Steve Jobs Is Back

Next’s New Machine

A Guide to Hard Drive Recovery
File Servers: Four Ways to Go
1988 in Review
Color Printers Compared
Spend seven years inside Apple and you learn a thing or two.

In 1981, Apple approached several major software developers with a radical vision of personal computing. A vision, it turned out, too radical for most to even accept. But one did. To this day, over seven years later, we suspect the other developers are still kicking themselves.

We, on the other hand, are still pushing ourselves.

At Microsoft, we shared in Apple's vision to make Macintosh® the most corporately powerful, yet disarmingly friendly, business computer in history. To give Macintosh users all the functionality, flexibility and power to push productivity to unheard-of limits. And to do it with a combination of hardware and software that's somehow embarrassingly simple to use.

It happens to be a vision we still share. Passionately. Which is why we've created Macintosh applications that have changed the way today's businesses do business.

Case in point: Microsoft® Word, quite literally the best-selling Macintosh application.
spreadsheet users are using Microsoft Excel. The simple truth is, for years it's actually been the most powerful argument for buying a Macintosh.

And speaking of power, until Microsoft PowerPoint® was created, desktop presentations didn't exist. Now the person making the presentation can actually generate it—from overheads to 35mm color slides. Best of all, only PowerPoint has built-in color schemes. For impact like you've never seen.

And with Microsoft File as your economical database, creating professional-quality business forms and mailing labels has never been faster. Or easier.

As for Microsoft Works, just think of it as the Swiss army knife of business software. Works integrates word processing, spread-sheets, a database, drawing, even a communications tool—all in one versatile package.

For the developing developer? We created Microsoft QuickBASIC, which basically gives you everything you need for quick, efficient programming, testing and execution.

Power Point® was created, desktop presentations didn't exist. Now the person making the presentation can actually generate it—from overheads to 35mm color slides. Best of all, only PowerPoint has built-in color schemes. For impact like you've never seen.

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All of which brings us to Microsoft Mail and the concept of workgroup computing. Mail actually lets you share data, graphics, thoughts, whatever—Mac® to Mac, or even Mac to PC.

For the full story behind our Macintosh applications and what they can do for you stand-alone, and working together, call us at (800) 541-1261, Dept. 189. It's inside information we think you'll find extremely useful.

Microsoft

Making it all make sense:

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Programs like Ultimage offer science and industry the benefits of image processing—the enhancing and analyzing of digitized images (p. 91).
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Software to Sharpen Your Macintosh Skills

DISKWORLD is an 800K, 3½" disk full of quality software for your Macintosh (512Ke, Plus, SE, II), delivered to your door every month for only $6.65 an issue. DISKWORLD keeps you on the cutting edge of the rapidly changing world of software for your Macintosh. Every issue brings you new useful applications for home or work as well as entertaining games and features. Each month you’ll receive from five to ten quality, original programs (not public domain) depending on the size of each program.

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Contents of Issue #3 (Available as a back issue)

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Now you can buy your Macintosh II with a powerful tool which will dramatically increase your productivity with every use. A Radius Display.

Radius offers displays for every type of Macintosh user and every Macintosh software application. If you're involved primarily in intensive word processing and database management, we heartily recommend our FPD.

The Radius Full Page Display shows you an entire 8½” x 11” paper-like page. With a refresh rate of 69 Hz, it is virtually flicker-free.

Our display is perfectly suited for working with software like Microsoft Word and 4th Dimension. If you're incorporating your word processing into page layout and design, we suggest that the Radius Two Page Display is clearly the choice for you.

You have the same flicker-free resolution of the FPD with a full two-page horizontal layout. Ideal for viewing a magazine spread. Essential for creating architectural plans.

Or, if you're putting photographs into your Macintosh, our Radius Gray Scale Display lets you create and manipulate life-like images in 256 shades of gray across the same expansive TPD.

Scan your photographs, then do your own retouching using Image Studio or Digital Darkroom. When you're ready, just print out on a LaserWriter or download to a Linotronic. You'll get startlingly beautiful and gratifying results.
For professional publishers and engineering designers, the Radius Color Display offers you the latest in digital design, Radius innovation and Trinitron color technology.

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Best of all, no matter which Radius display you do choose, you get the classic Radius firmware.

All of our displays offer you Tear-off Menus which can be positioned anywhere on the screen. And built-in screen savers, control panel access, as well as adjustable menu and menu bar type size.

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So before you buy your Macintosh II anywhere else, call 1-408-434-1010 for a brochure and the name of your nearest Radius Authorized Dealer.

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Welcome to Déjà Vu II—and to Las Vegas, the city that never sleeps—the city of excitement! Actually, you've already had plenty of excitement in the last 48 hours. You've been abducted by two thugs from Chicago, grilled by a notorious Las Vegas mobster, knocked senseless, and tossed into a bathtub in a cheap Vegas hotel. It couldn't possibly get any worse than this—or could it?!

Welcome to Déjà Vu II, an exciting, state-of-the-art thriller in the fine tradition of the original. Play at your own risk!
“SUM, or to be more precise, Symantec Utilities for Macintosh, is the slickest and most important set of utilities you can get for your Mac. To have a hard disk and not have SUM is sheer folly.”

Steven Bobker, Chief Scientist, MacUser Magazine, 9/88, 5 Mice, Highest Possible Rating

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For art directors and designers, the 21" flat-screen SilverView extends your range with an exact scale two-page spread. And your palette with the entire gray scale's 256 different shades. So you'll never have to leave anything to the imagination again.

Priced less than $1000, our PageView 15" flat-screen monitor is clearly one of the most remarkable bargains in this industry. Ideal for desktop publishing and text handling it comes with something ingenious called Multimode. Enabling you to work in actual size or the full 8.5" x 11" page. A feature you won't find on monitors costing twice as much.

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Circle 215 on reader service card
68030 Accelerator

A new 68030-based accelerator board from Siclone Corporation lets the Mac II run most applications three and one-half times faster than before. The Si3033 board speeds up applications on all Mac II models and memory configurations, including the IIX, and is compatible with all Mac II software including Apple's A/UX, according to the company.

Graphic designers, CAD/CAM users, and extensive spreadsheet users are most likely to benefit from the Si3033, but it will help anyone wanting a faster Mac II. The board will list for $3999, and should begin shipping during the first quarter of 1989. For further information, contact Siclone, in Sunnyvale, California, at 408/734-2508.

1200 Backup Megabytes

France's GigaTrend has developed a tape backup system for the Mac that stores up to 1200 megabytes of data. Helical scan technology makes the high capacity drive possible.

The Giga 1200 tape drive is intended for applications such as graphics, scientific and industrial uses, data acquisition, databases, image processing, and archiving. Its features include random read/write access and a 20-second average access time (40 seconds maximum). The drive uses the SCSI interface, is compatible with AppleShare, and can operate on a network.

For more information, call the American office of GigaTrend, in Carlsbad, California, at 619/931-9122.

New Version of Publishing Software

Interleaf's new version of Interleaf Publisher, version 3.5, is shipping; it has several new features including an open font architecture that supports the Apple Font Manager; the ability to convert typed-in text to graphic fonts that can be sized, stretched, filled, and rotated; support for multiple monitors; the ability to run under MultiFinder; and improved support for the industry-standard PICT format for importing graphics.

Version 3.5 also makes it easier for the Mac II to share documents with the various platforms Interleaf runs on, including computers from Apollo, Digital Equipment Corporation, IBM, and Sun Microsystems.

Version 3.5 will be available free to all registered users of Interleaf Publisher 3.0. Priced at $2495, it is sold through Interleaf's direct sales force and a limited group of publishing resellers. For further information, call Interleaf, in Greenbelt, Maryland, at 301/982-0991.

Logitech Hand-Held Scanner

A hand-held scanner for the Mac Plus, SE, or II is on the way from Logitech. ScanMan, which will be available in February 1989, can scan almost anything, according to Logitech. It includes a 4-inch-wide scanning window; gray scaling and contrast control; resolution that ranges from 100 dots per inch to 200 dpi, quasi 300 dpi, and quasi 400 dpi; and a SCSI interface box with an independent power supply. ScanMan takes less than 5 seconds to scan a picture 11 inches long.

The scanner comes with graphic editing software in English, Italian, French, Spanish, or German. It lists for $499. For further information, contact Logitech, in Fremont, California, at 415/795-8500.

Faster Network Transmission

The TOPS Division of Sun Microsystems is offering FlashBox, a device that lets Macs communicate over LocalTalk-compatible networks at 770 kilobits per second, up to three times faster than the AppleTalk data rate. FlashBox is designed to provide faster data transmission across networks, where performance often suffers as network traffic increases.

(continues)
FlashBox is fully compatible with AppleTalk, offering users the flexibility to mix and match Macs running both protocols over the same wire. It is also compatible with Microsoft Mail and with AppleTalk-based applications such as TOPS and AppleShare LAN packages and TOPS’s InBox (formerly Symantec’s InBox).

FlashBox can be installed on every Mac in a network or only on those Macs most frequently using the network. It automatically selects the correct speed for communicating with other workstations or peripherals. Installation takes less than five minutes on each Mac 512KE, Plus, SE, or II. A simple one-time installation on the server of the TOPS FlashTalk software is also required.

FlashBox lists for $189, including the software. For further information contact TOPS, in Berkeley, California, at 415/769-9669.

MacTCP Based on TCP/IP

Apple has developed network software based on the Transmission Control Protocol/Internet Protocol (TCP/IP), an accepted standard in education, business, and government. MacTCP is the building block that lets Macintosh users in universities, business, and government communicate with Cray supercomputers, UNIX-based workstations, VAX systems, and other computers that use TCP/IP protocols. With MacTCP-based applications, users can share information, access computing resources, send electronic mail, and collaborate with colleagues around the world.

Software developers have already demonstrated a range of TCP/IP solutions. Ungermann-Bass offers file transfer, virtual terminal, and mail applications, and Cayman Systems offers the Gator Box, which allows access to NFS (Network File System) servers while maintaining the intuitive AppleShare file-server interface. Apple’s own MacWorkStation software uses MacTCP to support a Mac interface for programs operating on host computers. For further information, call Apple Computer, in Cupertino, California, at 408/996-1010, Ungermann Bass, in Santa Clara, California, at 408/496-0111, or Cayman Systems, in Cambridge, Massachusetts, at 617/494-1999.

Hypertext Comes Full Circle

Before Guide and HyperCard came to the Mac, most work on hypertext and hypermedia was done on larger, more powerful worksations. The Association for Computing Machinery (ACM) held Hypertext ’87, the first professional conference on hypertext, and published some of the proceedings of the conference in the July 1988 issue of Communications of the ACM.

Now you can pursue that research using HyperCard. The ACM has released a two-disk package called HyperText on HyperText. All of the information is cross-linked, so that data in one article can be accessed from related articles; references and figures can be viewed simply by clicking the mouse. The topics covered include an overview of hypertext, the KMS-distributed hypermedia system, the HAM hypertext abstract machine, and experiences with a hypertext medical handbook. For further information, contact the ACM, in New York City, at 212/869-7440.

Video Scan Conversion for the Mac II

Have you ever wanted to display high resolution Mac II graphics in real time on one or more television monitors, and then record them on videotape? That’s the raison d’être of RGB Technology’s RGB/Videolink Plus. Like other high-end video scan converters, it digitizes the Mac II’s RGB input to 8 bits per pixel, compresses and antialiases them with line- and pixel-averaging techniques, stores them briefly as an image, then converts the image into NTSC composite video.

RGB Technology says that its proprietary antiflicker filter guarantees a clear, stable television image, without the flicker that often occurs when the Mac II’s RGB signal is converted to NTSC. Licking the flicker effect, however, is not without a price. At $10,000, RGB Videolink Plus is one of the more expensive video scan converters available.

The unit does not take up any slots in the Mac II; it is a separate box nearly the size of the Mac itself. Its other features include simultaneous use of RGB and NTSC monitors, conversion of the full RGB screen, genlock, PAL compatibility, and a video mix option for combining Mac II graphics with live or prerecorded video. For more information, contact RGB Technology, in Berkeley, California, at 415/284-4330.

Walking the Mac

The first portable Macintosh SE that operates from internal battery power is now available from Colby Systems. Called the Walkmac SE, the system can operate for two hours on battery power (two and one-half hours with the hard disk turned off). It weighs 12 pounds without the 3-pound internal battery and can also use external AC power.

The Walkmac SE, available through selected Apple dealers, uses an Apple system board supplied by the dealer from spare parts stock, according to Colby Systems. The system includes an extended keyboard with function keys and a numeric pad. Because the computer is wider than it is deep, it can be used as a true laptop in confined spaces such as airplane seats.

The basic unit has a suggested list price of $5495, with a super twist LCD screen that displays white characters on a dark blue background. It also comes with a floppy disk drive and 1 megabyte of memory. Hard disks with capacities from 40MB to 140MB range in price from $995 to $1895. Processor upgrades and external monitors are also available as options. For more information, call Colby Systems Corporation, in Fremont, California, at 209/222-4985.

Mac Bulletin

January 1989
At $1999, our Personal LaserPrinter (PLP) costs about $800 less than Apple's LaserWriter II SC.* But that's the least of many good reasons why you should buy one.

One of the best is demonstrated, in rich and varied prose, above. The PLP is the only laser printer in its category that lets you print in any number of point sizes, even fractionals. The LaserWriter II SC, by contrast, lets you print in any number of point sizes as long as the number is six.

The PLP gives you unlimited freedom in reducing and enlarging documents (critical for applications such as Excel and PageMaker*). The LaserWriter II SC doesn't. With the PLP, italics are true italics and bolds are true bolds—because the PLP uses true outline fonts. The LaserWriter II SC doesn't.

All this begs an obvious question: how can we offer so much functionality and still charge less for it?

The answer is software—software that enables your Macintosh to use its own resources to do the processing that would otherwise require costly additional hardware. But there's another reason the PLP performs better: it has to. After all, in a market saturated with laser printers, there are plenty of opportunities to compare price and performance. The PLP simply provides a higher standard of comparison.

For a PLP demonstration—or information on our ImageWriter trade-in program—see your authorized GCC Technologies dealer. For the one nearest you, call (617) 890-0880.

*Based on a comparison of manufacturer's suggested retail prices. In Canada, (800)263-1405. © 1988 GCC Technologies, Inc. GCC Technologies is a trademark of GCC Technologies, Inc. The GCC Technologies logo is a registered trademark of GCC Technologies, Inc. Personal Laser Printer and PLP are trademarks of GCC Technologies, Inc. Macintosh is a trademark of Apple Computer, Inc. LaserWriter and ImageWriter are registered trademarks of Apple Computer, Inc. PageMaker is a registered trademark of Aldus Corp. The document above was created with PageMaker 3.0 and printed on a GCC Technologies Personal Laser Printer.
IN T R O D U C I N G

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A new and advanced paint, editing and special effects program.

For the serious artist, with capabilities and speed beyond any other Macintosh paint software.

CUSTOMIZING COLOR PALETTES  Create and save your own set of colors — one at a time with color picker, or a range of colors using RGB and/or HLS tables. Blend any range of colors from 2 to 256. Change palettes to change the color scheme of any illustration.
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- New Pixel Brush allows you to create customized paint brushes.
- New “water drop” tool allows selective blending of colors.
- New “thermometer” displays colors on the palette.
- New spherization of any image including text.
- Two to ten times faster than any other advanced Macintosh paint or draw program.

Graphist Paint II is a new hi-end paint program with all of the standard painting tools, file formats and 16 Macintosh standard modes . . . PLUS you can:

- Import all of the standard formats, PixelPaint and video inputs (driver built-in) including PAINT, PICT I and II, TIFF and RIFF.
- Export many different formats for direct integration with other software to provide a more complete and better art solution.
- Digitize existing images from a video camera or a television (NTSC or PAL) with on-screen viewing, for subsequent editing.
- Select from 16.7 Million colors, supporting 1 palette of 256 colors at a time, on each of 2 screens.
- Pixel by pixel editing.

INCRUSTING

Take any two images, on two layers . . . incrust an image from one onto the other — in any position — or onto any other illustration — in any position — or back onto the full original.

SPHERIZATION

Take any image, or text . . . define the area . . . and create a 3-D sphere of the entire image, or text.

CUSTOM COLOR MANAGEMENT

Customize color palettes by changing RGB and/or HLS wave forms — or use the standard Macintosh color picker.

Graphist Paint II is packed with so many new features you’ll want to get your hands on it right away. For full information and the name of the Graphist Paint dealer nearest to you call: 1-800-234-0230.

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Circle 145 on reader service card
The Next Announcement

A dazzling introduction, a long wait for machines

So how good was it?

It couldn't have been much better from any viewpoint. Let me simply call it the best introduction of a computer since the Macintosh.

The setting: a symphony hall in a major city. It is glass and concrete on the outside, subdued and human on the inside. Within the softly lit hall, a scene of golden clouds is projected far overhead. A cone of yellow light flows over a cascade of cut flowers next to a graceful conductor's stand. Space music, unobtrusive but strong enough to set a mood, is piped in. A capacity crowd of the faithful has arrived, slowly filling every seat in the auditorium. All have produced photo identification with their invitation to enter. Many media people, including any with cameras, are turned away. Their job is to wait, noses pressed to the glass outside, and make the finish look like a Hollywood event.

Everyone is talking—in the lines while waiting to enter, in the carpeted hallways leading to the hall, in the hall itself. The computer industry is there to pay its homage, satisfy its curiosity, and express the hope that Steve Jobs will provide the technological thrill that makes Silicon Valley what it is. The hope that the substance will match the show. Every seat is occupied by someone of note. I sit down among several people I do not recognize. Two are from the National Science Foundation (NSF), which funds computer centers at colleges across the nation. Another is Gordon Bell, former VP of Research and Engineering at Digital Equipment Corporation, now cofounder of Ardent Computer, a mini-supercomputer start-up in Sunnyvale, California. He introduced the first Mac to the NSF, which still has only seven (compared to 1200 PCs). Another is an editor from the San Francisco Examiner. All bets are off, facades are down, conversations are intense.

There is talk of the dinner the night before. Of H. Ross Perot and Steve Jobs holding forth to a select crowd of potential customers, university advisors, and analysts. The machine crashed twice during dinner. The thought of the potential for disaster skirts one's consciousness, and then is gone.

Who Will Buy It?

The lights dim, come up again, and Jobs walks out to applause that would warm any conductor's heart. He is confident, happy, but thin. Three years is too long a time for this man to be out of the limelight.

He begins by telling us that all computers have a life span of ten years. The PC is dying, the Mac has peaked, and now his machine is being announced, he says—i.e., this is the personal computer of the 1990s. The opening slide is of the classical sandstone porticos at Stanford University. By the third paragraph Steve has convincingly positioned the machine as the "scholar's workstation." Never mind that a campaign based on this phrase was widely discussed but not promoted at Apple over the last year.

The target for this machine will be 3000 universities, 45,000 departments, 600,000 faculty members, 12 million students. Steve credits 23 carefully selected advisors, the heads of computer centers at colleges and universities across the country, with having guided the machine to this point. We are impressed—credentials have been proffered and look good.

So What's in the Box?

We still hadn't seen the actual computer, but Steve makes a transition to a discussion of what's inside the box. What's been going on in Palo Alto all these years?

He starts with a wish list of ten items that Next had been given from the members of Academe: 5-MIPS processing, floating-point processing, array processing, 8 megabytes of RAM, at least 100MB of disk capacity, unified imaging and printing, a
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Commentary/Jerry Borrell

1-megapixel display, transparent networking, and UNIX for the end user.

OK. Does a good showman set himself up to look foolish before a crowd like this? Of course not; he raises questions and has an answer for each. But a great showman knows how to stretch it out—and Steve did just that. "We wanted to do more," he says. "We wanted fast networks, great sound, an architecture expandable to the 1990s, a machine that is small and quiet, and an affordable laser printer."

You know the routine: Tell 'em what you're going to tell 'em, then tell 'em, then tell 'em what you've told 'em. But Steve does it very well, with panache. So he told us. The heart of the computer is two chips, gate arrays (a kind of custom silicon technology) that do the main processing tasks of the machine. A 68030 CPU chip from Motorola (like the one the Macintosh IIx has) handles the interface and is supported by a floating-point processor. There is a digital-signal processor chip that is very fast and dedicated to array processing (sound, facsimile, image processing, graphics).

In addition there are 12 other CPU chips that shuttle data back and forth on the board. "We had a revelation that it's not the processor but the data flow in and out of computers that limits them," Steve tells us. So Next added enough processing to the machine to solve many of these problems. The software designers couldn't have enjoyed figuring out all of this, but that's not our problem.

So there's the CEO showing color slides on a billboard-size screen, using a little laser pointer to visually walk us through the layout of a circuit card, and waxing enthusiastic about the internal architecture of his computer. Boy have times changed.

Steve admitted this crowd needed more than a TV ad with piano music. And admitted he's been around a few circuit boards and integrated circuits. Not many computer introductions dwell on the workings of a machine in this way. Has Steve changed? Was this over the heads of the audience? Or are there a lot more people these days with a fundamental understanding of computers?

The sound? CD quality, of course. A modem won't be ready until next year. An "Aah!" is heard from the audience at the first sign that the machine is not quite finished. Next chose NuBus (used by the Mac II) for
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Commentary/Jerry Borrell

Pictured are the laser printer, keyboard, monitor, and cube (from left) that make up the Next line.

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Circle 167 on reader service card

its internal communications path. A second, more enthusiastic "Aah" begins to well up when Steve notes that the NuBus in the Next computer runs at two to three times the backplane speeds in the Mac II. Ethernet is built in, of course; there's a SCSI port—"Aah"—and the machine is plug compatible with external devices for the Macintosh, but it runs at four times the speed.

People are making little grunts of appreciation, there are lots of smiles. The hardware is very good. Steve says he would love to show some slides of how the computer is made (that is, how its single printed circuit board is manufactured), but he's decided instead to show a movie. The film starts like an early George Romero flick—white type on a black background, high camp. Then it switches to the most polished corporate setting imaginable. The board fabrication is done by robots, with all surface-mount technology. The floor of the place is polished to a smooth gloss, and the lighting makes it look like a modern office.

About now, we all began to perceive that this is not the typical start-up company. Our old image of Steve, with his disorganization and mood swings, dissolves and is replaced by an image of someone who really knows what he's about. Don't worry. There are enough former employees of Next who think that Steve is still pretty squirrely, and they will find an eager audience through newspapers, but for now Steve is changing legends.

At the end of the film we get a glimpse of the machine. A black, 1-square-foot cube, with a tiny logo in the center. Then, at last, he shows us the machine itself. The design is everything you might expect. The cube can reside anywhere—only a keyboard, monitor, and mouse clutter your work space. The machine has an open architecture and holds up to three additional cards. Best of all, the cable connecting the monitor and the CPU is 10 feet long. With the matching printer, it all looks like a high-tech line from the Sharper Image catalog or from Porsche Designs.

By now, the audience is eating out of Steve's hand. Gordon Bell allows that if the machine has software he'll turn in his Mac at home and buy one of these. All of this before the machine is turned on—we don't even know if it runs yet and people are singing its praises.

Then Steve turns on the machine and it runs a cute demo that first emulates the IBM PC, then the Mac, and then launches into Aaron Copland's "Fanfare for the Common Man." The clouds projected on high are replaced by a sea of shining stars. The (continues)
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Macintosh owners have a reputation for being fanatical about their Macs. And rightfully so, when you consider the elegance of the Macintosh user interface.

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For network solutions, you should be seeing red.
demo image on the symphony stage shows three windows opening simultaneously with no perceptible slow down.

Now it's Steve's turn to be pleased—the machine didn't crash. He pats it appreciatively and announces one piece of the hardware he has saved for last. The computer has no floppy drive, instead using a 256MB removable, erasable optical drive “some four years before other companies can implement the technology,” he says. “We bet our company on this.”

Everyone's impressed. Then we’re given a break and it’s only as we troop out of the hall that some developers can be heard wondering how software distribution will work—the erasable disks cost $50 apiece (floppies cost $1). There’s talk about disk swapping when you want to load new programs into the machine. Never mind, there are machines waiting outside for people to see.

(It’s a pity that Bill Gates decided to downplay the Next technology, because he often speaks of revolutionizing software distribution through the use of CD ROMS. In the days following the announcement, we see a widely repeated quote from Gates in newspapers and newswEEKlies that the Next machine is just another microprocessor in a box.)

The tough announcements—software, pricing, programming—are saved for after the break. Steve’s ready for this. No one winces when he tells us that Display PostScript was chosen for the unified printing and display models, because they’ve seen the display work, and it’s fast. These are integrated into a software architecture called NextStep, which at a later point we hear that IBM has endorsed, and which we assume will be forthcoming on some future workstation. (One has to wonder if IBM’s use of NextStep has made Steve a new competitor to OS/2, PS/2 domination.)

Loud “Oohs” and “Aahs” are again heard from the audience. Steve wastes little time explaining the fact that all of the software rests on a UNIX base, because there is no need. UNIX is transparent to the user—truly. At least from everything we see during the demo. The developer environment looks even better. The toolkit features all object-oriented programming routines. The Interface Builder allows for fast construction of working interfaces. And the software architecture, NextStep, renders UNIX usable to “mere mortals.”

(continues)
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Commentary/Jerry Borrell

The entire second half of the presentation goes like this. One announcement after another describes features of the machine or its support functions, and each is punctuated with loud applause.

Then Steve sits down and says, “Now, I’m not a programmer, but to show you how easy it is to develop a program with our machine, I’m going to build an application today.” And he proceeds to develop an interface for a physics experiment showing how a molecule reacts to variables such as heat and compression. He hits the start button and then begins to tinker with sliders (virtual tools placed on the screen with the interface builder) that affect the parameters in which the molecule resides. And the molecule responds.

That is the beauty of an object-oriented programming environment—it allows “the rest of us” to develop applications. Next goes one step further, extending the concept to the interface as well.

Richard Crandal, a professor from Steve’s alma mater, Reed College, is then brought onstage to show us some applications he has built. Most go over my head, but one hits home. It uses the microphone of the machine to digitize and display different analyses of the sounds from the audience. The demo leaves little doubt that this machine is going to be the joy of a Next generation of hackers coming out of universities. Crandal’s students were the first to develop a color paint program for the Macintosh 512, a product that sat in the lobby of the executive building at Apple during 1986. A small touch of irony.

There is an old sales adage, “Don’t give the customers anything to say no to, and when you close the deal, they’ll probably say yes.” It’s been three hours, and no price has been mentioned. However, Steve now proposes to tell us about all of the software that will be bundled with the machine: Mathematica, a Next version of WriteNow, mail software, a database manager (from Sybase), Common LISP, and several digital books (a thesaurus, a dictionary, the complete works of Shakespeare, Bartlett’s Familiar Quotations). That’s more software than we had for the Mac for six months after its announcement. Each product is demonstrated, and there is only one crash, largely unnoticed because in a multitasking system only the applications window goes away, not the entire screen, so rebooting the system isn’t necessary.

(continues)
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Commentary/Jerry Borrell

At last, the price: $6500 for education users. No mention of retail prices, but one can assume an end user price of about $10,000. Suddenly the machine looks more like competition for Sun Microsystems than for Apple.

The shipping date? System software version 0.8 ships now to developers. Version 0.9 ships in the first quarter of 1989 to "aggressive end users." Version 1.0 ships in the second quarter of 1989. This is a machine that will not ship to most end users until the summer of 1989 at the earliest.

That understated fact brings the announcement back to reality. You can't even march down to your local dealer and see one of these things until next summer. Nevertheless, the price receives a strong round of applause. It's a good price considering what we've seen.

The pricing presentation is followed by some prerecorded endorsements of the machine from the software developers. We hear only John Warnock of Adobe and three others when the presentation is cut short, due to the need to let the symphony musicians into the hall. The crescendo of the announcement comes when Steve formally recognizes IBM's purchase of NextStep and Display PostScript to overlay AIX, IBM's version of UNIX. The significance? An endorsement of NextStep from IBM. More staggering is that all software written for AIX will run on the Next machine and vice versa, giving Steve the coup-de-the-year award.

To close the program, a violinist from the San Francisco symphony is brought out to play a movement from a concerto. His accompanist? The Next machine. At center stage are two pools of light, one for the musician, one for the black cube that is on a stand at shoulder level. For 15 minutes we hear the two playing together and it's not bad. Or as Jean-Louis Gassée would say, "not too shabby."

After applause for both, and a bow from Steve, the show is over. Lights come up and Steve thanks everyone. There is an odd sense of vulnerability about it all. The announcement went well, the machine looks great (you know how great), and the early adopters are enthusiastic. But the machine isn't shipping, there's no Next magazine. We're all left waiting, and next year is a long time in the world of personal computing.
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* Does not fit in Mac IIs with full-height disk drives or SEs with CPU Accelerator boards.
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Preference is our family of performance products for computer users who care. For Apple users, it's the new 20 or 40 megabyte storage solution that's swift, sleek and simply a pleasure to use.

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Result: They're incredibly fast. So you "Open" and "Save" files in a flash.
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Our new drives come ready to plug and play, preformatted and ready to connect to your Macintosh II, SE Plus or any Apple II with SCSI adapter. And they can even be used to provide font storage for the Laserwriter II NTX.

All in all, it's never been easier to make the right choice! Call 415-960-3360 for complete product details. Then see your Apple dealer. And express your Preference.

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Circle 367 on reader service card
Although this category, unlike spreadsheets and word processors, had a lot of new players this year, one seemed to us to be the clear leader.
4th Dimension, the powerful first product from ACIUS, takes the kudos.

MacUser, February 1988

"Congratulations! InfoWorld's readers have chosen 4th Dimension as the Product of the Year in the Macintosh Database Systems category.”
Jonathan Sacks, InfoWorld, April 1988

“I can't imagine a data-management problem that you won't be able to solve with 4th Dimension.”
Steve Mann, Macintosh Today August 11, 1987

"Users with no experience or interest in programming can build a barebones database in 4D's 'Design Environment' just by pointing, clicking, and naming files and fields.”
"For searches and sorts - database operations that are performed interactively - 4D's performance curve is probably the best of the four programs (Omnit 3 Plus, Double Helix II, dBASE Mac, and 4th Dimension).”
David Brandt, MacWEEK, January 11, 1988

"It will do everything you need, and then some, and will prove itself well worth the cost.”
Jan L. Harrington, MacUser, November 1987

"I'm convinced that many users of other Mac databases and even PC databases will want to switch over to 4th Dimension.”
Adam Green, Macworld, July 1987

"In general, Macintosh software is better than software for other personal computers... 4th Dimension redefines those high standards.”

4th Dimension from ACIUS, Inc. of Cupertino, California, outshines the other databases we tested both in number of features and in rich database development environment.”
Don Crabb, InfoWorld, January 11, 1988

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Letters
A forum for Macworld readers

FullWrite Supporter
Had I not already used FullWrite's style sheets extensively, I would have come away from your review (September 1988) with the false notion that "the lack of style sheets spoils the program." Not only is the style sheet feature beautifully implemented, but style sheets can also be exported easily to new documents with the save-as-stationery feature. Also, one can cut and paste formatted text to a new document. Further, custom styles added to the Style menu can be efficiently accessed through the WalkDown key commands with a minimum of keystrokes.

Judith Misb
Longmeadow, Massachusetts

CASE Tools for the Mac
I am trying to find some CASE (Computer-aided software engineering) tools that run on the Macintosh. Ideally, I need a system that supports the four major areas of software development: analysis, design, coding, and documentation.

Andy Berry
Milton Keynes, England

PowerTools is an integrated CASE tool set from Iconix Software Engineering (213/458-0092). Anatool 2.0 automates structured-system-analysis methodology, and BLUE/60 is a data modeller. Both are available from Advanced Logical Software (213/659-5157). MacDesigner is a comprehensive CASE tool from Excel Software (515/752-5359). And Foundation Vista from Menlo Business Systems (415/948-7920) offers online application analysis and design.—Ed.

Evangelism Exposed
Three cheers for Steven Levy's "The Unbearable Heaviness of Being in the Computer Industry" (July 1988). He gives voice to the sentiments of "the rest of us" by exposing the shallow roots of Mac evangelism and by reaffirming the principle of separation of church and state-of-the-art. Understand, I speak as a card-carrying Apple/Mac user since the birth of the Revolution. I remain loyal, though wary.

Paul Cohen
Westport, Connecticut

Kudos to Claris
In April, I received the upgrade to MacWrite 5.0 and found some problems with its spelling checker on my 512KE. I wrote a letter to Macworld outlining my problem. One week after the letter appeared in your magazine, I received an update to 5.01 that

(continues)
To an architect, fine hairlines like ours are pure poetry.

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

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

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

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

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

After he slipped away, we added rich Postscript® gray scales to Koko’s leftovers.

These unretouched drawings were created in Canvas 2.0 and output to a Mirrus film printer.
How an architect, an MBA, and an art director developed instant talent in precision drawing. While Koko developed a mild stomach ache. Meet Canvas 2.0. The new top banana. Able to help even ordinary people draw extraordinary things.

Easy enough for anyone to master. Except gorillas.

Use our Bezier curves and smooth polygons to build any shape. Add or delete control points and join, split, open or close them at will. Use Auto-Tracing to save countless hours by converting existing bit-mapped images — pictures like clip art or scanned graphics — into easily manipulated Canvas 2.0 objects.

Work across unlimited layers. View, print or save them in any combination. Draw in millions of colors, or with Postscript™ gray scales and patterns.

Experience heart-stopping accuracy (64,000 DPI) and fineness of line (1/1000”). Zoom around from 3% to 3200% of original size. Draw continuously up to 9 feet square. Import and export freely, using PICT, PICT2, TIF, MacPaint™ or MacDraw™ formats. Output to any Mac compatible printer, typesetter, or film printer you want.

Like we said: go bananas.

But do it soon. While we’re still throwing in Canvas 2.0 DA for free. It’s a special desk accessory version that puts some 80% of these features right under your Apple menu.

And if all this hasn’t convinced you that Canvas 2.0 is the drawing program you’ve been waiting for, send us $9.95 to receive a fully featured Demo Copy. With which you can finish convincing yourself.

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• Splits, combines and links (associates) these nodes together on graphic maps to connect related items within the text.

• Allows for an unlimited number of maps, each representing unique relationships between the nodes. In this way, you can keep adding to and refining your information.

• Searches for words or word combinations using the Boolean operators AND and OR. You specify the search text, the portion of the document to be searched and whether the search text should be confined to a sentence, paragraph or node text block. Search results may be used as a basis to link existing nodes or to create new nodes.

• Lets you append all the maps and nodes from another ArchiText document into your current document, thus allowing you to extend your research to related topics or build effective concordances.

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Letters

fixed the spelling checker. Once again my faith in software companies (no matter who controls them) has not been unfounded. Thanks, Claris, for your attention to those of us who have not yet made the transition to a meg or more of memory.

Larry B. Macy
Fayetteville, Arkansas

World-Class Thanks

I was thrilled to win second place in Macworld’s World-Class contest, and I was astonished when five gigantic boxes packed with thirty-some of the best Macintosh products arrived. I was under the impression that I would receive some used demo copies that had been evaluated by your staff, but they were new packages. You even tossed in some extra (quite expensive) products for which I have been saving my pennies. The stack of registration cards that I mailed was almost two inches thick! The Macworld staff is first-class in all respects.

Craig A. Mattocks
Hampton, Virginia

Indexing Pluses

In "Publishing with Word" (July 1988), Microsoft Word’s index generator is criticized because it requires the writer to code the entries rather than having the program automatically produce the index by listing every instance of an entry. As a technical writer, I’m sure Word’s design was based upon interviews with indexing experts. An index that lists every occurrence of a word is of little value to the user of a large manual or book. Entry categories such as “See” and “See also” can only be produced by having the writer specify the occurrence and phrasing for each index entry. As the authors did note, once this initial work is done, rerunning the index after changes have been made to the content or layout is a snap.

Joyce Hannah Swaney
Pittsburgh, Pennsylvania

Interleave Ratios

Lon Poole’s “Five Mid-Range Hard Disks” (July 1988) states that when you move a Rodime hard disk to a different model Macintosh, you must reformat the disk to change the interleave ratio. This implies that only Rodime requires reformatting.

The article also states that CMS, Jasmine, and SuperMac use special software that permits a 1:1 interleave ratio with Mac-
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The article clearly states that all the drives tested used a 1:1 interleave ratio with a Mac II. It also states that both the Rodime and NuData drives must be reformatted (and erased) to change the interleave ratio for best performance when one of these drives is moved from one Macintosh model to another. The article also explains that, in contrast, the CMS, Jasmine, and SuperMac drives require no such reformating because they use a 1:1 interleave ratio with any Macintosh model. The information about handling disk defects came directly from Rodime Technical Support.—Ed.

Circumflex Searches

In Business Clinic (July 1988), Danny Goodman said that Microsoft Word cannot search for and replace the ASCII characters that end up as ambiguous rectangles on the screen because it cannot cut and paste them. In fact, searching for them is simple: in the Find What box of the Change command, type a circumflex (Shift-6) plus the appropriate ASCII number. (To determine the ASCII code of a mystery rectangle character, select the character and type Option-X-Q.) For example, to get rid of the line-feed characters placed in WordStar documents that have been transferred as text-only to the Macintosh, simply type ^010 in the Find What box and nothing in the Change To box.

Gary Sprung
Crested Butte, Colorado

INIT Picking

In “The (D)A Team” (September 1988), it is stated that DiskTop cannot launch a document from within another application (continues)
Smart investors always buy utilities.

You've invested in a Macintosh to bring out the best in what you do. Now enhance that investment with SuperMac's family of easy-to-use utilities. Programs that protect your work. And help you do more in less time.

Improve your portfolio with our Sentinel data encryption software, SuperSpool or SuperLaserSpool printing control software, and DiskFit backup and restore program. The analysts say they're blue chip. And so will you.

Don't let your printer regulate your business.

Why stop working just because you're printing? Let SuperLaserSpool and SuperSpool take control. So you can use your computer again seconds after you select "Print." Even if your documents are long and complex.

See if documents have printed, preview them, or zoom in to see part of a page up close. Or send several documents to the spooler and change the printing order later. Both products work faster under MultiFinder than any other spoolers.

SuperSpool works with any ImageWriter. And SuperLaserSpool is the only spooler that works with all Apple printers. Plus, it's the only one compatible with PageMaker 3.0.

MacWeek said, "The speed at which SuperLaserSpool returns control of the Mac to the user is impressive, in some cases even astonishing."

Keep insider information where it belongs.

Lock up your confidential information with Sentinel, a program that lets you convert any document on your disk into a secure code. No one can open it without the password you define. Or a Cray and about 50 years.

Documents and folders can be grouped together in convenient sets. Then choose one of three advanced encoding techniques, including DES, the U.S. government's official data encryption standard. Sentinel encrypts, locks and unlocks faster than any other program.

The critics at MacWorld said, "Sentinel provides a simple, effective security tool that does exactly what it claims to do and does it well."

How to recover from a crash.

DiskFit copies files on your hard disk for safekeeping. If your disk crashes, DiskFit can completely restore them. Back up just once, and DiskFit makes a complete record of files called a SmartSet. Then, DiskFit copies only new or modified files to the SmartSet, and deletes old files. You won't waste time copying files that haven't changed, or disk space storing old versions.

Create backups on floppy disks, tape, Bernoulli cartridges or even other hard disks. Of whole volumes, documents, system or application files. And Network DiskFit backs up AppleShare or TOPS networks.

As MacSer said, "DiskFit is so easy to use and so well designed that it may be the program that gets you to do regular backups on your hard disk-making it more than worth the price."

Add SuperMac's utilities to your Macintosh portfolio.

Put SuperMac's utilities on your buy list. To protect the investment you've made in your Macintosh system, and to do more work in less time.

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Nobody reads copy anyway. MacDraw II.
using DiskTop. I do it every day. The program also has a menu that enables me to select one of twenty applications from within another.

And I sure thought Suitcase was an INIT, not a DA. (Suitcase certainly is nice—I’m down to 90 DAs.)

James L. DeVries
Huber Heights, Ohio

Suitcase is, indeed, an INIT, and DiskTop versions 3.0 and higher do enable you to launch documents from within another application. Opening MacWrite 5.0 documents from DiskTop can occasionally result in a bomb, since the word processing program uses a DRV resource for the spelling checker that conflicts with DiskTop. MacWrite 5.01 solves the problem.

—Ed.

Apple, Too

In reference to “Getting Scarred with Data Exchange” and your response in Letters (September 1988), I would like to bring to the attention of your readers the fact that owners of 5½-inch disks on the Apple II family have a method for getting any and all types of text files to the Macintosh without the expense of purchasing a 3½-inch drive. MacTransfer, at $60, is one of the earliest Mac programs, and it comes with a File Convert utility that puts any database file transferred from the Apple family into a format that can be used by all database programs on the Macintosh.

We are not overlooking the Apple II 3½-inch-drive owner. Before the end of 1988, our own translator for Apple File Exchange will be available. It will convert any AppleWorks file into a format that can be used by any program on the Macintosh, not just MS Works.

George McClelland
Southeastern Software
New Orleans, Louisiana

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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 512 and Mac Plus. The protective tactile, firm feel of 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.

**MAC-101 Keyboard (Specify ADB or non-ADB) .................. 139.**

**Blank Media**

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Mission Very Possible

In which I do what I'm told, and spread the word about a one-pound newsletter

If you've been reading Macworld for a while, you've probably noticed its growing heft. I'm very happy about that, because advertising dollars allow magazines to carry more editorial pages, so we can cover more ground in terms of news, features, and reviews. But it would take more pages than all of the Macintosh magazines combined to do what a huge and popular user group has been able to do with five people working around the clock.

I'm talking about BMUG's (the Berkeley Macintosh User Group's) semiannual “newsletter.” I use quotation marks because the latest issue is a perfect-bound volume containing 353 pages of useful, readable, funny information.

We extolled the virtues of user groups for some time, so I don't need to go on about how helpful and objective they can be for beginners and heavy-duty hackers alike. But I was so taken with BMUG's latest publishing effort, and the fun I had reading it, that I have decided to follow its nondisclosure agreement, which reads in part: “By flipping this page, you have implicitly agreed to...tell as many people as possible about the BMUG Newsletter or we'll take back your copy. Got it?” Okay, since I want to keep my copy, I'll comply.

The latest issue, Volume IV, Number 2, has an impressive array of articles on telecommunications, including a list of hundreds of Mac bulletin boards—perfect for those who want more help than they get from program documentation. (And who doesn't?) It's all I can do not to check out BBSs called Maltese Alien, Overflow Valve, and Tao of the Telecomms immediately.

Another 50-page section, “Hacking,” has excellent articles on how to build customized 4th Dimension applications, how to create tear-off menus you can move around on the screen, and even “How to Raise the Dead, Part II,” which is one of the most instructive articles I've ever seen about resurrecting crashed files and disks.

For people who don't want to hack, but do want greater productivity from their Macs, there are articles on page design and typeface basics; reviews of spreadsheet, project management, and graphics programs; and a “Tire Kicker's Guide to Word Processors.” There's a terrific 15-page glossary of Macintosh terms which must be one of the clearest reference tools ever on Mac concepts and elements. (With true user-group chutzpah, the definition of software piracy reads: “We have no idea what this word means.”) You can learn how to make your own icons in HyperCard, and how to use superfonts to get higher-quality printing out of an ImageWriter.

“Choice Products” is an opinionated, readable article highlighting mainstream programs and hardware as well as cheap, unknown products. It includes BMUG's ideas about the best floppy disks, database, mail-order vendors, Mac repair shops, the “best Macintosh newsletter (other than this one),” and a category called “Most sexist use of a Mac”—BMUG asks why David (Bruce Willis) has a Mac II on the TV show “Moonlighting,” but Maddie (Cylla Shepherd) only has an SE. “We figure she's the power user!” writes the editor.

The assumption throughout the newsletter, of course, is that the Mac is absolutely the only personal computer worth exploring, working on, and playing with. If for some mysterious reason your fervor needs rekindling, check out “IBM PC vs. Macintosh: The Movie,” by David Morgenstern. He writes that “anyone who used the early Macs...remembers the smug, derisive comments from the users of the Blue machines...this persecution only hardened our religious fervor...” Now a couple of years later, the Blue bloods are the ones defending their products.” He worries that “if the PC is going to come up to the Mac, won't the Mac have to come down? No one likes a smug winner.” A point well taken, and I'll practice being a little more humble about my machine of choice. (But only a little.)

From this description, you can see that you needn't live in Berkeley to take advantage of the BMUG newsletter. And in addition to the printed material, all BMUG members get unlimited help from real (and very knowledgeable) people on the phone about hardware, software, system design, and anything else you might possibly need, as well as access to BMUG's bulletin board. You can also order from over 20 pages of program disks and HyperCard stacks, ranging from business applications to pictures to fonts to sound effects and music. And the group has just announced that its entire software library and all back issues of the newsletter (published since 1984) are now available on CD ROM.

Membership in BMUG is defined by the term, a six-month period during which you get one issue of the fat newsletter plus all telephone and BBS access. One term costs $25 per person, two terms cost $40; a company can join for $100 per year. Even if you only get one issue of the newsletter, a membership would pay for itself in no time.

We pause now for the commercial break: You can contact BMUG at 1442A Walnut Street, #62, Berkeley, California 94709; 415/549-2684. And I want you to know that I've gotten no prompting to encourage your membership—and I'm not getting any kickbacks, either. I'm just following BMUG's credo: “We're in the business of giving away information.”
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Peter Killcommons is a fresh-faced former orthopedic surgeon—he looks a little like the actor Jeff Daniels—who brokers in the esoteric field of RAM chips. The other day I visited him. His company, Network Specialties, is located in an area of Manhattan now called NoHo, which sounds a lot better than the Bowery; Skid Row is a crack-bottle-throw away. From his renovated building, he supervises the production of some neat networking products, but mostly he deals in the RAM trade. These days it is like something out of a Thomas Pynchon novel.

It seems we are in a crisis. A worldwide shortage of DRAM. (RAM, of course, stands for random access memory, where the computer stores and processes information in a given session. The D stands for dynamic memory and is pronounced separately, as in dee-ram. The other variety of RAM chip is called static memory, but no one talks about ess-ram.) Some people refer to this shortage as though they’re speaking of a natural disaster, like a drought. Actually, it’s a scam, though sufficiently complex to cloud the issue of where the villainy lies. In the confusion, people like Peter have found a handy profit center.

Peter works through a guy whose name he doesn’t want me to print. This guy has contacts with some of the big chip makers. Often Peter will get a call from his friend, saying that a certain number of chips is available. Then Peter finds someone who wants the chips. After that, the real fun begins.

In these, the days of the RAM crisis, Peter explains, there are no organized methods for getting chips to customers. The exceptions are standing contracts that chip makers have with big companies: Apple, for instance, has survived the worst of the disaster so far by having “locked in” good prices from its Far East suppliers. Everybody else has to scuffle, and even the big computer firms need more chips than their contracts provide. So they have to go to the spot market, through brokers who buy from what is called “the back door” of the factories. The price is whatever the market will bear. And that price is further inflated by the odd conglomerate of brokers and subbrokers that has managed to insinuate itself between a chip manufacturer and the eventual purchaser. Each broker gets a piece of the deal.

**In the Chips**

Peter protects himself with something he calls a “noncircumvent” agreement, which assures that he will not be cut out of the profits. “I crawl through the chain of

(continues)
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The Price Drop That Didn't

While the DRAM shortage offers Peter a repertoire of amusing tales, it spells disaster for the user, particularly in the Macintosh market. Although Apple Computer professes not to be overly bothered by the crisis, this RAM thing is costing too many people too much money and is gumming up the entire Macintosh community at a time when it's growing like a bean sprout.

The ripple effect from this rip-off is that memory upgrades are very expensive—sometimes prohibitively so—at a time when they are needed most. And new computers are not coming down in price. For the first time in memory, they are going up. That's right—in the midst of a general consensus that Macintoshes cost too much, Apple Computer celebrated September by raising the prices of SEs and Mac IIs. All because of memory.

This crisis first hit the Macintosh world in August 1987, when almost everybody who had a Macintosh suddenly needed more RAM in order to run HyperCard and MultiFinder, two programs that made obsolete the memory configuration of 1 megabyte. At that time, you could add 2 megabytes to your Mac's RAM (using the preferable 1MB SIMMs) for about $600, if you shopped well. I recall doing so and grumbling about it—because if history was to be my guide, the same memory upgrade would cost about $200 in a year or so.

That's the way memory prices have gone, at least until recently. You old-timers can recall the original Macintosh, with the mighty powerhouse of 128K of memory. You could write maybe six pages of a document before the curtain came down; a spreadsheet would go blooey if your numbers approached six figures. So when Apple finally unveiled the "Fat Mac," with a whopping 512K of memory, some people paid for the upgrade immediately—a thousand dollars. Not long afterward, Apple cut its prices to $600, then to around $400. By then, the street price of an upgrade was about $200. The same phenomenon occurred when people upgraded to a megabyte.

Why? For the same reason our computers now are less expensive and more powerful than they were a decade ago—after chips are designed, and the factories that make them are built, they cost almost nothing to produce. So while the first 64K RAM chips were costly, they could be had
The gale tears at you, biting deep within, and you know that if you don't make landfall soon you'll all be dead. You are John Blackthorne, Pilot-Major of a dead fleet: one ship left out of five, eight and twenty men out of one hundred and seven, and only ten of those can walk. No food, almost no water, and that brackish and foul.

Bridge of the Erasmus
This is the bridge of the Erasmus, a Dutch merchant and privateer. The unlashed wheel is directly forward of you, a sea chair is lashed to the deck aft of the wheel, and the ship's bell is hanging here. Spray blows past in an angry torrent.

The wheel dominates the quarterdeck. It is turned straight and free to turn now.

The ship heels in a sudden squall, throwing you from your post at the wheel, which, uncontrolled, begins to turn to port.

STRAIGHTEN THE WHEEL!
The game that started it all has a new beginning! Zork Zero is the interactive fiction prequel to the Zork Trilogy, the most popular entertainment software product of all time. In Zork Zero, an unpredictable jester challenges you with puzzles, paradoxes and plenty of fun as you seek out objects ranging from the curious to the sublime.

- One million satisfied game players can’t be wrong! Discover the origins of the Great Underground Empire in this new and exciting chapter of Zork.
- Zork Zero integrates graphics into the game play with visual puzzles, illustrated maps and a Zorkian encyclopedia.
- Zork Zero includes our most requested features: a friendlier parser for easier typed-in commands, on-screen hints, mapping, optional mouse interface and sound.
- Your Zork Zero package includes the game disk, a secret spell, “Lives of the Twelve Flatheads” Calendar and an unusual blueprint.
- Zork Zero is available for most personal computers. See the order form on the reverse side for machines and prices.
From the outside, the CAVE ENTRANCE is almost completely camouflaged. Briars and rubble provide concealment sufficient to thwart all but the most persistent visitor. The walls and ceiling of the CAVE ENTRANCE are constructed from packed earth. The passage leads downward and to the south as far as the eye can see, which isn’t far, considering the dimness of the light. There is no evidence of man-made workmanship. The cave appears to have been naturally constructed.

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Three months ago, the Tree Druid Colony vanished without a trace. A search party is sent to discover what fate befell these peaceful people, and to save any who may survive. In Quarterstaff, it is your mission to guide this ever-changing band of warriors through cavern and crypt in search of an unknown demon.

- **Quarterstaff** is the first computer role playing game to capture the mood and feel of pen-and-paper RPG’s.
- **Quarterstaff** features the most realistic environment of any fantasy role playing game. Characters need to eat and sleep, objects have size and weight, and even monsters have motives.
- The Macintosh version of Quarterstaff features the ultimate in Macintosh interfaces, with hierarchical menus, realistic sound, context-sensitive hints and a dynamic map window.
- When Quarterstaff was developed by Scott Schmitz and Ken Updike, *Dragon Magazine* gave it a perfect rating. This new version is refined and enhanced with Infocom’s distinctive brand of storytelling.
- Your Quarterstaff package includes the game disks, a dazzling poster, a mystical ritual parchment and a Druid coin. Macintosh version also has an extra color graphics disk.
- **Quarterstaff** is available for the Macintosh, Apple II GS, and IBM and 100% compatibles. See the order form on the reverse side for specifications and prices.

(Top) Superb graphics, on-screen mapping, and a dramatic story create a realistic role playing experience.

(Center) Quarterstaff is the fantasy role playing game for true RPG players.

(Bottom) Quarterstaff is easy to play using logical, sophisticated menus.
Animated outtakes for you to zoom in on the action.

The package tells you that BattleTech means business.

Detailed scan helps keep track of damage sustained in combat.

**BattleTech**: The Crescent Hawk's Inception

In the 31st Century, brutal wars are waged in giant machines, and human lives are cheaper than water. In this action-packed RPG, you are Jason Youngblood, a warrior cadet who must fight to preserve his planet, his honor and his life.

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- **BattleTech** includes "The Arena," a gladiatorial module you can play again and again to hone your skills and accumulate supplies.
- **BattleTech** features the richness of plot and depth of detail that you have come to expect from Infocom games.
- You will see animated game sequences rendered in the distinctive style of Japanese "monga" comics.
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Journey

For six long hours, we climbed steeply up the side of the Sunrise Mountain, and thus we came to the high tower of Astrip, the wizard. No sooner had we arrived, then the tower's massive oak door opened.

"I have been following your progress with great interest," the wizard said, stricking his stringy gray beard. "You are a very resourceful group, that is certain!"

His voice became dark and we seemed to shiver from some unseen injury. "The question is: Have you mettle enough to make siege on the Evil One himself?" And then, smiling, the darkness fell from his voice, and he answered his own question, "We shall see, I suppose; we shall see."

