. HFS-compatible. $49.95. MacMaster Systems, 108 E. Fremont Ave., #37, Sunnyvale, CA 94087. NCP (Sept '86) * $9.95 Eddy

Findspell is a spelling checker that checks for typographical errors that install a new button in the Open Dialog box of virtually every Macintosh application. Press the button, type a search string, press Find, and Findspell searches for any files that match. Click Open or double-click to open the correct file. Requires 512K+. $49.95. Work of creativity, P.O. Box 1844, Santa Cruz, CA 95060. NCP (Nov '87) * $9.95 Eddy

FlashBack is a utility to back up HFS hard disks onto floppy disks. A unique graphic display of the HFS directory facilitates file selection. The program can handle file sizes larger than 80K. $59.55. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (June '88)

Font/DA Juggler Plus gives you unlimited access to almost any number of fonts, desk accessories, and sounds. Uses hierarchical menus. $59.95. Alan E. Shulman, 12109 Technology Blvd., Austin, TX 78727. NCP (June '88)

Gain adds a print-to-disk capability to many programs. ImageSaver installs as printer driver; Viewer allows copying and printing of graphic files. Handy utility for desktop publishers. $59.95. Solutions International, P.O. Box 1800, Wheeling, IL 60090. NCP (Oct '86)

Hard Disk Util uses patch files to allow users to mount and run specified programs on their hard disks. The list of patches is constantly expanding. $89.95. FWB Software, 2040 Polk St., San Francisco, CA 94109. NCP

HFS Backup ranks as one of the preferred hard disk back-up utilities. Back up by hard disk, floppy, or Sidecar disk. One of the few specifications can be saved as template. Good graphic interface. Reliable program. $49.95. PCPC, 4710 Eisenhower Blvd., Tampa, FL 33634. NCP (Dec '86)

HFS Locator Plus is the essential HFS desk accessory. It can search for a file by name or by file size, locate an icon, create folders, move files from one folder to another, set a program to launch while in an application. $39.95. PBI Software, 1163 Triton Drive, Foster City, CA 94404. NCP (Sept '88)

Icon-It! lets you create icons to use as an alternative to menu commands. Comes with 47 icon templates or you can create your own. Version 1.0. $79.50. Olduvai Software, 7520 Red Road, South Miami, FL 33143. NCP (Feb '88)

LabView is a graphical programming environment that creates "virtual instruments." To perform calculations, requires laboratory data, and controls instrumentation. Slow. Version 1.1 reviewed. $1900. National Instruments, 12109 Technology Blvd., Austin, TX 78727-6204. NCP (July '88)

Linux is a printer spooler for AppleTalk networks. After installation all operations are transparent. $39.95. Programmer's On-line Companion. NCP (July '88)

Mac Disk Catalog II is a utility that will quickly organize a moderate-size disk library. Easy to use with powerful reporting and label-making features. $49.95. New Canaan MicroCode, 136 Beech Road, New Canaan, CT 06840. NCP (July '88)

MacFlow is a design tool created for programmers. Traditional flowcharting symbols are linked together, and a symbol can be connected to a separate flowchart file. Now supports custom symbols. $125. Mainstay, 5211-B Derry Ave., Tustin, CA 92680. NCP (Dec '87)

MacFinder uses the program confusing, somewhat difficult to use. $34.95. Addison-Wesley, Route 126, Reading, MA 01867. NCP (July '87)

MacFlow is a data file security program that allows you to place multiple files into a single, and then you can further protect them through two types of encryption (including DES). Flexible and very easy to use. Allows for installation on hard disk. $149.95. Kent Marsh Ltd., 1200 Post Oak Blvd., Houston, TX 77056. CP (Mar '87)

MacServe converts a Mac and a hard disk into a disk and printer server. Can also be used as a file server for multi-networked machines. Users can partition the hard disk into multiple volumes. Runs in the background, so users can work on all machines in the network. $250. Requires 512+. Infosphere, 4730 S.W. Macadam, Portland, OR 97201.

MacTree displays a map of your files in a corresponding hierarchical tree. Good idea, poor performance. Can't view tree easily. Good search function. Requires 512K+. $59.95. Software Research Technology, 22901 Mill Creek Drive, Laguna Hills, CA 92653. NCP (Apr '86)

MockPackage+ is a three-part disk utility. It can be used to recover some damaged files and files and makes backup copies of most disks. $59.95. Micro Analyst, 2905 Roxmoor, Austin, TX 78723. NCP (Jan '86)

Menu Fonts displays the names of fonts in the actual font instead of standard symbols. $49.95. Works with HFS and DMS, $125. Apple Computer, Inc. NCP (Aug '88)

MenuGen is a design tool created for programmers. Traditional flowcharting symbols are linked together, and a symbol can be connected to a separate flowchart file. Now supports custom symbols. $125. Mainstay, 5211-B Derry Ave., Tustin, CA 92680. NCP (Dec '87)

Messenger is an easy-to-use cataloging program. Criteria selection option for library. Easy to use with powerful reporting and label-making features. $49.95. New Canaan MicroCode, 136 Beech Road, New Canaan, CT 06840. NCP (July '88)

MicroFinder is a three-part disk utility. It can be used to recover some damaged files and makes backup copies of most disks. $59.95. Micro Analyst, 2905 Roxmoor, Austin, TX 78723. NCP (Jan '86)

MockPackage+ is a three-part disk utility. It can be used to recover some damaged files and makes backup copies of most disks. $59.95. Micro Analyst, 2905 Roxmoor, Austin, TX 78723. NCP (Jan '86)

myDiskLabeler is an excellent label maker. It can read directories and use large or small icons or anything desired. Comes with 54 preset labels. $44.95; with color printing ability (on the ImageWriter II), $54.95; with PostScript font capability, $64.95. Working Software, P.O. Box 19206, Spokane, WA 99219. NCP (Aug '87)

*Cryptor is a simple, safe program that lets users password-protect their files. The same program is used for encoding and decoding. This is one of the best products in its category. $39.95. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP

NightWatch locks up your hard disk by using a floppy start-up disk that acts as a key. Type in the correct password, and access to the hard disk is allowed. Version 1.02. Requires 512K+, a hard disk, and an 800K drive. Mac II and MultiFinder friendly. $149.95. Kent Marsh Ltd., P.O. Box 450266, 1200 Post Oak Blvd., Suite 210, Houston, TX 77056. NCP (Sept '88)

On Cue lets you switch applications without returning to the Finder. Under MultiFinder, active applications are listed on a pop-up menu. Can also launch directly to a specific document. Version 1.0. Requires 512K+, Mac II and MultiFinder friendly. $59.95. ICOM Simulations, 648 South Wheeling Road, Wheeling, IL 60090. NCP (Sept '88)

PowerStation is an extremely easy-to-use, versatile and powerful Finder substitute. $35.95. Load After, 4756112. NCP (July '87)

Printerworks for the Mac is a comprehensive software-based dot-matrix printer control system. Optimizes printing from different applications, and is easy to use. Requires 512K+ + . Style, 7120 Kananaische Highw., Honolulu, HI 96825. NCP (Aug '87)

Programmer's On-line Companion puts an abridged version of Inside Macintosh in your system for reference. Simply read the text or transfer some or all of it directly into an application. Works with both MacServe and TOPS. Requires 512K+ and 800K drive or hard disk. $95 per node. Infosphere, 4730 S.W. Macadam Ave., Portland, OR 97201. NCP (Feb '87)
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ENCYCLOPEDIA MAC ROM: A Complete A–Z Reference for Macintosh Toolbox and Operating System Routines by Keith Mathews and Jay Friedland—This one-stop reference brings you 718 alphabetically arranged routines from the Macintosh ROM. Publisher’s Price: $29.95

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THE FULLY POWERED MAC by Robert Eckhardt—Tips, strategies, and public-exchange programs for installing Fkeys, adding your signature to PostScript fonts, changing arrangement of icons and lists, automating start-up routines, and more. Includes a disk. Publisher’s Price: $3995

MACINTOSH HARD DISK MANAGEMENT by Benjio J. Calica and Charles A. Rubin—Tips, techniques, and hints on file organization, backup, HFS directories, and print spoolers that help you speed print. Publisher’s Price: $19.95

THE COMPLETE HYPERCARD HANDBOOK: 2nd Edition by Danny Goodman—Features easy-to-use development tools that let you create your own information-based applications with backgrounds, cards, fields, and buttons. Publisher’s Price: $29.95

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**MINIFINDERS**

Quick & Dirty Utilities, Volume One is a disk full of handy programs. Several desk accessories include a menu bar clock and a terminal emulator, $39.95. Dreams of the Phoenix, P.O. Box 10273, Jacksonvile, FL 32247. NCP (Nov '85) $85 Eddy

QuickKeys lets you make full use of your keyboard. Assign any command (menu choices, DAs, etc.) or series of text blocks and/or command to any key or key combination. Enormously powerful, necessary for Apple Extended Keyboard owners. Requires 512K+ . $99.95 CE Software, 1854 Fuller Road, West Des Moines, IA 50265. NCP (Jan '88) $87 Eddy

RamSnap is a RAM disk and disk cache in one easy-to-use package. Can store multiple configurations as files. Good product but a little pricey. $30. Dove Computer Corp., 1200 North 23rd St., Wilmington, NC 28654. NCP (June '87)

Read-It! is the best consumer value in optical character recognition software. Works with any scanner that saves images as a bitmap, PICT or TIFF file. Comes with type tables that can be customized. Version 1.1. $395; ThunderScan version, $149.95 Olduvai Software, 7520 Red Road, South Miami, FL 33143. NCP (Apr '89)

RoundUp searches your disk for a specified text string. Slow, awkward, poor performer. Does not work with Mac II or 68020 accelerators. Version 2.0E reviewed. Requires 512K. $49.95 Virginia System Services, 5509 West Bay Court, Midlothian, VA 23112. NCP (Mar '88)

Sentinel encrypts data files (or sets of files) using a secure-secure DES or a super-fast SuperCrypt algorithm. Provides high-level security if you can keep your passwords secret. Requires 512K$295. SuperMac, 295 N. Bernardo Ave., Mountain View, CA 94043. NCP (Apr '88)

Smart Alarms is the best reminder system for the Mac. Easy to use, versatile, and, well, smart. This self-running DA automatically reminds you of anything you enter into its Reminder file, giving you a wide range of useful advance warning options. $49.95. Imagine Software, 19 Bolinas Road, Fairfax, CA 94930. NCP (Oct '86)

SmartScrap and The Clipper are two useful desk accessory utilities for graphics work. SmartScrap is a major enhancement to the standard Scrapbook DA. The Clipper provides you with a transparent Clipboard window, allowing you to resize or crop a graphic to the area that it will be pasted to. $59.95. Solutions International, 30 Commerce St., Williston, VT 05495.

