NEW!

Color Macs

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Color PowerBook
Portable Presentations, Page 120

LC III
Fast and Affordable, Page 102

Centris 610 & 650
040-Based Midrange Macs, Page 106

Quadra 800
Faster than a Quadra 950, Page 114
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Color Classic ........................................... 94
By James A. Martin Apple adds color, a PDS, an FPU option, and a revamped look to the original compact Mac, but is it worth the expense?

LC III ........................................... 102
By Cheryl England A best-bargain Mac, the LC III keeps pace with a Mac IIci and has none of the LC II's limitations.

Centris 610 and 650 .................................. 106
By Galen Gruman These successors to the midrange Macintosh II series offer powerful 640-based Mac systems—at very competitive prices.

Quadra 800 ........................................... 114
By Galen Gruman The latest in Apple's line of high-performance Macs, the Quadra 800 outperforms the Quadra 950 but costs less.

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### Color Systems

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<tr>
<th>Display Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>14-inch Color Display</td>
<td>$399†</td>
</tr>
<tr>
<td>PowerVision 8-bit video adapter for PowerBook</td>
<td></td>
</tr>
<tr>
<td>w/0 MB of RAM</td>
<td>$499</td>
</tr>
<tr>
<td>w/2 MB of RAM</td>
<td>$699</td>
</tr>
<tr>
<td>w/4 MB of RAM</td>
<td>$999</td>
</tr>
<tr>
<td>16-inch Mirror Trinitron</td>
<td></td>
</tr>
<tr>
<td>w/8-bit board</td>
<td>$1099</td>
</tr>
<tr>
<td>w/16-bit board</td>
<td>$1449</td>
</tr>
<tr>
<td>w/24-bit board</td>
<td>$1549</td>
</tr>
<tr>
<td>20-inch ProView Trinitron</td>
<td></td>
</tr>
<tr>
<td>w/8-bit board</td>
<td>$2499</td>
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<td>w/16-bit board</td>
<td>$2599</td>
</tr>
<tr>
<td>w/24-bit board</td>
<td>$2699</td>
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<tr>
<td>20-inch ProView V</td>
<td></td>
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<tr>
<td>w/8-bit board</td>
<td>$1799</td>
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<tr>
<td>w/16-bit board</td>
<td>$1899</td>
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<tr>
<td>w/24-bit board</td>
<td>$1999</td>
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### Monochrome Systems

<table>
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<tr>
<th>Display Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>15-inch Grayscale Portrait Display w/ monochrome card</td>
<td>$399† $549</td>
</tr>
<tr>
<td>ViewPort Full-page SCSI Display perfect for Mac Plus, Classic II or PowerBook</td>
<td>$699</td>
</tr>
<tr>
<td>19-inch Two-page Display w/ card</td>
<td>$799</td>
</tr>
<tr>
<td>21-inch Grayscale Display w/ monochrome card</td>
<td>$999† $1199</td>
</tr>
</tbody>
</table>
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10:00 Shoot

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10:12 Process

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10:45 Present

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October 22, 1991

Dear Ellen:

If there is anything better than being loved by you...it is loving you.

And you are so easy to love. You've brought such wonder into my life and have touched my heart with your love.

I just want you to know, my darling, that it feels so good being in love with you and I want to love you for a very long time.

You are a wonderful woman and I love you dearly. If I'm dreaming, please don't wake me up--I don't want this to end.

Monogrammously yours,

Your Mac can say a lot about you.

If somebody sat down at your Mac and started snooping around your disk, which would embarrass you more?

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How about the Confidential Employee Evaluation you were working on when the Boss hauled you into his office for a chat?

What? You never thought about this before? Then read on and you'll never have to think about it again.

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That's the key to DiskLock, the painless, yet powerful, System 7 savvy way to keep other people's noses permanently out of both your personal and professional data.

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Step 2. Notice how incredibly simple Now Up-to-Date is to use. Totally customizable, 100% non-fascist. Let’s you display calendars and events any way you want them. Just click on a date, enter the info, bang, you’re done.

Want to change it to a different date? Drag it there. That’s it. Want it to show up on the first Thursday of every month until the year 2035? Click once. You’ve got it.

Step 3. Think to yourself, “Wow, calendar software that’s actually faster and easier than the old pen and appointment book approach. Amazing.” Hey, we like the way you think.

Step 4. Read all the details up there in the captions that we couldn’t fit down here. Thanks.

Step 5. If you’re on a network, share events on your calendar with the other folks on your network. They’ll no doubt return the favor, sharing meeting dates and whatnot with you. You say you’re not on a network? That’s okay, Now Up-to-Date works fine all by itself. Plus, you won’t have to go to all those other people’s boring meetings.


Step 7. Pick up Now Up-to-Date 2.0. Or, for more info, give us a call at 1-800-237-3611.

Step 8. Quit goofing off reading software ads and get back to work. You’ve got a lot of stuff to do.
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All written comments, questions, and suggestions regarding any aspect of the magazine are read by our editor. We reserve the right to edit all submissions: letters must include your name and address. Direct all correspondence (by mail or electronically) to: Letters to the Editor.

Questions and Quick Tips
Direct questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to: Quick Tips, Lon Poole. Please include your name and address.

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Been burned? Really steamed? Direct your concerns (by mail or electronically) to: Consumer Advocate, Deborah Branscum.

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Wanna squash 'em? Hearing gobbles? Mail in nominations with description of problem, copies of correspondence with vendor or telephone contact notes (if any), and your telephone number, mailing address, and T-shirt size. Remember: Turkeys are flaws in conception or distraction! Direct your concerns (by mail or electronically) to: Conspicuous Consumer, Deborah Branscum.

NATURE

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Gogh Crazy.

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Friends, artists, Mac users...lend me your ears.
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Circle 10 on reader service card
Mitch Krayton, President of Digital Resources, knows that to compete in the real world of graphics and pre-press, he has to sell the best performing, and most cost effective systems to his clients.

"It's easy to claim your system is the fastest, the simplest to use, or the most cost effective, but to convince my clients in this competitive field, I need to know the truth behind the claims, so I decided to run my own tests."

In head-to-head competition MicroNet's Raven-040 disk array proved its reputation as the winner of the MacUser Eddy Award for Best Storage Product of 1991.

"We found that the Raven-040 outperformed a similar capacity SCSI-II Wide Disk Array by at least one-third in real world tests. The Raven-040 was directly bootable out of the box, requiring no special INITs or mounting software.

"By using both internal SCSI ports of a Quadra 950, MicroNet's disk array left the PDS and all NuBus slots open for further expansion. The Raven-040 has been Production Proven™ for our clients for more than a year."

For pre-press and graphic solutions contact Digital Resources or call MicroNet Technology for the name of your nearest Reseller.
Newton's Alpha: Apple showed an alpha version of its Newton personal digital assistant (PDA) at the January Consumer Electronics Show. The company said it expected to begin shipping the first full-fledged model of the PDA in the middle of this year at a list price well below $1000.

Apple's Record Revenues: In January, Apple reported that its revenues for the first fiscal quarter, ending December 25, 1992, hit an all-time high of just over $2 billion. Net income declined, however, from $166 million in the first quarter of 1992 to $161.3 million as Apple continued its price-cutting, market-share strategy. Unit sales of Macintoshes were up 31 percent versus the same quarter a year ago.

RasterOps Upgrades CorrectPrint: The CorrectPrint 300i from RasterOps (408/562-4200) is an upgraded version that replaces the company's troubled CorrectPrint 300 dye-sublimation printer. The new version is up to six times faster, includes 36MB of RAM, and has a larger color range with better color matching, according to RasterOps. The company says it has begun shipping the printer at a list price of $9999 and is offering an upgrade for the CorrectPrint 300.

Portable PostScript: Mannesmann Tally (206/251-5524) has introduced the Mobile-Writer P5, a portable PostScript printer that weighs 8 pounds and lists for $999. The thermal-transfer printer produces 6 ppm at 300 dpi. It was scheduled to be available in April.

Virtual Upgraded: Connectix (415/571-5100) has upgraded Virtual, a utility that provides virtual memory support under System 6 or System 7, to version 3.0. Connectix says that the $99 utility runs faster and requires less disk space than Apple's virtual memory, which is only for System 7. Virtual 3.0 is for Macs with a 68030 processor; Connectix plans to release an upgrade this spring for 68040 Macs.

Pantone's Color Assistant: Pantone's (201/935-5500) new ColorUp is intended to help people who are not trained as designers to choose harmonious color palettes for presentations and other common design tasks. The $99.95 program walks the user through creating a palette, displays sample graphics using the colors, and can export final palettes to many graphics and presentation programs. It also incorporates some interactive tutorials.

Freedom from Choosing: Portfolio Systems (408/252-0420) is shipping version 2.0 of its printing utility DynoPage. The $89.95 package includes a timesaving new feature: users can select printers or fax devices from the menu bar of their applications or from a pop-up list in the Print dialog box without going through the Chooser.

Quick Disk Recovery: Central Point Software (503/690-2650), which makes the comprehensive data- and disk-recovery utility MacTools, is launching a utility for recovering lost disks and files that runs without requiring the user to understand what has gone wrong or to decide what to do. The $49.95 Safe & Sound comes on a single floppy and deals with such problems as viruses, crashed disks, and lost files.
The CY-8500 can store up to 25 GB on a single tape, at speeds of up to 90 MB per minute, completely unattended.

How? With hardware data compression that can boost capacity by up to five times.

No other 8mm tape drive can match the capacity, speed, and price-performance of this best-selling drive.

**ADVANCED.** You'll never be left in the dark. A bright, backlit status display gives you the command under execution, transfer rate, compression ratio, amount of tape remaining and more.

Our data compression option is the fastest available. And it's switch selectable, so you can still read and write standard tapes. Locate and restore files quickly and easily with our accelerated file access option. Add data encryption to control backup and restore operations through the use of encoded card keys.

**FLEXIBLE.** The CY-8500 is plug compatible with virtually every computer system. Rack mounting options, dual drive configurations and a variety of cable lengths ensure a seamless fit into your computing environment. And as storage needs grow, you can upgrade to our ten tape library, capable of managing between 25 GB and 250 GB—all without manual intervention.

**RELIABLE.** A sophisticated Error Correction Code yields a bit error rate of less than one in $10^{12}$—the best in the industry. A MTBF rate of 60,000 hours ensures reliability.

Each turnkey subsystem features a 12-month warranty that includes technical support from our experienced in-house engineering groups.

Everything you want in a backup subsystem is available right now.

Call today for information at (804) 873-9000

Circle 188 on reader service card
Every year Macworld conducts the World-Class Awards survey to give our readers a chance to voice their opinions of the Macintosh hardware, software, and computer peripherals they use. This year we’re asking you to write in the names of as many as ten products and rate your level of satisfaction with them.

Please use this form to provide the following information for each product. First write in the full names of the product and company. Then circle a number from 1 to 10 that represents your level of satisfaction, with 10 being the highest possible rating and 1 being the lowest. In making your evaluation, consider all of the following factors, as appropriate:

- features
- design
- innovativeness
- adherence to the Macintosh interface
- ease of use
- customer service
- technical support

We’re also asking you to name the most promising and innovative hardware and software newcomers to the Macintosh market (to qualify, products must have been released since January 1992), and tell us which companies provide the best customer support.


Thank you for your opinions. Results of the 7th Annual Macworld World-Class Awards survey will be announced at the Boston Macworld Expo in August and published in September’s issue.
World-Class Changes

BY ADRIAN MELLO

 Every year for the past six years Macworld has asked its readers to vote for their favorite Macintosh products. And every summer, after you indicate your choices for best products, Macworld reveals the winners and presents them with the World-Class Award. The editors have always been proud that the World-Class Awards were based on readers' opinions instead of editors' opinions. After all, we get to tell you what we think about Macintosh products in the hundreds of product comparisons and reviews we print throughout the year; it's only right that the people who use these products every day should have a say.

This marks the awards' seventh year, and once again, we are asking you to choose the Mac products that you think best represent excellence. But this year we have changed the basis on which we confer the awards. Instead of asking you to choose the best product within a specific category from a list, we want you to name the products that have given you the greatest satisfaction. We're asking you to register how satisfied you are with the products you use.

Why the change? Two reasons. One is that it has become unrealistic to expect users to choose among literally thousands of products. How many readers have the time to try out ten word processing programs before deciding which is best? Even comparatively narrow product categories such as project management and mathematics software have swollen with new offerings in recent years. But there's another reason for the change—to reward those companies that go beyond innovation by providing solid products with good support at reasonable prices.

Reader Satisfaction

A COUPLE OF MONTHS AGO I DESCRIBED THE CRITERIA WE USE TO RATE PRODUCTS THAT WE REVIEW IN Macworld. I would like you to consider these same criteria when you decide how satisfied you are with the products that you use. When judging your own degree of satisfaction, ask the following questions: Did the product's interface live up to the standard of quality established by the Mac's own interface? Was the program easy to learn and use? Were the features and design of the product appropriate, complete, and well-executed? Was the documentation thorough and well-organized? If you have required after-sales support, has the company been responsive? Was the product priced reasonably for the job it does? Did it perform quickly and responsively? Was it reliable, or was it incompatible or buggy? Finally, was the product innovative and/or original? Please keep in mind that you cannot expect a product to be something it was not designed to be. For example, don't judge your word processor too harshly because it can't lay out pages as effectively as a desktop publishing program.

After you have considered the relative merits of each product you use, choose a number from 1 to 10 to show your overall satisfaction with the product. The best satisfaction rating you can give is a ten. After we hear from you and other readers, we should have a better idea of how satisfied a product's buyers feel after they have used it. The products with the highest user-satisfaction score in their category will be the World-Class winners. This is the most important measure of all, because even the most in-depth analyses by editors can't compare to the real-world experience of thousands of readers. We'll share the results and announce the winning products in the September issue of Macworld.

Apple is Back

ANOTHER CHANGE TO THE AWARDS IS THAT Apple products will be eligible again. Last year Macworld eliminated Apple from the contest, leading to confusion for some readers. Since that time companies have run advertisements proudly announcing that their products won World-Class Awards. These companies have a right to be proud of their achievements. Unfortunately, since Apple did not win any World-Class awards, some readers mistakenly inferred that Apple products had lost. The actual case was that Apple products were ineligible to begin with.

To avoid similar confusion this year, we are including Apple products in the competition. This means you can indicate how satisfied you are with any Apple product you use, whether it is a printer or a scanner or any Macintosh model.

Now that there are so many different Macs, it will be interesting to see how satisfied everyone is with their model. Use the same criteria with Apple products as with products from other companies. Note that on the ballot card inserted in this issue, we have room for only ten products—even though you may use more. Please write in the names of your choices from among the products that you use the most and are most familiar with.

Special Categories

IN ADDITION TO THE NEW CUSTOMER-satisfaction awards, we are continuing to ask you to vote in several special categories. Since innovation has always been key to the Mac, we want to encourage creativity by recognizing new products that capture the imagination of our readers. You can nominate one software product as the most promising newcomer introduced since the beginning of 1992. You can also pick the most promising newcomer out of the hardware products introduced in the same period.

We also want to recognize outstanding companies that provide the highest quality of support for the products they sell. As part of our reviewing process, we check on the support that companies provide. We also regularly report on support issues in the Conspicuous Consumer column, calling special attention to exemplary cases of support in the column’s“Service Heroes” section. Now we would like to hear your choices for best support. If you have experienced outstanding technical support or any other after-sales help, you can vote for best customer support for both hardware and software.

The readers have always been the heart of the World-Class Awards. This year we are working even harder to get your opinions—not just on which products you like, but also on how satisfied you are with them.
Introducing DigitalFilm™ from SuperMac. Bring your ideas to life right at the desktop. In full screen with full professional quality.

DigitalFilm combines video capture to disk at 30fps, editing, and stereo sound. All for under $6,000!

Now you can previsualize graphics, effects and rough cuts off-line and handle most non-broadcast work on-line.

DigitalFilm offers high-end features like S-VHS encoding, EDL, SMPTE time code, direct print-to-tape capability, and more.

Over $2,200 worth of software bundled free. With Adobe Premiere™ 2.0 and CoSA After Effects®, DigitalFilm is everything you need to create dazzling productions and presentations on the Macintosh™.


A lot of power in a little package!
Tough Competitors

I CAN NOT QUITE CONVINCE MYSELF that my next computer should be a Macintosh. In the December 1992 issue you compare a TravelMate 4000 notebook to the new PowerBooks (“New PowerBooks: The 145, 160, and 180”). It is very disheartening to see how poorly the "newer, faster" Apple products performed in testing. The inconvenience of learning enough DOS to load some programs and install Windows is negligible when it means saving hundreds of dollars buying a 486DX system rather than a Quadra, Iici, or Iivx.

Rob Hinkle
Salt Lake City, Utah

MY SURPRISE YOU INCLUDED my all-but-ignored Outbound 2030S in the list of comparisons. Lo and behold, it is still faster than even the best new Macs and would have been at the top of the list except for some DOS machines.

Despite its superior performance, you virtually dismissed the Outbound because it isn’t an Apple Macintosh. If fear that the company might go out of business is the only criterion for not covering the Outbound, you should endorse only Apple, Claris, and Microsoft and relegate virtually every other hardware and software venture to the "these guys might not be around in the future" category.

Daniel Koblasch
Redondo Beach, California

Outbound has closed its doors. See MacBulletin, March 1993.—Ed.

AFTER SEEING YOUR RECENT ISSUES, I dropped four grand on a PowerBook 180, saw several annoying white dots in the screen, and returned it the next day. The dealer wouldn’t exchange the machine because bad pixels are an epidemic among PowerBooks, and he didn’t want to pilage his stock until we found one I could accept. I later discovered that Apple considers a screen with fewer than five pixel voids to be the customer’s problem.

I can’t believe that for a computer on which the screen is the singular focus of the user’s attention, this kind of defect could be excused by a manufacturer’s arbitrary standard of what constitutes defective merchandise.

Matt Resmioff
New York, New York

For more on Apple’s policy regarding PowerBook pixel voids, see Conspicuous Consumer, July 1992.—Ed.

Upgrading Tips

DEBORAH BRANSCUM'S "THE UPGRADE EXPRESS" brought to mind a question I have concerning what to do with all the older versions (Conspicuous Consumer, December 1992).

I never throw away older versions of software because no one can truly guarantee upward compatibility. There is nothing worse than opening (if you can) a document created by a previous version and finding that nothing looks the way it used to.

Irvin Bingham
Frederick, Maryland

Readers should watch out for incompatibilities between older application versions and new Apple system software versions.—Ed.

MY IDEA FOR UPGRADING IS SIMPLE. Included with the software or on the registration form, the consumer should be offered any one future upgrade for a one-time additional cost. When each upgrade is ready to come out, the company could offer the upgrade to each of its customers and give them the choice to get it or wait for the next.

JoAnn Roa
New York, New York

continues
Epson now makes the
Suddenly everything you see in your
scanner for Macintosh.

office you can see in your computer.
Dr. Recovered; Reader Eternally Grateful

THAT ARTICLE BY ROBERT C.
Eckhardt absolutely saved my life, or at least my day (“Hard Drive Rx,” December 1992). I just finished reading it last week and thought that, although very interesting, it was unlikely I’d ever need it. Since using Apple computers since 1982, I had never seen the flashing “?” upon start-up—until tonight. I turned to page 212 in your December issue and within 15 minutes I was up and running again. To my grave I will subscribe to Macworld.

Joseph Pankowskii
Tallahassee, Florida

Harmless Piracy

STEVEN LEVY SAYS “SOFTWARE DEVELOPERS ARE DEFINITELY HURT BY PIRACY”

Small new companies with innovative products, like mine, cannot survive with high piracy rates. The programmers and publishers who worked hard to produce the product and bring it to market get not a penny if you pirate our software. If the software isn’t bought, our company folds and all our work goes down the drain. The software that you continue to use costs you money. Software development is a service, not a product.

Ken Beck
Spokane, Washington

CORRECTIONS


The actual resolution of the Hewlett-Packard LaserJet 4M is 600 by 600 dpi (“Workgroup Printers,” January 1993).


The correct name of Toshiba America’s 17-ppm laser printer is PageLaser GX400 (Workgroup Printers,” January 1993).

The correct name of Proxima Corporation’s ColorWorks sx A502C and Osation sx A812C LCD panels is 7 pounds (“Crystal-Clear Presentations,” January 1993).

Add Noise, a computer art show held in July 1992 in San Francisco, was organized by Bay Area artists Diane Fenster and Sig Totin, and by Matthew Boryszewski, principal of View by View, an architectural visualization firm (Art Beat, January 1993). The show was sponsored by Eastman Kodak and View by View, and the opening reception was hosted by Adobe Systems.
High resolution color scanners. New from Epson.

Epson introduces eyes for your Macintosh—complete with everything you need to start scanning immediately. Both the 600C and 800C models feature 24 bit, one-pass and three-pass scanning. Both come bundled with full versions of Adobe Photoshop so you can manipulate all the images you capture.

You get Caere OmniPage Direct OCR TryPack, so you don't have to retype documents. You get a PIM, cable, and all you need to make your scanner a desk accessory.

We offer an add-on transparency unit, which gives you the flexibility to scan slides. A document feeder attachment for both models. And of course it's all protected by Epson's one-year warranty.

Drop by your computer store soon and take a look or call 1-800-289-3776 and ask for representative 75 for more information. Just don't be surprised if you end up with a scanner.
liked well enough to steal then isn’t supported or maintained or upgraded.

Linda Kaplan
President
New York, New York

**DUE TO THE RICH CONTRIBUTION**
software firms make to the ad line, one should not expect too many piracy stories in *Macworld*. Too bad, because the free exchange of software is the engine that drives growth in this industry.

The world would be a very different place without unauthorized software duplication. The whole computer industry would be far smaller. Laser printers would start at $5000, and only the well-to-do would have computers in their homes.

If you print this letter, please withhold my name and address. I don’t wish to be harassed by the SPA.

*Name Withheld by Request*
Berkeley, California

Re: Saints and Sinners

Bought BeagleWorks in the spring of 1992, shortly after getting my computer. I was disappointed to find it extremely slow and buggy, so much so that I found it unusable. I called Beagle Bros and was told that they would send me an upgrade when it was complete. Although the quick and courteous response pleased me, I never received an upgrade.

Is there in fact a more recent version, and if so, how do I contact WordPerfect for an upgrade? BeagleWorks had a lot of potential, but at the moment it is merely an expensive piece of shelfware.

Jonathan Stimmel
Brattleboro, Vermont

After acquiring BeagleWorks, WordPerfect upgraded and renamed the program WordPerfect Works for Macintosh version 1.2. BeagleWorks owners who bought the product after October 16, 1992, will receive a free, disks-only upgrade. BeagleWorks owners who bought the product before October 16 can get a disks-only upgrade for $8 within the United States. The new reference manual is $29.95, and the new workbook is $19.95. Readers can contact WordPerfect by phone at 800/451-5151 or by fax at 801/228-5377 for more information.—Ed.

**THE LORAN INTERFACE ON OUR MICROPHONE II AND MICROPHONE PRO COMMUNICATIONS SOFTWARE** does help users navigate CompuServe, but it was not meant to compete directly with or replace a product like the CompuServe Information Manager.

Loran gives users one online interface. You don’t have to log on and off separate services to collect your mail, using different and often arcane comments and functions each time. Instead, you know one interface, connected to backend modules that know how to do the dirty work of navigating various services.

Paul P. Schmidmann
Vice President, Sales and Marketing
Software Ventures Corporation
Berkeley, California

Seconds Critique

**I HAVE TO AGREE WITH YOUR CRITICISMS** of the Quick Link II Fax software bundled with the Viva modem (Reviews, January 1993). I had it. It is frustrating. In my experience, sending faxes takes around ten minutes if it works. Sometimes it gave me error messages when the fax had been transmitted successfully. Once I received a call telling me to stop sending faxes. I had been resending after each error message and the recipients were drowning in paper from their fax machine.

**PHOTOREALISM**

**StrataVision 3d** is realistically the best 3D program on the Mac. • Already donned with top industry awards, there’s even greater power with version 2.6. New modeling features give you more control over objects. Apply realistic textures, set reflectivity and soften shadows with improved ease. Animations of flexible objects offer stunning results. StrataVision 3d 2.6 still has a realistic price: $995. • Whether you’re an illustrator, a designer or an architect, we have the realistic solution. Call toll-free 1-800-869-6855 today.

**StrataVision 3d** made by **Strata, Inc.** The Virtual Studio™ Company
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1-800-869-6855 / 801-468-5216

*StrataVision 3d* used by ABC News to animate Territorial News and Territorial News 3d on assignments of news. 

Art: Jon Watson; image modeled and rendered entirely in StrataVision 3d.
Perfect It.

MarkUp 2.0
Document Editing and Review

You've put a lot of work into that document. Now you just need to show it to a few people, get their comments, and it will be golden. Unfortunately, this usually means passing out copies to each reviewer in a group, then waiting to get the copies back, only to end up with a stack of papers covered with scribbled marks and little stick-on notes. So much for feedback.

With MarkUp, this process is Mac-based, making it automatically easier. Instead of passing out paper, a review version of any document is sent—through e-mail, over a network, or even on a disk to each person in your group or just to the guy down the hall. The review version is an electronic copy, created by MarkUp, that looks exactly the same as the original would look on paper.

Instead of marks on paper, MarkUp offers two full palettes of tools and proofreader's marks. There's a highlighter tool, a strikeout tool, note windows to replace those stick-on tags, even a voice-annotation tool and QuickTime support to convey a message as only sound or pictures can.

Now you won't have to wade through the paper flood again. Review a single MarkUp file, choose the edits you want to implement, then just do them.

MarkUp helps you and your co-workers review and improve your documents. Buy MarkUp today and create winning documents—easier than ever before.

For a free demo disk and catalog, phone, write, or fax Mainstay today.

Protect It, Organize It, Retrieve It, Share It, Leverage It...

MarcoPolo 2.0
Document Imaging and Management

You're overloaded with information: in your head, on your hard drive, in a file cabinet, scattered all over your desk. Most of it buried in different documents of various formats. You need a way to keep it safe, organize it, have it at your fingertips, and share it with your co-workers.

MarcoPolo is the solution. It images documents from any Mac application, or from paper copy through a scanner, and archives them in a document center database, compressing files as much as ninety percent. When archiving documents, you assign keywords to aid in organization and retrieval, and access rights to control sharing.

Document centers are password protected and can be located on local hard drives, to keep yourself organized, and on networked volumes, to facilitate group collaboration. MarcoPolo handles anything—letters, reports, page layouts, spreadsheets, e-mail, blueprints, artwork, movies, clip-plings, and more.

Search any or all document centers to which you have access. A search query can be driven by any combination of keywords, document content, archival date, or document owner.

Files that match query criteria are listed in a window. A double-click on the name displays a MiniPage—a miniature representation of the document—for easy recognition. Another double-click will bring a full-sized view of the document. Keep documents from many different applications on the desktop and view them instantly.

MarcoPolo lets individuals and workgroups leverage the wealth of today's world: information. Buy MarcoPolo today and you can get what you need, when you need it.
The finest point about this software is the technical support. It's a BBS (bulletin board system)! Fine if the software works, but then you wouldn't need help.

Donald Mackie
via CompuServe

The High Cost of Low Cost

Even though the focus of Jim Heid's article was to promote the acquisition of free/shareware, he suggests three telecommunications programs that are not freeware or even shareware (Getting Started, December 1992). He fails to mention the $30 shareware telecommunications program called ZTerm, which supports scripting and macros and, contrary to Heid's assertions about the uniqueness of Smartcom II, also supports the CompuServe B Plus protocol.

Second, the explanation of the file-transfer protocol was confusing even to the initiated modem user, and the suggestion that Xmodem should be used by beginners was very misguided. ZTerm requires very little effort to be used successfully. Once the Zmodem protocol option is selected on both the user's software and the host's computer, receiving a file is as simple as telling the host computer to download.

Finally, Heid's emphasis on CompuServe and America Online as places to find free/shareware is again contradictory to the theme of the article—acquiring low-cost, but quality, software. Small-scale bulletin boards are free, and the system operator, also known as the sysop, can usually provide more assistance to the new user on the hows and whats of downloading software. Your local computer store will usually be able to refer you to local phone numbers of bulletin board systems.

David Hammerner
Moscow, Idaho

For more information on bulletin board systems, see Conspicuous Consumer, March 1993 and in this issue.—Ed.

A Company Responds

According to the November 1992 Review, "NightWatch is not currently compatible with After Dark and will freeze your After Dark screen." This statement does not give the whole story. Any two screen savers operating on one computer at the same time will have similar problems; therefore, only one screen saver should be used at any one time.

In order to use After Dark as your screen saver and NightWatch as protection for your hard drive, turn off the screen saver feature in NightWatch.

Raman Boucher
Macintosh Technical Support
Berkeley Systems
Berkeley, California

Letters on Letters

I was amazed that someone would write to chastise you on Deborah Branscum's Conspicuous Consumer columns on Ehman and Bridgette (Letters, January 1993). She has done the Mac community a service and should be given a commendation for her reporting.

Richard Mumbard
Springfield, Virginia

Douglas Ethridge complains about the technical side of the reviews that you publish, and specifically continues...
Buying a hard drive is a lot like buying a car. You want a quality product that will last from a reputable company you can trust—all at a competitive price. We think that's not too much to ask. So before you go shopping, give us this little test. Then give it to the competition.

CHECK OUR LIST

☐ Quantum quality under the hood! For high-speed performance and reliability Quantum mechanisms are simply the best you can buy. As a Quantum company, La Cie proudly offers a full range of Quantum drives.

☐ Award-Winning Design! La Cie's award-winning Cirrus and Tsunami cases are sleek, streamlined, space-saving. They not only look sexy, they're actually smaller than conventional zero-foot-print cases.

☐ Award-Winning Performance! Check the record books. Year after year, the experts rate La Cie tops. In the race for Macworld's 1992 World Class Awards, La Cie won Best Hard Drive under 80MB, Best Hard Drive 80-200MB, Best Hard drive over 200MB, and Best Color Scanner.

☐ Prompt, courteous sales and support! We hate to wait, and we know you do too. That's why we answer the phone fast (95% of calls answered before the fourth ring). If somehow you get our voice-mail, we'll call you back fast (usually within the hour) during the business day.

☐ 30 day 100% satisfaction guarantee. That's what you get with La Cie. Why settle for less?

☐ Disk-for-disk or better replacement.

☐ Hard driving Silverlining software. La Cie drives come with System 6, System 7, and 30MB of shareware and Silverlining, the number one rated hard drive management software, ABSOLUTELY FREE. Silverlining works with all the drives in your system and optimizes your drive to let your applications run faster.

☐ Unique switchable active termination.

☐ FCC, UL, TUV, VDE, CSA certification.

☐ A company you can count on. La Cie has successfully served our customers with award-winning products since 1986. Quantum since 1980. With more than a billion dollars in revenue, La Cie and Quantum allows you to buy with full confidence in our ability to deliver tomorrow's technology along with long-term service and support.

Call us now for our new free Winter 1993 catalog!

800-999-1383

La Cie Limited
A Quantum Company

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Circle 246 on reader service card
Performance in the palm of your hand.

Our sporty 40MB, 80MB, 120MB and 160MB PocketDrives are built for mobility. Travel light (under 10 ounces). Travel fast (19ms seek time). The PocketDrive features Quantum's new 2½" drive technology, whisper quiet operation and our exclusive switchable external termination. Pack in your pocket, purse or briefcase. PocketDrives come complete with our exclusive T-connector adapter for connectivity to almost any Mac. For more connectivity, try our optional PocketDock desktop cable. Our T-connector and PocketDock make the PocketDrive system the most versatile and convenient pocket-size drive—anywhere.

Driving power by the book.

Here's Quantum horsepower for PowerBook owners. Available in 80MB, 120MB and 160MB capacities, La Cie's high-performance PowerBook drives come standard with Quantum's high-mileage 2½" drive technology. Lightning fast. Lexus quiet. Easy to install. La Cie PowerBook drives come complete with the correct brackets for convenient internal installation and an outstanding easy-to-read, easy-to-follow instructional and owners manual. And as always, each drive is fully equipped with System 6, System 7, our number one rated Silverlining disk management software and one of the industry's longest warranties.

CHECK OUR LIST

✔ Disk-for-disk or better replacement. If you have a problem with your La Cie drive while under warranty, we'll ship you a replacement within 48 hours. We've also been known to replace disks with better ones, rather than make a customer wait. That's how important your drive is to you. That's how important you are to us.

✔ Unique switchable active termination under the hood. Only La Cie hard drives provide simple, straightforward termination for your SCSI bus. No need for external terminators, just flip a switch. Our advanced circuitry is smart too, termination power is provided only if it is needed.
La Cie's Tsunami and internal drives like to be driven hard and fast.

Lap the competition.

La Cie's Cirrus and Tsunami drives outpace the competition for performance and value. That's because they're loaded with quality features like Quantum mechanisms, whisper quiet fans, 12ms access time, award-winning chassis designs and our Silverlining disk management software. From 40MB to 1.2GB take home your pick of load capacities. Each delivers the streamlined styling, diminutive footprint and single-handed convenience of the true portable. And that's not all. All Cirrus and Tsunami drives offers the La Cie's exclusive active switchable termination. No wonder they're rated tops in their class, year after year.

Never be afraid to internalize your drives.

If the fear of installation has deterred you from satisfying your desire for a more powerful internal drive, stop fretting. La Cie not only offers a full range of quality Quantum drives for your Mac, PowerBook or Quadra, we make them easy to install. Each La Cie disk comes complete with the correct bracket hardware for internal installation, and an outstanding easy-to-read, easy-to-follow instruction manual, plus all the no-extra-charge, toll-free telephone technical support you need to make the job quick, convenient, and painless.

Test us for real and call now for fast, friendly service!

800-999-1383

La Cie Limited
A Quantum Company

External Drives From
$249

Internal Drives From
$199

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Circle 246 on reader service card
These chassis

Time to Drive a Hard Bargain!

We're closing out our ZFP™, Cirrus™ and Silverscanner™ models!

40MB to 1.2MB capacities available

- La Cie is discontinuing our classic zero foot print (ZFP) and Cirrus hard drive cases in favor of newer, sleeker body styles.
- We're not fooling around—we're blowing out every ZFP and Cirrus hard drive in inventory at once-in-a-lifetime bargain prices.
- These are top quality, award winning drives. All La Cie ZFP and Cirrus hard drives deliver the latest in high-performance Quantum technology.