Leading us to his hearth, he sat us in a semi-circle around the blazing fire and spoke. "There is a story I must tell, a story of the Seven Stones. Created in a time lost to living memory, these Stones contained the very strength and essence of our world. Of the Seven, Four were entrusted to the races of men who could use them best: Elves, Dwarves, Nymphs, and Wizards."

"These are the Four: the Elf Stone, green as the forests of old, and the Dwarf Stone, brown as the caverns of Fern o-kisten; the Nymph Stone, blue as the deep waters of H'nero."

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(Top) Magical creatures and wondrous wizards inhabit the world of Journey.
(Center) Ask for Journey at your favorite software retailer.
(Bottom) You must interpret what you find for your journey to be successful.
Experience the drama and pageantry of 16th Century Japan in Shogun. Infocom’s Shogun captures all the power of the novel. Rich text and vivid graphics weave a gripping story of honor, intrigue, and survival.

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For six long hours, we climbed steeply up the side of the Sunrise Mountain, and thus we came to the high tower of Astrix, the Wizard. No sooner had we arrived, then the tower's massive oak door opened.

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His voice became dark and we seemed to wince from some unseen injury. "The question is: Have you met the Evil One himself?" And then, smiling, the darkness fell from his voice, and he answered his own question, "We shall see, I suppose; we shall see."

Leaving us to his hearth, he sat us in a semi-circle around the blazing fire and spoke. There is a story I must tell, a story of the Seven Stones. Created in a time lost to living memory, these Stones contained the very strength and essence of our world. Of the Seven, Four were entrusted to the races of men who could use them best: Elves, Dwarves, Nymphs, and Wizards."

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In the 31st Century, brutal wars are waged in giant machines, and human lives are cheaper than water. In this action-packed RPG, you are Jason Youngblood, a warrior cadet who must fight to preserve his planet, his honor and his life.

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(Top) Animated outtakes let you zoom in on the action.
(Center) The package tells you that BattleTech means business.
(Bottom) Detailed scan helps keep track of damage sustained in combat.
Flint's Utro, the CAVE ENTRANCE is almost completely camouflaged. Briars and rubble provide concealment sufficient to thwart all but the most persistent visitor. The walls and ceiling of the CAVE ENTRANCE are constructed from packed earth. The passage leads downward and to the south as far as the eye can see, which isn’t far, considering the dimness of the light. There is no evidence of man-made workmanship. The cave appears to have been naturally constructed.

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at drastically reduced prices once there were millions of them. Same with the 256K chips involved in the Fat Mac upgrade. And supposedly the same thing would happen with the 1MB chips currently in vogue.

But that's not happening. The upgrade I grumbled about at $600 would cost almost $1000 today.

**Behind the Drought**

To explore the factors behind the shortage I called up Dataquest, a high-tech consulting firm that studies the memory business and often uses its information to make predictions, some of which are worth the time of day. A friendly fellow named Sheridan Tatsuno provided the background for the problem.

The 1986 “antidumping” chip agreement the United States made with Japan artificially set a “fair-market” value for chips. But not all companies had to toe that line — Korean giants like Samsung weren’t covered, nor was NEC, which made its chips in America. So the Japanese companies that held to the agreement couldn’t get the fair-market value, since Samsung and others undersold them. As a result, those companies stopped making DRAMs, and fewer chips were available. Also, some chip factories were switching from the manufacture of 256K chips to a newer, 1MB version. As a result, they were out of commission for a while, and then some of the new factories had problems yielding quality chips. Meanwhile, the demand for RAM was higher than ever, in both the Mac and MS-DOS worlds. All of that spelled drought; thus began the price increases, as well as the intense underground brokering.

Dataquest believes that the shortage will ease in 1989. “With more factories coming on line, and demand softening, prices will come down steadily,” says Tatsuno. His colleague at Dataquest, Vic de Dios, predicts that by midyear the market price of a 1MB chip will drop by over half.

On the other hand, there is Peter Killcommons. It’s his theory that the chip makers are doing so well in selling out the back door, so to speak, that they have no incentive to supply big companies with lower chip prices. “A factory knows a good deal when it sees it,” he says. “If a company has ongoing purchase orders at $2.90 a chip, why honor it when you can sell the same chip for $6 out of the back door?”

(continues)
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In other words, if you're waiting for the price of memory to drop like a stone before buying that upgrade, don't hold your breath. You're going to need a bank loan before you equip your machine for MultiFinder and FullWrite.

Happy Apple

As a coda to this dire scenario I must report that Apple Computer seems rather unperturbed by the situation. When asked about the DRAM shortage, an Apple spokesperson said several times that the company had experienced 50 percent growth for several quarters. So how bad could the problem be? Apple had long ago won favorable contracts from chip makers, she said, adding that the chip makers are virtually "partners" with Apple, sharing strategies and cementing a "very secure long-term relationship." So forget about those rumors that Apple will attempt to assure its supplies by building its own chip factory, as IBM has. Apple doesn't need to. As far as the RAM crisis goes, "We've always portrayed ourselves as being very fortunate," she said.

Not so fortunate, of course, are Apple's customers. The long-term deals Apple cut with chip makers did not include sufficient RAM for the ever-important upgrade kits that would allow Mac users to take advantage of the growing list of memory-hog programs. While the backlog of orders grew, the prices went up. In May 1988, a 2MB Apple upgrade rose from $599 to $849, and then, three months later, to $1100. And in September, as I mentioned before, Apple did the unthinkable—it increased the price of Macintoshes.

By then, said the spokesperson, Apple itself had been forced to go to the spot market to find DRAM for its machines. In other words, Apple is now doing business out of the back door of chip factories—probably those same companies who have the "partnership" with Apple. Interesting.

Though Apple does not claim pre-science, it expects the chip shortage will continue into the first part of 1989, and then ease. But people have been wrong in predicting the end of this shortage before. And those making bucks off the shortage have a vested reason in continuing it. This does not sound like a prescription for prosperity, but more like one for profit grabbing.
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- Shareware
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  - Promodem 2400: 309.
- **Shiva**
- **Supra**
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We’ve been asked why Cricket Software would introduce a black and white paint program when the whole world is making so much noise about color. Frankly, we feel it’s obvious: There are more than 1.5 million* monochrome Macintosh® users — Apple® hasn’t abandoned them and neither have we. Plus, we felt there was still a lot of room for improvement over the current best selling paint program.

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The first rule of online services is that every minute you spend connected, you're being billed for the service, whether you're actively doing something or just sitting there trying to figure out how to find the information you want. So the idea is to connect, accomplish what you want as quickly as possible, and log off.

Learning to access the wealth of information offered by CompuServe can be a confusing and frustrating experience, thanks to its command-driven interface. But these shortcuts and suggestions should help you become a satisfied user of the largest online service.

**Shaving Off Seconds**
You can enter your user ID and password on the same line by separating them with a semicolon; for example, 70000,1212; password. This saves a few seconds in the log-on process. And you can configure your user profile (GO PROFILE) to jump directly into the EasyPlex electronic mail section if you have mail waiting when you log on.

**Getting Around**
CompuServe is built in a hierarchical fashion; that is, there are many different layers to the service. At the top is, not surprisingly, the TOP Menu, which lets you get to the many interest areas within the service, called forums. Inside each forum are message sections and data libraries. There can be up to 17 different message sections and data libraries within a forum. In message sections people post discussions to each other; data libraries store files available for downloading.

To delve directly into a particular forum, type GO (forum name) at any of the ! or : prompts. For example, type GO ALDUS to go to the Aldus Forum. Once you're in a forum, you can quickly enter a data library by typing LIB and the number of the library. For example, typing LIBS in MACPRO, the Macintosh Personal Productivity Forum, brings you to the library that has desk accessories in it.

One of the busiest areas on CompuServe is MAUG, the Micronetworked Apple User's Group. MAUG is where Apple II and Mac enthusiasts meet, and it consists of eight forums (see "MAUG's Forums").

The most active of the MAUG forums is MACPRO, where the general Mac discussions and programs are. Programmers hang out in APPDEV, and several software vendors (including Acius, Claris, CE Software, and TOPS) furnish online product support in APPVEND. HyperCard stacks have a forum of their own in APPHYPER, and you can find games and graphics in MACFUN.

**Reading the Message Base**
Any message left on a forum has a message header that looks something like this:

```
# : 80824 S8affer communications 31-Aug-88 05:06:18
Sb: CompuServe
Fm: Bill Cook (Sysop) 76703,1030
To: Tom Negrino 73277,2325
```

The header's first two lines show the message's number, section, and when the message was posted. Then there is the subject line, and finally the sender's and recipient's names and user ID numbers. A message left in a forum is usually a part of an ongoing series of messages, called a thread. To get a listing of the current threads in the message base, type SE. This gives you the Section menu. Choose the
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How To/Insights

MAUG's Forums

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<td>Macintosh Business Forum</td>
<td>GO MACBIZ</td>
</tr>
<tr>
<td>Macintosh Personal Productivity Forum</td>
<td>GO MACPRO</td>
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sections you want to scan, then the thread numbers of the messages that interest you. A faster way is to type READ NEW. This displays all the messages you haven't read, in thread order.

Conversations on MAUG can be freewheeling, and the messages in a thread can quickly mutate away from the subject listed in the header. Since you want to spend as little time online as possible, it's a good idea to turn on the Capture Text function of your terminal-emulation software, let the messages scroll as fast as possible using the SC command, log off, and read the messages at your leisure.

To leave a message of your own, type COM to compose a new message, or type REPLY to answer a message you've just read. A prompt with a line number appears, followed by a colon. Type your message, pressing Return at the end of each line (no automatic word-wrap here). When your message is done, type EXIT to get out of the Compose mode. Then type POST at the Post Action prompt. You can send any message as private EasyPlex mail, rather than posting it on the public forum, by using the MA command instead of POST.

Scouting the Sections

To get a listing of the different message sections or data libraries, type NA at the Forum menu. Then choose the number of the area you want to look at. In APPVEND and MACPRO, there are matching libraries for each message section. Some of the most active message sections (with their section numbers) include Acius (2), CE Software (4), and Claris (14) in APPVEND; and Software (6), Hardware (7), and Telecommunications (8) in MACPRO. The data libraries are full of interesting software. In MACPRO, some of the busiest are LIB4 (Utilities) and LIB5 (DAs/F-keys/INITs). In MACFUN, look for LIB3 (Games), LIB6 (MacPaintings), and LIB16 (R-Rated Paintings). In APPHYPER, check out LIB6 (Reference Stacks) and LIB11 (XCMDs and XFCNs).

The Community Square (2) sections in most of the MAUG forums deserve special mention, for it's there that members gather to talk about things other than computers. Recent Community Square threads have included topics as diverse as the Miss America pageant, the space program, and the 1988 political races.

Options, Options

Setting your user options in a forum (by typing OP at the Forum prompt) is a powerful tool for customizing the service to your needs. Here, you can turn off the menus and go into the faster command mode; tell the forum to ignore threads in message sections you're not interested in; tell it not to pause after displaying a message in a thread; and automatically display the text of messages addressed to you. You can change user options for just one session, or permanently.

Putting On the Brakes

If text from CompuServe is coming in faster than you can read, you can tell the service to pause by typing Control-S. To resume, press Control-Q. If you've gotten yourself into a section that you really don't want to continue with and you want CompuServe to slam to a halt, press Control-C. The service stops sending text and displays a prompt for further action.

(Count your software manual for Control-key equivalents if you're using a standard keyboard.)

Smaller Is Cheaper

Since connect time is money on an online service, several programs have appeared that can compress files, encoding them in a special format that takes less time to download. The most popular of these compression programs is a utility called Stuffit. The Stuffit program is not only smaller, it also allows you to consolidate two or more files into one compressed archive file, and extract the files from the archive. Stuffit is shareware; if you use (continues)
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.

This new color scanner joins our larger, widely acclaimed JX-450, which handles originals up to 11" x 17". The JX-450 also scans 35mm slides and overhead transparencies with an optional mirror unit.

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. Both are compatible with the leading PC 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. For information, call 1-800-BE-SHARP.
2.1. Mac World called the Data Frame “the Porsche of disk drives.” Now you can put that performance to work for more users than ever. Because now there’s a Data Frame configuration that’s right for every kind of user. For example...

1. The Deserving User:
DataFrame XP 30 Hard Drive
DataFrame XP 60 Hard Drive
Who deserves a Mac™ with Data Frame’s productivity-boosting performance? Everyone. That’s why Data Frame is the best selling hard disk drive next to Apple® Compare, and you’ll find that Data Frames are the fastest drives for the Macintosh. That they give you 50% more storage for your storage dollar. And that they offer the most reliable, elegant system design to boot.

2. The Practical Utilitarian:
Every Data Frame includes utility software worth over $500.
Worth over $500? Yes! Because all these packages purchased separately total over $500. SuperSpool and SuperLaserSpool mean long print jobs don’t tie up your Mac. DiskFit makes backup a snap. Sentinel makes encryption easy for sensitive files.

3. The Networker:
DataFrame XP-60 + 40 Tape
Networks need fast storage, so users don’t have to wait. And they need easy backup, for disaster prevention.
Solution: The Data Frame XP 60 + 40, with 60 Mb of fast storage, and our ultra convenient, industry standard DC-2000 40 Mb tape drive.
For bigger storage needs, consider our 105 Mb or 150 Mb drives (the XP-150 is the fastest Mac drive extant). Then backup with the Data Stream 40 Mb tape drive.

4. The Desktop Publisher:
DataFrame XP 60 + Bernoulli
Users with big data applications like desktop publishing or databases like this combination hard disk and removable Bernoulli® cartridge. 20 Mb removable Bernoulli cartridges make backup and archival storage fast and easy. And what a system: 60 + 20 means 80 Mb on line, with infinite storage on the shelf.
The Intensive Mac II User:
DataFrame XP 150i Internal Drive.
For people who want all the performance a Mac II™ can deliver: Here is the biggest capacity drive that fits into the Mac II, and the fastest drive, bar none!

The Multiple Office Personality:
DataFrame XP 60 + Bernoulli
Need to get files back and forth to different offices? Equip each office with a high performance DataFrame 60 + Bernoulli. Then use the convenient 20 Mb cartridges to ship information back and forth. Users at each office have high performance drives with fast cartridges for backup and archiving.

The Engineer (Or Scientist):
DataFrame XP 105 Hard Drive
DataFrame XP 150 Hard Drive
Those needing big storage and fast response will appreciate these two DataFrame systems—the biggest storage that you can attach to any Plus™ SE™, or II. And, unlike the ungainly boxes that house most large drives, DataFrames offer amazingly small, convenient packages.

The Protector:
DataStream 40 Tape Drive
Our handy 40 Mb DC-2000 tape system plugs into the Mac SCSI port, and lets the office protector backup data with ease.

The One Who Makes It All Work:
SuperMac’s™ No Compromise Support.
Relief for the office problem solver: Our designed-in reliability and quality, Superb documentation. And our responsive hotline that delivers answers fast.

Call for the name of your nearest SuperMac dealer.

(415) 964-8884

SuperMac Technology, 295 N. Bernardo, Mountain View, CA 94043
Navigator Tiles
CompuServe Navigator represents each Forum area as a tile, which you can open to specify which information Navigator should retrieve. Navigator adds the Macintosh user interface to CompuServe's command-driven system, making the service faster, cheaper, and easier to use.

it after a 15-day trial, you're honor bound to send Raymond Lau, the author, $20.

For those who just want to download and use files uploaded by others in StuffIt format, Lau has created UnStuffIt—a freeware desk accessory that only decompresses archive files. StuffIt is available in the same data library under the name STUFFIT.BIN; UnStuffIt is available in the same data library under the name UNSTUFFEA.

Finding and Downloading Files
Here's the way to find files in the data libraries. Let's say you want to get StuffIt. First type LIBB to move you to Data Library 8, the Telecommunications library. Then type BRO KEY:STUFFIT at the library prompt. This tells CompuServe to browse all files with the keyword StuffIT in this library. CompuServe displays a description of each file with that keyword, and when the file you want comes up, type CHICES. Pick Download from the resulting menu, then Xmodem from the Library Protocol menu. Then tell your communications program to receive an Xmodem download.

Mail Made Easy
CompuServe's EasyPlex electronic mail section is easy to use if you know a few tricks. For example, make sure you use the Address Book feature. You can store up to 50 names with their user ID numbers; from then on, when you're prompted for the To:, just type the intended recipient's name. EasyPlex scans the Address Book for a match and sends the message. To get all your mail at once, type SET MODE COMMAND at the ! prompt, then type RECEIVE ALL at the next ! prompt. And to make sure your outgoing mail gets read, tell EasyPlex to send you a delivery receipt by entering SEND/RECEIPT. (This does cost you an extra 25 cents, however.)

Navigator to the Rescue
CompuServe has recognized that it's easy to become bogged down in the service, and has responded by selling a program designed to make CompuServe more accessible to Mac users. CompuServe Navigator (reviewed in the December 1988 issue of Macworld) is a program that any serious CompuServe user should have.

Navigator saves you money by logging on, quickly performing any tasks that you've set, and logging off. For example, while you're offline, you can tell Navigator to log on, go to the MACPRO Forum, get any messages addressed to you, get a listing of new threads since you last logged on, download some interesting new programs from the data libraries, and send some electronic mail through EasyPlex.

Then you tell Navigator to run the session you've just set up. The program connects, does the tasks much faster than you could do them manually, and disconnects. You can then review the session at your leisure, without the clock ticking. You don't have to remember any of CompuServe's commands; Navigator does it for you. The program also takes advantage of CompuServe's Quick B downloading protocol, which is much faster than standard Xmodem. You can order Navigator online; type GO NAVIGATOR at any command prompt. The $79.95 program will be shipped to you, and your CompuServe account will be billed.

A Navigator Sampler
Navigator lets you change Forum choices in the Preview mode by double-clicking on a forum tile. The Forum dialog box will open for business. Navigator can also be used for uploading files using the Quick B protocol. (By the way, uploading to CompuServe is free.)

To see portraits of your online friends, download their face files from the CIS Navigator Library (LIB9) in MACPRO and store them in a folder called Face Files inside your Navigator folder. Navigator will then show the portraits whenever you review a session, if face files exist for those sending and receiving messages (see "Talking Heads"). An alternative is Face Manager, a freeware program written by Steven C. Kienle that is also available in LIB9. Face Manager lets you consolidate many faces into one large Faces file, instead of having hundreds of individual files in one folder.

Sharing the Wealth
If you've found a shortcut or undocumented trick not mentioned here, spread the word to other Macworld readers by sending it to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107.

Talking Heads
CompuServe users with Navigator can see eye-to-eye if both the sender and recipient have uploaded their face files. Navigator will display the portraits as you review your online session. Some users add faces with letter and punctuation combinations.
"Daddy says he owes his success to who he met in college, who he met in business and to Mommy who told him to save his information on Sony data cartridges."

Yes, it certainly is important. Because a data cartridge is used for critical document storage. So it goes without saying that reliability is its most important asset.

And reliability is unmatched in Sony data cartridges.

After all, reliability in a data cartridge means only one thing: no loss of data. And, when it comes to that, Sony data cartridges have been proven measurably better.

As the two charts on this page show, Sony data cartridges have the lowest dropout rate of any data cartridges made. Even after 5,000 passes. Perhaps that's because only Sony manufactures every single part of their data cartridges.

Or perhaps it's because Sony has such a long history of painstaking perfection in data storage for every media.

Including the invention of the 3.5" floppy disk format.

The benefit of all our expertise will not only help your firm, it will also help you at your firm when you tell them: To make sure your critical documents are safe, just save them on a Sony.
QMS introduces thousands of improvements to PostScript printing.

The new QMS ColorScript™ 100.
The world's first color PostScript printer.

PostScript printing is no longer simply a black-and-white issue. Thanks to the QMS ColorScript 100.

Now QMS has opened your projects to a range of new graphic possibilities using Adobe PostScript®, the industry-standard language of the desktop publishing revolution.

Now, your proposals, presentation graphics and publications can go from gray to glorious. Graphic design color schemes can change with just a single keystroke, not a hundred marker strokes. Even commercial printing proofs and in-house color separations can be produced and color-matched. All this will help save the two things every business needs. Time and money.

QMS worked closely with Adobe Systems, software developers and users to design the
ColorScript 100. All agree it's a breakthrough. That's not surprising since QMS offers more PostScript products than anyone else.

The ColorScript 100 uses a revolutionary thermal transfer process that produces true 300x300-dpi resolution. That means you can generate thousands of brilliant colors with pinpoint registration that can match the color swatches scattered on this page.

The printer is built around an intelligent controller, running a 68020 processor, equivalent to the one in the Macintosh II. That makes it a powerful computer in its own right. A 16 MHz processing speed makes it responsive. Especially to things like deadlines. You can print an 8½''x11'' page in just a single minute. An 11''x17'' page in under two.

The system's large 8 megabyte memory can handle complex applications. And a 20 megabyte hard disk offers generous space for downloadable typefaces to complement its 35 resident Adobe typefaces.

Compatibility is also built in. The ColorScript 100 connects with Macintosh®, IBM®, Compaq® and other compatible PCs, along with minicomputers, workstations and mainframes.

That means you can work with Aldus FreeHand®, Micrografx Designer®, Quark XPress®, Adobe Illustrator 88™, AutoDesk AutoCAD® and most programs written under Microsoft® Windows. Plus all the new programs that are being developed to join dozens of other color-compatible applications.

The ColorScript 100 is yet another useful solution from QMS. Solutions that have made us a leader in print technology. That's one fact we don't mind giving you in black and white.

For information on the QMS ColorScript 100, including print samples, a complete list of compatible software and information on financing, call 1-800-631-2692, ext. 202.
It's time we introduced you to the mastermind behind the PhoneNet System. Working quietly in the eye of an electronic storm, this nerve center insures that information travels reliably from agent to agent.

Code name: The StarController.

The PhoneNET StarController is an intelligent device that helps you build and manage AppleTalk networks. With its StarCommand software, the StarController will detect, isolate and diagnose problems on your network, reduce error rates, and monitor network activity.

So, should you accept the mission to build a better network, make it a success with the StarController. Your Farallon dealer has a complete dossier. Call (415) 849-2331, for the dealer nearest you.
Molecular Analysis on the Mac II

Sophisticated molecular modeling and analysis is now possible on a Mac II connected via a serial port to a remote Sun or VAX minicomputer host. Nitro software from Tripos Associates transforms the Mac II into a 3-D workstation displaying the molecules created on the host machine. Actual construction of the molecule is done on the remote host running the company’s Sybl molecular modeling software.

Three-dimensional animations of complex molecular interactions are created by combining fast minicomputer processing with high-quality graphics on the Mac II. Researchers working at the Mac II can rotate, scale, translate, and manipulate models created on the remote host in real time. They have complete control over the animation functions. Sybl offers them a wide array of analysis functions, including electrostatic interaction, surface-to-volume ratios, and molecular mechanical forces.

Nitro has been shipping since May 1988, and is available for $995 per workstation ($650 per workstation for academic purposes). It requires a Mac II with an 8-bit video card and at least 2MB of RAM. Running Sybl, however, requires at least a $30,000 investment—although there are discounts for academic users—without even counting the cost of the VAX or Sun. For those who can’t afford Sybl plus a VAX or Sun, Tripos Associates is currently developing Alchemy, a stand-alone product that will run on the Mac II and cost only $750.

Alchemy, expected to be announced later this year, will support a subset of the molecular modeling and analysis functions offered by Sybl. It will function as an entry point for people new to molecular modeling, enabling them to build, edit, and manipulate 3-D molecular structures. However, its analysis functions will be limited. For more information, call Tripos Associates in St. Louis at 314/647-1099.—Liza Weiman

Attention, Electronic Artists

Yet another Mac II color paint program has arrived on the scene. Studio/8, a $495 package from Electronic Arts, consists of five disks: the program itself, textures, brushes and backgrounds, fonts, and a slideshow utility complete with

(continues)
Road Racer
The Ultimate Driving Simulation.

Speed limit 200.
Strap yourself in for the ride of your life.

Road Racer's detailed graphics and digitized sounds simulate driving conditions in 5 environments ranging from high-speed desert flats to twisting mountain roads. So convincing you'll actually find yourself trying to look over the hills and around the turns.

The trees, rocks, telephone poles, and other graphics fly past your 1965 Corvette at breakneck speeds. Hear its thundering 350-horsepower engine and screaming tires as you corner around wicked curves.

Steer and accelerate with the mouse, and use your keyboard for brakes and shifting.

Each level is tougher than the last with unpredictable road hazards and many courses to travel. You score points for fast, skillful driving. Road Racer is high performance you won't forget.

Lunar Rescue
A Strategic Space Adventure.

Watch out! ... SMASH! ...
A heat-seeking missile has just slammed into your ship.

The year is 2059. Raiders have stolen five controlling crystals that maintain the defense and supply network for the moon's 26 cities. With key commodities cut off, the cities are doomed.

Your mission is to recover the fiendishly hidden crystals while transporting vitally needed goods between cities. Traverse dangerous terrain and combat relentless attacks with your arsenal of lasers, cannons, bombs and shields.

Prepare yourself for an odyssey of furious action and strategic high stakes trading.

Lunar Rescue is an addictive adventure that challenges your imagination and sets your adrenaline on fire.

MacGolf
The Premier Graphical Golf Simulation.

A premium edition of the best selling Macintosh game in the world.

MacGolf Classic puts you into a full perspective 3-D simulation of realistic golf action. You match your skills against fairways, roughs, sand traps, water hazards and trees.

MacGolf's two courses are together with the four MacCourses for a total of 108 holes, all in vivid full screen color on the Macintosh II.

MacGolf Classic gives you a player's eye view and an aerial overview of each hole with close up options. You have complete control of your position, ball placement, ball speed and direction, and selection of all 14 clubs. Spectacular digitized graphics and sounds add to the excitement.

MacGolf Classic is so close to the real thing it will improve your golf game. Every challenge should be this spectacular.
The Floating Monitor

The Mac II is a dream machine, so full of power and versatility that even we at Macworld have hardly begun to explore its possibilities. But there's an awkward trade-off for all that power: the Mac II is big. It takes up a lot of valuable space on a desk, and it's bulky and difficult to move. Ergotron has developed an elegant solution that promises to give your space back to you for laying out projects, organizing papers or presentation transparencies, or doing whatever it was you used to do on your desk before the arrival of the behemoth II. And considering the value of desk real estate, claimed by Ergotron to be up to $75 per square foot per year, the Mac II Workstation may indeed be a bargain at $550.

The Mac II Workstation is impressive looking — we installed one in the Macworld lab, and folks from miles around stop by to marvel at its imposing presence. The central processing unit, or CPU, sits on a sturdy, height-adjustable shelf above the desk, out of the way but not out of reach. The monitor is suspended from a track on the desk, out of the way but not out of reach. The monitor is suspended from a track on the desk, out of the way but not out of reach. The monitor is suspended from a track on the desk, out of the way but not out of reach. The monitor is suspended from a track on the desk, out of the way but not out of reach.

For further information, contact Ergotron at 612/452-8135 or write to the company at 3450 Yankee Dr., Eagan, MN 55121.

--Felicity O’Meara

Oracle Databases for the Mac

Oracle Corporation, one of the biggest guns in the minicomputer and mainframe database market, has moved onto Macintosh turf by announcing implementation of a full Oracle relational database for the Mac, based on the SQL standard. The product is identical to its counterparts for IBM mainframes and DEC VAX minicomputers (except for some operating-system-specific routines), and it can act both as a stand-alone database and as a networked, distributed database with other Oracle versions. The company will sell a developer position when you’re not using the Mac.

The Mac II Workstation accommodates most Mac II monitors, including 19-inch monitors weighing up to 65 pounds. Ergotron expects to bring out a heavier-duty version for 90-pound machines in late 1988.

The company's name, Ergotron, is derived from the word ergonomics, defined by Webster as the science "concerned with the characteristics of people that need to be considered in designing and arranging things that they use in order that people and things will interact most effectively and safely." Though lots of ergonomics went into the engineering of the Mac II itself, of course, the Mac II Workstation represents a significant enhancement of the human-interactivity of that machine.

For more information, call Ergotron at 612/452-8135 or write to the company at 3450 Yankee Dr., Eagan, MN 55121.

--Felicity O’Meara
## Parts Schedule

### Materials List

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## Cost Estimates

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Send list to the file "Materials"?

- Yes
- No

---

**MiniCad+™**

Computer-Aided Design and Analysis comes of Age

MiniCad+ rises on the foundations of a groundbreaking Macintosh CAD program, MiniCad 2D/3D. Universal in aim, MiniCad Plus is a total design and analysis solution, the answer to time-consuming transfers between applications. This professional CAD system offers the following easy-to-use components:

- High precision 2D drafting environment which includes complex duplication with arrays, hierarchical symbol editing with both external and internal libraries, fillets, bezier & cubic splines, auto-join, auto-dimensioning, continuously variable zoom up to 1000x, double-line tools with auto-clean up, 256 user-definable attributes, 8 line types, unlimited layers, full use of Mac II, and more...

- Active spreadsheet inside drafting area which can be hot linked with objects to perform area calculations, parts schedules, cost estimation and more. As easy-to-use as the spreadsheet you're using now.

- All new integrated 3D that is so powerful and user-friendly we may change your mind about micro 3D.

- MiniPascal, a programmable macro language, will allow advanced users and 3rd party vendors to create reports, macros, and powerful extensions to MiniCad Plus's capabilities.

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**Visa & MasterCard Welcome**

Circle 77 on reader service card
version for $199 and a networking version for $999.

A built-in version of the CL/1 language, created by Apple subsidiary Network Innovations, will enable users of CL/1-compatible Macintosh applications to gather data from Oracle databases for use in Mac applications.

What sets Oracle's product apart from other efforts to port mainframe databases to the Mac, however, is its front end, which transforms HyperCard into a full-function SQL database.

The front end, dubbed Hyper SQL, puts every SQL command from three definitions—ANSI, IBM's DB2, and Oracle's superset—into the HyperTalk programming language. A stack using Hyper SQL lets users log on to one of several remote Oracle databases and construct visual reports, including digitized photos and maps.

Oracle also has in the works an electronic mail package based on its databases. The company is even thinking of building a front end to HyperCard for the Knowledge Navigator—Apple's videotape vision of a talking, book-size Mac. For more information, contact Oracle in Belmont, California, at 415/598-8000.—Rory J. O'Connor

Editing Critters

Just when you thought the world was safe from Trimpets and Huskets, Tentawarbles, Duplicates, and Banes, new nasties—created by you and your fellow Crystal Quest warriors—emerge to try your tenacity and test your tendons. Patrick Buckland has been at it again.

Programming-wizard Buckland, creator of Crystal Quest, has produced CritterEditor, a sophisticated but easy-to-use resource-editing module bundled with the new version of Crystal Quest (released in August) to enable you to build a totally new game in the shell of the old. You can change the attributes of all the game's elements—shape, color, behavior, sound, scoring, and so on. CritterEditor includes a graphics editor with basic drawing tools, so you can start from scratch if you want, and the program also accepts images pasted in from other graphics programs or from clip-art collections.

You can create (or import) fantastic monsters, and have them screech like gryphons or spout Monty Python-type aphorisms. You can use tiny scanned images of your friends' faces, and make them dash about talking in their own digitized voices. All in all, you can change more than 1000 things in the game.

When a set of customizations is complete, you save it as a parameter file, a shorter version of the changes alone, which you can install into Crystal Quest when you want to play. The beauty of this scheme is that parameter files can be exchanged freely and posted on bulletin boards—Casady & Greene Inc., the publisher, invites this traffic and hopes that custom versions of Crystal Quest will become a popular commodity. And a possible side benefit, not mentioned in the manual, is that CritterEditor serves as a frivolous but valuable introduction to some of the basics of Macintosh resource-editing.

Crystal Quest version 2.2, including CritterEditor and a sample parameter file called Totally Silly, retails for $79.95. For more information, write to Casady & Greene Inc. at P.O. Box 223779, Carmel, CA 93922, or phone 408/624-8716.

—Felicity O'Meara

3+Open and Mac Support

With the Mac's popularity increasing in the corporate world, no networking company can afford not to support it. Novell's recent development of NetWare for the Macintosh, which maintains the favored AppleShare interface for Mac users, no doubt prompted 3Com to counter with similar features in its next round of Mac support. 3Com plans on including support for Apple's AppleTalk Filing Protocol and Printer Access Protocol in the 3+Open network operating system, which implements Microsoft's OS/2 LAN Manager. Users switching from 3Com's older 3+ operating system to 3+Open will notice that the familiar AppleShare client interface now provides access to 3+Open file servers.

3Com hopes that these improvements in 3+Open will be sufficient to forestall users of mixed Mac-PC networks from switching to NetWare, even

Macworld News

Denise Barton, 3Com product manager, shows off a Mac II and a PC-compatible 3Station using 3Com's 3+Open.
You've got to see it to believe it. Fast, efficient, and crystal clear. DirectPrint™ page printer uses Liquid Crystal Shutter technology giving you deep velvet blacks on graphic images as well as the sharpest readable text...fine lines like you've never seen before.

To stay ahead in this world you've got to run faster. And we do. Our 4 VP processor averages speed 5 times faster than the competition, depending on the document. All without sacrificing precision quality. DirectPrint is PostScript®-compatible, giving you unlimited versatility in creating and manipulating text and graphics.

They do it with mirrors. Electro-photography with a liquid crystal shutter array enables the DirectPrint to produce exceptional 300-dots-per-inch resolution. We don't use rotating mirrors and lenses so we don't suffer from scanning distortion. You can expect consistent quality from the middle of the page to the edges. And with fewer mechanical parts than the conventional laser printer, the DirectPrint offers greater reliability.

We won't weigh you down. We wouldn't exactly call it a portable, but at 35 pounds it's no dumpling. And with a price of under $4000, you owe it to yourself to see the DirectPrint.

Jasmine
1-800-347-3228
It's All in the Image

Computer graphics has always been the Mac's strong suit. But more and more, people are using the Mac to enhance images digitized by scanners and video cameras—real-world pictures, not just those generated by computers. This technique, called image processing, can also help people analyze images—for example, those from satellites, x-ray machines, and manufacturing and process-control systems.

GTFS and Perceptics have introduced sophisticated image processing and analysis programs developed in Europe for the Mac II. Both GTFS's Ultimage and Perceptics's TCL-Image are aimed at research, scientific, industrial, and medical markets (unlike Silicon Beach's Digital Darkroom and Letraset's Image-Studio, which are aimed at publishing).

Priced at $2990, Ultimage requires a Mac II with at least 2MB of RAM; an 8-, 24-, or 32-bit graphic card; a color monitor; and a hard disk. It can handle images in resolutions from 128 by 128 pixels to 1280 by 1024 pixels. In addition to supporting PICT, PICT2, and TIFF, Ultimage lets you define your own image format. You can even save and execute image processing scripts with the program.

Ultimage features several standard image-analysis functions: histogram equalization, user-configurable linear filters (for edge detection or smoothing), nonlinear filters (for noise reduction and contour detection), and its own scripting. Using the program's frequency processing capabilities—direct and indirect Fourier transforms, for example—you can analyze and enhance images with low overall contrasts, such as x-rays or CAT scans.

A binary processing feature allows representation of grayscale information in binary form, thus reducing the amount of data in a single image and, in many cases, decreasing processing time. A morphological measurement feature determines an object's perimeter, surface area, diameter, and mass center.

TCL-Image provides the same general image processing functions that Ultimage does, and also allows users to link their own C-language procedures to the program to expand its image processing capabilities. The primary difference between the two programs is that TCL-Image is command-line driven, instead of icon driven.

For more information, contact GTFS in Santa Rosa, California, at 707/579-1733, and Percepics in Knoxville, Tennessee, at 615/966-9200.—Brita Meng

A Faster Way to Share

Sometimes local-area networks (LANs) just aren't fast enough for two computers to share simulation, process control, and scientific computation applications data. All these tasks require real-time access to data, and the computers can't wait for data to travel back and forth over even a speedy Ethernet cable.

Flavors Technology thinks it has the answer: Bus-Link, a high-speed connection that links two computers' internal buses. A bus—like the Mac II's NuBus—is responsible for transferring the electronic signals between a computer's processor, memory, and other controllers. Equipped with an FT-60 Bus-Link subsystem, a Mac II can tap into the bus of another computer and directly access that computer's physical memory.

This ability, called memory sharing, eliminates the processing overhead associated with networking protocol and data conversions, especially between dissimilar computers. It also allows two computers to manipulate the same data simultaneously for a distributed, multiprocessor, or parallel processing computer system.

A Bus-Link includes two system-dependent bus interface boards—one for each computer—connected by two shielded cables. The Mac II, of course, needs a NuBus board. A variety of other bus interfaces

(continues)
HERE'S GRIPPING NEWS
FOR MOUSE USERS
Introducing The Gravis MouseStick™

A BETTER HANDLE ON DESIGN

The Plan: Create the input device that is the ultimate in controller precision and versatility.
The Strategy: Combine design ergonomics with state-of-the-art controller technology.
The Result: The Gravis MouseStick™. The breakthrough joystick controller technology ergonomically based on the hand's ability to perform precise movements with speed and accuracy.

A BETTER HANDLE ON TECHNOLOGY

Design makes the MouseStick™ responsive.

Technology makes the MouseStick™ today's most versatile input device. For desktop use. For large-screen monitor CAD and DTP applications. And, of course, for computer games.
Plug it in and get ready! Everything opens up with an amazing 1200 point resolution that can be set to any screen size.
And the big picture resolves into fractional sensitivity modes for precise pixel by pixel control.
The secret? The MouseStick's™ true optomechanical digital output signal. Here's a comparison: available analog joysticks perform like an old hi-fi. The MouseStick's™ digital optomechanics perform like a compact disk player.
And there's more — the Gravis MouseStick™ Processing Unit (GMPU). This little brain really frees you to select from hundreds of modes such as direct tracking with or without autocentering and fully variable pulse output. Three programmable microswitch buttons let you emulate keyboard commands, and the GMPU's 16-character display and menu system updates you on mode and function.

Thanks to the GMPU's 16K of ROM, programming options are virtually limitless and it can be user upgraded to include new features. The MouseStick™ is compatible with all Macintosh®, Apple IIe, IIc and IIgs computers, has all the unique features of the Gravis Joystick and comes with a one year no-nonsense warranty!

SO TEST-DRIVE THE MOUSESTICK™ TODAY!

Get a grip on the new MouseStick™ and you'll quickly discover it's light years ahead of the mouse, trackball or traditional joystick.
The MouseStick™ doesn't clutter your desk or require constant cleaning. And unlike a trackball, you don't need the dexterity of a cardshark to drag an item.
The Gravis MouseStick™ is one of the most technologically advanced and durable digital input devices available.
But don't worry. You can handle it.
Macworld News

Black and White and Mac All Over

Macintosh graphic artists love color, but the classic black-and-white Mac hasn't been abandoned yet: both Cricket Software and Aba Software have released new monochrome paint programs. Cricket Paint builds upon the standard Macintosh user interface, while Graphist-Paint B&W, developed by France's Adone Systems and distributed in the United States by Aba, introduces some new tools and techniques.

Cricket Paint offers a multitude of special effects, including gradations, smooth polygons, multiple resolutions up to 300 dpi, custom brushes, reshapable curves, lighten and darken image controls, a Spirograph-like drawing mode, a texture tool, overlay effects, and a feature called FreshPaint that lets you treat a bitmapped element as a separate object until you're ready to drop it into the background bitmap layer. The program can import most file formats, including black-and-white TIFF files, which can be edited at their original resolution.

Aba's Graphist-Paint features masking/stencil capabilities, a "neon" line tool, antialiased resizing, free rotate and distort, graduated object borders, overlay modes, customizable grids, variable smoothing and contour filters, and an innovative method for making a selected area into a brush.

Both programs are scheduled for release by December. For further information, contact Aba Software in Frazer, Pennsylvania, at 215/644-3580, and Cricket Software in Malvern, Pennsylvania, at 215/251-9890. —David Biedn

Apple-DEC Developers Conference

The courtship between Apple and Digital Equipment Corporation (DEC) has passed into a new phase. Developers now know the key building blocks of Mac-VAX connectivity and the tools they'll use to assemble them.

AppleTalk for VMS has become a kingpin in this connectivity framework. Both companies will collaborate on refining it to include faster response and network management support. Developers writing applications that use AppleTalk for VMS can now expect a smooth path to compatibility with future Apple and DEC products designed for VAXes.

In order to link Mac-based documents with DEC's Digital Document Interchange Format (DDIF) compound document format on the VAX, Apple has developed a translator for Apple File Exchange (AFE) that converts DDIF files to and from MacWrite, MacPaint, and PICT formats. Apple also offers a DDIF I/O Toolkit for Mac developers who wish to support DDIF directly within their applications.

Other Mac-VAX interfaces should be available in the first half of 1989 as Apple delivers its server for X-Windows version 11 (X11) and DEC couples X11 support with its DECwindows products. For further information, call Apple Computer, in (continues)
Sooner or later your Macintosh is going to crash. And unless your Mac's been backed up, it'll probably take your data with it. That's why you need the TG-4000 high performance tape backup system from Tallgrass. It features the tape format that Apple endorses, QIC-100. We invented it, and now it's the industry standard.

**The Fastest Backup in the Business.**
The TG-4000 backs up your data twice as fast as our closest competitor, with over 40 Mb of fully-formatted space. So you won't waste time rotating diskettes in and out of drives.

**Backup’s Never Been So Easy.**
You won't ever have to use the manual. The TG-4000 is icon-interfaced, so you can get the system up and running in no time. From novice to power user, the TG-4000 offers the total flexibility you need and expect from a backup system. Plus, it's compatible with Apple's 40 SCII, AppleShare™, and A/UX™. And since its backup operations are automatic and unattended, you can just set it and forget it.

**Nobody Backs Their Backup System Like Tallgrass.**
Our Exclusive 3-Year Warranty Proves It.

Check for yourself. Only Tallgrass has enough confidence to offer a three-year exclusive warranty on their backup system.

**Tallgrass Protects Your Company’s Bottom Line, Too.**
The TG-4000 protects your valuable data at a price much lower than you'd expect, and lower than any of our competitors.

**Protect Your Apple Before It Falls.**
Call 1-800-TAL-GRAS or write to:
11100 West 82nd Street, Overland Park, KS 66214

Dealers circle 320 on reader service card
End Users circle 6 on reader service card

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Good-looking Print

One reason Roger C. Parker's new guide to basic design for desktop publishing, Looking Good in Print, appears to be headed for success is, well, frankly, because it looks so good in print. When Parker talks about effective use of white space, you can readily see that it works for him. He says there are times when it's best to mix type styles, and you notice that that's just what he's done throughout the text. Early on you realize that the book is its own best example. Its airy design—lots of white space punctuated by bold subheadings, pull quotes, and an abundance of illustrations—makes it a welcome read for the most terminal-weary eyes.

Logically divided into three sections, and utterly generic, the book is designed for both beginning and intermediate users. The first section, Parker's nuts-and-bolts approach to the key elements of graphic design, can be skipped by most experienced users but should prove invaluable to the beginner. The final two sections zero in on how to put together many different types of publications.

The design reference section is filled with large, clear illustrations of sample makeovers, while the final section concentrates on detail, with plentiful and often-insightful examples. Checklists are included so you can see how your publication stacks up.

The book is well indexed, with a complete bibliography and a somewhat smaller directory of associations, user groups, and seminars and workshops.

Looking Good in Print looks so good in print that it serves as its own best example.

Digital Signal Processing

Your Mac can now act as a digital signal processing workstation, with help from Spectral Innovations' MacDSP board. The board is based on AT&T's DSP 32 floating-point signal processing chip, and is offered in three speeds: 8 million floating-point operations ($2249), 12.5 MFLOP ($2745), and 25 MFLOP ($3241). The software you need to use the board costs an additional $496.

Spectral Innovations expects to find a market in universities, engineering labs, medical labs, and wherever else digital signals are processed and analyzed. The Mac II has already been used to display static monochrome graphs of digital signals, such as human voiceprints. Now, with the MacDSP, it can display digital signals in real time, color, and three dimensions.

The MacDSP's easy-to-use Macintosh interface enables the beginner to install both the hardware and the software and have it working in as little as 15 minutes, and gives the expert a graphical signal-processing development environment in which to build, compile, and execute algorithms without writing source code. A 125-KHz programmable analog-to-digital and digital-to-analog converter board costs $486.

For further information, contact Spectral Innovations, 292 Gibraltar Drive, Ste. A-4, Sunnyvale, CA 94089; 408/734-1314.—Scott Beamer

The Mac Tickles the Ivory

Symbolics, in the process of announcing the signing of a VAR agreement with Apple, has taken the wraps off MacIvory, the company's Mac II-based symbolic processing system. Touted as a low-end delivery vehicle for AI applications, MacIvory is the first system based on Symbolics's proprietary LISP chip technology.

Like Texas Instruments' microExplorer system, MacIvory consists of specialized AI hardware and software. An add-in NuBus board includes Iovry, a complete LISP computer on a chip. Iovry and the Mac II's 68020 processor can com-
MMIM by Image Club is vector based PostScript clip art that can be used with any popular Macintosh applications such as PageMaker, ReadySetGo, X-Press, Cricket Draw, Freehand, and Illustrator. You can maximize printing detail with a PostScript laser printer including a Linotronic for typesetting sharpness. Image Club Digit-Art is easy to customize or add color for separations when used with Adobe Illustrator or Aldus FreeHand. Unlike bit-map scanned, jaggy edged bit-map clipart (edited only with programs like MacPaint), Digit-Art is PostScript (EPS). You will experience scaling and editing flexibility without any loss of image quality. Your Image Club art is expertly rendered by our staff of in-house artists and is equivalent to the very best in line art when reproduced on a PostScript printer. Digit-Art is available on the ArtRoom CD ROM or in diskette packages.

**MacUser Rating**

Digit-Art is by Image Club is vector based PostScript clip art that can be used with any popular Macintosh applications such as PageMaker, ReadySetGo, X-Press, Cricket Draw, Freehand, and Illustrator. You can maximize printing detail with a PostScript laser printer including a Linotronic for typesetting sharpness. Image Club Digit-Art is easy to customize or add color for separations when used with Adobe Illustrator or Aldus FreeHand. Unlike bit-map scanned, jaggy edged bit-map clip art (edited only with programs like MacPaint), Digit-Art is PostScript (EPS). You will experience scaling and editing flexibility without any loss of image quality. Your Image Club art is expertly rendered by our staff of in-house artists and is equivalent to the very best in line art when reproduced on a PostScript printer. Digit-Art is available on the ArtRoom CD ROM or in diskette packages.

**SET 1**

**SCANNING**
- Paint Brush
- Lynx
- Pica
- Tina Font

**SET 2**
- Liberty
- Chrome
- Mechanical Surf Style

**SET 3**
- Score Compact Copy
- Lunar Pipe
- Dyno

**SET 4**
- Fast Lane
- Calgary
- Drop Caps
- Signature
- Headliner

**SET 5**
- Casino Graphik
- Tribune

**SET 6**
- Jeff Mint New Yorker
- Savage
- Micra Font
- Coxtin

**PHON**

Circle 337 on reader service card
municate either through a specialized shared-memory channel or through a remote procedure call that allows each processor to utilize the resources of the other. For example, an application running on Ivory can communicate with a Mac program running on the 68020.

The MacIvory software environment, Genera, currently runs on Symbolics's 3600 AI workstation. Because the software environment is the same, programmers can develop AI applications on the 3600 and then deliver those applications on the less-expensive MacIvory. MacIvory thus makes symbolic processing more affordable for end users.

Symbolic processing allows programmers to work not only with traditional numbers and characters, but also with symbols, relationships, and graphical objects. This makes it easier to represent and solve complex problems on computers.

MacIvory supports applications written in Symbolics's versions of Common Lisp, C, FORTRAN, and Pascal, and all standard Mac languages. It also supports several Symbolics software products, including Joshua, a tool for building expert systems; Concordia, a hypertext document and delivery system; Statice, an object-oriented database; and S-Dynamics and S-Geometry, 2-D and 3-D animation packages, respectively.

The standard MacIvory configuration includes a Mac II with 1MB of memory, extended keyboard, and monochrome monitor; the NuBus board; the Genera delivery software; and a 300MB SCSI hard disk. Pricing for the system starts at $21,900. An upgrade package is also available with prices starting at $10,900. For more information, contact Symbolics, in Cambridge, Massachusetts, at 617/621-7500. —Brita Meng

Missing Link

Visual Information's Presentation Toolkit enables you to convert data from 2-D and 3-D CAD packages into desktop presentations.

This month's readers survey focuses on backing up files. We sent our survey to 1000 randomly selected Macworld subscribers and received 449 responses. Of the 449 respondents, 93 percent reported backing up their files. Seventy-two percent of them back up 1 to 5 times per month; 11 percent, 6 to 10 times per month; 6 percent, 10 to 19 times per month; and 11 percent, 20 or more times per month. Twenty-six percent spend 16 to 30 minutes performing a typical backup, and 20 percent spend more than 30 minutes.

If you did not participate in our survey, you can still back up your files. The Macworld editors have a list of the most popular backup programs. Based on 418 respondents.

Which medium do you use most often to back up your files?

- Floppy disk drive 76%
- Removable floppy disk drive 9%
- Removable hard disk drive 3%
- Hard disk drive 7%
- Streaming tape drive 5%
- 8mm video tape drive 0.2%
- Network file server 1%

Based on 418 respondents.

Respondents to our survey used these media to back up.

Stephen Hauser of Symbolics' technical staff shows off the Ivory coprocessor board.

Readers Survey: Backing Up
Our Silentwriter™ LC890 is the first desktop publishing printer that gives you both popular standards for creating graphics and type: true Adobe PostScript® and LaserJet Plus emulation. That alone would be enough to cause headlines. But we also added many more features to simplify desktop publishing. Like both Apple and IBM compatibility. PC Week stated, “the LC890 is actually better than having both an Apple LaserWriter Plus and an HP LaserJet Plus on your desk.” Equally impressed, PC Magazine awarded it an “Editor’s Choice.” And cited it in their “Best of 1987” issue.

And because the Silentwriter has a simple, trouble-free printing mechanism, it will be creating headlines for years to come. In fact, it’s twice as reliable as ordinary lasers, with an average life of 600,000 pages.

If you don’t require the power of our LC890, consider the LC860 Plus for text and less complex graphics.

To start producing your own headlines, call 1-800-343-4418 (in MA 617-264-8635). We’ll send you reprints of all the great reviews and the name of the NECIS dealer nearest you.

NEC PRINTERS. THEY ONLY STOP WHEN YOU WANT THEM TO.
If you are not satisfied with your current backup medium, which would you prefer to use? (50% were dissatisfied)  

<table>
<thead>
<tr>
<th>Backup Medium</th>
<th>Preference Percentage</th>
</tr>
</thead>
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<tr>
<td>Floppy disk drive</td>
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<tr>
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<td>2%</td>
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<td>Removable hard disk</td>
<td>26%</td>
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<tr>
<td>Hard disk drive</td>
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<tr>
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<td>40%</td>
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<td>Bnnm video tape drive</td>
<td>8%</td>
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<tr>
<td>Network file server</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
</tbody>
</table>

Based on 211 respondents.

Respondents dissatisfied with their backup medium expressed these preferences.

The most popular backup software products were SuperMac DiskFit (17 percent), Apple Finder (16 percent), and Fastback (11 percent).

Using Plain English

Retrieving information from a large relational database can be a daunting task indeed. You usually have to formulate commands in a difficult language like SQL (Structured Query Language). Now two products from Natural Language Inc. let you ask for information in plain English. Both are Mac II products running under A/UX, Apple's version of the UNIX operating system. Natural Language is a conversational English interface for relational databases. Connector is an interactive, knowledge-based program that helps users customize Natural Language to their particular database application. Connector asks the user questions and interprets the answers so that Natural Language can read vocabulary attributes and attribute relationships.

Natural Language, in turn, acts as the front end to several SQL-based databases by effectively translating users' conversational English sentences into optimized SQL queries. The program then retrieves data and presents it back in plain English. Supported databases include Oracle Corporation's Oracle, Sybase Corporation's Sybase, Relational Technology's Ingres, Digital Equipment Corporation's Rdb, and Informix Software's Informix. The databases can reside on either the Natural Language-equipped Mac, other networked Macs, or networked DEC VAX computers.

Teaching a computer to understand natural human language has been a long-time goal of computer scientists, but it's been a difficult task because, for one thing, computers are very literal, unlike humans. They are easily confused by pronoun references, ellipses, relative clauses, or poorly specified references, and they have no common sense; they can't resolve ambiguity automatically as humans often can. Finally, computers have trouble with homonyms and misspelled words.

Natural Language, Inc. claims that its technology solves these problems. Natural Language can understand both the syntax and semantics of English, enabling it to comprehend freeform English sentences. It has a built-in knowledge of 10,000 words and 1100 concepts, according to the company. In addition, the Connector transfers database-specific knowledge to Natural Language. The benefits of natural language include reduced training costs, increased productivity, and flexible access to data.

Natural Language and Connector require A/UX version 1.1, 6 megabytes of RAM, and a 60MB hard disk. Natural Language is priced at $5,000, and the Connector is priced at $10,000, with volume discounts available. For more information, contact Natural Language Inc., in Berkeley, California, at 415/841-3500. —Britta Menges

SA-4D offers ray-trace rendering and phong shading, so that images of objects can reflect and refract light at each pixel, simulating the light-refracting properties of real objects. An image of a glass sphere will bend rays as "light" passes through it and distort the way objects appear behind it, just as in real life. Motion blur, another feature of SA-4D, adds a smoothness and natural quality to fast-moving objects that would otherwise appear jumpy or seem to flicker.