SoundWave is a useful sound recording and editing utility. Works with waveforms; able to change sampling rates. Previously known as SoundCap. $199.95. Impulse, 8670 Shingle Creek Parkway, Minneapolis, MN 55430. NCP (Apr '88)

Stepping Out II is a software alternative to a large-screen monitor. Lets you create a virtual screen (as large as memory allows) inside the Mac's 9-inch screen. Automatically scrolls to new document position as you type or draw. Version 2.0. Requires 1 megabyte. $95. Berkeley System Design, 1700 Shattuck Ave., Berkeley, CA 94709. NCP (Oct '86)

StuffIt compresses files to reduce the amount of space they take up on disk. Great for transferring documents via modem. Also joins and encrypts files. Version 1.5. Requires 512K. Shareware fee, $18. Raymond Lau, 100-07 70 Ave., Forest Hills, NY 11375-5133; also available on most electronic services. NCP (Dec '88)

Suitcase is a transparent program that automatically lets you use all your fonts and DAs. Foolproof and indispensable. Comes with Proof, the best screen saver. Requires 512K+. $59.95. Fifth Generation, 1322 Bell Ave., Tuscaloosa, CA 92680. NCP (Nov '87) $87 Eddy

SuperLaserSpool is a LaserWriter spooler. Very fast because it does conversion to PostScript in the background, but doesn't print a faithful rendition of PageMaker documents as a result. $149.95 single user, $399.95 for up to five users on one network. SuperMac Software, 950 N. Rengstorff Ave., Mountain View, CA 94043. NCP (June '87)

Switcher is Andy Hertzfeld's contribution to Mac productivity. This program lets users run several programs at once (up to eight on a 1-megabyte or larger machine). Switching between the programs is nearly instantaneous. Requires 512K+. $19.95 from Apple, free from BB5s, included with some third-party applications. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. NCP (June '88)

Symantec Utilities for Macintosh (or SUM) reduces worries about losing data. It prevents, diagnoses, and if required, fixes many serious disk and file problems. Recovered lost files on crashed hard disks. Version 1.0. Re-

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**MARCH 1989 MAC USER 261**
MINIFINDERS

quires 512K. $99.95. Symantec, 10201 Torne Ave., Cupertino, CA 95014. NCP (Sept '88)

Tempo II is a powerful keyboard macro program that gives owners of extended

Macintosh Pascal is Apple Computer's version of this very popular programming

language. Loaded as Il ls with Innovative teaching features, this Interpret­

ation language package. The two-disk set provides an editor (Edit), an assembler,

language. New, reduced price; $199. Creative Solutions, 4701 Randolph Road,

Rockville, MD 20852. NCP

Mac II is a multitasking implementation of Forth that allows local variables and
text files. Can create stand-alone applications. Several windows can be up
with different operation systems. Executable in 1 minute! $99.95. Requires 512K+.

Macintosh 68000 Development System is a fairly traditional assembly lan­
guage package. The two-disk set provides an editor (Edit), an assembler,
a linker, an executive, and a resource compiler. $165. Apple Computer,
20525 Manani Ave., Cupertino, CA 95014. NCP

MacPascal is Apple Computer's version of this very popular programming
language. Loaded as it is with innovative teaching features, this interpret­

er is an excellent introduction to Pascal. $125. Apple Computer, 20525

Mariani Ave., Cupertino, CA 95014. CP

MacScheme is a LISP dialect with "artificial intelligence" capabilities. Has a large

appetite for RAM. Interpreted language with Toolbox access limited to a
small part of QuickDraw. $125. Semantic Microsystems, 4470 S.W. Hall
Beaver, Beaverton, OR 97005. NCP (June '86)

MacScheme + Toolsmith is a Mac version of Scheme. A LISP dialect. Beautiful
implementation, named only by relative slowness compared to similar products.

Microsoft BASIC was the Mac's first programming language. This interpreter (it's not a
compiler) now supports the Toolbox and the whole Mac interface can be implemented in your programs. For non-programmers, there are lots of programs available. $99. Microsoft, 1601 N.E. 36th Way, Red­

mond, WA 98073-9177. NCP (May '86)

Microsoft PASL was the first LISP dialect for Macs. A very good, highly Mac oriented
implementation. Currently written in BASIC. $195. Microsoft, 1601 N.E. 36th
Way, Redmond, WA 98073-9717. NCP (May '87)

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LANGUAGES

AAIIS Prolog is a fast standard Prolog with excellent debugging and error handling.

Good for serious program development. Documentation is not as good as the

program. $150. Advanced AI Systems, P.O. Box 39-0360, Mountain
View, CA 94039-0360. NCP (Mar '93)

Actualware is a unique visual programming system for creating stand-alone
programs. Can use most existing Lisa Pascal programs

and can be implemented in your programs. For non-programmers, there are
lots of programs available. $99. Microtech, 1601 N.E. 36th Way, Red­

mond, WA 98073-9717. NCP (May '86)

Pretty Good is a solid Prolog following the Edinburgh standard. Has extensive debug­
ing facilities, but you'll need a separate Toolbox disk with 58 additional
routines speech, serial drivers, split bars, and other topics. Provided on
three 400K diskettes. Requires TML Pascal. $79.95. TML Systems,
4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Dec '86)

THINK'S Lightspeed C features rapid turnaround time for development and test­ing
of programs by the use of an integrated compiler, linker, and editor.
Source-level debug steps through your code line by line to examine
the values of variables. Version 3.0. Requires 2 megabytes RAM. $175.
Symantec, 10201 Torne Ave., Cupertino, CA 95014. NCP (Jan '89)

THINK'S Lightspeed Pascal is a fast, powerful development system for Pascal
programming. Fully Integrated Mac-like environment. Requires 512K-+
$125. Symantec, 10201 Torne Ave., Cupertino, CA 95014. NCP (Feb '87)

TML Data Base Toolkit is an ISAM-type database that provides fast and efficient
administration of large databases. Supports multiple open index files. $89.95. TML
Systems, 4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Feb '86)

THINK'S Pascal is a good Pascal compiler, capable of produc­ing
stand-alone programs. Can use most popular Pascal compilers with only slight modification. Requires 512K-+. $99.95. TML Systems,
4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (June '86) Eddy

TML Source Code Library shows how to write programs that use custom definition
routines, speech, serial drivers, split bars, and other topics. Provided on
three 400K diskettes. Requires TML Pascal. $79.95. TML Systems,
4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Dec '86)

TML Visual Interactive Programming allows the development of stand-alone
Macintosh applications. Programs are constructed in a flow­chart-type manner. Easy access to most toolbox routines. $149.95.
Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301. NCP (June '87)

Turbo Pro is a fast, powerful Prolog following the Edinburgh standard. Has extensive debug­
ing facilities, but you'll need a separate Toolbox disk with 58 additional
routines speech, serial drivers, split bars, and other topics. Provided on
three 400K diskettes. Requires TML Pascal. $79.95. TML Systems,
4241 Bay Meadows Road, Jacksonville, FL 32217. NCP (Feb '86)
MINIFINDERS

ZBasic is a fast, interactive compiler capable of creating stand-alone applications that take advantage of Mac's unique features and abilities. Includes Editor, RMaker and MacinTalk. Requires 512K +, $89.95. Zdoror, 4500 E. Speedway Blvd., Tucson, AZ 85712. NCP (Dec '86)

EDUCATION

Alphabet Blocks teaches prereaders the letters and sounds of the alphabet. The digitized voice of an on-screen elf is clear and pleasant. Very intuitive. Requires 1 megabyte +, $59.95. Bright Star Technology, 14450 N.E. 25th Place, Bellevue, WA 98007. NCP (May '88)

AmericanDiscovery builds United States history. A strategy game that teaches states, capitals, and, in a roundabout manner, postal codes. Suffers from small maps. Requires 512K +, Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (May '88)

Business Simulator is a training tool in a simulation game. Make decisions that manage the company through several stages over 25 years. Decisions become more difficult over time. Requires 1 megabyte +, two disk drives (one must be 800K). May be run from a hard disk, $69.95. Electronic Arts, 1852 Gateway Drive, San Mateo, CA 94404. NCP (Dec '87)