All La Cie ZFP and Cirrus drives include:

- FREE Silverlining hard disk management software ($149 value)
- 2-year Limited Warranty on parts and labor
- Unlimited TOLL-FREE technical support
- FREE switchable termination ($50 value)
- All drives are burned-in and tested
- SCSI cables included
- Apple System installed; ready to plug and play
- Universal Power Supply
- Approved by FCC and UL.

Seeing is believing! Award-winning closeout!

La Cie is replacing our original Silverscanner (1992 World Class Award winner) with a newer model. Now can you can enjoy the rich imagery of our original Silverscanner at cheap thrills prices (perfectly balanced color to our shadowy details to our crisp clean curved lines). But don't wait! The only thing limited about our state-of-the-art Silverscanner is our inventory. Don't let this one-pass beauty pass you by this time. Call us and order one right now, before they're all gone!

Silverscanner with Color II! and Read-It O.C.R. Pro

Wass $1399 Now $999

Silverscanner with Photoshop and Read-It O.C.R. Pro

Wass $1799 Now $1349

Silverscanner with Photoshop, ColorStudio and Read-It O.C.R. Pro

Wass $1899 Now $1449
Call us now for super, fantastic, incredible closeout prices!!!

Quantum  | ZFP  | Cirrus
--- | --- | ---
40MB | Was! $299 | New! $249 | $299
85MB | Was! $379 | New! $289 | $339
120MB | Was! $499 | New! $409 | $459
127MB | Was! $439 | New! $359 | $409
170MB | Was! $469 | New! $409 | $459
240MB | Was! $689 | New! $579 | $629
525MB | Was! $1249 | New! $1109 | $1159
700MB | Was! $1429 | New! $1309 | $1359
1.05GB | Was! $1769 | New! $1689 | $1739
1.2GB | Was! $1999 | New! $1759 | $1809

Other capacities may be available on ZFP and Cirrus closeouts. Call for details.

These low, low, closeout prices will disappear with our inventory, so call us now for fast, friendly service! And as always, your satisfaction is guaranteed!

800-999-1383

LACIE LIMITED
A QUANTUM COMPANY

*Call for details on terms, conditions, limited money-back guarantee and free offers. System 7.6.1 software included only with certain configurations. ZFP Drives do not have switchable termination. Prices do not include shipping and only apply to pre-orders shipped within the continental United States. Please contact La Cie for international distributors. Add sales tax where applicable. ZFP, CF, Cirrus, Scanner, PocketDrive, PocketPix, ExpressDrive, Silverstone, SilverLink, La Cie and the La Cie logo are trademarks of La Cie, Ltd., a Quantum Company. All other trademarks are the property of their respective companies. All prices, specifications, terms, descriptions, products and services herein are subject to change without notice or reservation. © Copyright 1992-93 La Cie, Ltd. 1700 SW Creekside Place Beaverton, OR 97005. Phone: (503) 523-9000. Fax: (503) 523-9009. All rights reserved. Printed in U:S.A.

Circle 246 on reader service card
Our lot has great selection

Internal, ZFP™, ZFP+™, Cirrus™ & Tsunami™ Drives

Our hard drives feature a wide selection of capacities and quality brand-name mechanisms—all at very affordable prices. All drives have switchable active termination, efficient, quiet fans and universal power supplies.*

<table>
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<tr>
<th>Quantum</th>
<th>Internal</th>
<th>ZFP</th>
<th>Closeout!</th>
<th>ZFP+</th>
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80MB (2½") for Powerbook | $369 | See PocketDrive
120MB (2½") for Powerbook | $469 | See PocketDrive
160MB (2½") for Powerbook | $699 | See PocketDrive

Seagate | Internal | ZFP+ |
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<td>$2099**</td>
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**Available only in our award winning Cirrus and ZFP half-height cases.

PocketDrive™

Pack it in your pocket, purse or briefcase. PocketDrives offer convenient desktop connection at a great price.

40MB (2½") incl. T-connector | $299
80MB (2½") incl. T-connector | $519
120MB (2½") incl. T-connector | $619
160MB (2½") incl. T-connector | $849

Optional PocketDock Cable | $59
Extra T-Connector | $59
110V Accessory Kit | $69

Powerbook Internals

Pack more power in your Powerbook. Comes with brackets and instructions.

80MB Powerbook Internal | $369
120MB Powerbook Internal | $469
160MB Powerbook Internal | $699

Silverlining™

Hailed as one of the most powerful and useful hard disk management software available, Silverlining offers unique features found no where else! Give your hard disk a Silverlining.

Silverlining | $149
and a friendly sales staff.

**Cirrus Optical**
Our quiet Cirrus Optical drives offer 128MB removable media storage, compact portability and fast 38ms performance. Includes one free cartridge ($79 value).

- 128MB 3½" Optical Drive with Retrospect
  - Internal: $1399
  - External: $1499
- 128MB Optical Disk Drive
  - Internal: $1499
  - External: $1599
- *While supplies last

**ZFP Removable**
Our 44-88MB removable media drives deliver Syquest technology in a zero footprint case. Includes 1 free cartridge.

- 44MB Drive
  - Internal: $499
  - External: $549
- 88MB Drive (88C)
  - Internal: $719
  - External: $799
- 44MB Cartridge
  - Internal: $63
  - External: $69
- 88MB Cartridge
  - Internal: $98
  - External: $105

**ExpressDrive™**
Here's tight security and portability. La Cie Express Drives offer removable drive convenience and Quantum quality.

- ExpressDrive Chassis
  - Internal: $399
  - External: $549
- 50MB Quantum LPS Drive
  - Internal: $299
  - External: $599
- 100MB Quantum LPS Drive
  - Internal: $419
  - External: $849
- 120MB Quantum LPS Drive
  - Internal: $469
  - External: $919
- 240MB Quantum LPS Drive
  - Internal: $819
  - External: $1649

**Silverscanner II™**
One look at the image above should convince you that our next generation Silverscanner can really perform! Superior line art, detailed gray-scale and gorgeous color are the trademarks of this one pass, 24bit, high resolution, feature-packed scanning machine. Just scan it!

- La Cie Silverscanner II with Color It! and Read-It O.C.R. Pro!
  - Closeout: $1599
- With Photoshop and Read-It O.C.R. Pro!
  - $1999
- With Photoshop, Color Studio and Read-It O.C.R. Pro!
  - $2099
- With Photoshop, Color Studio and Read-It O.C.R. Pro!
  - $1449

**Test us for real and call now for fast, friendly service!**

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Improve your image.

Continuing our award winning tradition of providing outstanding scanning solutions for the Macintosh, La Cie proudly announces Silverscanner II. It is so good, we used it to produce this page. Gorgeous color. Fine image detail. Excellent tonal range. The proof is right in front of you.

Great color from the start.

With Silverscanner II, you get great color and gray-scale in one pass. That's because Silverscanner II's built-in image control operates on 9 bits of data before conversion to 8 bits per color. You get clean, bright scans with excellent detail and tonal range in highlight and shadow areas in one pass. Easy for the beginner, but with all the powerful control the advanced user craves.

Hug the curves.

When scanning line art, the Silverscanner II really shines! At 1600 dpi, you get what amounts to an electronic stat.

Superior software at the controls.

La Cie's powerful plug-in modules have been hailed some of the best software ever written for flat-bed scanners. And with features like dynamic color preview, independent color (R,G,B)/gamma correction/contrast/brightness controls, nine scan modes, savable scan settings, color dropout and magnified previews, proof scans, 25% to 400% scaling in 1% steps and 25 dpi to 1600 dpi in 1 dpi steps. And now with an electronic densitometer, color histogram and automatic tone adjustment, all interactive in the preview. How's that for an image building machine!

Test us for real and call now for fast, friendly service!

800-999-1383

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*Call for details on terms, conditions, limited money-back guarantee and free trials. System 7.6 or later software included only with color-scan configurations. 2PP: Drive does not have an available hard sector. Prices do not include shipping and only apply to pre-orders shipped within the continental United States. Please contact La Cie for international distribution. Add sales tax where applicable. 2PP - Chip, Tower, PocketDrive, PocketDock, ExpressDrive, Silverscanner, Stewart, Silverscanner, La Cie and the La Cie logo are trademarks of La Cie, Ltd., a Quantum Company. All other trademarks are the property of their respective companies. All prices, specifications, terms, descriptions, products and services herein are subject to change without notice or warranty. Copyright 1992-93 La Cie, Ltd. 1700 S. Calle Rodeo, Santa Monica, CA 90406. Phone: (800) 520-9000, Fax: (800) 520-9100. All rights reserved. Printed in U.S.A.
points out the October 1992 slide scanner review (Letters, January 1993). Frankly, he's whining because you're not publishing information he has a direct use for, and that's just dumb.

By the way, Macworld should set up a fax line for Letters, QuickTips, and so on. Several times in the past I'd contemplated mailing a letter to Macworld, but I'd been put off by the U.S. Mail.

Steve Godun
Piscataway, New Jersey

Readers can fax letters and tips to Macworld at our main fax number, 415/442-0766.—Ed.

Unfair Comparisons?

I N “LOOKING DOWN THE LINE” YOU present an unfair comparison of the IIvx to the IICi (December 1992). You state the RAM capacity of the IIvx based on 16MB SIMMs, yielding a total capacity of 68MB. You then state the capacity of the IICi based on 4MB SIMMs, yielding only 32MB. To my knowledge, the IICi can accept 16MB SIMMs for a total RAM capacity of 128MB. The IIvx is a great machine, but I get the feeling you're trying to sell us on this improved LC II at the expense of the IICi.

Cedric Johnson
Scottsdale, Arizona

According to Apple specifications for the IICi, it can only accept up to 4MB SIMMs, quite possibly because at the time the IICi was being developed, 16MB SIMMs were not available.—Ed.

THE POWERBOOK 180 MAY HAVE the best combination of screen and power from a computer geek's mind-set, but that does not mirror the mind-set of the businessman. As a traveling businessman, my major concern is weight. Once you travel with computer, luggage, coat, and everything else, every excess pound is a burden.

As one of the first purchasers of the Duo, I can say that if Apple was targeting businessmen, they did it.

David Dimston
Laredo, Texas

When you’re on the road or in a client’s office, your PowerBook probably isn’t connected to a phone line or a printer. But that doesn’t mean you can’t finish the work you need to do.

Now you can print your documents or send faxes as you normally would — chose Print from the file menu, close the documents and forget about it. Wherever you are, Let On The Road remember to complete the tasks you reconnect your PowerBook.

It happens automatically.

On The Road also handles repetitive chores like remounting AppleShare® volumes, opening disk accessories, controlling panels or documents, and choosing the last printer you used. And On The Road’s sophisticated location recognition gives all PowerBook users automatic site-specific configuration.

On The Road even makes it easy to re-assign deferred documents to similar printers at different locations. So when you’re on the move, you can take advantage of whatever printer happens to be handy.

Don’t let your fast pace keep you from finishing your tasks on the spot. Like a traveling secretary, On The Road remembers all the deferred details. So you don’t have to.

For more information, contact Palomar Software.

Palomar Software, Inc.
2940 Oceanside Blvd., Suite D
P.O. Box 120
Oceanside, CA 92049-0120
(619) 721-7000; Fax: (619) 721-4758

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Circle 228 on reader service card

Letters should be sent to Letters, Macworld, 501 Second St., San Francisco, CA 94107, via fax, 415/442-0766; or electronically to CompuServe (70370,702), MicMall (294-8078), America On-line (Macworld), or AppleLink (Macworld1). Include return address and daytime phone number. Due to the high volume of mail received, we can’t respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of Macworld. 

with PowerDraw, accepted worldwide as the professional 2D CAD standard for the Macintosh. Fast. Intuitive. Elegant.

PowerDraw™

By Engineered Software

For free brochure, call Engineered Software. 1-919-299-4843.
Circle 12 on reader service card.

MACWORLD April 1993 43
EIGHT MONTH OLD DELIVERS

TWINS

Software Product of the Year and Best New PrePress Program

As a software developer, you hope for one Eddy award.
We got two.
Which says something about Cachet® color correction software from Electronics for Imaging. You see, with Cachet you can not only color correct photos in seconds. Its expert color management system ensures your colors will match from screen to proof to print, saving you valuable time. So call 1-800-285-4565 or see your local dealer. Then you’ll know what Cachet really delivers: high-quality color correction, quickly, easily and intuitively.

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Circle 22 on reader service card
M y source instructed me to meet him in the rear booth of Fu Bar's restaurant, a squalid dive in San Jose. When I asked him why there, he gave me a high-pitched, nerdy laugh. "The food's so bad that no one I know would ever be seen there!" he crowed, delighted at his ingenuity. At the appointed time there he was, having ordered for both of us, juggling his chopsticks into the grossest pot sticker I'd ever seen.

"Oh, hi," he greeted me, dipping his food in the chili sauce and stuffing it in his mouth. "Not hot enough!" he yelled to the waiter. "Get me hotter sauce!" The waiter scrambled back to the kitchen and began a heated exchange in Chinese.

"See?" said the source, who for obvious reasons I will not describe. "This is the perfect rendezvous for a confidential meeting!"

I sampled the kimchee. Bland. "This better be good," I said.

"Oh, this is good," he assured me. Then his face went dark, as if he was reconsidering. He looked around the small storefront restaurant, even though we were the only diners. He reached in his pocket and pulled something out, but kept it in his closed fist. Another pause. I was getting impatient, about ready to walk out, but something in his manner made me stick around. He was no longer cocky. This was one scared dweeb.

Finally he opened his hand. "Know what this is?"

I considered the piece of plastic in his hand. It was the size of a beetle, the same off-white color as my Mac II, and had a very tiny multicolor Apple logo. A centipede-like row of metal connectors protruded from the bottom. "Some sort of encased computer chip?" I said.

He took a deep breath and slapped the thing to his head behind his right ear. It stuck there like a bolt in the head of the Frankenstein monster.

What the hell...?

His voice deepened. "Open Finder," he said, as if to himself, waiting a second and then nodding in recognition of something I couldn't see. "Open Schedule.

Pause. "List appointments for Friday." He looked up. "Dentist at 9 a.m. I hate dentists! Fax dentist. Tell him to cancel." He smiled, then began talking to himself again. "Open Excel. Open file called Baseball Statistics." He looked at me. "I know you like baseball." I saw that the chip was firmly lodged behind his ear. "All right, I've opened an Excel spreadsheet of the American League," he said. "Ask me the batting average of any player."

"Um, Mark McGwire?"

"He hit .268, with 104 ribbies."

"Look, a good baseball fan would know that."

"Alphabetically, next comes Mark McLemore, who hit .246. Brian McRae, .223. Kevin McReynolds, .246. Those four players had a total of 392 hits in 1601 at-bats, and as a group they hit... I'm setting up the formula... Yes! 245." He smiled. "I can, quote, see, the spreadsheet, as clear as if it were on a monitor. Hot-wired to the optic nerve."

I wasn't buying it—yet. "All right, how many doubles did the Seattle Mariners outfield hit?"

He told me, and tossed me a Baseball America stat book so I could check. I asked him a dozen more questions, and he got them all. Then he closed Excel, opened Mathematica, and solved some quadratic equations with it. He opened a Write-Now file and began reading from a William Gibson novel. Finally, he pulled out a portable phone, ran a tiny wire from it to the chip behind his ear, and began reading from obscure news groups on the Internet.

The Long and Winding 'Trode

It was real. "You've got a computer in your head!" I said. "A brain electrode—what cyberpunks call a 'trode. Apple's actually made one?"

"Yeah," he said, carefully removing the 'trode from behind his ear, wincing in pain when it came clear. "Wait a minute." He shakily reached for a glass of water and drank it like he'd just wandered in from the desert. His eyes looked all fuzzy. "Damn," he whispered to himself, cradling his head in his hands. Then he looked up, and his eyes were clear. "More chilli sauce!" he bellowed to the kitchen. "Hotter!"

This was hot, indeed. I decided not to push him. We ate the shredded liver (Szechuan style) in silence. Then, wiping a few grains of rice from his chin, he spilled the story.

"Apple began working on the thing not long after the Newton project. As you know, Newton is supposed to be the bell and end-all in portable technology. But we were late out of the gate. Before we ship Newton, we'll see other so-called personal digital assistants from a dozen other companies—EO, GO, and some with even more than two letters in their name. And you know what? They're all going to fail."

"How can that be?" I asked. "Didn't they pass some law saying that PDAs are the future?"

"Ha! The big thing about PDAs is that they give you the information you'd need just off the top of your head—the kind of things you want to know without hammering commands into a computer, or even with a little pencil that recognizes your handwriting. But the tests we've done with prototypes show that they have a useful life of two weeks. If you use them, you lose them. People sit on them, close car doors on them, leave them in cabs. And if someone snags your PDA the crook has all the details of your life. That's the problem with PDAs—they're not attached to you."

He cracked open a fortune cookie, looked at the fortune, shrugged, and popped the cookie into his mouth. "So then Apple gets hold of this guy from the former Soviet Union. Turns out he'd been a techie for the KGB and had stolen plans from our own government on this 'trode technology. The key is integrating the information with brain waves. We were very lucky—it turns out that the Finder is the only interface that could possibly do this. MS-DOS, even Windows, are continue..."
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too, uh, brain-damaged. We combined this stuff with our voice-recognition technology, and got the thing working."

He was almost shouting now. "Imagine the possibilities! A personal information manager, with software agents—in your head! With a simple wire connection, you can output faxes! You can do spreadsheet models—with your eyes closed! You know how people always say that they’ve been writing a book in their head? Well, now they can just hook their brain to a serial port and print out the sucker!"

"This sounds amazing!" I said. "Everyone is going to have one of these gadgets stuck behind their ear."

Neural Net Loss

"Well, that’s what we thought, at first," said the source. "But then we started having these—these problems."

"Problems?"

He started to fidget. "It started when Sculley insisted that he get the first prototype installed on his own head. He thought it would save time memorizing speeches, and he never liked using a mouse anyway. Since this was a secret project, we had to surgically implant the chip. It turned out to be a risky procedure—the guy’s got such a bony head and all. But he got through OK—in fact, it didn’t take much longer than installing System 7. After Sculley got one, of course, the rest of the executive staff had to get their own ‘trodies. It got to be the macho thing around Apple to duck into the Betty Ford Clinic and get a ‘trode installed."

"So what was the problem?"

"At first it worked great. Sculley’s speechwriters would download text into the ‘trode, and he’d take right off. We even considered spicing up the presentations with sounds from Star Trek— they’d come out of his mouth and he’d sound like Bobby McFerrin. But we figured that would be too weird. As it was, things got even weirder."

"Weirder?"

"Yeah. We started hearing things from him that made no sense. No sense at all. The first inkling came at a product meeting. ‘Ve presented Sculley with a list of six possible new Mac computers to develop, asking him to pick the one we’d ultimately ship. He told us to complete all of them. And at the next product meeting, he told us that he wanted even more!"

"Maybe he figured that the Macintosh line needed more diversity."

"No, it was crazy. He kept asking for more and more CPUs. The Performas. The Mac Ilvxs. More PowerBooks. Duos. With CD ROM. Without CD ROM. And new operating systems—PowerPC, Pink, Kaleida, Sweet Pea, Newton. Used to be that we did a big product intro every year or two. Now we do five or six a year, and each time we introduce a half-dozen machines. And of course, if any of the machines turn out to be popular, we don’t have enough of them. The PowerBook 180, for instance—if you order one today, you can expect delivery by 1998, and only if you leave a deposit."

"By 1998?" I asked. "That’s not bad—I was hearing turn of the century."

"Well, maybe 1998 is optimistic," he admitted. "But that’s beside the point. Do you know that Sculley told us that next year he hopes to introduce a new model of Macintosh every day except Easter, Christmas, and Martin Luther King Day? We kept asking ourselves, why is he doing this? And then we figured it out. It was the ‘trode talking! The ‘trode wanted us to make more and more computers. It had taken over Sculley’s thought processes."

"Like Invasion of the Body Snatchers?" continues.
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(Mom would be proud.)
“Exactly! The 'trode had Sculley making decisions that were totally wacko. Would any Apple executive in control of his senses have agreed to make the next generation of computers with IBM as a partner? No way! And we knew Sculley had gone totally over the edge when he publicly supported Bill Clinton for president. The old Sculley, before he had the implant installed, wouldn’t have voted for a Democrat for dogcatcher!”

“Wasn’t Sculley even being considered as Clinton’s vice president?” I asked.

“What a disaster that would have been—a robotic automaton one heartbeat away from the presidency!” my source groaned.

“It’s happened before,” I pointed out.

“True, but it’s something else entirely to take marching orders from a hunk of silicon. Apple is already infiltrated beyond repair—all the executives are in total mind-sync with Sculley. We were going to make every employee at Apple wear one, but since we reorganize so often, we figured that wouldn’t be cost-effective.”

You Have Been Warned

“THIS IS A FRIGHTENING STORY—BUT why are you telling me this?”

“You have been warned.”

“To warn the world,” he said. “Apple has diverted incredible resources in order to ship these in a year. Every yuppie is going to want one. At first, everything will work fine. But then his or her behavior will change. Instead of massaging spreadsheets, people will save up their money to buy more ‘trodos—parallel-processing ‘trodos! At a certain point, the computers will have more power than the brain. And at that point, everyone will start acting like a robot.”

“That is a scary prospect,” I said. “But how have you managed to avoid being taken over?”

He smiled. “As it turns out, there is a way to cancel out the ‘trode’s power. It involves getting a different ‘trode installed behind your other ear.” He smiled, and reached in his pocket, handing me another object. “It’s buggy, and it won’t ship on time, but it’s an effective antidote.”

This object was similar to Apple’s ‘trode, but slightly larger and finished in matte black. On it was stamped the words “Property of Microsoft.”

“Of course, there’s going to be a lawsuit when Microsoft tries to release it,” said my source matter-of-factly.

At that point, six beefy men wearing dark suits rushed into the restaurant. If you looked closely, you could see white plastic bumps behind their ears.

“There he is!” said the first one in, pointing to my source. “He’s taken the ‘trode off! Shoot him!” The source dashed into the kitchen and I followed him as he ran past the astonished cooks and through the back door. After ducking behind a truck loaded with Sun workstations, we seemed to be clear of our pursuers.

“Maybe I shouldn’t have talked to you,” he said. “But it was essential to let people know about this.” Before we parted, he downloaded a transcript of our conversation into my PowerBook—he had been recording the whole thing from his ‘trode, using his own ear as the microphone.

I dragged the file into a folder called April Fools’ Column, and barely made it to my next appointment—an Apple press conference announcing 16 computers.

Sixteen new CPUs! Must be a slow month.

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Dear MacTV,

You get the 6-Mouse award for filling a desperate need. I caught your program on our Education Channel last Saturday evening and all I could say was, "Hallelujah!" Someone has finally come to the rescue of small Mac users, to help us sort through the jungle of software and devices that bombard our senses in every new issue of magazines and catalogs. It is virtually impossible for an individual, working alone at home, to sort it all out, and to make wise decisions about which programs and technology advances are good and necessary investments for business, and which are merely "nice to have" (if money is no object).

Please continue this program of reviewing products for the Mac!

Sincerely,

Barbara Stengel
Technical Illustrator
Boulder, CO
A n invisible web of computer connections wraps the earth, making it possible to swap shareware, advice, and technical tips with Macintosh users around the world. Like the local bulletin board systems (BBSs) I wrote about last month, global networks offer users access to valuable information on computing and other topics, although on a much larger scale.

These systems link a variety of computers and individuals, placing university networks, scientific research centers, and commercial enterprises within hailing distance of each other. The best-known networks are Usenet and Internet. These noncommercial networks are not actual organizations but rather collections of linked computers, usually private, with administrators who allow their systems to carry messages or transmit files.

Such networks can be daunting to those accustomed to America Online or CompuServe. There's no Usenet Czar to forward complaints to; no Internet customer service to hold your hand. And it may take time to learn cryptic Unix commands or locate a source for specific information. But the investment in time and patience will pay off, especially if you are comfortable exploring new frontiers.

Investigating Internet

Internet is a 24-year-old network linking an estimated 1.5 million machines. This patchwork of government, university, and private computer networks began life as a project of the U.S. Defense Advanced Research Projects Agency in the late 1960s. Although some segments of Internet are federally subsidized, many are not, and commercial enterprises are expected to play an increasingly important role in the network's future.

In the meantime, Macintosh users benefit from Internet by swapping information with others via Internet mail; subscribing to discussion groups, called mailing lists, that volunteers maintain; and exploring Mac-specific files kept on various hosts. The daily InfoMac Digest (via info-mac@sumex-aim.stanford.edu) tracks technical Mac queries, bug reports, software ports, and the like. (I give it 3 stars.)

It would be a shame to limit your inquiry to the Mac, however, when Internet offers access to so much more. The Whole Internet User's Guide & Catalog (O'Reilly & Associates, 1992) lists resources covering close to 60 topics, including aeronautics, education, health, physics, and even zymology. Library of Congress records can be accessed (via telnet dracomm.com using VT100 emulation), for example. In the health field, the National Cancer Institute provides CancerNet, which offers cancer-treatment guidelines (updated monthly) that give users an opportunity to evaluate their treatment against the Institute's recommendations. (For a list of treatments, send the message help to cancernet@icib6.ccm.nih.gov. Leave the subject field blank.) Anyone in education can benefit from the Federal Information Exchange (connect via telnet fedix.sri.com; the login is fedix), which links colleges, universities, and government agencies, providing information on research programs, fellowships, and more. Closer to home, the federally funded Computer Emergency Response Team (connect via ftp cert.sei.cmu.edu; ed pub) focuses on computer and network security issues and provides papers on security issues and tools.

There's plenty of reason to connect to Internet, but gaining access is much more difficult than simply dialing up a BBS, unless you work for a business or research facility that already has Internet connections. Thankfully, a growing number of commercial services, including CompuServe, offer links to Internet.

For this article I tried out two private services that offer Internet accounts: WorldLink E-Mail from InterCon Systems Corporation (703/709-9890 or 800/638-2968) and HoloNet from Information Access Technologies (510/704-0160 or via modem to 800/638-4656). WorldLink E-Mail is a fairly painless system that offers file transfer and electronic mail via Interlink for $29 per month at 2400 bps and $29 at 9600 bps; there is no message limit. At this writing, you can dial directly from more than 35 cities. (WorldLink Advanced, due out later this year, will offer real-time file transfer, E-mail, and browsing.)

HoloNet is primitive by Mac standards—there's no graphical interface whatsoever. But the menu-driven interface is easy to understand and there's plenty of online help and tools to help you search for information. Unlike WorldLink, HoloNet lets Internet users chat interactively and play or observe games. (Internet boasts the world's largest chess club.) HoloNet can be dialed directly from 850 cities. Connection costs are $4 per hour during peak time, with a $6 monthly minimum. You can transfer 1 MB of data per hour; additional data transfers are $2 per megabyte.

Usenet

Usenet (from User's Network) began in 1979 with a student-written program that linked Unix-based computers at two universities. Usenet discussion areas, called newsgroups, are generally distributed over host computers (not always Unix-based) using the UUCP protocol, but personal computer users can also access the newsgroups. Usenet spans five continents and connects an estimated 400,000 computer systems. It also has gateways to Internet and other networks.

Usenet is chat city. It's a distributed network designed to let people read and respond to messages. The Macintosh newsgroups cover announcements, applications, communications, games, hardware, HyperCard, programming, the system, databases, and more. Newsgroups fall into the core categories, which include business, computers, and defense data networks, and also cover alternative topics, ranging from cyberspace to privacy to recovery to Spam. Not all hosts carry all newsgroups, but an increasing number of Macintosh user-group BBSs carry the Mac newsgroups. (See last month's Conspicuous Consumer for more on MUG BBSs. But please note that the correct number for the NYMUG is 212/473-1967.)

Global networks

link users

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Swap Tips around the World

By Deborah Branscum

Conspicuous Consumer

Macworld April 1993 63

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CONSPICUOUS CONSUMER

Many of the computer hosts that carry Internet also carry Usenet newsgroups. The newsgroups are also available through Holonet.

Fetching FidoNet

ANOTHER GLOBAL NETWORK IS FIDONET, a large, feisty group of individual BBSs. FidoNet is like a club that admits anyone who can figure out where the meetings are held and understands the lingo. It's not meant to be a secret society, but it can feel that way to a frustrated user searching for the Nodelist file, which lists the name, location, and phone number of every FidoNet BBS around the world. To find a local Fido BBS, check Computer Monthly or Computer Shopper, one of those hefty publications sold on many newsstands. (Or bite the bullet and make a long-distance call to Twilight Clone at 301/946-3070. This Washington, D.C., BBS is primarily devoted to Mac-oriented issues, although it doesn't use a graphic interface. Cool board, though.)

FidoNet fans—and there are many—like the noncommercial nature of the network and its easygoing callers. The closest thing to a FidoNet motto is “Don't be easily annoyed and don't be excessively annoying.” People who crave hierarchy will be in for a disappointment—FidoNet is a store-and-forward network made up of 16,000-plus BBSs run by relentlessly independent system operators who do whatever they want. That said, most sysops are receptive to callers and will add specific message areas, called echoes, to their boards if there is enough interest.

And when it comes to FidoNet, echoes are where the action is. The system was designed to provide a fairly fast, fairly inexpensive way to transmit messages in the wee hours of the morning. There's a Mac question-and-answer echo as well as echoes on System 7, desktop publishing, HyperCard, communications, hardware, software, and more. It's not the fastest system around, but it works. Lots of Mac-oriented BBSs take part in FidoNet, including the Arizona Macintosh Users Group (602/553-0721).

Netiquette

OVER THE YEARS A KIND OF ONLINE etiquette, dubbed netiquette, has evolved to help people save time, money, and hurt feelings while using E-mail. A lexicon of sideways so-called smiley faces—such as this :-) —has even evolved to add emotion to written messages that might be misread otherwise, since readers can't see facial expressions that normally accompany sarcastic or humorous comments.

Being misunderstood is one of the most common hazards of communicating online. Another risk is revealing too much about yourself or a coworker. Alone at a computer, you may imagine your comments are private and confidential, going out to only a few close friends. In fact, if posted in a public area, your words are spinning out over thousands of systems and, if ill-chosen, may damage your reputation, jeopardize your job, or ruin a friendship. Never post anything in anger, and never post anything you wouldn't want your boss, best friend, worst enemy, or spouse to read.

Don Rittner, author of EcoLinking (Peachpit Press, 1992), advises against responding to a message unless you add something meaningful to the discussion. “Don’t clutter up the pipeline with useless babble.”

Other tips: Don't type in all caps—it's the online equivalent of shouting. Remind people of what you are responding to by including the pertinent parts of the original message at the top of your reply. And make your point as succinctly as possible.

Netiquette is a particularly sensitive
issue on Internet, since many of the networks in the Internet are federally funded. In *The Whole Internet Catalog & User's Guide*, author Ed Krol warns that politically damaging actions include excessive game playing, hateful, harassing, or other antisocial behavior, and intentional damage to or interference with others.

Rittenma adds, "Don't get personal, or you'll get 100 people lashing you from head to toe. It's important to have manners when you are online."

**Sysop City**

Wannabe network administrators may not be able to commandeer a mainframe during working hours to share info over Internet, but there are other options. Many online fans go on to start their own BBSs. The Arizona Macintosh Users Group tries to help by offering a CD ROM called BBS in a Box. This CD ROM offers many megabytes of shareware and public-domain files for $50 for Macintosh users who love downloading files. Contact AMUG president Michael Bean (602/553-8966) for details.

Another source of downloadable files is the MacFiles Distribution Network, a group of Macintosh sysops that has established a FidoNet echo specifically for distributing shareware and public-domain Mac files. The network distributes 10 to 100 files every week. Contact Ralph Merritt via FidoNet at 2605/611 or Maria Langer at 2605/157 for more information.

**Must Reads**

Several books help users navigate Internet, which requires a guide for intelligent use. One very readable and highly praised volume is *The Whole Internet User's Guide & Catalog*, by Ed Krol, mentioned earlier. I have not seen the following two books, but others have recommended *Zen and the Art of the Internet: A Beginner's Guide*, by Brendan Kehoe (Prentice-Hall, 1992), and the more intermediate-level *The Matrix*, by John S. Quarterman (Digital Press, 1990). An excellent, more general guide to Internet, FidoNet, and much more is *The BMUG Guide to Bulletin Boards and Beyond* by Bernard Aboba, a BMUG sysop and knowledgeable denizen of the online world. (The second edition will be out in March. It should be available from Quantum Books [617/494-5042] in Cambridge, Massachusetts.) Ultimately, the networks and BBSs you find useful depend on your needs and your personality. Like a city neighborhood, each online system has its own character and quirks. It may take several visits to navigate comfortably, so give yourself time to explore. No matter where you wander, you'll probably benefit from discovering 24-hour access to people and resources online that can help you compute and work more effectively.

**Service Hero**

David C. Falco of Farmingdale, New York, writes in praise of NewGen. His company wanted to buy a NewGen printer that supports 11-by-17-inch output, but the model wasn't available in time for the opening of Falco's new offices. NewGen came to the rescue by providing a loaner printer to use in the meantime. As a result, Falco wasn't "forced to buy a competitor's printer with a lesser feature set," he writes. "Not bad considering I haven't even made a deposit yet."

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

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Mighty Draw is the affordable, general-purpose, object-oriented drawing program that lets you create pie charts, bar charts, flow charts, organizational charts, graphs, electronic schematics, network diagrams, flyers, newsletters, greeting cards, advertisements, logos, clip art and much more. It comes with its own unique symbols, and you can add symbols from other programs. Abracadata #06162

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Apple Unveils LaserWriter Selects

Apple recently introduced two of its most inexpensive laser printers with a host of new features designed to appeal to home users on a budget.

The LaserWriter Select 300 is a QuickDraw-based printer with a Fujixerox P0 5-ppm, 300-dpi engine. The Select 300 has all the features of the LaserWriter LS, which it replaces, plus networkability and improved output quality. The Select 300 relies on the host Macintosh for background rasterizing and can be shared on a network thanks to Apple's new GrayShare software, which also enables printing up to 33 levels of gray. For even better images, a PhotoGrade option (approximately $250) provides the equivalent of 800-dpi printing with 90 shades of gray. Both GrayShare and PhotoGrade are compatible with Apple's FinePrint edge-smoothing technology, which virtually eliminates jaggies on line art and text (the Select 300 comes with 39 TrueType fonts).