The program has optional data conversion modules for transferring files from RenderMan, DXF, and other 2-D and 3-D systems. It offers real-time wire-frame playback, RAM animation playback, and an easy-to-use animation scripting language for writing your own motion sequences—features usually found in PC-based systems costing around $12,000. Now these and more are available for $500 to $2500, and you can buy only the modules you really need. For more information, contact Byte by Byte Corporation, 512/343-4357. —Fern Friedman

Sculpt-Animate 4D

Professional animators have clamored for easy-to-use software, and Byte by Byte Corporation has answered with Sculpt-Animate 4D for the Mac, a third-generation animation package that improves upon Sculpt-Animate 3D for the Amiga. The Mac software adds enhanced imaging quality to the intuitive interface and affordability that make the Amiga product popular.

This image was created with Sculpt-Animate 4D, an animation package with ray-trace rendering and phong shading for simulating the light-refracting properties of real objects.
It's 7:59 PM EST...

The four-digit number next to each product is the product's ITEM NUMBER. Please refer to this number when ordering. Thank you.

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time.

CP denotes copy-protected.
NCP denotes not copy-protected.

Aatrix Software ... NCP

3976 Aatrix Payroll 3.01 ...................................... $99.
4020 Aatrix TimeMinder 1.7 ...................................... 109.
3956 Aatrix Payroll PLUS 3.02 .................................. 159.

Aba Software ... NCP

1305 “Draw it again, Sam” 2.03 .................................... 79.
4023 GraphPaint II 1.0 ............................................. 289.

Abacus ... NCP

4481 StatView II ................................................................ 349.

Microseeds Publishing ... NCP


Access Technology ... NCP

4109 MindWriteExpress 2.0 ........................................ 149.
1346 Trapeze 2.1 ................................................. 159.

Acus ... NCP

1401 4th Dimension 1.0 ........................................... 489.
4024 4th Dimension Runtime ................................... 239.

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4029 New Century Schoolbook 5 .................................. 127.
4030 Optima 6 ......................................................... 127.
4031 ITC Souvenir 7 ................................................ 127.
4032 ITC Lubalin Graph 8 .......................................... 127.
4062 ITC Garamond 9 ............................................. 127.
4033 ITC American Typewriter 10 .............................. 97.
4034 ITC Benguiat/Friz 11 ......................................... 127.
4035 Glypha 12 ........................................................ 127.
4094 Helvetica Light/Black 13 ....................................... 127.

Aldus ... NCP

1330 Freehand 1.0 ................................................... $349.
1328 PageMaker 3.0 ............................................... 399.

Alteys ... NCP

1194 FONstastic Plus 2.01 .......................................... 54.
1195 Fontographer 2.4.1 (CP) ..................................... 239.

Apple Computer ... NCP

1118 HyperCard 1.2 ................................................ 42.

Ars Nova ... NCP

1215 Practica Musicza 2.0 ......................................... 79.

Ashton-Tate ... NCP

1323 FullPaint 1.0SE ............................................... 69.
1098 Full Impact 1.0 ................................................. 249.
1324 FullWrite 1.0 .................................................. 269.
1322 dBASE Mac 1.0 ............................................... 296.

Berkeley System Design ... NCP

1541 Stepping Out II 2.0 ........................................... 52.

Beyond, Inc. ... NCP

4203 MenuFonts 2.02 ................................................ 30.

Blyth ... NCP

1470 Omnis 3 Plus/Express 3.25 .................................... 129.
4318 Omnis 3 Plus/Express 3.3 (3 users) ......................... 399.

Bogas Productions ... NCP

1481 Studio Session 1.25E ........................................... 49.
4255 Super Studio Session 1.0 ..................................... 79.

BrainPower ... NCP

1532 DataScan 1.0 ................................................... 118.
1534 DesignScope 1.1 .............................................. 128.
1537 MathView Professional 1.0 ................................. 144.
3960 ArchText 1.0 ................................................ 182.
4066 The Analyzer Bundle .......................................... 325.

Bravo Technologies ... NCP

1539 MacColor 1.2D .................................................. 79.

Bright Star Technology ... NCP

1402 Alphabet Blocks 3.01 ......................................... 32.
3961 Talking Tiles 1.0 ............................................... 69.
3962 HyperAnimator 1.0 ............................................ 79.

Broderbund ... CP

4314 Typel 1.0 ........................................................... 20.

GeoQutty

GeoQuery 1.0—Find specific data by clicking on a point, create reports on any geographic area you choose, & import data via ASCII files. No faster way to get the big picture! .................................. $295.

GeoQutty
<table>
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<tr>
<th>Product Name</th>
<th>Edition</th>
<th>Price</th>
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<tr>
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<td>Jarn Session 1.1</td>
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**Total:** $1,194.5
How fast? Tomorrow.

CE Software ... NCP
DeskTop 3.0—A Finder within a disk accessory.
Create, delete, rename and move folders and files from within any application. Includes Widgets & Laserstatus $27.

3393 KidTalk .......................... 32.
3393 MathTalk .................................. 32.
3394 SmoothTalker 2.0 .................. 32.
3395 Speller Bee ......................... 32.

Foundation Publishing ... NCP
2385 Comic People .................... 25.
2384 Comic Sans Factory 1.6 .... 44.

Fox Software ... NCP
4195 FoxBASE+ / Mac 1.0 .......... 208.

Freesoft ... NCP
2219 Red Ryder 10.3 .......................... 54.
2232 Hard Disk Partition 2.0 ...... 45.
2231 Hard Disk Util 2.03 ............... 53.

Generic Software ... NCP
4319 Generic CADD Level 1 ... 54.
4411 Flow Charts & Schedules .. 18.
4402 Home Landscaping ............. 35.
4401 Basic Home Design ............ 35.
4410 Commercial/Residential Furnishings . 35.
4400 Heating/Ventilation/Air Conditioning 35.
4406 Welding .............................. 35.
4409 Bathroom Design .................. 49.
4403 Kitchen Design .................... 49.
4404 Landscaping Architecture .... 49.
4405 Pipe Fittings ....................... 49.

Great Wave Software ... NCP
2277 TimeMasters 1.0 ................ 22.
2276 KidsTime 1.2 ...................... 26.
4334 NumberMaze ..................... 27.
2270 American Discovery 2.1 ........ 27.
2272 Crystal Paint 1.0 ................. 27.
2273 ConcertWare + 4.0 .............. 39.
2271 ConcertWare + MIDI 4.0 ....... 79.

Greene, Inc. ... NCP
2269 QuickDEX 1.4A ..................... 32.

ICOM Simulations ... NCP
4084 On Cue 1.3 ............................. 36.
4085 TMON 2.8.1 .............................. 89.

Ideaform ... NCP
2419 DiskQuick 2.10 ..................... 27.
2418 HyperBook Maker 1.0 ...... 31.
2420 MacLabeler Plus 3.0 .... 42.

Imagine ... NCP
2422 SmartAlarms 2.9 .................... 34.
2423 Multi-user Appointment Diary 1.0 84.

Individual Software ... NCP
2409 Typing Instructor Encore .... 26.

101 Scripts & Buttons for HyperCard $37.
101 Macros for Excel ................ 37.
Infosphere ... CP .................. 57.
2513 LaserServe 2.0 ................. 62.
2514 MacServe 2.4 ..................... 155.

Innovative Date Design ... NCP
2417 MacDraft 1.2B .................... 149.
Insignia ... NCP .................. 479.
4089 SoftPage 1.0 ...................... 479.

Intuit ... NCP
2425 QuickGen 1.0 ..................... 33.
Kont Marsh Ltd. ... NCP 2591 The NightWatch 1.02 .... 89.
2592 MacSafe 1.08C ......... 69.

LaCie ... NCP
4335 SilverServer 1.0 92.
SilverWare ... NCP ................ 4095 LaserPaint Color II 1.8 .. 359.
Layered ... NCP .................. 4095.
2615 Notes for...Excel 1.0 ........ 40.
2618 Notes for...Word 1.0 ........ 40.
2616 Notes for...PageMaker 1.0 .. 40.
2620 Front Desk 2.0 (multi-user) 59.
2613 Insight OneWrite 1.0 ............. 185.
2610 Insight Expert AR 2.0 ......... 475.

Silverserver 1.0-Powerful server utility lets local & remote users share hard drives and modems. Plus provides complete hard disk management, fast disk duplication and network electronic mail $92.

2611 Insight Expert GL 2.0 .............. 475.
2609 Insight Expert AP 2.0 .......... 475.
2612 Insight Expert Inventory 2.0 .... 475.
2614 Insight Expert Time Billing 2.0 . 475.

Learning Company ... CP
2670 Reader Rabbit 2.0 ............. 33.

Letrasel ... NCP
2619 Image Studio 1.5 .............. 279.
2621 Ready, Set, Go! 4 4.0A ........ 279.
4128 Ready, Set, Show 1.0 call

Lingusit's Software ... NCP
2649 Tech .................................. 36.
2643 LaserTech ............................. 79.

Microlytics ... NCP
3935 Speller Bee ........................... 32.
3936 KidTalk ............................. 44.
3939 MathTalk ............................. 44.
3941 SmoothTalker 2.0 .......... 32.
3937 Typing Instructor Encore ... 26.

MacroMind ... NCP
4202 Black & White Movies (17 of them) $30.
4291 Video Clip Animation ........ 36.
110 Clip Sounds (sound effects & music) 36.
4201 Clip Charts (bar, pie & bullet charts) 36.
1430 VideoWorks II HyperCard Driver 1.2 60.
1432 VideoWorks II Accelerator 1.1 ..... 118.
1431 VideoWorks II 2.0 ............... 118.

Mars Software ... NCP
4068 Aztec C 3.6B ........................ 65.
4316 Aztec C UniTools ................. 65.
4317 Aztec: SBD 3.6B ................... 65.
4069 Aztec MPW C 3.6B ............. 99.
4075 Aztec C + SBD 3.6B ............ 99.

MEGA ... NCP
2796 Managing Your Money 2.0 ... 128.

MEDIAGENIC ... NCP
1334 City to City 1.0 ................... 30.
4295 FocalPoint/Busines Class Bundle .. 48.
1338 Report's 1.2 .......................... 59.
3790 Lookup 1.0C ..................... 30.
3788 Fineware 2.0 ................. 36.
3792 Spellpower 2.0F .................. 45.

Microlytics ... NCP
2733 Word Finder 2.0 ............... 33.
2732 Gofer 1.0 ...................... 44.

Microseeds Publishing ... NCP
2913 Redux 1.5 .............................. 65.
4210 Screen Gems 1.0 ................. 49.

Microsoft ... NCP
4471 QuickBasic 1.0 ................. 65.
2683 Chart 1.02 ....................... 79.
2885 Microsoft Write 1.0 ............ 79.
2666 File 1.05 ............... 119.
2684 Works 1.1 .......................... 189.
2675 Microsoft Mail (1-4 users) ..... 156.
2672 Microsoft Mail (5-10 users) ... 325.
2873 Microsoft Mail (11-20 users) .. 459.
2874 Microsoft Mail (21-32 users) .. 650.
2685 Excel 1.5 ...................... 249.
2682 Word 3.02 ....................... 248.
2678 PowerPoint 2.0 ............... 249.

Miles Computing ... NCP
2768 Orchestra of Fonts Vol. 4 ... special 19.
2711 Mac the Rippe Vol. 3 ... 27.
2769 Peoples, Places & Things Vol. 5 ... 27.

Mindscape ... NCP
2749 The Perfect Score: SAT 1.0 (CP) .. 46.

Microlytics ... NCP
Gofer 1.0—Where's that letter? Which memo mentioned coffee breaks? Gofer quickly searches all your text files by words you recall and tells you what's buried where .......... 44.
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**Note:** The prices listed are subject to change without notice.
From C.A.T.'s to mice

3318 HyperDA 1.1 $49.
3317 Acta 2.01 38.
4504 Acta Advantage 1.0 69.
4160 PictureBase-WetPaint 99.
3130 VersaTerm 3.20 69.
3129 KaleidaGraph 1.10 125.
3131 VersaTerm-PRO 2.20 195.
3416 CAPP's for Lightspeed Pascal 1.0 $49.
3634 ClickArt Effects 28.
3129 KaleidaGraph 1.10 125.
3548 Source Code library II 1.0 $42.
3639 WriteNow 2.0 $109.
3615 MacEdge II 1.0 27.
3634 ClickArt Letters Vol. 1 28.
3636 ClickArt Holidays 28.
3633 Christian Images 35.
3631 Bombay Laser font 45.
3641 Plymouth Laser font 45.
3635 EPS Illustrations 75.
3632 ClickArt Business Images 28.
3616 Mind Over Mac 1.4 27.
3630 ClickArt Personal Graphics 28.
3635 EPS Illustrations 75.
3726 TOPS for DOS 2.0 119.
4160 PictureBase-WetPaint 99.
3418 lnBox Connections Mac 2.2 75.
3725 TOPS Repeater 132.
3720 TOPS Flashcard (90 days) 169.
3417 InBox Starter Kit 2.1 199.
3418 InBox Connection Mac 2.2 75.
3800 WordPerfect Mac 1.0.1 185.
3986 DeskPaint 2.0 69.
3985 ZBasic 5.0 105.
3778 Business Graphics $49.
3579 Mathematicians Toolkit 49.
3683 Scientific Graphics 49.
3684 Sorting & Searching 49.
3668 3D Graphics 49.
4178 Communications 49.
EDUCATIONAL SOFTWARE
3511 Algebra 35.
3573 Arithmetic 35.
3575 Calculus 35.
3577 Discrete Math (multi-variate calculus) 35.
3580 Pre-Calculus 35.
3581 Probability 35.
3586 Trigonometry 35.
3685 TrueSTAT 49.
3751 Animal Kingdom 27.
3753 Fraction Action 27.
3755 Mac Robots 27.
3756 Math Wizard 27.
3754 Read-A-Rama 32.
3779 DiskFinder 1.07 29.
3783 myDiskLabeler w/Color 2.8.1L 31.
3784 myDiskLabeler w/LaserWriter 2.8.1LI 34.
3800 WordPerfect Mac 1.0.1 185.
3801 WordPerfect Mac 1.0.1 185.
3986 DeskPaint 2.0 69.
3985 ZBasic 5.0 105.
3783 myDiskLabeler w/Color 2.8.1L 31.
3784 myDiskLabeler w/LaserWriter 2.8.1LI 34.
3800 WordPerfect Mac 1.0.1 185.
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3783 myDiskLabeler w/Color 2.8.1L 31.
3784 myDiskLabeler w/LaserWriter 2.8.1LI 34.
3800 WordPerfect Mac 1.0.1 185.

ENTERTAINMENT
Addison-Wesley ... NCP
4407 The Hobbit 1.0 24.
4474 Fellowship of the Ring 1.0 24.
Accolade ... CP
1184 Hardball 23.
4484 Mean 18 24.
4485 4th & Inches 24.
Avalon Hill ... CP
1011 MacProStar 2.0 28.
Blue Chip ... CP
1441 Millionaire 35.
Broderbund Software ... CP
1424 Lode Runner 12.
4099 Shufflepuck Cafe (air hockey) 22.

MacConnection
MacConnection President's Catalog—Upon your request, we'll send the premier edition of our catalog direct to your door. And, with orders of $250 or more, you'll also receive a complete set of 96 highly collectible Presidential Cards! (While supplies last)

From C.A.T.'s to mice

CE Software ... NCP
QuickMail 1.0—Send mail across wide area networks, to hardware devices, even other mail systems. Conferencing, remote access, & form customizing capabilities as well $165.
"Gentlemen,

My mouse died. I needed a new one. I had recently read your magazine ad about overnight shipping. I called you at 3:30 PM on Wednesday to order a new mouse. When your salesman, Robert, said, 'Look for it tomorrow,' I thought, 'Uh huh.' But the next morning at 9 AM I signed for it during my morning coffee. Only 18 hours later, I couldn't believe it. "Congratulations and thank you."

Foster C. Wilson
Newark, OH
Mostrak Products ... 1 year
Every Mac QT—Effective, ultra-quiet cooling fan with a sleek, low-profile design. Reduces temperature over 40°F and includes a built-in surge protector......... $65.

MSC Technologies ... lifetime
2608 A+ Mouse A/B ................. $65.
2609 A+ Mouse A/D ................. 85.
Nutmeg Systems ... 90 days
2992 15" Monitor for Mac Plus ... 1295.
2994 15" Monitor for Mac SE ...... 1295.
2995 15" Monitor for Mac II ....... 1395.
4002 19" Monitor for Mac Plus .... 1395.
4003 19" Monitor for Mac SE ...... 1395.
4004 19" Monitor for Mac II ....... 1495.

Nuvotech ... 1 year
3001 TurboNet ST (DB-9) ........... 30.
3000 TurboNet ST (DIN-8) ........... 30.
Orange Micro ... 1 year
4488 Grappler Spooler .............. 39.
3036 Grappler ....................... 79.
4076 Grappler LO ................... 92.
4487 Grappler LS ................... 92.

PCPC ... 2 years
3177 HD-WSI (Apple HD-20 to SCSI) .... 269.
3181 MacBottom HD 21 SCSI ........ 659.
3180 MacBottom HD 21 w/Modem ... 779.
3185 MacBottom HD 32 SCSI ...... 699.
3184 MacBottom HD 32 w/Modem ... 829.
3189 MacBottom HD 45 SCSI ....... 859.
3188 MacBottom HD 45 w/Modem ... 979.
3190 MacBottom HD 70 SCSI ....... 999.

Practical Peripherals ... 5 years
3100 1200 Baud External Modem ... 79.
3102 2400 Baud External Modem .... 181.
3089 Mac Communications Pack .... 229.

Sharp ... 90 days
3453 JX-450 Color Scanner ....... 5895.

Shiva ... 1 year
4547 NetBridge .................. 279.
3444 NetSend X232 ............... 269.
3442 Macintosh V2400 ............ 359.
3443 NetModem V2400 .......... 479.

Summagraphics ... 90 days
4298 BitPad Plus ADB ........... 329.

Thunderware ... 90 days
3648 ThunderScan 4.0 with PowerPort .. 199.
3645 Mac II Power Accessory .... 42.

DISKS
2214 Full 3½" DS/DD Disks ........ 18.
3297 Sony 3½" DS/DD Disks ....... 19.

Ergotron ... 1 year
The Muzzle—Protect your data/software against theft and alteration. Blocks access to floppy drive and power receptacle .......... $62.

Macintosh—Eliminate eye, neck, and back strain. Unequaled ease of adjustment .......... $88.

Goldstein & Blair
I/O Design ... lifetime
2373 MacLuggage HDware .......... 49.
2379 MacLuggage ImageWare II .... 49.
2376 MacLuggage Macinware Plus ... 64.
2381 MacLuggage Macinware SE .... 75.

Kalmar Designs
2531 Teakwood Roll-top Case (45 disks) .. 14.
2532 Teakwood Roll-top Case (90 disks) .. 21.
2533 Teakwood Roll-top Case (135 disks) .. 31.

Moustrok
2694 Moustrok Pd (standard 7"x9") .... 8.
2692 Moustrok Pd (9"x11") .......... 9.
2693 Moustrok Pd II (5"x7") .......... 10.

Moustrok Designer Series (Features selected photos from the book, "A Day in the Life of America") ........ each 12.

Ribbons
Available in black, blue, brown, orange, green, purple, red, yellow, silver, and gold. 3255 ImageWriter II Ribbon .. 4.
3261 ImageWriter II 4-color Ribbon .. 9.

Verbatim 3½" DS/DD Disks .......... $19.
MAXELL 3½" DS/DD Disks .......... 20.

INFORMATION SERVICES
Compuserve
1676 Compuserve Information Service ... 24.
1671 Grolier's Online Encyclopedia ... 32.
1673 Compuserve Navigator 2.02 .... 45.
1674 Standard Service/Navigator Bundle .... 59.

Dow Jones
1789 Dow Jones Membership Kit .... 24.
1785 Desktop Express 1.03 .... 95.
1786 Market Manager Plus 2.0 .... 189.

ACCESSORIES
Bantam Books
1403 Complete HyperCard Handbook ...... 23.

Computer Coverup
1723 ImageWriter II Cover ........ 8.
1722 ImageWriter LO Cover ....... 8.
1720 Mac Plus Cover Set .......... 10.
1725 Mac SE Ext. Keyboard Cover Set .. 10.

Ergotron
1789 Dow Jones membership Kit ..... 24.
1785 Desktop Express 1.03 .... 95.
1786 Market Manager Plus 2.0 .... 189.

I/O Design ... lifetime
MacLuggage Macinware SE—Features a tear, soil, and water resistant cordura outer shell, and ultra-high density foam. Pockets for mouse cords, extended keyboard and drive .......... $75.

IOP Design
3260 ImageWriter LO Black Ribbon .. 17.
4011 ImageWriter LO 4-color Ribbon .. 20.

Sopris Softworks ... lifetime
3163 The Gallery (folding disk holder) .... 20.
3017 ImageWriter II Cover .......... 11.
3019 Mac SE & Ext. Keyboard Cover .. 15.
3240 LaserWriter Cover ........... 17.
3012 High Trek ImageWriter II carry case ........ 49.
3013 High Trek Mac Plus carry case .... 59.
3014 High Trek Mac SE & Ext. kybd. case .... 69.

Targus
3616 ImageWriter II Carry Case .... 49.
3017 Mac Plus/SE Carry Case .... 59.

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Call 800/622-5472.
we've got your price.

**HARDWARE**

Manufacturer's standard limited warranty period is listed after each company name. Some products in their line may have other warranty periods.

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**Doce Computer | 90 days**

1801 SCSI Interface/Port...
1807 MacSnap 524E...
1809 MacSnap 524S...
1811 MacSnap 548E...
1812 MacSnap 548S...
1800 MacSnap 2SE...
1979 MacSnap Plus 2...
1791 Mac SE 66020 ACCELERATOR BOARDS...
1793 Marathon 020 M2E1...
1794 Marathon 020 M2E2 (1 Meg)...
1795 Marathon 020 M2E3 (3 math chip)...
1796 Marathon 020 M2E4 (1 Meg/chip)...
1401 Marathon 020 M2E4x4...
1803 1024 Option...
1405 Marathon 030 Accelerator...

**Ergotron | 1 year**

2004 Mouse Cleaner 360°...
3092 The Muzzle (platinum)...
1998 MacTilt (platinum)...
2000 MacTilt...
3993 Workstation A (up to 40 lb monitor)...
3994 Workstation B (up to 60 lb monitor)...

**Farallon Computing | 1 year**

2202 PhoneNET-AppleTalk 1200...

**Practical Peripherals | 5 years**

2203 PhoneNET PLUS (DIN-8)...
2204 MouseNET Plus (DB-9)...
2206 PhoneNET StarController...
2205 PhoneNET Punch Down Block...
2201 TrafficWatch...

**FVB Software | 1 year**

4263 PocketHammer 240...
4264 PocketHammer 260...
3998 Hammer 91...
3999 Hammer 155...

**Hayes | 2 years**

2300 Smartcard II 3.08...
2307 Smartcard 2400...

**Kensington | 1 year**

2563 Mouse Pocket ADB...
2577 Mouse Pocket PS/2...
2569 Mouse Plus or SE Cover...
2589 Universal Printer Stand...
4126 LaserWriter II Cover...
2562 Mouse Cleaning Kit w/Pocket...
2550 Disk Drive Cleaning Kit...
2580 Mac II Stand...
2545 Universal Copy Stand...
2573 Maccessories Tilt/Swivel...
2578 Extra Long ADB Keyboard Cable...
2556 Maccessories Anti-glare Filter...
2579 Mac II Monitor Cable Extension...
2559 Apple Security System...
2568 Maccessories SuperBase...
2585 Printer Muffler 60...
2586 Printer Muffler 80 Stand...
2583 Printer Muffler 132...
4070 System Saver SE...
2560 MasterPiece 400...
2561 MasterPiece Mac II...
2546 Maccessories A-B Box...
2566 System Saver Mac (platinum)...
2547 New Turbo Mouse ADB...

**Koala Technologies | 90 days**

2593 MacVision 1.4...
2594 Kraft Systems | 1 year

2600 3-Button QuickStick...
4082 3-Button QuickStick ADB...
2604 IS ADB Tablet...
2505 Cordless 4 Button Cursor (1 year)...

**Mobius Technologies | 1 year**

4470 Fanny Mac QT...
F
ive years is a long time in computer development. It was about five years from the Apple II to the IBM PC, and only two more years to the Macintosh. And when you honestly look at it, the Macintosh was the last major advance in the microcomputer industry. The Amiga and the Atari ST were Mac mutants—collateral, specialized descendents, finding and occupying certain niches. The IBM PS/2 and OS/2 projects represent an effort to crossbreed species; they may prove to be evolutionary dead ends. Mac IIIs and 386-based systems are the pride of the two major computer phyla, but they represent straight-line extrapolations of systems that existed five years ago. Our industry has been long overdue for a major shift.

The Next computer just might represent that advance, though only time—and the marketplace—will tell. It certainly represents an ambitious leapfrogging over the current flagship systems in the Mac and MS-DOS markets, as well as a definite challenge to workstation manufacturers. Right now, the Next machine is aimed specifically (and solely) at the higher-education market, but the potential exists for it to break out into more general distribution in a year or two. While much of the Next system is a stepwise refinement of what's already out there, several features are truly innovative, and the overall combination at the announced price—$6500—is that evolutionary leap the industry has been waiting for.

I've had a chance to watch some of the development of the Next computer over several months preceding the October product announcement. In this article I've tried to preview the product in its newly announced, not-yet-released state, from the viewpoint of a long-time Macintosh user.

One warning: many of the statements here are based on claims by Next. Some have been verified by direct observation, but since I don't have a Next machine to work on yet, and since it's not due to be generally available until the second quarter of 1989, there's always the possibility of errors and changes.

Opening the Cube
As you can see from the photos, the Next computer itself is a black cube, 12 inches on a side, designed to sit under your desk, on a bookshelf, or wherever you want to put it. The cube by itself is mostly empty space: an adaptable power supply, four slots, and space for two 5¼-inch mass storage devices. The case itself is magnesium, which is light and has good radio-frequency shielding properties.

The power supply is a 200-watt, wide-range switching power supply. You can plug it in anywhere in the world, and it automatically adapts to the local current, accepting voltage ranges from 90 v to 270 v and frequencies from 50 Hz to 60 Hz. Each expansion slot gets 25 w of power.

Bruce F. Webster, not surprisingly, is the author of The Next Book, to be published early in 1989 by Addison-Wesley.
The expansion slots are set up to accept 11-by-11-inch circuit boards. The connectors are standard NuBus connectors (like the ones in the Mac II) and use the same pinouts; the major difference is that the bus operates at 25 MHz, as opposed to 10 MHz in the Mac II. In other words, it's not compatible with the Mac II.

To make designing for the bus easier, Next has developed a single VLSI (very large scale integration) chip to handle the bus interface and will sell these chips to third-party developers for $25 each.

The standard configuration comes with one board (the system board) and one mass storage device (the optical disk drive) in the cube. In theory, you could put multiple system boards into a single cube, not to support multiple users but to increase the processing power of a single user; however, the current system software doesn't support that yet, so it remains theoretical.

**The Next Word in Displays**

The Next MegaPixel Display is designed to operate at some distance from the cube. In fact, it comes with a cable 3 meters long (nearly 10 feet) that carries all signals—video, sound, keyboard and mouse input, and power—between the cube and the display. You don't need a separate power cord, and you turn the entire computer system—cube, display, and printer—on and off from the keyboard.

The 17-inch monitor is a high-resolution grayscale screen: 1120 by 852 pixels at 94 dots per inch (dpi), with four levels of gray (two bits per pixel). The refresh rate is 68 kHz; the result is a fine, crisp, flicker-free display. The video memory itself is on the system board, separate from main memory; the video hardware is also located there. The monitor has a built-in stand that you can adjust for height and tilt angle.

The keyboard plugs into the display. It has 84 keys, including control and cursor keys. There are also (as mentioned) a power on/off key and keys for adjusting display brightness, display contrast, and volume. There are no function keys.

The two-button mouse plugs into the keyboard, much as on the Mac SE and Mac II. Unlike those systems, however, the Next has no desktop bus and there are no plans for other devices. While an application can use the mouse buttons as desired, the user interface works primarily with the left button and reserves the right one for a specific "move the menu here" function.

Since the video RAM and hardware are on the Next system board, you don't have the option (as you do on the Mac II) of buying a display from a third-party company. However, Next says that products will be coming out in the future that will support color and other video options. Since Steve Jobs owns a large chunk of Pixar, the computer graphics firm founded by Lucasfilm, those products could be very interesting.

**A Look at the Main Board**

As "Next Revealed" shows, the entire electronics of the Next computer fits on a single 11-by-11-inch circuit board. It uses a total of about 45 chips, most of which were designed at Next, and several of which use VLSI technology.

The standard system board comes with three processors: a central processing unit (CPU), a floating-point unit (FPU), and a digital signal processor (DSP). The CPU is a Motorola 68030 processor, and the FPU is a Motorola 68882 chip. These are the same two chips that are found in the Macintosh IIfx; however, in the
Next computer they run at a clock speed of 25 MHz, as opposed to a clock speed of 16 MHz in the Mac IIx.

The DSP is a Motorola 56001, a chip designed for the math operations specific to signal processing, speech and music synthesis, array processing, and other related operations. Average execution speed is about 12.5 million instructions per second (MIPS); the DSP can perform a fast Fourier transform (FFT), an operation common to engineering and scientific applications, on 1024 points of data in 3.2 milliseconds. The DSP has within it 256 bytes of instruction memory and 1024 bytes of data memory; in addition, it has 8K of fast (zero wait state) static RAM for holding both instructions and data.

As for main memory, the system board holds up to 16 megabytes, using 1MB Single Inline Memory Modules (SIMMs). Next says that once 4MB SIMMs are available, you should be able to expand the system to 64MB. A separate section of 256K is used for video RAM.

The system board has a number of ports along the back (see "Behind the Cube"), including the following:

- the video port (to the MegaPixel Display)
- the printer port (to the laser printer)
- the SCSI port, with a Mac-compatible pinout
- two RS-422 serial ports, with Mac-compatible pinouts
- an Ethernet connector
- a special port for communicating directly with the DSP

The SCSI port, while Mac-compatible, is capable of transfer rates two and one-half times that of the Mac. The serial ports are, according to Next, identical to those found on the Mac SE. Also, the Next system board has full 32-bit Ethernet hardware built in, with complete system support for it. All you need to network two (or more) Next cubes is the appropriate cabling.

One of the drawbacks of Macintosh architecture is that the CPU has to do just about everything, especially when it comes to moving data from one location to another. The Next system alleviates that problem in large part by using 12 I/O processors, implemented in one of the two large VLSI chips on the board. These processors handle transferring data between main memory and the other system components: video RAM, DSP RAM, serial ports, the SCSI port, the printer port, the optical disk drive, and so on (see "Next Hardware Architecture"). This is known as direct memory access (DMA) and lets the CPU go on to other tasks once the transfer has been started. The result, according to Next, is that devices can be transferring data into or out of memory at full speed, and the CPU will still have some 50 percent of its processing power left over for applications.

**Mass Storage Goes Optical**

Perhaps the most innovative—and certainly the most controversial—feature of the Next computer is its optical disk drive. It uses magneto-optical technology and has full read/write/erase functionality. The drive stores 256MB per disk, which means a single disk holds the same amount as about 328 Macintosh floppies, at 800K each (see "256MB to Go"). And since the disks are removable, you can have as many as you want, at $50 per blank disk. Seek time is about 92 milliseconds, meaning that it takes about 1/60 second for the drive to set up to read from a given sector on the
disk. This isn’t great speed; by comparison, the Mac II’s internal hard disks have a seek time of 30 milliseconds. However, transfer rate between the disk and main memory is about 1MB per second, the same as in the Mac II. One of the custom I/O processors handles the disk transfer, using DMA to free up the CPU.

The second VLSI chip on the system board is the Optical Storage Processor (OSP), which acts as disk controller for the optical disk drive and also performs Reed-Solomon error correction on the fly as data is coming in from the optical drive. Again, the CPU isn’t involved, which increases the overall system performance.

256MB to Go
A magneto-optical disk capable of holding 256MB of read-write storage. The disk itself is the same size as a compact disk and is enclosed in a self-opening plastic case, much like 3½-inch floppies.

The question that repeatedly comes up is: Why didn’t Next include some sort of floppy drive?

Two reasons, mainly. First, Next is pushing a number of new concepts—sound, high-resolution graphics, digital books—that require large amounts of storage. Floppy technology is advancing, but not fast enough. Winchester (hard disk) technology is also advancing, but is usually fixed in the system; if it does come out, it’s rather fragile. In fact, both types of storage are susceptible to head crashes and other types of damage, while the optical disk is never touched by anything but a beam of light.

Second, Next wants students to be able to carry their “world” in a backpack. A student can be working on one Next computer, pop out the disk, go across campus, and start working again—with his or her complete set of applications, files, and system configurations—on another Next computer. Likewise, several people can share the same Next computer (albeit at different times) with complete security, since each person has his or her own disk.

The question, mostly from software developers, is: How are software publishers going to distribute their products, especially if blank optical disks cost $50 each? Whether the use of the optical drive turns out to be a brilliant move or a dumb one won’t be known for some time, though a lot of people on both sides think they know the answer already: In the meantime, Next is offering internal Winchester hard disks for anyone who wants one, or for use in file servers. Two sizes are available: 330MB for $2000, and 660MB for $4000. But no floppies. Not yet, anyway.

A New Look in Laser Printers
The Next 400-dpi Laser Printer is quite a bit smaller than most laser printers, and has a short, straight paper path from the tray on the right to the tray on the left. The printer uses standard toner cartridges, can handle a wide variety of paper sizes and types, and prints at either 300 or 400 dpi. The former is Next’s equivalent of draft mode; 400 dpi offers almost twice the resolution of 300 dpi (160,000 dots versus 90,000 dots).

The printer is not included in the system’s $6500 price; it costs another $2000, which is still very inexpensive, given its quality and features. One reason for the low cost is that all imaging is performed within the Next cube, on the system board, as a separate process within the multitasking environment. Once the image is completed, one of the custom I/O processors blasts the bit image from main memory to the laser printer at some 5 megabits per second.

The printer is completely controlled by the Next computer. There are no lights or switches on the printer, just a power cord and a 3-meter cable connecting it with the cube. All signals, error messages, and so on, are handled through the user interface on the screen of the MegaPixel Display.

CD-Quality Sound

Sound has always been an afterthought on most computers, with only occasional exceptions like the Amiga. Even when the basic hardware is included, as with the Mac II, the software support is usually minimal, and it takes a system wizard to get anything impressive out of the machine.

Next’s approach was to make high-quality sound an integral, accessible part of the machine. The hardware is certainly in place: the 56001 DSP allows the Next to perform many advanced functions, including true real-time music synthesis, and a software-assisted implementation of FAX and modem functions, reducing the hardware required for the latter two.

The sound software is there, as well. Special libraries in the Application Kit make it easier to use
sound and music in programs, alleviating the need for the program to make direct calls to the DSP. More important, sound input is supported as well as output.

The sound output from the Next computer is, literally, CD quality: 44.1 kHz sampling rate, 16-bit resolution, and stereo. Since stored digitized sound files can get very large very quickly, you can step the sampling rate down to 22.1 kHz, cutting the size of a file in half while losing only the uppermost octave (which is pretty much out of hearing range anyway).

Sound input is telephone-quality and uses an 8-bit CODEC digitizing chip, with an 8 kHz sampling rate. This means that each second of digitized sound takes up about 8K of memory or disk space. A few of the applications bundled with Next take advantage of this hardware; for example, the Mail application has an option for sending voice mail. Remember, though, that a 10-second message takes up 80K of storage.

The MegaPixel Display handles all sound input and output. A speaker is built into the display; there are also left and right gold-plated RCA line-out sockets, as well as a Walkman-type stereo headphone socket. A monaural microphone socket provides input for the CODEC chip.

The Mach Operating System

The foundation of the Next system software is Mach, an operating system developed at Carnegie-Mellon University to help UNIX make it into the '90s. Current versions of UNIX tend to be a good idea grown to disastrous proportions and somewhat out of control. Mach was, in essence, a ground-up rewrite of UNIX, aimed at current and future hardware.

The heart of Mach is its kernel, which performs only three major functions. The first is virtual memory management. This is a technique, common to mainframes, that lets each application think that it has a very large memory space in which to work. Only a portion of memory is used; the rest of the application's "memory" is on the optical disk, being swapped in and out of true memory as needed.

The second function is scheduling, determining which application or task is actually being executed at any given moment. Since this is a true multitasking system, Mach needs to give each task some amount of time to work, in order to maintain several applications running simultaneously.

The third function is intertask communication, which provides a clean, fast, flexible means for tasks (applications and processes within applications) to send messages to one another. This is a key feature of the entire system, and its power shows up in many places, some of which we'll see later.

Built on top of the kernel is an operating system that is completely compatible with the 4.3 BSD (Berkeley) version of UNIX and that includes a fast filing system, TCP/IP networking capabilities, and the Network File Standard (NFS) protocols licensed from Sun.

Taking the Next Step

Mindful of the struggles of Mac developers who find themselves rendering images twice—once for the screen and once for the printer—Next decided to go with a single imaging model for its system: Display

The hardware architecture of the Next computer system uses 12 input/output, or channel processors, a concept used in mainframes like the venerable IBM 360. All external data from an Ethernet network, as well as the optical disk drive, SCSI hard disks, and other devices pass through the Integrated Channel Processor chip. Each channel processor has its own direct memory access path to the main memory.
PostScript. This special version of PostScript, developed jointly by Adobe Systems and Next, has been extended to support image modification (such as on a screen), compositing (merging or covering of overlapping images), and working in a multitasking environment. The breakthrough with Display PostScript is that you can use the exact same imaging commands for displaying and for printing. More important, what you see on the screen is truly what you get on the laser printer.

Wrapped around Display PostScript is a process called the Window Server. This is, in effect, the main event loop for every application in the system. The Window Server gets events from the mouse and keyboard, handles any events that it can directly, and passes the rest on to the appropriate application. The Window Server also accepts messages from applications telling it to modify the screen display, and performs any screen update handling that it can.

On top of all this is the Next user interface, called the Workspace Manager. I can't give you a lot of detail about it, since many features were not yet finalized when this article was written. However, it is a mouse/window/icon-type interface. Here are some of the highlights:

- pop-up, hierarchical, and tear-off menus, instead of a menu bar
- window controls that perform the same functions as those on a Mac, but that avoid the Mac's look and feel (too much so, in my opinion)
- an "icon dock" along the right edge of the screen for displaying the standard applications tools
- a black hole instead of a Trash Can for disposing of files
- a disk browser that enables you to quickly navigate the files and folders

Underlying all this is the Application Kit, Next's equivalent of the Mac's Toolbox. The Application Kit

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**Applications for Free**

"But wait—that's not all! If you order now, we'll throw in thousands of dollars' worth of software for free!" Sound familiar? Not since the introduction of the Osborne has a computer manufacturer offered this much software along with the hardware. The products being bundled include:

- **Mathematica**, from Wolfram Research. This product not only handles sophisticated and complex computations, it also comes (in the Next version only) with an "interactive textbook" user interface for development of mathematical courseware.
- **Sybase SQL Server** database management system, from Sybase. This is a complete relational database with full network support for up to five simultaneous users.
- **WriteNow**, the Next version of the popular entry-level word processor that runs on the Mac.
- **Allegro Common LISP**, from Franz, Inc. This version will provide full access to the Application Kit.
- **Digital Library**: This is a utility for indexing, searching, and retrieving text and graphics from online documents. Included on the Next master disk for use with Digital Library are: *Webster's Ninth New Collegiate Dictionary*, complete with pronunciation, etymology, definitions, and (in some cases) illustrations; *Webster's Collegiate Thesaurus*; *The Oxford Dictionary of Quotations*; William Shakespeare: *The Complete Works* (Oxford University Press edition); and all user manuals and technical documentation.
- **Mail**, a complete UNIX mail application, supporting both text and voice mail.

All those applications are not only there for each user; they can also be called by other applications, thanks to the generalized event/message handling of Mach and the Window Server. For example, WriteNow can ask Digital Library to look up and display the definition of a highlighted word. Likewise, you can have your own programs call Mathematica to perform computations (such as solutions of simultaneous equations) and then return the answer.

Several other firms, including Lotus, Frame, Cricket Software, Adobe, and Mark of the Unicorn, have announced plans for, or interest in, developing for the Next computer. The developers' introduction, held the day after the rollout, attracted a paying crowd of over 700 people; how many of those end up developing for the Next computer remains to be seen.
not only implements all the standard user interface features, such as windows, menus, buttons, and so on, but it does so in a way that greatly aids programmers, which I'll discuss shortly.

The Window Server, Interface Builder, Workspace Manager, and Application Kit together are collectively known as NextStep (see “Next System Software”).

Programming the Next Machine
Given the complexity of the Next system, programming it could be a real nightmare, as those who have developed programs on the Macintosh can imagine. However, after programming on the machine, I feel Next has taken an approach that tremendously simplifies and speeds the task of developing applications.

The first solution, already mentioned, is the Application Kit. It's a code library implementing a number of objects—windows, menus, controls, buttons—from which you can build an application. As you might guess, this means that the Next system uses an object-oriented programming approach.

As you develop new objects or extend old ones, you can make these part of your standard library and use them in other programs.

Programming can be done in Objective C, a full ANSI C compiler with some object-oriented extensions done via a preprocessor. This approach lets you mix normal C routines with defined (or predefined) objects, so you can use as little or as much of the Application Kit as you desire. Objective C was developed by the Stepstone Corporation; Next has included with it a source-level debugger and several other program-development utilities.
# Mac–Next Price Comparison

<table>
<thead>
<tr>
<th>Mac IIx A/UX Development System</th>
<th>List price</th>
<th>Consortium Price (approximate)</th>
<th>Next Computer System</th>
<th>List price</th>
<th>University Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>16-MHz 68030</td>
<td><strong>25-MHz 68030</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>FPU</strong></td>
<td>16-MHz 68882</td>
<td><strong>25-MHz 68882</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>DSP/sound</strong></td>
<td>Apple Sound Chip</td>
<td><strong>25-MHz 56001 digital signal processor</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>I/O processors</strong></td>
<td>none</td>
<td><strong>Integrated Channel Processor (12 direct memory access I/O processors)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Disk controller</strong></td>
<td>Integrated Woz Machine disk controller</td>
<td><strong>Optical Storage Processor (optical disk controller with error-correction code)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>8MB (4MB expansion kit)</td>
<td><strong>64MB</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>ROM</strong></td>
<td>256K (Toolbox, Mac OS routines)</td>
<td><strong>256MB 5/4 optical disk drive</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Removable storage</strong></td>
<td>1.44MB 3½&quot; floppy drive</td>
<td><strong>optional</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Fixed storage</strong></td>
<td>three 80MB hard disks (2 external)</td>
<td><strong>MB (diagnostics and boot code)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Serial ports</strong></td>
<td>RS-122 with Mini-8 connector (2)</td>
<td><strong>2640</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
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<tr>
<td><strong>SCSI ports</strong></td>
<td>DB-25; internal</td>
<td><strong>DB-25; internal</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Other ports</strong></td>
<td>Apple Desktop Bus (2)</td>
<td><strong>DSP, video, printer</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Sound output ports</strong></td>
<td>speaker, headphone</td>
<td><strong>microphone port, 8-bit 8kHz CODEC chip</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Sound input ports</strong></td>
<td>none</td>
<td><strong>4 slots (3 available): 11&quot; x 11&quot; cards</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Slots</strong></td>
<td>6 slots: 4.0&quot; x 12.9&quot; cards</td>
<td><strong>25-MHz modified NuBus (CMOS)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Bus</strong></td>
<td>10-MHz NuBus (bipolar)</td>
<td><strong>1132 x 820 pixels, 92 dpi, 4 gray levels</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>640 x 480 pixels, 72 dpi, 16 gray levels</td>
<td><strong>$898</strong></td>
<td><strong>Mach (BSD 4.3 compatible)</strong></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Keyboard</strong></td>
<td>81 keys</td>
<td><strong>$625</strong></td>
<td><strong>Display PostScript (all devices)</strong></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Mouse</strong></td>
<td>1 button</td>
<td><strong>84 keys</strong></td>
<td><strong>Application Kit, Music Kit, Sound Kit, and Array Processing Kit</strong></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Networking</strong></td>
<td>Network File System, Mac II EtherTalk board</td>
<td><strong>$490</strong></td>
<td><strong>Workspace Manager, UNIX shell</strong></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Operating system</strong></td>
<td>A/UX (AT&amp;T System V compatible)</td>
<td><strong>Mach (BSD 4.3 compatible)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Imaging models</strong></td>
<td>QuickDraw (screen, dot matrix printer)</td>
<td><strong>Display PostScript (all devices)</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Libraries</strong></td>
<td>Mac Toolbox</td>
<td><strong>Application Kit, Music Kit, Sound Kit, and Array Processing Kit</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>User interface</strong></td>
<td>UNIX shell</td>
<td><strong>Workspace Manager, UNIX shell</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Bundled software</strong></td>
<td>HyperCard, UNIX utilities and tools</td>
<td><strong>Mathematica, SYBASE SQL database, Mail, Objective C, Interface Builder, WriteNow, UNIX utilities and tools, the Digital Library</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
<tr>
<td><strong>Total price</strong></td>
<td>$18,375</td>
<td><strong>$11,045</strong></td>
<td></td>
<td><strong>not available retail</strong></td>
<td><strong>$6500</strong></td>
</tr>
</tbody>
</table>

To compare apples to apples, you must compare the price of the Next computer to Apple's University Consortium prices. Because the Next machine will be sold only to universities, no retail price for that machine is given. Items shown without prices are included in the system.
There's an even easier way to program, though. Interface Builder, a remarkable utility written by Jean-Marie Hulloc at Next, lets you build the user interface for a program by arranging objects (such as windows, buttons, menus, and so forth) together in graphical form. It even lets you connect objects (such as sliders and buttons to fields) to one another. And once you're done, it will (at your request) generate full Objective C source code, as well as a makefile to compile it. You can then add in the main routines of the program, filling it out as needed. And as you create your own objects, you can use them within Interface Builder, too.

The combination of these three tools—the Application Kit, Objective C, and Interface Builder—significantly increases programmer productivity and reduces programming time. This isn't just according to Next. I've actually programmed using an early prototype of the development software, porting a simple version of my Go board program from the Mac to the Next, and I was amazed at how quickly and easily I brought it up. Given the current state of these tools, I know I could accomplish it in even shorter time.

**Survival of the Fittest**

When Apple announced the Macintosh IIx, with its 16-MHz 68030 and its $10,000 price for a system with no monitor or printer, common wisdom in the industry was that this was to preempt the impact of the Next computer. If anything, the IIx served to heighten the impact. In fact, the entire Apple price increase was a generous gift to Next; with higher DRAM prices, the base price of the Next computer had undoubtedly been pushed up from where Next wanted it.

"Mac—Next Price Comparison" shows an attempt to equip a Mac IIx to the level of a Next system, using only Apple equipment. Both list and consortium prices are given for the IIx. There are some obvious gaps—no DSP, no optical disk, no large-screen display, and most of all, no software bundled with the machine—so you can adjust the price upwards to include these items on your own. As you can see, even at consortium prices, the Mac IIx can't compete with the Next system.

As far as features go, the Next computer has it over the Mac IIx (not to mention the rest of the Mac product line) in almost every area. The one area where the Next machine falls short is in the availability of third-party software, but then the Macintosh also started with a similar handicap. On paper, the Next computer has more raw power; whether or not Mach and Display PostScript slow that down to something closer to Mac performance remains to be seen.

Steve Jobs has a good industry track record: two successes out of three attempts, with the one failure (the Lisa) spawning the greater success (the Mac). The ultimate test of the Next computer's fitness is not its personal survival, but its impact and influence on the rest of the industry—its genetic heritage, so to speak. In that regard, Jobs and the other folks at Next have already succeeded; moments after its introduction, the Next computer became the new standard against which competing systems will be compared, and it or its progeny may replace the Mac II (or its progeny) as the power user's system of choice. Whatever the outcome, the true winners will be you, the users, who will have more choices and better solutions.

As a friend once said, think of it as evolution in action. □
A Folder of File Servers

Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.

—Samuel Johnson

by Dave Kosiur

A Macintosh network is a wonderful thing for sharing peripherals, trading data, and exchanging electronic mail. One of the fundamental building blocks of the Mac network is the file server. The file server controls access to files on a network—how you exchange data files, share multiuser databases, or even share applications.

Since the introduction of AppleTalk in 1985, the number of major players offering file servers has grown to four: Apple, TOPS (formerly Centram), 3Com, and Novell. Their respective Mac products—AppleShare, TOPS, 3+Share, and NetWare—support not only Macs, but IBM PCs and PC clones too. 3Com is working on a new server system, 3+Open, that will also support PCs and the Mac. But Mac-compatible file servers aren’t limited to running on just Macs and PCs. As you’ll see, they’re also making their mark on departmental minicomputers and corporate mainframe computers.

The Way You Work

Every network depends on the cabling that links the workstations, servers, printers, and other devices to form the physical net. Yet, from a user’s point of view, it shouldn’t matter whether LocalTalk twisted-pair wire, Ethernet coaxial cable, or fiber-optic cable tie those pieces together. What should matter is the logical structure of the network. Your net’s logical structure should reflect the way you and your coworkers work together (see “Before You Choose”).

Workers interact in different ways depending on how a company is organized, or on how various workgroups within one company are organized. This fact underlies one of the most important differences in the design philosophy of Mac file servers. On the one hand, there’s the machine-centered viewpoint, adhered to by centralized servers from Apple, Novell, and 3Com. On the other hand, there’s the user-centered view, espoused by TOPS in its distributed server software.

Centralized servers store all of a workgroup’s files on one machine. You could consider a centralized server as an extension of the typical organization of a company where one person (machine) is responsible for collecting and storing information for others, and for passing information to others. It’s a natural extension of most companies’ management structure—natural, at least, to the managers—with roots dating back to MIS departments and the mainframe computer. You’ll probably find that workgroups with an active coordinator, project leader, lead secretary, or department head fit well into this structure, which is reinforced by a centralized server.

Distributed server systems spread the wealth around. Users of such systems keep their files on individual machines, rather than on one single computer. You may have worked in a group where everyone works as an equal toward a common goal, without supervision from one particular individual. The distributed server attempts to conform to the type of interactions found within such a workgroup. TOPS claims that, in such cases, “information flows between individuals in a free, spontaneous, unfiltered manner without the intercession of a hierarchical structure.”

Dave Kosiur, a Macworld contributing editor, is the publisher of Connections, an international newsletter concerned with Macintosh networking.
Meet the Players

Every server uses some type of operating system to handle file access for its disks and to communicate with the outside world—the network via network protocols (see “Layer Cake”). In the case of AppleShare, it’s the Macintosh operating system. TOPS uses either the Mac operating system or MS-DOS, depending on the machine.

Novell has developed its own proprietary operating system that, when coupled with its NetWare services (file services, print spooling, and E-mail), forms a network operating system. 3Com added its own family of network services, called 3+, to standard MS-DOS to create the 3Com network operating system; the company is using Microsoft’s OS/2 LAN Manager and OS/2 as the basis of its new network operating system, 3+0pen.

AppleShare

AppleShare is Apple’s entry in the file server market. With it, you can turn a Macintosh with up to seven SCSI hard disks

Before You Choose

Before you select your server, analyze the way in which your workgroup or company operates. It’s worth the effort. Compare your working habits—real or desired—with the features of each of the servers. In his book Corporate Networking (Free Press, 1986), Robert K. Mueller, the former chairman of Arthur D. Little, offers some steps for designing a network.

- Clarify the network’s purposes.
- Take an inventory of your own resources, such as knowledge, contacts, and so on.
- Identify needed resources unavailable locally.
- Select a suitable network structure.
- Assess what kind of networking each person in the network will be.
- Decide which networking process will be most effective.

Mueller was writing about people in his book, not computers, but these steps are just as pertinent to setting up a computer network. After all, it’s the people, not the computers, who are going to use the network.

Layer Cake

Novell, 3Com, Apple, and TOPS all use an operating system to control the computer that acts as the server. For example, Apple uses the Mac operating system, because of its distributed nature, TOPS can use either MS-DOS or the Mac operating system. Network protocols like APP are layered on top of the operating system to handle network access to files on the file server.
into a centralized file server—enough storage space to keep almost anyone happy. It was the first server to use Apple's AppleTalk Filing Protocol (AFP), the protocol Apple now advocates as the standard for supporting Macs on networks (see "AFP ABCs").

An outstanding feature of AppleShare is its method of controlling file access. Access is granted by folder, not by individual file. As users join the network, they are assigned to groups; file access privileges for a given folder can then be assigned as read-only or read-write for an individual, a group, or everyone. This form of access control, however, can cause some problems in the smooth operation of AppleShare. You need to remember which groups you and fellow workers belong to in order to access files. AppleShare offers no online facilities to help you get such information.

It's also worth noting that the same AppleShare folder-security information can cause problems with some backup programs. If you back up files from an AppleShare server to a disk on your own Mac, you may have to reassign the access privileges to folders after you've restored them to the server. This is obviously a nuisance. SuperMac's Network DiskFit is one of the few backup programs I know of that retains an AppleShare folder's access privileges.

Until recently, AppleShare didn't allow you to make administrative changes (adding users or groups, for example) to the server unless you disconnected it from the rest of the network. The release of AppleShare version 2.0 last September solved most of these problems. You can now add and subtract users and groups while the server is operating, and users can change their own passwords, rather than relying on the AppleShare administrator to do it.

With Apple's AppleShare PC software, PCs can access AppleShare files too. AppleShare PC runs over all the AppleTalk add-in boards for the PC, available currently from Apple, Daystar, and TOPS. Files on the server have multiple file names, one for each compatible operating system (Mac, MS-DOS, ProDOS). As the end user, you only see the file name appropriate for your computer.