ChipWits is a combination game and teaching tool. Players create programs to maneuver robots through a set of eight mazes. The programs are written in the built-in Icon-based programming language (IBOL). $49.95. Brainpower, 24909 Ventura Blvd., Calabasas, CA 91302. NCP ★ '85 Eddy


KidsTime is a package of five quality educational programs for children between the ages of 3 and 12. The programs all have adjustable difficulty levels. Some use speech and one is a nice introduction to musical notes. Sparse documentation. $49.95. Great Wave, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Oct '87)

LearnWord 3.0 is a three-part series of cassette tape/ diskettes modules that explain the intricacies of Word 3.0. They do the job, but remind you why cutting classes was more fun. $49.95 per module. Personal Training Systems, P.O. Box 54240, San Jose, CA 95154-0001

LXR-Test generates tests from a database of questions. Makes it easy to modify and scramble test questions. Flexible output. Requires Mac 512K +, two 800K drives, or a hard disk drive. $199 or $399, depending on features. Logic Extension Resources, 9651 Business Center Drive, Rancho Cucamonga, CA 91730. NCP (May '87)

MacType offers structured typing instruction. Can teach both standard and Dvorak keyboards. Features include certificates for reaching certain levels. Can be used in a multimedia environment. $49.95. Palantir Software, 17777 Jones Road, Houston, TX 77070. NCP (June '87)

MasterType is proof that learning to type can be fun. In this arcade-style action game word games descend from four corners towards the center ship; the user must type them correctly. Features 18 skill levels, tracks errors, recommends lessons and provides comparison scores. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP

Mavis Beacon Teaches Typing! has more features than a Selectric. Lots of diagnostics concerning typos. Incomplete docs. Version 1.1, $49.95. Software Toolworks, 1 Toolworks Plaza, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (Nov '88)

On Becoming a Desktop Publisher is a video training tape based largely on the syndicated television program, "The Computer Show." Good primer on the fundamentals of DTP products. Will eventually become dated. Requires Betas or VHS VCR. $49.95. Ocean Communications, 1641 North First St., Suite 160, San Jose, CA 95112. (Sept '88)

Reader Rabbit teaches 4-to-8-year olds how to read in four elegant games that respond by voice. You may get tired of hearing "Gotcha," though. $39.95. The Software Toolworks, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (July '88)

Sensible Physics is a capable, intelligent, well-designed study aid. Covers Vectors to Thermodynamics to The Nature of Light. Animated experiments let you try out concepts. Requires 512K +, $99.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903. CP (Jan '88)

Typewriter Encore recognizes that it's being used on a word processor. While it is easy to control, there are some strange bugs in the program. Requires 512K. $49.95. INDIVIDUAL Software, 125 Shoreway Road, Suite 3000, San Carlos, CA 94070-2704. NCP (Nov '88)

Typing Tutor IV consistently tests your use of all keys, including seldom-used ones. It's hard to maintain user's attention span, as the testing material is unimaginative. Requires 512K +. $49.95. Simon & Schuster, One Gulf and Western Plaza, New York, NY 10023. NCP (Nov '88)

ENTERTAINMENT

A Mind Forever Voyaging is a departure in text adventure games. It has a more extensive vocabulary and a more involved story than most of the genre. The story here is gripping, but there are only a few puzzles to solve. Requires 512K +, $39.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (May '86)

The Ancient Art of War gives users a chance to relight some famous campaigns on both strategic and tactical levels. Campaigns can also be designed from scratch. Very playable, addictive game. Requires 512K +, Mac. $44.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (Apr '88)

Balance of Power is the world's first computer peace game. This simulation allows players to become either the President of the United States or General Secretary of the Soviet Union. Extraordinary artificial intelligence routines and graphics make this a classic. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60022, CP (Prem)

Battle Station is a deceptively simple game based on the pen and paper game of Battleship. Requires strategy on several levels. Makes excellent use of Mac sound and graphics. Fun, casual game, especially when the Mac is one of the players. Requires 512K +. $30. TimeLine, P.O. Box 60, Yorkshire, MI 48197. NCP (June '87)

Beyond Dark Castle brings back Prince Duncan in an encore performance to run, jump, and beat his way to victory. But really, just more of the same. Requires 512K +. $49.95. Broderbund Software, P.O. Box 281430, San Diego, CA 92126. CP (Aug '88)

Beyond Zork is yet another installment in the famous Zork series of text adventures. Find the fabled Coconut of Quendor to restore failing magic in this expert-level game. On-screen mapping and the Mac's window environment are utilized. $49.95. Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140. NCP (Apr '88)

The Chessmaster 2000 is a masterful chess program that will appeal to both beginners and the madcap master. It's easy to learn, fun to play, and turn the board for a better look. Play is smooth and easy, and the program responds by voice. You may get tired of hearing "Gotcha," though. $39.95. The Software Toolworks, 13557 Ventura Blvd., Sherman Oaks, CA 91423. CP (July '88)

Crystal Quest combines all the good elements of nearly every video game ever made. Move a piece around to gobble up pins and crystals. Shoot the nasties and get through the goal before they get you. Excellent sound effects. In color on the Mac II. Requires 512K +, Mac. $44.95. Cassidy and Greene, P.O. Box 223779, Carmel, CA 93922. NCP (Apr '88)

Dark Castle is an outstanding achievement in action games which integrates RealSound with superb animation and graphics. You'll need better-than-average hand/eye coordination, but it's well worth the effort. Requires 512K +, $30.95. SouthWest Software, P.O. Box 21430, San Diego, CA 92126. NCP (Apr '87) ★ '87 Eddy

Deja Vu: A Nightmare Comes True is a graphic adventure that breaks new ground. Innovative use of the Mac interface in a truly playable and exciting game. A great introduction to graphic adventure games. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Jan '86) ★ '86 Eddy

Dinner at Eight is a useful recipe-fileting system that includes a collection of recipes from a nationwide sampling of restaurants. Users enter number of diners and program scales recipes. $49.95. Rubicon, 2111 Dickson Drive, Austin, TX 78704. NCP (Jan '86)

Down Hill Racer is an action game with three skier personalities, four courses and four skill levels. There's something here for every player, no matter how bad or good. Full digitized sound (very nice). $49.95. Miles Computing, 7741 Alabama Ave., Canoga Park, CA 91304. CP (Sept '87)

Falcon simulates an F-16 fighter jet with gut-tightening, sweat-making realism. Go against MiGs and dodge SAMs scenarios. Requires 1 megabyte +. $49.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. NCP (May '88)

Ferrari Grand Prix is an exciting race car simulation game. Mastering it takes quite a bit of time and effort. Star com course and four other courses are built into the program. You can also design your own courses and backgrounds. Requires 512K +, $59.95. Bullseye Software, P.O. Drawer 7900, Incline Village, NV 89450. CP (July '87)

Foof's Airshow is a combination of 80 puzzles woven around a mythical theme of an evil priestess and the search for wisdom. Requires 512K +, $49.95. Michael Computing, 7774 Alabama Ave., Canoga Park, CA 91304. NCP (July '88)

Gate crashers are in command of an American submarine in World War II. This superb simulation game uses all of the Mac's graphic capabilities to really make you feel that "you are there." $49.95. Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501. CP (Nov '85)

MARCH 1989 MAC USER 263
ON APRIL 17, WE'RE GIVING AWAY THE MOST SOUGHT-AFTER HARDWARE IN THE INDUSTRY.

See our May issue to find out which new Macintosh products won the Eddys—the industry's most prestigious award. Ceremonies will be held April 17th in New York. Read all about it in our special issue. It could be a very rewarding experience.

MacUser
MINIFINDERS

GO is the Chinese equivalent of chess. Players plonk markers on a grid to gain territory and outwit an opponent or the computer. Requires 512K +. Mac II hostile. MultiFinder friendly. Version 1.0 reviewed. $49.95. Infinity Systems, 128, Reading, MA 01867. CP (Mar '87)

Handwriting Analyst produces a personality profile based on answers to questions about one's handwriting. It's simple and the results will amaze and astound. $49.95. Cisal, 2017 Cedar St., Berkeley, CA 94709. NCP (Apr '87)

Hollywood Hijnx substitutes a modern Hollywood estate for the famous Underworld Empire, but otherwise represents a return to Zork gameplay and takes players through its villages and towns. Requires 512K +. $39.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Dec '87)

Shadowgate is an icon-based graphic adventure. You, as the seed of prophecy, must save the seed from the evil warlock. Far surpasses all others with great animated graphics, sound, and adventure. $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062. CP (Dec '87)

Shanghai challenges players to clear a board of all 144 tiles by matching pairs of maa+jongg tiles and removing them. Terrific strategic options plus the ability to randomly generate new game boards keeps this one fresh. $44.95. Activision, 3885 Bohannon Drive, Menlo Park, CA 94025. CP (Nov '86) $69 eddy

Snake-Eye-AI guide a snake (or train or semi) through a maze, picking up objects that feed and make your snake grow. Options include changing languages, editing the maze, and an X-rated game. $15 (shareware). George Matnound, 37 Bis rue des Abbesses, Montmartre, 75018 Paris, France. CP (Feb '87)

Solitaire Royale is a collection of eight solitaire card games. The Tour mode cycles through each game. Tournament deals the same hand for several players. $34.95. Published by Spectrum Holobyte, 2061 Challenge Drive, Campus Center, San Mateo, CA 94404. CP (Aug '87)

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Winter Games lets up to eight players compete against each other in Olympic events including figure skating, bob sledding, biathlon, and ski-jumping. Excellent animation, good graphics, good theme music. $39.95. Epix, 600 Galveston Drive, P.O. Box 8020, Redwood City, CA 94063. NCP (Mar '86)