The LaserWriter Select 310 uses the same engine as the 300 but has Adobe PostScript Level 1 with 13 fonts. Sporting both serial and parallel ports, the Select 310 can connect to a single Mac (GrayShare is not an option) or PC running Microsoft Windows (the driver and manual come in every box). The Select 310 is powered by an AMD 29205 RISC processor, and 4MB of RAM can be added to the standard 1.5MB for greater performance.

Pricing and availability were not final at press time, but the LaserWriter Select 300 was slated to ship February 10 at a list price of $899, followed a month later by the $1199 Select 310.—Owen W. Linzmayer.

WordPerfect's Groupware

WordPerfect is combining the E-mail and calendar-management features of WordPerfect Office into one integrated system that will let colleagues coordinate projects and let managers delegate tasks, route messages to several recipients in order, schedule meetings, and manage to-do lists.

Office 4.0 will let users arrange their view of calendars, inboxes, and files—Fractal's New Painter

In a bid to offer an all-in-one graphic-design package in which you can create an impressionist-style painting and then do the color separations before the painting is printed, Fractal Design has added an enhanced interface and a wealth of new painting and image-editing tools to Painter 2.0.

New interface features include the ability to preview alterations to a design before applying them. You can also preview how a graphic will look when printed or output to video, and for easy access, you can view thumbnails of graphics files before opening them.

New image-editing tools enable you to create masks easily; use a variety of lighting backdrops, such as a spotlight; and sharpen, soften, and resize photographs. Painter 2.0 is $399; the upgrade cost is $79. Fractal Design, 408/688-5300.—James A. Martin
The limits of multimedia continue to be redefined by inspired developers everywhere.

A photojournalist and his production team publish an interactive book that chronicles a woman's camel journey across the Australian outback. A technology consultant develops a network of information kiosks for an urban convention center. An in-house producer assembles a high-impact presentation for an annual shareholders' meeting. And an electronic games designer creates a hit title that invites its users to battle a different intergalactic foe every time it's played.

The applications are as unique as the vision of each developer. Yet, they've all been produced with the very same tools you'll find in a program named Director®.

WELCOME TO THE DIRECTOR'S GUILD.

As the premier authoring software for multimedia productions, Director is the program-of-choice for more than 50,000 developers. In fact, virtually every best-selling multimedia
title and countless corporate presentations have been built in Director with the most advanced set of authoring tools ever created. Those tools include a visual database for complete command of media content, a full-featured 24-bit paint module to generate graphics and animated effects, and an integrated timeline to sequence and synchronize your Director projects. Plus, the Lingo™ scripting language ensures total flexibility for creating links to external programs and adding interactivity to entire productions, separate objects or individual frames. Only Director gives you the power to go as far as you ever want to go.

GO EVEN FARTHER WITH DIRECTOR 3.1.

Our newest Macintosh® version of the industry standard adds exceptional QuickTime™ support, 23 robust Lingo commands and Macromedia™ Accelerator™ for compiling movies into faster playback formats. While many programs import QuickTime movies, Director 3.1 gives you the tools to modify those movies or change them altogether. You can combine several movies into one, add controls for interactive playback and save your Director files as QuickTime movies for exporting to other applications.

The only thing we’ve left out are the limitations.

NOW PLAYING ON SCREENS EVERYWHERE.

After putting in all that time and effort, you’ll want to share your productions with the largest possible audience. That’s why our cross-platform Director players make it easy to distribute those productions as fully-interactive applications to other Macs, Windows™-based PCs and UNIX-based Silicon Graphics workstations. And any titles, presentations or other applications you develop in Director 3.1 can be distributed royalty-free to millions of users worldwide. All of which could make a very big impression, indeed.

HOW DO YOU TAKE DIRECTION?

There’s no telling how far you’ll go with Director 3.1. So call 1-800-945-9073 for more information and a copy of our $9.95 multimedia production showcase video. (Outside the US and Canada, please fax 415-626-0554 or call 415-252-2000 and add $15 [US] for shipping and handling.) Then you’ll be on your way. Because all you need are the right tools.

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EASIER ON THE WALLET.

When your competition is Apple, you have to play hardball. Which is why we build our high-density drive for the big league.

We use the same top-quality Sony mechanism used in Apple's SuperDrive. And we offer twice the warranty. Plus worldwide support at over 2,000 locations.

Features? We match them point for point. Right down to the high-impact, platinum-colored case.


OUR HIGH-DENSITY DRIVE BEATS APPLE'S. NO MATTER HOW YOU SLICE IT.

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<thead>
<tr>
<th>Feature</th>
<th>Applied Engineering</th>
<th>Apple</th>
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<tr>
<td>FDHD (Read/Write MS-DOS)</td>
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<td>Yes</td>
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<tr>
<td>1.44 MB SuperDrive Capacity</td>
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<td>Sony Mechanism</td>
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<td>1 Year</td>
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<td>Price</td>
<td>$359</td>
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And our drive even offers something their's doesn't: an exclusive 2-color read/write indicator that tells you exactly what your drive is doing at any moment.

So before you pay extra for the Apple name, consider a company that's been making quality peripherals for just about as long.

Applied Engineering.
Making the most of your Mac.

CALL DIRECT FOR SAME-DAY SHIPPING 1-800-554-MACS, ext. 215
Coda’s Music Teacher

Coda Music Technology is expanding from music software to complete systems with a hardware-software combination designed to help budding musicians practice. Vivace, the Personal Accompanist, includes a microphone that attaches to the soloist’s instrument; software that plays the accompaniment (by another musician, a band, a quartet, or an orchestra); and a MIDI device with software on cartridges to monitor the soloist’s performance. Vivace can be hooked up to headphones or a stereo system.

Vivace can speed up and slow down to stay with the musician, or can play at a set tempo that makes the musician keep up with the other players. Vivace lists for $2295, and cartridges start at $30.

More Coda news: the company has acquired a technology that converts scanned sheet music into notation files that open in Coda’s notation package, Finale. The company plans to market the technology in three ways: as an add-on to Finale, as a stand-alone product, and by setting up a service bureau. Coda Music Technology, 612/937-9611.—D.L.

Iomega Floptical Drive

In a departure from its main line of removable-cartridge Bernoulli drives, Iomega Corporation has introduced a second-generation floptical disk drive. The Mac Floptical Subsystem drive uses the Holographic Optical Tracking (HOT) technique invented by Iomega to improve tracking and reliability.

Like other floptical drives, the Iomega device reads from and writes to regular floppy disks, as well as storing 21MB of data on floptical disks. Iomega began shipping the Mac Floptical Subsystem in January, at a street price that should range between $399 and $439. Iomega, 801/778-1000.—T.M.

SuperMac’s Thunder II Board, PhotoSpeed CD ROM

SuperMac has unveiled Thunder II, the next generation of its Thunder graphics accelerators, and PhotoSpeed, a subsystem that speeds Kodak’s Photo CD digital photo-storage system and integrates it into a Mac graphics workstation.

Intended for high-end color publishing, the Thunder II series accelerates Photoshop, Photo CD, and EffColor color management by up to 2300 percent, and accelerates QuickDraw by more than 2600 percent, SuperMac said. The $9999 Thunder II HDTV board supports resolutions up to 1920 by 1040 at a 4:3 aspect ratio. SuperMac will also offer the $4999 Thunder II, which has a 1360 by 1024 resolution, and $1699 Thunder II Light, which has a 1152 by 870 resolution.

The PhotoSpeed subsystem includes a very fast multisession Toshiba Photo CD-compatible CD ROM drive and an image processing board with two DSP chips. The board comes with software for accelerating Kodak’s Photo CD Access, Storm Technology’s PicturePress image-compression software, and either Kodak’s PhotoEdge or Adobe Photoshop. The hardware and software together speed retouching and image manipulation by up to 2300 percent. SuperMac will also offer PhotoSpeed Pro, which will provide four times the performance of PhotoSpeed at higher resolutions for prepress use. PhotoSpeed and PhotoSpeed Pro are slated to ship in March, at list prices of $2999 and $4999, respectively. SuperMac, 408/245-2202.—T.M.
**DOUBLE YOUR MAC'S SPEED FOR AS LITTLE AS $199.**

No wonder the competition is running for cover.

Our new accelerators deliver all the speed theirs do. Plus a lot more features. At a much better price.

Take our new 25 MHz SE/Classic Accelerator. For about half the price of DayStar's entry-level accelerator, it more than doubles the speed of your SE or Classic. And at $349, our 25 MHz LC Accelerator is another spectacular value.

But that's not all. Only our accelerators feature expansion options for EtherNet and enhanced video capabilities. So when you plug them in, you can still add high-speed networking and a full-page display.

**GET GREATER EXPANDABILITY AT A BETTER PRICE WITH AN APPLIED ENGINEERING ACCELERATOR.**

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<th>CPU Speed</th>
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<th>Video Expandability</th>
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<td>Yes</td>
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Ask about our complete line of upgradeable accelerators!

Plug in a DayStar (or any other brand) and you're out of options. And when you're ready for more speed, our Step-Up program lets you move all the way up to Quadra-level performance by simply upgrading to one of our faster accelerators.

Call us today for more information on our complete line of accelerators and cache cards. Chances are, there's one that matches your needs. At a price no one else can match.

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Other files in a library, where multiple Authorware applications can access them without creating copies. Authorware also has a new search-and-replace feature that lets authors search applications for text strings or icons.

Macromedia says that tighter code doubles the speed of printing and of decision loops (a kind of branching based on a user's response to a question).

Macromedia is also upgrading the Windows version of Authorware; files can be translated in either direction, though XCMDs and QuickTime don't make it across from Mac to Windows.

Authorware 2.0 lists for $4995. Upgrades from version 1.7 are $695. Macromedia, 415/252-2000.—CAROLYN BICKFORD

Tools for Technical Publishing

Some typesetting tasks don't lend themselves to desktop publishing—for example, generating highly exact layouts, creating intricate tables, or composing pages of mathematical, chemical, and other scientific symbols. For tasks like that there are tools like Tex (pronounced Tek).

Tex began life as a control language for outputting equations on early electronic typesetting devices, and evolved into a precise and powerful typography programming language. The only Mac implementation of Tex, Blue Sky Research's Lightning Textures 1.5, stops far short of being a point-and-click interface, but it renders Tex code as users enter it so they can see what they've done in a separate window.

Lightning Textures is part of a $695 package called Classic Textures that includes copious third-party documentation; LaTeX, a collection of macros for formatting scientific papers, books, and so on; other tools for creating bibliographies, indexes, and other special documents; and 75 PostScript math and symbol fonts. Blue Sky Research, 503/222-9571.—D.L.

\[ \sum_{j=1}^{3} \int_{0}^{1} \left\{ \frac{d\phi_j}{dt} + k \phi_j \right\} dt = \int_{0}^{1} kT_{\phi_j} \phi_j dt \]

TWO TRICKS FOR TEX: A COMPLEX EQUATION AND AN IMPRESSIVE LAYOUT GENERATED IN LIGHTNING TEXTURES.

Network Resources' Simple Strategy

Network Resources Corporation (NRC) plans to update its software for managing hubs to control more than its own network devices.

Based on the Simple Network Management Protocol (SNMP—the nonpartisan standard for managing devices over a network), the $995 Multi-Gate Manager SNMP controls and monitors NRC's Multi-Gate SNMP hubs over TCP/IP. NRC's new $1495 24-port 10BaseT hub can be manipulated remotely using Telnet and can accept software upgrades downloaded to a new flash ROM.

What NRC first released as mild-mannered management software for its own hubs will soon be keeping tabs on most devices that have a TCP/IP SNMP Management Information Base. With third-party pager software, the new Multi-Gate Manager will be able to warn network managers of impending doom. Pricing for the new version was not set at press time.

SNMP does not run on AppleTalk yet, a situation that Apple will remedy later this year. NRC will add AppleTalk support then. Network Resources Corporation, 408/263-8100.—MARGIE WYLIE
THE LATEST THING IN WORD PROCESSORS ISN'T THE WORD.

It's the colors. Life is more than black and white. It's magenta, indigo, auburn, and with WordPerfect, 253 other dazzling colors to blend, rainbow, or complement. Enough to make others green with envy.
It's the movies. With WordPerfect and Apple's Quicktime, using video and sound is as natural as using just plain words. So place a color movie in your document, and have yourself the ultimate in show and tell!

It's the layout. Say goodbye to boring, cookie-cutter pages. Because WordPerfect makes it easy to add attention-getting text boxes, callouts, or columns. Choose from 36 borders and 64 border patterns. Create overlays. Watermarks. Even rotate a headline.

It's the pictures. WordPerfect makes adding graphics to documents easy. Without even leaving the program, you can import a visual, change it, or just create one of your own. Then drag-and-drop your masterpiece in place, and watch how text flows automatically around it.

It's the compatibility. There are millions of Mac systems in the world today. But hey, there are plenty of systems like Windows, DOS, NeXT, and UNIX too. With WordPerfect, your files will be compatible with them all.

It's the system. As the first word processor to be fully System 7 savvy, WordPerfect brings you features like TrueType, Publish and Subscribe, and more. For the latest in Mac innovations, you can count on WordPerfect.

It's the people. While its elegance of design embodies all that is Macintosh, WordPerfect also brings you a standard all its own: WordPerfect's dedicated toll-free support staff. Just call (800) 526-7820. Whatever your need, we're always here to help.

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Thinking of Buying Norton Utilities or MacTools? Think again, think...

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Introducing Datawatch SuperSet Utilities,® five full-featured data recovery, protection and management products packed into one.

Air Tight Disk and File Security
SuperSet lets you restrict access to your data with a powerful set of Citadel security tools. Use passwords to protect certain files or to lock entire hard disks and floppy drives. Datawatch Citadel with Shredder,® a MACWORLD Editors' Choice, includes DES file encryption, and Shredder, which can turn your Trash Can into a secure document shredder. Only SuperSet includes a complete, Editors' Choice security product.

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Virex®, a perennial best-seller, detects and repairs files infected by all known viruses. And it prevents future infections, even by unknown viruses. Only SuperSet includes a complete, best-selling anti-virus product.

Super Remote Access and Control
ScreenLink® lets you control another Mac's screen, keyboard and mouse over a network or via modem. ScreenLink works with both System 6.0.4 and later and System 7. Only SuperSet includes remote access and control capabilities.

Comparison with other Disk Utility Packages

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<th>Complete</th>
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<th>Datawatch 911 Utilities®</th>
<th>Norton Utilities</th>
<th>MacTools</th>
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<td>Protocol</td>
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<td>Disk &amp; File Recovery</td>
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<td>Undelete Capability</td>
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SuperSet costs no more than the others. So, see your favorite retailer for SuperSet today, or call us for your free SuperSet Overview at (919) 490-1277 ext. 201.
Trend

Pixar’s New Standard

Pixar’s upcoming product, Glimpse, may make RenderMan as basic to 3-D graphics as PostScript is to publishing.

RenderMan is a tool for creating photo-realistic 3-D objects and environments by applying shaders, which can make bottles look like glass and cafés look smoky. But RenderMan has a problem, a problem that PostScript has transcended. PostScript Type 1 fonts are accepted as a standard because they all work exactly the same, but RenderMan is not yet widely accepted because every RenderMan shader works differently. Any RenderMan-capable 3-D program needs a separate interface for each shader—no interface means no shader.

Enter Glimpse, the universal interface. It appears as a window inside any Glimpse-compatible 3-D modeler to provide control over a look (a new kind of shader), with slider bars for adjusting parameters. Glimpse provides quick feedback when you change parameters, and you can name and save modified looks for reuse.

So far VIDI has committed to supporting Glimpse in Presenter Professional; other 3-D vendors will follow suit. Pixar will also sell Glimpse for $99 to use in Typestry and ShowPlace. Pixar, 510/236-4000.—D.L.

Software for Driving Disks

Third-party disk-formatting software may give better performance or provide features not provided in Apple’s basic disk-formatting software or the software that comes with many third-party drives. Two companies are touting new drive software.

Surf City Software is shipping Lido 7, an all-purpose drive utility. Lido 7 supports most Macintosh drives, including most makes of removable cartridges, magneto-opticals, and floppy disks (Lido 7 includes an INIT for mounting all kinds of removable media). It can change the size of partitions after formatting and provides password protection for partitions. Lido 7 is $95. Surf City, 714/289-8543.

Insignia Solutions says its RapidTrak adjusts the RAM cache depending on the type of application accessing the drive. RapidTrak also makes it possible to mount DOS-formatted removable media and access them with Apple’s Macintosh-PC Exchange. RapidTrak is $99.95. Insignia Solutions, 415/694-7600.—D.L.

Faster Printers for Workgroups

To avoid long lines of people waiting for laser printer output, busy offices are turning to printers that can crank out pages faster, thanks to faster print engines and processors.

The Olympus IS2030 300-dpi printer handles letter- or legal-size paper. The $699 printer is rated at 20 pages per minute and is based on an Intel RISC processor running TrueImage, Microsoft’s PostScript-clone interpreter. The IS2030 also supports Hewlett-Packard’s PCL 5 printer language and has simultaneously active LocalTalk, Centronics, and RS-232C serial interfaces. An optional Ethernet interface is available for $1095. The IS2030 comes with two 250-sheet paper trays.

BGL Technology is shipping the LaserLeader 9215 ($5995), a 15-ppm printer that is based on a Fuji Xerox engine. It prints at a resolution of 400 dpi on letter-, legal-, or tabloid-size paper. The high-speed printer comes with a 52MB internal SCSI drive for font storage and uses Pipeline Associates’ PowerPage PostScript emulation. The standard amount of RAM is 8MB, expandable to 32MB. Olympus Image Systems, 714/753-5935; BGL Technology, 805/987-7305.—TOM NEGRINO

Bug Report

WriteNow 3.0 Incompatible with Norton Utilities’ Directory Assistance on Macs with 9-inch screens. T/Maker is shipping a modified version 3.0 that fixes the bug and is available free to registered users on request. Version 3.0 files cannot be imported into QuarkXPress 3.1. T/Maker says it is currently developing the proper filter.

Lumina tor LCD Burns out the logic board of the venerable Mac Portable (problem does not affect PowerBooks). nView warns potential customers who inquire and says the risk is prominently documented with the units.

Mavis Beacon Teaches Typing 1.3 Doesn’t work properly with Dvorak keyboard layout. Software Toolworks says it will notify registered users when a bug-fix is ready.

Performer 4.01 Save As command crashes and damages original file. Mark of the Unicorn says bug is fixed in 4.02, which was sent to registered users.

Infini-D 2.0 If an Infini-D file subscribes to an Adobe Illustrator file and the Illustrator file is moved, the Infini-D file becomes unopenable. Specular says bug is fixed in version 2.01, which was sent to registered users.

MACWORLD WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE HOW TO CONTACT MACWORLD.
When NASA was planning a September 1992 launch of the Shuttle Endeavor, they asked us to put a frog experiment on board. Actually they weren’t frogs yet, just frog eggs, to be fertilized in space. NASA needed some answers about fertilizing vertebrates in microgravity and our job was to conduct a variety of tests on the tadpoles when they returned to earth.

Now, the equipment for this kind of experiment is not something you run down to the nearest WalMart to buy. And neither is the software for the Macintosh, so we had to write our own. Hypercard was slow, its critical timing mechanisms were inaccurate, and C and C++ were intimidating. We chose Prograph from TGS Systems instead.

Prograph was perfect from the beginning. The graphical dataflow language of Prograph made it easy to use all of the best Macintosh features. It is faster and easier to use than THINK C, it has an interface builder that simplifies creation and management of windows and menus, and it allows complete access to the Macintosh toolbox. Using Prograph’s automatic debugging capabilities, we moved effortlessly toward our launch date.

Now, Prograph is the first choice for all our custom applications. After all, space shuttles don’t wait for slow programmers.

"Without Prograph, I might have missed my flight on the space shuttle."

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Scott Pronyder of Dalhousie University Halifax, Nova Scotia, programmed with Prograph.

"We heartily recommend it to in-house corporate programmers..." MacUser, October 1992

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Circle 267 on reader service card

Prograph 2.5 is a trademark of TGS Systems. All other product names are the trademarks of their respective holders. ©1993 TGS Systems, 447 Battery Street, Suite 300, San Francisco, CA 94111.
Putting the Squeeze on Video

Because of how much data a video signal contains (each 24-bit video frame, when digitized, takes up about 1MB of disk space), no Mac, not even the Quadra 950, has been able to capture full-screen, full-motion video. That changed with the release of three QuickTime-compatible video digitizers with on-board compression chips.

SuperMac’s $3999 Digital Film board captures 30-frame-per-second video at 640 by 480, the size of Apple’s Macintosh Color Display hi-res 14-inch monitor. The board works with NTSC, PAL, and S-video inputs; captures stereo audio; and has NTSC and PAL outputs for recording to videotape. The Digital Film board also serves as a 24-bit video adapter for monitors up to 17 inches, and incorporates SuperMac’s Thunder graphics-acceleration technology.


Video output requires the $699 Video Expander II.

Radius has announced the Digital Media Studio, which captures 24-bit full-motion video, at 640 by 480 up to 1152 by 870, in 8-bit color, and stereo audio. The $3999 board has an external panel for audio and video connections and can output images to videotape in NTSC or PAL formats.

All three boards come with Adobe Premiere 2.0 video-editing software. Radius also includes VideoLake’s VideoExpansion special-effects package and three CD ROMs of audio and video clips. Digital Film and MoviePak are shipping now; Digital Media Studio is expected to ship late in the first quarter.

Views of the World

The United States has spent many billions of dollars gathering images of Earth from spy planes, satellites, and spacecraft, but unless you are a scientist, you’ve probably never seen more than a few of them. A new company called Now What Software has gathered about 250 images from NASA, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, and other organizations; processed them into Mac-compatible format; built an attractive interface for them; and pressed all on a CD ROM called Small Blue Planet.

Small Blue Planet includes aerial photographs, false color infrared, and several kinds of digital multispectral images. From a CIA political map of the world, you can zoom in on aerial photos of major cities; geological maps of the earth’s plates and ocean floor are also available. The CD includes information about how the images were created and how to obtain more files from the suppliers.

Small Blue Planet includes Chronosphere, a whimsical application that shows the changing line where day and night meet as the earth rotates each day and revolves around the sun.

All images on the CD are copyright-free. Small Blue Planet is $199; Chronosphere is available on floppy disk for $59. Now What, 415/689-1699.

Compress Market Expands

Now Utilities is fielding Now Compress in the crowded market for software that saves room on a disk by automatically compressing and decompressing files when they’re needed. Two similar utilities are being upgraded.

Now Compress has a single window for performing all functions—selecting files to compress, creating archives, and so on. It can create self-extracting files; it can open files created by most competing utilities; and it has a viewer that lets you see the contents of an archive without decompressing it. Now Compress lists for $99. Now Software, 503/274-2800.

Fifth Generation Systems is shipping AutoDoubler 2.0 (Salient Software, which developed AutoDoubler, was acquired by Fifth Generation). The new version can selectively compress applications and files in the System Folder and has a utility to speed Finder copying. AutoDoubler 2.0 lists for $89.95. Fifth Generation, 504/291-7221.

Alysis is incorporating its automatic-compression utility, More Disk Space, into SuperDisk 2.0. The new version adds special compression for the resource fork of applications, can create compressed applications that don’t require SuperDisk to run, and supports ETC’s Data-Print hardware-compression device. SuperDisk is $119.95. Alysis, 415/566-2263.

TURKEY SHOOT

DESIGN FLAWS NOTED

FileMaker Pro 2.0 Scenario: Say you have one or more FileMaker databases open. Say you try to open another file, but it’s damaged. Say FileMaker tries to repair it but can’t. Now what? Your only option is to quit FileMaker with your undamaged files open—and next time you try to open them, they’ll be damaged too.

Microsoft: Works 3.0 If you plan to make the switch from Works 2.0 to Works 3.0, be sure to set aside plenty of time to convert your old files, because you have to relaunch to convert each file. (Workaround for System 7 users: drag-and-drop launch the new Works with a bunch of old files.)

So you use Outline Selection to put a nice black border around a range of cells in your Works spreadsheet and it looks pretty cool. But then you decide to change your style, so you want to turn off the border. Isn’t it odd that you must apply the border again before you can turn it off?

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See Flau to contact Macworld.
WITH THIS $100 OFF COUPON THE DECLASER 1152 IS ONLY $999.

If you think the deal's great wait until you see how great the printer is. This new 4-page-per-minute desktop laser printer comes ready to plug and play with Macintoshs® and PCs with simultaneously active ports. It also comes with Adobe PostScript® Level 2 and PCL protocols, image enhancement for extra sharp copy and a single supply cartridge, too.

This introductory offer won't last forever, so call us today for more information and the name of a participating distributor near you. And don't forget to clip this coupon, because from now until March 31st this piece of paper could be worth a hundred.

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Customer must submit coupon with proof of purchase (dated invoice and serial number) from an authorized distributor to Lisa Johnson, Digital Equipment Corporation, 6 Technology Park Drive, Hopkinton, MA 01748. One coupon per customer site. One printer per coupon. Offer valid for purchases and deliveries in the U.S. only. Printer must be purchased by 3/31/93. Coupon must be redeemed by 4/30/93. This offer cannot be combined with any other offer or discount.
**Scanning for the Paperless Office**

After years of promises, the paperless workplace has never materialized and we continue to use paper at ever-increasing rates. Virginia Systems' new Sonar Image provides all the components needed to go paperless, so Macintosh offices may finally be able to start saving trees.

**Digital Ocean's Wireless Network**

Ever wanted to network at the airport? If so, start-up company Digital Ocean has brought out Grouper, an AppleTalk-compatible radio transceiver designed for PowerBook users who want to create impromptu wireless networks or just add themselves to an existing AppleTalk LAN. The device, small enough to fit under a PowerBook, can talk to up to 14 other Groupers.

Each Grouper can use one of four communications channels so multiple "schools" of Grouper-equipped devices can coexist without interference with each other. To link Groupers to a hardwired AppleTalk network, one Grouper must be directly connected to the network to act as a hub. A Grouper sends and receives data at 382 kbps at distances up to 250 feet. The Grouper will list for less than $500 and should be available in March. Digital Ocean, 913/338-1595.—T.M.

**Sonar Image**

Sonar Image expands on Virginia's text-indexing and retrieval product, Sonar Professional. Like Sonar Pro, Image can search text files at alarming rates, link concepts through hypertext, and perform context-sensitive searches. But Sonar Image adds image capture and archiving, and uses Caere's OmniPage Direct to provide optical character recognition as well.

Sonar Image links text with images of scanned paper files, so context items like margin notes and scribbled drawings are saved, and archives can incorporate files created in a wide variety of word processing and desktop publishing programs.

You need Sonar Image to create archives, but you can search Image archives with Sonar Professional. Sonar Pro is $795; Sonar Image is $2195; and one copy of Image with a five-pack of Sonar Pro is $4936. Virginia Systems, 804-739-3200.—DANIEL W. RASMUS

**Desktop Librarian**

Books on Microsoft Excel 4.0

This month we look over four companion books to Microsoft Excel 4.0.


**Digital Ocean's Wireless Network**

- **A SPLINE-LADEN IMAGE MODELED IN VIDI'S PRESENTER PROFESSIONAL 1.5 AND RENDERED WITH GLOSSY RAY-TRACING.**

VIDI's New Presenter

Visual Information Development Inc. (VIDI) has released Version 1.5 of Presenter Professional, its 3-D modeling, rendering, and animation package. Presenter Professional provides spline-based modeling and vertex editing, and its rendering options include ray tracing.

Additions to the modeler include a Bevel Extrude command to extrude an object and bevel its surface at the same time; a Move To command for precise movement and placement of object groups; and the ability to export in Stanton and ElectricImage formats. Presenter 1.5 also has better access to MacRenderMan shaders and textures, including support for RenderMan's Boolean operations, fog and other atmospheric shaders, and animated shaders for such effects as rippling water.

Presenter Professional has been reduced to $2995. ModelerPro 1.5, which offers all of Presenter's modeling capabilities without rendering or animation, is $1995. VIDI, 919/918-8834.—CARLOS DOMINGO MlNEZ

**Lasers**

Two versatile laser printers that produce up to 10 pages per minute are now shipping, NEC's SilentWriter 97 ($2149) and Brother's HL-10PS ($2395), both print at 300 dpi but use built-in smoothing technology for printouts that give the appearance of about twice that resolution. Both printers can also connect simultaneously to Macs and PCs—or even disparate networks—automatically switching to the correct printer port.

The SilentWriter 97, built around a Minolta marking engine, comes with Adobe PostScript Level 2, HP PCL 5 emulation, and 35 Type 1 scalable fonts. For an additional $599, NEC sells an adapter for printing plain-paper copies of fax transmissions that have been prepared as PostScript files.

The HL-10PS contains a Brother marking engine, with the company's own PostScript Level 2 interpreter and 37 compatible fonts built in. It can also emulate HP's PCL 5 and comes with 36 fonts in that mode.

Both printers have room for 250 sheets per paper tray, with the ability to combine two trays for big jobs, but Brother's adds an adjustable tray that accommodates letter-size, legal-size, or A4 paper. Brother, 908/356-8880; NEC Technologies, 508/376-8880; NEC Technologies, 508/264-8000.—NANCY E. DUNN

**Two Laser Printers**

**THE NEC SILENTWRITER 97 PRINTS 10 PPM AND CONNECTS TO MACS AND DOS MACHINES.**
A TECHNOLOGY BREAKTHROUGH!
EXPAND YOUR DISK FOR TWICE THE SPACE.
SAFELY AND TRANSPARENTLY!

A 40Mb Drive Becomes An 80Mb Drive: An 80Mb Drive Becomes A 160Mb Drive!

AN ingenious new technology so advanced - it's patented. Transform your PowerBook or Rais - with less storage more space. TimesTwo is amazing easy to use - a one-time installation converts your disk to TWICE ITS ORIGINAL SIZE in just a few minutes - no additional configuration is required. And every bit of your information is 100% safe - TimesTwo does not alter data in its process. That's because - unlike anything we've ever seen - TimesTwo actually makes your disk bigger, instead of making your files smaller, just drag a file from your TimesTwo disk to a floppy, another hard disk or AppleShare server and it arrives in its original form and same size. You can even take your TimesTwo disk to another Mac - and it remains twice as big.

100% Compatible With Every Application. TimesTwo is a snap to install and works with all SCSI and SCSI-2 hard disks, including SyQuest removable, Bernoulli and erasable optical disks, and is fully compatible with all Macintosh applications, including file recovery programs like the Norton Utilities and Central Point’s MacTools. A couple of mouse clicks installs the device on the user's disk. After that, TimesTwo is completely invisible - there's no control panel, system extension or other system software installed on the disk. Go back to work, you're done.

And here's the kicker: TimesTwo is 100% transparent. The user doesn't even have to know it's there. TimesTwo works by compressing disk blocks at the driver level, reducing the amount of space they require, and increasing the true size of the disk. The Finder sees an 80Mb drive - the same drive it used to see as a 40Mb. TimesTwo intercepts files as The Finder requests them to load, and handles all compression and decompression BEFORE The Finder gets the data. To YOU, everything is normal, with absolutely no slowdown or extra steps - you're unaware of the TimesTwo activity. The only thing you notice is more room.

By operating at such a low level - lower than that typically used by application programs - TimesTwo eliminates problems associated with changing files themselves. Disk allocation sizes and creator types remain the same as they would on a normal Mac, so files can be opened, saved, transferred, recovered and recovered just as they would on a normal Mac. You get twice the disk space without any of the problems associated with file compression.

Time-Tested For Reliability. TimesTwo uses the same proven L2S compression technology used in MacWrite, the industry-standard disk expansion product for the PC. That means - although TimesTwo's patent pending technology is a new breakthrough for the Mac - you get years of tried-and-true experience for trouble-free, rock-solid service.

This is a PowerBook way to double your disk space - turn 40MB into 80MB without ever touching a screwdriver! It also eliminates the need for cumbersome external drives. For removable disks, media can be moved to another Mac without the need for TimesTwo on the receiving machine. For example, an 80MB TimesTwo SyQuest cartridge that has been transformed into a 176MB disk can be sent to a service bureau because the TimesTwo software is already installed on the drive.

Connecting to another Mac with AppleShare and copying files is easy. No file-size guesswork involved. Drag a file from another hard disk to your own - 100MB there is 100MB here.

TimesTwo is the trouble-free way to instantly double the size of any hard disk on any Mac.

It's A First - Nothing Else Like It. TimesTwo is the first drive-level disk expansion product for the Mac. No one else has it.

TimesTwo isn't just new, it's a quantum leap beyond such products as AutoDoubler and More Disk Space. Those type of products increase disk space by compressing individual files, changing creator types and inevitably causing numerous compatibility problems. (Do you need to constantly buy upgrades from them?) But TimesTwo is different. TimesTwo works with rock bottom system levels so file sizes and creator types are not changed. That's why file and recovery programs like Norton Utilities and MacTools can go about their business diagnosing and fixing disk problems.

TimesTwo is especially attractive in an era when budgets and resources are tight. System administrators love TimesTwo because of its simple installation and complete transparency to the user. Administrators adding another hard disk represents not only a significant expense, but also the added difficulty of proper configuration and the security risk posed by external disks. TimesTwo handles all that.

The Old Way: With products like Compact Pro, StuffIt and DoubleDisker you have to manually select individual files for compression and decompression. Even with products like AutoDoubler that automatically compress and decompress files when they're loaded or saved, you're still working with individual files. You're adding a level of interaction (and complication) between the application program and the Mac operating system. That adds eventual trouble every time.

These type of programs were originally designed not for hard disks - but for modern file transfers. The original purpose was to save money by cutting modern transfer times - shrink the file size and transfer it faster. It was also developed for squeezing files onto floppy disks to save money when distributing applications and files. But it also became popular as a way to increase hard disk storage space.