TOPS

TOPS was actually the first file server software for Macs and PCs, released even before AppleShare. Since then, it's been extended to other computer systems such as Digital Equipment Corporation's VAX, and UNIX workstations from Sun Microsystems. TOPS is also the only distributed file server available for the Mac.

Because TOPS is a distributed server, there's no need to dedicate one machine as the file server to users on the network. Instead, every computer running TOPS becomes a server. You decide which files you will make available (publish) to the rest of the network. Anyone else using TOPS can then access (mount) those files. In the meantime, you can mount files from Macs or PCs so long as those files have been published to the network by their owners. It's definitely a situation of "share and share alike."

TOPS uses its own TOPS Filing Protocol (TFP) to access the filing system and the network. TFP is a completely different protocol from Apple's AFP and TFP runs at the Mac's system software level to provide the TFP interface and file information to users. Because TFP doesn't use AFP, its display is different from AppleShare's display. For example, you must use TOPS's own DA, not the Chooser, to navigate through your network and display servers. That being said, though, publishing and mounting files in TFP is just as easy as using any of the other servers.

Equipped with an AppleTalk interface board, PCs can also use TOPS to share files with other systems. If you want to access TOPS servers on Ethernet, however, you'll have to keep the PC on a LocalTalk network and use an Ethernet bridge, like the Kinetics FastPath, to connect to Ethernet.

Motorola's 68000/88000 Microprocessor Group in Austin, Texas, uses AppleShare to exchange information among designers, application engineers, and technical marketers.
**AFP ABCs**

Apple's creation of the AppleTalk Filing Protocol (AFP) is a crucial step toward simplifying access to file servers. AFP attempts to extend the file-handling features (icons, folders, and so on) from the local Mac desktop to networked file servers. Recognizing that other systems will coexist with Macs on networks, Apple also designed AFP to make files available to other operating systems. AFP now supports Macs running the Hierarchical Filing System (HFS), PCs running MS-DOS, and Apple IIIs using ProDOS.

When a program requests a file, it issues *native* file system commands; that is, commands understood by the operating system of the computer it's running on. If the file resides on the computer's local disk, the native file system handles the request commands. If, however, the request commands refer to a file located on a server, commands are routed to a translator within the computer. The translator then deals with the network and the server to deliver the desired file to the computer.

Apple makes a distinction between these two types of request activities in AFP. The local file system and its services are called the Native File Interface; the interface between the translator and the network is called the AppleTalk Filing Interface (AFI). Because of the way the translator issues AFP requests to a file server, AFI is completely transparent to a user. Once an AFP server is identified by your program, requests for files from that server can be handled without your intervention. You ask for the file, and you get it—whether it's on your computer or on the network server.

TOPS's flexible, distributed approach does present a problem, however: you are at the mercy of the person who owns the volume you've mounted. There's nothing to stop someone from crashing a Mac; with say, beta software, while you're using that person's published files. You could lose whatever changes you had made to your file since the last time you saved it. Worse yet, a file may be corrupted by the owner's crash and, in turn, will cause your Mac to crash the next time you open that file. Conversely, should you attempt to shut down your computer while someone's accessing your files, you can still turn off your Mac without warning other users—despite a warning from TOPS that others are using your files.

**3+Share and 3+Open**

Founded by some of Ethernet's original architects, 3Com offers stand-alone, centralized servers for PC local area networks (LANs), as well as interface boards that physically connect PCs to network cabling. The company's current server software, 3+Share, supports Macs on both LocalTalk and Ethernet, and PCs on Ethernet.

3+Share can only use 3Com's own 3Server systems—based on IBM PCs and clones—as the centralized server. So even if you have a Mac-only network, you must have a PC to install and configure the 3+ software and to back up the server. The 3Server does come with a serial port so that you can connect a LaserWriter or other PostScript printer to it; you can use the server to spool print jobs destined for the printer. The 3Server cannot spool jobs for LaserWriters that are part of a LocalTalk network.

The 3+ system allows you to group users and network resources (called *domains*) by name, within a hierarchical structure. For instance, you can assign resources to workgroups based on the workgroup's organizational function or location—Finance or Sales, Los Angeles or Boston. You don't need to know anything about the net's physical connections, just the name of the resource you want to access.

Although domains can be used on both single-server and multiserver networks, the names of the domains are stored in one centralized network database called the Name Server. What do you do when the computer containing that name server crashes? 3Com doesn't have an answer. You can have multiple name servers on a network; however, those servers don't automatically update each other. Instead, the network administrator must ensure that each name server has the correct entries.

3Com's new network system, 3+Open, is based on Microsoft's OS/2 LAN Manager. There is a reason for the *Open* in 3+Open's name. With the proliferation of different desktop computers and operating systems, many vendors are developing net-
work software that allows them to layer various network protocols over their own base software, or kernel. This enables a vendor to network with several other computers while maintaining a kernel specific to its own server hardware, in 3Com's case, the PC. 3+Open utilizes this layer concept.

Initially, 3Com installations will have to maintain 3+ and 3+Open servers side by side to support both Macs and PCs. Macs are stuck with 3+ software for the time being; the company doesn't plan to release any 3+Open software for Macs until the end of 1989. When 3+Open for the Mac does become available, it will support AFP in addition to Apple's Printer Access Protocol (PAP) for communications with LaserWriters and similar PostScript devices. A word of advice: If you plan to use 3+Open to connect Macs and PCs in the immediate future, be sure to get the Advanced Level version of the software. Advanced Level 3+Open can support Macs because it can communicate with 3+ servers. 3Com's Entry Level 3+Open system is designed to support only PCs.

**NetWare**

Novell and 3Com have been fighting it out as major rivals in the PC networking market for quite some time. Now that Novell supports Macs with NetWare operating system software, expect the competition to spill over into the Macintosh market as well.

Like 3Com, Novell designed its network operating system in a layered fashion, calling it Open Protocol Technology. The NetWare server can support other computers—PCs running MS-DOS, PS/2s running OS/2, and Macs running AppleTalk—by layering those protocols over the core NetWare protocols. You can also use NetWare to link different kinds of networks together, for example, IBM's Token-Ring LAN.

Novell's support of AppleTalk protocols, especially AFP, means that you can access a NetWare server with Apple's standard AppleShare client software (distributed with System 6.0). Since Novell offers more security and accounting options on its NetWare servers than AppleShare does, NetWare for the Mac also includes its own disk accessory to allow Mac users to view and modify the added features of a NetWare server. Some of these features include restricting log-ons to certain days and times, specifying an account expiration date, and restricting the amount of disk space per user.

A NetWare server appears as an AppleShare server within the Chooser. If the server has a LocalTalk interface board, it can also act as a print spooler for the LaserWriter, enabling Mac and PC users to share the printer. Programs you run can determine which type of printer they will print to; you can intermingle both PostScript and nonPostScript (Diablo 620) print jobs in the print queue. Macs can print either to NetWare's spooler or directly to a LaserWriter on the network.

With the current version, you need at least two PCs to create a NetWare system that supports Macs. One PC acts as the server machine; you attach the server hard drives to it, install the appropriate interface board (Ethernet or LocalTalk, for example), and load the NetWare software onto it. You need the second PC to perform administrative functions, such as configuring user accounts and controlling backups. NetWare 2.15, the first version of NetWare to support Macs, won't extend these administrational functions to Macs. If you want to use a Mac as a network administration machine, you'll have to wait for a later version of NetWare.

**Follow the Leader**

Apple strongly promotes the AppleShare interface and underlying AFP as the standard way to support Macs on networks. Should your network consist of several servers from different vendors, you can access them all with your Mac's AppleShare client software, so long as those servers conform to AFP specifications. For example, you can access both an AppleShare server and a NetWare server with AppleShare client software.

This standardization of AFP as the Mac file-service protocol has definitely influenced companies' network-development plans. Novell, a latecomer in announcing Mac support for its network, decided to wholeheartedly support AFP, thereby leapfrogging 3Com's 3+ operating system.

3Com initially merged support for Macs within 3+ on its own terms, opting to concentrate on the Xerox Network Service (XNS) protocols that are the basis of 3Com's network. Although a Mac client's interface to a 3+ server uses the Chooser, it looks different from the AppleShare client interface. However, 3Com's decision to support AFP in its 3+Open software later this year will make its servers accessible by AppleShare client software.

Support for AFP and AppleShare extends even beyond PC-based servers to DEC VAX minicomputers. Alisa Systems' AlisaShare and Pacer Software's PacerShare, which offer varying degrees of AFP compatibility, enable Macs to access the
VAX as a file server using AppleShare client software.

TOPS, of course, is the notable exception to this AFP trend. It is not AFP-compatible, but it can coexist with AFP-compatible servers on a network. But once TOPS and Sun (TOPS's parent company) merge the TFP with Sun's widely accepted Network File System (NFS) protocols, AFP could have some major competition. NFS already provides transparent file sharing in networks of computers and operating systems from a variety of vendors, including IBM, Sun, DEC, Apollo Computer, Hewlett-Packard, and even Apple (for its A/UX operating system).

**Choices, Choices**

Unless you already have a file server system in place, the field is wide open for selecting a server (see "Services Galore"). Apple and TOPS started out from a Macintosh point of view. Now the PC-based players, 3Com and Novell, have embraced the Mac too. You can see representative networks for each file server system in "Configuration Options."

But it's important to remember that if you're looking for a single file-server package (and you're considering future networking needs such as E-mail), your choices are still greatly affected by the corporate philosophy of the vendor.

Apple relies on AppleShare as its file server software. A separate package, the AppleShare Print Server (formerly LaserShare) provides LaserWriter print spooling for networked users, but only if a Mac is the server. Macs come with built-in AppleTalk support. However, you'll have to shop for a LocalTalk adapter board for any PCs that are part of your network. You must look to third-party vendors for services more complex than file servers and print spooling—for example E-mail or remote access. Similarly, using another machine (such as a VAX or PC) as an AppleShare server also depends on third-party products.

If network speed is important, for example, Apple offers an Ethernet controller board for the Mac II—but not for any other type of Mac (see "The Ethernet Solution," Macworld, January 1988). Dove Computer, 3Com, and Kinetics offer Ethernet controller devices for the entire Mac line. Bear in mind that AppleShare PC currently cannot be used directly over Ethernet, so an AppleShare server running on Ethernet can only be used by other Macs. PC users running AppleShare have to content themselves with a bridge between their LocalTalk network and Ethernet.

TOPS also provides a limited selection of network services, offering file server and print spooler software for both Macs and PCs, as well as hardware for PCs. As you might expect, the print spooler software (shipped standard with TOPS) also follows a decentralized approach. If you want to use a UNIX or VAX computer as the TOPS server, you can purchase the appropriate product from either TOPS or a third-party. TOPS can link Macs, UNIX workstations, or VAX computers over Ethernet, to use Ethernet, PCs must run on a LocalTalk network and be connected to an Ethernet bridge like Kinetics' FastPath.

Perhaps the most comprehensive systems for networking are those from 3Com and Novell. Each offers services other than file servers and printing, in addition to features such as fault-tolerance (see "Crash Recoveries"). In both cases, it makes more sense to consider 3+Share and NetWare as a way to link Macs into existing company networks of PCs than as systems for networking only Macintoshes. Apple's support of 3Com and Novell is more a part of Apple's goal to connect to many other types of computers than it is an attempt to provide networking alternatives that compete with Apple's own AppleShare software.
## Services Galore

<table>
<thead>
<tr>
<th>Product and version</th>
<th>3+ for Macintosh 1.31</th>
<th>AppleShare 2.0</th>
<th>TOPS/Macintosh 2.0</th>
<th>NetWare</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
<td>3Com</td>
<td>Apple Computer</td>
<td>TOPS</td>
<td>Novell</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>$495 per server</td>
<td>$799 per server</td>
<td>$189 per user</td>
<td>$200 per site</td>
</tr>
<tr>
<td><strong>Additional components required:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server hardware</td>
<td>3S/200, 3S/400 server</td>
<td>Mac Plus, SE, or II; hard disks</td>
<td>none</td>
<td>PC and hard disk</td>
</tr>
<tr>
<td>Administrative hardware</td>
<td>PC</td>
<td>Mac</td>
<td>n/a</td>
<td>PC</td>
</tr>
<tr>
<td><strong>Server implementation:</strong></td>
<td>Dedicated hardware server</td>
<td>Dedicated Mac server</td>
<td>Distributed server</td>
<td>Dedicated hardware server</td>
</tr>
<tr>
<td>Mac required</td>
<td>n/a</td>
<td>Plus or higher</td>
<td>512 or higher</td>
<td>Y</td>
</tr>
<tr>
<td>AFP compatible</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>AFP compliant</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Network capacity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of workstations</td>
<td>31 per LocalTalk Network</td>
<td>50</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td><strong>Client Macs supported:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>512KE</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Plus</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Mac II</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Other clients supported:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM PC</td>
<td>Y</td>
<td>with PC AppleShare</td>
<td>with TOPS/DOS 2.0</td>
<td>Y</td>
</tr>
<tr>
<td>Sun</td>
<td>N</td>
<td>N</td>
<td>with TOPS/Sun software</td>
<td>N</td>
</tr>
<tr>
<td>DEC VAX</td>
<td>Y</td>
<td>1</td>
<td>UNIX 4.2 or 4.3 BSD</td>
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</tr>
<tr>
<td><strong>Security:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log-on passwords</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>User-alterable password</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Folder-level passwords</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Folder access privilege</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
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<tr>
<td><strong>Server features:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online management</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Node-independent manager</td>
<td>Y</td>
<td>N/a</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Shut-down message to users</td>
<td>N</td>
<td>Y</td>
<td>N/a</td>
<td>Y</td>
</tr>
<tr>
<td>Back-up software</td>
<td>Y</td>
<td>with hard disk backup provided by Apple</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Pre-scheduled backup</td>
<td>5</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td><strong>Print spooling:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spooler included</td>
<td>Y</td>
<td>6</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Centralized spooler supported</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Local supported</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>n/a</td>
</tr>
<tr>
<td>Maximum no. of printers</td>
<td>2</td>
<td>8</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

1 With AppleShare or PacerShare. 2 Only person posting folder can change password. 3 With administrator floppy. 4 User warning that file is being accessed on network. 5 Only with Tape Option, $1895. 6 LaserShare is available as an added program from Apple for $299. 7 Additional port expansion board can be purchased for $525 adding 1 parallel and 4 servers. 8 LaserShare allows spooling for one LaserWriter per server. 9 Practical limit set by administrator.
Configuration Options

Shown here are examples of networks that can be configured with each of the four file servers. Novell, 3Com, Apple, and TOPS all support Macs connected with either LocalTalk or Ethernet. Other computers, such as PCs, VAXes, or UNIX systems, can also be supported by some of the file servers. 3Com and Novell also offer direct support for other LANs, such as Token-Ring.

Key to cables used:
- LocalTalk
- Ethernet
- Token-Ring
- RS-232
Crash Recoveries

Fault tolerance is a feature that has been offered only recently in network systems. A 1985 study by Tandem Computers found that while 45 percent of all network faults were caused by administrative (human) errors, disk failures accounted for 7 percent of all network faults; power failures caused another 9 percent.

Network fault tolerance is a method for ensuring data integrity, should there be a power failure or a disk crash. There are three types of fault tolerance: track mirroring, when files are copied to more than one disk cylinder; disk mirroring, when files are copied to more than one disk drive; and server mirroring, when parallel servers receive all files, monitor each other, and transfer services automatically should a failure occur.

Both 3Com and Novell offer fault tolerance in different forms for their high-end server systems. 3Com currently provides methods for both disk and server mirroring, and recently made arrangements for third-party support of uninterruptible power supplies (UPS) for their servers. Novell's System Fault Tolerant NetWare includes track mirroring, drive mirroring, and server mirroring, in addition to a Transaction Tracking System. This tracking system allows you to recreate database entries and preserve database integrity in the event of a crash.

You should consider the importance of fault tolerance for your file server, taking into consideration your own experiences and your work environment. In the long run, the value of your data could easily make the added expense of a fault-tolerant system pay for itself.

3Com includes file and print services as basic components of its server, in addition to offering an Email package with links to larger international electronic mail systems, such as MCI Mail. Called 3+Mail, the software can also be linked to standard corporate mail systems, such as IBM's PROFS. 3Com's 3+Remote allows network access from remote PCs; 3+Net Connect links Ethernet and Token-Ring LANs to the network. Novell also offers a mail system, and there are gateways available to link NetWare to other LANs.

If you plan to go beyond just file and print services, the products from Novell and 3Com deserve a look. NetWare and 3+ can be especially appealing if you're working in a heterogeneous environment of Macs and PCs, and you require connectivity to other, larger machines within the company. Just don't expect each system to have nice implementations of the Macintosh interface for every part of the package.

Building Blocks

File servers like AppleShare, TOPS, 3+Share, and NetWare are only the first step in the evolution of productive networks. That's because they provide the means for controlling access across a network. Multiuser databases such as Omnis 3Plus, FileMaker II, and 4th Dimension already use AFP to control access to a file's data at its byte and record levels.

A new type of Mac application just becoming available will also depend heavily on file servers. Whether you call it computer-supported cooperative work, groupware, or distributed network computing, this type of program will run over networks and permit users to work together on a series of files. And like multiuser databases, network applications will take advantage of the file access controls, not to mention storage space, already provided by file servers.

Currently, you have to actually generate a request for a file to be opened on a server in order to use it. Most servers operate on a client-host system. There's little doubt which machine has control of the file, and you have to find that file yourself.

In the future, however, software will take greater advantage of network operating systems. Working in a completely transparent network, you won't know (or care) where your files are.

One step toward this goal of network transparency is the standardization of server access protocols, which makes it easier for applications to interact with the file server. With the acceptance of Apple's AFP by server developers such as Novell, 3Com, and DEC, applications such as Email and groupware will run over a network connecting a variety of computer systems, not just Macs. Similarly, as TOPS and NFS merge into one system, NFS-compatible applications will offer competition to AFP-compatible applications. As the user, you stand only to gain.

See Where to Buy for contact information.
In 1988 Apple chairman and CEO John Sculley made between two and three million dollars. Asked by an interviewer if he thought he'd be at Apple five years from now, he earned a World-Class Award in the Understatement category by replying that he had "nowhere better to go."

Actually, the whole computing community has nowhere better to go. For business software, graphics, music, scientific applications, and even video, the Macintosh is the most exciting game in town. Even at IBM, the main "news event" of the year was the introduction of its cumbersome Mac-imitation interface, OS/2.

A look at sales sheets shows that Apple executives are worth their lavish salaries. Hardware earnings are now over a billion dollars a quarter. The Mac II is performing according to goals—accounting for 15 to 20 percent of Macs being sold. And 1988 was the year when the more upscale SE finally overtook the Plus as the Mac line's best-seller.

Worms in the Apple

Although business boomed at Apple, not everything the company did during the year went according to plan. One of the year's big announcements, for example, may or may not yield a significant income. Apple's January proclamation of a long-term strategic alliance with Digital Equipment Corporation cheered all of us who believe the world should have an alternative to IBM. But by midyear DEC executives had begun to perceive just how capable the Mac II is of competing in the engineering-workstation market DEC had marked out for its MicroVAX "desktop solution."

This strategic infelicity apparently persuaded DEC to rethink its enthusiasm for cooperating with Apple, and by autumn DEC-watchers noticed that the flow of happy press releases about the alliance had slowed to a trickle.

Another questionable venture is Apple's entry into the UNIX market. A/UX didn't do much for the UNIX universe or for the Mac world last year, in spite of sometimes frantic press activity. As it stands, you can't use most Mac applications under A/UX, and the icon interface that's supposed to give users easier access to the power of UNIX isn't quite there yet. On the other hand, no other scheme is likely to make UNIX palatable to the masses, so there's a market there if the right Mac products can be developed.

And then there's the story of Apple's curious lawsuit over the Mac's user interface. As Bill Gates observed, "It's like two guys living across the street from a mansion. When they try to break into the place at the same time, one of them complains that he thought of doing it first." Apple apparently believes that it swipe the windows/menus/mouse scheme from Xerox fair and square, and that somehow no one noticed.

The graceful thing would have been to let OS/2 and Presentation Manager sink under their own weight (this Mac-alike operating system takes up most of a

In five years of Macintosh watching, Charles Seiter has had the unsettling experience of seeing his most exaggerated and facetious predictions all come true.
20MB hard disk all by itself), and to let Hewlett-Packard’s New Wave enjoy its own small market share.

The whole affair seems like the sort of corporate legal bungling one associates with IBM, and in some circles it has made Apple appear a less attractive business associate. Surveys show that 85 percent or so of Mac users thought the suit was a bad idea.

Inside Apple, the roles of the players shuffled considerably in 1988. Apple set up a special government marketing unit, put overseas marketing on a more independent footing, and settled in for a long campaign in corporate offices. Jean-Louis Gassée held no fewer than three titles during ’88, finishing the year as president of the Apple products division, in charge of marketing, research and development, and worldwide manufacturing. Asked to describe Apple in the 1990s, Gassée replied, “Apple will be even more fun.” It will be for him, anyway.

Hype-R-Card
Apple held a splashy first birthday party for its favorite young prodigy, HyperCard, featuring proud parents reminiscing about the act of creation. If everyone upgrades to 4MB, HyperCard could become the all-powerful, low-cost dream-DA-plus-interface of the future. But in 1988, despite furious development of nifty stacks, HyperCard was still most often used as sort of a bulky database with limited internal searching and reporting features.

Even developers with a longstanding interest in low-priced software don’t have many uses for HyperCard. Asked in a French magazine interview if Borland would someday be developing stackware, Philippe Kahn gave a characteristically frank answer that translates as something between “No way, José” and “You’ve got to be kidding.”

Memory Madness
As the result of some Reagan administration trade policy efforts that may be charitably described as mistaken, the price of memory rose 150 percent. This was outstandingly bad news for software developers who, having seen prices drop for several years, figured that 1-megabyte SIMMs would soon drop below $100, opening the door for large, feature-rich programs. Although it is widely assumed that prices will start to edge down in 1989, the high-priced-RAM era may be starving out the prospects of some of these programs.

Furthermore, there is no law of physics that dictates ever-declining chip prices: these emerge from a type of cutthroat competition that the big RAM makers may, like the cooperative gentlemen they are, decide is undignified and unnecessary.

The Spread
Spreadsheets remain, with word processors and page-layout programs, among the most popular Mac applications. And Microsoft remains master of the spreadsheet market. Microsoft Excel has been one of the top three Macintosh programs for the last three years, with an estimated 85 percent of the spreadsheet market. That’s bad for other spreadsheet developers, but what’s even worse is that Microsoft Multiplan owns a big chunk of the other 15 percent—and Microsoft Works is a best-selling program as well.
Modern Jazz, Ancient History
Among the year's discouraged developers was Lotus, which finally abandoned Modern Jazz in July. As demonstrated at Macworld Expo last January, Jazz was already a large program. One suspects that it ended up as a monster that demanded gobs of memory and a 68020 for acceptable performance from its spreadsheet.

So Lotus decided to forego the uphill battle of selling Jazz to the corporate Mac II elite and is now pinning its Mac hopes on a version of Lotus 1-2-3.

Battle of the Titans
Undaunted by the fate of others, software giants Ashton-Tate and Informix challenged Microsoft with new feature-packed spreadsheets. Full Impact, Ashton-Tate's spreadsheet bid, offers advanced text-and-layout capabilities reminiscent of Trapeze (not a spectacular market success). It handles huge spreadsheets—up to half a million cells—and includes macro capabilities beyond those in Excel 1.5.

Presumably Informix has been studying the efforts of Microsoft, Lotus, and Ashton-Tate with keen interest. Widely known to Macworld Expo-goers as a leading purveyor of free luggage and cheap thrills, the company was promising, as this article went to press, to finally release its powerful but supposedly easy-to-use spreadsheet, Wingz, by year's end.

“IT'S SO QUIET IN THE HALLS AT APPLE, IT SCARES ME.”
—BILL GATES ON THE CHANGES AT APPLE

by Ashton-Tate from Ann Arbor Softworks, and finally—a mere two years after it was announced—shipped in August. It has features that go fairly far into page layout. Why people would want to gum up their word processors with DTP features is beyond me; it's yet another example of how integrated programs are a neat way to do more than one thing poorly. In addition, all this "power" means that the program really needs a Mac II, or an SE or a Plus with an accelerator, for acceptable performance.

The only word processor really generating much in the way of sales aside from Word, WriteNow, finally made it to version 2.0 late in the year. The new release brings file translation into the program itself and includes a beefier dictionary and a mail merge function.

MacWrite distinguished itself by being the only major word processor still unable, despite several upgrades, to handle multiple windows.

All the Bases
Despite lively interest in 4th Dimension over the year, high-end database programs for the Mac haven't been spectacular sales hits. Somehow, developers and the press perceive a need for all-powerful, fully programmable relational databases, while the majority of users perceive a need for something they can learn easily and use to manage modest mailing lists. Hence the success of the only Mac database that is selling well, FileMaker, which now sports a Claris label.

dBase Mac's sales for 1988 were not a source of great cheer to Ashton-Tate. Blyth Software, developer of the once-dominant Omnis database family, closed its United States offices and retreated to Britain. Actus struggled all year to produce a speed upgrade and applications shell for 4th Dimension. (The long-awaited Skeleton program finally appeared in September.)

The main database news of the year was the appearance of FoxBase+/Mac, a fast program that allows easy port-over of dBase applications from the DOS world. Good initial FoxBase sales suggest that even among developers, convenience—in this case the convenience of using existing applications—has far more allure than bells and whistles.

In Other Words
Turning to word processors, 1988 saw the first serious challengers to Microsoft Word and MacWrite. The long-awaited, much-discussed FullWrite was acquired...
based presentations. Although a Mac II–based system for video processing isn’t cheap, it’s a bargain compared to anything of comparable quality.

Several suppliers brought out NTSC video interface cards for the Mac II, allowing images to be transferred directly to ordinary video recorders. The result was the appearance of some amazingly amateurish productions (including the most embarrassing home-educational video of all time—name supplied upon written request). But then many first-year efforts in page layout were also disasters.

Is Dis a System?

Enough developers complained about software crashes with Apple’s new System 6.0 that Apple released 6.0.2 to major developers a few months later. This release fixed an assortment of bugs, primarily having to do with color and sound.

But while release 6.0.2 fixes most of 6.0’s contributions to compatibility headaches, it doesn’t help if the application is at fault. Just as there are many ways to get to work faster that don’t involve slavish observance of traffic signals, many developers find that it’s possible to speed program performance by ignoring Apple’s programming guidelines. Lynnea Johnson, system software product manager at Apple, points out that as we move into increasingly complex operating systems, every update will be a new exercise in guideline enforcement. Paradoxically, this means that in the near future, as Mac hardware gets faster, software will be getting slower.

“Can I patent gravity?”

—Steve Jobs on the Apple lawsuit

Now You CDs, Now You Don’t

Apple released its CD ROM drive and HyperCard CD extensions, and Toshiba and Panasonic also introduced drives. But the CD market remained stalled in a classic who-moves-first deadlock. (Why should people develop new CDs when there are so few drives out there? Why should I buy a drive when there are so few CDs?) At a Microsoft conference in March announcing the dramatic entry of a major player (Microsoft) into the Mac CD ROM arena, the remarkable fact emerged that no real products were ready to be released to the assembled multitudes.

Apple, however, maintains that the CD is central to John Sculley’s visionary Knowledge Navigator concept, and may yet force this market as a matter of corporate commitment. Perhaps in 1989, Microsoft, as part of its own corporate commitment, will finish porting its Bookshelf CD, a reference set for writers, into a tool for use with Word on the Mac.

The Mac in a Non-Mac World

A bit of good news for the Mac, bringing the Mac further validation in a non-Mac world, is the announcement of AutoCAD. AutoCAD’s dominance in drafting is so complete that many firms that would prefer to use Macs have been forced back into the blue world of the PC for compatibility. AutoCAD for the Mac promises to help Mac penetration in engineering and technical offices.

Likewise, WordPerfect for the Mac, while unlikely in its current form to set new standards in word processing, is nonetheless a significant bridge product, given WordPerfect’s dominance in DOS offices.

For the educational market, the good news is the giant program Mathematica (the title was suggested by a former Apple employee, one S. Jobs). This general-purpose research tool demands a loaded machine (the manual observes that a 4MB to 5MB Mac Plus is “desirable”—anyone out there got a 5MB Plus?), but
delivers the most comprehensive, easiest-to-use system for bringing the power of mathematics to bear on research problems.

It may become a university standard, replacing most traditional programming methods, and for the next few years the Mac is the cheapest target hardware it can use. This is an example of a new class of Mac program—one developed on workstations and ported to the Mac rather than to the PC because PC hardware can't easily handle the required memory.

Getting the Word Out (and In)

This year saw the introduction of a collection of faxes and advanced scanners, including long-awaited products from Apple. The Mac handles most data in graphic form anyway, so the fax is a natural extension of familiar modem-based communication, and high-speed send/receive faxes are cheaper to implement on the Mac than on most other computers.

Although scanners for the Mac were one of the earliest hardware enhancements (the redoubtable ThunderScan, for example), the real news is HyperScan from Apple: software to transfer images directly into HyperCard with halftoning and all sorts of additional image processing.

Never say NeVR. A group at Apple produced this button, but Steve Jobs introduced his ground-breaking NeXT computer on October 12 nonetheless.

Journal of a Plague Year

In a bizarre twist, 1988 became the year when the hitherto unrelated (for most of us) words computer and virus came together to form a common (and feared) compound. Three varieties swept through the Mac community. One was spawned by some Canadian jokers who wanted to wish users "Peace" on the Mac II's birthday. Much more serious were the nVIR and Scores viruses, which managed to incapacitate thousands of Macs, causing uncounted hours of down-time.

The only positive side of this epidemic is that it inspired many Mac users to a salutary degree of caution regarding such things as using only copies of application programs and backing up hard disks. It was also gratifying to see the way the Mac community rallied to the threat, uploading a variety of freeware and shareware antivirus products onto bulletin boards for wide distribution. Similar products in the IBM world cost from $80 to $200.

Bigger and Better?

By the last months of 1988 nearly every major program had added color support in some fashion. Despite price and availability problems for RAM, most releases of major applications required 1MB of memory or more. And things are still heating up. Apple recently started shipping its 68030-based Mac II with 1.4MB floppies that can read both DOS and Mac disks. Other hardware developers are working on 030 cards for existing Mac IIs and SEs.

That the hottest Mac systems now compete with scientific minis for hardware power is good for the minority who need and can afford that kind of equipment, but what about the average Macintosh owner? Apple's last round of price increases in September put the Mac II safely beyond the economic reach of the rest of us and raised some disturbing questions about the company's intentions. Would Apple really rather be a high-margin workstation shop like Sun than a mass-market organization? Does John Sculley's vision of a "$25 billion company" mean that there will be five customers left in North America paying $5 billion apiece for their Mac XVs in 1996? And will those five be willing to pay $4 million each for their subscriptions to Macworld?

If it comes to that, I hope they will, but I'd rather see the Macintosh base broadening out rather than shrinking as it mounts into the fiscal stratosphere. □
Printing a Rainbow

Color printers are arriving by the armload. But can they really produce the color output you need?

by Ron Risley

It's taking a long time to reach the end of the Mac II's rainbow. In 1987, when Apple unveiled the Macintosh II with its 16 million dazzling colors, there was very little software that let you do anything with those colors. Today, however, a whole spectrum of software products can bring the Mac's color display to life. What the original Macintosh did for the latent Escher in us, Mac II color is doing for our inner Monet.

But while our Escher is happy printing black-and-white images on a laser printer, our Monet is having a tough time getting colorful screen impressions onto paper without leaving the studio. None of today's color printers produces output that matches the colors on the screen or the colors of an image printed on a commercial offset press. Also, each printer has limited application. An ImageWriter might be great for printing a few copies of a memo with highlighted words, but it can't create camera-ready color art. Likewise, a printer that creates acceptable camera-ready art might not be suitable for low-volume publishing or for creating colorful presentations. And unless you have access to United States currency clip art, and a license from the Treasury Department to use it, cost is a very real consideration when choosing a color printer. If you need fast, high-resolution, continuous-tone color, you might find that the available options are too cumbersome, too expensive, or both.

Today's color printers fall into four categories: impact dot matrix, ink-jet, thermal transfer, and film recorder. Some color printers support QuickDraw and PostScript interfaces; some (most notably film recorders) print QuickDraw documents saved in PICT format; others support the same video interface normally used to connect a color monitor. Which type of color printer is best for you? Let's look at some color printing technologies and see how well they address common color applications.

A Color Primer

Before you can figure out which printer will give you the results you want, you need to understand how color is produced on screen and on paper — and why the two just don't match up. Each pixel on a Macintosh II color display consists of three tiny dots — one red, one green, and one

Ron Risley has been a designer of computer and telecommunications hardware, software, and programming languages and is an amateur science fiction writer. He recently left the computer business to pursue a degree in medicine.
blue. Combining red, green, and blue light in varying amounts can create any color visible to the human eye. The Apple Video Card for the Mac II can select one of 256 shades for each of these three primary colors, resulting in a palette of 256 by 256 by 256, or 16,777,216 possible colors. All color printers, with the exception of film recorders, work similarly except that they combine yellow, magenta, and cyan pigment to create a rainbow of colors (including red, green, and blue) on the printed page. Since the black that results from combining yellow, magenta, and cyan often appears muddy, these printers usually add a pure black layer as well.

But the difference between the way colors are created on screen and the way they are created on paper is more than just a matter of red/green/blue or cyan/magenta/yellow. You might have noticed that scanned photographic images printed on a LaserWriter at 300 dots per inch (dpi) don't look as good as they do when displayed on a Mac II gray-scale monitor at a modest 72 dpi. That's because monitors continuously vary the brightness or intensity of a color to create different colors. If you adjust the brightness controls on a monitor the colors change—now which ones are the true colors?

With a color printer, however, a dot is either there or it isn't—so, although you can vary the color of a dot somewhat by using more or less ink, you can't really control the ink's density the way you can control the brightness of phosphor on a display tube. It's a take-off on the old joke: You can have any size or density you wish, so long as it's 1/100 inch and solid. Four-color process lithography (the type of printing used to reproduce the color photographs in this magazine) gets around the problem by varying the size of the dots of ink instead of their density. Thus, each dot is formed from hundreds of miniscule droplets of ink—the dot can be as large as necessary to create a specific color.

Most color printers, however, rely on a technique called dithering, in which adjacent dots are printed in different colors. The human eye perceives this block of variously colored dots as a single color. Of course, using more than one dot to represent each equivalent video pixel seems to reduce the resolution of the image. The wider the range of colors you need to present, the more dots the printer must use for each color, and the poorer the resolution appears to be. For instance, eight-by-eight-dot clusters can yield thousands of colors, but on a 300-dpi printer the perceived resolution is less than 38 dpi. Eventually, similarly colored dots get too far apart—you begin to see patterns of dots, and the overall image appears grainy and off-color. Except for very expensive printers that print dots of varying size, high-resolution printing with large color palettes is relegated to film recorders, which work not by dithering but by photographing a CRT display. Film recorders can reproduce a wide range of colors for each individual pixel.

**Impact Dot Matrix: Color on a Budget**

ImageWriter II owners might be surprised to find that they already have a color printer attached to the Mac—one that can be used to produce color output from any Macintosh, not just the Mac II. An ImageWriter II with a four-color ribbon lets you print any of seven colors. If you just want to add some red ink to your financial report (without having it show up on the bottom line), then the 144-dpi ImageWriter II, or another dot matrix printer that supports color, might be just the ticket.

How is this feat possible? Ever since the Macintosh was first released, QuickDraw has supported seven colors: red, green, blue, yellow, magenta, cyan, and black. The original Macintosh display could
What's Next
Of all the printer technologies, inkjet is the most promising because of its versatility and quality. Today, however, only high-end, prohibitively expensive inkjet printers can produce color output of this quality. These printers don’t even come with Mac drivers yet.

show only black and white, so anything that wasn’t white appeared as black. A handful of programs, like Silicon Beach Software’s SuperPaint, let you assign colors to graphic objects. You couldn’t see the colors on the screen, of course; but they were there, hidden behind the monochrome screen. The Mac II’s Color QuickDraw supports the old seven-color model, as well as its own multimillion-color model, so when Apple introduced the Mac II, some older applications automatically displayed color on the Mac II. A number of other new or upgraded products now support the seven-color model.

Dot matrix color is remarkably good. Ribbon life is variable, since the yellow ink band tends to get contaminated with darker ink. Conversely, if your output is mostly black text with an occasional color highlight, you might find that you use up the black ink while the colors are still fresh. Dot matrix printers use plain paper and can typically print hundreds of pages from a single ribbon. Output costs are down in the pennies-per-page range. If you already have an ImageWriter II, getting a color upgrade for the price of a $15 ribbon is a deal that’s hard to beat. If you don’t own an ImageWriter II, its $595 price isn’t excessive. ImageWriter LQ owners can also get the same seven-color capability at a somewhat higher resolution: up to 216 dots per inch. An ImageWriter LQ four-color ribbon costs about $30.

With any of the dot matrix printers, you can manually simulate more than the seven colors, while sacrificing resolution, by dithering. Claris Corporation’s MacDraw II, for example, lets you create fill patterns that contain combinations of the QuickDraw colors. Still, the low resolution and paucity of colors make the ImageWriter unsuitable for generating color proofs. It doesn’t print well on transparent film, so its use in presentations is limited, and its output could be considered camera-ready only for low-quality spot color applications.

Inkjet: A Spray of Color

Inkjet printers span the widest range of capability, from ImageWriter replacements to high-end color proofing systems (currently not available for the Mac). Typical low-end color inkjet printers, like Hewlett-Packard’s HP PaintJet color graphics printer, print at 180 dpi (a slightly higher resolution than the ImageWriter II’s). Like dot matrix printers, inkjet printers can add spot color to charts and graphs but lack the variety of colors and the resolution necessary for prepress proofing, low-volume publishing, or generating camera-ready art. One advantage ink-jets have over dot matrix printers is that ink-jets can print on transparencies, although the output is not as good as a thermal printer’s. The drivers for inkjet printers have not been standardized, so you should check software compatibility carefully before you buy (see “Quicker Quality”).

Most inkjet printers can also print on plain paper, but the jets on some printers tend to clog with paper debris, while others bleed excessively when used with some types of paper such as newsprint. (The
manuscript usually recommends a special paper for best results with these printers. Sharp claims that its JX-730 printer uses a cluster of very small jets that do not clog or cause the ink to bleed.

PaintJet ink comes in two cartridges, one with black and one with yellow, magenta, and cyan. The ink in these cartridges doesn't get contaminated as do the ImageWriter ribbons, and you can replace the black cartridge independently of the color cartridge. The Sharp JX-730 carries this idea one step further; it has separate ink reservoirs for each color. The cost of printing a page with an ink-jet printer is comparable to using an ImageWriter but, as with the ImageWriter, printing a full page with many blocks of color is quite slow.

Leaping toward the high end of the ink-jet spectrum are printers from Iris Graphics. Designed to work with commercial color-processing systems, these printers produce high-quality color, suitable for low-volume publishing, prepress proofing, overhead transparencies, and even camera-ready art for medium-quality jobs. The top-of-the-line Iris 3024 is the only ink-jet printer that can vary its dot size. It can print up to 300 dpi, with each dot consisting of 32 shades of each of four colors, to produce continuous-tone color output. The 3024 prints large images—up to 24 by 24 inches—and prints on almost any media, including plain paper, newsprint, transparencies, cloth, or even sandpaper. Output from the 3024 rivals high-quality four-color-process printing, still for pennies per 8-by-10-inch image.

Sound ideal? Well, while the cost per image might be low, the 3024 printer—which weighs in at a hefty 400 pounds—lists for $75,000, without a controller. And even if money is no object, there is currently no Macintosh-compatible controller available (GCC Technology, however, demonstrated a prototype interface at the Macworld Expo last August).

Thermal Transfer: Crayola Technology Printing

Decades ago my mother kept my brother and me entertained by letting us draw designs with crayons on a sheet of newsprint. She then used an iron to press our designs onto a T-shirt. This pastime has been resurrected in our high-technology world as thermal-transfer printing.

Thermal-transfer printers offer medium resolutions of 200 dpi to 300 dpi, and produce a wide range of colors through dithering. These printers produce acceptable overhead transparencies quickly and work well for proofing output that will be finalized on a film recorder. (Dithering, however, makes the output unsuitable for camera-ready art.) Thermal-transfer printers can be used for low-volume publishing, although the special paper they require may be too slick for some jobs. Thermal printers print more quickly than impact or ink-jet printers, requiring about one minute per page (it takes extra time for the Mac to transfer data over a cable to the printer where it is processed). The operating cost, for ribbons and special paper or transparency film, is typically around 50 cents per page.

Although most thermal-transfer printers work alike, some support QuickDraw and others support PostScript. One high-end printer, QMS's ColorScript 100, supports PostScript and prints at 300 dpi, making it work just like a LaserWriter when printing in black and white. Some people, however, will find that for fine details the LaserWriter produces better results.

PostScript compatibility for color printing, however, is important only to users who generate color separations electronically on a Linotronic or similar PostScript-based phototypesetter. If you must accurately proof PostScript-specific effects such as undercolor removal, screen rota-
tion, and font manipulation, then you need a color printer that supports PostScript. Just as using a laser printer gives you a good idea of how your pages will look when typeset, so using the ColorScript gives you a much better idea of how your color separations will look when produced on a Linotronic. Color matching, however, will still be far off the mark, because of the dithering dilemma.

For anything other than proofing, however, using PostScript is a drawback. While nearly all applications that support color displays can print in color through a Color QuickDraw driver, only applications that specifically support color operations in PostScript can print in color on the ColorScript 100. Currently, the ColorScript supports only Illustrator, Illustrator 88, FreeHand, QuarkXpress, PixelPaint, Mathematica, and LaserPaint Color II. QMS is working to support other major PostScript applications. On top of its limited software compatibility, the ColorScript 100 is expensive, listing for around $22,000. (It can, however, be shared through an AppleTalk network.)

QuickDraw-based color thermal printers are compatible with a much wider variety of software than are PostScript printers. In fact, PostScript applications such as Il-

**Quickier Quality**

Until recently, if you wanted a range of good-quality, high-resolution typefaces you had to use an expensive PostScript printer. That's because in order to get high-quality 300-dpi fonts from a QuickDraw or Color QuickDraw printer (like the Tektronix 4693D), you must install fonts four times as large as the corresponding screen font—and the choice of QuickDraw fonts is limited. Even then, you couldn't rotate QuickDraw fonts or scale them to fractional point sizes without losing quality.

To get around QuickDraw's weak font-handling capabilities, some companies now include their own font technology within their software. For instance, Cricket Software includes the ability to rotate and scale text within its paint, draw, and presentation packages. If you use these features and print the results on a PostScript-based Laser printer, you'll get the same image that you see on screen. If you try to print on a QuickDraw printer using a standard QuickDraw driver, however, you won't get these nice text effects.

As a result, Cricket, in conjunction with font-maker URW, has developed drivers that are basically a superset of QuickDraw. These drivers, called Expression, have the versatility and quality of PostScript fonts, but unfortunately they work only with Cricket's software packages. In a bid to make its drivers a standard, so that all software packages support them, Cricket plans to license a generic version of the drivers to printer manufacturers. For color printer users, this URW/QuickDraw hybrid translates into good quality for a much lower price than pure PostScript has.

Yet many questions remain. Cricket isn't the only company that wants to set the standard—Palomar Software also licenses a set of drivers. Palomar may have one advantage over Cricket: software companies may be less willing to modify their software so that a potential competitor such as Cricket can sell drivers (Palomar doesn't market any competing software). Also, while the outline fonts (such as the ones from Bitstream and URW) used by the drivers look fine on paper, they don't quite match the PostScript text on screen. Most users won't notice—and won't care—but a professional graphic designer might discern a difference.

Will enough printer manufacturers adopt the new drivers to ensure a healthy supply of typefaces and application support? If third-party enhanced QuickDraw drivers proliferate, application vendors will be forced to offer compatibility; if printer manufacturers are assured of wide application compatibility, they'll be encouraged to embrace the new drivers. If this chicken-and-egg combo can agree on who will come first, we'll soon see the emergence of a new, lower cost standard for quality output.
### Color Printers on Parade

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<tr>
<th>Model</th>
<th>Manufacturer</th>
<th>Price</th>
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<th>Maximum resolution (dpi)</th>
<th>Colors</th>
<th>Auto dither</th>
<th>Hardware interface</th>
<th>Software support</th>
<th>Requires special paper</th>
<th>Accepts plain paper</th>
<th>Produces transparencies</th>
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<td>QMS</td>
<td>$21,995</td>
<td>11 x 17</td>
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1. [MacDrive package: $99.95](#)
2. Driver must be purchased from third party. Expression, Phoenix Printworks for the Mac; Hewlett-Packard driver being developed.

As with 300-dpi black-and-white QuickDraw printers, however, the font handling in these color printers isn't as versatile as that in PostScript printers. In order to get the highest quality type, you must install fonts in your System that are four times the size of the type you wish to print. Currently there are fewer "four-times" QuickDraw fonts available as there are PostScript fonts. QuickDraw does not support rotated text, or text that follows an irregular curve.

If you need a color printer only to create informal overhead transparencies, you might check out a thermal-transfer printer that uses a video interface, like Mitsubishi's G330-70 Color Thermal Transfer Printer. Whenever you press its Print button, the 150-dpi G330-70 prints a replica of the current screen display. The G330-70 can simulate up to 4096 colors by dithering. The good news about this video interface is that an application needn't be equipped to handle color printing in order to generate color output; if you can see color on the screen, you can print in color.

What a video interface gains in simplicity, though, it loses in versatility. You can't print full pages—only screens—you print whatever is on the screen, including the menu bar and window frames. You're also limited to the resolution of the screen—no high-quality text or object-oriented graphics. It's easy to see why a printer like the G330-70 is unsuitable for desktop publishing or color proofing. But if you just want to create color transparencies for presentations, and if you don't mind including a menu bar, then the $5900 G330-70 is a bargain at about $3000 less than most other thermal-color printers.

### Film Recorders: Mama, Don't Take My Kodachrome Away

If you want high-resolution hard copy of images that use a lot of colors, the only real alternative at this time is a film recorder. Film recorders, which produce 35mm slides, are capable of very high resolution: typically up to 4000 by 2700 lines on
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### Film Recorders Compared

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<th>SlideWriter</th>
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<td>PICT</td>
<td>PICT, TIFF</td>
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What's the Difference?

**Impact Dot Matrix**
Inexpensive printers suitable for adding spot color to reports and graphics. Too slow for low-volume publishing. Lack of resolution and limited palette (only seven colors) makes these printers unsuitable for prepress proofing. Cannot print on transparency film for presentations.

**Ink-Jet**
About the same speed, palette, and resolution as impact dot matrix, but can print on transparency film for low-cost presentations.

**Thermal Transfer**
Better speed and higher resolution. Palette of seven colors can be enhanced (at the expense of resolution) by dithering. Good for proofing color images that will be reproduced by a typesetter or film recorder. Great for fast and easy presentations. Not suitable for camera-ready art. Paper too slick for some publishing jobs.

**Film Recorders**
Excellent resolution and large palettes perfect for professional-quality presentations and production-quality artwork destined for color separations. Working with film is less convenient than with paper; not suitable for low-volume publishing or quick proofs.
Just a Spot of Color

If you can’t afford an expensive color primer but want to add some spot color to your pages, the $875 Kroy ColorPlus system might be an answer. To use the Kroy system, you place a sheet of color transfer film over an image that was printed on a laser printer or photocopied. You then feed the page into the ColorPlus, which fuses color transfer film onto the black areas of a page. In just seconds, a black-and-white image changes into a colorful one. If on color printers. In addition to pastel colors in glossy and matte finishes, you can get metallic foil transfer films in a variety of glossy or matte colors, including gold and chrome. Using the metallic foil, you can create a remarkably good imitation of expensive foil embossing. Using foil transfer film on a scanned halftone image produces an eye-catching metallic image that is difficult or impossible to create with conventional foil embossing techniques.

If your color needs are limited to low-volume spot color of high quality, or if you can use the expensive look of foil embossing to advantage, the Kroy ColorPlus is a fun color alternative worth investigating.

These gorgeous renderings come at a price. It takes several minutes to expose a single frame, and you still have to get it processed before you can see the results. Some film recorders let you use Polaroid instant slide film so you can produce slides in your office, but this film is a hassle to work with; you must still expose an entire roll of images before you get to view a single one, and you have to process and mount the slides for presentation. Any type of film output is expensive, often exceeding $1 per usable transparency. Even after you have the slides, you need a projector for viewing. Making 8-by-10-inch color prints for low-volume publishing applications can get expensive in a hurry.

Showing Their True Colors

No color printer currently available can faithfully reproduce the full spectrum of Mac II colors, at high resolutions, on paper. For top-quality presentations or camera-ready art, film recorders are really the only choice, but they are slow, expensive to use, and cumbersome. Thermal-transfer printers work at a lower cost per sheet and offer immediate gratification, but none of the current players has a color palette that even approaches the 16-million-color Mac II video. Still, they work well for proofing (well-heeled presentation houses often use a thermal transfer printer for previewing files before sending them to a film recorder), for low-volume publishing, and for making overhead transparencies for presentations.

Although most of the color printers currently available use thermal transfer, the up-and-coming technology is ink-jet. As the popularity of these printers increases, a driver standard that supports a wide range of software will evolve (see “Quicker Quality”). None of the models available now have the right mix of resolution, color palette, interface, and affordability, but ink-jet technology has the potential for supporting a low-cost, high-performance printer that will handle the proofing, presentation, and publishing needs of those whose budget or whose software precludes their using a film recorder.

See Where to Buy for contact information.
Rescuing a Hard Disk

by Bruce F. Webster

What to do when a disk drive crashes

Computer Nightmare #27. After a good friend accidentally trashes his hard disk and loses lots of files in the process, you decide it's time to get serious about backups. So you buy a great backup program and save the contents of your hard disk to floppies. Sure enough, a few days later, you find that the hard disk has been inadvertently erased, due to a child's error. Pleased with your foresight, you launch the backup program and start to restore files from the archived floppies. Three-fourths of the way through, however, you run into a problem: the backup program can't read the inserted disk. A little shook, you insert the next one. It's bad too. And the next one. And the next one. You realize that there was some sort of problem with the floppy drive while you were backing up the hard disk. And you wonder how you're ever going to get those files back.

Something very much like this happened to me around midnight during the Labor Day weekend. I couldn't even blame my kids; I had deliberately erased the hard disk—right after backing it up—in an effort to test a backup utility. Of course, I had first saved (by hand) all the important files, but it still shook me. After all, if you can't trust your floppy drive, what can you trust?

Fortunately, help was at hand, in the form of two software packages: 1st Aid HFS, from 1st Aid Software, and Symantec Utilities for Macintosh (or SUM), from Symantec. Using them, I was able to recover all the files on the trashed floppies. For that matter, I could have directly recovered the deleted files on the hard disk without resorting to my backup floppies. And if you're doing any important work with the Macintosh, you shouldn't be without one or the other.

Out of Sight

How does a disk crash, anyway? First, you need to understand how information is stored on a disk, whether it be floppy or hard. Information (as you have been told repeatedly) is composed of bits, little mythical Os and Is running around inside the computer's memory. Groups of eight bits form bytes; a byte is typically the

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amount of information used to encode a single character (letter, digit, punctuation, space) in a text file.

On a disk, bytes are collected into sectors. Each sector holds 512 bytes of the user's information, as well as another dozen or so bytes of housekeeping information. The bytes themselves are actually encoded in a special format, consisting of a limited set of values. This provides a certain amount of error checking; if illegal values appear in a sector, then the computer knows that the data has been damaged somehow.

Each file on the disk consists of one or more sectors. The sectors themselves don't need to be contiguous, that is, in successive order on the disk. Noncontiguous storage allows you to put a large file on a disk where there is sufficient free space, but no single available area big enough to hold the entire file.

The disk itself has a file directory. This is a special file that contains information about all the other files on the disk: file names, types, creators, attributes, sectors used, and so on. The file directory also contains information about the folders on the disk, such as what folders and files a given folder contains. Each disk also has a second directory that contains information about the disk itself (volume name, size, number of files, free space left), as well as the location of the file directory.

There are two basic approaches to organizing directory information on Macintosh disks. The first approach is called MFS (Macintosh File System); this is the original system used on the 128K Mac, and it seriously limits the number of files you can have on a given volume. The second approach is called HFS (Hierarchical File System). It is the predominant of the two and confers many advantages. If you're using System 3.1 or later, then you're using HFS. Of course, if you've been using the Mac for a long time, some of your older disks may still be organized with MFS, in which case you should probably copy those files to HFS-formatted disks and use them instead.

All of this is generally invisible to you. What you see is a set of windows and labeled icons, put up by the Finder. The screen organization itself—which folders are open, how the icons are arranged, and so on—is saved in an invisible file called Desktop, which you may see listed when you recover files from a damaged disk.

**Disk Abuse**

Given this intricate organization, there are several different ways in which a disk can be trashed. For example, if something changes or destroys information in the file directory, then you lose the main guide to what's on the disk. The files are still there; you just can't look them up. Here's an analogy: Imagine a library in which all the books have been rebound into identical, numbered volumes (sectors). If a book is big, then it's split up into several volumes; if it's small, then blank pages are added so that all volumes are the same size. To read a book, you look it up in the card catalog (the directory), which tells you which volume(s) to read, and in what order. However, if the card catalog is destroyed or damaged, you no longer know which books are in what volumes.