Your Personal Poet creates personalized greeting cards on the Mac. Comes complete with four greeting cards and matching envelopes. Requires 512K +. $29.95. Computer Poet, 775 E. Greg St., Sparks, NV 89431. NCP (June '87)

Seven Cities of Gold is an educational program masquerading as an adventure game and is practically unique in being equally good in both respects. You are to land (not the easiest part) ... gold. Nice work if you can get it. $39.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (June '87)

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MUSIC

Alchemy loads and edits digitally sampled sounds from most commercial samplers. Works with 512K, but it eats up memory quickly. Requires MIDI or RS-422 interface, and sampler, $495. Blank Software, 1477 Folsom St., San Francisco, CA 94103. CP (Oct '88)

Apple MIDI Interface is a simple Musical Instrument Digital Interface with a 1 megahertz clock rate. Has only one MIDI Input and one output. Works with all Macs, adapter required for 128K and 512K. $99. Apple Computer, 20525 Marnier Ave., Cupertino, CA 95014. (June '88)

ConcertWare is an enhanced version of ConcertWare. Has different instruments and can use any four of a set of eight at any point in a piece. Supports Adobe Sonata musicfont. $69.95. Great Wave Software, 5353
SUITCASE II is the perfect utility for desktop publishers. It now allows unlimited access to fonts, desk accessories, FKEYs and sounds. Plus, now you can display fonts in their own typefaces right in the menu. FASTBACK FOR THE MACINTOSH makes backing up a breeze for every hard disk user. Its incredible speed, automatic formatting and reliability assure regular backup. PYRO! is a must for every Macintosh owner. A nifty, resident program that prevents screen burn-in damage. POWERSTATION is ideal for hard disk users who regularly work with multiple applications. It helps to organize the disk for quick, easy access to applications, documents and desk accessories.

To get the most out of their Macs, more and more users are choosing these four firsts from Fifth.

To receive more information on these products call 800 873-4384 Please circle 164 on reader service card.
**MINIFINDERS**

Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Dec '87) *85 Eddy

**ConcertWare** = MIDI is a composition and transcription program that can record multiple notes from a MIDI keyboard. Easy to use if you read music. Handles up to eight voices each. Requires 512K, Version 4.0. $149.95. Great Wave Software, 5353 Scotts Valley Drive, Scotts Valley, CA 95066. NCP (Dec '87)

**Cue:** The Film Music Composition System is a powerful and versatile assistant for scoring films. Automates spotting and logging cue points and searching for matching tempos. Also performs many minor jobs, such as generating a performing rights cue sheet. Version 2.0 reviewed. Requires 512K+.$255. Opcode Systems, 1024 Hamilton Court, Menlo Park, CA 94025. CP (Feb '89)

**Deluxe Music Construction Set** lets you enter up to 48 voices on eight staves, and play the music through the Mac's internal speaker and/or via MIDI. Requires 512K+. Mac II and MultiFinder hostile. Version 2.0 reviewed. $99.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. CP (June '88)

**Graphic Notes Music Publisher** is a very good page-layout program for music notation, with MIDI support. Comes with a special notation key pad. Version 2.0 reviewed. Requires 1 megabyte and second disk drive. $595 (including Presto keypad). Graphic Notes Inc., 200 Seventh Ave., Santa Cruz, CA 95062. NCP (Mar '89)

**Jam Factory** is a program for performing complex manipulations on MIDI data in real time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+; MIDI interface, and MIDI synthesizer. $169. Intelligent Computer Music Systems, P.O. Box 8749, Albany, NY 12208. CP (Oct '87)

**Jam Session** is a music program for those who think MIDI refers to the length of skirts. Without any skill, you can "Jam" with rock, jazz, rap, or country tunes. A sort of "Sing Along With Mitch" for the computer set. Requires 512K+. $49.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903. CP (July '88)

**Listen** is an educational tool for ear training. It has both a piano keyboard and a guitar fretboard for the student to input notes, and offers a wide range of exercises. $99. Resonate, P.O. Box 9556, Menlo Park, CA 94026. (Jan '88)

**M** is a music composition and creation program that works with MIDI data in real time. Unique, entertaining, and very powerful, but requires lots of patience and practice. Requires 512K+; MIDI interface, and MIDI synthesizer. $219. Intelligent Computer Music Systems, P.O. Box 8749, Albany, NY 12208. CP (Oct '87)

**Master Tracks Pro** is a full-featured, second-generation MIDI sequencer that adheres to the Mac interface very well. It's the first program to have graphic controller editing. Needs patch chasing for professional use, but it's still a rock-solid program. $350. Passport Designs, P.O. Box 48, Albany, CA 94706. (Sept '88)

**Music Mouse** is a music program in a genre all its own. Called an "intelligent instrument," Music Mouse gives you instant musical feedback as you move the mouse and type on the keyboard, which controls tempo, volume, etc. $59.95. Opcode Systems, 444 Ramona St., Palo Alto, CA 94301. CP (July '88)

**Performance** is the definitive MIDI sequencer, and is priced accordingly. Includes looping, SMPTE syncing, 32 simultaneous Ins and Outs, unlimited overdubbing, and compatibility with Professional Composer for transcription. Version 2.2. Requires MIDI interface and 512K+. $395. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan '88)

**Practice** is an audio graphing and practice approach to teach music theory and ear training. Excellent training tool for the serious music student, it is also fun for anyone who wants to develop a trained ear for intervals, chords, and melodies. Requires 512K+; $129. ARS Nova Software, P.O. Box 40629, Santa Barbara, CA 93140. CP (Nov '87) *87 Eddy

**Professional Composer** produces performance-quality sheet music using Adidas's Sonata font. Scores can be created from scratch or imported from Paralyzer and can be exported to Performer (for MIDI playback). Requires 512K+. $495. Mark of the Unicorn, 222 Third St., Cambridge, MA 02142. CP (Jan '88)

**Softsynth** creates sounds for additive synthesis samplers. Downloading from Mac sampler is time consuming. Requires 512K. $295. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. CP (Oct '88)

**Sound Designer** sets the standard for editing samples on lower-cost samplers, but it still lacks some features. Requires 512K. $295. Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025. CP (Oct '88)

**Studio Session** consists of two programs, an Editor, and a Player, that produce music with six voices of digitized sound. Excellent program plus good manual makes this a good buy. $93.95. Intelligent Music, P.O. Box 66999, Tem Lina, CA 94030-0699. NCP (Aug '87) *85 Eddy


**UpBeat** turns the Macintosh into a front panel for a highly complex and versatile drum machine. Input patterns with mouse, MIDI keyboard, or drum machine. Requires 512K+ $150. Intelligent Music, P.O. Box 8748, Albany, NY 12208. CP (May '88)

**HARDWARE & ACCESSORIES**

**Apple** CD SC reads CD-ROM optical discs that contain up to 656 megabytes of data. Also plays audio compact discs. Reads High Sierra format, an industry standard for CD-ROM. Requires SCSI port. $1,295. Apple Computer, Inc., 2525 Mariani Ave., Cupertino, CA 95014. CP (Oct '88)

**Apple Scanner** is not the state of the art, but is adequate for scanner neophytes. The 4-bit (16 gray levels) scanner comes with AppleScan software and HyperScan, written by Bill Atkinson. Requires System 6.0; hard disk for full-page work; SCSI connection cables. $1,799. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. CP (Feb '89)

**AST TurboScan** is a 300 dpi scanner with sophisticated graphics software. Scans at resolutions from 72 to 300 dpi. SuperScan software offers hallowtone, line art, and mixed modes. Available in virtual memory. $3,500. AST Research, Inc. CP (Nov '87)

**Classic Professional Graphics Display** is a low-cost color monitor for the Mac II. Good value, but has an IBM look about it. Green tint is annoying. Requires Apple video card. $549. Classic Components, 1490 Atesia Blvd., Gardenia, CA 90247. (June '88)

**CMS S-140 SCSI Hard Disk** is a very fast, high-capacity SCSI hard disk with a very fast seek time and average access time of 18 milliseconds. *1 megabyte. Helps, file transfer, and tape back-up concepts built-in. Hard Disk Partition is a useful DA. Comes with a 6-foot SCSI cable. $2,395. CMS Enhancements, 1372 Valencia Ave., Austin, TX 78746. (July '87)

**ColorVue SE** is a video processor board for the Mac SE that lets you display colors on an external RGB monitor. Suits up performance. $695. Orchard Technology, 45365 Northrop Loop West, Fremont, CA 94538. (Oct '88)

**DASCH** is an external hard disk drive. Sizeable, $299. Passport Designs, 625 Miramontes St., #103, Half Moon Bay, CA 94019. CP (Dec '88)

**DaynaFile** hooks up to a SCSI drive to read MS-DOS disks in the Mac environment. Use Mac applications to manipulate data created with an IBM PC. Comes in both 5.25 and 3.5 inch formats. $595 for single floppy. Dayna Communications, 50 S. Main St., Fifth Floor, Salt Lake City, UT 84144. (Jan '88) *87 Eddy

**DEST PC Scan Computer** is an 8-bit scanner that saves images in up to 256 levels of gray. Can be configured for IBM PCs. Requires 1 megabyte. Scanner, $1,495; Publish Pac software, $595; OCR text processor card, $995. DEST Corporation, 1201 Cadillac Court, Milpitas, CA 95035. NCP (Dec '88)

**FAX** is an early entrant in the fax modem race. Adequate, but slower than most fax machines, and using it as a normal modem requires changing plugs. Requires 1 megabyte of memory, and a hard disk is strongly recommended. *695. STF Technologies, P.O. Box 247, Higginsville, MO 64037. NCP (Feb '89)

**Felix** is an optical-tracking graphics tablet that replaces a mouse. Precision mode gives pixel-by-pixel control. Doesn't collect dirt like a mouse does. The 6-inch square device is designed primarily for right-handed people. Works with Mac Plus. $149. Lightgate, 6202 Christie Ave., Emeryville, CA 94608. (Sept '88)

**FX-20** is a good 20-megabyte external hard drive. Good utility software. Reliable and reasonably quiet. Sits next to the Mac, has a large, oval-shaped case. Requires SCSI port, 512K+ new, ROM. $1,199. General Computer Corp. CP (Oct '88)

**Grappler LQ** hooks Macs up to parallel laser and 24-pin letter-quality printers. A cable, driver software, and special fonts combine to make dozens of once-unfriendly printers now compatible with the Mac. Requires 1 megabyte.
Teach your Mac to perform unnatural acts.