Here's just some of the reasons why you don't want to do it the old way:

- Compression and decompression requires constant user intervention it's just too much work.
- Files must be decompressed before they can be recognized and used by an application.
- A decompression utility must be included with compressed files for others who don't own the compression product.
- Compressed file sizes don't represent the file's real, usable size. Users have to guess whether they have enough disk space to decompress and use it. (Automatic compression programs attempt to handle this by playing tricks with the Finder, but that makes them highly vulnerable to any new changes in the Mac's operating system.)
- You can't double-click on a file to launch the original application: double-clicking launches the decompression program instead.
- Some compression programs replace the original icon with their own - then you can't tell at a glance what kind of file it is.
- In changing file creator types, compression can falsify your virus-detection software - which needs to know.
- Compressed files can't be salvaged by file recovery programs. (In other words, only perfect people who never make mistakes or have equipment can feel safe.)
- Final size.
- Compression programs can't compress the System Folder.
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- Compression programs can't compress the System Folder. That means if you have a 20MB System Folder, that's 10MB you'll never get to use.
- Constant packing and unpacking of files play havoc with disk fragmentation, so your hard disk and overall performance slow down much more rapidly.

TimesTwo - The New Way: Rather than operating on files and placing extra layers of complexity between a program, its files, and the Mac operating system, TimesTwo goes right to the basics. TimesTwo gets down to the disk driver level and doubles the size of the disk. It compresses the disk storage blocks twice as many fit on the same disk. That's simple. As a result, the Finder, Mac operating system and all application programs see a disk that's twice as big. Files aren't compressed at all; creator types aren't changed, and users can continue to work as they did before.

TimesTwo removes the complexity with:
- No file changes. No guessing about "real" file size to make sure you have enough room to work, and no different creator types that make a file useless to the original application.
- File recovery programs still see the same files they did before, so recovery is no problem.
- No extra level of file manipulation between an application and the Mac operating system. No chance of future incompatibilities if Apple changes things.
- No unpacking utility needed for distributing disks and files, because TimesTwo is already there - inherently on the disk.

TimesTwo is the way to run a hard disk.

Twice the space - Transparently!

Circle 114 on reader service card

GOLDEN TRIANGLE

BDZ2868 TimesTwo $99.95
New MacEKG Spots Trouble Before It Strikes!

The Mac was used to be a simple machine. It was a 28K white-ribbon, 128K floppy machine, and they applications were limited. It was a computer for the rest of us...

People who bought Macs way back when, circa 1984, paid more than they would have for a stodgy PC machine, but they didn’t mind — they knew the potential of the fun-loving box with the monitor built in and the cute little icons.

They were right. The Mac has grown up, becoming a powerful and mature business tool in its own right. Today, the Mac enjoys a starring role in a variety of businesses, from graphic designers, to CEOs to television producers. The Mac can run spreadsheets with the big boys, produce high-quality, 3-D animation and more.

With this amazing growth, the Mac now has some serious responsibilities. It must handle CDEVs, extensions, scanners, viruses, megabyte drives, virtual memory and voice recognition.

That means your Mac must be modified for the way you work — and what type of work you do. And that opens the door for possible problems. Drop an extension into your Mac’s system folder and watch the fireworks...

MacEKG is the most advanced, easiest-to-use system diagnostic program we’ve seen, helping you prevent problems before they even think about occurring. You can run a series of tests that will look for possible problems. Drop an extension into your Mac’s system folder and watch the fireworks...

If EKG detects a substantial decrease in performance, it displays a warning and issues you in the offending part. This is precisely what any technician would do to repair a Mac.

Avoid Simple Conflicts And Lethal Failures! Apple has served up a tempting curvaceous with System 7. It’s advantages fulfill many of the promises that the Mac made in the early days.

But there’s a funny spin, and if you use System 7, you’re not out of the woods until you’re running System 6. MacEKG watches your system with a set of features that were used to be available only to Authorized Apple technicians. Moreover, some of the routines included in MacEKG are not available anywhere else.

MacEKG tests individual hardware components to seek out possible faults — before they become major problems. The VIA (Versatile Interface Adapter) chips handle all user input like the mouse and keyboard. If allowed to get worn, a faulty VIA can cause complete system shutdown.

RAT Testing. With more complex applications, comes the need for upgrading your RAM. MacEKG tests each bit of RAM twice to verify that all bits of memory arc usable. The test is more reliable than the Mac’s self-test.

MacEKG registers and samples bits of memory, divides memory into eight blocks and runs each block through a battery of tests. If a block tests lower than the others, a "POOR" indicator will appear next to the suspect block and a component warning will be issued. You will see the actual chip that is bad — or about to go bad.

PRAM Testing. PRAM (Parameter RAM) provides your Mac with time and date functions and acts as a storage area for keyboard and mouse settings, startup drive, port settings and more. PRAM, like main RAM, must always have power to hold the information it contains.

MacEKG tests this chip with time and loading exercises.

Got an intermittent problem? For intermittent failures, you need to run Reactivator. It continually tests, powers down and retests until the problem goes away. This is a heaven-sent tool for anyone trying to find heated-related problems.

(Must be for every Mac technician.)

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MacAcademy videos can be updated upon release of new software versions for only $14.95.

$49 ea.
Color Matching by Agfa

Agfa has introduced two color-matching programs. FotoTune ($795, $495 until March 31, 1993) creates a profile of how your scanner or monitor produces its range of colors and then compensates for the colors your output device can't produce. FotoTune's color definitions help accurately translate colors from one device to another. The second release of the software package, expected in mid-1993, will also be able to dynamically define colors for output devices; until then the program uses predefined tags for printers and other output devices. The companion product, FotoReference, serves as an absolute color reference with calibrated measurements of standard color swatches developed by the Commission Internationale de l'Eclairage (CIE). FotoReference comes in two versions, one for $1110 that has spectral measurements for all the CIE IT8.7/1 and IT8.7/2 swatches, and one for $295 that contains averages instead. Both programs are compatible with Apple's ColorSync.

Sonic Gateway to TCP/IP

Sonic Systems has come out with two inexpensive software gateways that enable Macs and other LocalTalk devices to access TCP/IP services located on Ethernet networks. The first program, called PowerBridge/TCP, supports one Macintosh over LocalTalk. The second, called SuperBridge/TCP, supports five Macs over LocalTalk. Although both software bridges require a host Mac, the amount of processing power required is small enough that the host can still be used for normal work, according to the company.

PowerBridge/TCP retails for $249 and SuperBridge/TCP for $349; both are much less expensive than a hardware bridge. The software bridges are available now. Sonic Systems, 408/736-1900.—T.M.
When it comes to high-resolution laser printing, we've done our homework. NewGen products include a host of features designed specifically for the artistically-inclined. Take our unique Image Enhancement Technology (IET), for instance. IET dramatically enhances text, line art and grayscale images to deliver output that's simply brilliant. Add to that, resolution up to 1200 dpi in 11" x 17" format and you have printers that are perfect for graphic design, desktop publishing and a multitude of other applications.

But NewGen printers also get high marks from the technically-astute business user. Features like high-speed RISC processing maximize printing performance. And, our proprietary Automatic Recognition Technology — an automatic emulation, interface and network protocol sensor — makes it easy to share a NewGen printer among Macintosh, PC and workstation users.

For a quick lesson on the benefits of NewGen's complete family of laser printers, call us today at 1-800-756-0556.
At Last, A Fax Modem That Speaks Up

Home Office, the modem that handles voice and fax calls automatically.

Now, there's a single solution for small business communications. Home Office for the Macintosh integrates a data modem, a send/receive fax and a digital answering machine all on one phone line. For about the price of a fax modem you can have communications power similar to a Fortune 500 company.

Unlike most fax modems, Home Office provides a sophisticated voice messaging system. The 999 password protected mailboxes keep messages for each caller private and organized. And you can easily change greetings or retrieve messages remotely.

The 9600 bps, Group III fax sends or receives fax communications from anywhere in the world. Plus our MaxFax software, bundled with each product, makes faxing as easy as printing.

With the choice of the powerful V.32bis modem operating at 14.4K or the 2400 bps modem, both the Ultima Home Office and Home Office know how to perform. Data throughput is up to four times faster with V.42bis data compression and error correction.

Isn't it time your business communications are heard? For more information about Home Office for the Macintosh and Ultima Home Office for the Macintosh or PowerBook*, call 1-800-477-3473.

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COLOR CLASSIC

Apple adds color to its original compact Mac, but is it worth the money?

Compact Mac fans can wave good-bye to black-and-white: the Color Classic is here. And besides its color display, the Color Classic has PDS and FPU slots, a built-in microphone, and a logic board design that makes it easy to upgrade. But notice how close the Color Classic's prices are to the more flexible LC models before you get carried away with its cute design.

BY JAMES A. MARTIN

THESE DAYS, THERE ARE SO MANY MACINTOSH VARIATIONS—LC, Performa, Centris, Quadra, two kinds of PowerBooks—and so many Macs with abbreviated life spans (remember the Quadra 900?) that it's a comfort to know the original Mac is still with us. Just as San Francisco has its cable cars, Central Park its horse-drawn carriages, and Venice its gondolas, we've still got that cute, huggable, luggable, all-in-one computer.

To prevent its signature Mac from becoming just an endearing anachronism, Apple has introduced the Color Classic, which updates the Classic II's 9-inch black-and-white monitor with a 10-inch built-in color display. Apple didn't stop there, though: the Color Classic also offers slots for a Processor Direct Slot (PDS) expansion board and a floating-point unit (FPU) math coprocessor, among other new features. Along the way, Apple gave the Classic a new look. (The Color Classic will be sold to international markets; at press time, Apple hadn't decided if a Performa version of it will be sold in retail outlets.)

Despite the emotional responses the Classic line arouses—nostalgia for the early days of the Mac and all that—the Color Classic poses a nagging practical question. Specifically, does it make sense to buy one? For starters, a 10-inch color screen is too small for anyone who's even halfway serious about desktop publishing,
Beyond Black-and-White

Although the Color Classic has a number of intriguing new features, the most important is, not surprisingly, the color monitor.

Color is not really new to compact Macs. The SE/30's ROM, for example, is the same as the Macintosh II's and includes support for color and gray-scale graphics. Third-party add-in monitor boards, such as the TX/SE/30 from E-Machines, enable you to hook up a color display to the SE/30.

In October 1991, the Classic II replaced the Classic part of that upgrade was an improved ROM with 32-bit QuickDraw, which technically gives the Classic II the ability to display grayscale and color information. However, because the Classic II's built-in display is 1-bit black-and-white, and the computer offers no expansion slot, adding color is not a smooth operation. Among the third-party products for adding color to a Classic II are Radius's PowerView and Aura Systems' Scuzzy View, external display interfaces that let you hook up a color monitor to a Classic II (or a PowerBook without video-out capability) through the SCSI port. But SCSI devices have rarely, if ever, been lauded for their speed, and this type of workaround is often frustratingly slow.

As long as the Classic II had the capability to display color, why didn't Apple offer a Color Classic earlier? According to Apple, the quality—and price—of smaller color displays just wasn't viable until now. In addition, the Classic's chassis and logic board needed to be redesigned to accommodate a color-display tube. When Apple introduced the Classic II, it just wanted to get a 68030 replacement for the 68000-based Classic out the door as quickly as possible.

The Color Classic's Sony Trinitron 10-inch display (measured diagonally) is remarkably crisp and offers 12 percent more viewing area than the Classic II's 9-inch screen. With 512 horizontal by 384 vertical pixels, the Color Classic's resolution is the same as that of the now-defunct Apple Macintosh 12-inch RGB Display. Nonetheless, the 10-inch monitor looks much sharper because it displays the same number of pixels across a smaller area.

In fact, the Color Classic's 10-inch Trinitron display has an overall screen resolution of 76-dpi, while the 12-inch screen has a 64-dpi resolution (which looks watered down in comparison) and the 14-inch Macintosh Color Display has a 70-dpi resolution.

For your further statistical enlightenment, it's worth mentioning that the 10-inch Trinitron picture tube's clarity is measured at .26mm stripe pitch. The most important thing to know here is that the smaller the stripe pitch, the sharper the image. By comparison, the 12-inch color display has a .28mm stripe pitch, while the 14-inch Trinitron's stripe pitch is also .26mm.

Like the LC II, the Color Classic ships with 256K of VRAM for displaying 8-bit color (256 colors). With the addition of an optional 512K VRAM chip ($99), the monitor will display 16-bit color, or 32,768 colors. Using the Color

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<th>Squaring Off: New versus Old</th>
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<td>The Color Classic resembles the Classic II and previous compact Macs, but there are noticeable differences—among them a tilted, oversize front; front-bezel volume and screen-contrast buttons; a built-in microphone; and feet on which the computer stands. The Color Classic's modified appearance prompted a variety of responses from Macworld editors. Here's a sampling.</td>
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**ADRIAN MELLO, editor-in-chief:** "The most disturbing design change is the broad protruding bezel that houses the color monitor. It reminds me of the arched masonry plate around a triceratops head. The whole design looks like a baby dinosaur that just erupted from an egg. The new look is growing on me, but part of me regrets the partial loss of the original Mac design."

**TOM MORAN, associate editor/news:** "It looks like the Alamo, or some adobe architecture. It really doesn't look that much like the original compact Mac, but people will like the color screen and the slip-out logic board for easy upgrading."

**CHERYL ENGLAND, senior editor/features:** "When I first saw the Color Classic, I had the same feeling you get when you see a bassett hound puppy trip over his ears. I wanted to smile, then feel a little bit guilty—how could I betray the faithful old design? But when I found out it has an LC II-style expansion slot, I started to take this 'baby' Mac seriously."

**JAMES A. MARTIN, senior associate editor/features:** "In general, I'm happy to see that Apple is keeping the original compact Mac design, despite the alterations. But the Color Classic has those same design-for-design's-sake 'airholes' as the Mac IIvX and Centris models. The lower-front-panel adornment serves no practical purpose and looks as if the designer responsible was unduly impressed by acoustical tile ceilings at an early age."

**TIM WARNER, assistant editor/lab:** "A neoclassical, postmodern Italian design with deconstructivist tendencies... but it grows on you."

**CHARLES PILLER, senior associate editor/features:** "It's a welcome design change. The old Classic and all old compact Macs remind me of the VW bug—but let's hope the new design doesn't do the same thing to Apple that dropping the bug did to Volkswagen."

**GALEN GRUMAN, associate editor/features:** "It's so sort of baroque looking, and I don't like it. In particular, the huge bezel makes the monitor look tinier than it really is."

**MARK HURLOW, associate editor/lab:** "I find it slightly overweight and oversized. Also, the screen is kind of small—a 640-by-480 screen would certainly have been an improvement. The contrast and sound control buttons are a nice touch, but I could live without them."
The Color Classic's small display size makes absolutely no sense for anyone who needs to regularly view or edit large color files. So why not buy an LC II instead?

Classic's PDS expansion slot—which is compatible with the LC slot—you can add a graphics board for 24-bit color. The Color Classic's built-in video supports only the 10-inch Trinitron screen; if you want to hook up an external display, you need to add a board that supports that particular monitor.

Of course, the PDS slot opens up the Color Classic to many other options as well, including sending video out to a large TV monitor (with an NTSC video board)—great for teachers who want to show what's on the screen to a classroom of students; adding an Apple Ille emulation board, which enables you to run Apple Ille software on the Color Classic; adding a third-party CPU accelerator board; and installing Ethernet networking capability.

Room for a View?

Because the 18-inch monitor has the same pixel-by-pixel resolution as the 12-inch display, any software that runs on a standard 512-by-384-pixel display runs on the smaller display as well. Admittedly the image is smaller, but at least it's intact and not distorted.

With software designed to run on larger monitors, however, you could face some problems. Certain games and CD-ROM titles, for example, need a 640-by-480-pixel display (such as Apple's 14-inch Macintosh Color Display) to work properly. These programs still run on a 512-by-384-pixel screen, but you can't see everything that's happening, and you lose access to any icons or controls that don't appear on the screen.

The Color Classic's petite viewing area can present a problem for anyone working with large graphics. You have to scroll color graphics that are larger than the screen to view the entire image. The higher the graphic's resolution, the larger the file size; and the larger the file size, the longer it takes the screen to redraw the image after each scroll.

As a result, the Color Classic's screen size makes absolutely no sense for anyone who must regularly view or edit color files that don't fit in the display's viewing area or that are larger than 1MB or so. That leaves out a lot of images, including high-resolution Photo CD-formatted files (for more on screen-refresh rates, see "Color Classic Performance"). Of course, you could add an external color monitor for easier viewing, but that brings us right back to that nagging question: Why not just buy an LC II instead?

To strike a more positive note, the Color Classic works fine for viewing QuickTime movies. The computer ships with QuickTime 1.5, which enables you to comfortably view video clips in a 320-by-240-pixel window (QuickTime 1.0 could only manage a 160-by-120-pixel viewing area).

If you plan to look at QuickTime clips regularly, add the extra VRAM for 16-bit color for best results; QuickTime clips look pretty ragged with just 8-bit color.

Performance Notes

In general, MacWorld lab tests didn't reveal any significant performance differences between the Color Classic (with no FPU), the LC II, and the Classic II.

With display-intensive tasks—Microsoft Word scrolls and the like—the Classic II was faster than the LC II and Color Classic. That's because the process of displaying text and graphics in black-and-white is much faster than displaying color.

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### CLASSIC COMPARISONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Classic II/Performa 200</th>
<th>Color Classic</th>
<th>LC II/Performa 400</th>
<th>LC III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>16Mhz 68030</td>
<td>16Mhz 68030</td>
<td>16Mhz 68030</td>
<td>25Mhz 68030</td>
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<tr>
<td>Math coprocessor</td>
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<td>Data bus</td>
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<td>32-bit</td>
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<td>1 PDS</td>
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<td>16&quot;</td>
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<td>10-inch color (built-in)</td>
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<tr>
<td>Maximum colors</td>
<td>NA</td>
<td>22768</td>
<td>256&quot;</td>
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<td>Ports and connectors</td>
<td>ADB; 2 serial; SCSI; sound in; sound out; floppy connector</td>
<td>ADB; 2 serial; SCSI; sound in; sound out; video out</td>
<td>ADB; 2 serial; SCSI; sound in; sound out; video out</td>
<td></td>
</tr>
</tbody>
</table>

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* The total space dimensions for the LC II and LC III combine CPU chassis dimensions with those of a 14-inch Macintosh Color Display. * On 13- and 14-inch monitors. 1 Supports 256 colors on 12-inch monitors. 1 Supports 32,768 colors on 12-inch monitors and 256 colors on 16-inch color monitors. 1 With additional VRAM. 1 1 Supports 32,768 colors on 12-inch monitors. 1 Supports 32,768 colors on 12-inch monitors and 256 colors on 16-inch color monitors. 1 With additional VRAM. 1 1 Supports 32,768 colors on 12-inch monitors. Prices are for Macs with a standard minimum of 4MB of RAM. 1 1 Suggested retail prices for the LC II and LC III include $599 for the 14-inch Macintosh Color Display.

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MACWORLD April 1993 97
Inside the New Classic

The computer's feet give it some height and place the monitor in a slightly better position for viewing. But their real purpose is to give the Classic a distinctive new look.

The analog board contains two independent power supplies: one for the display, the other for the CPU. Power supplies are traditionally located on the main logic board, but here the goal was to design a logic board that could easily—and safely—be removed by owners.

The speaker is housed within a specially designed plastic box. The box is secured to the computer's chassis using a high-quality, Velcro-like material (generically known as a hook-and-loop fastener), which reduces sound vibrations.

The logic board slides in and out of the computer chassis along tracks.

The case holds the fan (not shown). This is mounted with rubber to minimize sounds and vibrations.
One glance at the new Classic and you'll see that it isn't the same old box it used to be; not as obvious is the new slide-out logic-board design, complete with PDS slot.

and-white requires less data than displaying them in color.

The Color Classic performed slightly better than the LC II in display tasks. Again, the slight differences in performance are mostly because it takes a little longer to render data on a 640-by-480-pixel, 13-inch color monitor (our test display for the LC II) than on the Color Classic's 512-by-384-pixel, 10-inch color display.

New Color, New Look

AS LONG AS APPLE HAD TO TWEAK THE Classic’s chassis and logic board, its designers went ahead and made a few other changes, too.

Beginning at the top of the chassis, Apple has added a built-in microphone for 8-bit mono sound input (the Classic II came with an external microphone for 8-bit mono sound input; the Classic shipped with no sound-input capability at all). The microphone is centered directly above the monitor, which may seem backward from a practical standpoint, as most people I know have eyes located above their mouth.

During its development, the Color Classic’s built-in microphone picked up ambient noise from the computer’s internal fan and vibrations from the hard drive. Apple engineers tried to fix this problem by installing the fan with a rubber mount, which acts as a shock absorber. Apple also cushioned the external microphone with rubber, to further prevent it from picking up vibrations. In addition, Apple recessed the microphone slightly into the front bezel, as a way to block ambient noise and better isolate voice input.

For comparative purposes, we made voice recordings on both the Color Classic and a Macintosh IIvx (using an external microphone). The Color Classic recording sounded as if it had been made while on an airplane in flight; it carried an audible background hum that wasn’t present in the IIvx recording, even though actual background noise levels during both recordings were minimal. Granted, you aren’t going to use your Color Classic to record CD-quality sound, but that hum was noticeable, persistent, and ultimately annoying.

Below the monitor Apple has placed four control buttons: volume up, volume down, higher contrast, and lower contrast. The external volume controls enable you to make the same kind of adjustments that you can make with the Sound control panel, but it’s faster to push the buttons. (By the way, you can also control the Color Classic’s sound level and turn the computer on and off using the new Apple Adjustable Keyboard; for more on the keyboard, see “Apple Redesigns Input Devices” in News, Macworld, March 1993.)

The two display buttons under the monitor allow you to adjust contrast (the monitor’s range of shades and colors). If you want to adjust brightness (the volume of light that’s fed into the monitor), Apple has added a Screen control panel that enables you to adjust both brightness and contrast (see “Adjusting Your Vision”). In addition, the panel includes a useful Screen Power Saver, which, when activated, puts the monitor to sleep after a preselected amount of idle time (between 15 and 60 minutes). This feature prolongs the life of the picture tube, by automatically turning it off when it’s not needed, and reduces the amount of power the Color Classic needs to operate (and thus lowers electricity bills ever so slightly). According to Apple, the Screen Power Saver reduces the power consumed by the screen from 60 watts when active to 30w when asleep.

Clicking on the mouse reactivates the screen. Depending how long it has been snoozing, the screen takes up to 15 seconds to spring back to life.

Other Cosmetic Changes

THE COLOR CLASSIC IS NOTICEABLY taller, deeper, and heavier than its compact Mac predecessors.

The front bezel now extends beyond the chassis—a result of adding the 10-inch color screen—and subsequently looks a bit out of proportion with the rest of the computer. Unlike that of its ancestors, the Color Classic’s front tilts backwards 6 degrees, offering a slightly improved viewing angle on the monitor.

The Color Classic sits atop four built-in feet, which position the display a little higher than it would otherwise be (see “Squaring Off: New versus Old” for reactions to the design changes).
More on Board  You can pull the logic board out to add an LC PDS expansion board. The logic board's direct connector secures the board back in place.

A Logical Logic-Board Design

AT LONG LAST, YOU CAN KISS YOUR torx screwdriver and case cracker—the indispensable tools for getting inside a compact Mac—good-bye.

It’s extremely easy to get into the Color Classic to add an expansion board. The Classic’s bottom back panel (where its seven ports are) has been revamped for easy access; just unlatch the clasps and off it comes. Inside, the logic board has been reengineered so that you can easily detach it, thanks to a direct connector that snaps the board into, and out of, place. You can then slide the board out, snap an expansion board into the PDS slot, slide the main logic board back inside the computer—giving it a delicate push to ensure the connector clips it back into place—and then snap the back panel on.

Because it is so much easier now to slip inside your Classic, a few words about Apple’s warranty policy are in order. Apple recommends that upgrades to the logic board itself—RAM or VRAM, for instance—be performed by an authorized Apple dealer or other service provider (your company’s technical-support staff, for example). If you do the job and accidentally cause some damage, your warranty doesn’t cover the cost of repairing the damage or replacing the board. If the service provider does the job and causes damage, then the warranty covers the cost to fix it. However, if you pull out the logic board to add an expansion board—such as the Apple IIe emulation board—to the PDS slot, your warranty does cover any damage you might do, except when the vendor of that expansion board specifies that an authorized dealer should install the board. The bottom line: While you’re under warranty, have a dealer or company tech-support person install RAM or VRAM. If you plan to install an add-in board, read the accompanying literature carefully in advance and have a dealer or tech-support person install the board if the vendor recommends doing so.

Math Coprocessor and More

APPLE HAS MADE SOME OTHER CHANGES to the logic board as well. Chief among these is a slot for an optional math coprocessor ($79), something you don’t have with the Classic II and LC II. Adding a math coprocessor to the Color Classic resulted in significantly speedier handling of FPU-intensive chores (Excel recalcs among them). Not surprisingly, however, the FPU’s impact on other tasks was negligible, reinforcing the fact that FPUs really aren’t necessary for the vast majority of Mac owners in general— and Color Classic owners in particular, who aren’t likely to be performing heavy Excel recalcs.

The Color Classic’s logic board includes two 512K ROM chips (compared with the Classic II’s one 512K ROM chip). The ROM is based on the LC II and Quadra ROMs and was specifically designed for the Color Classic. The ROM was upgraded to include the Screen Power Saver and the keyboard Power on-off button, among other features.

With the Color Classic, Apple has phased out the floppy drive connector port in its low-end Macs in favor of offering two ADB ports (“Classic Comparisons”). This was inevitable, as internal hard drives don’t add that much extra cost to a computer anymore, and as a result, fewer people need to run a computer from two floppy drives.

The Color Classic ships with 4MB of RAM standard. It has one dual-slot SIMM bank for installing two 1MB SIMMs, two 2MB SIMMs, or two 4MB SIMMs. If you install two 4MB SIMMs, you end up throwing 2MB of RAM away. The Color Classic, like the Classic II and LC II, can’t use more than 10MB of RAM, due to the limitations of the memory address map in those computers.

Who Will Buy?

NOW THAT I’VE CONSIDERED what the Color Classic has to offer, I’m back at the same practicality question—does it make sense to buy one?

From a purely economical standpoint, consider this: A Classic II with 4MB of RAM and an 80MB hard drive retails for $1079, while a similar Color Classic costs $1389—a difference of $310. Considering that the Color Classic gives you a slightly larger, color screen, one expansion slot, and an FPU slot, it’s a good deal. (The Color Classic ships with the standard Apple keyboard, the new Apple
If you are in the market for a Classic II, forget it and buy a Color Classic. The difference in cost is about $300. But the LC II or LC III is ultimately a better buy.

Desktop Mouse II, and System 7.1 fully installed.

The cost comparison certainly spells doom for the Classic II. Apple plans to continue selling the II as long as there's a demand, but you can bet that the black-and-white compact Mac is on its way to oblivion. Besides, who wants black-and-white these days when you can have color?

A 4/80 Mac LC II, with standard keyboard and the new mouse but no monitor, retails for $1169—$220 less than the Color Classic. Add the 14-inch Macintosh Color Display ($599), and the cost of the LC II system is $1768—$379 more than the Color Classic. Thus, for a few hundred dollars more you can buy an LC II with a 14-inch color monitor. Pay $559 more and you've got an LC III, which is more robust and expandable (it's upgradable to up to 36MB of RAM, for example) than the Color Classic or LC II and supports a variety of monitors.

Conclusion? Strictly on a financial basis, if you were in the market for a Classic II, forget it and buy a Color Classic. Otherwise, the LC II or LC III is ultimately a better buy for the money.

But other factors complicate the issue. Size, for one. Because of its compact, all-in-one design, the Color Classic is perfectly suited for classrooms, dorm rooms, and many educational uses. The Color Classic is easy to set up and transport, it's less susceptible to tampering, and it's therefore a better choice than an LC II. The small footprint of the Color Classic makes it a good choice for office or home users without much desk space to spare—the Color Classic is expected to be a big hit in Japan and Europe for this reason alone.

But if you're not worried about simple setup, desk space, or portability, and you want a computer you can grow with, I strongly suggest buying a LC model instead of a Color Classic. Even if you're not sure that you need the extra flexibility, consider this fact of life: once you take the plunge into color, there's no stopping you. After you use the Color Classic for a while and see its limitations, you'll want a larger color screen. Then you'll want 24-bit color, and before long you'll want another computer entirely.

As a result, the Color Classic makes a lot of sense for Apple—hook 'em with a small color screen and soon they'll want more. For many people, though, the Color Classic is not quite so practical.

But it is cute.

Macworld Lab testing supervised by MARK HURLOW and TIM WARNER.

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<thead>
<tr>
<th>Processor Tasks</th>
<th>Drive-Access Tasks</th>
<th>Display Tasks</th>
<th>Math Tasks</th>
</tr>
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<tbody>
<tr>
<td>Macintosh LC III</td>
<td>211</td>
<td>58</td>
<td>328</td>
</tr>
<tr>
<td>Color Classic (with FPU)</td>
<td>409</td>
<td>116</td>
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<tr>
<td>Color Classic (no FPU)</td>
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<td>Classic II/Performa 200</td>
<td>447</td>
<td>111</td>
<td>764</td>
</tr>
<tr>
<td>Macintosh LC II</td>
<td>432</td>
<td>115</td>
<td>740</td>
</tr>
</tbody>
</table>

The Color Classic is a hybrid of the Classic II and the Mac LC II, so it's not surprising to find that its performance is extremely similar to those two computers (all have a 16MHz 68030 processor and a 16-bit data path). Even when an optional FPU is installed in the Color Classic, there's not much difference, except for math-intensive tasks. The new Mac LC II, with its 25MHz 68030 processor, 32-bit data path, and optional FPU, clearly provides the best performance among compact and low-cost color Macs.
The newest LC is more affordable than ever and as fast as a Mac IIci

When Apple introduced the original LC, the company was admitting that it needed a low-cost color computer in its line-up—that for many customers the benefits of the Macintosh interface didn’t justify the machines’ premium price. Eating humble pie worked—the LC and LC II became Apple’s most popular Macs. The LC III continues the tradition, offering good performance at lowest-ever prices.

When the Macintosh LC first came out in October of 1990, it had its share of naysayers. “It’ll never sell,” they said. “It’s still too expensive ($2400 for a system with 2MB of memory and a 40MB hard drive), it’s not very fast, and it doesn’t have many expansion options.”

But sell it did—within a year the LC became Apple’s best-selling Macintosh, with 560,000 units sold. It took nearly a year and a half to update the LC to the LC II. Even then, the improvements were minor: a 68030 processor replaced the aging 68020, and memory was upped to 4MB on the logic board. Performance remained the same. Still, the LC II sold well—industry analyst Pieter Hartsook estimates that Apple sold 950,000 LCs and LC II’s in 1992.

From what I’ve seen of the latest in the LC line, the LC III, I predict a continued streak of high-volume sales. Apple has finally fixed the few things that hindered the LC and the LC II: the LC III recognizes up to 36MB of memory (not just 10MB), there’s a socket for an optional math coprocessor, and the built-in video circuitry supports more colors on larger monitors. Most important, Apple has increased the 68030 processor speed to 25MHz and added a 32-bit data bus so that users will see a real speed improvement over previous LCs. The upgrade is significant enough that Apple will continue to sell the LC II (and the Performa 400), not just replace it with the LC III.
Oh, and by the way, the basic LC III with 4MB of memory and an 80MB hard drive will cost only $1349 retail—that’s $700 less than the 4/80 version of the LC II sold for when it was introduced. A 4/160 configuration of the LC III will cost $1669. All configurations will include a standard keyboard and a redesigned mouse, although some dealers may sell a slightly less expensive version of the LC III without a keyboard. At press time, Apple had not yet decided whether it would sell the LC III as part of the Performa line.

**Speed Burst**

The 16MHz 68020 LC and the 16MHz 68030 LC II are by no means slouches. Although they certainly don’t hit Quadra 950 speeds, they run common educational, home, and business applications well. The LC III runs twice as fast, meaning that this Mac more easily supports applications, such as QuickTime and video editing, that require snappy performance. The LC III has the same 25MHz 68030 processor as the Macintosh IIci—the machine that was Apple’s mainstream business Macintosh until the IIXs came along. In Macworld Lab tests, the LC III ran as fast as the Iici and even faster than the slim-line Iiis. The only exception was the math test, which depends on an FPU for a speed burst. In this test, the LC III did not include an FPU (an optional component for this machine); the Iici did include an FPU (a standard component).

The LC III’s speed burst is due to the 32-bit bus as well as the slightly faster processor. The 68030 is a 32-bit processor; it handles data in 32-bit (4 bytes) chunks. The LC II has only a 16-bit data bus, meaning that data moves between the processor and memory only 16 bits (2 bytes) at a time. The slower data bus creates the same kind of bottleneck as two lanes of traffic trying to merge into one.

**Expanding the LC III**

**APPLE HAS NOT CHANGED THE ORIGINAL LC’S SLIM CASE DESIGN, SO THE LC III STILL HAS ROOM FOR ONLY ONE Expansion slot, one ½-height hard drive, and one SuperDrive floppy drive.** But because the functions of several of the LC II’s logic board chips have been integrated into one custom chip, the LC III has more room on the logic board for additional features. Some changes are immediately apparent, while other changes may be noticed only when it’s time to upgrade.

For instance, the LC III comes with 512K of video memory (VRAM), soldered onto the logic board, as well as a slot for adding 256K of VRAM. With 512K of video memory, the LC III supports 8-bit video (256 colors) on 13-inch, 14-inch, and 16-inch monitors, and 16-bit video on 12-inch monitors. For monochrome monitors, the standard LC III supports 8-bit video on 12-inch displays and 4-bit video (16 grays) on 15-inch portrait-size monitors. With an additional 256K of video memory, the LC III supports 16-bit color (32,768 colors) on 12-inch, 13-inch, and 14-inch monitors.

That’s enough colors to display QuickTime movies as well as many images with near-photo-realistic quality. The additional 256K of VRAM also lets the LC III display 256 shades of gray on portrait monitors.