A second type of crash occurs when the contents of a file are damaged. An application might write directly to a disk sector already in use, overwriting whatever data is there. Or the information in a given sector may be garbled, either because of software problems or due to a momentary hardware glitch while writing. Or while playing with a file-editing program (for example, FEdit, MacTools) you might have inadvertently changed something you should not have changed.

Also, the formatting of the disk itself can be disrupted in several ways. Physical damage to the disk—either by direct contact of the disk drive's read-write head and the disk, or by foreign matter (salt, Jolt, iron filings) getting between the disk and the read-write head—can damage or wipe out sectors. Exposure to magnetic fields (ringing telephones, the cover of the ImageWriter I, a little kid playing with magnets) can alter the disk's encoding. The result is a bad sector, which the Macintosh won't read.

Finally, there are the dumb errors. You throw away a folder, select the Empty Trash command in the Special menu—and then remember that you haven't transferred an important document out of it first. Or you're distracted while reformating a floppy disk and discover that you've erased the hard disk instead.

At this point, you may be wondering how data survives for any length of time. All things considered, it survives amazingly well, mostly because a disk's physical build, as well as the computer's use of that disk, are designed to avoid data loss. Some simple precautions on your part can make the odds of losing data very small indeed.
(see "An Ounce of Prevention"). But sometimes it happens anyway, and when it does, you'll want to have some means of recovering what you've lost.

**Recovery Strategies**

How can any program recover a crashed disk or restore deleted files? Through a variety of approaches. One, used heavily by SUM, is to save information about the files and disks; for example, keeping track of all files that are deleted and where they were located. Deleting a file merely means removing its entry from the file directory; therefore, you can "undelete" a file if you can restore the correct entry. This assumes that the sectors used by the file haven't been reassigned to other files; even if some have, you can still recover part of the information if it's a text file.

If one or more sectors in a file are damaged, then you can attempt to recover the rest of the file, filling the bad sectors with zeroed data. If the file directory itself sustains damage, you can use whatever information there is to help recover files. And if the directory is gone altogether, you can still scan all the sectors on the disk, trying to decide which ones go with which.

This, of course, would be difficult and tedious if you had to do it yourself. However, there are at least two commercial software packages to help you along: Symantec Utilities for Macintosh and 1st Aid. Let's take a look at each.

**Parts of the Sum**

Symantec Utilities for Macintosh contains a variety of applications designed to help you protect files in a variety of ways. It comes with two 800K disks and a 170-page manual, spiral bound so that it lies flat nicely. The applications on the disks include Disk Clinic, HD TuneUp, QuickCopy, Guardian, HFS Recover, Scanner, Floppy Recover, and Symantec Tools. In addition, there are two INIT files (Shield and HD Partition) and a desk accessory (HD Partition).

The main set of applications runs from within Disk Clinic, which looks as though it were written using HyperCard. You use Disk Clinic to select the function desired: undelete files, repair damaged disk, tune up hard disk, set options, and so on. The actual user interface is a bit tedious and awkward at places, but it works. Most of the applications can be run directly as well. Note that the SUM manual recommends not using these applications (except for Guardian/Shield) under MultiFinder;
that's a good idea for any utility that directly modifies files and directories, since there's a real danger of two or more applications messing with the directory and/or the same file, with unpredictable results.

The software itself has two basic approaches: prevention and recovery. The prevention software is called Guardian. It works in conjunction with an INIT file called Shield, and its purpose is to keep track of file deletions and modifications. You install Guardian by dropping Shield into the System Folder, rebooting, then running Disk Clinic to tell Guardian which volumes (hard drives or floppy disks) to protect.

Each time you delete a file, Guardian saves information about that file in a file-save record elsewhere on the disk. If you (or an application you're running) then accidentally delete a file, you can recover it using one of the SUM programs.

Guardian also maintains volume-save information about the volume itself. This procedure is designed to aid SUM in recovering disk information in the event of a disk crash. You can tell Guardian to save this information automatically each time you shut down or reboot, or to do it only when instructed by you. This information should be transferred to other volumes regularly, since it may be lost or damaged if the disk crashes; Disk Clinic provides an option to do just that.

Finally, Guardian affords a modest degree of protection against certain viruses. It watches for an attempt to zero out the file directory of the start-up volume and blocks such a move.

**Recovering Lost Files**

The recovery phase comes when you find that you've lost data, through accidental (or even deliberate) deletion, through hard disk initialization, or through damage to a floppy or hard disk. You launch Disk Clinic and select the appropriate option (Recover Deleted File(s) or Recover Crashed Disk); Disk Clinic then takes you through a set of questions (Was Guardian installed? What type of device is it? and so forth). Based on your answers, SUM selects the best utility for recovering files. There are five altogether: Guardian, HFS Recover, Floppy Recover, Scanner, and Signature Scanner. You can use Guardian to recover files if you had it installed for the volume that crashed; otherwise, you use one or more of the others. The others are listed in order of effectiveness; HFS Recover is restricted to volumes formatted using HFS, while Floppy Recover is restricted to floppy disks.

One very important note: the last four (non-Guardian) methods cannot recover a fragmented file. One way to get around this limitation is to use HD TuneUp regularly. It attempts to defragment files by rewriting...
them into contiguous sectors. Note, though, that it does not defragment the disk itself—that is, it doesn’t push files together in order to eliminate small chunks of free space between them. The best way to do that is by backing up the hard disk with a backup utility (such as DiskFit), then restoring the files to the hard disk. Be sure all the backup disks are good before starting the restoration, though.

There are other tools, as well. QuickCopy is a convenient means of copying unprotected floppies using a single drive. QuickCopy reads in the source disk (either all sectors or only those in use), then writes the disk image out to one or more floppies, formatting first if you request it. This is very handy if you want to erase a bunch of already-formatted disks; just read in a blank disk (which has very few used sectors), then write it out (without formatting) onto the disks you want to erase.

Symantec Tools gives you the ability to edit sectors in a file or anywhere on the disk. It can also display a disk map showing which sectors are used and which aren’t. You can view the sectors used by each file to see if the file is fragmented, that is, broken up into several nonadjacent pieces.

Finally, the HD Partition INIT and desk accessory let you partition a hard disk into several volumes, provided you have enough contiguous free space for each one. You can also encrypt each partition, requiring a password to mount the partition and decrypt the contents.

**Using 1st Aid**

The 1st Aid Kit, from 1st Aid Software, takes a different approach. It has a single 800K floppy with two programs—1st Aid HFS and SysVers—as well as a disk cache utility (Cache Flow) in both desk accessory (DA) and function key (F-key) versions. It also has some tutorial files, which have been deliberately damaged in different ways so that you can use 1st Aid to fix them, and some template files, which are used in repairing disks whose volume information has been lost.

1st Aid provides many of the same functions as SUM, including backing up volume information, initializing and duplicating floppies, repairing crashed disks, and recovering deleted files. The user interface is more traditional, with pull-down menus and the like.

For repairing a damaged disk, 1st Aid gives you two options: Quick Cure and Full Evaluation. Quick Cure attempts to recover files without checking for bad sectors, while Full Evaluation reads and checks every sector on the disk. Quick Cure took only 4 seconds to find and list all the missing files on a damaged 800K floppy; Quick Cure recovered those files safely to hard disk. Full Evaluation took 58 seconds to check out the same disk and found three bad sectors, only one of which was inside a file that needed to be recovered; 1st Aid was able to recover that file intact anyway.

However, 1st Aid was of little help in recovering deleted files or in restoring files from an initialized hard disk. This is because 1st Aid relies on sector tags—special pieces of information written in each sector—to restore deleted files. Unfortunately, many hard disks don’t support sector tags, and Apple’s own support for them is waning.

Even with that limitation, 1st Aid is a valuable package. It was easier and quicker to use in repairing the damaged floppies, and it recovered 100 percent of the files on the disks.

More valuable than the software is the 318-page manual, which comes in a three-ring, loose-leaf, 8-by-5-inch binder. This is not your typical user’s manual for a software package. Instead, it is an extensive troubleshooting guide for Mac users that goes far beyond the scope of recovering deleted files or crashed disks.

**Comparisons**

So how do 1st Aid and SUM stack up to each other? They were both able to recover all the lost files on my damaged backup floppy, as well as from a deliberately erased hard disk.

**Recovering Deleted Files**: SUM did a better job overall, especially if Guardian...
An Ounce of Prevention

So, what can you do to prevent loss of data, on either hard disks or floppies?

The best prevention is to back up files on a regular basis and obey the following rules to minimize the risk of losing data or damaging disks.

First, write-protect all the floppies you can, especially the master disks for any software that you buy, as well as any disks that you use for backup. Keep them write-protected unless it's absolutely necessary to write something on the disk (for example, while backing up).

Second, do not use master disks to run applications. Make working copies and use those, or (if you have a hard disk) copy the application to the hard disk. In either case, put the master disk safely away. If an application is copy-protected, then get Copy II Mac and use it to make a working copy or to install the application on the hard disk.

Third, think twice before deleting a file, and think three or four times before deleting a folder. Even utilities that recover deleted files can't help if you delete a file or files, then do a fair amount of work on your disk, including creating and copying files. That's because the new files will overwrite the old ones, and you'll lose the data, regardless of what recovery utilities you use.

Fourth, beware of the distinction between copying and moving. Dragging a file from one disk to another creates a copy; the original stays on the first disk, and a brand new copy appears on the second. If you then throw the copy away, the original remains untouched. However, if you drag a file from a folder on one disk into another folder on the same disk, you just move the file into the second folder.

Fifth, use the Restart command in the Special menu to reboot the system and the Shut Down command before turning the system off. This ensures that all disk drives are properly updated before the reboot or shut down. This is especially critical if you have disk cache turned on (check the Control Panel DA).

Sixth, don't use the Erase Disk command in the Special menu unless you're sure you know what you're doing. If you do use it, be sure that the volume name shown is the same as the disk you want to erase. If it says something like "(SCSI 0)" after the volume name, then you're trying to erase the hard disk, and you probably don't want to do that.

Seventh, if you insert a floppy into the Mac and get any of the following messages, don't panic:

"This is not a Macintosh disk. Do you want to initialize it?"
"This disk is damaged. Do you want to initialize it?"
"This disk is unreadable. Do you want to initialize it?"

Whatever you do, do not initialize the disk. Instead, follow what the 1st Aid manual calls the HELP procedure: Halt, Eject, Lock, and Protect. Stop what you're doing, select the Eject button in the dialog box, and slide the write-protect tab on the disk up (so that the little hole in the upper-right corner of the disk is open). Leave the disk protected during any recovery procedures. Likewise, if files on the hard disk suddenly disappear, shut down and reboot from a floppy, and don't transfer any files to the hard disk until you've tried all recovery efforts.

Recovering Files from a Damaged Floppy: 1st Aid was easier and faster to use; however, both programs were able to recover all files on the damaged floppies from my disastrous backup attempt.

Recovering Files from an Initialized Hard Disk: When you initialize a hard disk (use the Erase Disk command in the Special menu), the Mac just clears the directory, so the file information is still intact. SUM has no problem recovering the files, assuming that you have been using Guardian/Shield and have a relatively up-to-date volume save file backed up on another disk. If you didn't have the volume-save file backed up, then SUM still restores everything; it just takes longer (about 15 minutes longer) because it has to search the hard disk for that file. If you haven't been using Guardian/Shield, then you probably won't be able to recover all the files; in this test, SUM was only able to recover 230 out of 583 files. 1st Aid, on the other hand, was unable to recover any files at all.

Recovering Files from a Crashed Hard Disk: There was no real way to test this, given all the ways a hard disk can get...
messed up. Based on my experience with floppies, I'd say that both programs would work equally well, though 1st Aid is probably faster and easier to use.

**Disk Copying:** The QuickCopy utility in SUM is much better. It reads in a source disk once (either all sectors or just the used ones), then writes them onto any number of disks, formatting first if desired. The Copy Disk command in 1st Aid isn't as fast as QuickCopy, nor as convenient.

**Additional SUM Utilities:** SUM has a number of options that 1st Aid doesn't, including hard disk tuning, hard disk partitioning, disk and file editing, and of course, the Guardian/Shield system.

**Additional 1st Aid Utilities:** As mentioned, 1st Aid offers the Cache Flow DA/F-key, which lets you force the disk cache to write to disk. The SysVers utility is handy if you're not sure which system version you're running under.

**Conclusions**

At the risk of sounding as though I'm waffling, I seriously recommend owning both SUM and 1st Aid. Their functions overlap quite a bit, but it doesn't hurt to have multiple solutions to the same problem, especially if lost files are at stake. The SUM software has greater functionality; it does a lot of things that 1st Aid doesn't (or doesn't do as well), while there are few things that 1st Aid does that SUM doesn't. On the other hand, the 1st Aid manual is almost worth the price of the package by itself, especially for novice (and even not-so-novice) Mac users. An ideal package would be the 1st Aid manual (appropriately revised) combined with the SUM software (with some improvements to the user interface).

But whatever you choose, get at least one of them. The cost isn't that great, especially through mail-order software firms. And the first time that a program like this recovers a day's, a week's, or a month's work, you'll be glad you made the investment.

And while you're at it, learn to do backups. ☑

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When desktop publishing first brought electronic page layout within the reach of Mac users, a cry arose among professional graphic artists: untutored users would commit fatal design flaws when let loose with the software. Learn the elements of design first, they cautioned, lest your pages sag and never sizzle. QuarkXPress 2.0 brings even more pre-production tasks to the desktop. Now you'll have to learn the basics of typography and graphic arts before you can unlock all the features in XPress.

As with earlier versions, QuarkXPress 2.0 offers power for users who have complex typographical needs. The program's kerning, hyphenation, and justification controls are excellent. And where PageMaker 3.0 restricts you to type sizes in 1-point increments and limits your largest character size to 127 points, XPress enables you to scale fonts from 2 to 500 points in 1/2-point size increments. Quark has also added style sheets and four-color process separations (in addition to the program's previous spot-color capabilities).

Still, if you are a PageMaker devotee, XPress's interface may become a stumbling block. With PageMaker's flexible Pasteboard metaphor, it's easy to change a design element, undo a placement, and move text columns around. In contrast, you might feel stymied at first by the structured hierarchy of the text and graphics boxes in XPress. But if you approach XPress with a plan in mind, and a firm grasp of the program's underlying rules, you'll never regret the day you left PageMaker behind.

In the early rounds of the desktop publishing battle, XPress was the first program to provide text wrapping around irregularly shaped graphics. In this round, XPress is the first to directly support four-color separation for offset lithography. Text, graphic elements (such as lines and boxes), and color encapsulated PostScript (EPS) files created in PostScript drawing programs such as Adobe Illustrator can be separated in XPress. The program cannot handle continuous-tone color photos, such as a scanned TIFF file, although it will colorize a black-and-white TIFF file.

For graphics, you can blend new colors and alter existing ones, using one of four color palettes. The HSB (hue, saturation, and brightness) palette is used by artists mixing paints; RGB (red-green-blue) is the color medium of video output; CMYK (cyan-magenta-yellow-black) is familiar to designers and lithographers preparing four-color plates; and Pantone colors are a catalogued group of standard, pre-mixed ink colors, frequently used to specify spot-color print runs.
But XPress goes beyond the ability to mix and match in your favorite color palette. The Style menu, formerly the home of type faces and paragraph specifications, changes into a virtual offset print house, enabling you to select the dots-per-inch screen for halftone reproductions of scanned photos or line drawings. The program also lets you adjust picture contrast, tones, and highlights.

Rumor has it that XPress version 2.0 files can be sent directly to high-end Scitex printing presses. Unfortunately, that's only true for Scitex's version of XPress, called Visionary.

Making What's Good Even Better

XPress adds several text-handling features that were missing from the first version. A major flaw of XPress—its inability to cut and paste text within boxes, or to copy or move text or graphic boxes within the document—has been fixed, adding flexibility to the program. Furthermore, XPress lets you import a page from another XPress document into your file. Style sheets and templates, which are becoming a standard way of storing type specifications for repeated use, have been added.

One of my favorite features is the expanded search and replace function, with which you can change style attributes, such as boldface or point size, as well as individual words. Imagine changing all occurrences of bold type or 12-point Garamond text in a book-length document in one swoop. I used this feature in conjunction with the Font Usage function, which lists all the fonts in a document. When reviewing the list, I noticed a typeface that I did not want in my document. Using the search and replace function saved me from having to proofread every line to find any other occurrences of the typeface.

The Art of Boxing

Quark's box metaphor provides a method for structuring your document into chapters or sections with repeating formats (such as sidebars). Although you cannot extend boxes farther than the boundaries of a single page, you can link them so that text flows throughout the document, from one box to another, no matter what page it's on. The trick is not to change each column into a separate box in order to flow text, however, but to use the boxes to lay out separate design elements, such as headlines, sidebars, or main body text. The boxes can be copied and moved, to standardize complex layouts.

I got a bit dizzy using the linking icon. Unlike PageMaker, which also lets you flow text between pages, XPress uses a linking arrow. When you start to create links, the outline of the active box glitters like a movie marquee and the link is represented by a plaid arrow, stretching down to its partner. There is no way to make these arrows invisible, nor is it easy to undo a botched link. The closest parallel in PageMaker is its window shades, which are easy to move or delete; there is no way to keep track of the text flow in PageMaker, except to read the document. At least XPress's arrows reveal the pathway of your text as it winds its way through a document.
Swivel 3D 1.00

3-D drawing, modeling, and animation tool. Pros: Excellent user manual; linking allows 3-D objects to have moving parts; intuitive user interface; fast 3-D rendering; extensive animation features. Cons: Size of 3D World View is limited; drawing is mainly freehand; no CAD-like numeric input for drawing objects, only snapping to a grid; rotated polygons limited to 48 facets; uses only one light source. Company: Paracomputer. List price: $395. Requires: 1MB; 1MB of RAM for S version; 2MB or more for L version; 2MB recommended for color.

Every once in a while a new software product surfaces that provides a significant new capability for particular applications. Swivel 3D provides more than just 3-D drawing and modeling; it also animates and allows you to create 3-D models of objects with moving parts.
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PC Tools/Mac.
you define numerically the allowable amount of movement and the allowable range of attitudes of the parts of an object.

You use the standard Mac II color wheel to color an object. On a monochrome Mac, shaded renderings automatically produce either gray shades or dithered patterns, depending on how many gray shades your hardware can handle (Mac Plus and SEs will always show dithered patterns).

You have a choice of getting wireframe, hidden-line wireframe, shaded, shaded with outlines, or contour shaded renderings. On color Macs, the shaded renderings look lifelike. You can request automatic shadowing when you want, and you can move the single light source. Most 3-D products provide multiple light sources, so Swivel 3D is comparatively weak in this area. However, it makes up for this weakness by letting you add surface detail to a 3-D object. Swivel’s light source can project any pictorial image from the Scrapbook onto a flat surface or wrap the image around a 3-D object.

Move Over, Disney
Swivel 3D has many features for producing animations. Place an object at the beginning and end locations and orientations, tell Swivel 3D how many frames (cells) to create to get from here to there and off it goes. You can make the object grow or shrink, and you can change its World View orientation. Swivel then generates a series of images and either places them in the Scrapbook or creates a series of PICT files—one PICT file for each frame. You also have the choice of storing output in Paint-type or Draw-type formats.

These Scrapbook images or PICT files can then be used by other programs (such as VideoWorks II) to produce animated sequences of 3-D objects with moving parts.

A Tweening dialog facility gives you a number of options for creating and storing sequences, including a Fast Tween option that allows you to preview animation sequences in real time, albeit in outline form.

ParaComp also has a Command File Language capability that is described in a booklet provided by the company only on written request. Entitled “Script Command Set,” the booklet outlines how to create text lists that describe objects and their movements. It is similar to a programming language and could be useful to advanced users who want to do the keyboard input required.

Inside the Box
Swivel 3D comes with two disks and an excellent 146-page user manual. The Program Disk contains two versions of Swivel 3D: 1.00L is for systems with 2 megabytes or more of RAM; and 1.00S is for users with less than 2MB.

The Image Libraries disk contains folders with finished sample images, tutorial files, and libraries entitled Alphabets, Components, and Simple Extruded Forms.

The Swivel 3D manual is concise and well-written; it’s well illustrated and contains numerous tutorials. Some tutorial sessions use the object libraries supplied with the program, others have you create new objects.

Would I Buy It?
Swivel 3D packs 3-D value and power in an inexpensive package. It is well designed and well documented. Swivel 3D’s user interface is almost self-explanatory and can be mastered in one session. The linking capabilities have many uses in animation as well as in demonstrating or simulating how things operate. Even though Swivel 3D currently lacks numeric input for drawing objects, it should still be in your library if you deal with 3-D images.

—David L. Peltz

See Where to Buy for contact information.

AppleFax Modem 1.1

Modem and software for transmitting and receiving facsimile documents. Pros: Compatible with Group 2 and 3 facsimile machines; supports 9600-baud file transfers with other AppleFax modems; includes fax polling and “in care of” addressing at AppleFax stations. Cons: Does not work in the background under MultiFinder; received fax documents are barely legible on the Mac; fax documents do not retain proportions and scale of original. Company: Apple Computer. List price: $7.29. Requires: 1MB.

Faxing Your Mac
The AppleFax Modem is a compact, platinum-colored box that comes with the AppleFax application and a driver for use with the Chooser. The package also includes the ImageWriter LQ fonts, which ensure best quality when sending a fax file to a facsimile machine. Installation for both the hardware and software is straightforward and well explained in the manual. The unit comes with a separate power supply.

There are two different methods for transmitting a fax document. First, when you’re in an application, you can select the

(continues)
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* Sheldon Needle survey. 1988
AppleFax Modem with the Chooser and send a document immediately. Second, if you'd rather wait until a series of documents is created or wait for a time with lower phone rates, you can save files in their applications' format or as fax files. Then you group files for mailing to one address—or identify a group of addresses that will receive a document—and set a time for transmission. To save on phone costs, AppleFax lets you receive any incoming fax mail from the station to which you're sending a fax, so long as that station is an AppleFax Modem.

With the AppleFax application, you can create a series of address books that include phone number, station ID, best time to call, and information about the receiving equipment. An address can consist of a single station or a group of stations; an address can also include an "in care of" line, for forwarding to another fax station. Using AppleFax you can assign a password to your station.

When you've accumulated several fax documents for transmission, you can send the group of documents in one envelope (see "May I Have the Envelope, Please"). If you choose the Send Station ID Message option, then your station ID and the current date and time appear at the top of each page. AppleFax keeps a log of fax traffic, and has options for viewing and printing fax documents.

Despite Apple's delay in releasing the AppleFax Modem (it was originally announced last August and was slated to be available before the end of 1987), AppleFax still can't function in the background under MultiFinder. AppleFax must be the active application under MultiFinder in order for you to receive incoming faxes. In effect, this turns the Mac into an expensive fax machine. Also, the AppleFax Modem presents a dialog box that gives you the choice of picking up the phone for an incoming call. But if you do, that caller has to call again to transmit a fax to you. You cannot switch from voice to data transmission in one call.

Since the AppleFax Modem can exchange files only with other AppleFax modems, it includes a pass-through port for connecting another device, such as an ordinary modem or a printer. The AppleFax Modem powers up in the fax mode, but pressing the switch on the front of the modem puts the unit in pass-through mode. However, you can't use the AppleFax software while the modem is in pass-through mode (say, to update an address book), since AppleFax will not launch unless the modem is turned on and set to the fax modem mode. You must turn on the AppleFax Modem and set it on pass-through mode to access another device, which strikes me as another design flaw.

**Documents Compared**

These two screen shots illustrate the difference in image quality between the original Mac document (prepared using MacDraw and ReadySet-Go) and a document received from a facsimile machine. The original was printed on a LaserWriter and then transmitted to the AppleFax Modem; the result is this screen from the View Fax window (bottom).

**Dealing with Documents**

You must exercise great care when preparing documents for faxing, particularly graphics files. Every fax I received using the AppleFax Modem was reduced by about 10 percent, while every fax that I sent to facsimile machines was enlarged by about the same amount. Plus, the vertical distortion is not the same as the horizontal distortion. This would cause havoc for an engineer sending CAD/CAM files or for a publisher receiving ads that must fit within certain dimensions. (I've been unable to determine if these effects are caused by the AppleFax Modem's not having a standard fax resolution. Most fax machines are either 200-by-100 lines per inch [lpi] or 200-by-200 lpi, but Apple does not state the AppleFax Modem's resolution.)

The View Fax option lets you open received fax documents in a window on the Mac. But don't expect to be able to read them (see "Documents Compared"). The software does not provide a zoom feature to allow you to read a fax on the Mac. Documents I received were largely illegible, due to the screen's resolution; it wasn't until I printed them on a LaserWriter that I could read them.

Printing on an ImageWriter doesn't improve quality much, either. Only laser printers can duplicate true fax quality. And if you're planning to receive a large number of fax documents, you'd better reserve a lot of disk space. Files that use less than 10K of disk storage in original form take up 200K or more when received over the AppleFax Modem. (Files saved in fax form for later transmission are usually smaller than the originals.)

When I used View Fax, two other things bothered me as well. First, the view window lacks a zoom box. Second, when viewing a fax document, I couldn't print it. You must first close the view window and then select Print Fax.

**Room for Improvement**

The AppleFax software could be made more convenient. For example, you must insert a 7 in front of all long-distance telephone numbers for the dialing sequence to be correct. It would be preferable if you could define a local area code and have the modem automatically insert a 7 for all other area codes. Also, although you can set the number of times the modem will redial if the receiving fax is busy, you... (continues)
THERE'S MORE THAN ONE WAY TO SCAN A CAT

When you want to create graphics with your Macintosh, there's no need to pussyfoot around with anything less than ThunderScan. ThunderScan* turns any printed image into a detailed, high resolution Macintosh graphic. Then, with a powerful set of software tools written by Mac developer Andy Hertzfeld, ThunderScan lets you change, enhance and save the image in a wide variety of ways.

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Reviews

get no indication that the line is busy and the modem is redialing.

As it stands, the AppleFax Modem comes across as a half-hearted attempt to provide fax capabilities to Mac users. While it does allow you to create and transmit fax documents directly from Mac applications without printing them, you'll be disappointed with what you receive from other fax machines. Many of the AppleFax Modem's features are optimized for connection with another AppleFax Modem, which makes it a reasonable purchase if your office doesn't already have a fax machine. If you're contemplating sending fax documents from the Mac, I suggest that you wait until AppleFax runs in the background and you can do more with the program even with the AppleFax Modem turned off.
—Dave Kostar

See Where to Buy for contact information.

DeskPaint 2.0 and DeskDraw


When the Macintosh was first introduced, pasting graphics into a word processing document was considered quite a feat. The possibilities seemed endless—you could dignify your document with a logo, clarify it with a chart, or dress it up with a graphic. In practice, of course, adding a graphic wasn't so simple; it meant quitting the word processor, launching MacPaint, creating the artwork, quitting MacPaint, and reopening the text document, a convoluted process that invariably took several minutes.

The invention of graphics desk accessories such as DeskPaint have eliminated such convolutions. With virtually an entire art department in a DA, you can add visual flair on the fly, without exiting the program you're using.

Metamorphosis

DeskPaint (left window) and DeskDraw are both open at once. Clicking on an element with the Auto Trace tool makes the DeskPaint drawing sprout a shimmering outline. Once copied and pasted into DeskDraw, the drawing becomes object-oriented, complete with MacDraw-type handles: alterations, like shading the sunglasses or straightening the tiny notches in the chin, are easy to make.

Double Features

DeskPaint 2.0 boasts a list of features that reads like a wish list for the ultimate paint program: editing at any resolution up to 4000 dots per inch; browsing; editing and slide show of MacPaint, PICT, or TIFF graphics files; adjustable-spray airbrush; distortion; free rotation; and so on (see "Keeping in Perspective"). There are even some features not found in MacPaint, FullPaint, or SuperPaint, such as a Charcoal tool for smudging dark areas, a lighten/darken image command, and a text tool that permits you to edit text with standard drag-cut-and-paste methods as you're creating it. If you get lost in this maze of features, the easy-to-use online help system will guide you.

DeskPaint 2.0 would leap to the forefront of the paint programs—especially in light of its Apple menu—if it only had the elegance and intuitiveness of its application-size brethren. Many of the thoughtful touches common to other paint programs—such as the ability to edit the paintbrush, to duplicate an object by dragging while holding down the Option key, or to undo by tapping the tilde key (~)—are missing. DeskPaint can be slow, too; often several seconds pass before it reacts to a command. And when you use the lasso, the selected item's outline doesn't shimmer, as it does in other paint programs. Instead, you see a whole rectangle that shimmers, as though you had used the marquee tool. When you actually drag the selection, only the enclosed object moves. But the appearance of a large rectangular selection is disconcerting, because you're never sure exactly what you're about to manipulate.

Without reading the manual, you would be hard pressed to distinguish between the nearly identical Pencil, Charcoal, and Auto Trace tool icons, or to figure out how to exit the text mode, or to understand why line and pattern selections change each time you click a new tool icon. The manual itself is disappointing; even though graced by profuse illustrations, it exhibits appalling syntax and spelling errors (including 40 misspelled occurrences of the word marquee).

What's the Object?

One of the biggest limitations in the original DeskPaint was its inability to edit object-oriented (PICT or MacDraw-type) graphics, which have several advantages over bitmap (MacPaint-type) drawings. For example, MacDraw objects can be reshaped, resized, or dragged out from beneath other elements of the drawing at any time. And objects print smoothly on laser printers, without the jaggies associated with bitmap art.

To address this deficiency, the developers of DeskPaint 2.0 have added a new DA called DeskDraw, which is an object-oriented graphics editor. DeskPaint 2.0, with DeskDraw, has tremendous potential because DeskPaint now offers an Auto Trace tool that converts bitmaps into objects for use in DeskDraw (see "Metamorphosis").

(continues)

Keeping In Perspective

The tool palette changes to become an array of area-manipulation icons when you select part of a drawing with the marquee or lasso. These are DeskPaint's strongest tools; they work smoothly and allow some spectacular effects, such as perspective. Several of the special effects can be combined—a selection can be flipped, then rotated, then skewed.
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Circle 173 on reader service card
Unfortunately, the concept is not well executed. First, you have to click on both the inside and outside of every single item that comprises a drawing, so the name Auto Trace isn't quite accurate. Second, as in other programs with a tracing feature, the process fails with artwork involving shading, detail, or many small lines. As long as you're converting simple, clean line art, Auto Trace works well.

Once in DeskDraw, you can clean up the art by deleting or rearranging the handles, adding fill patterns, changing line thicknesses, and so on; the laser printout will be clean and smooth. The icons (such as polygons, arcs, text) and menu commands (for example, Send to Back, Duplicate, and Snap to Grid) in DeskDraw are familiar to MacDraw, Canvas, or SuperPaint users. The free-rotation icon works nicely except on text, circles, or rounded polygons, which rotate in only 90-degree increments. In general, even though DeskPaint has more features, you might find DeskDraw easier to work with; its simplicity and freedom from clutter contribute to a feeling of directness and stability that's absent in DeskPaint.

**Drawing Conclusions**

In addition to the two DAs, the package includes the DeskPaint application, whose functions are identical to the desk accessory. But in light of the smoother, more intuitive graphics programs available there would be little reason to consider using it. Only the supreme convenience of its desk accessory format makes DeskPaint/DeskDraw a contender in the graphics market.

Yet if you're using a 1-megabyte Mac and try to run large programs such as PageMaker and HyperCard, DeskPaint and DeskDraw often flash the "Can't do this, out of memory" message, especially if both DAs are open at the same time. One answer, of course, is to buy more memory for your computer. But then you defeat the whole point of DeskPaint/DeskDraw; if you had more RAM, you'd be better off using SuperPaint or any full graphics application in conjunction with MultiFinder.

Use the DeskPaint/DeskDraw package if you need the accessibility of the Apple menu and think you can live with the programs' quirks. But until this pair of desk accessories is polished to a shine, it's not quite a work of art. —David Pogue

See Where to Buy for contact information.

**Personal Writer 15SL 1.1**

*Text/graphics/command tablet with software.* **Pros:** Provides functionality, including handwriting recognition, macros, keyboard shortcuts. **Cons:** Requires lots of memory, disk space, and desk space; needs a fair amount of time and practice to learn to read handwriting; uses only one screen on a multiscreen system. **Company:** Personal Writer. **List price:** $1295. **Requires:** 1MB (2MB for use with applications), hard disk.

Personal Writer 15SL is sort of an input tablet to end all input tablets. It provides the basic function of a graphics tablet—enabling you to draw using a pen instead of the mouse—but does so almost as an afterthought. Its main features are threefold: it recognizes handwriting and translates it into text input; it provides macro-like facilities so you can perform actions with the click of a pen; and it combines mouse and keyboard functions, giving you access to the most frequently pressed keys via the pen and tablet.

The Personal Writer tablet is 16 inches square, and requires a few inches' clearance behind it. The active area of the tablet consists of two sections: an 8½-by-12-inch writing area covered by a thin piece of sticky cork (which does a wonderful job of holding paper in place), and a 4-by-12-inch control area. The control area is divided up into four sections: a keyboard section containing Return, Shift, Esc, Delete, space bar, cursor keys, common key combinations like ⌘-N, ⌘-O, ⌘-Z; a mouse section that lets you use the pen like a mouse over the entire screen; a macro section with 36 macro boxes; and a command section with 12 Personal Writer command icons.

To install Personal Writer 15SL, you copy files into your System Folder, turn the Mac off, plug the tablet into the Macintosh, and turn the Mac back on. You then must teach Personal Writer to recognize your handwriting. This involves using special learning sheets to practice letters, numbers, punctuation, and other symbols. You can also write in text and have the PW 15SL software analyze it, so that it can see how you write in normal situations.

After Personal Writer has learned to recognize (somewhat) your handwriting, you can begin to use it. When Personal Writer is in text-input mode, anything you write on the tablet is translated into a character and sent to your application as if you had typed it. You can do some editing via the tablet by crossing out letters or words. Unrecognized characters appear as question marks; you can then double-click on those characters and tell Personal Writer what they are, helping it to learn even more.

Options abound. A 100,000-word dictionary is available to help improve word recognition; Personal Writer attempts to match what you wrote with what's in the dictionary, making substitutions as it thinks best. You can also have its electronic voice speak aloud whatever you're writing on the tablet. That way, you don't have to constantly look at the screen to see if Personal Writer recognized what you just (continues)

**The 16-inch-square tablet has an active writing area of 8½ by 12 inches. The control area consists of a keyboard section, a mouse section, a macro section, and a command section.**
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wrote. And you can even teach it to replace a single shape with up to 11 characters.

Personal Writer functions nicely as a graphics tablet when you use the pen within the mouse area. You can also activate the entire mouse area (while running), giving you better control and detail.

You can program 36 macro command boxes in the macro area, selecting any of them with a simple click of the pen. The macros themselves can be of two types. Keyboard macros contain text and control keys (tabs, returns, and so forth). Recorded macros can actually learn a complete sequence of commands, including mouse movements, menu selections, and key presses.

**Do You Read Me?**

Did all this work perfectly? No. When I used two monitors, the mouse area only recognized the screen with the menu bar on it. There were a few glitches, usually when multiple applications were running while I used some of the Personal Writer utilities. For best results, you must learn to write letters separately, press down hard with the pen at all times, and leave a good space between words. Double-clicking on desktop icons is difficult; you tend to slide the icons around a bit, because the pen is moving slightly on the tablet surface as you press down to click.

Note also that Personal Writer requires a lot of memory: about 500K. If you're going to run applications on top of that, you really need 2MB of RAM. You can reduce the memory Personal Writer uses to 512K by not loading the code for the ongoing learning process, but only after you have the program well trained. And while in theory you can use Personal Writer on a two-floppy system, in practice you really need a hard disk.

The tablet, with its combined graphics/text capability, user-definable macros, and keyboard shortcuts, could be useful in a desktop publishing environment. For example, you could define several macros that would select different fonts/style/body combinations. A quick click on a box would choose a particular combination. The tablet/pen combination is useful for fine graphics work, especially for anyone not accustomed to sketching with a mouse.

As for Personal Writer's ability to read handwriting, the phrase that comes to mind is "a solution in search of a problem." It could be useful in filling out forms, but only after the person using it has gone through the lengthy teaching/learning process. It might have uses in word processing, but entering text via handwriting is tedious, slow, and error-prone, even compared to simple hunt-and-peck typing.

The PW 15SL is nice, but at $1295, it's also quite expensive. A less expensive solution might involve a graphics tablet that costs less (such as the Summagraphics Bit Pad Plus at $495) and one of the various macro software packages. If you really need handwriting recognition, the Personal Writer 15SL may well be the product for you. In the long run, though, it might be simpler to learn how to type.—*Bruce F. Webster*

See *Where to Buy* for contact information.

**Acknowledge 1.0**

*Macintosh communications toolkit. Pros:* Embedded telecommunications programming language; modular data management; automatic phone journal; automatic script generation; many bundled applications with source code; support for third-party developers; plethora of other features. *Cons:* Poor documentation for non-technical users; complex programming; hefty price. *Companies:* SuperMac Software. *List price:* $495. *Requires:* 512KE; hard disk.

Acknowledge calls itself a communications toolkit and actually lives up to that name. This excellent package consists of the Acknowledge program itself, a few stand-alone utilities, and several types of files used by Acknowledge, including Connection files, Service files, Lookup Tables, Phone Journals, record files, and text files.

Connection files contain Connections, Acknowledge's name for a given telecommunications setup. Among the connections that come with Acknowledge are a terminal emulator, a bulletin board system, an electronic mail manager, and a general online services program. Connections are written in TAL (Telecommunications Access Language), Acknowledge's programming language.

Service files function like TAL libraries that can be used by several Connections. For example, the CompuServe Service file contains routines for logging on to and off of CompuServe (among others), while the Hayes Modem file contains routines for controlling a Hayes-compatible modem.

Lookup Tables contain information such as phone numbers, network addresses, user names, and passwords, each associated with an identifier. Connections and Service files can access those items by referencing the identifiers.

Phone Journals keep track of the date and time, service name, phone number, elapsed time, and service user ID for each call. You can open up and view the Phone Journal, sorting it by any of those fields. You can maintain multiple Phone Journals, edit them, copy their information to other files, and otherwise manipulate them as you would other kinds of text files.

Record files allow you to ask Acknowledge to record your interactions while you are calling up another computer. Acknowledge will then convert the recording to TAL code that you can use to create Connections and Service files.

And text files are just that—regular text files (though they have a special Acknowledge icon). They can hold the output from an online session, documents that you want to upload to another computer, or text that you've cut and pasted in from a screen display.

**Customizing Communications**

TAL is a major aspect of Acknowledge. It has over 250 commands, keywords, predefined variables, and operators. The language itself resembles current BASIC implementations (optional line numbers, alphanumeric labels, while loops) with some event-oriented control structures. Programming in TAL isn't terribly difficult, but it can get messy, an indication that TAL needs better control structures.

As mentioned, Connections and Service files are written in TAL, and it's possible to do source-level debugging (with (continues)
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Circle 243 on reader service card
tracing and single-stepping) while running under Acknowledge. But a connection consists of more than just TAL code. You can define menus, with sections of TAL code associated with each menu item. You can define dialog boxes, again interacting with TAL code. And you can create icons to represent a given Connection within a Connection file.

Acknowledge comes with source code for most of its Connection and Service files, so that you can see how certain things are done and adapt the code for your own uses. It was very easy for me, with some judicious copying, to add BIX to the On-Line Services Connection and to create a separate Service file for BIX (see "Windows Galore"). Creating or adapting dialog boxes or icons isn't quite as easy; you have to use AckEdit, a custom version of Apple's ResEdit (resource editor) utility.

Acknowledge also has a Communications Control panel that lets you define your communications settings, including baud rate (300 to 57,600), duplex, terminal type (TTY, VT52, VT100), protocol (MacBinary, MacTerminal, Text, Xmodem, Xmodem Text, auto select), communications port, and character set (United States, United Kingdom, German, Danish, and others). These settings apply to all Connections and Services, so you may need to reset them manually for individual sessions.

Not for the Timid

The obvious target for Acknowledge is a corporate environment—obvious for three reasons. First, Acknowledge is expensive; hackers, home users, and small businesses aren't going to plunk down $500 for a communications program. Second, it has the potential for hiding most of the confusing and often low-level aspects of telecommunications behind a Mac interface, allowing executives to avoid tedious mucking about through communications systems. Third, it requires a full-time programmer to get beyond the canned solutions and simple script generations.

Acknowledge might crack a secondary, smaller market, that of developers. For another $500 (per year), you can become an Acknowledge Certified Developer—if your application meets with SuperMac's approval. As a Certified Developer you can distribute up to 250 copies of your application with a special (nonprogrammable) runtime version of Acknowledge; distribution of more than 250 copies requires additional licensing fees.

If Acknowledge has a major failing, it's this: the nontechnical user is going to have a hard time getting started with this package. The User's Manual is a thin (74 pages) book that documents more than it instructs. Compounding the problem is the lack of agreement between the User's Manual and the distribution disks. Chapter 2, "Getting Started with Acknowledge," refers to the Acknowledge Master Disk, and that is the name that appears in screen shots. The appropriate disk (out of a set of five) is actually labeled Acknowledge Application Disk, and its volume name is simply Acknowledge. Chapter 3, "Running Connections," makes heavy reference to two connections, MiniTerminal and Online Services. What it doesn't tell you is that those Connections are not in the Connection files folder that you were instructed to copy from the Application Disk. Instead, they're hidden within a Connection file named Samples, which itself is in a folder on a different disk, with MiniTerminal labeled just Terminal.

The Programmer's Manual isn't much better. It's thick (278 pages) and detailed but doesn't do a great job of teaching TAL programming. Its only tutorial section shows you how to use the recording feature to create a Connection; it gives no real instruction in designing and implementing a Connection of any complexity. Like the User's Manual, it forgoes instruction for documenting. The TAL Reference Manual (213 pages) helps fill in the gaps. The examples for each item (command, variable, and so on) are especially useful. It is clear, however, from the Programmer's Manual and the TAL Reference Manual, that programming under Acknowledge is not for the novice.

Even with these weaknesses, Acknowledge is an impressive package that does many things right and that can take most of the hassle out of telecommunications. It will probably make great inroads into the corporate market, becoming the business power user's telecommunications package of choice. What about the nonbusiness user? As for me, I was doing most of my telecommunications on an MS-DOS system, since the software there was so much better than MacTerminal. Now I'm back on the Mac for good.—Bruce Webster

See Where to Buy for contact information.

Two NuBus Prototyping Boards


Hurdler III. Pros: 12-bit parallel port; three 16-bit timers included; easy interface to popular LSI interface chips; auto-configuring device driver included in ROM; good documentation including driver listing and board schematic. Cons: Smaller wire-wrap area than MacProto. Company: Creative Solutions. List price: $279.

When the Macintosh first brought a consistent and friendly user interface to software, the only real cries of despair were heard from developers. Faced with the sometimes daunting task of learning a whole new way of writing user interfaces and having to master three volumes of Inside Macintosh (Addison-Wesley, 1985) before they could...
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translate their ideas into Macintosh realities, many would-be software authors turned away from programming for the Mac until superior tools, like HyperCard, made the task of creating Macintosh software easier to tackle.

A similar situation now faces hardware developers who wish to create add-in boards for the Mac II. In order to get performance and flexibility, the Mac II uses the NuBus architecture. Apple has created a system that can support add-in boards without using the configuration jumpers or switches common on most other computer peripheral boards. To further simplify installation, the Mac's designers eliminated the need to reconfigure the operating system or modify start-up procedures to install a properly designed board; driver installation can be almost automatic. Just as designing the circuit that you're trying to interface. Fortunately, two products that make building a board for the Mac II easier are now available. MacProto from Adex Corporation and Hurdler II from Creative Solutions are prototype boards that implement the basics of the Macintosh II interface on a NuBus board, but leave a wire-wrap area to allow you to attach your own circuitry to the interface. Although neither of these boards eliminates the need for Designing Cards and Drivers or Inside Macintosh V, they do address some of the trickier issues of NuBus and Mac II interfaces, and they allow you to move to the heart of your project.

Both boards handle address decoding, byte swapping, and latching of address and data during bus cycles to ease the timing requirements for the user circuit. Both have space for a slot-declaration ROM. Both also have a bidirectional parallel port to provide a simple interface to circuits that only need low-speed data transfer. Both boards also operate as NuBus slaves; all transfers must be initiated by a master processor (generally the Mac II system board).

**MacProto**

MacProto's approach is probably too simple for most applications. It supports a slot-declaration ROM and a single 8-bit-wide parallel I/O channel. Two bits of the parallel port are used to drive a multicolor LED that's convenient for testing and diagnostics, but those two lines are also available for user circuitry. Another bit of the port is dedicated to interrupt service, so only 7 bits are available to the user. This shortcoming and the lack of available handshake lines make the parallel port cumbersome to interface with circuits that need to transfer more than 5 or 6 bits at a time.

MacProto doesn't use the Mac II's reset logic but contains its own power-up reset circuit, which requires a 30-second wait between power off and power on to be sure the board is properly reset.

Although MacProto's slot-declaration ROM has the basic information required for the Mac II to find the board at power up, it doesn't have a driver or the code necessary for the board to find its own slot or install its own driver. If you're using the ROM supplied by MacProto, the supporting software must be hard-wired to a specific slot or must query the user for the slot number the board is installed in.

MacProto isn't particularly well documented. You have to do a lot of reading between the lines (or probing with an oscilloscope) to determine what's really going on with some of the signals. The programming examples are trivial and accompanied by little explanation, and Adex has not included a schematic of the board.

Because it takes such a simple, barebones approach, MacProto has a large wire-wrap area left over for your circuit. Still, MacProto remains little more than a Mac II-size wire-wrap board with a basic NuBus interface. Unless you have the capability to write your own drivers, program EEPROM, and design much of the interface yourself, MacProto probably won't do much to ease your design effort.

**Hurdler II**

The Hurdler II, from Creative Solutions (the same company that markets MacFORTH), is a more sophisticated approach to Mac II board prototyping. The Hurdler II has a built-in 12-bit parallel port to allow simple 8-bit transfers with a full handshake. The port is implemented with a Zilog Z8536, which also provides three 16-bit timers and eight levels of vectorized, prioritized interrupts. Support circuitry lets you connect other popular LSI interface chips—Motorola MC68230, MC68901, and Zilog's Z8530 (the same chip used to implement the Mac's printer and modem ports)—with no additional glue logic.

The Hurdler II slot-declaration ROM has a completely functional driver that automatically installs and configures at boot time. It allows access to all of the features of the Z8536 and many user-implemented functions through standard Macintosh Device Manager calls. The manual includes a thoroughly explained listing of the driver, and you can license the driver source code from Creative Solutions if you wish to include it in a production product.

The Hurdler II is full of nice little extras. The excellent documentation includes a full schematic of the board. Two alternate connectors are supplied for providing an outside-world connection (DB25 centronics parallel and 50-pin IDC). Its design allows you to replace the slot-declaration ROM with a 1-byte-wide RAM chip for testing and debugging your own drivers. In short, Hurdler II is an effective tool for getting a Mac II add-in board up and running with a minimum of pain.—Ron Risley

See Where to Buy for contact information.
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Data acquisition and Control Systems


MacPacq. Pros: 10-kHz maximum acquisition rate; HyperCard, BASIC, and Pascal interfaces available; 64K onboard memory. Cons: Macro control language takes time to master. Company: Biopac Systems. List price: $1195 (includes PacqManager software). Requires: 512K.

Data acquisition cards for the SE and the Mac II are now available in great variety. For Mac II owners, and for SE owners who can dedicate their SE’s only card slot to a data interface, an internal card is a tidy solution. For owners of older Macs, or for SE users who need to use the slot for an accelerator or other board, a stand-alone data acquisition system that uses the Mac’s serial port is the obvious choice.

The ADC-1, from Remote Measurement Systems (RMS), and the MacPacq, from Biopac Systems, are stand-alone data systems. Each is about the size of a cigar box, weighs approximately two pounds, and features screw-terminal strips for analog and digital I/O lines. They both use low-power ICs, so that extended battery-powered operation is possible. Despite the hardware similarities, and the general-purpose character of any data acquisition device with computer-controllable I/O, these systems are actually optimized for different applications. If you want to read and respond to a set of environmental monitors or check sensors distributed through a building, the ADC-1 can do the job, but if you are interested in scientific data acquisition and control of lab instruments, the MacPacq is a better choice.

ADC-1: A Dedicated Controller

The ADC-1 offers 16 analog input channels, 4 digital input channels, and 6 output lines for control of relays or low-voltage devices. It communicates with the Mac through the serial port—it’s basically an RS-232C peripheral. A unique feature of the ADC-1 is a transmitter for BSRX-10 control modules, which enable you to use your computer to manage home appliances over AC power lines.

Although the ADC-1 has been tested in a variety of academic data acquisition applications, it is more typically used in the field of biology than in the electro-optics field. The reason for this is the accurate but leisurely Interisil 7109 at the heart of the ADC-1’s circuit board. This 12-bit converter normally operates in auto-zeroing mode at 20 conversions per second; this rate can be boosted to 120 conversions per second at some cost in accuracy. The 20 conversions per-second rate is adequate for monitoring pH, temperature, and other slow-response sensors and for use with chromatography detectors. A university research group has developed a dedicated chromatography software package for the ADC-1. Nonetheless, the ADControl software can be adapted to control, for example, temperature and humidity in a building or an environmental chamber (see “Playing by the Rules”).

A HyperCard stack included with ADControl offers a simple, program-free mode of control. This is definitely a trend: of six new data systems examined for review, every one features a HyperCard interface, at least as an option. In a bank in the Southwest, for example, one ADC-1 stack answers the telephone and then announces the time and temperature.

MacPacq: Packing In the Data

The MacPacq features eight analog input lines and eight digital I/O lines. While the MacPacq’s A/D converter offers only 8-bit resolution, it can perform 10,000 con-
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Going through Channels
The PacqManager software for MacPacq makes it easy to set up the Mac as a dedicated multichannel chart recorder. The Acquisition menu, besides controlling a simple oscilloscope-like realtime mode, enables you to use the MacPacq as a remote (not connected to the Mac) high-speed data capture station.

versions per second. This fact alone opens up a range of applications that are not possible with the ADC-1. For example, you can program the MacPacq to capture high-speed transients directly into its 64K data buffer for readout by the Mac, and the MacPacq can do this in programmed mode in an electrically "difficult" environment (large fluctuating electromagnetic fields) while physically disconnected from the Mac itself. While the MacPacq can also handle general control functions, the PacqManager software system emphasizes data acquisition rather than AC-device control.

As a result, it's easy to use the MacPacq as a replacement for either of two laboratory workhorses, the chart recorder or the oscilloscope. The oscilloscope function corresponds to a single choice under PacqManager's Acquisition menu, and the available acquisition modes for sampling and triggering are all reminiscent of standard Tektronix scopes (see "Going through Channels"). A preprogrammed application called ChartRecorder, included in the package, enabled me to set up a two-channel chromatography system in ChartRecorder in five minutes, practically without consulting the manual.

Programming in PacqManager's macro language provides more challenge than these exercises. For serious use, I highly recommend one of the $95 language modules (Microsoft BASIC, True BASIC, or the Turbo Pascal module tested for this review); the HyperCard stack, HyperPacq, is another option at the same price. Both HyperPacq and the stack that RMS includes with ADControl offer a small-scale version of the capabilities in National Instruments' LabView package.

Tangerines or Oranges
Both systems are good values and perform to their specifications. Both boxes contain well-designed circuit boards showing no signs of rework or postrelease modification. For low-speed data acquisition and control, the ADC-1 will satisfy most requirements, and it's well developed as a home/factory/office control device. For general-purpose laboratory work, the MacPacq's faster converter and more sophisticated scientific applications software make it a better bet. It's also encouraging to see the visual-style instrument interface that was introduced commercially in LabView now appearing in low-cost HyperCard versions.—Charles Seiter

See Where to Buy for contact information.

LightspeedC 3.0

Integrated C development environment. Pros: Easy to use; doesn't compromise capability; well documented and easy to learn; integrated source-level debugger; reasonably priced. Cons: 2MB of RAM required to run debugger. Company: Symantec. List price: $175. Requires: Mac Plus, 2MB of RAM and MultiFinder to use the debugger; hard disk recommended.

With its previous programming systems (MacPascal, the original LightspeedC, and Lightspeed Pascal), Think Technologies (now a part of Symantec) has built a reputation for delivering capable, reasonably priced, and easy-to-use development environments. LightspeedC 3.0 maintains that reputation by adding a source-level debugger to version 2.15—further enhancing one of the most easy-to-use software-development environments available on the Macintosh.

The LightspeedC environment is completely integrated—there are no separate editor, compiler, or linker applications. As with previous versions, the project document forms the foundation of LightspeedC 3.0, maintaining all the information needed for the development environment to intelligently compile applications. This includes the interdependencies of the source files, the object code of the compiled sources, and optionally, the source-level debugger's tables.

Having all the vitals in one place for a program under development allows LightspeedC to compile, link, and launch the program with a single command. It also provides for an automatic make capability—LightspeedC only recompiles those files that have changed since the last compile.

The Editor
The functional, multifile text editor that is part of the LightspeedC programming environment is virtually unchanged since the previous version. It provides all the basics you'd expect—capabilities like autoindent, font control, search and replace—and it adds a few features that enhance the day-to-day functionality of the editor. For example, the search-and-replace capability facilitates more complex text manipulation by working across multiple files and letting you search and replace using regular expressions (like the UNIX grep command). The editor also balances parentheses and brackets—helpful in tracking down annoying errors in syntax when compiling.

LightspeedC's text editor has a couple of features that are as useful as they are unique. Holding down the option key (or the ⌘ key) while clicking in the title bar of a source file's window pulls down a menu that lists all the header files included in that source file. Selecting one of the header files opens a new window containing that file. The editor also allows you to hold down the Option key (or the ⌘ key) and double-click on any symbol in the source file to immediately get to the place where the symbol was defined—very helpful in traversing source code.