If you're losing your passion for running the same old programs on your Mac, add a little excitement to the relationship. Start writing your own, with the new Microsoft* QuickBASIC for the Macintosh.*

BASIC is already the easiest language to learn on the Mac. And now, with new Microsoft QuickBASIC, it's even easier.

We've built the compiler and the interpreter into one program. Which means you can compile and execute whatever your heart desires with a simple double click of the mouse. We've even added a complimentary personal finance program so you can practice. See any Microsoft dealer for a trial run.

You're going to have a lot of fun programming your own Mac, even when you're getting down to serious business. With new Microsoft QuickBASIC, you'll learn how to customize business applications and programs so they meet your specific needs and work with existing applications.

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You're what we call a "Macintosh Champion." And the fact that you directly influence purchasing could directly influence us to give you a fully-configured Macintosh II. Use the form on the right to tell your story. Then send it in before April 15, 1989.

And you could win a big Mac with all the fixings.
### THE "HOW I CHAMPIONED THE MAC IN MY COMPANY" CONTEST QUESTIONNAIRE.

1. Are you personally involved in your company's decisions to buy Mac products or services? Do you help to SPECIFY BRANDS, RECOMMEND products, or SELECT the hardware, software and services your company uses with Macintosh computers? Yes () No ()

2a. How many Macintosh computers are currently installed in your company/department?

<table>
<thead>
<tr>
<th>Company</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2b. How many Macintosh computers did your company/department buy through your direct influence?

<table>
<thead>
<tr>
<th>Company</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

2c. How many Macintosh software packages did your company/department buy through your direct influence?

<table>
<thead>
<tr>
<th>Company</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

2d. How many Macintosh peripherals (printers, modems, etc.) did your company/department buy through your direct influence?

<table>
<thead>
<tr>
<th>Company</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

3. What is your job title? Please be as specific as possible.

4. Do you work in your company's MIS or DP department? Yes () No ()

   If you answered "No", which department do you work in?

<table>
<thead>
<tr>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales/CS</td>
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<tr>
<td>Engineering</td>
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<tr>
<td>Research &amp; Development</td>
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<tr>
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<tr>
<td>Accounting/Finance/Auditing</td>
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<td>Micro Information Center</td>
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<tr>
<td>Purchasing</td>
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<tr>
<td>General Management/Administration</td>
</tr>
<tr>
<td>Personnel/Labor Relations</td>
</tr>
<tr>
<td>Other department (please specify)</td>
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</tbody>
</table>

5. What is your company's primary business? Please check the appropriate box or fill in the blank if you check "Other."

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Government (includes federal, state, and local agencies)</td>
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<tr>
<td>Military (not a private contractor or supplier)</td>
</tr>
<tr>
<td>Education (public or private)</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td>Finance/Banking/Insurance/Real Estate</td>
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<tr>
<td>Manufacturing</td>
</tr>
<tr>
<td>Retail/Distributor</td>
</tr>
<tr>
<td>Health/Medical/Legal Service</td>
</tr>
<tr>
<td>Agriculture/Construction/Mining/Oil/Utilities</td>
</tr>
<tr>
<td>Other (please be as specific as possible)</td>
</tr>
</tbody>
</table>

6. How many employees work in your entire company, including all divisions, departments and subsidiaries? __________

7. Please give us an example of how you have influenced or championed Macintosh product sales within your department or company. Please keep your story to 250 words or less. THIS ESSAY MUST BE TYPED OR COMPUTER PRINTED ON 8.5 x 11 PAPER.

**RULES AND REGULATIONS:**

1. ONLY THE FIRST 2000 RESPONSES WILL BE ELIGIBLE TO WIN. 2. Stories must be no more than 250 words long and must be typed and double-spaced. 3. Only one entry per person is allowed. 4. Winner will be determined by June 15, 1989 and will be notified within 5 working days. The winner will be selected by a panel of MacUser marketing and editorial management. Judges' decision will be final. 5. The contest is open to all residents of the U.S. and territories, who are 18 years of age or older, with the exception of employees of Ziff-Davis Publishing Company, its affiliates, its advertising and promotion agencies, and employee families. Void where prohibited or restricted by law. 6. For the name of the winner, please send a self addressed, stamped envelope to: Mac II Contest, MacUser Magazine, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Notification will be mailed within 60 days of the contest's close.

Address entries to: MacUser Magazine, c/o Mac II Contest, 950 Tower Lane, 18th Floor, Foster City, CA 94404

**MacUser**

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by and a parallel printer, $149. Orange Micro, 1400 North Lakeview Ave., Anaheim, CA 92807. (Nov '88)

**Hard Disk 2050C** is Apple's 20-megabyte SCSI hard disk. Reliable, fairly noisy unit. Useful software, but no back-up yet. Requires cable and terminator ($30). Requires SCSI port, 512K +, new ROM, $1,295. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Feb '87)

**Hewlett-Packard Color Pro Graphics Plotter** is an eight-pen desktop plotter that requires third-party software to drive it. Fonts are limited to an optional Graphics Enhancement Cartridge that requires some BASIC programing. Requires an Intel-Packetek, 16399 W. Bernardo Drive, San Diego, CA 92127. (Feb '88)

**HyperDioler** provides an interface between a phone and your Mac so you can "dial" a number using one of the Rolodex-type programs, like SideKick, Focal Point, or Handi Dialer. Only one available at this time . $149. Personal Computer Peripherals Corp. (PCP), 4710 Eisenhower Blvd., Building A, Tampa, FL 33634. NCP (Feb '89)

**Mac Crane 60MB Hard Disk** puts a Seagate 40MB platinum casing at $1 per megabyte. Also competitive value. Also available in 20-, 40-, and 80-megabyte models. Requires SCSI port. $939. Crane Technology, 6850 Vineyard Ave., Bldg. M, North Hollywood, CA 91605. (Nov '88)

**MacLntzer** is a graphics tablet and absolute positioning device that replaces the mouse. $599. GTCO Corp., 7125 Riverwood Drive, Columbia, MD 21046.

**MacLarger** is a 12-inch external monitor for 512K machines on up to the SE. Displays the same number of pixels as an internal monitor, only one-third larger. Buffer and brightness. $1,195. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. (Jan '89)

**MacPaco** transforms the Macintosh into a digital oscilloscope, waveform generator, and chart recorder. PacoManager is software expandable via external memory in IBM Pascal and other languages. Version 1.03 reviewed. $995. Biopac Systems, 42 Aero Camino, Goleta CA 93117. NCP (July '88)

**MacRecorder** is an easy-to-use sound digitizer. Includes software to turn sounds into Hypercard buttons, mix sounds, add image files, and convert sound formats. Stereo recording possible on a Mac II. Requires S12K +, $199. Farallon Computing, 2150 Kittredge St., Berkeley, CA 94704. NCP (June '88)

**MacSnap Plus 2** is a 2-megabyte memory upgrade for the Mac Plus. The board contains 256 kilobits. User installable. Not compatible with existing big screens or internal hard disks, and can't be expanded further. $729. Dove Computer, 1200 N. 23rd St., Wilmington, DE 19805. (June '87)

**MacTablet** is an elegant Danish worktable that holds a Mac and printer with room for accessories. The 30-inch desk and matching swivel chair are all assembled and must be assembled. Cabinet is optional. Table, $289; cabinet, $139. ScanCoFurn, P.O. Box 3217, Redmond, WA 98073. (Mar '89)

**MacTablet** is a style-driven graphics tablet. Users can easily sketch or trace art using this absolute-positioning device. Has a working area the size of the Mac screen. Allows concurrent use of the mouse. $495. Summagraphics Corp., 777 State St. Extension, Fairfield, CT 06430. (Jan '86)

**MacTilt SE** is a Mac SE (and external drive) holder that allows a full range of swiveling and tilting. Very strong, this well-made unit is also very easy to use. $99.95. Ergotron, P.O. Box 17013, Minneapolis, MN 55418.

**MacVision** is a digitizer that uses an ordinary video camera for input. Capable of extremely fine results and special effects. Easy to use and well-documented. $349.95. Koala, 269 Mount Hermon Road, Scotts Valley, CA 95066.