What’s not immediately apparent with the VRAM is the efficiency with which you can now upgrade it. The LC II’s logic board had a single SIMM socket for adding video memory. If you bought the LC II with 256K of VRAM and later wanted to upgrade it to 512K of VRAM, you had to discard the 256K SIMM and replace it with a 512K SIMM. The LC III has 512K soldered onto the logic board; a SIMM slot is available for adding an additional 256K of VRAM. You no longer have to waste a SIMM if you decide to upgrade video memory after purchasing a standard LC III.

Similarly, you wouldn’t think that the expansion slot had changed, based on Apple’s specifications. Like the LC II, the LC III has an expansion slot with 96 pins and accepts all of the boards that the LC II does, including the Apple Iie Card. The slot even retains the LC Slot moniker. But a look at the logic board reveals an additional section with 18 pins. Apple added these pins to support the signals necessary to make the slot run at the same 25MHz speed as the processor. (The 96-pin slot runs at 16MHz—the same speed as the processors in both the original LC and the LC II.) Thus, boards that need to hook directly into the processor, such as DayStar’s PowerCache accelerators, can be redesigned to run on the LC III using all 114 pins.

**More Memory**

ANOTHER EXPANSION PLUS FOR USERS who want to work on several applications at once or dabble with memory-hungry multimedia work is the LC III’s ability to recognize up to 56MB of memory. Apple still includes 4MB of memory on the logic board. But the company has updated the memory-control functions to recognize more than 10MB of RAM.

As part of its scheme to support more industry standards, Apple has designed the LC III’s memory slot to accept the same 72-pin SIMMs that many DOS machines use. (The Centris 610, the Centris 650, and the Quadra 800 also support these 72-pin SIMMs.) Because these SIMMs are widely available, you should be able to find them more easily than traditional Macintosh SIMMs. But because 72-pin SIMMs differ from the ones in earlier Macs, you won’t be able to take the memory from an older Mac and add it to the LC III. The LC III supports SIMMs with a capacity of 1MB, 2MB, 4MB,
I hope that Apple is cranking up its manufacturing line. With better speed, greater video and memory options, and the low price, the LC III is an outstanding bargain.

8MB, 16MB, or 32MB for a total memory capacity ranging from 5MB to 36MB.

Another first for the LC line is the addition of a socket for a Motorola 68882 math coprocessor on the LC III’s logic board. You’ll want this option only if you plan to use mathematical software or scientific applications. General spreadsheet functions such as addition and subtraction don’t benefit from a math coprocessor. If you plan to perform modeling, rendering, or CAD tasks frequently, then you are better off buying at least a Mac Centris for its sheer processing power (see “Centris 610 and 650,” in this issue).

The LC III also contains the standard array of ports and connectors (two serial ports, audio-in and audio-out ports, an ADB port, a SCSI connector, a LocalTalk connector, and, of course, a connector for hooking up an external monitor). The bite-size microphone is no longer bundled; instead it will be available as a stand-alone product. The sound input remains 8-bit. (CD-quality sound uses 16 bits; 8-bit sound, however, is perfectly appropriate for voice applications and recording system beeps.)

Should You Buy One?

I hope that Apple is cranking up its manufacturing line. Demand for the LC III should be high, especially since Apple is offering an upgrade kit to LC and LC II owners for $399. With the increase in speed, the greater video and memory options, and the low price, the LC III is an outstanding bargain.

The LC III also has the luxury of having a clear-cut place in the Macintosh line; the Color Classic is really its only competitor (see “Color Classic,” in this issue). On the positive side, the Color Classic offers a compact design, a slightly lower price, and the LC expansion slot. On the negative side, it is not nearly as fast as the LC III, and its built-in screen is minuscule. Still, the Classic’s lack of color in the past has been one of the reasons that people bought the LC instead.

As for the LC II, it should sell to people on a tight budget who would like the option of upgrading to a faster modular Macintosh when they can afford it. At press time, Apple estimated that there would be only about a $200 price difference between the LC II and LC III with 4MB of memory and an 80MB hard drive. If that turns out to be true, then you should buy the LC III if you can—it’s much improved over the LC II.

And there’s no longer any reason to buy an IIsi or a Iici. The LC III runs at the same speed as the Iici and faster than the IIsi and includes many of the same features as those two Macs. If you need more expansion slots or larger compartments for hard drives than the LC III provides, but you think the speed is reasonable, you should opt for a Performa 600 or a Iivx. And if you really want a faster machine, check out the Centris 610 or 650.

The average user, however, cannot get a better bargain than the LC III. The fact that previous LCs have sold so well, and that Apple is keeping the LC II around for at least a while, bodes well for the life span of the LC family and the proliferation of third-party add-ons. And that’s important as Apple continues to announce more and more new computers each year.

Macworld Lab testing supervised by MARK HURLOW and TIM WARNER.
Two new midrange performers replace the venerable Mac II line

Apple’s new midrange line of Macintoshes, the Centris series, brings 68040 power at competitive prices. These machines redefine the basic business Macintosh. Apple continues its tradition of offering both a slim-line model (the Centris 610) and a full-size expandable model (the Centris 650) in the midrange.

The Macintosh IIvx now defines the low end of the Centris line.

Six years after its introduction, the Macintosh II line has met its end. The first open-architecture Mac, the II was meant to make the Macintosh a business computer that could compete head-to-head against the business standard of the day, the Intel 80386-based PCs from Compaq, IBM, and scores of other vendors. Two years after its introduction, the original II gave way to the IIcx and the IIci, two highly popular Macs that were smaller than the II yet were faster, cheaper, and had enough expansion options for most users. These Macs redefined the business user’s Mac and remained essentially unchanged for the next four years—an eternity in the computer business.

Now it’s time to bid adieu to the Mac II line. The availability of the fast Motorola 68040 processors, the demand for better video-display performance, and perhaps most important, the expectation for much lower prices caused by the success of Windows-equipped, 80486-based DOS PCs gave Apple the impetus to redefine its midrange Mac line. The result is the Macintosh Centris line, which includes the Centris 650, a successor to the IIci in form and to the Quadra 700 in function; the Centris 610, a successor to the IIci; and the IIvx, the 68030-based Mac released last fall that defines the Centris line’s low end. The Centris 610 and 650 put the 040 processor squarely in the Mac mainstream.

By Galen Gruman
The Centris Macs are not just II's in new cases. Apple designed the systems from logic board on up to take advantage of highly integrated circuits that let Apple add greater functionality while greatly reducing manufacturing costs. Nothing underscores this twin benefit more than the fact that you can now buy an 040-based Mac system—including monitor, mouse, and keyboard—for a list price of about $2500. Yes, $2500 for a system that runs 1.5 times as fast as a IIci.

That low price signals Apple’s intent to compete for the large business market in price, not just in features. The prices for all the new Macs show that Apple is serious about competing with inexpensive Windows PCs. And this new lower-price strategy has affected the existing Macs. For example, the Ilvcs announced just six months ago now costs a third less—$1000—than when it was introduced.

**Centris 650: New Business Standard**

The Power User’s Business Mac is the Centris 650. It packs a processor with the power of a Quadra 900 in an Ilvc’s case, which means you get the benefits of both high performance and expandability, for boards as well as storage devices. And it does so for the same price as a Ilci. (Because the Centris 630 uses the Ilvc’s case, Ilvc owners can upgrade their systems to a Centris 650 by replacing the logic board.)

**Processor**

The Centris 650 boasts a 25MHz 68040 processor—that’s the same processor found in the Quadra 700. One version of the Centris 650—the base model that comes with 4MB of system memory and an 80MB hard drive—uses a variant of the 040 called the 68LC040, which has the 040’s built-in math coprocessor disabled. Most people won’t miss the math coprocessor, since it is used mainly by scientific, computer-aided design, modeling, rendering, and some very high-end graphics programs. These are the very application areas that Apple is targeting with the Quadra series. Contrary to what you might think, spreadsheet recalcualations rarely benefit from a coprocessor unless they are using specialized math functions (particularly trigonometric ones like sine and cosine).

If you need a math coprocessor, you can buy any other Centris 650 configured with more RAM or storage or you can later have a dealer replace the 68LC040 with a full 68040. Replacing the processor later is a fairly expensive proposition—a 25MHz 040 costs about $450, if you can find one—so it’s best to decide up front whether you want a math coprocessor.

**System Memory**

The Centris will be sold in two base configurations, one with 4MB of RAM soldered on the logic board, the other with 8MB. The Centris supports 4MB, 8MB, 16MB, and 32MB SIMMs—its memory controller circuitry does not support the smaller—capacity (1MB, 512K, or 256K) SIMMs that previous Macintoshes support. With prices for 4MB SIMMs running about $100 to $150, this limitation hurts only companies or people who have a stock of 1MB SIMMs on hand.

Using 32MB SIMMs gives the Centris 650 a maximum RAM capacity of 132MB if there are 4MB of RAM on the logic board, and 136MB capacity if there are 8MB on the logic board. Bear in mind that the 32MB SIMMs are not yet common in Macintosh configurations. But that should change fairly soon, since versions are already available for Sun Unix workstations and Compaq Desktops DOS PCs (Compaq uses its own type of SIMM, not the standard DOS SIMM). At press time, a 32MB SIMM costs about $2000, or roughly twice as much per megabyte as a 4MB SIMM.

The Centris 650 uses standard 72-pin DOS SIMMs, as well as 72-pin Mac SIMMs—not the same SIMMs used in a Ilci or in other Macs. The difference between the DOS and Mac 72-pin SIMMs is that those in DOS PCs (as well as many Unix workstations) have an extra chip that handles error correction, in addition to the chips used for the memory itself. Apple decided it wanted its users to be able to exchange memory freely with DOS machines, since this makes it easier for businesses to integrate the Mac into their computing stable. But don’t expect this broad SIMM compatibility to automatically mean cheaper RAM—in comparing SIMM prices, Macworld found that Mac and DOS SIMMs cost about the same, although some dealers charge more for Mac SIMMs than DOS SIMMs while others do just the opposite. Whether you get the 72-pin SIMMs as DOS or Mac SIMMs, they should be 80-nanosecond RAM.

Perhaps the most subtle yet substantial innovation in the Centris 630 is its new memory architecture, which lets the Centris recognize memory of any capacity in any SIMM slot. You no longer need to worry about rules for placing memory. There’s no longer any difference between a slot and a bank—a bank has just one slot, so a slot is a bank. That means you can fill one, two, three, or four banks by adding one, two, three, or four SIMMs—the Centris uses whatever RAM it finds. Also, you need no longer worry about whether the capacity of the SIMM used in one slot matches that of the SIMM in the neighboring slot—the Centris doesn’t care. For example, when you add SIMMs

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**Designed for the Long Term**

It looks like Apple designed the Centris line with the same longevity in mind as the Mac II line enjoyed. Instead of breaking existing logic boards, Apple engineers developed a set of components—buses, specialized chips, and memory circuitry—for use in several Macs. Then the company decided which of the components would go in each Mac.

By using one design for a whole product line Apple saves money while still providing extra oomph for the higher-end Macs. Thus, the Centris 610 and 650 share many of the components of the new Quadra 800, since they were developed in coordination. (In fact, they all shared the same code name: Wombat.) This coordinated approach should let Apple quickly develop new models to compete with the increasing sophistication of DOS and Windows PCs and Unix workstations.

For the near term, that is likely to mean advances in built-in circuitry, whether it be for memory, video, Ethernet, or sound. A trend for both Macs and PCs is to optimize the performance of subsystems like these rather than rely solely on the processor.

In the new Macs, the interleaved memory is one example of such optimization. Another is the continued miniaturization and combination of the specialized circuits, called ASICs (application-specific integrated circuits). For example, in the Centris Macs and Quadra 800, the ASICs that control memory have been consolidated into one ASIC, thereby speeding memory processing because information is being exchanged within one component rather than among three components as in earlier models. Another example is the reduction in number of SIMM slots. Instead of designing and manufacturing 8 or 12 slots and their accompanying circuitry, Apple saved costs by having just 4 slots. The fact that the 4MB SIMMs this strategy requires are plentiful and cheap means that Apple’s cost savings won’t be an added cost for buyers.
to a Mac IIC, which has four slots in each of two banks, you must fill all four slots with SIMMs of the same capacity. Plus, if you use different-capacity SIMMs in the two banks, you must put the higher-capacity SIMM in Bank B if you use the IIC’s built-in video. So to get an extra 12MB, you have to add two 2MB SIMMs in Bank B and four 1MB SIMMs in Bank A. With the Centris 650, you can get an extra 12MB by adding an 8MB SIMM in one slot and a 4MB SIMM in another, or by adding a 4MB SIMM to each of the three slots.

Another innovation, called memory interleaving, offers some speed improvements. If you put SIMMs of the same capacity in neighboring slots, the Centris 650’s memory circuitry interleaves the two SIMMs. Interleaving means that the processor can communicate in parallel with the two SIMMs (as if they were one large SIMM). This lets the processor communicate in burst mode, in which it sends a lot of data at once. The new Quadra 800 also uses this interleaved RAM technique (see “Quadra 800,” in this issue).

Practically, this means the processor has enough flexibility in how it places data and instructions in memory to boost speed by 10 percent in some cases. In spot testing, Macworld Lab found no performance gain with memory interleaving, even for programs like Photoshop that do massive calculations in memory. Expect to see speedup in only a few programs—those that consistently work on a lot of data in memory.

**Expansion Options**

**The Centris 650 Offers Three NuBus Slots and One Processor Direct Slot** (the same slot as used in the Quadras). That’s the same number of NuBus slots as in the Mac IIC. The PDS is located behind the NuBus slot, so you can’t use those two slots simultaneously with standard boards because a board placed in one slot covers the other slot.

The Centris 650 has the full complement of standard Mac ports: two serial, two ADB, and one SCSI. That SCSI port is a high-speed port, which faster hard drives can take advantage of to transfer data more quickly. And like the IICx, the Centris 650 includes mono sound-in and stereo sound-out ports.

If you want to add Ethernet to the base model (with 4MB of memory and an 80MB hard drive) you must buy an Ethernet NuBus board or external Ethernet box. All other configurations come with Ethernet built in.

**Storage Options**

**Because the Centris 650 Uses the Same Case as the IICx, it has an Internal 5½-inch Drive Bay that can hold a CD ROM drive, SyQuest drive, tape drive, or other removable storage device. This internal bay reduces desktop clutter.**

As part of its push to make multimedia a standard part of business computing, Apple is selling a CD bundle that includes a microphone, the AppleCD 3001 high-speed CD ROM drive, and a CD that has System 7 installed. You can restart from the CD and reinstall the System in case you ever damage the hard drive. The start-up CD has a version of the At Ease interface program (which the Performa consumer series of Macs includes to aid new users) to make System 7 reinstallation a snap. The Centris’s ability to restart from a CD ROM is due to an addition to the logic board’s circuitry (the Centris 610 and Quadra 800 also have this ability). The CD ROM bundle—8MB of RAM, 1MB of video RAM, a microphone, and the Apple CD ROM drive—will have a list price of $3999, or about $400 more than the cost of a Centris 650 system without it.

The Centris 650 comes with a choice of three capacities for its internal hard drive: 80MB, 230MB, and 500MB. Recognizing that modern system software, applications, and multimedia data files all take gobs of disk space, Apple now offers large-capacity hard drives like the 500MB option for the Centris line and the 1-giga-byte option for the new Quadra 800. (Until now, Apple’s highest-capacity hard drive had been a 400MB drive available only on the high-end Quadas; Apple’s configurations for the midrange Macs...
were limited to hard drives of 230MB.)
The Centris also comes with the standard 1.44MB SuperDrive.
To power all these devices, the Centris 650 has a 112-watt power supply; by comparison, the IIfx also uses a 112w supply, while the Quadra 950 uses a 300w supply. Apple designed the Centris so that each slot gets as much power as it needs, up to the amount of power available. Apple says each NuBus slot can power a 15w board without difficulty. A typical accelerator or 24-bit video-display board uses between 8w and 12w.

Video Support
THE BUILT-IN VIDEO CIRCUITRY HANDLES all standard Apple monitors (12-inch, 14-inch, 15-inch portrait, 16-inch, and 21-inch) and 19-inch monitors. The base Centris 650 model comes with 512K of video RAM, which supports 8-bit color depth (256 colors) on monitors as large as 16 inches. Expanding the VRAM to 1MB gives you 16-bit color depth (32,768 colors) on these same monitors and 8-bit color depth on 19-inch and 21-inch monitors.

The built-in video also supports “typical” VGA monitors found on DOS PCs. Typical here means that the Apple video circuitry handles the common video timings used by most VGA monitors, but the circuitry is not compatible with the Video Electronics Standards Association’s Super VGA standards, so not all Super VGA monitors—especially those with high refresh rates—work with the Centris 650. Still, you can drive most VGA and Super VGA monitors—certainly any that have multisynching capability—at 8-bit color, at the standard 640-by-800-pixel (14-inch monitor size) and 800-by-600-pixel (16-inch monitor size) resolutions. You can also drive monitors that follow the Super-Mac timing for 1024-by-768-pixel (19-inch monitor size) resolutions; most multisync monitors can lock on to that signal. If you use a VGA or Super VGA monitor, you need a Mac-to-VGA adapter, and you need a different one for each resolution because of how the Mac senses a monitor’s resolution.

Performance
MACWORLD LAB TESTS SHOW THAT THE Centris 650 has more than twice the overall performance of the former Mac business standards, the IIfx and the IIfx (see “Centris 610 and 650 Performance”). The Centris 650 fared best in math and basic processing, thanks to the 040 processor used. For tasks involving peripherals like video and storage, the Centris 650 was between 1.5 and 2 times as fast as the IIfx and IIfx. It also edged out the Quadra 700 and IIfx in all tests.

Price
WHAT DOES ALL THIS COST? NOT MUCH, especially by Apple standards. Apple will offer several configurations of the Centris 650. “What a Centris Costs” shows the prices and specifications for each setup. The base model—which comes with 4MB of RAM, 512K of VRAM, and an 80MB hard drive—will have a list price of $2699. The standard keyboard and a 14-inch color monitor together cost about another $750.

Street prices should be about 20 percent lower than list prices. That means a typical Centris 650 business configuration—one with 8MB of RAM, 512K of VRAM, a built-in math coprocessor, and an 80MB hard drive, as well as a keyboard and 14-inch monitor—will have a street price of about $3500. Compared with a similarly configured 80486-based Windows system, that’s about an $800 premium for the benefits of Apple’s integrated hardware, software, and interface. Another way to look at it is that you can now get the equivalent of a Quadra 700 for what the former business-line Macs—a IIfx or IIfx—cost just a few months ago.

Inside the Centris 610
Who Offers 7-Inch Boards?

The Centris 610 accepts only NuBus and Processor Direct Slot boards that are 7 inches long. Most boards are longer than that (up to 12 inches), accommodating Macs previously designed with longer slots. The 7-inch limit is part of a NuBus standard expected to be approved this spring, and Apple has advised developers to stay within that limit. Regardless of Apple’s urging, most vendors do not have boards that fit in a Centris 610. Even most of Apple’s own boards do not fit into the smaller slot. Centris 610 owners who want to expand the Mac will be restricted in their purchasing options.

Macworld surveyed 40 vendors in four board categories—Ethernet, 24-bit video display, video capture, and accelerator—to see what boards fit into a 7-inch slot. We found that 7-inch boards are available in only one category: Ethernet. The 7-inch Ethernet NuBus boards available at press time were the following:

- Apple Ethernet NuBus Board, Apple Computer (408/996-1010)
- E6020, Cabletron Systems (603/332-9400)
- EtherPort 2 and EtherPort 2T, Eagle Technologies (800/733-2453)
- FastNet Three, Dove Computer Corporation (919/763-7918)
- GatorCard/1, Cayman Systems (617/494-1999)
- GeoLink Card series, Chesapeake Systems (301/583-7717)
- PhoneNet Card and PhoneNet StarController EN, Farallon Computing (510/814-5000)
- Sonic Ethernet boards, Sonic Systems (408/736-1900)

Asante Technologies, Dayna Communications, E-Machines, and Newer Technology all have plans to offer 7-inch boards later this year.

Centris 610: A Slim-Line 040

ALTHOUGH IT PACKS A LOT OF POWER for a good price, a Centris 650 may be too expensive for many people. After all, systems that cost between $1500 and $2500 make up the majority of computer sales—these prices are lower than the expected street price of even the least-expensive Centris 650 configuration.

That’s where the slim-line Centris 610 comes in. It looks like a 65i but shares many of the features of the larger and more powerful Centris 650. And the street price for a basic Centris 610 system is expected to start around $2000, which makes it extremely attractive to small businesses and home users.

Basic Features

THE CENTRIS 610 USES THE SAME 68LC040 processor found in the base model of the Centris 650, in which the math coprocessor is disabled. The logic board has 4MB of RAM soldered on it, and can accept 4MB, 8MB, 16MB, and 32MB SIMMs.

There are the standard one SCSI, two ADB, and two serial ports, as well as mono sound-in and stereo sound-out ports. A microphone is not included. The built-in video circuitry comes with 512K of VRAM, enough to drive 16-inch and smaller monitors at 8-bit color depth; the VRAM is expandable to 1MB to handle these same monitors at 16-bit color depth. Ethernet is built in, except on the base 4/80 model. For that model you can add an Ethernet board or external SCSI box later.

There is a 5¼-inch drive bay for a removable storage device, like a CD ROM or SyQuest drive. The 610 also has room for an internal hard drive. You can purchase a 610 from Apple with an 80MB or 230MB internal hard drive. And there is a CD bundle like that for the Centris 650; the S2959 bundle includes 8MB of RAM, 1MB of VRAM, a 230MB hard drive, a microphone, and the AppleCD 300i CD ROM drive.

Proces sor

THE CENTRIS 610 USES THE SLOWER 20MHz 68LC040 chip (the 650’s processor runs at 25MHz). Unlike with the 650, there is no option to get configurations with a full 68040 (which includes a math coprocessor) or to replace the 68LC040 with a full 68040.

Apple says it is unlikely that many third-party developers will offer a replacement processor with a math coprocessor because the extra heat generated would require a heat sink, and there is little room for such a device in the Centris 610’s case. People who need a math coprocessor are also likely to need a faster processor and more expansion options than a slim-line Mac provides, so this limitation doesn’t affect the 610’s intended users.

System Memory

ANOTHER SIGNIFICANT DIFFERENCE IS the maximum RAM capacity: the Centris 610 supports 68MB compared with the 650’s 136MB. This difference is due to the fewer SIMM slots on the 610—two, versus the 650’s four—as well as to the fact that the 610 comes with 4MB soldered on the logic board, not a choice of 4MB or 8MB as in the Centris 650. Also, the Centris 610’s memory is not interleaved, so it’s less efficient in transferring data—and thus a little slower—than the 650’s memory for some applications.

NuBus Limits

THE MAJOR DIFFERENCE BETWEEN THE two Centris Macs based on size is the lack of a NuBus slot in the Centris 610. Through an optional $99 adapter that goes in the 610’s expansion slot, you can add a NuBus slot that accepts only 7-inch boards. (Most boards are longer.) This 7-inch limitation is particularly bothersome for owners of NuBus boards, which are a popular way to add functionality. Many vendors do not offer 7-inch boards (see “Who Offers 7-Inch Boards?”).

Because the 7-inch size is part of the revised NuBus standard that has been in the works for two years (and is expected to be adopted this spring) by the Institute of Electrical and Electronics Engineers (IEEE), a standards-making body, Apple claims that vendors bear the responsibilit-

WHAT A CENTRIS COSTS

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1 Apple's expected list prices, including SuperDrive and mouse. 2 Apple CD bundle (AppleCD 300i CD ROM drive and microphone). 3 = Ethernet; M = math coprocessor.
ty for keeping their boards within that size. However, third-party vendors have long designed their NuBus boards based on the more spacious earlier Mac designs.

Apple claims that the 7-inch NuBus limitation should not be a problem because users won't need NuBus options like video-display boards, since such common functions are built into the Centris 610. That's not true. If you want 24-bit display (16.7 million colors), you need a board, since the built-in video supports only 16-bit display. You also need a board if you want to do video capture. If such options make sense (and they do) for the Macs, they certainly make sense for the low-end Macs as well.

Not surprisingly, the Centris 650 is faster than earlier midrange Macs. And, because of improvements in its logic board design, the 650 performs better than the Quadra 700. The Centris 610 comes close to the Centris 650 and Quadra 700 in most tests. The major exception is engineering-oriented math processing, since the Centris 610 has no built-in math coprocessor. The new-ancient IIvx bears up well, particularly for processor-oriented tasks.

### Performance

As with the Centris 650, the Centris 610's 040 processor gives it fast overall performance—the 610 is about 1.6 times as fast as a IIci or IIvx. It is nearly as fast as a Quadra 700 for all tests but math processing (here, it was slower than all other midrange Macs tested but the IIci). That's not surprising, since the Centris 610 has no math coprocessor. Unless you are using scientific, rendering, or CAD programs that need trigonometric and related math functions, you'll find the Centris 610 to be a fast business machine.

### Price

Like the Centris 650, the 610 comes in a range of configurations, which are detailed in "What a Centris Costs." A base-configuration Centris 610 system—plus a 14-inch color monitor and standard keyboard—should have a list price of about $2,500.

Although Apple is deterministically comparing the Centris 610's price with similarly equipped Windows-based 486 PCs, a direct comparison is difficult because the few slim-line PCs available offer four to eight standard expansion slots (obviously, they're not as slim as the Centris 610). A similarly powered, full-size Windows PC can cost as much as $1,000 (list price) less than a Centris 610.

A more relevant comparison is between the Centris 610 and the IIvx. The prices are comparable for similarly equipped models—the choice you must make between these two Macs is processing power (in the Centris 610) and expandability (in the IIvx).

### ILvx: Entry-Level Office Mac

Although Centris is not part of its name, the IIvx is part of the Centris midrange line. Why the name difference? Apple lawyers were unable to complete the trademark check for the Centris name before the IIvx was released four months ago (see "The Macintosh IIvx," Macworld, December 1992). Apple says it will not rename the IIvx.

The only 68030-based computer in the revamped midrange Mac lineup, the IIvx offers computing power similar to that of the IIci, the former business stan-
standard for Macintosh users. While the IIfx's horsepower was once considered enough for a business power user, the increasingly complex and slow word processors and spreadsheets of the day, not to mention System 7, have eaten away at that power. Today, the 32MHz 68030-based IIfx—even with its 32K cache—is at the low end of business computing, no longer the high end. But its processing power is more than adequate for many business tasks like word processing and basic spreadsheet use.

Indeed, people with that basic level of work need, may find that the lower-priced, lower-speed, and less-expandable LC and new LC III also suit their purposes (see "LC III," in this issue). These users probably don't need the expansion options the IIfx provides, and their businesses will be attracted by the LCs' low prices. The LCs are fine business machines—they didn't become the best-selling Macs for no reason.

Because of the new Centris Macs and LC III, Apple has dramatically lowered the price of the IIfx since its introduction. The basic IIfx model—with 4MB of RAM, 512K of VRAM, and an 80MB hard drive—that then had a list price of $2949 now lists for $1899.

Which Is Right for You?

For the long term, you can count on a spate of new models every year with more power and more capabilities. But if you're buying now, what do you choose?

Clearly, the Centris 650 is the business Mac of choice for anyone doing intensive business work, such as newsletter publishers, financial modelers (and others who work with complex spreadsheets and databases), graphic artists, multimedia developers, and documentation specialists.

The case for the Centris 610 is less clear. The NuBus limitation seems to clash with the processing power offered by its 20MHz LC040 and built-in multimedia support. If you have that kind of processing power, you'll probably want the Centris 650's expansion options at some point, especially if you buy into Apple's vision of QuickTime as the next desktop publishing, a computing-intensive creative tool that migrates from the few to the many. As a machine for running multimedia presentations or as an inexpensive business machine for people doing black-and-white publishing or moderate financial modeling, the Centris 610 makes sense.

But for the bulk of business users—the administrative assistants and secretaries and report writers—the LC II, LC III, and IIfx make more economic sense while also providing fine performance. The LCs provide the lowest cost overall and the IIfx the lowest cost for an expandable business Mac. If you use just Microsoft Word, WordPerfect, Microsoft Excel, or Lotus 1-2-3 all day, these are the business Macs for you.

Each midrange Mac was designed for a different type of user, offering a clear trade-off between function and price. There's no reason that everyone in your company should use the same model—there's a good option for everyone. The Centris line delivers that.

Macworld Lab testing supervised by MARK HURLOW and TIM WARNER.
The new high-end Mac performs like a Quadra 950 at a lower cost

With each new product introduction, Apple's Macintoshs get smaller, cheaper, and faster. The Quadra 800 is no exception. The Quadra 800 runs about as fast as the top-of-the-line Quadra 950 but comes in a more compact case. And, in some ways, the Quadra 800 offers more expandability than the Quadra 950. Apple's latest Quadra will be the mainstream choice for high-performance computation.

APPLE'S QUADRA 800 DELIVERS STRONG performance at a nice price. It's the kind of machine that color desktop publishers, product designers, video editors, multimedia authors, and others who are pushing the desktop computing limits have needed but often couldn't afford.

The Quadra 800 uses a 33MHz 68040 running on a 33MHz system bus, just like a Quadra 950. The Quadra 700, by contrast, has a 25MHz 040 and a 25MHz bus. The Quadra 700 also has a slower I/O bus. On the Quadra 800, all of the input/output is directly connected to the system bus to make input/output faster. Because the Quadra's processor is a full 68040, there's a math coprocessor and the instruction and data caches are built in.

Not Just a 700 Replacement

IF YOU STROLLED BY ONE, YOU COULD easily mistake a Quadra 800 for a Quadra 700. They're roughly the same size (the 800 is about 2 inches larger along each dimension), and you might not notice at first the sculpted curve that marks the Quadra 800 as a current-generation Mac. But this first appearance is deceiving, because inside, the Quadra 800 is a more powerful computer. In fact, it's about as powerful on paper as the Quadra 900 that was discontinued last year, and Macworld Lab tests show that it is about 15 percent faster than the 900 and—surprise—about
8 percent faster than the 950. Compared with the Quadra 700, the 800 is 33 percent faster overall. And the Quadra 800 is nearly 200 percent faster than a IIci or IIfx. There’s no single reason for the 800’s better performance—Macworld Lab tests show that the Quadra 800 does better both in raw processing and in working with peripherals like video and storage.

Although the Quadra 800 is positioned to replace the 700, the 800 is more appropriately an alternative to the Quadra 950. At 1767 cubic inches and 25 pounds, the 800 is a midsize tower when compared with the Quadra 950’s 3410 cubic inches and 37 pounds. (The slim Quadra 700 comes in at 942 cubic inches and 13 pounds.) Consider what the Quadra 800 offers and you’ll see why it’s likely to be the high-end Mac of choice. The real Quadra 700 replacement is the new Centris 650, which was developed in tandem with the Quadra 800 (see “Centris 610 and 650,” in this issue).

**System Memory** The Quadra 800 comes with 8MB of RAM on the logic board, and you can expand the memory to 136MB by adding 32MB SIMMs in each of the 4 SIMM slots. While 32MB SIMMs are not yet easily available in the Mac market, they are appearing in other markets and should soon be available for use in the Quadras. They are likely to cost about $2000 per SIMM. If you don’t need that much RAM, the Quadra 800 can also accept 4MB, 8MB, and 16MB SIMMs. The Quadra 800’s memory circuitry doesn’t support lower-capacity SIMMs, like the 1MB SIMMs used on many earlier Macs. But with the price of 4MB SIMMs running at about $100 to $150 (compared with a 1MB SIMM’s price of about $40, or $160 for 4MB), it’s clear that the 4MB SIMMs will soon be the basic size for most RAM.

One thing that might make 32MB SIMMs available sooner rather than later is the fact that the Quadra 800 uses standard 72-pin DOS SIMMs as well as 72-pin Mac SIMMs. (These 72-pin SIMMs are not the same SIMMs that were used in earlier Macs; only the Quadra 800, the Centris 610 and 650, and the LC III support this RAM type.) DOS SIMMs have an extra chip to handle error correction—though most modern PCs no longer need it—to be backwardly compatible with earlier PCs. This means that Macintosh users can easily share SIMMs with their DOS and Unix workstation colleagues. Because DOS and Mac SIMMs are roughly the same price, expect no savings—or added expense—from this new compatibility.

Whatever your source of SIMMs, make sure you buy 70-nanosecond memory for the Quadra 800—that’s faster memory than the 80ns RAM required for the Quadra 950. (Changes to the memory system’s design make faster RAM necessary to run at peak speed.) The faster RAM is one reason the Quadra 800 outperforms the 950.

The Quadra 800 shares the same memory architecture as the Centris 650, which means that the 800 offers two benefits over earlier Quadras. One benefit is
that you need no longer worry about memory-placement rules. You can put any capacity SIMM into any slot, and you need no longer fill more than one slot at a time—fill as few or as many slots as you wish with any supported SIMMs you have. Gone are rules like how many slots must be filled to make a bank and what capacity SIMMs must go in which bank.

The other benefit is that, through a trick called interleaving, the Quadra 800’s processor can access RAM about 10 percent faster in some cases. This happens if you have two SIMMs of the same capacity in neighboring slots; the memory circuitry, in effect, combines the two SIMMs, writing data simultaneously to both, which lets the processor deal with larger chunks of data in the same period of time than it could handle without interleaving. Keep in mind that the performance gain of memory interleaving will not happen with everyday programs, they don’t use memory in large chunks consistently enough for the memory-interleaving advantages to come into play.

Expansion Options The Quadra 800 offers three NuBus slots and a Processor Direct Slot, or PDS (which accepts standard Quadra PDS boards). That’s one more NuBus slot than the Quadra 700 offers and two less than the 950 offers. As in other Macs, the PDS is behind a NuBus slot, so these two slots can’t be used simultaneously because a board in one slot covers up the other. There are also the standard two serial ports, two ADB ports, and one SCSI port, plus a mono sound-in and stereo sound-out ports using the same stereo circuitry that’s found in the Quadra 950. The addition of raised plastic icons on the side of the tower’s case to help you more easily find the board’s connectors is a nice touch.