(continues)
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The Compiler

The fast LightspeedC compiler generates either 68000 or 68020/68881 binaries at a speed in excess of 15,000 lines per minute on a Plus or an SE. It supports all that is currently considered standard C (including function prototypes) and promises to conform to the ANSI (American National Standards Institute) standard of the C language soon after that standard is finalized. The compiler also supports inline 68000 assembly language, though it doesn’t generate assembly source from C source files.

To speed up an already fast compiler, LightspeedC 3.0 supports precompiled header files, which dramatically speed up the compilation of a program by effectively reducing the number of source lines the compiler needs to process. Porting C source from other environments is facilitated by the fairly complete standard C and standard UNIX libraries provided with the system.

The Debugger

Although it requires a minimum of 2 megabytes of RAM to be fully functional, certainly the most notable feature of LightspeedC 3.0 is the source-level debugger. Based around MultiFinder, the debugger integrates nicely into the rest of the LightspeedC environment. When you activate the source-level debugger option, LightspeedC automatically invokes the debugger after you have successfully built the program. In addition to the program’s windows and menu bar, LightspeedC adds two more windows: one displays the currently executing source file; the other shows variables and data structures.

Within the source window, you can set and change breakpoints, move in and out of functions, and observe the current call chain through the clever use of a pop-up menu. Switching between the source observation window and an editing window requires only a single command. The data window lets you examine and modify the values of variables, including structures and unions, with an easy, mouse-based interface. For example, double-clicking on a pointer automatically dereferences it, and double-clicking on a structure opens a new window displaying the field names and values of that structure.

General Impressions

LightspeedC is probably the most usable C development environment available for the Macintosh. Because of its well-designed interface, you find yourself able to focus on programming work rather than spending undue amounts of time learning to use the development system. However, LightspeedC 3.0 is not without its shortcomings, though most complaints that I have could be considered nit-picking. I’d like a few more bells and whistles in the text editor (text markers, for instance), and it would be nice if LightspeedC were extensible. If a programmer could add tools to the LightspeedC environment, that would enhance its functionality. I’d also like to see an integrated resource compiler. With the otherwise comprehensive development environment, it makes sense that creating resources should be more integral to the build process than having to go to ResEdit or some other external resource editor.

Still, LightspeedC remains the best-performing C compiler available for the money. Its minor shortcomings are more than compensated for by the fact that it embodies the same high standard of usability that went into the Macintosh itself. And LightspeedC seems to be driving the Macintosh interface philosophy into the area of software development, where people have not heretofore recognized the need for clear, intuitive interfaces.—Jim Takatsuka

See Where to Buy for contact information.

Datacopy 830
Flatbed Scanner

Scanner. Pros: Flatbed design allows easy scanning of books and large artwork; software allows gamma correction and provides some image processing features. Cons: Expensive; can’t select or alter irregularly shaped area within an image; minor bugs. Company: Datacopy Corporation. List price: Scanner, $2800; SCSI interface, $200; MacImage software, $495. Requires: 1MB, SCSI port, hard disk.

Conventional wisdom holds that the more levels of gray a scanner can detect, the better its images will look. Given a choice between a 6-bit scanner (which can discern 64 gray shades) and an 8-bit one (which detects 256), most people would take the 8-bit unit—and shoulder the burden of finding disk space for the larger image files it creates.

Technically, “the more bits, the better” is a sound rule. In practice, however, discerning between 6- and 8-bit scanned images is difficult. Indeed, the Datacopy 830 shows that a 6-bit scanner can produce first-rate scans (see “Six Bits Versus Eight”). The 830 is a member of the crowded field of 300-dots-per-inch (dpi) flatbed scanners—photocopier-like units in which the original lies face-down on a piece of glass while the scanning mechanism moves beneath it. (For an introduction to scanning, see “Getting Started with Scanners,” Macworld, November 1988.) The (continues)
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Six Bits Versus Eight
The top image is scanned by an 8-bit scanner (a DEST PC-2020). The bottom image is scanned by the 6-bit Datacopy 830. In these 300-dpi printouts, the 8-bit image reveals more accurate grays.

830's competition includes Microtek Lab's MSF-300Q and Abaton's Scan 300/FB. A look at these products reveals some close similarities to the 830, and for a good reason: all of them are manufactured by Microtek Lab.

Like all of today's scanners, the 830 connects to the Mac with a SCSI cable. And like most scanners, it doesn't have a SCSI connector on its rear panel; instead the 830 uses an adapter box that connects between the scanner and the Mac and translates the scanner's outgoing signals into SCSI, and the incoming SCSI signals into ones the scanner can read. Scanner manufacturers take this route in order to market the same hardware for both the Macintosh and the IBM PC.

That's convenient for them, but the adapter boxes can be clumsy to use. Fortunately, Datacopy's isn't as bad as some. It doesn't require a separate power supply, as do Microtek's and Abaton's. And unlike Microtek's, the Datacopy adapter doesn't require that you remove the case and venture inside to change the SCSI address. You do have to find room for the adapter on your desk—or let it dangle and put undue stress on the scanner's connector.

The Software Difference
The Datacopy 830's SCSI adapter is better than its cousins', but what really sets the 830 apart is the MacImage software. The programs accompanying most scanners have bare-bones gray-scale features. Rarely can you edit gray-scale images or change their brightness and contrast (a process often called gamma correction). For gray-scale work, you need to spend a few hundred dollars for an image-processing program such as Letraset's ImageStudio or Silicon Beach's Digital Darkroom.

MacImage provides the usual controls for adjusting brightness and contrast before the scan, and for specifying the size of the original and whether it's line art or a continuous-tone image. And like most programs, MacImage lets you edit non-gray-scale images in an enlarged view similar to MacPaint's FatBits mode. The program also has excellent file-handling features. It can open and save files in MacPaint, SuperPaint, Encapsulated PostScript, PICT, RIFF, and TIFF.

Unlike its competitors, MacImage allows you to remap gray-scale data to change brightness and contrast after the scan and to obtain special effects such as posterized and solarized images. The program also has commands that perform electronic equivalents to common photographic darkroom techniques. The Burn & Dodge command lets you darken or lighten an image. Reduce & Intensify lets you reduce light tones and intensify dark ones. Add Diffusion blurs an image to create textured or soft effects. All three commands operate on an entire image or on a selected area. Unfortunately, you can't select and alter an irregularly shaped area within an image.

Before scanning, you use MacImage's pop-up menus to specify the characteristics of the scan. You can also use the Image Setup pop-up menu to choose one of 15 combinations that let you quickly configure the software for common scanning jobs. Choosing the Quick Scan Photo option, for example, sets up MacImage to scan a photo at 75 dpi and 16 gray levels. Choosing Gray View 64 Levels sets up the program to create a 300-dpi, 64-level gray-scale image. You can also create your own image setups tailored to your applications—a nice touch.

Alas, MacImage did occasionally choke. The program crashed when I used the Control Panel's Monitors setting to change the number of gray levels displayed on my Mac II. And it often hung when I clicked on a document's close box after using an image-altering command.

There's one other problem with the 830/MacImage duo: it's expensive. At a total cost of $3495, an 830 with MacImage costs a grand more than Microtek's MSF-300Q. The MSF-300Q's scanner software is of the bare-bones variety, but with the money you'd save, you could buy ImageStudio and Digital Darkroom and still have money left over. And the MSF-300Q is available with a built-in SCSI port.

The 830 is a fine scanner and MacImage is one of the better scanning programs I've seen, but neither is priced competitively. If you can get a deal on the pair, I recommend them. Otherwise, shop around.—Jim Heid

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Alchemy 1.1

Digital sound-editing program for keyboard samplers. Pros: Stereo sound-editing features; allows you to transfer sounds between different samplers; reads and writes Sound Lab, Sound Designer, and Dyaxis files. Cons: Doesn’t control front-panel settings; copy protected.

Company: Blank Software. List price: version 1.2 $450. Requires: Mac 512KE, 500K external drive, MIDI interface, and supported sampler; 2MB or more of RAM recommended.

The Mac’s sharp graphics and approachable operating style make it ideal for editing digitally recorded sounds. Musical sound samples, usually 1-10 seconds long, can be stored in the memory of a musical keyboard called a sampler. The sampler plays back a sound—be it a recording of a grand piano, a trumpet, or a choir—in the pitch corresponding to the key you press. In addition, a sampler lets you “play” non-keyboard instruments. (For background on Mac music applications, see “Getting Started with Music,” Macworld, November 1987.)

But creating convincing samples often requires extensive editing. Sampling keyboards provide built-in editing software, but it’s typically torturous to use because samplers lack such interactive niceties as video screens and typewriter keyboards. Armed with a computer and sophisticated software, you can change sound-design headaches into new frontiers for aural experimentation.

Digidesign’s Sound Designer and Blank Software’s Sound Lab were two of the first Mac-based sample-editing programs. Now Blank Software’s Alchemy is ushering in some significant improvements over its predecessors. But it also has some drawbacks that make assessing your needs before buying important.

Alchemy is designed to be the centerpiece of a digital audio network comprising multiple samplers attached to a Mac via MIDI, SCSI, or the Mac’s modem port. From Alchemy’s command post, you can move samples from one keyboard to another, even if the keyboards use different sampling rates (the number of times per second an original sound is measured). Before Alchemy, managing a sound library meant drowning in floppy disks—and still not being able to move sounds easily between samplers.

In the Editing Room

Like Sound Lab and Sound Designer, Alchemy lets you loop, edit, and manipulate digital sound samples in many ways. And like Sound Designer, Alchemy also lets you digitally equalize and mix samples and change their volume. (For a closer look at Sound Lab, see “Reviews,” July 1987; a review of Sound Designer appears in the October 1987 issue.)

But Alchemy has a faster, more responsive feel. One reason is that Sound Designer uses temporary disk files as it operates, but Alchemy keeps opened samples in memory. This means, however, that Alchemy users are more likely to lose work during a power failure or system crash.

Another interesting twist is that Alchemy can open stereo samples and can create stereo samples from monaural ones. You can make changes affecting both channels simultaneously, or edit them individually.

A sound-editing program’s greatest strength is its graphic waveform display, and Alchemy’s displays are more useful than Sound Designer’s. Both programs let you zoom in on a small portion of a sample for detailed editing, but Alchemy helps you keep your bearings by showing a small overview of the entire sample (see “Selected Samples”). Alchemy recalls up to eight different waveform views per window, allowing you to quickly navigate through a complex sample. And Alchemy can load and display as many samples as will fit in the Mac’s memory; Sound Designer can’t load more than three samples at once.

Both programs can display a graph depicting a waveform’s harmonic content, based on a fast Fourier transform (FFT) analysis. (FFT is an algorithm that allows you to break any waveform into a series of sine waves.) Sound Designer’s FFT display is a 3-D plot showing a sound’s harmonic content as well as how the sound changes over time. Alchemy’s 2-D waveform plots lack the latter feature but atone for this omission by allowing you to alter harmonics, in a separate window, to perform resynthesis.

Resynthesis lets you alter the harmonic content of a sound. For example, say you sampled a kick-drum from a record, but a guitar was playing at the same time. With Alchemy, you can remove the guitar from the sample by removing its harmonics. You can also resynthesize to modify existing instrument sounds for special effects.

At least in theory. Unfortunately, Alchemy’s harmonic-editing features lack the thoroughness of the rest of the program’s features. A complex sample can have hundreds of harmonics; Alchemy just doesn’t provide enough tools to tame them. As it stands, the resynthesis procedure makes editing a complex waveform an exercise in manual labor.

A Sound Buy?

Alchemy is an excellent program that’s remarkably easy to use given its sophistication—thanks, in part, to a manual that’s clear and complete (except that it lacks an index).

But the arrival of Alchemy doesn’t mean the departure of Sound Designer or Sound Lab. Alchemy’s sampler-networking philosophy prohibits it from controlling (continues)
The new SUITCASE II is really packed. Now you can have up to 99 suitcase files full of fonts and DA’s, or files containing FKEYs and alert sounds, that you can access at any time—and you don’t have to install them in your System file. Plus you can see in the menu what a font will look like before you use it. By merging PostScript fonts into one family, SUITCASE II unclutters your font menus. And by compressing fonts and sounds, SUITCASE II saves you precious space on your hard disk. So, whether you’re a new Mac user or a dyed-in-the-wool Mac enthusiast, you need SUITCASE II.

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keyboard-specific settings, often called *front-panel settings* because you adjust them with the sampler’s front-panel knobs. Sound Designer, by contrast, is available in several versions, each custom-tailored to a specific sampler. Sound Lab is tailored to the Ensoniq Mirage—a sampler whose front-panel settings are difficult to adjust.

In short, Alchemy mediates between samplers and lets you create a central sound library. Sound Designer and Sound Lab are sampler specialists that let you tame front-panel settings. (Sound Designer II, in development at this writing, will incorporate some of Alchemy’s networking features—but like Alchemy, at the expense of front-panel support.)

Alchemy is faster, more polished, and easier to use than Sound Designer and Sound Lab, but its inability to control front-panel settings is a limitation. If you have only one sampler—especially one with hard-to-use front-panel controls—you must decide whether Alchemy’s second-generation sample-editing features warrant the trade-off. —Jim Heid and Erik Holstinger

See *Where to Buy* for contact information.

**Chuck Yeager’s Advanced Flight Trainer 1.0**

*Flight simulator.* **Pros:** 14 airplanes; beginner to advanced lessons; freestyle, formation, racing, and stunt flying. **Cons:** Airplane quiz must be passed each calendar day; no map, radar, or direction finder. **Company:** Electronic Arts. **List price:** $49.95. **Requires:** 512K.

General Chuck Yeager is the legendary United States test pilot who inspired the original astronauts in Tom Wolfe’s novel *The Right Stuff.* Now he’s endorsing the latest flight simulator from Electronic Arts—the Advanced Flight Trainer (AFT). Designed to give you a test pilot’s experience of 14 different airplanes, AFT is the first 16-color flight simulator for the Macintosh II.

**Pop Quizzes and Lots of Planes**

When you load AFT each new calendar day, the program presents you with an airplane silhouette to identify and a question about it that you must answer—or the game quits on you. The 45-page manual provides the essential information about the planes and the format for reporting test-flight results. But if you just want to fly, the daily quiz becomes a bother.

The smorgasbord of simulations includes Spad, Sopwith Camel, Spitfire, and P-51 Mustang, which are World War I and World War II fighters; Cessna Skyhawk and Piper Cherokee, easy-to-fly domestics; X-1 and X-3 rocket planes from the history of test piloting; F-16 and F-18 fighters and an SR-71 high-altitude reconnaissance jet; and finally, two test pilot’s nightmares and one test pilot’s fantasy for mettle testing. There is optional, realistic sound for each simulation.

Chuck Yeager’s Advanced Flight Trainer is geared for the experienced pilot. Nevertheless, it’s also an excellent choice for a first flight simulator. AFT provides 8 basic training routines and written lessons suitable for beginners, as well as 15 advanced flight exercises, 5 airplane-racing and 6 formation-flying scenarios (there’s only one designated plane per stunt, but you can create up to three stunts using any planes). Racing begins with one opponent, with each victory adding a tougher opponent, until you are racing against four computer-generated opponents. The manual mentions a dialog box that you can use to save and play back races, but version 1.0 does not implement this feature.

**Views and Displays**

The world of AFT is essentially a test course of towering pyramids, massive pylons, and landing strips of various sizes. On a Mac II, color is a big help in distinguishing land mass from airspace. Unlike some simulators, the ground and all structures on it appear solid, even in black and white. To help you judge distance visually, a pattern of spheres gets progressively larger as you descend to the ground. So you might use the stripes on a highway to keep your car on course. However, there are no airport homing signals, nor is there radar or even a map to supplement visual orientation—a serious drawback.

Keyboard commands provide a selection of views in all directions. Unfortunately, the control panel only appears when you select the cockpit view. However, there is a feature called HUD (heads-up display) that displays critical flight information on the front windscreen. The HUD is especially useful when you’re taking lessons; first you observe a maneuver, then you try to match your cursor to the trail of the programmed cursor, and finally you try the maneuver without the programmed cursor’s assistance. HUD operates with all views, but continuous access to the full control panel would be better.

AFT hits a nice medium between simplicity and realism. In its two 800K floppy disks there’s plenty of challenge. On a Mac II, you’ll love the color and the smoothness of the animation. Chuck Yeager’s Advanced Flight Trainer clearly rates a place among top Macintosh flight simulators.—Keith McCandless

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TurboSynth 1.0

Modular synthesis software. Pros: Excellent software implementation of modular synthesis, wide variety of modules provide great flexibility in sound design. Cons: Can't create SND resources; sketchy documentation; no help screens; key disk required. Company: Digidesign. List price: $349. Requires: 1MB, MIDI interface.

In the 1960s, music synthesizers were made up of separate circuits called modules. To create a sound, you connected one or more oscillator modules, for producing basic tones, to one or more sound-modification modules—such as filters, which let through some frequencies but squealed others, and envelope generators, which controlled how the sound's dynamic qualities changed over time. You connected these modules using cables called patch cords. Entwined with patch cords, a modular synthesizer looked like a telephone switchboard with a keyboard.

When advances in electronics made portable, inexpensive synthesizers possible, most synthesizer manufacturers abandoned the modular architecture. The new generation of synthesizers eliminated patch cords and their hassles, but sacrificed the sound-generating flexibility of the modular systems.

Like the modular synthesizers, TurboSynth provides a battery of sound-generating and sound-modifying modules that you interconnect with patch cords. But TurboSynth's modules and patch cords exist only on the Mac's screen. Instead of plugging and unplugging actual cords, you use the Patch Cord tool to draw lines between modules, which are represented by icons (see "Synthesis by Numbers"). Beneath each module are algorithms that mathematically describe what goes on in an oscillator, a filter, an envelope generator, and so on. Click on TurboSynth's speaker icon, and the program crunches through those algorithms to create the sound; then TurboSynth plays the sound through the Mac's speaker (for more accurate sound attach a microphone). When you're satisfied with a sound, you can transfer it over MIDI to any Digitally-supported sampling keyboard.

Using concepts similar to those of a compact disk (CD), sampling keyboards play back recorded samples of pianos and other instruments. Click on the Mac-to-Keyboard icon, and TurboSynth transfers the sound to the sampler, where you can play it in full fidelity.

Sounding Off

A new, untitled TurboSynth document contains one icon—the output jack. To create a sound, you might first add a sound-generating module—for example, an oscillator—by selecting one from the palette and then clicking within the document window. TurboSynth represents the oscillator module with an icon that you can drag to any location. For a simple sound, you could attach the oscillator to the output jack by drawing a line between them. More often, however, you'll want to create complex sounds by using multiple oscillators, combining them with the mixer module, and using TurboSynth's sound-altering modules.

You adjust a module's settings by double-clicking on it to open a window that contains icons and tools of its own. Modules that produce waveforms or envelopes display their output graphically and provide tools for making fine adjustments. Modules that mix or modify sounds provide sliders similar to the Mac's speaker volume control in the Control Panel. Most module windows also contain Get Info icons for assigning descriptive names and making other adjustments.

More Than a Synthesizer

If TurboSynth did nothing more than emulate a modular synthesizer, it would still be a revolutionary program. But it goes beyond that by letting you include sampled sounds as part of a TurboSynth sound. By combining oscillator-generated sounds with sound samples, you can create new sounds that have some qualities of both. A new version of TurboSynth will work with Digidesign's Sound Accelerator Board, which adds CD-quality audio to a Mac II or SE. Digidesign says that combination will allow you to hear the results of module adjustments as you make them.

A sample-editing program, such as Digidesign's Sound Designer or Blank Software's Alchemy 1.1, can save and play portions of synths that both programs can read. As an Ensoniq Mirage owner, I found Sound Designer useful for adjusting a sound's loop points (which cause the sound to repeat when you hold down a key). The Mirage imposes restrictions on loop points, and the Mirage version of Sound Designer works within those restrictions better than TurboSynth does.

Alchemy users can open TurboSynth files saved in Sound Designer format and then save them as SND resources, which can be added to HyperCard stacks. Unfortunately, TurboSynth can't create SND resources, nor does it support Apple's audio Interchange File Format (IFF).

If your main interest in TurboSynth is to expand your sampler's horizons, these shortcomings aren't a major consideration. But TurboSynth's sketchy documentation is. What's there is good, but it isn't enough. TurboSynth can create an infinite number of sounds, but you're on your own in finding the best ways to produce them.

TurboSynth's learning curve is steep. The program needs a hands-on tutorial—ideally, accompanied by an audiocassette—that shows you how to use each module to produce different results. A reference card and help screen showing each icon's name and purpose would help, too.

Even though TurboSynth is not easy to learn, it is an enchanting program that will have you clicking, dragging, and listening into the wee hours. TurboSynth successfully combines the flexibility of modular synthesis with today's software and sampler technology. —Jim Heid

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Circle 297 on reader service card
The computer can help people who have little training in a field do things they never imagined they could. Among the programs I'm reviewing this month is one that lets you create sky charts like an astronomer and another that helps you perform statistical studies even if you can barely multiply.

Like many people, I can identify only one constellation reliably—the Big Dipper. I like star gazing, but not the fiddling with calculations or overlays necessary to create a diagram of the sky.

**Sky Travel 1.0**

Sky Travel 1.0 ($69.95, from Microillusions) makes identifying celestial bodies easy by creating a diagram of the sky for you. Simply specify your observation point (by placing a crosshair on a map location), a date and time, your elevation, and the direction you will be looking, and Sky Travel will calculate the position of the stars and planets and display a view of the sky. You can choose to have the display change in real time, minute by minute; or you can stop the movement or accelerate it up to 64 times real time. You can print your view or save it as a MacPaint file.

The Sky Travel display offers a wide range of choices. For example, it can include constellation or planet symbols, add constellation lines, or show deep space items (those not visible to the naked eye). Once the display is set, you can slowly change your viewing angle and direction and scan the sky. You can have the program find any planet or constellation. You can even look at planets that would be below the horizon, since in the program the earth is transparent.

If you're interested in learning as well as observing, you can click on any star, planet, or constellation and the program will display information about your selection. Sky Travel's manual is also a great learning tool. Only about a third of its 76 pages are devoted to explaining how to use the program (it only takes about 15 minutes to learn). The rest of the manual is a fascinating "Guided Tour of the Universe," with information about such things as Halley's Comet and eclipses, as well as wonderful historical experiments. Do the experiments and you can discover which star guided the three Magi to Bethlehem, and which constellations the Egyptians used to align the Great Pyramid at Giza.

This program has something for everyone from poetic sky-gazer to Trekkie to serious astronomy student. I highly recommend it.

**Crystal Ball 1.0**

Crystal Ball 1.0 (which requires one megabyte) is a relatively easy way for nonmath types to get up to speed in a major area of statistics: probability and forecasting.

Here's how Crystal Ball works. You use Excel, Works, or Multiplan to create a spreadsheet that contains your best guesses of particular quantities. For example, you might estimate 7 as the number of defective products out of every batch of 75, or you might estimate the price of a stock at $65. You then create a formula based on a number of these estimated quantities. For example, the formula might determine gross profit based on the number of defects, the market price, and whether a competitor comes out with a similar product; or the formula might provide the value of a stock portfolio that is based on the combined values of stocks, options, puts, and calls.

After importing the spreadsheet into Crystal Ball, you must define the probability distribution for the estimated value. Determining probability distribution is a complex procedure, but Crystal Ball makes it relatively painless with the combination of a clear manual and illustrative screen graphics. Using the stock you estimated at $65 for an example, if you believe that it (continues)
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**Breakthrough design.** The WorkManager™ System has the ergonomics of high-priced designer furniture systems. The work surface is the perfect typing height for Mac keyboards, and features a comfortable beveled leading edge. A covered, recessed channel holds cables and surge protectors. Built-in sockets handle WorkManager™ accessories.

**Breakthrough construction.** Strong, lightweight structural components are molded of steel reinforced Resinite™ composite. Molded-in color makes surfaces highly scratch resistant.

*The WorkManager™ System.* For people who need workstations as advanced as their computers—from the people at MicroComputer Accessories, Inc.
can be anywhere from $60 to $70, but it is most likely to be $65, you would use the normal distribution, represented in Crystal Ball as a mountain sloping equally on two sides. On the other hand, if you think the value is just as likely to be anywhere between $60 and $70, you would specify a uniform distribution, which is represented by a straight horizontal bar. (There are a total of 12 distributions, including an option for creating custom distributions.)

When you run the simulation, Crystal Ball actually tries out all the possibilities Monte Carlo fashion. If you specify a uniform distribution for your stock, it will randomly select a number from $60 to $70. If you pick a normal distribution, it will tend to choose numbers near the peak ($65). You can decide how many times to perform this tossing-of-the-dice action (normally over 1000 times). For each "toss of the dice," the bottom-line figure (in this case, the value of the entire portfolio) is computed. In the end you get a chart depicting the results. The chart could tell you, for example, that in 70 percent of the tries, the value of the portfolio was $10,000 and in 5 percent of the tries, the value of the portfolio was $-500. This gives you an idea of your chances of success or failure, and helps you plan strategies.

While the program is relatively straightforward, the concepts are not easy for a newcomer to statistics to understand. It will take you at least two or three solid days of practice before you know what you're doing. But compare that with the time it would take you to complete a course in statistics, and you'll be glad you bought Crystal Ball ($395, from Market Engineering Corporation).

2001 Quotes 1.0

In front of me is a copy of Bartlett's *Familiar Quotations*. I'm going to time myself to see how long it takes to find one quotation related to equal or equality. Here goes... okay, it took 19 seconds. Now I'm going to do the same thing with 2001 Quotes 1.0, a HyperCard stack from Chris Tie Associates. I'm starting with its index on my screen so all I have to do is scroll to the word equality and click return—OK, that was about 7 seconds. Less than half the time. And to find a second quote on equality in 2001 Quotes, I only have to press return again. But I can't do that more than two more times, since 2001 Quotes has only 4 cards on that subject; my Bartlett's has over 40.

That's the crux of the matter. 2001 Quotes may be faster, but Bartlett's weighs in with 22,500 quotes, about a tenfold advantage. And 2001 Quotes may not even be faster if I count the time it takes to start up the computer and load the stack. And it certainly isn't faster if I'm working on a plane and have to wait to return to my office to find a quote instead of reaching into my backpack for my copy of Bartlett's. A final consideration—price. The program costs the same as my hardback edition of Bartlett's—$24.95—and you can get a paperback version for less than half that. 2001 Quotes requires 1MB.

If you still prefer the stack to the book, you'll find that 2001 Quotes does have some good features—it has a wide selection of subjects and a variety of quotes from many different points of view. The section on equality, for example, includes quotes from Aristotle, Mao Tse-tung, and e. e. cummings.

Also, 2001 Quotes has a find function that lets you search for quotes by keyword. Sometimes this works fine, but more often you get words used in unexpected ways, or worse, you get the wrong word entirely. For example, when I tried to find quotes using the keyword book, I got a quote from Booker T. Washington.

Personally, I would only give up the greater number of quotes in Bartlett's for a really special program. 2001 Quotes is fun, but it isn't special.

City to City

HyperCard is utilized to much greater advantage in City to City ($49.95 from Ten-Point0). City to City has multiple levels of HyperCard stacks containing helpful information for travelers to any of 30 American cities. The first card for each city sports a scanned photo of a famous landmark and a paragraph describing the city in general. Along the bottom of the card are 12 buttons that take you to information cards about specific aspects of the city. The envelope button provides business information, with addresses and telephone numbers of express mail, post offices, Western Union, and printing services. The place-setting button has information about restaurants and includes codes for type of cuisine, price, and quality. And the man-in-the-moon button brings up a card that contains the names and addresses of all-night or late-night eateries, pharmacies, food markets, and newspapers. There are also cards for lodging, market data, media, sports, shopping, tourism, and transportation.

You can create a card that contains your travel profile—such information as frequent-traveler numbers or airline and car-rental preferences—which can be used by your company's travel planner. And there is a detailed itinerary card on which you can list plane connections, lodging, and appointments. Once you've chosen the cards that are important to you and filled out the itinerary card, you can print a booklet containing a custom packet of travel information.

It can be hard to get the kind of information in this stack—late-night facilities, shopping areas, and places to hear jazz, for example—when quickly blowing in and out of town. If you're an occasional traveler and don't feel like picking up a guidebook at a newsstand, this booklet might be convenient. But the data is a bit limited. For example, each city stack contains only 18 hotels (6 each in 3 price ranges), 2 printing services, and 2 office-supply stores. And there is another potential problem. The program is now only a few months old and the information is still fresh, but there is no guarantee that it will remain so, since the manufacturer has no plans to create regular upgrades.

When I travel on business, I find that I divide my time between my hotel and my appointments. For me, City to City's data is sufficient. But if you have special requirements, you're going to have to input some of your own data. If you will be returning to the same city, or if others in your organization will be traveling there, the input time spent will be rewarded with a well-organized, easy-to-access custom stack of travel information.
Peel this Apple and get Macintosh performance without the Macintosh price.

On the surface, this Apple® appears to be a flawless, shiny Lisa™. But get under its skin and you'll discover Macintosh™ Plus capabilities in all their glory. There's just one way this Apple doesn't measure up to a Macintosh. At $995*, the Lisa falls impressively short of a Macintosh price tag.

Meet the New Lisa with MacWorks™ Plus

We thought it looked like a perfect match: the highly efficient Lisa and the myriad of Macintosh software solutions. On the one hand, there was the Lisa, a professional business computer with an extra-large 12" screen, Macintosh graphic interface, familiar mouse, easy-to-reach internal components, space for an internal hard disk drive, three expansion slots, and a numeric keypad on the keyboard. Then there was the popularity of the Macintosh Plus, with its amazing capabilities, functionality and software applications.

What we did to bring the two together was develop a software program called MacWorks Plus. MacWorks Plus brings Macintosh functionality to the Lisa, plus compatibility with every application that runs on the Macintosh Plus. With MacWorks Plus, the Lisa can run HyperCard, MultiFinder, AppleShare, WordPerfect, Adobe Illustrator and Cricket Draw. (To name a few.)

How We Support Lisa and MacWorks Plus

We do a lot more than market the Lisa and MacWorks Plus. We offer a complete line of out-of-production, new and used Apple compatible products. And we are the only company authorized by Apple Computer Inc. to sell and service their out-of-production equipment. Because of this, we have invested sizeable resources in developing improvements for all of the out-of-production and reconditioned products we sell. Plus, every product that comes from us must pass rigorous Apple quality control tests. We also back our products with a 30- to 90-day money-back guarantee.

Call 1-800-821-3221 for your Apple Lisa

If you like the capabilities and compatibility of Macintosh, but don't like the price, pick the Lisa with MacWorks Plus. To order a Lisa, or get a copy of our product catalog, call 1-800-821-3221 and we'll send your order out today. All major credit cards accepted.
Imagine what you could do with an advanced drawing program that was actually easy to use.

A program that could give you the freedom to create more with your Macintosh® than any other drawing program; even work as sophisticated as the illustrations in this ad.

That's the power of Aldus® FreeHand™ 2.0. And here are some of the things you'll be able to do with it.

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2. Not only can you import PICT, EPS and TIFF images, you can actually work with them. There's no easier way to enhance existing artwork.

3. Choose graduated, radial and patterned fills from our extensive library, or create your own PostScript®-language fill patterns for special effects.

4. Now PANTONE® Colors are available in Aldus FreeHand 2.0. So it's easy to see and specify the colors you want.

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That's the basic rule of thumb with disk drives because you can't risk crashing. And that's precisely why you should buy a Jasmine DirectDrive.® Ranging in storage from 20MB up to 140MB, all DirectDrives have to first pass the Jasmine torture test: 10 million read/write commands with stop starts at low voltages.
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Yet another Jasmine exclusive.
We drive faster than the competition and offer a no-nonsense two year limited warranty.
It's storage you can definitely afford. And given the value of your data and our safety record, you can't afford to consider anything else.

DirectDrive 20—$549
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DirectDrive 70—$999
DirectDrive 100—$1249
DirectDrive 140—$1499

Call for P.O. pricing.
New Products

Information on the Mac’s latest hardware, software, and accessories

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

**HARDWARE**

**ColorMax** A 19-inch color display system for the Mac II with landscape-mounted monitor and display adapter board. Pixel display measures 1152 by 870 and provides 82-dpi resolution. Full-tilt swivel base; front-panel on/off, brightness and contrast controls; and flicker-free screen included. Displays up to 256 of its 16 million colors simultaneously. $5299. Sigma Designs, 415/770-0100.

**CrystalPrint Publisher** PostScript-compatible page printer with 3MB of RAM and 11 built-in font families (35 typefaces). Print resolution is 300 by 300 dpi. Compatible with Mac 512K and Apple IIGS computers. Drum and toner sold separately. $4499. Qume, 408/942-4000.


**FS102 Hard Disk Tape Backup Unit** An 88MB hard disk with access time of 18 ms and a 60MB TEACV tape drive that backs up data at 3.5MB per minute. Management software provides hard disk partitioning, password protection, performance timing, and manual head-parking capabilities. $3995. Everex, 415/498-1111.

**HammerTape Tape Drive** Tape drive with 150MB and 300MB capacities. 150MB unit backs up at 8MB per minute; 300MB unit, at more than 14MB per minute. Backup software supports file-by-file and image backups, and A/UX operating system. HammerTape 150 $1895; HammerTape 300 $2895. FWB Software, 415/474-8055.

**Insite Model 1325 Floptical Disk Drive** Entry-level, high-capacity disk drive with 25MB unformatted removable disk storage and 20.8MB formatted memory. Plugs into SCSI host adapter for the Mac. Single unit $500; volume discount available. Insite Peripherals, 408/727-8484.

**MacDOS SE** MS-DOS coprocessor board for the Mac SE. Lets users run MS-DOS and Mac software simultaneously: Comes with disk-transfer and file-conversion utilities, plus cable to transfer files from PC to Mac. $795. PerfecTek Corporation, 408/263-7757.

**MacStor Capsule** Internal hard disk dealer’s kit. Set the interleave and choose from six different SCSI drivers with Silverlining disk-management software. AppleTalk users can share hard disks over the phone or over AppleTalk cabling with SilverServer networking software. Can be installed on a two-floppy SE without replacing the upper floppy drive. $299. LaCie, 503/684-0143.

**Mac II-Compatible Color Monitors** Color monitors designed for CAD/CAM and similar applications. Available with 15-inch or 19-inch CRTs, at 1024-by-768-pixel resolution. 15-inch model $2195; 19-inch model $2995. Pixelink Corporation, 508/562-4803.

**MBC-625 Base Data Acquisition Board** Data acquisition board for the Mac II and SE. Consists of multifunction NuBus-compatible base board that is capable of accepting piggyback boards. $1290. MetraByte, 508/880-3000.

**MC3200NU Coprocessor** A 20 MFLOPs-per-second, 10 MIPS coprocessor for the Mac II aimed at 32-bit, floating-point intensive applications. This single-slot processor board executes computation-intensive vector and scalar operations for simulation, modeling, signal processing, image processing, and PostScript support. 2MB system, h/w only. $10,000; FORTRAN and C development environment $8500. Mercury Computer Systems, 508/458-3100.

(continues)
New Products

NuView Image processing board for the Mac II. An 8-, 16-, or 24-bit color-image-capture board that digitizes and manipulates real-time images from standard NTSC or RGB source, such as video camera or VCR. Color QuickDraw-compatible. $2099. AST Research, 714/863-1333.


PocketHammer Hard Drive External high-capacity SCSI tape subsystem for the Mac. Compact; available in capacities of 40MB, 80MB, 100MB, and 200MB. Average disk access times range from 14 to 18 ms. $2895. Westcom Computer Systems, 919/746-4961.


Westcom SCSI Hard Drives External and internal model SCSI drives for the Mac Plus and SE. Includes 15MB–20MB public do-

main software and stackware library with DAs, communications, utility, word processing, and database software. Also includes two SCSI ports, and AC jacks. Internal drives start at $415; external drives start at $519. Westcom Computer Systems, 919/746-4961.

SOFTWARE

Atlas Explorer World geography drill and practice software. Has 37 geographical maps, and information on state and province boundaries. Will quiz you on locations or general information for a given region. IBM min. memory. $49.95. Springboard Software, 612/944-3915.

Bookends for Mac HyperCard stack reference-management system. Printouts that can be customized; word processor-style text editor. IBM min. memory. $99.95. Sensible Software, 313/528-1950.

Components General Ledger First in a series of three accounting modules. Flexible set-up: unlimited custom journals, such as cash receipts and disbursements; and forms-oriented output. IBM min. memory. $595. Satori Software, 206/443-0765.

DBase Data management DA that files a variety of information from color pictures to multifont text to calculated figures. IBM min. memory. $129.95. Preferred Publishers, 901/683-5583.

DTP Advisor HyperCard application that combines a graphic-design tutorial with a project-management database and interactive set of forms. Tutorial covers layout, typography, and printing. IBM min. memory. $79.95. Broderbund Software, 415/492-3200.

Focal Point II Time- and schedule-management program with reporting capabilities. All functions are linked. Does project management and task tracking. IBM min. memory. $199.95, $89.95 for registered Focal Point owners. TenPointO, 415/329-0500.

Hard Disk Deadbolt Security utility program that protects applications and data files through encryption. Supplied as either application or DA. Compatible with AppleShare file server and MultiFinder. IBM min. memory. $39.95, $99.95 for registered Focal Point owners. TenPointO, 415/329-0500.

HyperADC-1 HyperCard stack for use with ADC-1 peripheral data collection unit or in simulated mode. Provides data acquisition and control while enabling the Mac to monitor its external environment. IBM min. memory. $45. Remote Measurement Systems, 206/328-2255.

HyperFamily-Tree HyperCard stack that records and displays genealogy information. Use it to make pedigree charts, trace family lines, and produce birthday calendars. IBM min. memory. $49.95 plus $3 s/h. Leister Productions, 717/697-1378.

(continues)
Mac II Workstation
Everyone who needs the power of the Mac II also needs the space that the Monitor and Processor occupy. With no desk space to organize work and lay out projects, the Mac II's effectiveness is limited. The Mac II Workstation takes a totally new approach to workstation ergonomics. It provides a unique arm suspension system and shelf area giving the operator the ultimate in adjustability and space savings.

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MacTilt SE
The Mac SE sitting on the desk leaves the screen too low for comfortable operation. MacTilt SE elevates the Mac 4" and provides 30° tilt and 360° rotation for better viewing and greater operator comfort.

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Mouse Cleaner 360°
By regularly cleaning your Mouse, you can eliminate sluggish operation and expensive repair bills. By removing the grime from the tracking rollers, free cursor movement is quickly restored. Compatible with Macintosh, IBM, and any Mouse using either a 7/8" or 1" positioning ball.

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MacTilt for Mac II & Large Screens
The same outstanding features and user benefits of the MacTilt SE are now available for your Large Screen Display or Mac II Monitor. Call for specific models.

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The Muzzle
The Muzzle protects your confidential files, documents, and software on your hard drive by preventing the Mac SE from being powered up. Models are also available which allow operation of the Mac SE, yet prevent access to the 3.5" disk drive for showroom and software demonstrations.

$69.95

Mac Extension Cables
Ergotron's Extension Cables allow the user to position the Monitor or Keyboard up to 8' away from the Macintosh SE or Mac II.

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Ergotron Accessories are available at your local Apple Dealer or Distributor including Bonsu, Micro D, and Ingram. In Canada contact Softcode.

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New Products

**Instant Mail Manager**  Communications package gives Mac users access to Western Union’s EasyLink electronic mail service. Binary file transfer lets you transmit variety of documents. Maintains file and folder icons and formats specific to the Mac. 512K min. memory. $69. Olduvai Corporation, 505/665-4665.

**MacJet**  Software that allows Macs and PCs to share the same printer. Gives the Mac 512K, Plus, SE, and II ability to print directly to HP LaserJet series and HP-PCL-compatible printers. Acts as a QuickDraw driver and works with most Mac applications. Comes with variety of HP downloadable fonts. 512K min. memory. $249. QMS, 205/633-4300.

**MacSchematic**  Library of electronics symbols for schematic diagrams. Symbols snap to grid so external connectors fall on grid points, and lines connect to symbols without having to be manually aligned. Comes with PICT format and MacDraw II libraries. 128K min. memory. $80 plus $5 s/h. Thinking Tools Software, 301/383-6490.

**MultiClip**  Clipboard utility that gives you the ability to have multiple, editable clipboards. Cut, copy, and paste actions can be repeated without losing previously cut or copied information. 512K min. memory. $99. Open It, 415/535-0500.

**NFL Pointspread Analyzer**  Football information system enables you to search for patterns in NFL games from 1979 to the present. Considers control factors like team, spread range, game number, results of previous games, playing surface, and year. Compares teams and groups of teams. 512K min. memory. $125. Bet Best Software, 415/540-5072.

**Open It**  Print-to-disk DA for file sharing, desktop publishing, and telecommunications. Save files from any application in a common format and transfer files without using original applications. View up to eight pages in any file. 512K min. memory. $89.95. TenPoint0, 415/329-0500.

**Open It**  PC MacTerm/Network Remote computing software that connects Macs and PCs on the same AppleTalk network. Includes PC programs, MS-DOS, peripherals, and internal boards. 512K min. memory. $395. Dynamic Microprocessor Associates, 212/687-7115.

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New Products

RayTrace Dimensions  Ray tracer that supports realistic shadows, reflective (metal or mirror) objects, and refractive objects such as glass balls. Supports unlimited numbers of objects, light sources, and viewer positions. 1MB min. memory. $1495. Visual Information, 818/918-8834.

SportSeries Encyclopedia Volume 1: Golf  First in a series of HyperCard programs designed for sports league management. Gives rules and regulations of the game, provides handicap regulations, explains calculation methods, and answers questions about the game of golf. Bowling and Softball programs are next volumes in series. 1MB min. memory. $39.95. Excalibur, 716/377-1551.

State-Smart United States geography clip-art package containing three sets of bit-mapped art scaled to fit the small screen. Includes outline maps of each of the 50 states; nearly 1200 city locations; and every major lake, river, reservoir, and mountain range. 1MB min. memory. $49. 59.95 HyperCard stack. HyPerform, 505/758-5429.

State-Smart

RayTrace Dimensions


Stack Starter  Collection of scripts, icons, sounds, XCMDs, and XFCNs designed to create stacks. You can extend the catalog by adding new components. Works with all versions of HyperCard. 1MB min. memory. $5. ComputerWare, 800/235-1155, 800/323-1133 in California.

Top Honors  Certificate program that produces custom text, and graphics that give the appearance of a watermark. Select bor-

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New Products

der patterns, fonts, and size and alignment of text; specify up to four different signature lines; also specify seals and variety of graphical elements. 1MB min. memory. $99.95. Springboard Software, 612/944-3915.

**Trainer's Kit for Microsoft Excel** includes transparencies and illustrations. Teaches how to create a spreadsheet, perform statistical calculations, manage data, and work with sales ledgers and macros. Comes with Instructor's Guidebook, Student Guide and Practice Disk. 512KE min. memory for version 1.5; 512K for earlier versions. $490. Tutorland Corporation, 408/973-0472.

**TypeStyler** Tool that gives control over typeface and produces special effects with display type. Prints styled text with smooth edges using PostScript printer. 1MB min. memory. $149.95; $20 for registered owners of PosterMaker Plus, Broderbund Software, 415/492-3200.

**Vantage** Using bypass code, this DA opens up to 16 files simultaneously. Has online spell checker, and full macro language capability. 512KE min. memory. $99.95. Preferred Publishers, 901/683-3383.

### ACCESSORIES

**Command Post** Joysticklike accessory that fits over numeric keypad. Works with all keyboards and keyboard-controlled applications and games. Comes with games disk. $11.95. Omni Enhancements, 509/928-3863.


**HyperCard Course Training Materials** Three modules include fundamental training for accessing and using stacks; describe underlying structure of stacks; and explain added capabilities available at the print, authoring, and scripting levels. Kits include instructor's manual and 12 student data disks.

**LifeGuard** Computer battery monitor that alerts you with beep and blinking light several weeks before the Mac's battery loses power. $29.95. Advanced Concepts Research, 215/860-1606.

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New Products

**The Macintosh Bible: Stax Edition**

**The Mac II Workstation**
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**Perma-Charts**

**QuikNet**
Cabling system connects computers and peripheral devices in a network. Converts signals for data transmission and exchange over modular cables. Can extend more than 3000 feet without data loss. May be used with existing phone system wiring. $59. Belkin Components, 213/515-7585.

**Trim Trak**
Hand-held margin trimmer for tractor-fed printer paper. Trims edges off up to eighteen sheets of paper at once depending on thickness. $12.95. Lund Company, Ltd., 415/543-7556.

Offers a support system for beginning to intermediate Word 3.0 users. Readers can ask the author questions through the electronic bulletin board set up specifically for that purpose. Step-by-step diagrams, and tips and techniques chapter. $19.95. Scott, Foresman and Company, 312/729-3000.

To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, Macworld, 501 Second St., San Francisco, CA 94107. We reserve the right to edit press releases.

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Quick Tips

Answers to your questions

by Lon Poole

Malignant tumors, benign tumors, or vital organs—which do the Mac’s surrogate function keys (F-keys) most closely resemble? Five years ago the original Mac development team debated that question and decided to keep the ten F-keys that come with the Mac Operating System. Typing \#-Shift-1, for instance, ejects the disk in the internal drive. You should be able to save screen snapshots as MacPaint files with \#-Shift-3, but it doesn’t work with large or color screens or with screen-extender software. And it won’t work if you’re already pressing the mouse button. To capture a color image, a large screen image, or any screen image with a menu pulled down, you must replace or augment the standard \#-Shift-3 with Screen Dump II or Capture.

Capture is a commercial program ($59.95 from Mainstay, 818/991-6540). It copies any part of the screen image to the Clipboard, from which you can paste it into any document, or it saves the image as a standard PICT II document. (For more information, see “The Chartreuse Scroll Bar,” Reviews, Macworld, June 1988.)

Screen Dump II is a shareware package of three screen-snapshot F-keys. One F-key saves any part of the screen image as a MacPaint document. Another F-key saves a color screen as a PixelPaint, GIFF, GrayView, or Startup Screen document. Screen Dump II’s third F-key sends any part of the screen image to an ImageWriter or a LaserWriter to print. Screen Dump II is available from online information services (Computerve’s Macintosh Personal Productivity forum, Data Library 4, file SD) and from user groups (the Macintosh User Group of the Boston Computer Society, 617/625-7080). If you keep it, send the author $12. You can also get Screen Dump II directly from the author, Mike Wittingham (send $12, a disk, and a self-addressed, stamped envelope to 215 Thayer Pond Rd., Wilton, CT 06897).

Text Format Changes

Making identical changes to attributes such as font, size, and style of text fragments scattered throughout a document is easier with some applications than with others. ReadySetGo and FullWrite Professional, for instance, let you define custom styles (also called style sheets) for individual characters. For example, you might define a custom style for book titles. By changing a custom style’s specifications, you automatically change all text to which you have applied that custom style in the document.

In contrast, Microsoft Word does not let you define custom styles at the character level—only at the paragraph level. However, you can use Word’s Find Formats command (Ctrl-Option-R) and its Find Again command (Ctrl-Option-A) to change text attributes semiautomatically.

First, select some text that has the attributes you want to change. Before changing the attributes, press Ctrl-Option-R to find and select the next instance of the same attributes. Change the selected text’s attributes using menu commands or keyboard shortcuts. To change underlining to italics, for example, press Ctrl-Shift-U to remove underlining and then press Ctrl-Shift-I to apply italics. After changing the text attributes, press Ctrl-Option-A to find the next instance of text having the same attributes as your original selection. (If you press Ctrl-Option-R again, Word finds the next instance of text having the same attributes as the current selection, which you just changed.) Note: The Find Formats command ignores font, size, superscript, subscript, expanded characters, and condensed characters if your original selection varies from Plain Text style in more than one attribute.

To further automate changing text attributes in Word, use a macro utility such as Apple’s MacroMaker, CE Software’s QuickKeys, or Affinity’s Tempo II. Using MacroMaker, for example, you can record a

Lon Poole answers readers’ questions and offers advice in his monthly Macworld column. Many of the tips he’s compiled can be found in his book Mac Insights (Microsoft Press, 1987).
macro that with one keystroke changes the attributes of the current text selection and activates Shift-A to find and select the next text to be changed.

**Editing HyperCard Patterns**

I recently tried to alter some of the predefined HyperCard paint patterns. Using ResEdit, I changed a few patterns in HyperCard's PAT# resource and saved changes. I anxiously restarted HyperCard, but much to my chagrin, my personal patterns did not appear on the Pattern menu. Upon returning to ResEdit, I verified that the PAT# resource had been changed. Why don’t the changes appear on the Pattern menu?

Jeffrey R. Smeenge
Ann Arbor, Michigan

**AppleWorks on Mac**

I recently purchased a Mac SE after owning an Apple Ile for several years. I would like to sell the Apple Ile, but don’t want to reenter a number of AppleWorks spreadsheet and database files. How can I transfer my files? Also, I am interested in software that would allow my Mac SE to emulate an Apple Ile, so that I can keep using some Ile programs.

William Bartel
Anchorage, Alaska

You can copy custom patterns from stack to stack. Draw samples of the custom patterns from another stack and copy the samples to the stack whose Pattern menu you want to change. Tear off that Pattern menu. Double-click on a pattern in the menu to bring up the pattern-editing dialog box, and click on one of the sample patterns outside the dialog box to pick it up; repeat for each pattern you want to pick up. The script in "Pattern Menu Copier" relieves some of the tedium.

Unfortunately, you cannot copy an entire Pattern menu by copying a PAT# resource using ResEdit. For reasons known only to members of the Acme Dot Company bowling team, a stack's Pattern menu is not kept in a PAT# resource in the stack document.

**Quick Tips**

You can transfer files between Apple II ProDOS disks and Mac disks using the Apple File Exchange (AFE) application on your Macintosh. AFE reads 3½-inch ProDOS disks you insert in the Macintosh disk drive. If your AppleWorks files are on 5¼-inch disks, you must copy them to 3½-inch disks using an Apple II. Unless you want to copy only plain text, you’ll also need a special translator file for AFE, such as Works-Works Transporter, which enables AFE to convert AppleWorks files—word processor, spreadsheet, and database—to Microsoft Works files on the Mac. When you open the converted files in Microsoft Works, they contain all the data of the AppleWorks originals and as much of the formatting as possible.

AFE is probably on one of the disks that came with your Mac. If not, you can get it with the latest System software update disks from your local Apple dealer for less than $50. Works-Works Transporter is available on CompuServe (file name WKSAFE.SIT in Data Library 4 of the Macintosh Personal Productivity forum) for the cost of downloading.

You can run Apple II software on a Macintosh by using the Apple II emulator II in a Mac ($149.95 from Computer Applications, 919/846-1411). On a standard Mac 512K, Plus, or SE, Apple II software runs at 40 to 50 percent of normal speed, which may not be satisfactory for games.

**What is PICT used for?** SuperPaint offers it as an option for saving a document.

Moki Goyal
Sudbury, Massachusetts

PICT is a standard, general-purpose Macintosh graphics format. Many graphics, desktop publishing, and word processing applications can open and display, with full fidelity, documents saved in PICT format. The Clipboard and the Scrapbook use PICT format for all graphic images. In contrast, very few, if any, applications besides SuperPaint can open and display documents saved in its specialized private format.

The PICT format defines a graphic image, or picture, using the QuickDraw graphics imaging language built into the ROM (read-only memory) of every Macin-
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Circle 321 on reader service card
How To/Quick Tips

A PICT image consists of objects such as lines, rectangles, ovals, arcs, and minimally formatted text. Individual objects can be edited—resized, filled with any pattern, text-edited, and so on—any time after they are initially drawn. By contrast, bitmap graphics created by MacPaint or the paint layer of SuperPaint define a picture as a pattern of dots that can only be altered dot by dot.

Q

I want to make a cable to connect my Mac Plus and my AT&T PC6310 as described in The Well Connected Macintosh (Harcourt Brace Jovanovich, 1987) by Tony Bove and Cheryl Rhodes. However, I can't find the requisite mini-circular 8 connector.

Anthony Tuorto
Fort Salonga, New York

A

If your local electronics parts store can't help you, you can order the connectors from Electronics Plus in San Rafael, California (800/321-4524). If you have steady hands and good eyes for close work, you may be able to work with the $3 solder-type connectors (PAGMD-8P). For a more rewarding cable-fabricating experience, splurge on the $17 connector that comes prewired to a 6-foot cable (PAGCA-508).

Q

I have an Apple HD20SC. It's strong, but not so silent. Is there a solution to the loud fan of the HD20SC or of the Mac II, for that matter?

John E. Herzenberg
Ann Arbor, Michigan

A

Early HD20SC hard disk drives did have noisy fans, but for the last two years or so the chief noisemaker has been the hard disk drive mechanism itself. If the noise you loathe steadily gets louder for the first 8 to 10 seconds after switching on the drive, you're hearing the drive mechanism. If you have an early HD20SC with a fan that dwarfs out the disk mechanism, get a replacement fan from an obliging authorized Apple dealer who sells service parts separately.

The standard fan inside the Mac II power supply is a Matsushita Panaflo DC fan measuring 3 inches square by 1 inch deep, drawing 0.45 amps, and blowing 31 cubic feet of air per minute. Two companies make Mac II power supplies—Aztec and Sony—but both use the same fan. You can replace it with a much quieter fan, such as Radio Shack catalog number 273-243A, a DC brushless ball-bearing unit that draws 0.16 amps and blows 27 cubic feet per minute. To swap fans, you need sundry tools and supplies including screwdrivers, soldering iron, pliers, wire cutters, heat-shrink tubing, and wire ties. You can find a parts list and instructions for the Aztec-built power supply on CompuServe (file MACFAN.SIT in DL11 of the MACPRO forum).