**MagicDigitzer** is a hardware digitizer that works with video cameras. With Magic software you can generate 300 dpi images (PostScript), requires $12K +. Digitizer with Magic software, $395. MagicSoftware, $49.95. New Image Technique, 10300 Greenbelt Road, Seabrook, MD 20706. NCP (May '87)

**Microtek MSP-3000C** is a 300dpi fastscan. Really fast when used with a normal MS-DOS/C program. Comes with VersaScan Plus software (NC) to scan and manipulate image. Saves images in a number of formats including TIFF and MacPaint. $1,895. Microtek Lab, 16901 S. Western Ave., Gardena, CA 90247. (Dec '87)

**Microtek Modem** is a new fast-speed modem about the size of a 3-x-5index card. Comes bundled with MacTerm 2.0, Borland's telecom DA. Manual is confusing, and tech support is minimal. $295. Microtek, 865 Tahoe Blvd., Incline Village, NV 89450-6062. (Nov '87)

**Mouse Mover** is a mouse pad-type surface that snaps onto the bottom of the mouse like a roller skate, freeing it up to glide over desk or mouse pad with ease. 99 tiny ball bearings at three strategic points. Mouse glides faster and saves on mouse wear and tear. $19.95. Magnum Software, 21115 Deveraux St., Chatsworth, CA 91311. (June '87)

**Moustrak** is a fabric-covered foam mousing pad. It will increase the efficiency of your mouse while helping to keep it clean. Pad comes in a variety of colors. Particularly useful in the typical office desktop environment. $10. MouseMatic, 3037 S. Helena Highway, Saint Helena, CA 94574.

**NetModem** is a 1200-baud modem that can be accessed by all users on an AppleTalk network. The modem's display lights and the dial tone are simulated on-screen. Requires $12K +. $599. Shiva, Suite 1200, 222 Third St., Cambridge, MA 02139. (Feb '89)

**One Plus One** is a user-installable memory upgrade for a Mac Plus. Adds $1 megabyte of RAM to the 1 megabyte already there. Simple one-evening project. Includes MacBreeze, an excellent small fan. Requires Mac Plus. $199. Northstar, 3037 S. Helena Highway, Saint Helena, CA 94574.

**Personal LaserPrinter** is a non-PostScript laser printer at a great price. Clumsy workarounds required in some applications. Printing can be slow. Requires 1 megabyte +, $1,999. Fonts Plus, $299. General Computer, 3311 West St., Winsted, MN 55962. (Feb '89)

**Personal Writer PW15 S** is a table-based handwriting recognition system that also allows graphics and macros. Number of misread characters is too high for general word processing. Requires 1 megabyte +, $895. Personal Writer, 1801 Avenue of the Stars, Los Angeles, CA 90067. Software NCP (Mar '88)

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**MINIFINDERS**

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MINIFINDERS

PhoneNET is an AppleTalk-compatible network. Network can be up to 3,000 feet in length. In-place, unused phone cabling can be used for network, and can be combined with AppleTalk on the same network. $59.95 per node. Farallon Computing, 2150 Kittridge St., Berkeley, CA 94704. (Dec '86)

ProPoint replaces the mouse with an ADB trackball. Works better on the SE than it does on the Mac II. Lefties will find the button positions uncomfortable. Requires SE or Mac II. $139.95. Abaton, 48451 Millmont Drive, Fremont, CA 94538. (Oct '88)

QMS ColorScript 100 is the first color PostScript printer that uses a four-color thermal wax transfer technology. Works on AppleTalk. Excellent typographic quality. Does on the Mac II. Lefties will find the button positions uncomfortable.

QMS-PS 810 is an eight-page-per-minute, 300-dpi PostScript laser printer that competes with the LaserWriter INT. 2 megabytes of RAM is standard; upgradeable to 3 megabytes. Emulates HP LaserJet, 7475 (HPGL), and Diablo 630. $5,495. Laser Connection, 7852 Schilling Park West, Mobile, AL 36608 (July '88)


Radius Accelerator 25 can make your Mac SE run 50 percent faster than a Mac II.

Radix Accelerator Card 25 is the add-in accelerator card that has a Motorola 68020 CPU that runs at 25 megahertz, and an optional 25 megahertz 68881 math coprocessor. $1,695; $2,195 with optional 25-megahertz 68881. Radix, 404 East Plummer Drive, San Jose, CA 95134. (Oct '88)

SpeedCard is an accelerator board for the Macintosh SE that more than doubles the speed of most applications. The board uses the 68000 chip found in the SE and an optional floating point 68881 chip for number crunching. Requires Macintosh SE. $399; $699 with coprocessor. SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043. (Nov '88)

SuperRam 2 and SuperRam 4 are 2- and 4-megabyte RAM upgrades. Should be dealer installed but can be (carefully) user installed. SuperRam 2 includes RAM adapter module, 1-megabyte memory module, modified power connector, jumper, and fan. SuperRam 4 adds power supply booster and two 1-megabyte memory modules. Not compatible with most big screens. $499. SuperMac Technology, 295 N. Bernardo, Mountain View, CA 94043. (Oct '87)

Tektronik 4693D Color Printer is a 300 dpi bit-mapped color printer. Colors look smooth and rich. Uses bit-mapped screen fonts; most type has noticeable jaggies. Requires Mac II with color monitor. Recommended 8-megabyte configuration, $11,495. Tektronik, P.O. Box 500, Beaverton, OR 97077. (Oct '88)

ThunderScan replaces the ribbon cartridge in an ImageWriter, which is required to use it. Laser scans art that can be run through the ImageWriter, producing high-quality digitized images. The images can be manipulated as they are created or afterward. $249. Thunderware, 21 Orinda Way, Orinda, CA 94563. (Feb '88)

TimeWand is a bar-code reader with a built-in time/date stamping clock. Can be used with TimeWand Manager software, a database that's extensive though difficult to use. Poor docs, but good support. Requires 1 megabyte +. TimeWand 2K version, $156; TimeWand Manager, $489. Videx, 1 105 N.E. Circle Blvd., Coralville, IA 52245-4285. (Dec '87)

Turbo Mouse ADB makes an excellent mouse replacement, even if you're not a trackball fan. If you're seeking absolute control, you can buy the optional cdev that enables you to specify custom tracking and double-click speeds. $169.95; cdev $15 direct order only. Kensington Microware Ltd., 251 Park Ave. South, New York, NY 10010. NCP (Feb '89)

TV Producer is an add-in card that overlays Mac graphics and text onto a video signal. Software is clumsy to use. Requires Mac II, Apple video card, and video source. $559. Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229. Software NCP (May '88)

V-series Smartmodem 5600 is the fastest modem you can get for the Mac. To achieve high speeds, you'll need a special cable and software that supports the format. Requires $12KE, Mac-to-modem cable, and communications software. $1,299. Hayes Microcomputer Products, 705 Westtech Drive, Norcross, GA 30092. (Jan '89)

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<tr>
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<td>Macintosh SE 2 800k drive</td>
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<tr>
<td>Macintosh II 60mb internal</td>
<td>$4150</td>
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<tr>
<td>Apple keyboard for SE or II</td>
<td>$100</td>
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<tr>
<td>Datadesk 101 keyboard</td>
<td>$140</td>
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<tr>
<td>Apple 13&quot; color monitor</td>
<td>$750</td>
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<tr>
<td>Mac II 8 bit video card</td>
<td>$495</td>
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<td>Imagewriter II w/cable</td>
<td>$450</td>
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<td>Imagewriter LQ w/cable</td>
<td>$995</td>
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<tr>
<td>Apple laserwriter II NT</td>
<td>$3695</td>
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<tr>
<td>General Computer P.L.P. Plus</td>
<td>$1595</td>
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<td>SIMM chips in stock</td>
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<tr>
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<th>$499</th>
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<tr>
<td>AppleCrate/Seagate 20 Meg</td>
<td>$749</td>
</tr>
<tr>
<td>Internal for Mac SE &amp; II:</td>
<td>$499</td>
</tr>
<tr>
<td>Mac 100 with Universal Kit</td>
<td>$999</td>
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286 MAC USER MARCH 1989
**PRODUCT CATEGORIES**

**HARDWARE**
- Bar Code
- Cables
- Computer Systems
- Data Acquisition
- Disk Drives
- Engineering
- Expansion Units
- General
- Insurance
- Memory Upgrades
- Monitors
- Networking
- Peripherals
- Printers
- Security

**SOFTWARE**
- Accounting
- Bar Code
- Business
- Data Base
- Desktop Publishing
- Educational
- Engineering
- Entertainment/Games
- Fonts
- Graphics
- Health
- Language Tools
- Mail Order
- Music/Midi
- Public Domain
- Real Estate
- Religion
- Scientific
- Security
- Shareware
- Stackware
- Statistics
- Taxes
- Utilities
- Word Processing

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Wm. F. Buckley, Jr.

Word Finder installs as a desk accessory with all Macintosh software, and also supports MultiFinder™ and HyperCard™. Not copy protected.

*Mr. Buckley volunteered this statement about Word Finder, and is not being compensated for his endorsement.

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PLUS

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Editors absolutely reserve the right to publish none, some, all, or just the parts we managed to complete of the above, due to the inherent problems that occur when reviewing software, hardware, and the ever-elusive vaporware.
Introducing the Sharp JX-300 letter size color scanner.

Our affordable, new JX-300 can scan the most appetizing color originals up to 8½" x 11". It also has a small footprint and fixed scanning bed to give you more usable desk space.

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Both units scan at 300 d.p.i. resolution and 256 shades for each element to give a range of 16.7 million colors. Not to mention 256 gray scales for monochrome systems.

Sharp also offers the JX-730 color inkjet printer to give you plain paper color printouts that are faithful to your originals.

If you're looking into scanners—even black and white scanners—don't overlook the future. The future is mouth watering color.