The Quadra 800 drops the dual SCSI-port implementation that the Quadra 900 and 950 offered. The Quadra 900 and 950 have one high-speed internal SCSI port and one high-speed external SCSI port. (The total number of SCSI devices is still limited to seven.) This gives those Quadras the ability to take advantage of some kinds of fast hard drives to gain very fast data transfer. One way to take advantage of this is to connect one drive to the internal SCSI port and a second drive to the external SCSI port. In this configuration, data can be written to and read from both drives practically simultaneously, making overall data transfer faster. But few vendors take advantage of this; most vendors offering these types of RAID (redundant array of independent drives) systems provide their own hard drive controller—one that transfers data even faster than the Quadra. The fact that Apple dropped dual SCSI ports in the Quadra 800 acknowledges that their advantages were minimal for most users, and the cost of implementing the dual ports was more than it was worth.

Apple includes Ethernet on the Quadra 800’s logic board for all configurations sold in the U.S. Elsewhere, Ethernet may be optional or require an add-on board or SCSI box.

To power all these expansion options as well as internal drives, the Quadra 800 comes with a 200-watt power supply, which should be adequate. The 950 has a 300w supply, which is an advantage if you simultaneously use an assortment of power-consuming options, like very-high-capacity drives, combination video-display and video-capture boards, and multiprocessing boards. The Quadra 700 has a small, 95w power supply. Like the new Centris Macs, the Quadra 800 does not allocate a fixed amount of power to each NuBus slot; instead, it sends as much as each device needs, up to the total amount of power available for NuBus.

Apple says it tested boards that draw as much as 15w without difficulty. A typical accelerator or 24-bit video-display board uses between 8w and 12w.

Storage Options With the Quadra 800, Apple is also introducing two high-capacity, high-speed drive options—500MB and 1GB—that are perfect for the byte-hungry database, video, audio, and image files Quadra users typically work with. The standard configuration for the Quadra 800 is a 230MB drive, which is larger than the standard 80MB and 160MB drives shipped with the original Quadra 700 and 950, respectively. (The 230MB drive is now the basic configuration for the Quadra 950, although Apple also sells a configuration with no internal drive.)

One of the most useful features of the Quadra 800 is the accessibility of its internal drives. The 800 has bays for four drives, and three of them have removable front panels, so you can use them for removable media like CD ROM, tape, SyQuest, and floppy drives. That’s a lot more accessibility than the earlier Quadras offer: the 950 has two accessible bays and the 700 has none.

The Quadra 800’s top bay holds a half-height 5¼-inch drive, such as a CD ROM, SyQuest, or optical drive. The two bays below each hold a half-height 3½-inch drive, like a SuperDrive, some optical drives, or a low-capacity tape drive. The fourth bay, which is not accessible from the front panel, holds one full-height or two half-height drives. (The 230MB and 500MB hard drives are half-height drives, while the new 1GB drive is a full-height drive.) The inaccessible bay is meant to hold a hard drive; the Quadra 800 comes with options for a 230MB, 500MB, or 1GB drive. You could also put another vendor’s drive in the bay.

With the three accessible bays that hold one drive each and the one inaccessible bay that can hold up to two drives, the Quadra 800’s top bay holds a half-height 5¼-inch drive, such as a CD ROM, SyQuest, or optical drive. The two bays below each hold a half-height 3½-inch drive, like a SuperDrive, some optical drives, or a low-capacity tape drive. The fourth bay, which is not accessible from the front panel, holds one full-height or two half-height drives. (The 230MB and 500MB hard drives are half-height drives, while the new 1GB drive is a full-height drive.)

**QUADRA PRICE COMPARISON**

<table>
<thead>
<tr>
<th>Model</th>
<th>List Price</th>
<th>RAM</th>
<th>VRAM</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
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<td>8MB</td>
<td>512K</td>
<td>230MB</td>
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<td>24MB</td>
<td>1MB</td>
<td>1GB</td>
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</tbody>
</table>

Prices are Apple’s expected list prices at the Quadra 800’s product introduction. Dealers may offer other configurations. All configurations include Ethernet, a SuperDrive, and a mouse.

Back Panel Up Close The back panel of the Quadra 800.

**Video port**

**SCSI port**

**Ethernet port**

**Serial ports**

**ADB ports**

**Sound ports**

**Covers for NuBus boards’ connectors**
you might think you could install five drives in a Quadra 800. You can't, since there are only four SCSI connectors inside the Quadra. Still, the setup of the Quadra 800's four bays gives you great flexibility in what kinds of drives you can install—it's well thought out.

The Quadra 800's maximum capacity of four internal devices compares favorably with both the Quadra 700's two and the 950's four (see "Macintosh Quadras Compared"). The chief differences are that the 700's drives have to be slim, since the 700 supports only third-height 3½-inch devices, while the Quadra 950 supports four 5¼-inch half-height devices (compared with the 800's one) and—unless you build a mounting bracket—no 3½-inch half-height drive (compared with the 800's three). The 800 is clearly more capacious when compared with the 700, but not so clearly when compared with the 950. The difference is the type of drive supported—if you need multiple 5¼-inch internal devices, the 950 is the only choice. Otherwise, it's a toss-up.

As it does for the new Centris Macs, Apple offers a CD bundle that includes an Apple CD 300i CD ROM drive and a CD with System 7.1. This adds about $400 to the price. You can restart the Mac and reinstall the System onto the hard drive from the CD should the drive ever fail.

Apple has enhanced how SCSI termination works for internal devices in the Quadra 800. First, a refresher on SCSI: each end of a SCSI chain must be terminated. One end of the chain is the internal hard drive, which usually has its own termination built in. The other end is the last external SCSI device. The Quadras support multiple drives internally, so the SCSI chain starts inside the Mac. The same rules apply: the first drive on the internal part of the chain (the one at the end of the SCSI ribbon) must be terminated, while the others should not be. If there are no external SCSI devices, you should not terminate the last SCSI device, which block the SCSI connection between the logic board and the internal SCSI device.

The Quadra 800 supports DOS VGA and Super VGA monitors at common video resolutions, moving video data from the processor to the VRAM in 16-byte chunks rather than in 4-byte chunks. That should particularly speed up vertical scrolling and solid fills. Apple says, because those operations tend to result in more raw data being generated than other common display-altering operations, like changing typefaces or inserting text.

Like the new Centris 610 and 650, the Quadra 800 supports DOS VGA and Super VGA monitors at common video resolutions, moving video data from the processor to the VRAM in 16-byte chunks rather than in 4-byte chunks. That should particularly speed up vertical scrolling and solid fills. Apple says, because those operations tend to result in more raw data being generated than other common display-altering operations, like changing typefaces or inserting text.

Price For a workstation-level Macintosh, the Quadra 800 is surprisingly inexpensive. The base configuration—$230 of RAM, 512K of VRAM, and a 230MB hard drive—has a list price of $4976. The midrange configuration—with 512K of VRAM and a 500MB hard drive—costs $5429, while the high-end configuration—24MB of RAM, 1MB of VRAM, and a 1GB hard drive—costs $7199. (For all configurations, the monitor and keyboard are extra at the newly redesigned Apple mouse is included.)

Because of the Quadra 800's aggressive pricing, Apple plans to lower the...
price of the 950 considerably—by more than $1000 for each configuration when compared with the list prices in effect as we went to press. After the new Quadra 950 prices take effect, the 8/230 model will list for $6099, the 8/500 model for $6849, and the 16/1GB model for $8149. At press time, Apple had no plans to lower the Quadra 700’s prices. To put these prices in perspective, the Quadra 800 will cost about the same as a comparably configured Quadra 700 and $1500 less than a comparably configured Quadra 950.

More Integration

TO PACK THE QUADRA 950’S LEVEL OF performance into the 800’s smaller box, Apple greatly miniaturized and consolidated the 800’s logic-board components. Apple engineers took ten special circuits called ASICs (application-specific integrated circuits) and combined many of their functions. The result is a set of three ASICs that do what ten used to do. (The three ASICs handle memory [both system and video RAM], input/output management, and NuBus.)

This miniaturization is really obvious if you put a Quadra 800’s logic board next to a 700’s. The boards are the same size, and the Quadra 800 offers more power, so you might expect the 800’s board to be cluttered with components. You’d be wrong. The 800 looks empty by comparison. All that empty space used to be occupied by circuitry; now that circuitry has been miniaturized or consolidated.

Miniaturization and consolidation do more than free up logic-board space—they let computer designers create more-efficient systems. For example, the integration of all the memory functions on one ASIC lets the memory on the Quadra 800 operate faster than on previous Quads because there is no slowdown as various components exchange informa-

### MACINTOSH QUADRAS COMPARED

<table>
<thead>
<tr>
<th>Model</th>
<th>List Price (base model)</th>
<th>RAM/HD capacity (base model)</th>
<th>Processor</th>
<th>Processor speed</th>
<th>Math coprocessor</th>
<th>Max RAM</th>
<th>Max VRAM</th>
<th>Number of NuBus slots</th>
<th>Number of Processor Direct Slots</th>
<th>Hard drive capacities</th>
<th>Ethernet</th>
<th>Total external bays</th>
<th>Accessible 5/8-inch bays</th>
<th>Accessible 3/8-inch bays</th>
<th>Accessible 3½-inch bays</th>
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</thead>
<tbody>
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<td>included</td>
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</tbody>
</table>

* All configurations other than the base model use a regular 68040, which has a built-in math coprocessor, and include Ethernet.

### Quadra 800 Performance

<table>
<thead>
<tr>
<th>Processor Tasks</th>
<th>Drive-Access Tasks</th>
<th>Display Tasks</th>
<th>Math Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>We ran several tests that show how the different processors perform. Our tests included adding and subtracting numbers and finding a word, which depend mainly on the speed of the processor.</td>
<td>We ran several tests that show how well each Mac performs on tasks that rely heavily on the hard drive. Our tests included opening and saving files, which require the processor to work with the hard drive.</td>
<td>We ran several tests that show how well each Mac performs on tasks that rely heavily on the speed of screen redraw. Our tests included scrolling, which requires the processor to work with the display circuitry.</td>
<td>We ran several tests that show how quickly math coprocessors of various speeds perform. Our tests included recalculations that involve scientific functions, which depend heavily on a math coprocessor.</td>
</tr>
</tbody>
</table>

The Quadra 800 outperforms the Quadra 700 by a wide margin in all of our tests. Even more significantly, the Quadra 800 outruns the high-end Quadra 950 in most individual tests, although not by much.

**Comparison of the Quads**

DESPITE THE ADVANCES IN THE QUADRA 800, the Quadra 950 retains the mantle of most-powerful Mac, thanks to the 950's faster SCSI and Processor Direct Slot (which lets some drives and add-in boards perform faster), as well as to its greater number of NuBus slots (five versus three). But in terms of computation ability, the Quadra 800 and Quadra 950 are about evenly matched.

In some ways, however, the Quadra 800 offers more than the 950 does: memory can be expanded to 136MB (compared with 64MB in the 950), three drive bays are accessible from the front panel (compared with two in the 950), and it supports restart from the AppleCD 300i CD ROM drive (the 950 doesn’t). These considerations, plus aggressive pricing, make the Quadra 800 the mainstream choice for high-end users.
The PowerBook 165c has 256 colors—but the view isn't always a rosy one

Color is the theme of Apple's latest product introductions. But the company has gone a bit too far, too fast in introducing a color PowerBook. The price for the PowerBook 165c is fair; and the machine has solid performance, but the passive matrix screen just isn't alluring enough to make this laptop a "must buy." I'd rather wait until an active matrix display is available (and affordable) before buying in.

BY CARY LU

WHEN MOST OF US GO TO A STORE TO buy a Mac, we walk over to inspect the Quadras and high-end PowerBooks—to dream a little—before plunking down our hard-earned money to buy a Classic, LC, or some other Macintosh that is truly affordable. At least we can get a glimpse of the future—even our own future—as the high-end Macs of today become the mainstream Macs of tomorrow.

But Apple's first color PowerBook features the technology of the recent past rather than the promise of tomorrow. The PowerBook 165c is a competent laptop computer—it has the same 68030, 33MHz CPU, and 68882 math coprocessor as the PowerBook 180, and retails for only $3399 with an 80MB hard drive and $3759 with a 160MB hard drive. Its reception will depend entirely on a single component—its color, passive matrix LCD screen, a screen technology that was introduced in DOS-based computers almost two years ago. That's passive and dim, rather than the brilliant, sharp images offered by the significantly-more-expensive active matrix color LCD screens available for some DOS laptops and as a retrofit for some PowerBooks (for the differences between passive matrix and active matrix screens, see "Crystal-Clear Presentations," Macworld, January 1993).

Apple certainly plans to offer a color PowerBook with an active matrix screen
—probably before long. The Macintosh has to remain competitive with DOS laptops, and at the Comdex computer show last November, a flood of active matrix, color DOS portables appeared, not only from the major manufacturers but also—for the first time ever—from many small Asian companies.

The PowerBook 165c lacks excitement, but it does make some marketing sense—as a cost-effective mass-market product.

Screen Problems

The PowerBook 165c's screen is the color equivalent of the gray-scale passive matrix screen in the PowerBook 160, although the 165c's screen is slightly smaller, 8.9 inches diagonally instead of 10 inches. The display shows 256 colors out of a palette of 4096 colors, sufficient to support ColorSync, Apple's method of matching screen colors with printed and scanned colors (see "Managing Color," Macworld, January 1993). Apple deemed 16-bit color unnecessarily expensive for a mainstream color product like the PowerBook 165c. In fact the 165c's standard 256K of video RAM cannot be expanded.

Passive matrix LCD screens have a variety of image defects that active matrix screens avoid. It takes time (reapause time) to change a pixel's color, so moving objects leave a ghost trail. The trail left by a cursor isn't usually a big problem, but ghosting in a QuickTime movie gives images a smudged quality. Submarining, the disappearance of the cursor during a rapid move, is controlled fairly well in the PowerBook 165c. Sharp, the Japanese maker of the screen, has gotten response time down to 400 milliseconds—pretty good for a color display, although gray-scale passive matrix displays respond in 250ms and all active matrix displays respond in under 100ms. So people accustomed to a gray-scale screen may be disappointed in this regard.

The PowerBook 165c continues a PowerBook tradition with a 640-by-400-pixel screen, 80 pixels short of the standard 640-by-480 screens used by desktop Macs and nearly all DOS laptops. The short screen might have had some justification in past years as a space-saving measure. It's now an anachronism, especially on a color display. Many multimedia titles are designed for at least a 640-by-480 screen. When necessary, all PowerBooks clip the bottom 80 pixels off full-screen 680-by-480 images.

The horizontal and vertical scanning process used by the 165c produces vertical and horizontal shadows that spread out from any large dark region or the edges of well-defined rectangular objects, such as a window frame (see "What Causes LCD Shadowing"). The shadows, most easily seen against a light background, also distort colors. To save money, Sharp built the 165c display with a single scanned panel. Designers frequently divide passive matrix displays into two independent panels to minimize shadows and improve contrast; that's why the shadowing stops in the middle of the screen on monochrome and gray-scale PowerBooks with passive matrix displays.

Under optimum lighting conditions—that is, no ambient light at all—the passive matrix screen shows its colors reasonably well. The viewing angle is surprisingly wide for a passive matrix design, but for the most part only one person at a time can look at the screen. The colors look mottled compared with colors on a standard Macintosh display because the LCD pixels do not have as smooth a brightness range. On the other hand, all LCD screens show perfect geometry, unlike CRTs, which exhibit many distortions. And LCDs are nearly free of electromagnetic emissions. In the long run—a period that may stretch into decades—LCDs will probably replace CRTs even on desktop computers.

In their current form, color LCD screens—whether passive matrix or active
The 165c tips the scales at 7 pounds, but if you want to carry enough batteries to work throughout a transcontinental flight, the 165c will weigh 10 pounds.

matrix—work somewhat less well than their monochrome and gray-scale cousins. The color filters reduce the overall brightness considerably.

To overcome the dimming effect of the color filters, Apple uses two fluorescent backlights in the PowerBook 165c; all previous PowerBooks have just one backlight. Still, the color filters render the screen unusable outdoors in daylight because the backlighting isn’t strong enough to overcome ambient light. All the monochrome PowerBooks work acceptably outdoors even without backlighting; the screens are translucent enough and the backing reflective enough to produce a usable image.

Even one backlight is a major drain on battery power, however, and the second backlight drives Apple’s estimate for battery life down to one and a half to two hours for the PowerBook 165c. Macworld Lab tests indicate that you’d be lucky to get one full hour of continuous use. By comparison, the PowerBooks 160 and 180, which use the same battery, are rated for two and a half to three hours.

To meet the additional power requirement, the 165c comes with a higher-power AC adapter, a 24-watt unit that is also compatible with and will eventually replace earlier PowerBook 100-series AC adapters. The power requirement creates the one area where the PowerBook 165c is partially or completely incompatible with earlier PowerBook accessories—power adapters and some third-party battery packs. Apple supplies a 2.9-ampere-hour nickel-cadmium (NiCad) battery pack for the 165c, replacing the 2.8Ah battery introduced with the PowerBooks 160 and 180, which replaced the 2.5Ah battery.

Memory: RAM and Disk
THE 165C HAS 4MB OF PSEUDOSTATIC RAM soldered in and accepts up to 10MB more of expansion memory for a total of 14MB, using the same expansion

Driving an External Monitor   Like the PowerBook 160 and 180, the 165c has a video-out port for driving an external monitor. The external monitor can show the same image as the 165c, or an alternate image.
boards as the 160 and 180. The same speed issues apply as well; the optimum 85-nanosecond RAM runs at full speed, the 100ns RAM sold for the PowerBooks 100, 140, 145, 160, and 170 slow the computer down about 10 percent. Check large expansion memory boards for physical compatibility with the PowerBook 165c before you buy any of them.

Apple will ship the 165c with either an 80MB or a 160MB hard drive, and the computer will accept any PowerBook-compatible 2.5-inch hard disk drive. Drives with 240MB are available today; 300MB drives should be available by fall of 1993. Hard drive performance is decent, with a transfer rate of about 1MB per second—comparable to the performance of midrange desktop Macs. (High-performance hard drives are unlikely to appear in a battery-operated computer because their higher clock speeds and faster disk rotation consume much more power.) The built-in 1.4MB floppy drive (SuperDrive) is the same as on other PowerBook models.

External Video

The 165c, like the 160 and 180, has built-in video circuits to drive a range of monitors. The video circuits, which have their own video RAM, will drive all standard Macintosh external monitors from 12-inch RGB (256 colors) to 16-inch RGB (256 colors) and full-page portrait displays (16 grays). In addition, the 165c drives common VGA (640 by 480 pixels) and SuperVGA (800 by 600 pixels) monitors sold for use with IBM PC compatibles, although only at the flicker-prone vertical refresh rates of 60Hz (VGA) and 56Hz (SuperVGA). Macintosh monitors run at their normal flicker-free refresh rates of 60Hz or higher, except for the 12-inch RGB monitor, which runs at 60Hz. The video-out circuit uses the same high-density video connector as the 160 and 180.

The external monitor can mirror (duplicate) the LCD screen, which is handy if you want to use the 165c to control a CRT or projection panel in a group presentation. In mirror mode, the external screen shows the same 640 by 400 pixels as the built-in screen; any remaining pixels on the external screen are blacked out. Or you can juxtapose the external monitor with the built-in screen; in this mode each screen shows a separate image and the main menu bar can go on either screen.

An internal modem slot accepts both the older modems designed for the PowerBooks 100, 140, 145, and 170 as well as the newer Express modems developed for the 160, the 180, and the Duos. (At press time, Apple was considering selling a version of the PowerBook 165c with 4MB of memory, a 160MB hard drive, and an Express modem for about $4000.) Other familiar connectors making a return appearance are two serial ports, an ADB port, a SCSI port, and sound-in (mono) and sound-out (stereo) ports. All of these connectors and ports are protected by a panel that you flip up in order to gain access. A microphone is built into the case between the keyboard and display.

Ergonomics

The 165c's screen (8.9-inch diagonal) is nominally smaller than the Duo's (9-inch) and appreciably smaller than a 160's (10-inch). The width of each color triad (red, green, blue) is 0.3mm, or 84.7 dpi. While the 84.7-dpi resolution contributes to a sharper-looking image, it differs enough from the resolution of a standard desktop Macintosh display (75 dpi; the PowerBook 160 is 77 dpi) that if you work with both built-in and external displays, you might have some difficulty switching back and forth. When you roll a trackball or move a mouse, you use feedback from your eyes along with your muscles to control movement; this difference in resolution can be disconcerting for precise work.

The keyboard is identical to other 100-series PowerBooks' keyboards. A two-level tilt adjustment sets the keyboard at a 5-degree or an 11-degree angle for more comfortable typing.

Mechanical Design

Internally, the 165c differs from the 160 and 180 because of the extra circuitry necessary for the color display. The earlier PowerBooks contained two circuit boards—a main logic board and piggy-back board holding the CPU, ROM, and soldered RAM. To accommodate the extra circuitry required for color, the 165c moves the ROM and soldered RAM to a second piggyback board.

Like the 160 and 180, the PowerBook 165c has molded into its case the small security slot originally designed by Kensington. A few security products connect with this slot to try to prevent computers from disappearing.

System Software

The 165c runs under System 7.1 with an extension (which Apple calls a system enabler) that invokes special features of the PowerBook 165c: optimized controls for power conservation in the PowerBook 165c control panel; the ability to dim or shut down both the internal and external display; and of course, the Colors control panel and the number-of-colors choice in the Monitors control panel, which are active for the first time in a PowerBook internal display.

Alternatives

You could buy a PowerBook 160 and connect an external color monitor when you need color; the total price would be about $2600. Obviously you won't get a color display on the PowerBook, but you will get an LCD display with fewer disadvantages, as well as good-quality color on the CRT.

If you travel by car and want a relatively compact Mac to show high-quality color images to small groups, the Color Classic (see "Color Classic," in this issue) may suffice; it is certainly cheaper than any PowerBook solution.
As an alternative to the 165c, you could buy a DOS color laptop. But none of the DOS laptops have the ergonomic design of a PowerBook or the built-in networking.

Newer Technology has demonstrated an active matrix LCD upgrade for a PowerBook 140, 145, or 170. Although the company has not committed to definitely selling a product, it anticipates that the upgrade would cost about $3000 and include 6MB of expansion RAM and an external video connector. Newer Technology’s 9-inch-diagonal screen, which is made by Sharp, displays 256 colors (from a palette of 32,000 colors) with 640-by-480 pixels rather than Apple’s 640 by 400 standard. The screen fits without modifying the PowerBook 165c’s case because it is 96 dpi, noticeably finer than any common Macintosh display.

To save circuitry space, the external video connector supports only 640-by-480-pixel monitors, either Macintosh-type or VGA, and only in mirror mode. From a cost standpoint, the PowerBook 145 is the best choice for this type of upgrade because it has the performance of a 170, but wouldn’t force you to throw away a 170’s active matrix black-and-white screen. Since the PowerBook 145 sells for about $1900, the total price would come to an estimated $5400. After you install the Newer Technology upgrade, the PowerBook will be boxed out from the RAM standpoint, and you may need to replace the AC adapter to cope with the power demands of the Sharp screen’s two backlights. Newer recommends extended-life battery packs.

Newer also plans a passive matrix color upgrade for the 140, 145, and 170. Before you upgrade, compare the costs against selling your current PowerBook and buying a 165c; remember that the 165c comes with higher performance, more RAM capacity, and more-flexible external video output.

Considering DOS

You could also consider a DOS color laptop. DOS laptops cost roughly 20 percent less than PowerBooks, although exact comparisons are hard. The cheaper DOS passive matrix color laptops go for about $2500, and some display only 16 colors rather than 256. A DOS laptop with an active matrix color display starts at about $3500 for a 16-color display, about $4000 for 256 colors. For the extra money, you do get a good display but you’d still face all the other limitations and costs of a DOS laptop.

A capable DOS laptop running Microsoft Windows does a good job, and many major applications, from FileMaker Pro to PageMaker, work essentially identically on PCs and Macs. Thanks to Apple’s SuperDrive, you can exchange files via floppy disk with little trouble. Then again, none of the DOS laptops have the ergonomic design of a PowerBook or the built-in networking. And the killer is the cost of buying equivalent Windows versions of the software, which would eliminate any savings on hardware.

Finally, you can wait for Apple to put out a PowerBook with an active matrix color display. How much will it cost? Perhaps $1100 to $1300 more than a 165c. I expect it to cost a little more than today’s active matrix DOS laptops, since Apple will probably provide additional features. I’m inclined to wait. I’d want to see a color active matrix PowerBook and consider the cost and display quality trade-offs—though I might still buy a 165c. Apple might even see a rise in sales of the 165c—as the most cost-effective, workmanlike alternative—after more-expensive color PowerBooks become available.

And the wait shouldn’t be long.

CARY LU is a Macworld contributing editor and the PowerBook Notes columnist.

Macworld Lab testing supervised by MARK HURLOW and TIM WARNER.

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**PowerBook 165c Performance**

<table>
<thead>
<tr>
<th>Times are in seconds. Shorter bars are better.</th>
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<tbody>
<tr>
<td><strong>Processor Tasks</strong></td>
</tr>
<tr>
<td>We ran several tests that show how the different processors perform. Our tests included adding and subtracting numbers and finding a word, which depend mainly on the speed of the processor.</td>
</tr>
<tr>
<td>PowerBook 180</td>
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<tr>
<td>PowerBook 165c</td>
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The PowerBook 165c, which uses the same processor and math coprocessor as the 180, shows similar performance in every area except display tasks, reflecting the slower performance expected from a color LCD display, compared to the 180’s gray-scale LCD display.


4th Dimension 3.0.1

PROS: True multitasking capabilities; multiple open windows with interprocess communication between windows; improvements in real speed and apparent speed; incremental refinement of interface and language. CONS: Connectivity to other databases minimal—these functions part of 4D server. COMPANY: ACI US (408/252-4444). REQUIRES: Mac Plus; 2MB of RAM; hard drive; System 6.0.7. LIST PRICE: $895.

To its credit, 4TH DIMENSION has survived as a database—and ACI US (the company has redesigned its logo, restyled its manuals, and changed its name from ACIUS to ACI US) has survived as an intact Mac-oriented corporate structure—longer than any of its competitors. The main reason for this is developer loyalty, and the reason the developers are loyal is that, after a significant initial investment in mastering 4D's huge features set, a developer can make reliable and competent database programs that look like real Macintosh applications.

4D has always had plenty of scope—most complaints have focused on speed issues and 4D's learning curve. ACI US has addressed these complaints with three specific moves. First, it introduced 4D Compiler over a year ago to speed execution of procedures in database applications, often by factors of 100. Second, it recently introduced 4D Server, which seriously improves speed and simplifies development of network applications. Finally, the core product, 4D version 3.0.1, includes a long list of programming-facilities enhancements plus multitasking, which produces great speed improvements when used carefully.

Many Tasks Make Light Work

MULTITASKING MAKES THE SINGLE-USER product pretty delightful for both end users and developers. For example, the import of tabbed text files isn’t particularly faster than in earlier versions, but a developer can design an application so that file importing, and for that matter report printing, is always done in the background. Similarly, since 4D indexes selected fields as a background activity, with no perceived time penalty, developers can painlessly improve 4D's search speed on large flat files by extensive indexing (see "Lurking"). The time-slice multitasking used in 4D 3.0 means that the program inspects the tasks to be performed in different windows and allocates machine cycles for completing the tasks while keeping the active window "live." In practice this can give the user, in a carefully designed application (and developers report that some experimentation is needed to optimize applications for multitasking), the illusion that all tasks are performed nearly instantly, since the user can usually control the screen right after issuing a command. This aspect of the new 4D also makes most time-honored reviewers' benchmarks misleading, since 4D can now offer applications with perceived speeds comparable to those written for the usual speed champ, FoxBase+/Mac.

Other considerations arise from the change in the internal structure of 4D. For example, developers can switch back and forth instantly from the design environment to the user environment; the old
style, which involved endless closing and opening of windows with numerous attached files, was a major source of tedium in day-to-day practice. While working with a selection of records, you can perform searches and generate reports in independent windows without disturbing your current selection. Because 4D allocates cycle time to processes that can be running simultaneously in different windows, even the single-user version mimics a sort of internal multituser model, in which processes themselves are the users. This is why, if programmers pay a modicum of attention to the precautions emphasized in the manuals, any single-user application can automatically become a multiple-user application when used with the new 4D Server, which employs the same multitasking scheme.

Goodies

Although the attentions of Laurent Ribardiere apparently cannot be turned toward such mundane matters as basic search-engine tinkering, nor can ACI US management be persuaded to offer reasonable ad hoc SQL reports or a bridge to Windows or a compiler in this package (these functions are sold as separate products), the new 4D offers a reasonable assortment of new items beyond multitasking. It's now easier than ever to implement custom help (see “Balloon over the Fields”). Security has been improved: individual users can have different passwords for layouts, creating various levels of access to the same file. Invisibility is a new priority in 4D—you can hide fields, files, and processes for added security. Automatic relations, which used to give sluggish searches on large related files, are now fast enough for use in modest professional applications (the improvement is at least a factor of four). Besides the new commands associated with managing multitask processes, there are now about 20 other commands (PROJECT SELECTION and REDUCE SELECTION, for example) that make shorter procedures possible for most standard business database work. Other new touches include interface features that are a bit overdue: close boxes on windows (!) and floating palettes.

Beginner's Luck

Despite 4D's reputation for complexity, version 3.0 makes a serious effort to deliver its power into the hands of ordinary citizens. The manuals are simply better than anyone else's database manuals—they are no more effort to read than this review. The tutorial has been updated and there's a huge examples file. Although relational database design still takes some contemplation, it's now no more difficult to set up a real application in 4D than it is to construct linked budget spreadsheets in Excel. 4D isn't going to replace FileMaker Pro for users doing simple mailing list merges, but for a multitasking relational database it is impressively easy to use. Strangely enough, with this much more ambitious product, ACI US seems to have succeeded at providing the friendly environment for beginners that the company promised in FileForce.

4D Praises

By the time you read this, every serious commercial developer of 4D custom applications will have upgraded to version 3.0, and will be singing the praises of 4D Server as well. Multitasking in 3.0 provides not only a remedy for most of 4D's speed deficiencies, but also a great environment for developing multiuser applications. While 4D's capabilities have been greatly extended, the product is actually easier to use than earlier versions. At its current price, there's some grumbling from developers that built-in assistance with SQL and Windows connections ought to be included, but version 3.0 now offers power features you can't get in any other Macintosh relational database.—Charles Seiter

Image Assistant 1.0

Pros: Assist mode; multiple levels of undo; automated scanning capabilities; prints color separations. Cons: Font options limited by text-tool bug; text not antialiased; inadequate selection capabilities; no selective-revert function; nonstandard implementation of smudge tool; doesn't support QuickTime compression or Photoshop plug-ins; buggy. Company: Caere Corporation (408/395-7000). Requires: Mac II; 5MB of RAM; SuperDrive; hard drive; System 6.0.7. Recommended: 8MB of RAM; 13-inch color monitor; 24-bit video board; System 7. List Price: $495.

Although the Macintosh market now has more than 25 commercial paint and image-editing applications, most users still turn to Adobe Photoshop when retouching scanned photos. Casual users, attracted to the world of on-screen photo editing by inexpensive scanners and Kodak's recent Photo CD technology, can be overwhelmed by Photoshop's high price and relative complexity, however. Image Assistant is Caere Corporation's attempt to provide a more affordable, less intimidating program, especially for the new crop of image-editing enthusiasts. Unfortunately, Image Assistant is barely able to keep up with less expensive bitmap editors, most notably Microway's Color It (also reviewed in this issue).

Easy Come, Easy Go

Image Assistant's main contribution is the Assist mode, which simplifies the software to its most essential ingredients. In the Assist mode, all menus except File and Edit disappear, and the toolbox dwindles to just ten items. You can retouch an image with paint tools, select and mask portions of the image, add text, sharpen and blur the image via dialog boxes or tools, adjust tone and color—continues
balance settings, and apply special-effects filters—plus you get multiple levels of undo and redo. The filtering and color-balance options bring up thumbnail examples that demonstrate how a range of settings will affect the image. When applying special effects, for example, Image Assistant shows thumbnail results of each of nine filters (see "Try before You Apply"). You can then home in on a single filter to test several variations on the effect. It's a fine way to get an idea of the outcome of the program's filtering and color-adjustment features.

But even within Assist mode you encounter rifts in the program's interface. Foremost among these is that the text tool can access fonts inside the System file only. It ignores fonts opened using font-management utilities such as Fifth Generation Systems' Suitcase 2.0 and ALSoft's MasterJuggler. When you use Adobe Type Manager under System 7.1, Image Assistant entirely overlooks fonts inside the Fonts folder. As a result, many users will have to reconfigure their systems or accept severely curtained font options. Furthermore, text characters are jagged, not antialiased, as is standard among 24-bit color paint programs from Expert Software's $50 Expert Color Paint on up. You can feather selected text to diffuse its edges, but even with 96-point type, the result is fuzzy.

Image Assistant's selection tools emulate those in Photoshop but are less capable and, ironically, more cumbersome. As in Photoshop and Color It, you can use a selection as a mask, so you can paint inside a specific portion of an image while protecting areas that lie outside it (or vice versa). You can add to a selection by pressing the shift key, but to subtract from it you have to use paint tools to edit the mask, a useful but decidedly counterintuitive alternative. None of the selection tools provide automatic antialiasing. Though you can feather selections to soften their edges, the effect is choppy, with incremental bands around the selected image instead of soft, tapering edges. You can't nudge a selection using the arrow keys—a convenience standard among Macintosh paint programs—and while you can move a selection by dragging it, Image Assistant shows only a rectangular box during the move, too imprecise for most placement procedures. Finally, you can't delete a selection by pressing backspace, delete, or any other key; you have to choose the Clear command in the Edit menu.

**Working without a Net**

EXITING THE ASSIST MODE GIVES YOU access to additional color-correction and retouching capabilities. From the expanded toolbox, you can generate two-color gradients; transform an image by scaling, rotating, or flipping it; duplicate portions of an image using a rubber-stamp tool; and smear colors using a smudge tool. Of these capabilities, however, only the gradient tool measures up to its counterparts in Photoshop and Color It; the others all fall short in some way. First, while Image Assistant enables you to scale a selection numerically—a function Photoshop lacks—you must perform all transformations while a dialog box is open, which limits your view of the image and impedes access to the selection handles you must use to perform transformations manually. Moreover, the software offers no skew or distortion feature. Second, Image Assistant's multiple undo capability doesn't excuse its inability to selectively revert portions of an image using the eraser or rubber-stamp tool. And third, the smudge tool smears colors according to the additive color model. This may sound like a pretty obscure complaint, but even novices will see the difference. Imagine smearing traditional media like finger paints or pastels. The pigments darken as you mix them—green and red mix to form brown, red and blue mix to form violet. Colors smeared inside Image Assistant, however, become lighter and brighter. Green and red mix to form yellow; red and blue mix to form vivid lavender. You get glaring, phony-looking streaks as opposed to deep, transitional blends.