Warning: Replacing the fan will void the manufacturer's 90-day warranty and may void your AppleCare agreement, if you have one. Because the Radio Shack fan outputs about 10 percent less air than the standard fan, you shouldn't use it in a Mac with more than five NuBus cards or in a Mac operated in a hot environment. Replace the fan entirely at your own risk.

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Circle 399 on reader service card

Circle 26 on reader service card

206 January 1989
Filling Odd Shapes

**Tip:** MacDraw often will not completely fill a shape constructed from a grouped collection of arcs and lines. You could trace the shape with the polygon tool to create a similar shape that can be filled. But in most cases I’ve found that drawing patches with the Freehand and Rectangle tools is faster and easier (see “Pattern Patching”).

Henry RD Simpson
Bath, Maine

Typesetting Service Bureaus

**Tip:** A number of applications including ReadySetGo, MacDraw, and QuarkXpress don’t always print the same on your LaserWriter as they do on a service bureau’s Linotronic high-resolution printer. To work around this, the service bureau may ask you to send your System file, which it uses to start its Mac before printing your document. But sending a PostScript derivation of the document is faster and cheaper. Because you make the PostScript derivation using your System and screen fonts, it should print perfectly on the service bureau’s Linotronic.

To create a PostScript derivation from most applications, press `F` within one second after clicking on OK in the Print dialog box. For the best results, temporarily remove from your System Folder any downloadable printer fonts (not screen fonts) that the service bureau already has on its System. Look in the application’s folder for the PostScript file (named PostScript and followed by a numeral).

To create a PostScript derivation using PageMaker 3.0, select the Aldus driver and the Linotronic 100/300 printer type (or other type as appropriate) in the Print dialog and then press the Option key while clicking on OK for specific PostScript print options advice.

Louis Peddicord
Timonium, Maryland

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- Click Art Letters, Vol. 1 $26
- Click Art Letters, Vol. 2 $26
- Click Art Personal Graphics $27
- Click Art Publications $27
- Cricket Paint $48
- Crystal Paint $38
- The Curator $66
- Desk Paint $64
- "Draw It Again Sam" $214

## LANGUAGE
- LightSpeed C $93
- LightSpeed Pascal $65
- MS Basic Interpreter $56
- Turbo Pascal $57
- Z Basic $111

## MATH
- Calculate Constr. Set $28
- Calculus $54
- Data Desk Professional $250
- Eureka: the Solver Mac $122
- Pre-Calculus $25
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## MONEY MANAGEMENT
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- Tobias Managing Your Money $114

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- Coach $47
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- Coach Thesaurus $28
- Doug Clapp's Word Tools $39
- Look Up $25
- Spellwell $39
- Thunder! $28
- Word Finder $28

## SPREADSHEETS
- MacCalc $73
- MacSQL $42
- 101 Macro for Excel $34
- TrapEase $139

## UTILITIES
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- Copy II Mac $18
- Disk Express $28
- Diskit $47
- Disktop $24
- Findswell $32
- Icon-It! $38
- Multi-User $186
- My Disk Labeler w/Color $32
- PowerStation $28
- QuickKeys $47
- Sentinel $139
- Sidkick $57
- Stepping Out II $46
- Suitcase $37
- Super Laser Spool $71
- SuperSpool $46
- Tempo II $35

## UTILITIES & HYPERCARD
- Bulkminder Plus $70
- Bulkminder Plus $165
- Business Class $26
- City to City $26
- Disk Finder $32
- Diskquick $25
- Fastback Mac $47
- Formset Bus. Forms Edit. 1 $45
- HFS Navigator $32
- Hyperbook Maker $30
- Hyper DA $33
- Hyper Tutor $24
- Laserspeed $52
- Macinuse $37
- Macsafe $70
- My Disk Ladder w/Laser Write $32
- The Nightwatch $79
- Protobyper $59
- Read-it $165
- Report! $52
- Shanghai $12
- Smooth Talker $29
- Video Works Hyper Card Driver $54
- Video Works II Accelerator $106

## WORD PROCESSING
- Mindwrite $91
- Mindwrite Express $117

## WORD PROCESSORS
- FullWrite Professional $235
- MS Write $77
- MS Word $219
- Word Perfect $179
- Write Now $93

## GAMES
- Balance of Power $27
- Beyond Dark Castle $24
- Chessmaster 2000 $27
- Dark Castle $24
- Deja Vu $26
- Early Games $25
- Falcon $29
- Ferrari Grand Prix $29
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- MS Flight Simulator $28
- Patton vs Rommel $23
- Shadowgate $26
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Getting Started with System Update 6.0

What's new in the System Folder, and the hows and whys of keeping yours up to date

by Jim Heid

Another year, another System. As the Mac matures, Apple continues to improve the System software—the dozen or so System Folder files that make the Mac run. Last January, I examined System Tools 5.0, the release that introduced MultiFinder and the first rays of multitasking, as well as a modular Control Panel, hierarchical menus, and improved printer drivers. (See "Getting Started with the New Mac System," January 1988, and "Getting Started with Multitasking," June 1988.)

This month, we'll tour System Update 6.0 (System 6.0, for short) and examine the goodies—and gotchas—that come with it. Released last April, it is the ninth revision of the Mac's System software in five years.

Check "System Folder Revised" for a list of the icons, purposes, and version numbers of each file in the new System software. Here are a few definitions that will help make the following explanations more clear. An INIT is a small, system-modifying program that resides in the System Folder and loads during start-up. A CDEV (short for Control Panel device) is a file that provides settings for a specific aspect of the Mac's operation. When you click on a CDEV's icon in the Control Panel, the CDEV adds the buttons and controls that are necessary for its operation to the Control Panel window. An F-key (short for function key) is a small program that runs when you press ⌘-Shift and a number. For instance, ⌘-Shift-3 creates a MacPaint file of the current screen image.

The Tweak Release

Unlike the earthshaking new features added with System Tools 5.0, the improvements in System 6.0 are of the "a tweak here, a new feature there" variety. Big enhancements are promised for System 7.0, which will ship in early 1989. I'll say more about 7.0 later.

Jim Heid is a Macworld contributing editor who is currently writing an advanced user's guide to the Mac.

The most convenient tweak is MultiFinder 6.0's ability to open a document when you double-click on its icon while the application is already running. Previously, when you tried to open a document this way, MultiFinder displayed an error message telling you to use the application's Open command.

(continues)
## System Folder Revised

<table>
<thead>
<tr>
<th>File name</th>
<th>Purpose</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finder</td>
<td>Disk, program management</td>
<td>6.1, 4.2 for 128K Macs, 5.3 for 512K Macs</td>
</tr>
<tr>
<td>MultiFinder</td>
<td>Runs multiple applications simultaneously</td>
<td>6.0.1</td>
</tr>
<tr>
<td>System</td>
<td>Holds fonts, desk accessories, operating system</td>
<td>6.0.2, 2.0 for 128K Macs, 3.2 for 512K Macs</td>
</tr>
<tr>
<td>Scrapbook File</td>
<td>Holds contents of Scrapbook</td>
<td>6.0.1</td>
</tr>
<tr>
<td>Note Pad File</td>
<td>Holds contents of Note Pad</td>
<td>n/a</td>
</tr>
<tr>
<td>Clipboard File</td>
<td>Provides auxiliary storage for Clipboard</td>
<td>6.0.1</td>
</tr>
<tr>
<td>MiniFinder</td>
<td>Switches quickly between programs (not for use with MultiFinder)</td>
<td>1.0*</td>
</tr>
<tr>
<td>Backgrounder</td>
<td>Lets printing take place in the background</td>
<td>1.2</td>
</tr>
<tr>
<td>DA Handler</td>
<td>Runs desk accessories under MultiFinder</td>
<td>6.0.1</td>
</tr>
</tbody>
</table>

### Printer Resources

<table>
<thead>
<tr>
<th>File name</th>
<th>Purpose</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>ImageWriter</td>
<td>Allows printing to ImageWriters</td>
<td>2.7</td>
</tr>
<tr>
<td>LaserPrep</td>
<td>Prepares PostScript printers for printing</td>
<td>5.2</td>
</tr>
<tr>
<td>LaserWriter</td>
<td>Allows printing to PostScript printers</td>
<td>5.2</td>
</tr>
<tr>
<td>AppleTalk</td>
<td>Allows printing to AppleTalk-equipped ImageWriter II</td>
<td>2.7</td>
</tr>
<tr>
<td>LaserWriter IISC</td>
<td>Allows printing to LaserWriter IISC</td>
<td>1.1</td>
</tr>
<tr>
<td>Print Monitor</td>
<td>Print spooler for PostScript printers</td>
<td>1.2</td>
</tr>
<tr>
<td>LQ ImageWriter</td>
<td>Allows printing to ImageWriter LQ</td>
<td>2.0</td>
</tr>
<tr>
<td>LQ AppleTalk ImageWriter</td>
<td>Allows printing to AppleTalk-equipped ImageWriter LQ</td>
<td>2.0</td>
</tr>
</tbody>
</table>

### Control Panel Resources (CDEVs)

<table>
<thead>
<tr>
<th>File name</th>
<th>Purpose</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup Device</td>
<td>Selects start-up hard disk (SE and II)</td>
<td>3.3.1</td>
</tr>
<tr>
<td>Monitors</td>
<td>Select Mac II display options</td>
<td>3.3.1</td>
</tr>
</tbody>
</table>

### Other Files

<table>
<thead>
<tr>
<th>File name</th>
<th>Purpose</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse</td>
<td>Adjusts mouse tracking and double-click speed</td>
<td>3.3.1</td>
</tr>
<tr>
<td>Keyboard</td>
<td>Adjusts key-repeat rate and delay- until-repeat rate</td>
<td>3.3.1</td>
</tr>
<tr>
<td>General</td>
<td>Provides basic Control Panel settings</td>
<td>3.3.1</td>
</tr>
<tr>
<td>Sound</td>
<td>Allows selection of system alert sounds</td>
<td>3.3.1</td>
</tr>
<tr>
<td>Color</td>
<td>Allows selected text or icons to appear in color</td>
<td>3.3.1</td>
</tr>
<tr>
<td>Map</td>
<td>Displays world map and adjusts Alarm Clock</td>
<td>1.1</td>
</tr>
<tr>
<td>CloseView</td>
<td>Enlarges screen image</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Utilities

<table>
<thead>
<tr>
<th>File name</th>
<th>Purpose</th>
<th>Current Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Font/DA Mover</td>
<td>Installs and removes fonts and desk accessories</td>
<td>3.8</td>
</tr>
<tr>
<td>Installer</td>
<td>Updates System Folder to latest System version</td>
<td>2.6.1</td>
</tr>
<tr>
<td>Apple HD 20 Setup</td>
<td>Tests and initializes Apple SCSI</td>
<td>2.0</td>
</tr>
<tr>
<td>Disk First Aid</td>
<td>Tests disks and performs minor repairs</td>
<td>1.4.1</td>
</tr>
<tr>
<td>HD Backup</td>
<td>Backs up and restores hard disks</td>
<td>1.1</td>
</tr>
</tbody>
</table>

* available in System 4.1 and earlier versions
MultiFinder users will appreciate the Notification Manager, which allows applications performing background tasks—printing, transferring a file over a modem, sorting a huge database—to notify you when the task is complete or an error occurs. This attention-getting process can involve flashing the application’s icon over the Apple menu, displaying a dialog box, or both. Print Monitor, MultiFinder’s background-printing program, uses the Notification Manager, as does SuperMac Software’s Acknowledge telecommunications program. Expect to see more communication programs using the Notification Manager.

In Finder 6.1, the Get Info box displays an additional piece of information: the application’s version number. This is possible because of a new type of resource called VERS. A VERS resource usually contains copyright information and the application’s version number. The resource is stored in the application itself. If an application lacks a VERS resource (as do most older programs), the Finder displays the contents of the application’s creator resource, a string of text characters stored within the application that identifies it.

Interestingly, this version-reporting feature can apply to documents, as well. Although no major developers are yet using this potentially valuable Finder feature, future applications will be able to include a VERS resource when they save documents. This would allow you to determine which version of an application created the document—a good thing to know when exchanging files with someone else.

Another sign of evolution appears when you choose the Erase Disk command: a new dialog box gives you another chance to cancel. Also, the File menu’s Print Catalog command, which prints a list of the files in the active disk or folder window, now reads Print Directory, which more accurately describes the command’s purpose.

Making Macros

Among System 6.0’s more noteworthy features is an INIT program called MacroMaker. To create a macro, you record keystrokes and mouse actions, and then assign a key or key combination that can be used to play back the sequence. Using this utility, you can remap your keyboard, store frequently typed text, or assign keystroke shortcuts to commands.

(continues)
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### How To/Getting Started

MacroMaker lets you create global macros, available in all applications; Finder macros, on tap when the Finder is active; and application-specific macros, which work only when the application you used to create them is active. MacroMaker loads into memory during start-up and adds a menu (a cassette-tape icon) to the menu bar. To record a macro, choose Start Recording from MacroMaker’s menu, then perform the tasks you want to record. The cassette icon flashes while you’re recording. When you’ve finished, choose Stop Recording from MacroMaker’s menu, and MacroMaker’s window appears (see “Macro Making”).

When you save a macro, the name you choose for it appears in MacroMaker’s menu. You can use the name or the assigned keystrokes to summon the macro. If you choose $key sequences, however, you risk disabling a program’s built-in shortcuts. For example, if you record the text Sincerely, from within your word processor, and assign the 5 key sequence to the macro, you’ll disable the keyboard shortcut for your word processor’s Save command.

The SE’s and the II’s Control key makes a good surrogate $key. If you use the Apple extended keyboard—the 105-key beast—you can assign macros to its 15 function keys. For the Mac Plus keyboard, which lacks Control and function keys, use the 5 key along with the Shift or Option keys. Or just examine your program’s menus before assigning a key sequence to be sure that sequence won’t override an existing one.

MacroMaker does have limitations. You can’t stop recording when a modal dialog box (one you can’t click outside of) is open. Thus, you can’t record a macro whose last act is to issue an Open command—you can’t tell MacroMaker to stop recording without pulling down its menu, and you can’t get to its menu without canceling the dialog box. Also, MacroMaker can’t record a pause, so you can’t use it to automate a telecommunications session or other activities that involve waiting between two tasks. Two commercial macro packages—CE Software’s QuicKeys and Affinity’s Tempo II—don’t have these shortcomings. If you become addicted to macros, you might graduate to one of these. But MacroMaker is ideal for automating simple tasks and putting the extended keyboard’s function keys to work. And the price is right.

### Are They Awake in Ankara?

I recently read of a Gallup poll in which three out of four Americans couldn’t locate the Persian Gulf on a map. Perhaps System 6.0 will change that. Its new Map feature adds a world map to the Control Panel and offers options for finding cities, and determining the distances and time differences between locations (see “The Mac’s Map”).

Besides being useful and educational, the Map CDEV illustrates Apple’s intent to make the Mac a truly international computer. When you use the Set button to specify your location, Map stores the location in the Mac’s parameter RAM—that battery-powered area of memory that holds the time, date, and other Control Panel settings. Take your Mac to a different time zone, and you can use the Set button to adjust the Alarm Clock accordingly.

Apple’s goals for dealing with the time issue go far beyond making it easier to reset the Alarm Clock. More businesses are linking remote Macs with modems and

---

**Macro Making**

MacroMaker’s cassette recorder window lets you name, store, and retrieve macros. Here, a global macro (one available in any application) named Chooser has been loaded.
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How To/Getting Started

Changes Under the Hood
I’ve mentioned a few of System 6.0’s technical improvements, but there are others. System 6.0 gives a Mac Plus or an SE the same sound capabilities—actually, the same Sound Manager—as a Mac II. This lets SE and Plus users enjoy the same digitized alert sounds—the monkey, boing, and clink-clank—that II users guffaw over. There’s a bigger advantage, of course. By allowing the Plus and the SE to sound off like a II, Apple has made it easier for developers to write programs that can use the digitized sounds for all three machines.

Speaking of Mac II’s, with System 6.0 the II can display color graphics more quickly. The system code that allows this, a set of graphics routines called QuickerGraf, was created outside Apple by former Mac team member Andy Hertzfeld. He wrote QuickerGraf as an INIT and distributed it through information services and user groups. It became so popular that Apple licensed it and made it part of the Mac II’s System file.

The new system also offers LaserWriters and other PostScript printers more printing power. The new LaserWriter driver supports tabloid (11-by-17-inch) pages, allowing all Mac applications to tap tabloid printers such as Varityper’s VT-600W and Dataproducts’ LZR-2665. Previously, an application needed its own PostScript driver to print tabloid pages. The new Text Smoothing option in the Page Setup dialog box smooths the jagged edges of bitmapped fonts—non-PostScript fonts such as Geneva and New York. In the LaserWriter Options dialog box, the new Unlimited Downloadable Fonts option lets you use as many downloadable fonts in a document as you like, but it also lengthens printing times.

And in the little-things-mean-a-lot department, several of the Mac’s desk accessories—the Chooser, Calculator, Find File, Alarm Clock, and Scrapbook—now remember their window positions when you close them, and appear in the same place when reopened. And if the date display and clock icons are visible when you close the Alarm Clock, they will both be there when you reopen it, rather than only the digital time display.

Utilitarian Improvements
The new Font/DA Mover, version 3.8, allows the System file to hold thousands of fonts instead of only 255 (disk space permitting, of course). The secret to the Mac’s enlarged type drawer lies in a new kind of font resource called NFNT—short for new font-numbering table. Fonts stored in NFNT format can be grouped according to font families. For example, the Times family contains four fonts: Times, Times Italic, Times Bold, and Times Bold Italic. With the Mac’s original font format, called FONT, each of these family members is considered a separate font. In the NFNT format, however, the entire family is considered one font with four members. This approach lets the Mac start many applications faster because it decreases the time required to create a Font menu.

At this writing, however, not all applications support NFNT fonts. And few NFNT fonts are available. But we’ve seen it before—changes in the Mac system send software makers back to the drawing board to update their wares. By the time you read this, NFNT fonts will probably be in control of the Mac’s type foundry. And you’ll be able to convert FONT-format fonts into NFNT fonts using Icon Simulation’s MacKern, a font utility scheduled to ship this fall. Apple also reports that a future version of the Font/DA Mover may be able to convert FORMTs into NFNTs.

(continues)
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Here's How to Order
You can get the System 6.0 update from user groups, by downloading its files from CompuServe or other information services, or from an Apple dealer. The System Update 6.0 package sells for $49 and includes excellent manuals. Many dealers will also let you copy their System 6.0 disks if you supply your own disks.

The System 6.0 package includes a program called Installer that updates the System Folder on your hard disk or on start-up floppies. Installer uses special documents called scripts, each tailored to a particular model of the Mac. You choose the script for your Mac, and Installer reads it to determine which modifications to make to your System Folder. (Tip: To ensure that your system is updated properly, start up with the System 6.0 disk. Apple reports that several problems can occur if you start up under an older system and then run Installer.)

Like many of us, the Mac system has put on weight over time. System 6.0 barely fits on one double-sided floppy. For that reason, the System 6.0 package includes several minimum scripts that create scaled-down System Folders. The minimum Mac SE script, for example, creates a system containing only the Control Panel and Chooser desk accessories, just a few fonts, and no printer drivers. Clearly, a hard disk isn't a luxury anymore.

Caution Advised
System 6.0 offers some distinct advantages over 5.0, but before you update your system, verify that your applications are compatible with it. Initially, many programs didn't get along with System 6.0. In some cases, compatibility problems were caused by bugs in System 6.0; in others, they surfaced because developers bent Apple's programming rules, and changes in System 6.0 caused their shortcuts to backfire. In still others, problems emerged because Apple had not previously spelled out exactly how a given task should be performed. These things happen with an extremely complex operating system.

Happily, most developers have fixed the problems they caused, and by the time you read this, Apple should have released System 6.0.2 and the Mac's system should have settled down again.

But by then, System 7.0 will be on the horizon. System 7.0 will be a significant step forward for the Mac system. Among its enhancements will be a mechanism for interapplication communication—so that programs can automatically exchange data with each other under MultiFinder. Also, look for improved color capabilities. Apple is reworking Color QuickDraw, the Mac II's graphics routines, to support video hardware that can display color images with photographic realism.

System 7.0's debut will undoubtedly cause another round of incompatibilities and software revisions, but that's the price you pay for progress. The Mac is still making the transition from a slow, expensive toy to a powerful, expensive business machine. Thanks to Apple's talented software designers and programmers, the transition isn't at the expense of the Mac's approachable operating style. If only they could do something about the price.
If you're looking for software to assist you with your business activities, or to help manage your home budgeting, Somak Software has the programs you need.

If you're looking for educational software, for almost any scholastic level from preschool to higher education, Somak Software has the programs you need.

If you're looking for clip art, typefaces, and other graphic tools for your desktop publishing projects, Somak Software has the programs you need. And we have a whole lot more...
Please read the shareware info on page 5!
Reward shareware authors for their efforts. We will all benefit from their work.

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Introduction

What does Somak do? If you could have your wish when it came to buying software, what would it be? Well, you would want quality software. And you would want the assurance of qualified technical assistance when you needed help. And, of course, you would want the software to be inexpensive. Maybe you want all of these things?

Somak Software offers you these benefits. We distribute high-quality software for business, education, entertainment, desktop publishing, design, and many other uses. We select and distribute only the finest programs in each category, to insure you the maximum value for your dollar. And we stand behind our software. Every program on our disks has been tested with the latest Macintosh hardware, and is guaranteed to work as described, or we'll exchange it for you.

How much does it cost? You pay Somak Software a small service charge for each disk that you order. This service charge covers research, duplication, technical assistance, and other related expenses. Service charges start at only $8.99 per disk, and when you order more disks, the price goes down. For complete pricing information, see the order form on page 17. Postage and handling charges of $4.00 are added to each order shipped within the continental US and Canada. Shipping charges to other areas are higher; please call for details.

What else do I need? Our software is provided on double-sided disks, so you'll need a Mac equipped with an 800K drive. All programs have been tested on the Macintosh Plus, Macintosh SE, and Macintosh II for compatibility, and unless otherwise indicated, run on all three machines.

Some software categories have specific requirements. The LaserWriter fonts described on page 15 require a LaserWriter, LaserWriter Plus, LaserWriter II or LaserWriter II NTX. These fonts do not work on the LaserWriter II SC. The Hypercard stacks described on pages 24 through 28 require Apple's HyperCard software. If your Macintosh did not come with a copy of HyperCard, contact your local dealer to purchase one.

The networking software described on page 29 requires two or more Macintosches equipped with an AppleTalk/LocalTalk network. The Macintosh II software described on pages 30 and 31 requires a Macintosh II with 8-bit video card and monochrome or color monitor. Any other program requirements or incompatibilities will be explained in that specific program's description.

OK, now what? Please read the information about "shareware" software distribution on the next page. Then, begin reading the software descriptions on page 6. We're confident that you'll find software that interests you. Write down the disk numbers you want to order as you go. You'll find an order form in the center of the catalog that you can fill out, and then give us a call or mail in your order. You'll be pleasantly surprised! Software really can be all the things you want it to be...
About shareware...

What is it?

Our software comes in two flavors – shareware programs and non-shareware programs. It’s a very important distinction, so we’ve indicated next to the name of each program whether it is or isn’t shareware. But you’re still asking, what is shareware software, anyway?

Shareware is a method of software distribution that cuts out the middleman; the software author doesn’t have to pay for packaging, advertising, and other marketing expenses, and the customer gets to do something very rare in the software marketplace – try out the programs at home, on their machine, before deciding whether the programs are worth paying for.

Shareware programs contain a notice, either in the program itself, or in the accompanying instructions, asking the user to try out the software, decide if they like it, and pay a registration fee directly to the author if they decide to keep it. Sometimes this registration fee also entitles the user to upgrades or enhanced versions, or perhaps expanded documentation.

Somak Software strongly encourages our customers to pay the registration fee for shareware software that they decide to keep and use. Usually this fee is very low; between $2 and $20 dollars. If the authors are not rewarded for their efforts, they may decide it’s not worth it, and we would lose their talents forever. Here’s a parable that graphically illustrates everyone’s shareware obligation...

Once upon a time...

“After conquering a local tyrant, a village decided to put on a big shindig to celebrate their new freedom. Every villager agreed to bring two skins of their best wine, which would all be poured into a great vat to symbolize the unity with which they fought. One villager (every village has at least one) was the stingy sort who decided he would put water in his skins instead of wine, calculating that the dilution would go unnoticed. He made sure no one discovered his plot as the entire village stood in line, emptying their skins of wine into the vat.

Finally came the evening of the great shindig. As the villagers gathered with their tankards around the vat, the newly appointed leader gave a speech that inspired one and all. Finally, the villagers suggested that the leader be first to fill his tankard from the vat, and the leader happily agreed.

When the leader placed his tankard under the vat and turned forth the flow of wine, he was surprised to find that his glass was filled with clear water.”

You can see that it really is everyone’s responsibility to be honest when it comes to shareware software. If you don’t use a program, don’t register for it. But if you do use it, and want to thank the author for the opportunity to try it out before you pay, please register and keep the shareware system alive. Now, on to the software descriptions!
Business software

▌ 101 BusinessWare
Volume 1

Six powerful programs for your small business, from payroll and amortization to a full-featured spreadsheet!

Amortize 2.4 (shareware) – A loan amortization calculator. Calculate loan amortization schedules quickly and easily with this excellent program. Schedules can be printed directly or saved as text files for use in other applications.

Biplane 1.02 (shareware) – A full-featured spreadsheet in a desk accessory. Enjoy the benefits of a very capable spreadsheet program anytime, within any other application! Biplane has a number of features not found in other spreadsheets, like individual cell formatting. Also includes a stand-alone version with additional functions, larger worksheet size, and other enhancements.

ExChequer (shareware) – A payroll accounting system for small business. Managing your payroll is a snap with ExChequer. It calculates state, federal, and FICA taxes and prints a multitude of payroll reports. You'll receive the limited version, capable of handling up to five employees. After registering ExChequer with the author, you'll receive an enhanced version that manages the payroll records for 100 employees.

Financial Calc (shareware) – A versatile money calculator with six functions. Calculate the time value of money with compound amount, present worth, sinking fund, series compound amount, capital recovery, and series present worth formulas.

Ledger d'Main – A simple cash accounting program. Even though Ledger d'Main isn't going to replace the functionality of expensive commercial accounting software, you may find that it suits your needs. Checks are entered into the database, and reports can then be calculated and printed. NOTE: Ledger d'Main does not work with the LaserWriter printer.

Option Pricer – Value puts and calls in your stock portfolio. Enter six pieces of information, such as the current stock price, expiration day of the option, etc. and Option Pricer will evaluate the situation and recommend whether to hold or sell the call or put.

▌ 102 SoftStart
Worksheets

A collection of worksheets for personal finance and business analysis. Requires Microsoft Excel or Microsoft Multiplan.

Personal finance worksheets (shareware) Included are worksheets and instructions for investment analysis, portfolio management, budgeting, mortgage analysis, and checkbook and credit card management.

Business analysis worksheets (shareware) This collection of worksheets is designed for small business financial analysis. Includes cash flow budgeting, payables/receivables analysis, break-even analysis, and an integrated set of payroll templates.

Mortgage – Calculate mortgage amortization schedules. Not a part of the SoftStart package, this bonus worksheet calculates an amortization schedule, and also tracks reduction in principle, cumulative interest, and cumulative deduction. This worksheet works only with Microsoft Excel.

Place your order today! Call (800) 842-5020
This number is for orders only. For other information, please call (619) 942-2556.

The Biplane spreadsheet package includes a desk accessory that gives you access to your worksheets within other applications.
Prices start at only $8.99 per disk!
Discounts available for quantity orders. See the order form on page 17.

**103 Worksheets for Excel**

Eighteen worksheets and macros, plus a unique add-on application. This disk requires Microsoft Excel.

- Pegboard (shareware) — A bookkeeping system for small business. A collection of linked worksheets that implement an electronic version of the popular one-write pegboard system.
- Car Loan — Calculate payment amounts for auto loans.
- Conversion Tables (shareware) — Over 150 unit and currency conversions.
- MacDep — A macro to figure straight-line depreciation.
- Optima Best Answer (demo) — An optimization add-on for Excel. Analyze business situations to arrive at the "best answer" with this unique application. Best Answer manipulates data from your Excel worksheets, and uses linear programming techniques to help analyze the numbers.

Fourteen more worksheets and macros are also included:
- Bi-Weekly Mortgage, Cellular Phone, Closing Costs, Increments, Loan Schedule, Mortgage Refinance, Interest Calculator, Point-To-Point, Fourier (shareware), MortAmt Macro (shareware), Print Macro, Regression Macro, Schwab (shareware) and Shortcuts.

**Home management**

**104 HomeWare Volume 1**

Six programs to help make your home life more efficient... and more fun!

- Home Inventory (shareware) — Maintain accurate records of your possessions. Hopefully, you’ll never need to replace household items like electronics, furniture, and appliances because of theft or damage, but if you do, accurate records will prove invaluable. This program maintains an inventory of your possessions, including purchase prices, serial numbers, and descriptions.
- Form It! (shareware) — A powerful form management system for home or office. With Form It!, you can make all your data entry tasks faster, easier, and more automated. It will turn any PICT or MacPaint image into a form, and then help you fill in the blanks, storing each record in a data file as you type! It can also print out each form on your ImageWriter or LaserWriter printer. Use it for invoices, party invitations, tax worksheets, certificates, or any time you need to add data to a form, drawing, or picture.

Form It! is the first shareware form management software. Use it to enter, maintain, and calculate data for invoices, certificates, or almost anything!

- Household Shopper — Save time at the market with automated shopping lists. You'll never forget that bottle of ketchup or roll of paper towels again! Mark the things you need from a built-in list of common items. You can also add your own items and categories. Then, print a list and go shopping. Household Shopper will even mark those items that you have coupons for!

continued on next page...
Place your order today! Call (800) 842-5020
This number is for orders only. For other information, please call (619) 942-2556.

Disk 104 (HomeWare) continued...

CK 2.1 (shareware) – A complete checkbook accounting system.
Get your checkbook organized with the help of this easy-to-use checkbook management program. A variety of reports can be generated and the program also includes functions to automatically reconcile the checkbook against a bank statement. Complete on-line help is built into the program.

MacAuto (demo) – A complete gas mileage and repair log for your automobiles.
Track your gas mileage, gas costs, repair costs, and more with MacAuto. Now, all we need is a portable Mac that we can take with us on the road! This demo version does not save or print. Information on ordering the complete version directly from the author is included within the demonstration program.

Mac's Bar (shareware) – Keep track of your favorite bar recipes.
Including over 100 recipes, you may never have to add any recipes to Mac's Bar. But if you do have some favorites, keeping track of them is a snap. Drinks can be located by drink name, or by a particular ingredient.

Education

105 Stars and Planets
Explore the mysteries of the universe, including a faster-than-light journey to the corners of the galaxy!

Gravitation 2.5 – The most fun you’ll ever have learning about planetary Interaction!
Learn about the force of gravity, and how the planets interact with each other. Includes 64 samples illustrating simple orbital motion, pulsars, planetary collisions, and more!
Also included are Orbit, another planetary simulation, and Planets 2.0, a 3-D planetary simulator that works in color on the Mac II!

Orion 1.75 – Fly a spaceship and explore our solar system and nearby stars.
Climb behind the wheel of the Orion starship and reach speeds of several million times the speed of light! Learn about the planets and stars you pass. You can even try to achieve a stable orbit around the heavenly body of your choice!

Star Chart 2.0 – Learn to recognize the stars and constellations of the night sky.
Eighty constellations are built into the program, but the stars can also be drawn from any specified ascension, declination, and view angle.

EarthPlot 3.0 – Draw a map of Earth from space, and learn about the continents.
Type in any latitude, longitude, and altitude and EarthPlot will draw a globe-shaped map of the Earth, in either bit-mapped or PICT format. Works in color on the Mac II!

Also on disk 105: Bright Stars (shareware), StarGazer (shareware), and Full Moon.

Climb aboard the Orion, and travel to the fringes of the galaxy, learning about interstellar navigation and orbital maneuvers along the way!
106 Preschool Programs

Six activity programs for the youngest Macintosh user. No reading skills are required.

With the Dot-to-Dot Construction Set, parents can create a variety of fun and educational puzzles. As the dots are connected, the picture will emerge!

Dot-to-Dot (shareware) – Help your child learn numbers, letters, and words. Designed for ages 4 to 8, the Dot-to-Dot Construction Set combines elements of a child's dot-to-dot coloring book with a non-violent hangman game and picture puzzle. Parents can create new puzzles with any MacPaint-compatible drawing program.

Natalia's Dots (shareware) – A traditional dot-to-dot game with 26 puzzles.

Pattern Blocks (shareware) – A simple drawing program using geometric patterns. Encourage creativity in your child with this simple drawing program. One of twelve different blocks can be dragged into the drawing area to create a picture. Parents can easily customize each of the blocks.

Kieran (demo) – A computer voice helps your child learn to read, count, and tell time. This demonstration contains only a portion of the original program, but will give you an overview of the complete Kieran program.

Something's Hidden Here! – A picture recognition game for kids. Click on one of the 38 puzzle buttons, and a picture will flash on the screen for an instant. As the child tries to guess what was in the picture, more and more of the image can be revealed by moving the 'decoder' (also known as a mouse!) across the image.

Halloween Night! (shareware) – Help young children overcome their Halloween fears! Even the youngest children want to be a part of Halloween. This program helps your kids understand the holiday, with animated characters who come to the door for candy!

107 Beginning Math

Help develop their math skills early with these fun and educational programs for the beginning math student.

MacMath (demo) – A four-part program, including a high-speed math game! A friendly alien guides your child through the math basics, first by teaching, then by testing the student. After all that hard work, an exciting outer-space game is included in which the student must shoot down the correct answer to each problem!

HeloMath (shareware) – Practice your math skills as you pilot a high-flying copter! Fly across the mountains, blast the correct answers, and make it back to base in time!

Flashcard – A flashcard builder for repetitive-enforcement learning. Children have learned with flashcards for years. Now, they can practice their skills on the computer! A set of multiplication cards is included, and parents can create their own.

Math Factory (demo) – A fun, flexible way to learn beginning math skills. This program tracks a students day-to-day progress, and provides ten adjustable skill levels, to make sure the program grows as the students' skills increase. This demo version teaches only addition, but the complete program includes subtraction, multiplication, division, and fractions.

Hi! My dog Spot and I want to teach your children all about math! At our Math Factory, they'll have so much fun, they won't know they're learning!
Games

108 Arcade Action Games

Nine exciting games that bring the arcade action home! Battle killer insects, rescue astronauts, and more!

Centipede – Fight off an insect invasion in this Mac adaptation of the arcade classic! Become the ultimate pest control service while you fight off deadly mutant centipedes, spiders, fleas, and other nasty creatures. The game includes great digital sound.

Continuum (shareware) – Explore 60 different worlds in your galactic gunship! Pilot your ship through the solar wind while you blast laser cannons and pick up fuel. The game includes 60 different levels, each with a different map and layout. Plus, with the built-in editor, you can create your own worlds, and modify every game setting!

Iggy Iggopolis – Help Iggy conquer the void by laying down his special fences! In this high-speed geometric challenge, based on the classic arcade game OIX, you'll have to fence off enough of the void to capture the deadly ZUUL.

Let's Get Tanked! – Go one-on-one with a computer controlled armored tank!

Lunar Lander – You'll need a steady hand to land safely on the lunar surface! Choose your landing site carefully, because you'll need a steady hand to settle down safely on the uneven surface of the moon. This game does not work on the Mac II.

MacLanding (shareware) – Defend your astronauts from an alien kidnapping ring! You'll have to keep moving to watch over an entire planet full of careless astronauts, who are being abducted by sneaky aliens as fast as you can rescue them!

MacMissiles (shareware) – A nuclear nightmare come true! Can you save the cities? You are the controller of the S.D.I. (Star Wars) defense system in this classic missile defense game. How long can you protect six major cities from nuclear destruction?

Megaroids Plus – Battle your way out of the center of an asteroid belt! You're caught in the middle of a dense asteroid field, with only your wits and your laser to blast your way out! This game does not work on the Mac II.

Spacestation Pheta (shareware) – Climb and jump your way out of the station! This game will put your dexterity (and your strategy) to the test! Ten increasingly more difficult levels will challenge you, and when you register with the author, you'll receive a code that will "unlock" 70 additional levels for you to play! And, if that weren't enough, the game features a built-in editor, so you can create and play your own levels too!
Puzzles and Strategy

Over thirty different puzzles and games that will put your strategic abilities to the test!

This Macintosh version of the classic Stratego game includes high-quality graphics and vibrant digital sound effects. Outwit the Mac and find his hidden flag!

- Dragon (shareware) - Help save Bosnia from a ruthless fire-breathing dragon.
- Stratego® - Find and capture the Mac's flag in this classic strategy board game! Use your marshals, scouts, spies, miners, and other soldiers to find and destroy the enemy flag. But be careful! Hidden bombs will throw you off the track, and destroy your men in the process! Stratego is a registered trademark of the Milton Bradley Company.

- MacPuzzle - Fit each piece into the proper place, if you can! 25 puzzles are included.
- BlobManager - Sixteen puzzles and games in one program!
- MysteryBox (shareware) - Fire rays into the Mystery Box to find the hidden balls.
- Enigma (shareware) - If you liked Rubik's cube, you'll love Enigma's locking rings.
- PegPuzzlePak (shareware) - Four different puzzles in one! Can you solve them all? These classic puzzles are solved by jumping pegs over each other into empty holes.
- Tablut - It's the Muscovites vs. the Swedes in this strategy board game for 2 players.
- ThinkAhead Plus (shareware) - You'll need to think ahead to outwit your opponent. Move by choosing numbers on a board; each number subtracts from or adds to your score. Plan your moves carefully, and force your opponent's hand! For 1 or 2 players.
- Also included: Towers of Hanoi, 2D and 3D Maze Games, and Hex Puzzle.

Adventure Games

Tired of shoot-em-up games? Put your brain to work with 2 "interactive novels" that make you the main character in an exciting adventure story!

- EveryMan Adventure #1 (shareware) - Go from mild-mannered to major muscle! Your neighbors know you as an average guy. What they don't know is that underneath that meek exterior you are EveryMan, a super-duper hero lifted from the pages of the comic books to defend goodness and fight badness. So strap on your rocket boots and get ready for the adventure of a lifetime! Can you save the city from destruction, or will the mad scientist destroy you in his Rube Goldberg toilet trap? Look for more EveryMan adventures in future catalogs!

- The Village (shareware) - A medieval tale of mystic temples and ancient relics. Something's rotten in the village of Darmothe...the priests of the Stone Temple are up to no good and the villagers are helpless! Can you save the village (not to mention your own neck), or will you become another victim?

Put on your tights and become EveryMan, protector of truth and justice, in this comic-book adventure. Can you stop the mad scientist and his evil Glob Monster?
The Phoenix – Return to the Discovery in the year 2066 for a little sci-fi sleuthing. Based on the hit science fiction movies 2001 and 2010, this game features an abundance of digitized scenes and sound effects from the films. For the best results, you'll also want to order disk 112 (below), which contains a huge add-on sound file that provides the voice of the treacherous HAL9000 computer system.

Also included: Colossal Cave Adventure (shareware) and Strange Hotel (shareware).

The Phoenix - Disk One

If you liked the movies 2001 and 2010, you'll love this game!

Climb aboard the disabled Discovery and attempt to reactivate HAL9000 in The Phoenix, an adventure based on the hit movies 2001 and 2010.

The Phoenix - Disk Two

This companion to disk 111 contains a huge add-on sound file for The Phoenix, and 2 other bonus games!

HAL Files – A companion sound file for The Phoenix adventure game. This file is not required to play The Phoenix (disk 111), but will greatly enhance the game. Place this file in the same folder as the game itself, and the pesky HAL9000 computer will come to life, speaking to you as you play!

The Journey (shareware) – Repair your ship and blast off in this text adventure.

The Venice Project (shareware) – Hack into a mainframe and prevent disaster! In this unique game, you are a young computer “hacker” attempting to break into a large mainframe computer system. But your intentions are good...the world is doomed unless you can defuse the situation through the mainframe.

Clip Art Graphics

Animal Clip Art Volume 1

Spice up your newsletters, pamphlets, and publications with 52 different images from the animal kingdom.

You never know when you'll need a picture of a bullfrog or giant sloth to add life to a newsletter, flyer, or other publication.

This disk contains a collection of bit-mapped images that can be easily incorporated into almost any publication. The pictures are stored as MacPaint files, which can be opened or imported by most graphics applications, such as PageMaker, Ready-Set-Go, MacDraw, SuperPaint, and many others. The images include birds, cats, forest mammals, monkeys, farm animals, reptiles, whales, insects, amphibians, and more!
Prices start at only $8.99 per disk!
Discounts available for quantity orders. See the order form on page 17.

114 Planes, Trains, & Automobiles
Add these images to your flyers, posters, and other desktop publishing projects.

This disk includes over 75 images of cars, trains, airplanes and motorcycles. A number of auto manufacturer and railway logos are also included, as well as a "construction set" of drawings that assist you in drawing '64-'68 model year Mustangs yourself. All images are in bit-mapped MacPaint format for use in a wide variety of drawing programs.

115 Misc. Clip Art Volume 1
100 different images, including holiday pictures, foods, famous places, and more!

On disk 115, you'll find a wide selection of quality digitized and hand-drawn images to add character to almost any project.

116 Laser Art Volume 1
LaserWriter art that prints at the highest quality, even after stretching and resizing!

The artwork on this disk requires a LaserWriter or other postscript-compatible printer. The art can be used with any desktop publishing program that can use the Encapsulated Postscript Format (EPSF), such as PageMaker, Ready-Set-Go, Quark Xpress, and others. The images can also be opened by Adobe Illustrator, or imported into Aldus Freehand, for further editing and modification.

These are just a few of the high-resolution images you'll receive on disk 116. Since the images are in Encapsulated Postscript format, they can be scaled, rotated, and stretched without distortion.
ImageWriter Fonts

Near LQ Fonts
Volume 1

Three fonts that produce near letter quality output on any ImageWriter, ImageWriter II or ImageWriter LQ printer.

Alexis – Includes serif and sans serif versions, and a variety of bullets and symbols. Designed by a professional printer, Alexis is one of the most legible fonts available. It includes light and medium faces, point sizes from 8 to 48, rules, boxes and other special characters.

Beverly Hills (shareware) – One of the all-time classic high quality serif fonts. The Beverly Hills font family was designed to be a formal, highly readable font that doesn’t look computerized. It comes in 9-48 point, and is one of the most popular fonts ever.

Palencia (shareware) – A hot serif font from Andrew Welch, “Mr. Shareware!” Besides beautiful print quality, Palencia includes a unique integrated instruction manual that offers tips on using the font to its full potential. Character reference charts are also included. You’ll love it!

Near LQ Fonts
Volume 2

Three high-quality fonts for your ImageWriter. Get both disks 117 and 118 for a complete set!

Alderney (shareware) – Another quality font from Andrew Welch, creator of Palencia. Alderney is a beautiful sans serif font that comes in 9 to 48 point sizes. Though it is perfectly usable alone, pair it with Palencia, from disk 117, and you’ll have two of the best fonts ever produced for the ImageWriter.

Clairvaux (shareware) – A serif font with elements of Palatino & PostMedieval Light. Clairvaux comes in ten different sizes from 9 to 48 point, and also includes ClairvauxCaps, a special-purpose font for creating initial caps. It is a dense and angled font, with straight serifs, and looks great on screen and on paper.

Neshota (shareware) – This sans serif font will become one of your favorites! Neshota is one of the largest font families available anywhere! It comes in a whopping 22 different sizes, from 8 to 72 point. Because so many sizes are included, it will work well with the ImageWriter LQ’s triple-quality mode.

Display Fonts
Volume 1

This disk contains 56 ImageWriter fonts in large sizes, perfect for headlines, letterheads, and posters.

On this disk you’ll find 56 individual fonts, in a variety of sizes, for any ImageWriter printer. They are typically large and stylized, perfect for posters, headlines, flyers, and other special-purpose uses. The fonts are free, with no shareware fees required.

These are just some of the fonts from disk 119. They can add a special touch of personality to all your publications.
Please read the shareware info on page 5!

Reward shareware authors for their efforts. We will all benefit from their work.

LaserWriter Fonts

120 LaserFonts

Volume 1

Eleven quality downloadable fonts for the LaserWriter and other postscript-compatible printers.

Alison - An elegant font perfect for invitations, awards, and other formal purposes.
Alison ABCDEFGH abcdefgh 123456 !@%&

D. Ross Font Demos (shareware) - Sample versions of three outstanding fonts. These three font samples are missing some vowels, but we think you'll like them enough to pay the shareware fee and receive the complete versions from the author.
ARCHITECT SAMPLE DRAFTSMAN DEMO SKETCH abc123

Bill's Dingbats (shareware) - An extensive collection of arrows, bullets and symbols.

Canaith (shareware) - A striking text or display font with an Arabian influence.
Canaith Canaith Canaith ABCDEF abcd 1234567 !@%&

ChiTown - This typeface resembles the standard Chicago font.
ChiTown ABCDEFGHIJKLMNOP abcdefghijklmnop 1234 !@&

Helvetica Fractions (shareware) - Fraction symbols with horizontal separators.
Create custom fractions! 1/2 1/3 1/4 1/5 1/6 1/7 1/8 1/9 1/10 1/11 1/12

OCR - An Optical Character Recognition font developed for the U.S. Navy. This font mimics the standard IBM type ball used in many military applications.

Rodchenko (shareware) - A bold sans serif face perfect for posters, mastheads, etc.
Rodchenko Rodchenko Rodchenko 12345 !@%&

Sans Serif (shareware) - A multi-purpose font that's great for body copy or headlines.
Sans Serif ABCDEFGH abcdefgh 12345 !@%&

Also Included: Chz sbz IBM Klone, and Chicago Symbols %/••.

Disk descriptions continued on page 19...

121 LaserFonts

Volume 2

Ten more downloadable PostScript fonts for your LaserWriter printer.

Cuneiofont (shareware) - A bizarre display font with a new-wave pop appeal.
Cuneiofont ABCDEFGH abcdefgh 123456 !@%&

Flintstone (shareware) - A stone-age display font that looks great shadowed.
FLINTSTONE FLINTSTONE 1234567 1234567

Kathlita (shareware) - An unusual face with both formal and Informal characteristics!
Kathlita ABCDEFGHIJKLMNOP abcdefghijklmnop 12345 !@%&

Louisville (demo) - Similar to the classic Los Angeles font. Missing the "b" and "l".
Louisville ACDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 123456

ModernPrint Bold (shareware) - A narrow font that resembles fine hand printing.
ModernPrint Bold ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 123456 !@%&

Thomas - A classic serif font based on Caxton, with bold strokes and a stately look.
Thomas ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 123456 !@%&

Trondheim (shareware) - If you need some Nordic runes, this font's your only hope!

NYPXOFCDXYOS NYPXOFCDXYOS

Also Included: ©'stir, IBM Klone, and Chicago Symbols %/••.

Disk descriptions continued on page 19...
### How to order

#### Placing your order
The easiest way to place your order is by telephone. Call us toll-free at (800) 842-5020, and have your disk numbers and credit card information ready for our operators. If you prefer, you can also place your order by mail. Tear out or photocopy the order form on the next page, and mail it to: Somak Software, 535 Encinitas Boulevard, Suite 113, Encinitas, California 92024.

#### Business hours
Somak Software is open from 8:00 AM PST to 5:00 PM PST Monday through Friday, and from 10:00 AM PST to 4:00 PM on Saturday. Our technical support staff is available Monday through Friday only.

#### Payment methods
Orders placed through the mail must include payment with Visa, Mastercard, personal or company check, money order, or bank draft. Telephone orders must be paid by Visa or Mastercard. A minimum purchase of $20 is required for credit card orders. Written purchase orders will be accepted from major institutions such as universities and major corporations. California customers please add the correct sales tax for your county (6.5% or 7%).
Foreign orders must be paid by Visa, Mastercard, international money order, or a check in U.S. dollars drawn on a U.S. bank. No C.O.D. orders will be accepted.

#### Shipping
Please allow one to two weeks for delivery. Orders within the continental United States and Canada pay $4.00 postage and handling. Foreign orders please add 15% of the total order amount to the standard $4.00 charge. Federal Express service is available on most orders placed by telephone. Please call for details, delivery schedules and pricing.

#### Returns and exchanges
Somak Software warrants that programs will perform as described and are compatible with specified Macintosh configurations. If a disk does not perform as described, we will exchange that disk for another one of your choice. Defective disks, disks damaged in shipping, and disks duplicated incorrectly will be replaced with the same title. No refunds will be issued for software products.

#### Service charges
A service charge is paid for each disk ordered. This service charge covers Somak Software's costs for research, organization, duplication, advertising, technical support, and other related expenses. This charge does not release the purchaser from any shareware fees requested by a program author (see page five). Please pay the shareware fees requested for any shareware programs that you keep and use. This will insure that the shareware distribution system remains a viable marketing alternative.

#### Copyrights
The compilations and collective contents, and other proprietary software and instructional materials contained on each disk are copyrighted by Somak Software. Any other copyrights claimed on any other program or data file are retained by the respective copyright holder. Somak Software's disk compilations may not be duplicated except for personal archival purposes.
## Order form

### 1. Select your disks

Please circle the disk number of each disk you would like to order below. Disks start at $8.99 each, with discounts available for multiple-disk orders. Count the total number of disks in your order, and use the table at the left to determine your price per disk. For example, 3 disks would cost $8.99 each, and 20 disks $7.99 each.

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### 2. Calculate your subtotal

Multiply the total number of disks you selected by the price per disk you looked up with the pricing table above, and write your numbers below. For example, if you selected 2 disks, multiply 2 times $8.99. Your subtotal would be $17.98. If you selected 10 disks, multiply 10 times $8.49. Your subtotal would be $84.90.

Number of disks ______ X price ea. ______ = Subtotal $______

### 3. Splashes?

If you would like to order either of the Splashes clip art packages described on page 18, please indicate which ones you want by checking off the boxes below. Each Splashes package contains three disks of quality art, and sells for $39.95.

- Yes, I'd like _____ Splashes #1 - Assorted Art @ $39.95 each.
- Yes, I'd like _____ Splashes #2 - "Top Gun" @ 39.95 each.

### 4. Add it up!

Subtotal from section 2 above..........................$______

Splashes subtotal from section 3 ......................$______

Sales tax (CA residents only, add 6.5% or 7%) ......$______

Postage and handling....................................$______

Foreign postage charges (if any) .....................$______

GRAND TOTAL ............................................$______

**Method of payment:**

- [ ] Payment enclosed.
- [ ] Bill my Visa/Mastercard.

**Card Number:**

**City____________ State _____ Zip ______ Country_____**

**Daytime phone**

**Expiration Date:**

**Signature**

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Software developers! Somak Software want's you!

If you're a Macintosh programmer, and are interested in having a piece of software you've already written or a new project you're working on marketed commercially, we're interested too. Or, if you would just like your public domain or shareware software added to our next catalog, let us know.

We reach over 500,000 Macintosh customers annually, in the United States and worldwide. Your product will receive the maximum possible exposure.

If you are interested in having Somak Software market your products, please call us at (619) 942-2556 and ask for Robert.

Sincerely,

Robert Eberhardt
President

Volume 1
ASSORTED
CLIP-ART
SUBJECTS

INTRODUCES
Volume 2
"TOPGUN"
Clip-Art

Splashes

A CLIP-ART COLLECTION

- Hand Drawn
- Original
- Professional

$39.95

3 Disks in Each Volume
Each Volume ONLY

Splashes
A CLIP ART COLLECTION
is published by
The MAC Group
Prices start at only $8.99 per disk!
Discounts available for quantity orders. See the order form on page 17.

Utility software

122 Startup INIT Utilities

22 programs that add power and function to every session in front of your Macintosh!

Autoldle – An automatic screen saver utility that prolongs the life of your monitor. After long periods of inactivity, your screen may develop “burn-in,” or a retention of screen images. This utility will automatically blank your screen after a specified period of inactivity, and prolong the life of your screen!

Backdrop – Kick the gray habit! Use any MacPaint picture as a background pattern. Three samples are included. Backdrop does not work on the Macintosh II.

BigScreen (shareware) – A simulated big screen display for MacPlus owners. This turns your screen into a “window” on a larger page area, simulating the performance of a big-screen Mac. BigScreen does not work on the Mac SE or Mac II.

Curly Quotes – Two different programs that provide printers’ quotes as you type. Straight quotation marks are easy to type, but don’t look as good as the curly marks when printed. These programs will make the switch for you automatically.

F1-F4 (shareware) – Make your extended keyboard do what it was meant to do! If you have the extended keyboard with function keys, this will make the first four (F1-F4) actually perform the functions they are labeled for (undo, cut, copy and paste).

Fontsie (shareware) – Use fonts on the fly any time you want, without installing them! If you use certain fonts infrequently, why should you have to install them? Well, with Fontsie you don’t! Keep those fonts in a special folder, and any time you need them, they can be temporarily installed by pressing the Caps Lock key while a program opens.

MFMenu Plus – Use MultiFinder? You’ll love this! Switch between programs easily. Do you find yourself dragging down to the bottom of your Apple menu constantly to switch between programs in MultiFinder? MFMenuPlus creates a pop-up menu with a list of your open applications, and also serves as a demo for OnCue®.

SelText – Patches the dialog box routines to automatically select a default text item.