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1. Please indicate which of the following computers you currently use in your company or organization: (check all that apply)
   - [ ] Mac Plus
   - [ ] IBM PC
   - [ ] Mac SE
   - [ ] Other

2. How many microcomputers do you buy products?
   - [ ] 1-4
   - [ ] 5-49
   - [ ] 50+

3. Your primary job function is:
   - [ ] Administrative/General Management
   - [ ] MIS/DP, Communications Systems, Programming
   - [ ] Engineering/R&D
   - [ ] Financial/Accounting
   - [ ] Marketing/Sales
   - [ ] Computer Dealer/ VAR

4. For which of the following products are you involved in selecting brands/models to be bought by your company or organization?
   - [ ] SOFTWARE
     - [ ] Accounting
     - [ ] Spreadsheet/PC
     - [ ] Project Managers
     - [ ] Word Processors
     - [ ] Database Managers
     - [ ] Graphics
     - [ ] CAD/CAM
     - [ ] Communications
   - [ ] HARDWARE
     - [ ] Mainframe
     - [ ] PC
     - [ ] Printer/Plotters
     - [ ] Monitors
     - [ ] Disk/Video Backup
     - [ ] Add-in Boards
     - [ ] Computers

5. Are you involved in the purchasing of microcomputer equipment at your company?
   - [ ] Yes
   - [ ] No

6. If so, what function do you serve in the buying process?
   - [ ] Evaluations/Specification
   - [ ] Recommendation
   - [ ] Buyer/Purchaser

7. If you are involved in the buying process, what do you do?
   - [ ] Evaluations/Specification
   - [ ] Recommendation
   - [ ] Buyer/Purchaser

8. Please send me a one year subscription to MacUser for $19.97. I'll save 58% off the newsstand price of $47.40. Annual basic subscription price is $27.00.
HOW TO STAY ON TOP OF WHAT'S IN THE MAC MARKET

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People who buy word processors sometimes write about computers. But spelling checkers don’t know this; they don’t have any of the jargon of Silicon Valley in their dictionaries. Robert M. Tarabella of Palm Beach Gardens, Fla., wanted to see if the new spell checker for Works 2.0 practiced what it preached. He ran the Works ReadMe file through the spell checker and got 97 suggestions, including “Lasciviousness” for “LaserWriter,” “Applesaucer” for AppleShare, and “Multifariousness” for MultiFinder. (Maybe they’re on to something.) In any event, Working Software—the creators of Works’ dictionary—has a business dictionary in the works. (It sure would be nice if we didn’t have to keep looking up which e to accent in Gasée.)

There’s a multifarious trend underfoot: As soon as a high-powered software package begins to saturate the market, the publisher releases a scaled-down budget version of the program to broaden the potential audience. Microsoft’s Word devolved into Write, QuarkXPress begat QuarkStyle, and Passport’s Master Tracks Pro was truncated into Master Tracks Jr. Well, Michael Trigoboff of MLT Software may have stumbled onto the cause of this trend. Browsing through an ad from software discounter 47th St. Photo in a recent New York Times, Michael spotted an ad for Symantec’s “Lightweight C” language. (Maybe only the full-bodied versions get the Lightweight treatment.) If the Lightweight series of programming languages catches on, watch for future emasculated programs: low-rent page layout programs like Letraset’s Ready, Set, Pause, spreadsheets like Lotus 1-2, a new networking package called SOSO (from the new Sun Microsystems company of the same name), and our favorite game from Casady & Greene, Rhinestone Quest.

Felix Dupont of Rockville, Md., recently set out on a quest of his own. He saw the Jasmine hard-disk drive ad on page 256 of our December ’88 issue, and just had to have one. No, not the hard-disk drive, but the power briefcase that Guy Kawasaki uses to tote his Jasmine drive. For power users on the go, Felix tells us it’s a Halliburton, and you won’t find one at K-mart. The 3-inch Bordeaux model pictured lists for $415.

Here’s your chance to make a brief case about our very own anti-editor, John Dvorak. As the 17th century French poet/philosopher Renée Dubillard put it, “It is easier to mimic that which we despise than to despise that which we mimic.” We don’t know what he meant, either, but it gives us the chance to announce the first John “I Can’t Believe You Really Pay Him to Write That Stuff!” Dvorak Write-Alike contest. If you feel he needs a piece of your mind, send us your Dvorak-esque diatribe on the Mac-related topic of your choice. The best entries will be published in a future issue. Keep it short and, if this isn’t a contradiction in terms, sweet.

Here’s a contradiction in terms of endearment. We received a letter from Mark Smith of Hampton, N.H., that began “Dear MACazine…” We’ll plug his software here anyway: Mark has compiled a database of over 6,500 military and electronics acronyms, available in both Excel and Works formats. Contact Heizer Software Exchange: 1941 Oak Park Blvd., Pleasant Hill, CA 94523; (800) 888-7667 or (415) 943-7667.

FYI, we will happily interpret correspondence intended for any nationally circulated magazine. Send your observations, Dvorak Humoresques, and trade secrets to Mac on the Street, c/o MacUser, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

— Jon Zilber
LASER QUALITY FOR UNDER $1000

Affordable Macintosh Publishing

In the past, Macintosh users had to choose between printers they could afford and output that looked good. Laser quality, previously out of reach, is now available to everyone regardless of his budget. The new DeskJet 300 DPI printer from Hewlett-Packard provides the solution. With a retail price of only $995, the DeskJet offers quality matching that of the Apple LaserWriter II SC, at a cost below that of the ImageWriter LQ. At only 14 lbs., the DeskJet easily follows you to where the work is. Additional features include easy front paper loading, affordable and convenient ink cartridges, and envelope printing. If you need top quality output for the home, school, or small business, the DeskJet delivers.

The Deskjet and the Grappler LS

Until recently, the only problem with the DeskJet was that it didn’t work with the Mac. Now the Grappler LS printer interface provides a complete solution, allowing the DeskJet to print from the Macintosh at a professional 300 DPI. Now your letters, homework, proposals, and every document you produce can have that laser quality desktop publishing look.

<table>
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<th>Quick Draw Printer</th>
<th>Resolution</th>
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<td>Apple LaserWriter IISC</td>
<td>300 DPI</td>
<td>$2,799</td>
</tr>
<tr>
<td>Apple ImageWriter LQ</td>
<td>216 DPI</td>
<td>$1,399</td>
</tr>
<tr>
<td>Hewlett Packard DeskJet</td>
<td>300 DPI</td>
<td>$995</td>
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<tr>
<td>Apple ImageWriter II</td>
<td>144 DPI</td>
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Grappler LS

The Grappler LS is the latest Macintosh interface solution from Orange Micro. The Grappler LS connects the HP DeskJet or any HP compatible serial laser printer to the Macintosh Plus, SE, or II and drives it at its full 300 DPI resolution. To achieve this, the Grappler uses a standard Apple printer driver and translates the output for your printer, allowing compatibility with hundreds of popular packages.

The Grappler LS comes complete with cabling, spooling software, and 3 fonts families (Times, Helvetica, and Courier look-alikes). Look for the Grappler LS and other Orange Micro products to bring the best printing solutions to you and your Macintosh.

NEW! Optional Grappler LQ/LS font package!

Make your Grappler output even more effective with three new complete font families and five special headline fonts. Families: ITC Garamond Book, ITC Zapf Chancery Medium Italic, Dutch Italic. Headlines: Blippo Black, Broadway, Cloister Black, Bitstream Cooper Black, and ITC Zapf Chancery Medium Italic.

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IDEAS

Who says the best advice is never given? Right here in the very pages of MacUser, you the reader can offer free advice to other readers anxious to take it. Whether it’s good or not is another story. Nonetheless, we’ll give you a forum from which to enlighten right here. If you have a tip for your fellow Mac users or some startling revelation, feel free to share. Just send your tip to Bright Ideas, c/o MacUser, 950 Tower Lane, 18th floor, Foster City, CA 94404. Sharing can be profitable, too; if we use your pointer, you’ll be $10 richer. What more could you ask for?

TALKIN' BOUT MY SIMULATION

For a real blast of audiovisual stimulation, try this: Run Orion, the Space Flight Simulation found on many BBSs, with the lights turned off while listening to the soundtrack from the motion picture Cocoon on your Walkman. If you thought that space flight movie scenes were impressive, wait until you get to ride your own “score!” You’ll get goose bumps as you approach a new solar system and crescendos and ruffles show up on your Walkman. You could also try to recreate 2001 by playing “The Blue Dan-

HIT LIST

Ah, November. The Christmas buying season had just begun, and Egghead Discount Software boasted these top sellers:

1. Microsoft Word
2. TOPS
3. Microsoft Excel
4. Claris
5. Intuit
6. Suitcase II
7. Symantec Utilities for Macintosh
8. Symantec Falcon
9. Spectrum HoloByte PageMaker
10. Aldus Microsoft PowerPoint

Orion and the Cocoon soundtrack aren’t bundled together.

PAUL GONZALEZ
JACKSONVILLE, ARK.

STATIC ATTRACTION

Do you sometimes feel like you’re peering through miles of smog to read your spreadsheet? Dust and smoke particles are very attracted to your Mac’s screen. An easy and inexpensive way to reduce this problem is as close as your nearest clothes dryer. Those fabric softener sheets people use to reduce static on their clothing are still useful after a spin in the dryer.

Just grab a used one from your dryer and gently apply it to your Mac’s screen. Not only will you notice that the dust doesn’t accumulate nearly as fast but also how fresh and clean your Mac smells.