Image Assistant is available on both the Macintosh and Microsoft Windows platforms, so you can trade images with associates who use DOS-based machines. The program also supports the major image file formats, including TIFF (with LZW compression), JPEG, and Seiltes CT, as well as the DOS standards GIF, PCX, and BMP. What Image Assistant lacks is support for QuickTime compression and Photoshop's native file format, as well as for Photoshop plug-in filters, preventing you from taking advantage of third-party filter collections, such as Aldus Gallery Effects and the recent Kai Power Tools from HSC Software.

Despite its significant shortcomings, Image Assistant offers two redeeming surprises: it scans images from magazine pages and other documents that contain both text and graphics, and it prints color separations. Image Assistant supports direct scanning from several devices, including the Apple One Scanner and the Hewlett-Packard ScanJet. During the scanning process, the program can distinguish graphics from text, straighten and automatically crop graphics, and filter out the moiré patterns that generally occur when scanning halftone artwork. When it comes time to output your image, you can convert the image to CMYK, adjust independent color channels, specify screen angles and halftone frequency, and print thumbnail samples of different output settings.

If only Image Assistant's image-editing talents consistently measured up to its scanning and printing capabilities, it would be a strong program, easily capable of satisfying casual users and even attracting some Photoshop devotees. But the program provides few other notable features and is diminished by a clumsy interface. Image Assistant has to redraw the entire screen after most operations, so you spend much of your time waiting. Nor can you cancel lengthy operations such as opening and saving files.

The program is also plagued by more than its share of bugs and idiosyncrasies. The Cancel button inside the Paste Controls dialog box neglects to cancel feather settings, the program beeps at you when you use System 7 keyboard equivalents in the Open and Save dialog boxes (such as ~D to activate the Desktop button), and you can transfer only rectangular selections from Image Assistant to other applications via the Clipboard. Caere Corporation says it's working to remedy these problems in an upcoming release (perhaps available by the time you read this). But until Caere overhauls the program's image-editing capabilities and strengthens the interface, Image Assistant will remain at a disadvantage compared with programs costing half as much.

—DEKE MCCLELLAND
DON'T CALL ORKIN.*

When the Mac first came around, everybody loved its little rodent. No cursor up.
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Mozart: The “Dissonant” Quartet

PROS: Uncomplicated text; unusual essay on stringed instruments. CONS: Somewhat unchallenging commentary; lacks introductory essays for novices; few contrasting musical excerpts.

COMPANY: The Voyager Company (310/451-1383). REQUIRES: Mac Plus; 2MB of RAM; hard drive; CD ROM drive; speakers or headphones; System 6.0.5. LIST PRICE: $59.95.

Schubert: “The Trout” Quintet

PROS: Lively, uncomplicated text. CONS: Somewhat unchallenging commentary; lacks introductory essays for novices; minor volume-level problems.

COMPANY: The Voyager Company (310/451-1383). REQUIRES: Mac Plus; 2MB of RAM; hard drive; CD ROM drive; speakers or headphones; System 6.0.5. LIST PRICE: $59.95.

Richard Strauss: Three Tone Poems

PROS: Uncomplicated exposition; effective use of diverse musical excerpts; insightful commentary; includes annotated discography.

CONS: Lacks introductory essays for novices; minor volume-level problems.

COMPANY: The Voyager Company (310/451-1383). REQUIRES: Mac Plus; 2MB of RAM; hard drive; CD ROM drive; speakers or headphones; System 6.0.5. LIST PRICE: $59.95.


Each consists of HyperCard stacks and a CD containing a recording of a single extended work (or in the case of the Strauss, three) and a collection of related excerpts. Buttons let you move to the program’s main divisions and subsections, flip from card to card, jump to a recently viewed card, or find a specific card (by card number or content). Other buttons turn on and off balloon help and the gray underlined word switches you to the desired glossary card, and card-specific buttons open brief informational sidebars or play musical excerpts (in the Strauss and Schubert, the volume levels of the excerpts sometimes vary). The cards themselves generally contain artful combinations of ornamented borders, period illustrations, occasional animation, and text.

Unlike Warner New Media’s music programs, which tend toward an intricate hypertext approach, Voyager titles are more linear and booklike. The texts of these three programs contain the same basic elements: a structural outline (“pocket guide”) of the composition, a play-by-play commentary that accompanies the performance, historical background, a brief biography of the composer, essays on the music, a glossary, a bibliography, and finally, a quiz game. Strangely, the pocket guide is at the beginning of all three programs, followed in the Strauss and Schubert programs with the play-by-play commentary—before the sections on how to listen to (and what to hear in) the music.

Most Warner titles offer three or more real-time commentaries differing in depth and emphasis; Voyager’s include only one, and sadly, in these three programs all are comparatively unexciting (the Strauss has the best). The lack of essays on basic musical concepts is disappointing (Warner does better here). Musical notation is almost entirely absent in the Schubert and Mozart discs; as a result, the programs virtually ignore musical themes and motives. And only the Mozart quiz/game truly tests your new musical knowledge; the games in the other two titles are pretty lame.

The text of Schubert: “The Trout” Quintet, is by Alan Rich, a critic, UCLA lecturer, radio commentator, and author of Voyager’s So I’ve Heard series. Rich conveys his enthusiasm for this very appealing music, although he occasionally pours it on a little thick. Unlike that of the other two titles, nearly all discussion of the Schubert is confined to the real-time commentary, so it’s not as probing as it could be; however, the supplementary essays draw on diverse musical excerpts from Bach to Mozart to Beethoven. The disc includes a complete recording of Schubert’s original art song, “The Trout,” the basis for the fourth movement of the quintet.

The text for Mozart: The “Dissonant” Quartet is by Richard Winter, a UCLA faculty member, radio commentator, and author of two previous Voyager programs. It has an unusual, and unusually detailed, essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped minilecture (and slide show) on Mozart’s life and times. Sad to say, the musical excerpts in the essays, though well chosen, are limited almost entirely to the title piece; and Winter’s 23-minute history lecture contains no music at all.

The works in Richard Strauss: Three Tone Poems are Don Juan, Till Eulenspiegel, and Death and Transfiguration, with commentary by Russell Steinberg, a composer, UCLA faculty member, and principal author of Warner New Media’s The Orchestra. Steinberg’s prose is not lively, but his overall approach is the most effective. Noteworthy are the excellent discussions of texture, color, and orchestration in the three works; the helpful analysis of the music, apart from the real-time commentary; the wide variety of musical examples (ranging from Berlioz and Wagner to the music from Gone with the Wind); and, for the first time on a music CD ROM, comparisons of different performances of the same piece. Also commendable is Steinberg’s willingness to use musical notation (and a kind of quasi notation when space is limited) where it’s useful.

Although I much enjoy the music, I’m disappointed with Voyager’s Mozart and Schubert discs. They’re certainly worth exploring, but if you can afford only one chamber-music disc, pick Warner’s The String Quartet (based on Beethoven’s String Quartet No. 14); it offers more help for beginners and a more thorough analysis of a chamber work. Voyager’s Strauss disc does offer a satisfying musical analysis and lush orchestral music that is likely to appeal to beginners. For these reasons, and because it fills an important gap in the CD ROM music catalog, I recommend the Strauss disc to both novice and experienced listeners.

—ROBERT C. ECKHARDT
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Compton’s Multimedia Encyclopedia 1.00M

**PROS:** Variety of multimedia features and options; includes complete dictionary; writing style appears to young readers. **CONS:** Expensive; sluggish; hardware intensive; dated content. **COMPANY:** Compton’s New Media (619/929-2626). **REQUIRES:** Mac LC; 4 MB of RAM; CD ROM drive; color monitor; 40MB hard drive; System 6.0.7. **LIST PRICE:** $795.

The New Grolier Multimedia Encyclopedia

**PROS:** Easy to use; relatively fast; scholarly content; relatively inexpensive. **CONS:** Writing style may be too academic for young readers. **COMPANY:** Grolier Electronic Publishing (203/797-3530). **REQUIRES:** Mac Plus; CD ROM drive; hard drive; color monitor for QuickTime; System 6.0.5; QuickTime for access to film clips; **LIST PRICE:** $395.

Compton’s Multimedia Encyclopedia

**COMPTON’S NEW MEDIA DESIGNED ITS product with younger audiences in mind (as young as age six, according to the company). Its readable style makes it a useful resource for the primary and middle school student, as well as for families. Beyond the encyclopedia, the Compton’s CD ROM also includes a dictionary—the complete Merriam-Webster’s Intermediate Dictionary; an atlas; 40 animated sequences; and 60 minutes of sound effects, music, and speech. An opening picture menu offers a variety of ways to explore the disc (see “Many Paths to Knowledge”).

The dictionary is especially handy and beautifully integrated with the encyclopedia. You can summon the complete definition and phonetic spelling of any word in any article by double-clicking on the word. At first glance the atlas, accessible through the opening picture menu or through numerous map icons in encyclopedia articles, promises to be as handy as the dictionary. It allows you to view any spot on a globe marked with political boundaries. You can even zoom out or in by dragging a space-shuttle icon up or down.

Unfortunately, the globe images have little detail and are slow to redraw when you change your viewing position or altitude. Also, the globe is dated by the presence of the U.S.S.R. and other historical artifacts. Finally, it’s not easy to backtrack from the globe to your original article. The atlas is a clever idea, but it has little potential for serious research. Fortunately, many encyclopedia articles include small maps with greater detail.

The Science Feature Articles section is the multimedia showpiece of the Compton’s disc. Articles in this section are riddled with icons and other clickable spots for launching animated sequences, listening to sounds, or hearing the correct pronunciation of difficult words and phrases. Another section, the Researcher’s Assistant, guides young students interested in developing their own research projects.

Compton’s is loaded with features, but those features aren’t without cost. The standard installation fills more than 4MB of hard drive space with encyclopedia-related files. If you can’t spare that much space, you can choose the installer option to “conserve disk space.” With this option the files consume only about 1MB of space, but the manual aptly warns that “performance may be sluggish.” Believe it—even with the standard installation, performance is sluggish on an 8MB Iici. A third installation option offers “enhanced performance”—if you can spare 6MB to 8MB of hard drive space.

The New Grolier Multimedia Encyclopedia

**COMPARING WITH COMPTON’S, THE Grolier Encyclopedia is lean and mean. It contains no atlas, no dictionary, no research guide for youngsters, and significantly fewer diagrams and pictures. But the encyclopedia text is remarkably current and scholarly, making it appropriate for an older, more sophisticated readership. Maps are detailed and easily accessible from the main text. Grolier’s uses hypermedia expertise to make cross-referencing as easy as double-clicking. The Word Search feature is especially useful for locating every occurrence of a combination of words in the book. In seconds you can find every article that includes the words computers and privacy, or learn what major historical events happened on your birthday. For a CD ROM reference, searching, browsing, and opening articles are surprisingly fast—especially impressive considering that the application software takes less than 1MB of hard drive space.

The Grolier disc contains some nice features not found in traditional encyclopedias. Timeline, for example, provides a chronological list of events in human history from 40,000 B.C. to the present. Browsing through Timeline is fascinating, and if something piques your curiosity, it’s easy to link directly to related articles.

**CONTINUES**
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In addition to animated sequences illustrating scientific principles, the Grolier disc includes dozens of short QuickTime film clips, including the Hindenburg disaster, Gandhi emerging from a hunger strike, Nixon’s resignation speech, and mold growing on bread (see “Both Sides Now”).

**Take Your Pick**

**MOVIES NOTWITHSTANDING, COMPUTER**’S down-to-earth writing style and numerous bells and whistles make it appealing to young people. For adult researchers, Grolier’s is easier and much faster to use, in terms of both finding what you need and getting to it, and though the dry, academic language might stop young students, it’s not a stumbling block for adults.

Grolier’s also lists for about half the price of Compton’s—$395 as opposed to $795. However, since both discs come bundled for free with various CD ROM drives, for a few lucky buyers the price may be irrelevant. The bottom line is that both encyclopedias have a lot to offer to anyone with a CD-ROM drive and a thirst for knowledge.—GEORGE BEEKMAN

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**Adobe Dimensions Software**

**PROS:** Illustrator-like interface; creates PostScript-based 3-D art that can be resized without distortion; art-mapping feature is ideal for creating package designs or adding perspective to illustrator or FreeHand art. **CONS:** No text tool; no preview for PostScript on Clipboard; limited lighting and surface options. **COMPANY:** Adobe Systems (415/961-4400). **REQUIRES:** Mac II; 2MB of RAM; System 6.0.5. **LIST PRICE:** $199.

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**DOES THE MACINTOSH WORLD REALLY need another three-dimensional effects utility?** We already have Pixar Tyepster and Strata’s StrataType 3d, both of which let you create photo-realistic 3-D text effects (see Reviews, Macworld, November 1992).

Capable as these programs are, their final results are bitmapted images, which you can’t resize without introducing distortion. Bitmapted images are also tied to a specific number of dots per inch, so they can’t take full advantage of high-resolution output devices such as imagesetters and film recorders.

Adobe Dimensions takes a different approach to 3-D: the vector, or object-oriented, approach. The end result of a Dimensions session isn’t a PICT or TIFF file, but an Illustrator or Aldus FreeHand file. You can open this file in a variety of draw programs and modify it—change its stroke and fill attributes, resize it, rotate it, disassemble it, and reshape it using the Bézier controls that are the foundation of PostScript-oriented draw programs. Dimensions bridges the gap between the third dimension and PostScript draw programs.

If you use Adobe Illustrator, you’ll feel at home in Dimensions. Dimensions provides a floating tool palette and bottom-of-the-window information bar that work similarly to their Illustrator counterparts, as do Dimensions’ tools for scaling and rotating.

Dimensions is designed to be used with Illustrator or FreeHand—it isn’t very useful by itself. Dimensions doesn’t have a Print command, and its tool palette lets you draw only three types of shapes: spheres, cones, and cubes. The program also lacks a tool for creating text. You must create text in Illustrator or FreeHand and then convert the text to outlines. I would like to have the option of creating text within Dimensions; Adobe says it’s considering adding a text tool to a future version.

To create 3-D objects other than spheres, cones, and cubes, you must draw two-dimensional versions of them in an Illustrator or FreeHand file and then import the file into Dimensions and extrude the shapes or revolve them. Extrusion adds depth to an object’s boundaries; revolving an object makes it spin around one axis, to where you’re turning a block of wood on a lathe. You can rotate 3-D objects using Dimensions’ trackball tool or by typing specific rotation values.

One of the most fun aspects of working with a conventional 3-D program is giving objects surface textures such as marble, stucco, or red brick. Dimensions doesn’t support these kinds of textures—understandable, considering that textures are essentially bitmaps and Dimensions is an object-oriented program. Dimensions is limited to creating smooth surfaces with finishes ranging from matte to glossy. When you use Dimensions’ rendering commands to generate the 3-D image, the program creates PostScript blends that simulate shading and depth.

For lighting your 3-D scene, Dimensions lets you create any number of light sources and specify their position and intensity. All lights produce white light. Adobe says supporting colored lights would be very complex in Dimensions’ process-color, PostScript-oriented world.

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**One of Dimensions’ slickest features is its ability to map an Illustrator or FreeHand drawing onto a three-dimensional surface. If you’re designing a package, you can create its label in Illustrator or FreeHand and then use Dimensions to electronically apply the label to a shape such as a bottle or box (see “The Adobe Dimension”).** Dimensions accurately retains the characteristics of the art while also giving it the appropriate perspective. Besides being a boon to package designers, the artwork-mapping feature makes it easy to add accurate perspective to two-dimensional art.

The outcome of a Dimensions session is an Illustrator or FreeHand file, but you can also tell Dimensions to render an image and place it on the Clipboard for subsequent pasting into a publishing or word processing program. Unfortunately, Dimensions doesn’t place a PICT version of the image on the Clipboard along with the PostScript version. As a result, you can’t see the image once you paste it into another program; instead, you simply see the message “PostScript on Clipboard—no preview available.”

Dimensions has a limited animation capability—specify the beginning and ending attributes for a shape, and Dimensions generates the in-between frames and saves each as an Illustrator file. Unlike Pixar’s Tyepster, Dimensions can’t create QuickTime movies. You can, however, create a movie by importing the Illustrator frames into Adobe Premiere.

Adobe Dimensions is likely to be misunderstood. Anyone used to working with conventional 3-D programs may think Dimensions is very limited, what with its white-only light and lack of surface texturing. Only when you realize that Dimensions performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript does it hit home that this is a ground-breaking program. Dimensions is an excellent 3-D tool for anyone who works extensively in Illustrator or FreeHand.—JIM HEID

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**REVIEWS**
Norton Essentials for PowerBook 1.0

**PROS:** Flexible power-saving features; excellent AppleTalk control. **CONS:** Doesn’t monitor serial port for activity; some modules of little use.

**COMPANY:** Symantec Corporation (310/453-4600). **REQUIRES:** PowerBook; System 7. **LIST PRICE:** $129.

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**REVIEWS**

**Norton Essentials for PowerBook (previously called GUM, or Guy’s Utilities for Macintosh, and hereafter referred to as NEP) is an uneven collection of utilities. Some of NEP’s modules are great, but some are mediocre.**

First, the useful modules. Three battery-saving modules are quite good. Backlight Dimmer lets you specify an interval of time before the screen backlighting turns off, and it lets you choose whether keyboard or mouse movement, or both, reactivates the backlight. Battery Saver lets you control when the hard drive spins down, the PowerBook sleeps, and the microprocessor rests. You can have settings for different applications and switch to those settings when you launch an application. Unfortunately, Battery Saver doesn’t monitor the serial port; it only monitors the ADB port, so if you’re uploading a file via modem, NEP can put the machine to sleep unexpectedly, thereby knocking you offline. You can set Battery Saver to wait for a long time to power down your telecommunications programs.

NEP’s Instant Access module monitors the AppleTalk port, automatically turning AppleTalk on or off. Instant Access also remounts any server volumes at start-up and displays an icon in the NEP menu or the menu bar if AppleTalk is on or off.

Other useful modules are Caps Lock Control, which cures the caps lock key of its oversensitivity; Power Guard, which lets you password-protect your PowerBook; and the marginally useful Power Cursor, which replaces the system cursors with versions that are somewhat easier to see. Power Cursor also offers an animated rectangle that zooms to the current cursor location.

But some NEP modules are disappointing. Airport Shut Down is supposed to help when security wants to inspect your PowerBook. A customizable dialog box lets you shut down immediately. This module is unnecessary if you transport your PowerBook in sleep mode, however. The Quick Notes module lets you jot down short notes (up to 64 characters), each one with an even shorter keyword (up to 32 characters). Quick Notes can be used for credit card numbers, but any notepad DA would offer more flexible note-taking. You can password-protect the notes, however. The Indicators module customizes the menu bar and NEP menu, and lets you display the time or date. The Power Keys module lets you set key combinations to control NEP’s functions.

Battery Gauge has six charge indicators, including a time-remaining gauge and a simulated gas gauge. To check Battery Gauge’s accuracy, I timed the actual battery life of two stock Apple batteries and an extended-life battery from Battery Technology. Unfortunately, Battery Gauge was inaccurate—it understated the battery life at the start and in the middle of the tests.

Synclt compares two folders on different Macs and synchronizes them so that they contain the same files. Synclt copies files in either direction and replaces older versions of files with newer ones. Synclt works well, but only with one folder at a time.

Both NEP and Connectix’s CPU are packages of PowerBook utilities. NEP’s Instant Access is unique and useful, and the Battery Saver is more flexible than the CPU equivalent; but both NEP and CPV do poorly jobs of estimating battery life. With at least three other PowerBook utility packages soon to be available, NEP will have to be revised soon to be an essential purchase for PowerBook owners.—Tom Negrin

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**Still-Video Camera/Video Digitizer**

**Canon ESP**

**PROS:** Good image quality; easy to set up and use; innovative. **CONS:** Expensive. **COMPANY:** Canon USA (516/328-5970). **REQUIRES:** Mac II; 4MB of RAM; hard drive; System 6.0.7. **LIST PRICE:** $4500 (includes one disk; ten-disk box $100).

**MW**

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The Canon ESP (for Electronic Still Presentation) system is a nonsensical package that lets you shoot still-video pictures, digitize the video into a Mac for touch-up, and record the modified shots back to the camera for playback through any television set. Canon’s system lets the desktop presenter take a Mac-produced video slide show on the road with a minimum of equipment. All the presenter needs is the still-video camera (acting as a playback unit), an AC adapter, and a television monitor with a video input (Canon sells an optional RF adapter, in case you’ve got a really old TV).

The ESP system consists of three main parts. The core of the system is the RC-570 still-video camera, which records still-video snapshots on a 2-inch floppy disk. The next component is the SV-Mac NuBus video-digitizing board and its accompanying software. Rounding out the package is the SV Recording piggyback board.

Superficially, the RC-570 resembles Canon’s consumer still-video camera, the RC250 (see Reviews, Macworld, June 1992). Unlike the RC250, however, the RC-570 was designed from the ground up to interface with a computer, and certain features make it a better imaging device. The RC-570’s improved CCD (charge-coupled device) imaging chip creates higher-resolution pictures. Also, you can choose how pictures are stored on the floppy disk: as a video frame, which has higher resolution but takes up more disk space, or as a field, which has only half the resolution but requires half the disk space. One video floppy holds 25 frame shots, 50 field shots, or a combination of the two. The camera also comes with an integrated, motorized 3:1 zoom lens, with sharper optics than the earlier camera.

You can use the built-in flash; an extra option lets you attach a bracket for positioning an external flash. Removing the camera’s battery allows you to slip in a cable that attaches to the AC adapter; the cable also has a built-in receiver for the camera’s infrared remote control. The camera and its accessories fit neatly into a lockable hard-shell case the size of a small briefcase.

The SV-Mac NuBus board allows you to digitize video from the camera, bringing that video into the Mac. With the SV-Mac attached to the RC-570, you control the camera’s playback and recording functions from the Macintosh, instead of directly from the camera. Attaching the SV Recording piggyback board to the SV-Mac NuBus board lets you record Mac images onto the video floppy disk inside the RC-570 camera. The SV-Mac hardware comes with software and a plug-in acquisition module for Adobe Photoshop. The SV-Mac software shows you thumbnails of all of the video shots on a video floppy; double-clicking on a thumbnail opens a window with the full-size image. You also get a surprisingly rich set of image-manipulation tools, enabling you to select, magnify, crop, resize, and flip...
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images; you can also change brightness and contrast, and apply special effects such as Posterize, Invert, Sharpen, and Trace Edges. You can erase images from the video floppy disk from within the software as well as directly from the camera. If you install the SV Recording piggyback board, the SV-Mac software also lets you record your choice of frame or field shots to the video floppy.

You can save the shots onto the Mac's hard drive in TIFF, PICT, and Photoshop formats. You can also save in an unusual format, Auto-JPEG, which is actually an application that uses the JPEG compression scheme; double-clicking on an Auto-JPEG file causes it to decompress into a TIFF file that most image-editing programs can open. You can even save a series of thumbnails as a QuickTime movie file; this feature enables you to create stop-motion animations.

The ESP system is easy to set up and use. After charging the camera's batteries, I just went out and shot a few floppy's worth of pictures, using both frame and field modes. I shot outdoors and indoors, in sunny and overcast weather, and I used the built-in flash. Then I viewed the images on my television. The image quality of shots made in well-lighted conditions was very good. Light from the built-in flash drops off rapidly, so you tend to get overlighted foregrounds and overly dark backgrounds. But if you take some care, you can get decent pictures with the flash.

I tried opening several Photoshop files in the SV-Mac software, then saving them to the video floppy. On the Mac screen the images showed some loss of detail, but on a television they looked great. This is a case where the lower resolution of a TV actually benefits the user.

The Canon ESP system works as promised, and it's a good solution for presenters who need to create video slide shows that incorporate photographs, not just text and graphics. The Canon system has two big pluses: a high-quality still-video camera and the ability to play back on any television. But at a list price of $4500, it is quite expensive. For that kind of money you can take one of the Power-Books with video output, team it up with a computer monitor, and run your Aldus Persuasion presentations directly. If you mostly do standard Mac presentations, the ESP system probably isn't for you. But for professionals who need to do a lot of image capturing, such as real estate brokers who must show properties to potential buyers, I'd recommend the ESP system in a minute.

---TOM NEGRINO

**Dynodex 3.0**

**Pros:** New integrated word processor with mail merge; synchronizes files between desktop Mac and PowerBook; improved interface.

**Cons:** Manual is incomplete; synchronizing can be tricky.

**Company:** Portfolio Software (408/222-0420).

**Requires:** Mac Plus; 2MB of RAM; hard drive; System 6.0.4.

**List Price:** $89.95.

PORTFOLIO SOFTWARE'S UPDATE of its flagship address manager adds welcome features and value while maintaining the program's strengths in speed and ease of use.

After installation, with Apple's Installer program, Dynodex opens to the familiar two windows. The right-hand one, Just Names, shows a scrollable list of all your contacts. Clicking on a name brings up that contact's record in the Entry Screen window on the left side of the screen. You can control most functions, such as adding and deleting records, using the icon palette in the Entry Screen or through menu choices and 3-key equivalents. In color, the Entry Screen sports a new, boxy 3-D look similar to many Microsoft Windows applications. While Dynodex's interface still conforms to the Mac interface guidelines, it's clear that Portfolio wants to make its Mac and Windows versions look as much alike as possible. Although I did not test this feature, Portfolio claims that Mac and Windows Dynodex files are completely compatible and can be opened on either platform.

Dynodex includes some new features as well as improvements to some old ones. You can now write a memo using the limited word processor. You can select fields from the address book to place into a memo, and when you print the memo, Dynodex automatically merges the fields into it. You control the font, size, and style of text, but that's about it. The memo writer isn't a great word processor, but for its intended use, it works fine. I found it useful for short letters that I wanted to send to several people.

Another new feature, file synchronization, is of special interest to PowerBook users. While there are dedicated synchronization programs on the market, such as Inline Design's Inline Sync and Leader Technologies' PowerMerge, those programs work on a whole-file basis; that is, they copy the newest version of a file to whatever machine contains the older version. Dynodex's synchronization works with both versions of an address file, adding and changing records from each file as necessary. This works well when you add or modify records in files on both machines. The problem comes when you delete records from one machine; the next time you synchronize, Dynodex thinks the deleted records are "missing" from the other machine and adds them back. A workaround is to first synchronize your files, then delete records on one Macintosh's Dynodex file, and finally manually replace the now-outdated file on the other Mac with the file from which you just deleted records.

Other changes are smaller but still welcome. Dynodex 3.0 finally adds automatic telephone-number formatting. The Date Stamp feature can be configured to place the date, the time, or both into any field; and you can record the duration of phone calls with the timer option. Although Dynodex has improved the options for dialing when you use a credit card, it still isn't quite right; the program now dials the credit card suffix on all long-distance calls. It would be more useful to have it include the suffix only when you hold down a key and click on the Dialing icon. And you can now copy and paste an entire record; it goes onto the Clipboard in tab-delimited format.

The program now stores up to eight different return addresses, which is good, but it doesn't let you name them, which is bad. Naming them would allow you to jump immediately to the return address you want, instead of looking through Return Address 1, Return Address 2, and so on.

Printing, especially double-sided printing for address books, has always been Dynodex's strong suit, and this continues.

The Canon RC-570 and video floppy disk (shown here next to 35mm slides, for scale)
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sion doesn't disappoint. When you print, you can now choose to print one record, all records, or just selected records, and you can change layouts and sort the database. Options for double-sided printing and page order have been moved to the Page Setup dialog box, where they belong. Portfolio has added new layouts for the Apple StyleWriter and the Hewlett-Packard DeskWriter. There are also improved printing instructions in the manual and on-screen. Unfortunately, the manual needs some work in other areas: the index is incomplete and the manual and Read Me files leave out a few features altogether.

Portfolio has certainly kept up with the other address book programs on the market: Dynodex 3.0 inches ahead of competitors like After Hours Software's TouchBase 2.0, but Dynodex doesn't have a connection to a scheduling program, whereas TouchBase integrates with After Hours' DateBook. Users who are looking for an all-in-one solution for address management and scheduling may wish to look elsewhere, but as an address book manager and printing program, Dynodex does an excellent job.

—TOM NEGRINO

Music-Education CD ROM

The Orchestra: The Instruments Revealed

PROS: Great musical selections; excellent commentary on theme and variation. CONS: Unfocused structure; lacks adequate background for classical music novices; lackluster and jargon text; expensive. COMPANY: Warner New Media (818/955-9999). REQUIRES: Mac Plus; 1MB of RAM (2MB for color); hard drive; CD ROM drive; speakers or headphones; System 6.0.5. LIST PRICE: $79.98.

I T DATES ME TO ADMIT IT, BUT I remember watching Leonard Bernstein's Young People's Concerts on television—in glorious black-and-white with decidedly low-fidelity sound. Perhaps most memorable was Bernstein's introduction to the instruments of the orchestra, using a piece designed for just this purpose, Benjamin Britten's The Young Person's Guide to the Orchestra (also known as Variations and Fugue on a Theme by Purcell). Lacking a similar spokesperson for serious music, this generation of young people must rely on music-education CD ROMs. Warner New Media's The Orchestra, featuring the Britten work, is the modern counterpart to the classic Bernstein concert.

Like all of the current crop of music CD ROMs, The Orchestra combines HyperCard stacks and a CD ROM of recorded music. The main screen contains buttons that lead to the program's various parts, and a sliding pointer that enables you to start The Young Person's Guide at any point in the performance. Most cards also provide a button that gives you access to CD player-like controls, and other buttons that let you navigate from card to card, jump to related topics, or return to the main screen. On certain cards, buttons play musical examples, pronounce musical terms, and open sidebars containing additional information. Clicking on boldface words jumps you directly to their corresponding glossary entries.

Like Warner New Media's past efforts, The Orchestra adopts a many-branched, interwoven hypertext style, compared with The Voyager Company's more linear approach. This adds a certain richness and an element of the unknown, but I find the program harder to navigate and digest. Worse, it doesn't provide the newcomer to classical music a clear idea of where to start. Add to this the fact that much of the program assumes an unrealistically high level of motivation and understanding, and you've got big trouble for anyone new to classical music. The absence of a good introductory essay to orient the listener is a significant flaw.

The Orchestra's sections include three play-by-play commentaries on the performance (plus a notebook for entering your own comments); essays on orchestra history and sound, conducting theory and practice, variation-and-fugue technique, Benjamin Britten, Henry Purcell, and so on; a catalog of the instruments; a glossary and several indexes; and a quiz in the form of a game. Unlike other titles from both Warner and Voyager, The Orchestra seems tuned to the television generation: most sections are disconcertingly skimpy. Tempo and dynamics, for example, are described on just a card or two. And though topics such as musical notation, harmony, scales, and meter are covered well on other Warner titles, they're not adequately explained anywhere in The Orchestra. On the other hand, one of the highlights of the program is the catalog of instruments, an entertaining, enlightening, and thorough introduction to the various instruments—how they work, what they look like, and how they sound.

Apparently to revive listeners with flagging attentions, The Orchestra includes some puzzlingly irrelevant essays, such as Weird Sounds from the Orchestra, and Europe before the Walkman, which haphazardly intermixes music-history trivia with milestones in music recording. Surprisingly, Warner does not match these efforts to jazz up the format with an equal effort to spice up the text itself. On the contrary, the writing is often enervating, lapsing all too often into sleep-inducing musical jargon ("Dotted rhythms soften into a rubato melody. The rubato passage then varies the rise and fall of the scale motive . . . "). Of the three play-by-play commentaries that accompany the music, one is simply a dull enumeration of the composition's parts, and one is a decent but lackluster attempt to highlight the instruments and instrumentation in the work. Fortunately, the third commentary is a near-perfect example of what a program like this can do. With a simple text, effective use of informative sidebars, and abundant musical excerpts, it thoroughly explores and explains the structure of the piece.

The London Symphony Orchestra performance of The Young Person's Guide used here (conducted by Britten himself) is top-notch, even though the recording occasionally shows its age (especially when you want to pick out a single instrument in a dense orchestration). While the music is exhilarating and easily merits repeated listenings long after you've outgrown the guide aspect, sadly the same cannot be said for The Orchestra. Though the program is primarily for beginners, new listeners will find many parts of it difficult to comprehend, with precious little online help. And though experienced listeners will undoubtedly enjoy the theme-and-variation commentary, they'll find little else that's worthwhile. Almost any music-education CD ROM from Warner or Voyager is better designed and, compared with The Orchestra's high price of $79.98, a better value. Unless Britten's work is of overriding interest, I recommend you steer clear of this one.—ROBERT C. ECKHARDT
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Passport Producer 1.0

**PROS:** Straightforward interface; frame-accurate time controls; surprisingly extensive MIDI editor. **CONS:** No leading control; can't edit multiple slides at a time; no support for TIFF or EPS. **COMPANY:** Passport Designs (415/726-0280). **REQUIRES:** Mac II; 5MB of RAM; SuperDrive; hard drive; System 7. **Recommended:** 68030 processor; 8MB of RAM. **LIST PRICE:** $495.

In many ways, your Mac is already a multimedia machine. Maybe you don't have a scanner, a QuickTime input board, a sound recorder, a MIDI sequencer, and a CD-ROM player, but you can still assemble screen presentations that move and make noise by assembling images, animation, and sound clips you've created using other programs or acquired from online services. Passport Producer is one of the new breed of entry-level multimedia programs that enable you not only to control a variety of devices from a single application, but also to make the most of the resources you already have.