SFVol (shareware) – Select volumes directly, and create new folders instantly! This one is hot! Instead of clicking the Drive button repeatedly to select the disk you want to work with, use SFVol’s pop-up menu to select that disk directly! New folders can be created, and the amount of free space is displayed in all Open and Save dialogs.

TattleTale (shareware) – This one keeps tabs on your other INITs & logs their activity!

Welcome2 – Turn on your Mac, and it will greet you with a spoken message.

PopIt! and PopUp (shareware) – Select any menu item from anywhere on the screen!

INIT Manager Demo – Let’s you keep your INITs in any folder and log their activity. This demo doesn’t actually do anything, but explains in detail how INIT Manager can make dealing with a lot of INIT utilities much easier. The actual program lets you keep your INIT utilities in separate folders, and also keep a log file of their activity.

Seven more INIT utilities are also included: Insure, MacWalt, AutoCursor, Reverse Screen, CrashSaver, Enchanted Menus, and CursorWrap.
Control Panel and CDEV Utilities

These great utilities are configurable from your control panel desk accessory.

ApFont (shareware) – Choose the default font that will be used by your applications.
ApplicationMenu – Switch between programs in MultiFinder from a pop-up menu.
Fortune – A fortune, quote, or joke will greet you each time you start up your Mac! Turning your Mac on will be a new, fresh experience every day with Fortune! One of hundreds of different quotes, jokes, sayings, and fortunes will be randomly selected and displayed each time you power up, or just once each day.
Front & Center (shareware) – The ultimate utility for the truly lazy mouse operator. This one causes all dialog and alert boxes to be centered over wherever your mouse cursor is at the moment. This can save you a lot of time, especially with a big-screen.
Maire – A fully configurable screen saver that draws beautiful animated patterns.
Port-Master – View and change the default settings of your serial ports.
SCSI Parker (shareware) – Automatically parks hard disk drives when you shut down. If your hard disk requires you to run a special program to park the heads, then you need SCSI Parker. It will park the heads when you select Shut Down from the Finder.
SCSI Tools (shareware) – View the IDs of all SCSI devices, mount any off-line drives!
SuperClock – A time and date display that doesn’t get in the way of your other work. It’s a bird... It’s a plane... no, it’s just the greatest menu bar clock utility of all time, SuperClock! It will display the time in the upper right corner of your menu bar, and is completely adjustable. You can even choose what font/style to display the clock with!
Who’s Who – Find out Just what that Macintosh of yours has under the hood. This displays 10 different pieces of info about your Mac configuration: System version, processor, QuickDraw type, keyboard type, AppleTalk driver version, and more.
Two CDEVs for the Mac II are also included: ScreenMaster (shareware), and Toggle-Cache. See page 30 for descriptions of these two utilities.

Virus Fighters and Vaccines

Protect your valuable data from destructive computer viruses and “Trojan Horse” programs!

It was bound to happen sooner or later. In 1988 the first Macintosh computer virus was unleashed on the world. The “Peace Virus” turned out to be relatively harmless, but was followed by Scores, nVir, and a host of others with malevolent intentions. This disk includes informational files and utility programs designed to educate you about computer viruses and help you protect your data from contamination. You’ll receive:
Vaccine – This CDEV from CE Software prevents unauthorized changes to your files.
GuardDog (shareware) – Protect your files from being renamed, moved, or copied.
Interferon (shareware) – Searches for multiple virus types and blows them away!
Virus Detective (shareware) – A desk accessory to scan for infection and remove it.
Also included are Ferret, Virus Rx (©Apple), Agar, and VCheck.

StuffIt and StuffIt Utilities

The most powerful data compression utility ever, plus some great stuff to go with it!

StuffIt (shareware) – The industry standard for data compression and transmission. Do you have files and programs you use very infrequently, but can’t bear to throw away? Well, with StuffIt you can reclaim up to 90% of that used disk space, and not lose a thing! It can compress any file, making it occupy as little as 10% of the original space on disk. Passwords and DES encryption can also be added for data security.
StuffIt Utilities (shareware) – A collection of companion utilities and accessories. Includes UnStuffIt, AutoUnStuffIt Shell, two “DAs”, and the SFVol Init (see page 19).
StuffIt Cataloger (shareware) – A HyperCard stack to catalog your StuffIt archives. This stack will “look” into any StuffIt archive and create a directory of the contents.
Remember (shareware) – The ultimate personal secretary who never forgets!
Do you have trouble remembering appointments, birthdays, and other occasions? You
won’t any more, if you have Remember! Enter descriptions of important occasions, and
this combination desk accessory/INIT utility will automatically remind you of impending
events when you turn on or reset your Mac! Occasions can be one-time events, like
dentist appointments, or periodic, like birthdays and anniversaries. You’ll love it!

With the Remember DA, you’ll never miss another appointment! The Casio clock DA
features 9 time zones, 10 alarms, and 10 timers! The SunClock DA creates a world
map showing where the sun is shining! Our SunClock demo is limited to one time zone.

Calendars – Eight calculators for scientific, financial, and other specialty uses.
Included are the dCad Scientific (shareware), the RPN-C calculator, a Feet/ Inches/
Fractions computer (shareware), an abacus, a Roman numeral calculator, and 3 more!

Convert (shareware) – The ultimate Metric-to-English and back again converter!
Not only will Convert move numbers from the English system to Metric, but it also does
unit conversions in linear, square or cubic measurements, supports all standard mul­
tiples and submultiples (deca-, milli-, etc.), and is even a four-function calculator!

Unit Conversions (shareware) – Unit conversions for area, acceleration, mass, etc.

Note Pad II (shareware) – A great note-pad replacement with pop-up topic index.
When you need to jot something down, do you still reach for a scrap of paper? Well, you
won’t if you have Note Pad II installed on your Mac! It provides a multi-page scratch
pad, and has an innovative pop-up menu that keeps your notes categorized.

New Scrapbook (shareware) – Store your pictures and text with greater flexibilility.
This text and graphics scrapbook functions much like the original one, except that
specific portions of any text or graphic pasted into it can be copied separately. Large
pictures can be reduced to fit inside the scrapbook window without distorting the image,
and long text entries can be scrolled to view areas that are outside of the main window.

Clocks – The time can be fun with these wild, wacky and useful replacement clocks!
You’ll receive eight new clock accessories to replace the old alarm clock. Choose from
Casio (shareware), which features nine programmable time zones, ten countdown
timers, ten elapsed timers, and ten nameable alarms, a reproduction of London’s Big
Ben, the infamous “Two Sheds” Jackson clock, and five more!

Sunrise...Sunset – Displays the sunrise and sunset times for any location.
Enter your latitude and longitude, and this DA will display an accurate sunrise and sunset
time for either your standard time or daylight savings time.

SunClock (demo) – A fascinating display of the relationship between Earth and Sun.
SunClock draws an accurate world map showing the areas of light and darkness.
127 Graphics Desk Accessories
A collection of outstanding accessories for drawing, painting, and other graphic work.

DAfx is a painting desk accessory with most of the features of MacPaint, and some unique tools of its own for special effects.

With SuperRuler, you can overlay a ruler on top of any on-screen document for precise alignment and measurement.

128 Text Editing Accessories
Sometimes you don’t need all the features of a word processor. Use one of these great editors!

McSink features an innovative icon bar that offers an alternative to its pull-down menus. All the functions are quickly and easily accessible from these icons.
MiniWriter (shareware) – This text editor is optimized for the ImageWriter owner. If you need to quickly edit a text-only document, and print it out on your ImageWriter, you'll like MiniWriter. It comes with a special font that mimics the draft printing characters of your ImageWriter, for 100% WYSIWYG operation. And if you own a LaserWriter, you can use MiniWriter to send Postscript commands to your printer!

SigmaEdit – This text-only editor works with documents larger than 32K!

MyWord (shareware) – Is it a text editor or a word processor? Well, a little of both... Most text editing accessories allow you to select a font for the entire document to be displayed in. MyWord lets you specify individual fonts, styles, and sizes for every character! And, it uses familiar on-screen rulers for margin settings.

Word Counters – Three accessories to count the number of words in your text files.

Afterthought (demo) – A disk-based editor designed for the power programmer! This disk accessory editor is modeled after MDS Edit, the standard in text editing since the early days of the Mac. Since it is disk based, it can edit documents as long as 8,000,000 characters, and can open two files simultaneously. This demo version can't save or print your files, but includes ordering information for the complete package.

PowerEdit (shareware) – Another editor designed for the C or Pascal programmer. PowerEdit includes features that programmers will love, like block shifts, search and replace, auto indentation, automatic save, and even bracket matching!

JoliWrite (shareware) – Beautify your files before transmitting them with a modem. Some communications services need files to include a carriage return at the end of each line, and need spaces instead of tab characters within the text. JoliWrite automatically does most of this formatting for you before you upload your text to another system.

Sound effects

SoundMaster (shareware) is a small utility that you place inside your System Folder. It will play sound effects during specific Mac operations, such as inserting a disk or shutting down. Think of your co-workers’ amazement when your Mac greets you in a human voice and asks what you would like to work on! Or, create a high-tech environment with our robotic effects that make your Macintosh sound like a deadly killer android! We’ve included five different sound “environments” for you to choose from.

NOTE: Digital sound effects can use substantial amounts of memory. This disk will work on Macs with the standard one megabyte of RAM, but will work more efficiently if your Macintosh has two or more megabytes installed.

The SoundMaster control panel lets you select different sound effects to accompany eleven different Mac operations.
HyperCard Stacks

The programs in this section require the HyperCard application from Apple.

130 Utility Stacks
Volume 1

Do you use Apple's HyperCard to create your own stacks? You'll love these external functions and script examples!

About XCMD - Now your stacks can have a custom "About this stack..." menu. Most Macintosh programs include a credit line under the Apple menu. Now your HyperCard stacks can too! This external command adds one or two lines under the menu that you can link into any card or script.

FileName - Access the standard file dialog routines from your HyperTalk scripts. Nobody likes to type in pathnames like "HardDisk:HyperCard:My Stacks:Test1" when they can just point and click! Well, this external function lets your stacks use the standard file dialog boxes for opening and saving files.

Clicky Buttons - Seventeen whimsical animated buttons to add life to your stacks. The wizards at the Acme Dot Co. have come up with a collection of buttons that move when you click them, in a variety of visually interesting ways. Use them in your stacks, and you'll achieve a unique look and feel that everyone will enjoy.

PopAlert (shareware) - Access the standard alert dialog boxes with their Icons.

ResCopy - If you use XCMDs, XFCNs, or any other resources, you need ResCopy! This external command, which is copyrighted by Apple, is one of the most useful HyperCard utilities ever created. It facilitates the movement of resources to and from any stack, with commands to copy, rename, renumber, and remove resources. It can also play sounds and display icons and cursors. You'll never want to be without it!

DragRect - Create "draggable" windows with this external function.

StackEditor Demo - Edit scripts from different objects or stacks simultaneously! HyperCard's standard script editing environment is somewhat restrictive, since you can't easily edit scripts from a number of different objects. Cutting and pasting between scripts can be a real chore, too. With the StackEditor, your scripts from stacks, fields, buttons, cards, and backgrounds are all accessible with a scrolling field.

ZoomRect - This XCMD animates a zooming rectangle to provide visual cues.

ZipCheck - An XFCN to check the validity of 5- and 9-digit zip codes. Enter a zip code, and ZipCheck will return the two-letter state abbreviation if it's valid.

Menu XCMDs - Add standard pull-down and pop-up menus to your stacks! We've collected five of the best HyperCard menu bar utilities available, and put them together on one disk. Now you can create standard pull-down menus, pop-up menus, hierarchical pop-ups and pull-downs, and even a pop-up menu bar (this function is a shareware item). With all these routines, you'll never need another one!

Windold - Six newsletter stacks packed with helpful Info, scripts, and Ideas. These stacks, transcripts of the first six newsletters from Apple's HyperCard User Group, include some of the best utilities available for streamlining your stacks and making them more functional and efficient. Find out how to group and move buttons and fields, create "sticky buttons," import text files, and much more!
Prices start at only $8.99 per disk!
Discounts available for quantity orders. See the order form on page 17.

Utility Stacks
Volume 2
This disk is filled with 33 external commands, functions, and scripts to enhance your stacks.

BarButton – An innovative and flexible control button similar to a scroll bar. Sometimes you need a variable control, but a scroll bar just isn’t right. When you move the mouse over aBarButton, a black area in the button will move with the mouse to indicate a selection.BarButtons can be placed horizontally or vertically.

ChangeCursor – This XCMD will change the cursor independent of any handler. HyperTalk’s commands to change the cursor work only within one handler. This XCMD lets you change the cursor on the fly, and it will stay that way until you change it again.

Clipboard – This pair of XCMDs will send and receive text to and from the clipboard.

Crunch – An XFCN that removes extra spaces between the lines of a text field.

DispPict – Display paint pictures, PICT images, or color images with HyperCard. This external command will open a graphic image, either from a separate file, or from a PICT resource stored within your stack, and display it over the top of the current card. On a Mac II, the image can be displayed in color.

FormatNumber – This will format numbers by adding commas and decimal point.

FormatPhoneNumber – Converts 7 or 10 digit numbers to phone number format. This will automatically convert a “raw” number like 6199422556 to (619) 942-2556.

Highlight – Automatically highlight any button as the mouse passes over it!
This stack was designed to help computer neophytes grasp the concept that buttons are meant to be clicked on to initiate actions. Buttons can automatically and selectively be highlighted when the mouse cursor is pointing to them.

Mac II Stacks – Three stacks to control color and 68020 data cache on the Mac II.

HyperTools – A collection of eight different external commands and functions. This stack includes 8 functions: StripPt returns the width of a string in pixels. ZoomRect will create a zooming rectangle from one point to another. DragRect simulates a moving window outline as you drag a field. CopyBits will copy any bit image from one point to another, scaling it if necessary. RGB Backcolor and RGB Forecolor will set the background and drawing colors on a Mac II. GetPicture can retrieve and draw PICT images, and ListCatalog will read the contents of a disk or folder into a field, showing each file name, its size, and its type and creator information.

PaintView (shareware) – Preview MacPaint pictures before importing them.

Power Tools – Toggle instantly between tools, without wasting time with the menu! Normally to select a new tool, you have to move the mouse up to the tools menu, select your tool, and go back to your work. After installing PowerTools, you can hit the Enter key, and you’ll toggle between the browse, button and field tools. Hit Shift-Enter, and you can quickly move through the other painting tools! It’ll save you a lot of time!

StringCase (shareware) – These XFCNs convert text between upper and lower case.

StripDelim – An XFCN that pre-processes text by stripping unwanted characters.

StripPt – A function to strip selected characters from text. Includes pascal source.

ThumbButton (shareware) – Create control bars with indicators inside the “thumb.” Similar to a scroll bar, the ThumbButton can be placed horizontally or vertically. The white control box, or thumb, can contain a number indicating the selected value.

TitleBar – This will show or hide the title bar of HyperCard’s main window.

UserLevel15 – Force your user level to stay at 5, even if pesky stacks try to change it.

XPict – Draw PICT images at any size, anywhere on the screen, in 8 different modes!

Also Included: NewFolder, ShutDown, Flasher, and Effects stacks.
**132 Chevy Super Sport Stack**

The serious car buff will love this stack, filled with info and pictures for 1961 to 1976 Chevrolet cars.

Because of its size, this stack requires a hard disk drive! It contains statistics, emblems, tables, charts, production specifications, and other information for 53 different models of Chevrolet Impala, Chevelle, Camaro, Nova, and Malibu cars. There is a high-quality digitized picture of almost every car, as well as images of engine insignia. If you're a car collector, car lover, or even if you just need some automotive clip art, you'll like this!

![Chevrolet cars](image)

**133 CWC³ Wind Chime Stack**

This stack describes the products of Celestial Wind Carillons. It's an excellent example of HyperCard as an advertising medium.

Are you thinking about producing a HyperCard-based training disk, or an information stack about your company? Or, are you looking for a wonderful musical gift for yourself or someone else? Either way, you'll get something out of this stack! It's a great example of how to use HyperCard as an educational tool, to tell people about your company or your products.

And, it contains pictures, descriptions, and sound samples of some of the most beautiful wind chimes available, too! Six different models of chimes are previewed in the stack. The chimes are available directly from the manufacturer, and ordering instructions are included.

![Wind chime](image)

**134 Animation Stacks**

Explore the power of animated graphics with these informative and hilarious stacks!

American Gothic – A hilarious take-off on Grant Wood's famous painting! You've always wanted to know what the old couple was saying to each other, and now you can find out! Includes sound effects from a classic sci-fi film.

Rocky's Dream – Rocket J. Squirrel was never like this when you were a kid!

A Funny Day – A cute cartoon with a trick ending, done in the Japanese style.

HyperZoetropes – Six examples of historic animation from the late 19th century.

HyperMutoscopes – Two more old-time flicks, including a Chaplin short!

Anim Stack (shareware) – Easily create animated effects in your stacks.

Drag Tracer (shareware) – More automatic animation effects. This stack helps create special effects by following your mouse movements and repeating them.

These are some of the outrageous characters that will show off HyperCard's animation capabilities to you in this entertaining cartoon collection.
Please read the shareware info on page 5!
Reward shareware authors for their efforts. We will all benefit from their work.

**135 Bill’s Clip Art Stack**

Five hundred different images in one HyperCard stack, indexed for easy location and selection!

This enormous stack contains five hundred different cards, each with a high-quality digitized image. Categories include people, animals, famous places, tools, home appliances, old-fashioned cars, holiday images, borders, ornamental scrolls, and even pre-Columbian pottery! Most of the images have keywords associated with them, so that by searching for the word “animal,” all pictures of animals could be quickly located. The pictures can be used with any program that works with MacPaint style graphics, such as PageMaker, Ready-Set-Go, SuperPaint, MacDraw, and many others.

It’s easy to find the image you want with Bill’s clip art stack. Type “witch” & you’ve got a picture of one. Type “Easter” and a suitable image appears. It’s that simple!

**136 Magazine Index Stacks**

Quickly find articles of interest in MacWorld, MacUser, and NibbleMac Magazines.

If you’re lucky enough to have a full set of back-issues, or if you have access to them, you can find almost any article of interest quickly and easily with these stacks. This disk contains 3 separate sets of stacks that index articles from the major Macintosh magazines MacWorld, MacUser, and NibbleMac. Article subject, title, issue date, and page number are all included.

The MacWorld index contains articles from the premier issue in 1984 through September of 1987. The MacUser index includes articles between 1986 and 1987. The NibbleMac index features articles from the premier issue in 1985 through December of 1987, and also includes digitized reproductions of the cover art from each issue.

**137 Game Stacks for Kids**

Some games are too hard for kids... but these aren’t; they were created especially for kids.

Dragonsword – Escape the cave, kill the dragon, and rescue the beautiful damsel! Written by 12 year old Nat Ingalls, with Andy Ingalls helping out in the art department.

K‘Kal Adventure – Explore a magical castle under the sea, and make new friends! The second grade class of Kaunakakai Elementary in Hawaii created this adventure.

Knight Adventure (shareware) – Even kids that can’t read yet will like this game! Ten year old Marshall Ward made this crazy adventure. There’s danger at every turn unless you make the right decisions.

Animals (shareware) – Think of an animal, and the Mac will try to guess it! This is the HyperCard version of one of the oldest computer games. The Mac tries to guess your animal, asking yes or no questions, and can learn new animals as you play!

Mr. Potato Head – Roll the dice, and see how fast you can complete your potato man!

The graphics might not be the best in the world, but the games are fun! All were designed to be easy enough for the youngest children to enjoy.
138 KidStacks Collection

An integrated collection of stacks for preschool age children that actually talk as they teach!

This great collection of stacks for preschool kids teaches them about the alphabet and numbers, how to tell time, how to count money, and even lets them drive a car!

139 MIDI Stacks for Musicians

If you have a MIDI instrument and interface connected to your Mac, you need this disk!

HyperMIDI Toolkit (shareware) – Customize & program your MIDI studio in HyperTalk!

This stack contains a collection of sophisticated external commands, functions, and routines that give you almost unlimited control over any MIDI device in your studio. You can set up MIDI macros to automatically send patches or change parameters, create custom sequencers, and much more. Included in the stack are a data analyzer, MIDI filter, step sequencer, Roland D-50 librarian, Yamaha DX-7 envelope creator, and more!

Benson – Retrieve and send MIDI bulk dump data to and from your Instruments.

With Benson, you can read in any data from your MIDI devices, examine it, manipulate it, and send it back to your MIDI network. For example, you could use Benson as a patch librarian for any MIDI instrument. Includes a 38-page instruction manual and two individual versions of Benson, one for HyperCard 1.1, and one for version 1.2 and up.

Benson’s graphic interface gives you control over your MIDI data. The stack includes built-in settings for over 40 of the most common keyboards, and you can create custom settings for other devices.

The KidStacks collection consists of eight integrated stacks that teach youngsters the basics of the alphabet, numbers, simple math, shape recognition, counting, money, and telling time. All of the stacks are accompanied by a synthesized voice that talks to the child as they learn. Recommended for ages 3 and up.

Money – This teaches the relationships between different coins and paper money.

ABC’s – This stack teaches how to draw each letter, number, and basic shape.

Time – Your child will learn how to tell time from a friendly clock person!

Math – Simple addition and subtraction problems are presented here.

Lessons in Spelling – A picture and pronunciation will help reinforce each word.

People – For the older child... Learn to recognize policemen, firemen, and others.

Laura’s Letters – This uses a digital human voice to teach the alphabet and numbers!

Map – Let your child explore a house, move from room to room, even take a drive! After all that learning, it’s time for a little fun! This stack presents an overhead map of a house, and simply by moving the mouse, your child can move between rooms. Clicking on the names of pieces of furniture and other fixtures will display and speak their names. Once they’ve found their way outside, the child can actually get into the family car and take a drive in the country! They’ll get a real kick out of it!
Network software

140 AppleTalk Utilities

Are you part of a multiple-computer AppleTalk/LocalTalk network? Check out this disk!

ATView (shareware) – This desk accessory displays info about each node on the net. Displays the node ID, user name, node type, and socket number for each node.

Broadcast – Send messages to and from any users on the network, with the Chooser! Now you can transfer messages between users on the network, in the background! Just select the network user who should receive your message (or select all users), type the message, and it will appear on the screens regardless of what they’re doing at the time!

ClockSynch – Remember when they used to say “synchronize your watches?” It’s annoying when the Macs on a network have their clocks set to a slightly different time. ClockSynch fixes that by synchronizing the clocks on all connected Macs!

Dopplemaker (shareware) – Protect files on your server from unauthorized copying. You want your network users to be able to access the applications they need, but you don’t want them to pirate those programs! Well, Dopplemaker will create “phantom” programs that work just like the originals, but are useless if they are copied!

FolderShare (shareware) – Flexibly assign folder access privileges with AppleShare. This utility works only with AppleShare networks, and allows folder access privileges to be granted to not only the folder creator, but any other user or work group as well.

HyperCom™ Promo (demo) – Design and program network functions with HyperCard.

Apple-Jam (shareware) – A teleconferencing program for up to twenty users. Up to 20 people can chat simultaneously with Apple-Jam. Just type your message, and it will be sent to any or all of the other participants. Great for a network staff meeting!

JamPaint (shareware) – Share sketches and drawings over the network in real-time! Open JamPaint on one or more networked machines, and when a user draws something on one Mac, their drawing will appear simultaneously on the other Macs. This is great when you want to “rough out” some art ideas with other workers.

SetNode – A control panel device (CDEV) to set the node hints in parameter RAM.

NetTrek (shareware) – Battle for control of the universe in this multi-player game! After the serious work is over, it’s time for some serious play! NetTrek is an incredible outer-space combat simulation based on the popular Star Trek television series. Up to 5 players can compete simultaneously, selecting either a Terran, Klingon, or Romulan vessel. You must explore the known galaxy, deploying a base and staking your claim to each of the 8 star clusters. But your opponents might decide to throw a phaser blast or photon torpedo in your way! Unfortunately, this program does not work on the Mac II.

NetTrek is a strategic, stellar conquest game for two to five players. All players compete simultaneously over their AppleTalk/LocalTalk network. You can even send harassing messages to each other!
Mac II Software

141 Misc. Mac II Stuff

A grab-bag of fun and useful graphics and utilities. These programs require a color monitor.

DeskPict — Tired of a gray background? Use a color picture as your desktop pattern!
No IBM! — Let your true sentiments be known with this flashy startup gag!
ScreenMaster (shareware) — Improve software compatibility & startup screen colors. Some programs run into compatibility problems because of the Mac II’s larger screen size. This CDEV utility allows you to choose between your standard screen size and the smaller MacPlus/SE screen, which allows some programs to work properly. It also forces startup screens to retain their original CLUT color tables, making them look better.
ColorCursor — This changes your mouse pointer to a rainbow-colored arrow!
Fish! (shareware) — Watch crazed and colorful fish swim around on your desktop! This CDEV utility is one of the wackiest programs for the Mac to date! It installs a number of animated swimming fish that cavort through your background pattern, swimming around behind your icons! The fish are completely editable, so you could conceivably add mermaids, submarines, and other characters to the cast!

The author of the kooky Fish! CDEV says it’s his goal to have “a fish on every desktop!” Spectra produces incredible animated color wheels. The “No IBM!” program will let the world know how you feel about the competition.

142 Image Processing

Three programs for color image conversion, image processing, and color separation production.

VisionLab (demo) — Convert images between 6 popular Macintosh graphics formats. VisionLab’s primary function is to convert color images between several standard formats. Images can be translated between PICT data files, PICT resources, Thunder­scan documents, MacPaint files, PixelPaint documents, and GIF, a highly compressed storage format that can reduce the size of color images by up to 90%! Color images can also be dithered in six different ways, producing images compatible with black-and-white Macs. This demo has some features disabled, such as printing and TIFF compatibility.
Image — A full-featured image processing, enhancement, and colorizing utility. This program was designed to enhance, analyze, edit, animate, print, and colorize gray-scale images on the Macintosh II. It can produce density histograms, do digital filtering, perform contrast enhancement, and much more. It also supports image capture with the Data Translation QuickCapture frame grabber card. The program requires a Macintosh II with at least two megabytes of memory, and works best with five or more megabytes.
Separator — A color separation processor for PixelPaint documents. If you need to produce color separations from a PixelPaint file, this makes it easy! It produces four separate files that can then be printed on a Linotronic typesetter.
Prices start at only $8.99 per disk!
Discounts available for quantity orders. See the order form on page 17.

143 Mac II Fantasy Images
Seven spectacular full-color images of dragons, sorcerers, and other fantasy themes.

144 Mac II Auto Images
You'll love these color pictures of some of the world's most powerful driving machines!

145 Color Fractal Graphics
Explore the fantastic world of the Mandelbrot set with these fractal graphic generators.

146 Color Mac II Games
Time for a little fun and games - in color! Play solitaire card games, or play Hangman against the Macintosh!

Our Mac II image disks contain some of the finest color pictures available. Each disk includes the Giffer utility, which lets you view the images and save them as PICT files for use as startup screens, backdrops (with DeskPict from disk 141), and other purposes.

If you're a car buff, you won't believe the pictures on this disk! You'll get incredible color images of a Z-28, 944 Turbo, Lamborghini Countach, Maserati Bora, and more!

Fractal graphics are mathematically calculated plots of a specific set of numbers called the Mandelbrot set. These calculations create infinite and beautiful recursive designs, and are used in many various applications today. This disk contains ten different programs that generate fractal images in dazzling colors.

Seahaven Towers™ (shareware) - An original and addictive solitaire card game.
Canfield (shareware) - A color variation of a more traditional solitaire game.
Hangman Plus (shareware) - Can you guess the computer's word before you hang?
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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

AppleShare File Server version 2.0 has CD ROM support that allows AppleShare users to share information on CD ROM drives. Foreground server administration lets you add users to the server group while the server remains available. Users can change their own passwords. With the Super User option, the network administrator can perform routine server maintenance while the server is active. Includes server lock feature and copy protection setting for applications. Also supports enhanced Apple IIe and IIGS computers. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010. Free to registered owners who purchased after March 1, 1988, otherwise $50; $799 new.

Canvas version 2.0 has autotrace, unlimited multipoint bezier curves and smooth polygons, unlimited layers, choice of 16.7 million colors, gray scales in 1-degree increments. Can zoom from 3 to 3200 percent of original. Deneba Software, 7855 N.W. 12th St., #202, Miami, FL 33126; 305/594-6965. Free; $299.95 new.

Falcon version 2.0 lets two players simulate head-to-head combat via built-in communications software. Makes dogfights possible with direct-connect, 1200-baud modem, or AppleTalk network. Also includes realistic changes to the HUDs (head-up displays) and radar modes. Falcon's F-16 can be set to automatically fly to a selected target, and MIGs have been given a limited armament but made tougher. Digitized voice warns the pilot of potentially dangerous situations. Sphere, Inc., 2061 Challenger Dr., Alameda, CA 94501; 514/522-3584. Free; $59.95 new.

MGIStation CAD version 2.5 includes comprehensive layering capability, improved user interface, and macro language for user customization. Version 2.5 I runs on Mac 512KE, Plus, SE, and II; version 2.5 II is designed for the color Mac II. Micro CAD/CAM Systems, Inc., 5000 Sepulveda Blvd., Van Nuys, CA 91411; 818/376-0008. Version 2.5 I $100, version 2.5 II $300; version 2.5 I $999 new; version 2.5 II $1399 new.


PowerStation version 2.0 eliminates having to search through files and folders to find a single document. Presents Apple's hierarchical file

(continues)
**Updates**

Structure in a newly organized system. Allows user to create series of up to 16 screens from which applications and documents can be installed regardless of their location within the hard disk filing system. You create screens that consist of menu bars and buttons, with each button able to launch an application, open one or more documents, or open a desk accessory. Applications and documents can be listed alphabetically. Program remembers setup and location of documents and files and allows the user to power up to the same custom desktop each time. MultiFinder compatible. Requires at least 512K and System 3.0. Fifth Generation Systems, Inc., 11200 Industriplex Blvd., Baton Rouge, LA 70809; 504/291-7221. Free; $59.95 new.

**Teacher’s Rollbook** version 2.0 generates form letters requesting parent conferences, reports on grades by type of assignment, averages grades for all assignments, and prints up to ten sets of assignment reports with one command. 1MB min. memory. Current Class Productions, 22824 Berendo Ave., Torrance, CA 90502; 213/326-4246. $17.95; 149 new.

**Timbuktut** version 2.01 gives gray-scale version of color screen to users when host computer has color monitor. Farallon Computing, Inc., 2150 Kittredge St., Berkeley, CA 94704; 415/849-2331. Free; $99 new.

**VersaCAD/Macintosh Edition** version 2.0 contains a HyperCard-based bill-of-materials program that allows you to define categories for a report and immediately run VersaCAD drawing files against it. Improved construction tools include rubber-band stretch, chamfers, and automatic calculation of line lengths. VersaCAD Corp., 224 Main St., Huntington Beach, CA 92648; 714/960-7720. Free; $1995 new.

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.
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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.

To order your copy publisher-direct, call SoftView at 1-800-622-6829. Or, visit any one of 10,000 retailers offering MacInTax.

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Circle 419 on reader service card
Where to Buy

This listing provides company addresses and phone numbers for products mentioned in this issue. Allow several weeks for responses to Reader Service Card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader Service

754 AppleFax Modem. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.
755 AppleShare. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.
756 Bit Pad Plus ADB. Summagraphics Corp., 777 Commerce Dr., Fairfield, CT 06430; 203/384-1344, 800/243-9388.
759 Chuck Yeager's Advanced Flight Trainer. Electronic Arts, P.O. Box 7530, San Mateo, CA 94403; 415/571-7171, 800/245-1525.
760 City to City. Mediagenic, 3885 Bohannon Dr., Menlo Park, CA 94025; 415/329-0800.
762 ColorScript 100. QMS, Inc., 1 Magnum Pass, Mobile, AL 36618; 205/633-4300, 800/631-2692.
765 CompuServe. CompuServe, P.O. Box 20212, Columbus, OH 43220; 614/457-8600, 800/848-8199.
767 Datapay 850 Flatbed Scanner. Datapay Corporation, 1215 Terra Bella Ave., Mountain View, CA 94043; 415/965-7900, 800/821-2998.
769 Different Drummer. Primera Software, 650 Cragmont Ave., Berkeley, CA 94707; 415/525-3000.
770 FilmPrinter. Mirus Corp., 4301 Great America Pkwy., Santa Clara, CA 95054; 408/980-9770, 800/654-0808.
771 1st Aid HFS. 1st Aid Software, Inc., 42 Radnor Rd., Boston, MA 02135; 617/782-4676, 800/843-5497.
* FIFO. Shareware on CompuServe.
773 HP PaintJet. Hewlett-Packard, 16399 W. Bernardo Center Dr., San Diego, CA 92127-1899; 619/592-8010, 800/547-3303.
774 ImageWriter LQ. Apple Computer, Inc., 20525 Mariani Ave., Cupertino CA 95014; 408/996-1010.
775 ImageWriter II. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; 408/996-1010.
776 Iris 3024 Ink Jet Printer. Iris Graphics, Inc., 6 Crosby Dr., Bedford, MA 01730; 617/275-8777.
Where to Buy

777 Lightspeed. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 408/253-9600.
778 Mac/LFR. Lasergraphics, Inc., 17671 Cowan Ave., Irvine, CA 92714; 714/660-9497.
779 MacPac. BIOPAC Systems, 5960 Mandarin Dr., #5D, Goleta, CA 93117; 805/967-6015.
780 MacProto. Adex Corporation, 1750 Junction Ave., San Jose, CA 95112; 408/436-9700.
788 QuarkXPress. Quark, Inc., 300 S. Jackson, #100, Denver, CO 80209; 303/934-2211, 800/356-9363.
789 QuicKeys. GE Software, P.O. Box 65580, West Des Moines, IA 50265; 515/224-1995.

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Circle 61 on reader service card
Now Macintosh and Wang can communicate and nothing gets lost in the translation.

Transferring files from one system to another is somewhat pointless if you spend most of your time reformatting the data. Which is why we introduced MacLinkPlus for Wang. Whether you're running a Wang VS system, an OIS or a Wang PC, MacLinkPlus provides a complete solution for document transfer and file conversion.

MacLinkPlus includes the entire collection of more than 40 translators — the key to accurate conversion of file formats such as rulers, indents, bold and plain text styles, margins, tabs, underlines, superscripts, subscripts, paragraphs, and tabular tables. If it looks a certain way on a Wang, it will look the same way on a Mac. And, of course, vice-versa. No time-wasting and difficult pre-conversion to ASCII or print files is necessary.

MacLinkPlus doesn't stop there, however. It offers full Wang VS Workstation capabilities, allowing easy access to Wang word processing, data processing and electronic mail. All 32 Wang Workstation functions can be executed through familiar Macintosh menus or command keys, and you'll even be able to use the mouse on Wang displays.

Software for the Macintosh, software for the Wang (8" or 5.25"), software for the PC and a direct connect cable (you can use a Hayes or compatible modem if you prefer), is included in the MacLinkPlus package; everything you need to be up and running in minutes.

So call (203) 268-0030 for your nearest DataViz dealer, because no matter which Wang system you're using, there's a MacLinkPlus solution to connect it to the Mac.

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Randall D. Smith, President of F.M.I., Inc. invites you to a unique learning experience to be held in your area.

A few years ago I bought a new Porsche 911. As I was reading through the literature I came across an interesting statement. It said: “the only limitation this automobile has is the driver!”

I must admit that I felt the same way when I bought my Macintosh computer. I was like a lot of first time owners in that I never read the manuals. I simply popped in the disks and figured out the basics on my own. After having used an IBM for three years I was thrilled to be able to accomplish the Mac basics without taking a six month Lotus course!

Over the next few months I happily used my Mac for letters, simple spreadsheets, check books, a few graphics, and for games. But as a business owner, way in the back of my mind, I knew that there was a whole lot more the computer and the software could do if they just had someone else behind the mouse.

I realized I needed training to get the most out of my computer. I first tried reading the manuals. At some point in school they convinced me that I’m a fairly bright fellow. But after nights of reading manuals I simply didn’t understand what I was reading.

My next step was to visit my local Apple dealer for help. He was friendly enough, but made it fairly clear that his interest was in selling computers, not teaching me how to use them. He did mention however, that there was some training available at $75 per hour. I had already paid for one college education and didn’t really have the budget for another!

Next I subscribed to all of the Mac Magazines. Most (including this one) were very interesting. After a while though, I found myself reading the ads more than the articles. I wasn’t interested in advanced graphics, HyperCard stacks, or MS-Dos connectivity. It seemed like more and more of the articles were written to the advanced user - which was definitely not me.

My last resort was a Mac user group. These were great people who were extremely bright and could quote the electrical diagram of the Mac backwards and forwards. But the group was too advanced for me. I was stuck!

In marketing, you are taught to “find a need and fill it”. I definitely saw a need for good, practical instruction on the Mac for the rest of us. I decided to provide the answer for Mac users myself. In January we presented the very first MacAcademy. Since then we have had tremendous response. MacAcademy places training emphasis on techniques and business applications of the featured software.

The Results. Over 6,000 people have attended MacAcademy. On a scale of 1 to 5 they have given the experience a 4.6. Companies who have attended include General Electric, Kodak, G.T.E., M.I.T., Honeywell, N.A.S.A., Boeing, Citicorp, Kinko’s Graphics, Mobile Oil, Gillette, TRW and 500 additional corporations. Are they happy with MacAcademy? The City of Anaheim sent one employee to our first workshop and ten to our second. We have had over 400 people volunteer to be references for those considering attending.

What about you? I’d like to personally invite you to attend MacAcademy. This year we will present our dynamic 2 day workshop in over 65 cities in the U.S., Australia, Europe, and Canada. For a schedule of our upcoming workshops call (904) 677-1918.

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THE FTC MAIL ORDER RULES State:

1. The Seller must ship your order within 30 days of receiving it, unless clearly stated otherwise in the advertisement.

2. If the Seller cannot ship your order when promised, you must be notified in writing prior to the promised date. The notice must specify a new date if available, and must state your opportunity to cancel the contract with a refund, if you agree to a specific delayed shipping date, or (c) agree to an indefinite delay.

3. The Seller's notice must include a postage-paid reply envelope or card so that you may indicate your preference. If you do not respond, the Seller may assume you agree to the delay.

4. The Seller is obligated to cancel the order that the merchandise has been shipped.

5. If you cancel an order that has been paid by check or money order, the Seller is obligated to mail your refund within seven business days. If you paid credit card, the Seller must credit your account within one billing cycle following receipt of your cancellation. Store credits or vouchers are not accepted in place of a cash refund.

6. If the item you order is unavailable, the Seller may not send you substitute merchandise without your consent.

If you remain dissatisfied, write to the Seller immediately. Include a description of the problem and a copy of your letter.

Questions to ask:

- Does the advertised merchandise include all necessary parts and accessories? Are they made by the same manufacturer? Is the version compatible with the requirements of the hardware/software you intend to use it with?

- Can your order be shipped immediately? If not, when will it be available for shipping?

- Has the advertised price increased?

- What warranties does the merchandise carry? Who provides the service?

- What is the Seller's return policy? Exchange or repair? The refund policy?

- What is the advertised price included? Sales tax, shipping fees, etc.

- Does the advertised merchandise include all necessary parts and accessories? Are they made by the same manufacturer? Is the version compatible with the requirements of the hardware/software you intend to use it with?

- Can your order be shipped immediately? If not, when will it be available for shipping?

- Has the advertised price increased?

- What warranties does the merchandise carry? Who provides the service?

- What is the Seller's return policy? Exchange or repair? The refund policy?

- What is the advertised price included? Sales tax, shipping fees, etc.

- Confirm the price and expected delivery date as advertised.

- Make a record of your order, the price, promised delivery, and any written confirmation sent by the Seller.

- Keep copies of your order and all associated correspondence. Your records should include the company name, address, and phone number, a description of the merchandise, your canceled check or money-order number, the date you ordered, the date you paid, and any sales slips and shipping receipts.

- Do not return your order. It is the Seller's responsibility to make sure you receive your merchandise.

- By phone:

- Note the name of the person who takes your order, and the time and date of your conversation.

- Make a record of your order, the price, promised delivery, and any written confirmation sent by the Seller.

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ADOBES PAGEMAKER 3.0

Create your own brochures, newsletters, and reports with page formatting, layout, and design tools.

ALDUS PAGEMAKER 3.0

The number one choice in word processing programs for the Macintosh. Write Now 2.0 now features mail merge, 100,000-word dictionary, cursor key support, direct import and export of text, MacWrite, and RFT (Word, Write, and Works option) files, window menu, decimal tabs, hide pictures option, multifinder and network capability...and more.

SOFTWARE

$255.96

SCANNERS

$361.80

DISK DRIVES

$88.85

ACCESSORIES

$587.94

MONITORS

$587.94

COMPUTERS

$2,396.52

PRINTERS

$459.00

CONSUMER

$2,396.52

LETS CALL...
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<th>Price</th>
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### Drives over 150 MB Call for Price

## Mac II Internal Hard Drives

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<td>44 Cartridge</td>
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## Hardware Accessories

- **Anchor**: 5-year warranty (includes Cable & Software)
  - 2400 Baud Modem: $149
- **Everex**: 2400 Baud Modem & Cable: $209
- **Farrallon**: Mac Recorder: $135
- **Radius**: Mac Recorder: $142
- **Phone Net Connector**: $1,425
- **Two Page Display SE, II**: $1,949
- **Radius Color Monitor**: $2,395
- **MacIn Scripe 340**: $2,295
- **44 Cartridge**: $119

## Memory

- **MacLand has memory for most Macs, Please Call for Pricing**
- **All hard disk drives carry a manufacturer's one year warranty except for the Microtech International drives which have a manufacturer's Five year Warranty.**

---

**To Order Call 1-800-333-3353**

Visa, MasterCard, and American Express accepted. No surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders, additional $5.00 charge, AZ residents add 6.5%. All shipments made by Federal Express.

Standard Air which is 1 to 2 day service. COD's shipped by UPS 2 day air. Call for shipping costs. Products purchased in error are subject to a 20% restocking fee. All prices subject to change without notice. All products subject to availability.

5006 South Ash Avenue, Suite 101 Tempe AZ 85282 (602) 820-5802

Circle 264 on reader service card
## SOFTWARE

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- All returns must include original packaging
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- All returns must be in new condition
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- All returns must be approved by Dr. Mac

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Expands to 4 Megabytes RAM. Plus Only

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MOST ORDERS SHIP FROM STOCK!

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4 Megabytes RAM, 120ns, CMOS.
Ram II - Cost Effective $CALL
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RamPlus 2- Cost Effective $CALL
Expands to 2 Megabytes RAM. Plus Only
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Expands to 4 Megabytes RAM. Plus Only

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SD 60 Megabyte .......... $799
SD 80 Megabyte .......... $1249

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45 Megabyte SE rear .... $689
65 Megabyte SE rear ... $899
80 Megabyte SE rear ... $1199
100 Megabyte SE rear ... $1489
60 Megabyte Mac II .... $699
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TS-60 ........................ $729

Everex
External 20D ................ $509
20 Deluxe External ......... $575
40/60 DTL External .... $1795
20 ID Internal Mac II .... $445
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800K External Drive .... $175
Wedge XL30 ................. $625
Wedge XL45 ................. $825
Mac 105 ADB Keyboard .. $129

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Viking I 19" ................. $1598
Viking 2400 24" .... $1898
Viking G/S 19" ... $2498
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Grappler C/Mac .... $179

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24 pin, 180 cps ... $369
Grappler LQ .... $89

Hewlett Packard
DeskJet ........................ $698

Seikosha
SP 1000 AP .............. $215
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Dove Computer

MacSnap Tool Kit ........ $15
MacSnap Plus 2 ......... Call
MacSnap 2 SE .......... Call
Mach II/SE Accelerator .. $549
Co-Processor 68881 ... $249

Call for SIMM prices

Modems

Beverly Hills
External 1200 Baud ...... $99
External 2400 Baud ... $169

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Circle 5 on reader service card
"What's wrong with copying software?"

"I use a lot of programs on my personal computer, and I copy them all the time."

"I'm a programmer. Every time you copy one of my programs, you're taking away my income—I depend on sold programs for a living."

"Oh, come on. I bought it: I have a right to copy it."

"You do have a right to make a back-up, that's true. But when you start copying programs for your friends and co-workers, that's breaking the law."

"What law? Any copying I do is in the privacy of my own home."

"It doesn't make any difference where you do it. Every time you copy a program without permission from the publisher, you're committing a federal offense."

"That's all right, I won't get caught."

"You're missing the point. The issue isn't "What can I get away with?"—it's "who am I hurting?"

Remember, lots of people worked hard to produce every program you use: designers, programmers, distributors, retailers, not to mention all the people who support users. They have a right to be compensated for their efforts, and their major compensation is through software sales."

"Well, I don't mean to hurt all those people—or anyone, really."

"Unfortunately, that's what copying does: it hurts people. And, ultimately, it hurts people like you, who want new and innovative software."

Do you copy software? Think about it.

The unauthorized copying of software is a crime.

Software Publishers Association
Suite 1200
1111 19th Street, N.W.
Washington, D.C. 20036
Now *Macworld* connects you with the world of Macintosh products instantly. And cost-effectively.

*The Macworld Catalog* is your immediate access to hundreds of Macintosh products, manufacturers, and services. Each month, this special direct response section brings you detailed product information arranged by category—so you can quickly compare prices and capabilities. Then pick up the phone and order!

For the best Macintosh buys, scroll through *The Macworld Catalog*. 
## The Macworld Catalog

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### Advertising Rates & Information

**The Macworld Catalog** section is a monthly link-up for advertisers and volume purchasers of Macintosh-related products and services. The Catalog offers advertisers a low-cost marketing opportunity and provides readers with a timely, easy-to-use menu for product buying.

Display ads are sold by column inches (2” minimum). Standard red is available as a second color. Text-only listings are available for a minimum of three issues at $322 per issue ($965 total).

For more information, space closings, and material deadlines, please call toll-free 800/888-8622.

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- Niki Stranz, Western U.S.
- Carol Felde, Eastern U.S.

**The Macworld Catalog**
- 501 Second Street
- San Francisco, CA 94107
- 800/888-8622

**Instant Link:**
- Macintosh Products, Manufacturers, Services

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Instant Link: Macintosh Products, Manufacturers, Services

The Macworld Catalog

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Furniture

MacDesk Organizer
Harwell Services
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Long Beach
CA 90814
Call Now
213-433-3807
Printer Stated
Now Available
$25

- Affordable, sturdy, functional, handsome
- 100% wood finished in cherry, oak or walnut
- 2 models, extended or standard
- Holds both external and hard disk drives
- Keyboard and peripherals fit underneath
- Cost only $30

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- Abaton Mouse Trackball-Propoint • Apple Expanded Keyboard • Mac-101 Enhanced Keyboard • Mouse Systems A+ Mouse. Also Turbo Mouse ADB at low, low prices! Cambridge Automation, Inc., 3260 Industry Dr., Signal Hill, CA 90806, 213/597-1626, 800-345-8666, 800/826-9214 (in CA)

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Company Logo Specialist
Grey, Green & Red Pads
Size: 9½" × 8" × ¾"
- 12 pads $9.50 w/logo
- 36 pads $8.50 w/logo
- 72 pads $6.90 w/logo
- 144 pads $4.70 w/logo
- 500 pads $4.14 w/logo
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ENTIRE pad imprinted.
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Computer Expressions, 3833 Chestnut Street, Philadelphia, PA 19104, 800/443-8278

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Custom Printing Available Cloth:
Blue, Gray, Burgundy, Red, Brown, Green, Black, Navy & Platinum
Size: 8 x 7 2/5, 8 x 9 2/5, 8 1/2 x 11
12 Pads: $3.25, 3.50, 3.75
72: 3.00, 3.25, 3.50
144: 2.85, 3.10, 3.35
PLASTIC: Blue, Platinum, Gray & Red
Size: 8 1/2 x 11
12 Pads: 6.50, 7.00, 8.00
12: 6.50, 7.00, 8.00

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A leather mouse pad for the rugged and rational. Your mouse will ride cleaner, faster, smoother on a Chesapeake Leather Works cowhide mousepad. Each pad is carefully handmade with specially tanned leather stitched to a rubber base. The ultimate pad.
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- $19.95 - VISA/MC

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3.5 " DS/HD

SONY 1.29
DATASAFE 1.19
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Princeton

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DUST COVERS!

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MAC, II, ImageWriters, & Lasers

For Mac or Apple Copyright

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Contemporary ComputerWear
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The Macworld Catalog

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Get rid of that tacky paperclip! Add class and style to your Mac or Apple drive. Uses Manufacturer's eject hole. Platinum color tool and Mount (with adhesive) are high strength, electrically insulated, ABS plastic and chrome steel. QUALITY $4.95. Check, MC, VISA + $1 s.h. DEALERS—Christmas special.
PcI Enterprise, Inc., 1818 Manor Hill, St. Louis, MO 63131, 314/821-1415

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68050?
What else can you call an accelerator that fits the 512/Plus/SE and can use the 020 DB 030?
Total Systems Integration 99 West 10th Ave., #333 Eugene, OR 97401 800-874-2288 503-345-7395

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The Macworld Catalog reflects the expanding corporate Macintosh audience whose purchasing activities increasingly include mail order. The cost-effective direct response advertising available monthly in The Macworld Catalog links you instantly with nearly 500,000 qualified buyers.
Get into the link. Call 800.888.8622 and place your ad now!
800.888.8622

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**Discount Macintosh**

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<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>Macintosh Plus</td>
<td>$Call</td>
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<tr>
<td>Macintosh SE 2 800k drive</td>
<td>$Call</td>
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<tr>
<td>Macintosh SE 30mb internal</td>
<td>$2695</td>
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<tr>
<td>Macintosh SE 40mb internal</td>
<td>$2895</td>
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<tr>
<td>Macintosh II 40mb internal</td>
<td>$3995</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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<tr>
<td>Imagewriter II w/cable</td>
<td>$450</td>
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<tr>
<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>$1595</td>
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<tr>
<td>C.M.S. external hard drives</td>
<td>$Call</td>
</tr>
</tbody>
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**Data**

**DATA COMPUTER**

- LaserWrt.SC/NT/NTX In Stock
- Mac+ /20Mb 1345./1895.
- MacSE2/20Mb* 2475./2775.
- MacSE50/45Mb+ 3095./3295.
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- MacII60/80Mb* 4475./4755.
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- CMS Internal MacSE CALL
- CMS Internal Mac II CALL
- MonitorMonochrome/Color 325./725.
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One megabyte SIMM modules in stock for your Mac Plus, SE, or Mac II. Immediate delivery. Fully guaranteed.

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- monitors
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(512) 343-9661

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Mountain View, CA 94043

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MacSE2/20Mb* 2475./2775.
MacSE50/45Mb+ 3095./3295.
MacII/40Mb* 3675./4375.
MacII60/80Mb* 4475./4755.
CMS ExternalMac+,SE,II CALL
CMS Internal MacSE CALL
CMS Internal Mac II CALL
MonitorMonochrome/Color 325./725.
*Keyboard Reg./Ext. 99./175.

**Data Memory**

- ONE MEG SIMMS
- Mac II Mac Plus Mac SE

Don't settle for long lead times from other suppliers.

- Competitive Price
- Fast Service
- 1 Year Factory Warranty

Order Today: 800-227-4637 or 303-449-6400

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**Memory Systems**

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**Circle 640 on Reader Service Card**

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MEMORY EXPANSION MODULE
FOR YOUR MAC +/SE & MAC II
WITH 256K SIMMS

THE BEST VALUE FOR YOUR MONEY

SOFTWARE I - upgrades your Mac +/SE from 1 Med to 2 Meg, by expanding your 256K SIMM to a 512K SIMM. The Mac SE expansion slot remains clear.

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SOFTWARE utilizes new technology to conserve power and space. It allows you to upgrade by using your existing 256K SIMMS. All Computer Care products carry a 1 year limited factory warranty. Call for a FREE brochure. Made in USA.

As always, our 256K and 1 Meg SIMMs are in stock.

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100% MAC II COMPATIBLE
1 MG X 8 - 100NS
$360.00 PER UNIT
QUANTITY DISCOUNTS AVAILABLE!
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RAM/ROM
Upgrades
128K to 512K $350
128K to Plus $500
128K to 2MB+ $700

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Memory Expansion SIMM Kits
for Macintosh™ Plus, SE and Macintosh™ II

Easy to install, plug-in modules that let you add 2 to 8MB of memory. Ideal for "memory-gobbling" software applications and the new Multi-Finder multitasking environment.

Guaranteed Same Day Shipment
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We buy and sell 256K SIMMs.

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  - File / Folder names
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### Macworld Best-Sellers

#### Business Software

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<td>7</td>
<td>8 Adobe Illustrator</td>
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<td>9</td>
<td>–</td>
<td>9 WriteNow for the Macintosh</td>
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<td>10 FileMaker Plus</td>
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#### Education Software

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<td>4 Early Games</td>
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<td>9</td>
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#### Hard Disks*

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#### Add-In Boards

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<td>–</td>
<td>5 Mac286</td>
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#### Product Watch

Editors' choice: Other recent or forthcoming products of particular interest.

- **Microsoft Word 4.0** Microsoft word processor
- **Milo** Paracomp mathematics processor
- **Studio/8** Electronic Arts color graphics program

#### Networking/Data Communications

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<td>2</td>
<td>–</td>
<td>5 Red Ryder</td>
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*Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during September 1988.

*Does not include hard disks installed at the factory.*
Happy Users!

The WriteNow difference:
Ease, Performance, and...

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<th>WriteNow 2.0</th>
<th>MacWrite 5.0</th>
<th>MS Write</th>
<th>MS Word 3.01</th>
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