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Typing Tutor 4 38.00
Early Games 28.00
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Adobe Fonts Save 33%
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Suitcase II 48.00
Microsoft Products call
MiniCAD + 489.00
Hyper DA 41.00
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MS Works 2.0 199.00
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Grappler LQ 95.00
Cutting Edge 800K 119.00
2 Meg Upgrade (Mac II) 325.00
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Thunderscan 189.00
Kraft Quick SE, + 39.00
Mac SE, II, ??? call
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TOPS Flash Box 129.00
9600 Baud Modem 695.00
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Fanny Mac QT 53.00
Tape Backup 60mb 699.00
Mac Recorder 139.00
MDI Interface 87.50
TurboMose 3.0 119.00
Seikosha Printer 234.00
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Sony Bulk (50) 1.44 1.21
Mac Disk Bulk (50) .99 .98
KAO Bulk (50) 1.35 1.35
KAO Boxed 15.50 12.00
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Color Ribbons 3.50
ImageWriter LQ Ribbons 15.00
ImageWriter LQ 4-Color 25.00
Teak Disk Box 50/100/150 1625/3
Disk File/30/70 $10.00 12.00
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Daystar 68030 5265.00
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YOU MAKE THE CALL

As the Mac has matured, so have its entrepreneurs. They've realized that what P.T. Barnum said a century ago still stands today, "There's a sucker born every minute." In keeping with these sentiments, we're presenting you with a few efforts from these plutocrats to let you judge whether or not they're what you'd want in a product. You make the call.

This Diskette Ejector could come in handy when you need to get a diskette out of your Mac or when you're too lazy to drag the icon to the trash. Platinum colored, this little gem won't clash with your Mac's color scheme. It even comes with an adhesive strip, so you can slap it right on the side of your computer. Great idea, huh? I guess you could call it reinventing the paper clip for profit.

Here's an item that, for the moment, comes free with every purchase of a box of diskettes. Some people might call them dust covers for the diskette. Still others, like Dr. Victor Technicado of Melbourne, Fla., refer to it as a virus prophylaxis — that's right, diskette condoms. Dr. Technicado insists that they provide 100 percent protection against virus transmission to your hard disk, though they might damage your floppy drives. Dust cover or diskette prophylaxis? You make the call.

A certain manufacturer who advertises in our magazine, among others, has a HyperCard-based product that may very well be "The Most Incredible Totally Integrated Hyper Relational Application," and "Absolutely The Greatest Value Ever." Judging from the packaging, it certainly is an extravaganza, what with a "Partial Feature List" including 39 features, the 39th being "And Much, Much More!!!" But you have to wonder if these guys really believed that HYPE stood for HyperCard when they came up with their phone number, (800) 888-HYPE. Again, you make the call.

— Kristi Coale
LightFax 9624 also with your PC, with optional software. Finally click the mouse and your LightFax 9624 becomes a 2400 baud modem with Bell & CCIT standards for worldwide standards compatibility. To learn more about all the exciting capabilities of LightFax 9624 consult your nearest Apple dealer or call us for information.
PHILE PHORMATs

RIFF, TIFF, and PICT. What are these, anyway? Well, if you paid attention to the previous pages in this magazine, you might know the answer. If you've been attentive, you'll know RIFF is a solo section within a song and that TIFF and PICT refer to a particular unpleasant demeanor—being PICT off, or having a TIFF with someone. And if you really read the magazine, you'll know we're kidding here.

Actually, these are file formats. No kidding. And imagine our shock when we discovered that we had completely overlooked the formats below, and far too close to deadline to cover them properly. Fortunately, we were able to displace the Laptop Mac article in this section to bring you this important information. Do try to pay attention here. You might be tested later.

STIF: Structured Tagged Image File. No longer widely used. Based on industry trends, it appears that it will soon be a dead format.

SNIFF: Sharable Neutral Interface File Format. Developed by Dr. Lyle Scratchen of MIT. Known in graphics circles as the Scratchen SNIFF.

SKIFF: Sequence-Keyed International File Format. Based on floating-point numbers, it's eminently suitable for transoceanic file exchange.

GARBL: Globally Acceptable Redundant Bit List.

Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transmission over standard phone lines without appreciable degradation. Suitable for transmission over standard phone lines without appreciable degradation.

STUFF: System Transferable Uncompressed File Format. By far, the most generic of all formats. Based on a survey of filenames on 100,000 Macs, there's a trend toward global acceptance.

JUNK: Jumbled Unformatted Never-Knowable. All file formats can be easily converted to this. It's fairly easy to write, but harder to read. The eventual state of all stored data. —Salvatore Parascandolo

DO YOU KNOW ME?

Gold leaf gone wild? Goldie's locks? A rube's Goldberg?

MathType 2.0

Equations for Word Processing

If you need an easy way to create technical reports, slides, class notes, research papers, or even entire books, then MathType is the tool you've been looking for. It's an intelligent equation editor for the Apple Macintosh or for IBM PCs and compatibles that lets you build up complex equations using simple point-and-click techniques...

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\left \{ \int _{a}^{b} \left ( \sum _{i=1}^{m} \lambda _{i}(x) \right )^p dx \right \} \frac{1}{p} \leq \sum _{i=1}^{m} \left \{ \int _{a}^{b} \lambda _{i}(x) dx \right \} \frac{1}{p}
\]

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Booster Shots

Will Macintosh users forever be defensive and worried about their image? Do they need constant boosterism and reminders that they did the right thing when they bought a Macintosh in the first place? A quick survey of all the Mac magazines, a look at columnists, editorials, and letters to the editor soon reveals this to indeed be the case.

Let’s look at last December’s issue of MacUser, a nice fat magazine. In the editorial, our illustrious editor-in-chief, Fred Davis, practically swooned as he waxed eloquently about the Mac. Hasn’t he waxed eloquently enough already? He calls the machine “the best computer for molding information” — whatever that means. He then goes on to tell us about all the wonderful Mac software and all the wonderful things one can do with a Mac. Can it, Fred?

Moving to the letters to the editor — still we hear praise for the Mac. Now to the columns. Neil Shapiro is the leadoff hitter. His theme is not the Macintosh (this time) but the crummy Macworld Expo in Boston. He moans and groans about it. Just to make sure he stays in good stead with the Mac community, though, out of the blue he throws gratuitous nosegays at the Mac. “I’m probably as excited about the Macintosh as the next guy, even if I’m seated next to Jean-Louis Gassée.” Name-dropper.

Next we get to Jim Seymour. He’s one of those converted PC users. You know the type. The worst. Like a guy who quit smoking. In this column Jim debunks all the nasty and bad things people say about the Mac when compared with an MS-DOS machine. The fact is, the reader of MacUser already knows all the reasons a Mac is as good as an MS-DOS machine. So who is the column written for? Yes, it’s written for the readers who can’t get enough boosterism.

Onward. Robert Wiggins actually does a column where he doesn’t pander (too much) to the Mac lover. He discusses “The Many Faces of Apple” and how the company needs to unify its image. Nowhere does he say “I love the Mac,” or “As we all know, the Mac is the world’s greatest machine.” I was stunned by this and expect he’ll receive numerous nasty letters. Robert made up for this flaw by writing a feature story in the same issue on presentation graphics, in which he humbugged artifically about the capabilities of the machine. After reviewing some fabulous software for this phenomenal machine, he concluded, “Whichever one you choose, you’ll end up with a winner.” Gag me.

We move to Michael Swaine, former editor of Dr. Dobbs Journal of Software Tools and micro maven from way back. Somehow he’s become enamored with HyperCard and is devoting his life to it. He writes a column about its every idiosyncrasy as if he were a psychiatrist dealing with the three faces of Eve. Would someone please throw a bucket of water on this guy?

We haven’t even discussed the ex-MacUser columnists such as Steve Bobker and Doug Clapp who, together, have created entire new genres of brownnosing and pandering. Meanwhile, the readers eat it up. They can’t get enough. Talk about people who are insecure.

It’s apparent to anyone who took one lone sociology course that the roots of fascism are present in this community. I’m always chided by my coworkers at PC Magazine, where I do most of my work, about all the Macintosh magazines, including this one. “Aren’t those people ever critical of anything?” they ask. I have to explain that this Macintosh community is a family of well-wishers. Smiling faces. “Kind of like Jonestown,” I say.

The problem boils down to the one-vendor syndrome. Without clones or competition, how can one be critical? It’s like a one-party political system. How can you criticize the boss when there is nowhere to run, no alternative? Apple has always had this advantage in the marketplace. The alternative to a Mac is no alternative if you like the Mac in any way. It was the same with the old Apple II. What this means is that the engineers and users are dependent on Apple’s goodwill for them to continue to exist as engineers and users. No such dependency exists outside of the Apple camp.

Since this situation is inherently uncomfortable, constant soothing and reassurance are necessary. Mac users and the hapless engineers at Apple must be steeped in this boosterism that I cited above and that you see all around you. It’s the users who have chosen to live this life. They, in essence, demand the boosterism and flag-waving. They have sacrificed the intellectual freedom to be critical just so they can comfortably use one specific brand of computer. The forced loss of objectivity has been chosen as the lesser of two evils. The alternative is to fight city hall. In this case, city hall is like the Chinese Cultural Revolution and the user community is like a united cadre of disciplined figures in blue pajamas waving little red books. None of the believers is interested in hearing some guy complain, especially against the Chairman.

While this all works out fine for Apple and the bottom line, someday things will swing the other way, and Apple will zig when it should have zagged. It will ask the community of drones what happened, why they didn’t let Apple know that it should have zagged. And all the community will be able to do is quote meaningless aphorisms.
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