Producer permits you to integrate the five basic kinds of media—text, still images, animation, movies, and sound—to create presentations that you can either play on screen or output to video. To assemble your presentation, you position media elements on a time line, called a cue sheet (see “Working on the Time Line”). Each element, or cue, plays according to its position in the cue sheet. In theory, you can play up to eight cues simultaneously; in practice, however, playing more than three or four at a time usually impedes performance. For example, having assigned Producer 12MB of RAM on a IIci with a 40MHz cache card, I encountered glitches when I tried to run a slide with a transition effect at the same time that I played an animation sequence and a QuickTime movie. Producer skipped frames and played cues significantly later than it was supposed to. In the worst cases, very short cues failed to appear at all. Very likely, at the outset you'll spend a lot of time trying to balance the program's capabilities against your system's limitations.

Producer's timing controls are its greatest strength. The program measures time according to the SMPTE (Society of Motion Picture and Television Engineers) time code, enabling you to specify the exact video frames at which a cue begins and ends. To precisely synchronize images and sound, you can record time markers during playback—simply watch the movie and press the tab key whenever an event you want to mark occurs. You can then align the beginning or end of a cue to the marker or leave the marker in place for later reference. You can also crop a cue to a desired length or stretch a cue so that it repeats over and over for a specified amount of time.

Sound is Producer's other strength—not surprising, considering Passport Designs' track record as a supplier of sequencing, recording, and composing programs. You can add digitized sounds from disk, play songs directly from audio CDs, and even throw in a few MIDI files for controlling synthesizers and sound modules. Producer includes a comprehensive MIDI editor that lets you select instruments, mix them by adjusting instrument volumes, transpose tunes, and even adjust stereo balance.

Unfortunately, Passport Producer doesn't treat all media equally. Its slide editor—used to create headlines and bulleted text—offers no control over leading or paragraph spacing, so that lines of type invariably appear packed together. You can't format multiple slides at once; and there's no provision for automated builds, in which each bulleted item is added sequentially to the list of previous items, as in traditional presentation programs such as Aldus Persuasion and Microsoft PowerPoint. Producer imports still images saved in the PICT format, including those compressed using QuickTime's JPEG, but it lacks support for other graphic formats such as TIFF and EPS. In terms of image handling, only Producer's QuickTime movie support measures up to what I expected. You can copy and paste frames between movies and even adjust sound levels throughout the duration of a movie.

While straightforward in design, the cue sheet suffers its share of problems as well. You can select multiple cues, but you can't move more than one at a time, which complicates the editing process unnecessarily. If you crop a cue down to just a few frames (as when playing a single word from a sound file), you can't recover the cropped media in the cue sheet—say, to stretch it to two words—because the cue is too small to manipulate. The remedy I eventually stumbled on—no thanks to the manual—involved several steps and wasn't much easier than reimporting the element from scratch. Also, many of Producer's menu commands remain available even when they produce no effect. For example, you can choose Edit Cue when a CD icon is selected, but Producer ignores you. This can be a bewildering experience for first-time users.

While the cue sheet has its limits, the program offers some other welcome features. Producer's time controls let you insert pauses to delay the action for a specified amount of time or until the viewer presses the mouse button. Producer even introduces a smidgen of interactivity by allowing you to store up to ten locations on the time line. You can then return to one of these locations during playback by pressing the corresponding number on the keyboard. For example, the viewer could select a QuickTime clip from a numbered list, or a presenter could select an illustrative slide in response to a question from the audience. There is a bug in this, however. To change a stored location, you must first clear it and then reassign it. Supposedly, you can clear each one independently, but if you clear the first stored location, you clear all the others as well; clearing any of the others independently works fine.

If you're a MIDI composer or some other variety of sound enthusiast itching to try your hand at assembling a multimedia presentation, you'll find Passport Producer both logical and capable. But if you're used to traditional presentation or animation software, you're more likely to be put off by Passport Producer's middling text- and image-handling capabilities, its inability to create gradient backgrounds, and its lack of even the most basic animation options. As it stands, Passport Designs needs to devote more effort to the visual half of multimedia.

—Deke McClelland

Working on the Time Line The cue sheet serves as a time line for positioning individual media elements, called cues. You can set a cue to display the times at which it begins and ends, like the slide cues in the left column, or view the contents of the cue, like the QuickTime movies in the two right-hand columns.
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Final Draft 2.0
PROS: Well-conceived; easily customized; many automated features; 30-day money-back guarantee. CONS: Copy protected; must hide ScriptNote markers to get exact page count; manual not indexed. COMPANY: MacToolkit (310/395-2424). REQUIREMENTS: Mac Plus; hard drive; System 6.0.2. Recommended: 2MB of RAM. LIST PRICE: $349.

ShowScape 4.1
PROS: Good format for storyboarding a video production; ability to create and print separate Linkfiles. CONS: Copy protected; requires WordPerfect; does not run under MultiFinder; dual-application modes awkward. COMPANY: Lake Compuframes (914/941-1998). REQUIREMENTS: Mac Plus; hard drive; System 6.0.3. LIST PRICE: $429; with WordPerfect 2.0 $679.

A Snappy Story Line isn't Enough
To get your script read. Busy agents, producers, and studio readers expect manuscripts to conform to film and video industry standards.

Traditionally authors have pounded out steady manual typewriters, laboriously adjusting the margins for the various script elements, but many a recent scenario has been composed on a computer using a word processor's style sheets to shape the content. Now, formatting a script is easier than ever before. Here are two products specifically designed to ease the woes of the professional screenwriter.

Final Draft
START TYPING IN A FINAL DRAFT WINDOW and the letters are all capitalized, the proper format for a slug line (scene heading). To format the next script element, a bit of action (scene direction), for instance, hold down the Shift key, and a bar appears at the top of the window listing available formatting elements—Slug Line, Action, Character, Parentheses, Dialogue, Transition, and General—each preceded by a number. Type 2, and your new paragraph is formatted for Action.

If you choose Character format with the character-matching feature turned on, you need type only enough letters to distinguish a character in your predefined Character List, and the full name appears, centered and capitalized. Now hit the return key, and you are in Dialogue for-
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Nowadays, color paint programs are about as scarce as rabbits. Some software vendors (including Electronic Arts and Deneba) even sell more than one paint program. MicroFrontier, designer of Expert Color Paint and Color It, recently added a third program, Paint It, to its line. Color It and Paint It are both distributed by Timeworks.

Color It is the top of the MicroFrontier/Timeworks product line, and it's equipped with a full range of painting and image-retouching capabilities. Among the program's high points are 15 levels of undo; extensive control over antialiasing and feathering; versatile selection tools, including a magic wand that outperforms its equivalent in Adobe Photoshop; an 8-bit masking layer; and direct support for any scanner that offers a driver for either Adobe Photoshop or Aldus Digital Darkroom. And unlike most of the paint programs available in its price range, Color It allows you to selectively revert portions of an image to their last saved appearance or to their appearance prior to the last operation.

With version 2.0.1, Color It's toolbox is improved—it's much less confusing than before. The program also adds a generous supply of filters and a few color-correction options. You can colorize gray-scale images and homogenize blotchy scans. You can also apply special dithering routines when painting and when printing to QuickDraw output devices. Still, while generally more straightforward than before, Color It's filtering and dithering capabilities defi immediate understanding. Command names like Stochastic Light, Convolution, and Jarvis/Julice/Nikke make it easy to forget you're creating artwork and not performing an arcane surgical procedure. One minute, Color It is an entry-level paint program; the next, you need an advanced degree in color theory to get in the door.

Registered users of Color It 1.0 can upgrade for $49.95. But if you plan to purchase version 2.0.1 outright, the retail price—more than twice that of its predecessor—might make you reconsider. Let's face it, at a little over $100, the old Color It was a useful, if not altogether ideal, tool for casual users and novices. At $300, the new Color It places itself in the same price camp as Fractal Design Painter, one of the finest graphics tools for the Macintosh, and one that easily outpaces Color It in the image-creation department.

That's why MicroFrontier/Timeworks' second paint program, Paint It, is particularly refreshing. Though Paint It lacks Color It's image-editing features—masking, feathering, multiple undos, dithering, and filters are all missing—it includes the same cast of versatile selection and painting tools that distinguish Color It from other low-end paint programs. Furthermore, it's incredibly straightforward and easy to use. And at only $60, it's priced to sell. If only Color It were so simple and so reasonably priced, Timeworks would have the low-end bitmap graphics market all to itself.

—DEKE MCCLELLAND

Liberty Bowl I used Color It's paste controls to colorize the moon with a gradient and superimpose the face of the Statue of Liberty. I then overlaid the hands and football and used the program's selective undo capability to restore portions of the background and smooth the edges around the image.
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keys in exchange for the lower cost, size, and weight of a simple tone generator. (There are three sources for ready-to-run MIDI files: online services like America Online, "clip music" disks such as those sold by Passport and Opcode, and local MIDI-equipped musicians.) As an unusual bonus, the TG100 has an Audio In miniplug jack, so you can plug in a traditional microphone (the microphone that comes with the Macintosh doesn't work here) and use the TG100 as a mini-PA system.

Sonically speaking, the TG100 won't convince you that you're hearing a live orchestra. The TG100's 192 sounds are as realistic as those on the popular Roland MT-32 or Sound Canvas—about what you'd expect on a low-cost MIDI instrument. (If you're interested, I recorded some musical snippets with my MacRecorder to give you an idea of the TG100's realism. I posted them on America Online in the Macworld forum so you can download them and play them through your Mac speaker.) You can edit these sounds, but your changes disappear when you turn off the instrument. The TG100 can play 16 independent lines of music simultaneously, each with a different sound, and can strike up to 28 notes at once. And there's a cherry on top: built-in reverber effects, for giving your music a little professional spin.

Unfortunately, the Yamaha TG100's design won't help beginners much. The non-backlit, one-line LCD readout displays only cryptic abbreviations (like "G9G6EPiano2"). And selecting sounds is unnecessarily difficult, as a result of the cost-saving six-button front-panel scheme. The manual, while at least some musical snippets with my MacRecorder to give you an idea of the TG100's realism. I posted them on America Online in the Macworld forum so you can download them and play them through your Mac speaker.) You can edit these sounds, but your changes disappear when you turn off the instrument. The TG100 can play 16 independent lines of music simultaneously, each with a different sound, and can strike up to 28 notes at once. And there's a cherry on top: built-in reverber effects, for giving your music a little professional spin.

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**MicroPhone Pro**

**PROS:** Powerful scripting language; customizable interface; includes send-and-receive fax software; good documentation; good value.

**CONS:** Complicated TCP/IP tools; Loran interface not fully implemented. **COMPANY:** Software Ventures Corporation (510/644-3232). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** $295.

**MicroPhone Pro is the new high-end version of Software Ventures' outstanding communications package, MicroPhone.** The all-you'll-ever-need MicroPhone Pro package includes dependable stand-alone send-and-receive fax software and an upgraded version of MicroPhone II, souped up with a set of tools for connecting with TCP/IP computer networks.

MicroPhone itself is largely unchanged in this version; minor bugs are gone and a handful of features have been updated. For example, MicroPhone now has 18 modem drivers (up from 15), and the program now supports Apple's internal PowerBook modems and a variety of new high-speed modems with built-in error-correction and data-compression features. MicroPhone continues to offer powerful scripting features for automating telecom sessions and a refined interface that can be easily customized.

The most significant part of the upgrade—what takes us from MicroPhone to MicroPhone Pro—is the addition of TCP/IP Tools, which enable you to connect your computer to a Transmission Control Protocol/Internet Protocol (TCP/IP) network. The tools include the required MacTCP system extension from Apple and the MP Telnet Tool, which gives the program the necessary instructions for connecting to a network using the TCP/IP protocol.

You establish a TCP/IP connection by opening the Communications Settings dialog box (accessed through the Settings menu in Microphone's main interface) and selecting Telnet from the Method pop-up menu. This causes a new dialog box to appear in which you enter the host's Internet Protocol address and set the terminal emulation. Once MicroPhone Pro connects to the specified host computer, the rest of the session runs like any standard modem connection.

Most modern users dialing into BBSs or other online services won't have to mess with TCP/IP, but those who need that kind of connectivity will appreciate MicroPhone's scripting language features and well-designed interface. To use the TCP/IP tools, you must be connected to a network; Mac on non-TCP/IP networks, such as LocalTalk, require gateway hardware such as Shiva Corporation's EtherGate or Cayman Systems' GatorBox. The TCP/IP Tools documentation is clear and precise. That's a relief because configuring Apple's MacTCP is complicated and counterintuitive, and an incorrectly configured MacTCP can cause problems across a whole network. As long as you stay glued to the 80-page TCP/IP manual when installing the tools, you'll be fine.

The other big bonus in the Pro package is that it comes with a separate send-and-receive fax application for use with fax modems. STF Technologies' Faxstf enables you to send faxes at 200-by-200dpi resolution from within any Macintosh application by selecting FaxPrint from the Chooser and issuing the Print command. Faxstf also offers customizable cover-sheet options, fax broadcasting to multiple destinations, multiple online phone books for autodialing, and the ability to schedule fax transmissions. You can view fax documents at 50, 75, 100, 200, and 300 percent magnification, and the FaxStatus DA makes it easy to monitor the progress of faxes you send and receive.

MicroPhone and Faxstf constitute a truly comprehensive telecommunications package. Still, one part of MicroPhone Pro is disappointing. Last year, Software Ventures unveiled Loran (Long Range Navigator), a module included with MicroPhone to provide a single interface for dialing into various online services such as CompuServe and GEnie. Initially, Loran's capabilities were limited to sending electronic mail to and from CompuServe and Software Ventures' own bulletin board—but more was promised in the future. Software Ventures originally said additional plug-in modules would be available by the end of 1992, but these are yet to materialize.

Even so, there's plenty packed into MicroPhone Pro. And here's some really big news: With the introduction of MicroPhone Pro, Software Ventures has slashed $100 from the price of MicroPhone II 4.0, which now lists for $195. Without the TCP/IP tools (needed exclusively for communications on a TCP/IP network) or the fax software (generally included when you buy a fax modem), MicroPhone II already offers more than most users need in a telecom program, so it's probably the best choice for most people. And at the new discounted price, it's also a great deal.—JOSEPH SCHORR

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**CPU 1.0j**

**PROS:** Single control-panel interface; accommodates multiple users; many invaluable modules; online help. **CONS:** Some modules of dubious utility; security features easily bypassed. **COMPANY:** Connectix Corporation (415/571-5100). **REQUIRES:** Mac PowerBook 100; hard drive with 200K free space; 2MB of RAM; System 7. **LIST PRICE:** $99.

**A** **S ITS NAME INDICATES, CPU (CO**nnectix PowerBook **U**t**i**l**i**ties) is a collection of utilities designed specifically for PowerBook users. A few of its 13 modules duplicate features of Apple's standard PowerBook software, but most offer new or greatly enhanced functionality. Overall, the indispensable items easily out-number the trivial.

Installation is as simple as running the Installer utility and entering your name to personalize the CPU control panel. Although CPU comprises many different utilities, you access all modules through the single control panel. CPU maintains preference settings that determine how the PowerBook behaves, so you can have certain settings in the office and different ones when traveling. CPU even accommodates multiple users, each with as many different settings as desired.

CPU's power management is its strongest feature. You can greatly extend battery life by specifying how long the PowerBook should wait before spinning down the hard drive, resting the processor, dimming the backlighting, and going to sleep. (The initial version of CPU had a nasty habit of putting the PowerBook to sleep in the middle of long downloads or disk writes.) Recognizing that the optimum time-outs differ depending on whether the PowerBook is running on battery or AC power, CPU lets you specify different settings for each situation.

I especially appreciate the user-configurable Hot Keys feature, which you can use to instantaneously spin down, sleep, and change backlight settings. There's also a key that flashes a large circle around the cursor, helping you locate it after "submarining." There's even a Panic button that quickly hides whatever you are working on—or playing with—behind a graphic of your choosing. One nice addition would be a hot key to toggle into Rest mode to conserve power. Also, since I often forget which key combination does what, I wish Connectix would provide a continues.
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With Astound's included runtime players, your presentations can be viewed by anyone with a Macintosh or Windows PC. Create powerful training, sales or educational materials, even with interactivity and QuickTime, and share them with your friends, staff or customers without additional charge.

A value too good not to try.
Astound's suggested retail price is $399. However, until May 31, 1993, you can get Astound at an amazing introductory price of only $99. No manual covers to tear off or disks to send in. Contact your local dealer, or call 1-800-465-3375 (international call 416-602-4000). Dealer inquiries welcome.

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Circle 298 on reader service card
way to print a cheat sheet listing all hot keys and their functions.

If you hate the trackball, you'll love Keyboard Power because it lets you access just about any menu or dialog box option with keystrokes. CPU automatically locates all of the options available at any given time and underlines the letters you must type in combination with the modifier keys of your choosing. Connectix should provide a separate Keyboard Power extension for users who want the same functionality on their desktop Macs.

The Indicators and Display modules present important information along the right-hand side of the menu bar. For example, Apple's Battery accessory, the graphic battery indicator shows the charge level, and it also provides a rough estimate of the remaining battery life (in time or percentage of power remaining) by monitoring your power consumption. Other optional indicators include date, time, speed of the processor, and icons warning when the PowerBook is about to sleep or when the hard drive is going to spin up or down. I think the Caps Lock indicator is worthless since you should know that key is depressed whenever everything you type appears in uppercase. Connectix allows you to disable the Caps Lock key altogether.

CPU can be set to request a password at start-up or upon waking up from Sleep. If you prefer, CPU can require you to click in a secret area of any graphics image (interesting, but more a gimmick than a needed gadget). Anyone can bypass both of these security features, however, by simply inserting a bootable System disk and restarting. If you need true security, I recommend Fifth Generation's DiskLock instead.

CPU's LCD Saver "conditions" the screen—by inverting black and white pixels during periods of inactivity—to prevent ghosting and frozen pixels. This isn't exactly entertaining, but according to Connectix, the liquid crystal display in the PowerBook requires a different kind of screen saver than the type traditionally used on phosphor-based monitors. Any screen saver is better than none at all, but I doubt LCD Saver is better for your PowerBook than Berkeley Systems' After Dark or Fifth Generation System's Pyro.

You can duplicate much of CPU's functionality in the Finder's dialog boxes by combining individual public-domain shareware programs. But you'd have to put up with disparate user interfaces, inevitable compatibility problems, and multiple update hassles. Even at its full list price of $99, CPU is a relatively inexpensive way to turn a mere PowerBook user into a full-fledged power user.—OWEN W. LINZMAYER

PowerMerge 1.0.2

JUST WHAT IS FILE-SYNCHRONIZATION SOFTWARE, you ask. Webster's defines synchronize as "to make synchronous in operation," and "to... arrange (events) to indicate coincidence or coexistence"—a pretty good description of PowerMerge.

It updates selected files so that different Macs end up with identical versions of the selected documents. Autorunization, selective file transfer, and the ability to recognize conflicts (files that have the same name but different creators, creation dates, or file types) give file-synchronization software an advantage over dragging-and-dropping files to get the same versions on various Macs.

PowerMerge's three-step synchronization scheme is definitely convenient. Install PowerMerge on the Mac with the files to be synchronized, on each Mac select the files or the folder containing those files, and preview the files or folders selected. That's it.

You can name and save an unlimited number of synchronization setups. I have several since I sync many databases individually—unfortunately, my databases aren't organized in a folder.

PowerMerge's best feature is the Preview window. The Preview window compares the two folders you want to sync, and before synchronization, displays the folders' contents and indicates which of the selected files need to be updated, plus any files in conflict. You can resolve some conflicts from the Preview window by excluding or even trashing selected files. This approach is more practical than skipping over conflicting files and having you resolve the conflicts individually, as Magnet does (see Review, February 1993).

The Preview window's icons and keyboard commands let you easily trash old files, exclude files from syncing, or synchronize a previously excluded file. You can use the icons to navigate nested folders or move among files to be synchronized or from one conflicting file to another.

PowerMerge 1.0.2 allows you to synchronize the contents of the System Folder. The ability to synchronize the System Folder is particularly useful for saving or transferring preference files or folders across Macs. You must specifically designate each file within the System Folder to sync. This extra step should help prevent inexperienced or frazzled users from inadvertently having two System files on their Macs.

Now the interface. PowerMerge uses a conceptual view called Left-Right. The idea is this: the Mac or folder with the preeminent files is located on the left. On the right is the Mac or folder with auxiliary files. Volumes update from left to right when both left and right are active. With a locked volume, PowerMerge synchronizes one-way instead of the normal bidirectional transfer.

Sounds straightforward, and many users find it easy; but it's really like a Rorschach test, a software inkblot in which some people see a coherent picture and others nothing recognizable. For those in the latter group, Leader has an additional interface, based on the 7.0 Finder, that is expected to ship in 1993.

Either read the manual and know for certain in which group you belong, or take the plunge. The interface does take getting used to, but it's hard to get lost when PowerMerge has only three steps; plus I mostly grasp this Left-Right business—although anyone who rides in my car may dispute that. When I did get confused, I used PowerMerge's online help. Only rarely did I consult the manual.

Interface aside, PowerMerge's biggest drawback is the licensing agreement, which limits users to two copies of PowerMerge per purchase, one for each machine. Those with simple-use needs won't be inconvenienced. However, if your needs are more complex—say, from one desktop Mac to ten PowerBooks, or one desktop to several file servers—PowerMerge rapidly becomes expensive. I don't consider myself a power user, but the licensing agreement immediately cramp my style, as I wanted to update two volumes—a file server and a SyQuest cartridge—from my file server. I would have needed to buy another copy of the program. Leader Technologies plans to offer multuser copies and site licenses; users should call for pricing.

Don't get me wrong—PowerMerge is a fine product. I can definitely live with floating dialog boxes that don't quite stay put and the lack of a Cancel button on screen during the merge process (of peri­od [I] works but is not documented), but these are minor inconveniences when I look at how much easier my file-update process has become since switching to PowerMerge.—SUZANNE COURTÉ
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ArtBeat Professional 1.0

**PROS:** Multiple layers; great autotrace feature; blends objects along a path.  
**CONS:** Limited color capabilities; no masking or gradient fills; rudimentary text-editing and core drawing capabilities.  
**COMPANY:** Pie Practical Solutions (201/902-9500).  
**REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.3.  
**LIST PRICE:** $249.

ArtBeat Professional is an inexpensive paint and draw program imported from Europe that combines object-oriented and bitmap graphics, along the lines of Deneba’s Canvas or Aldus SuperPaint. But while it’s surprisingly fast and generally easy to use, ArtBeat lags well behind its American counterparts in the features category.

ArtBeat Professional offers separate drawing and painting layers, as does SuperPaint, but where SuperPaint supplies only one layer for each, ArtBeat lets you create as many as 255 layers and lets you mix up paint and draw layers indiscriminately. Unfortunately, all of ArtBeat’s layers are hampered by color limitations. Each painting layer can accommodate no more than two colors. Each drawing layer can take advantage of 256 colors, but you can’t have more than 256 colors in the entire graphic. By contrast, SuperPaint 3.0 offers 16 million colors in both the drawing and painting modes. If you use Microsoft’s Switch-A-Roo or Chris Sanchez’s PixelFlipper, beware of changing screen depths while using ArtBeat. Any time you change the number of colors your monitor can display, ArtBeat restores the default system palette, thereby completely upsetting the color of objects in your drawing.

Though ArtBeat’s painting capabilities are scant—more like those of Canvas as opposed to SuperPaint—ArtBeat offers a remarkable autotrace feature for converting bitmaps to objects. Not only can you filter out random pixels when tracing an image, but you can also preview the effects of different settings on the current selection and specify the drawing layer to which ArtBeat sends the finished object. The dialog box is a bit bewildering, but the feature provides a degree of control matched only by the stand-alone Adobe Streamline.

ArtBeat can also blend objects along a path. After creating a series of intermediate blends between two objects, you can bind those blends to a free-form path. This feature has been available to Microsoft Windows users for a couple of years in Arts & Letters and CorelDraw. Unfortunately, ArtBeat lacks a masking function, so there’s no way to fill objects with blends. ArtBeat also lacks gradient fill patterns.

ArtBeat’s other features just don’t cut the mustard. Bézier curves can’t include cusp points—corners between curved segments, as in the horn of a crescent—almost entirely undermining their benefit over less sophisticated smooth polygons. When you edit smoothed polygons, ArtBeat displays them with straight sides, making it nearly impossible to predict the results of your edits. You can’t append points to the end of an open path, you can’t open or close existing objects, and you can’t change the identity of existing objects. Text isn’t much better. You can bind text to a path, but you can’t kern characters, you can’t justify a paragraph, and you can’t adjust leading.

None of this is to say ArtBeat is awful. The interface is straightforward, the documentation is well translated, and the program requires little memory. If ArtBeat had come along two or three years ago, I might have recommended it. But there’s no denying the existence of at least two programs—SuperPaint and Event One’s Michael’s Draw—that offer many more capabilities for less money. Even the four-year-old MacDraw II, also less expensive, is a better all-around program.—DEKE MCCLELLAND

OrgChart Express 1.0

**PROS:** Combines database and organization chart functions; solid array of design and adornment options; supports passwords; extensive help.  
**CONS:** Many key-click and option-click procedures to learn; no field formatting.  
**COMPANY:** Kaetron Software Corporation (712/890-3434).  
**REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.5.  
**LIST PRICE:** $279.

The program provides six predefined tile styles, but you are free to design your own. It’s up to you which fields appear in a tile. Although you can set fonts, colors, and styles for each field in a tile, you cannot specify more detailed formatting options for any field other than the name field. You can’t, for instance, set a “currency” format that will automatically include dollar signs and commas for a salary field. Each chart can contain as many tile styles as you like. You can also specify the way tiles are grouped; subordinates can be arranged in ten different patterns, for instance.

You enter information in a tile by typing directly on the face of the tile or by popping up the Single Record Editor, the program’s database. Within the editor, you can page through records and display them in any order.

When there’s turnover in a position or a new position is created, it’s easy to move existing personnel into the open slots. Simply double-click on the tile for the person you wish to move and then click on the destination tile. Personal information (the employee’s name and phone number, for example) is transferred with the move to the new tile. Positional information, such as the position title and office number, remains with the original tile.

OrgChart Express is extremely flexible. Many of the program’s functions can be selected from tear-off palettes. Because a chart or its underlying database may contain sensitive information, the program offers two types of passwords: one for the owner and one for potential guests.

There are plenty of options for dressing up charts. You can select, for example, a different border and shadow style for each tile. Charts can include graphics, and program tools allow you to add text, lines, boxes, and arrows. You can also add color or shades of gray.

However, OrgChart Express is not simple. The key-combinations do anything unusual, such as enlarging a data field in the Single Record Editor (press the option key while clicking on the field to be resized), require frequent references to the manual or to the extensive online help system.

Also, if you’re the person charged with doing organizational charts in your company, you should think about getting a two-page display. Designing an org chart on a built-in 13-inch monitor is extremely difficult because of the constant need to switch among the screen magnification and reduction options.

Still, when you get tired of doing organization charts in your draw program, you should definitely consider OrgChart Express. Although it has a fairly steep learning curve, the payoff is well worth the effort. —STEVEN A. SCHWARTZ
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**A-Train**

**PROS:** Great details; wonderful graphics.

**CONS:** Relatively high learning curve; interface not sufficiently Mac-like.

**COMPANY:** Maxis Software (510/254-9700).

**REQUIRES:** Mac Plus; hard drive; System 6.0.5.

**LIST PRICE:** $69.95.

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I am a sim nut: that word processing, telecommunicating, and databasing I do is just a cover for my multiple virtual careers as a jet pilot, city planner, warrior, and paper airplane. So naturally I was thrilled to receive A-Train. This was a railroad simulator, and I love trains!

First let me praise some of what's done right. The graphics are stunning. The basic scenario opens to a breathtaking landscape: a sleepy suburb next to developing new rail lines and activity around them. The other scenarios, which depict a precarious empire of transportation, real estate, and stocks, are even more impressive. You view a seething riot of houses, skyscrapers, golf courses, stadiums, department stores, factories, and, above all, train lines chugging along. You can see how careful nurturing will cause a bustling metropolis to spring from a bedroom burg.

As in other Maxis simulations, the detail is astonishing and often witty. A-Train's progress is marked by hours; the sky darkens every evening, and night falls. Fireworks explode in the summer, and on Christmas Eve, Guess Who rides by on his sleigh. The details that concern you more, however, involve the tracks you lay, and the stations, apartments, and commercial buildings you construct. If you do these things logically, the city thrives, as does your personal fortune. With the exception of sometimes-tricky track laying, everything works well.

A-Train is not merely a train simulation, but a financial one as well. Unlike with SimCity, which it somewhat resembles, the goal is not developing an urban area with a happy populace, but becoming a magnate. Familiarity with spreadsheets and profit-and-loss statements is helpful. It's satisfying to see your bottom line grow, but the real thrill is watching the train lines grow, with areas around stations exploding with activity as a result of your planning acumen.

A-Train does have its downside. The program meets the Mac interface only halfway—you can't keep multiple windows open, and you can't get information about objects on the screen by double-clicking on them. A more serious limitation is conceptual. Perhaps because of A-Train's Japanese origin, the mind-set here is less the gritty gestalt of American railroading than the world of sleek commuter trains. If you lust for the former, I suggest a less artistic but equally entertaining simulation, Sid Meier's Railroad Tycoon, from MicroProse.

Finally, A-Train is a little slower than other Maxis's and requires a good understanding of the ground rules before anything can happen. You'll have time to kill while your factories churn out building materials—I spent it usefully, reading A-Train: The Official Strategy Guide by Nick Dargahi (Prima Press, 1992). This guide, like A-Train's manual, is loaded with lore that illuminates a charming and diverting simulation program.—STEVEN LEVY

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**Media-Pedia Video Clips**

**PROS:** High-quality recordings; well indexed; some formats are SMPTE time-coded.

**CONS:** Synchronized audio sometimes detracts from video; steep price tag; COMPANY: Media-Pedia (617/235-5617); REQUIRES: Mac II; reliable VR; digitizing board: QuickTime; LIST PRICE: VHS $195; S-VHS, Hi8, and 3/4SP $299; BetaCam SP $995.

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Looking for a clip library of QuickTime video sequences? With QuickTime in a state of flux, now is probably not the best time to invest in digital movies. If you have a QuickTime input device, such as SuperMac's VideoSpigot or Radius's VideoVision, you're better off recording from stock video footage. That way, the next time Apple upgrades QuickTime's play speed, frame size, or compression capabilities, you can upgrade your movies by simply re-recording them.

The trick, then, is to locate stock footage. If your local library has a video department, you can probably find a tidy sum of sequences in the public domain. But even assuming that you find what you want, you're not guaranteed quality. Most library videos play as if they spent their formative years strapped to the front of bumper cars. A more reliable, and more expensive, solution is to purchase a collection of public-domain footage, such as Media-Pedia (as in *encyclopedia*) Video Clips.

Media-Pedia contains 57 minutes of stock footage—the kind of stuff you'd spend hours trying to piece together on your own. More than 150 segments are included on a single videotape, offered in a variety of formats, everything from standard VHS to BetaCam. Covering the entire twentieth century, most of the sequences are from the thirties, fifties, and seventies (the eighties are remarkably underrepresented).

In addition to listing sequences in the order in which they occur on tape, the manual contains alphabetical and chronological indexes, perfect for locating a quick flick. The BetaCam and 3/4SP formats include SMPTE time codes; other formats are indexed by time in minutes and seconds. If your VCR provides some other form of counter, you'll have to jot down the sequence locations manually.

The sequences range from unremarkable (flybys of fields and orchards) to dramatic (tornadoes ripping apart homes) to genuinely funny (aggressive hordes of pigeons making moonseasick in their efforts to nurse). Audio tracks have been tacked on to most of the silent scenes. While most of the synchronized audio enhances the video—a scene at a playground aptly features the sounds of kids playing—other scenes would have been better left soundless. One sequence, a line of dandified men, is debased by an almost embarrassingly contrived laugh track. Nearly all the space footage features a constant *funk* *fawb* that eventually bores holes in your head. While you can easily separate video and sound when recording movies to disk, Media-Pedia's licensing agreement prohibits you from mixing and matching the tape's audio sequences.

For $195 you get the VHS tape and permission to include up to 15 minutes of Media-Pedia footage in any single production or presentation. The licensing agreement also warns that you can be sued by someone who appears in a sequence if you use the person's likeness in a manner that is libelous or intrudes on his or her privacy. (To its credit, the manual even provides a special section on libel and privacy law.)

If you're used to paying $20 for a movie at WalMart with a straightforward FBI warning—Record this and die!—Media-Pedia's price and terms may seem a bit daunting. But if you're serious about acquiring stock footage, Media-Pedia is a good value. I hope this idea will catch on and we'll see longer collections at more affordable prices in the future.—DEKE MCCLELLAND
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Humor Collection

Just Joking 1.0

PROS: Wide variety of topics and sources; good interface; you can add or delete text to personalize program. CONS: Many of the entries didn't strike me as all that funny. COMPANY: WordStar International (415/382-8000). REQUIRES: Mac Plus; hard drive; System 6.0.5. LIST PRICE: $49.

NORDSTAR INTERNATIONAL, purveyor of such prosaic writer's aids as Correct Grammar and Correct Writing, now offers something on the lighter side: Just Joking, a HyperCard stack of around 2800 humorous quotations. According to the box, Just Joking is perfect for, among others, "a business writer who knows the value of a funny line." Because that describes me to a T (and since I seem to have contracted a near-fatal case of writer's block), I decided to utilize the program while writing this review.

Since this is a computer magazine, perhaps I should start off with some plausibility about computers. I begin by searching the entire stack for the word computer. I get a few references in the program's credits, and only one mention in a joke, which doesn't happen to work here. So I try a new tack. Looking under C in the list of 250 topics, I see 17 categories. Hmm, California... Capital Punishment... Celibacy... Crime & Crooks—if only I were writing about a lonely Silicon Valley hacker who goes to prison for his misdeeds. Alas, Computers isn't among the headings. But wait! There's a listing for Critics. I'm writing a review, so maybe there's something I can use under that topic. I click on Critics and am presented with three quotations, none of which works in this context. But a helpful note says "see also Journalism." I jump to Journalism, and copy and paste the following lines, from Nicholas Tomalin: "The only qualities for real success in journalism are ratlike cunning, a plausible manner, and a little literary ability. The capacity to steal other people's ideas and phrases...is also invaluable." Too true.

The "see also" note for Journalism suggests other topics, including Magazine Editors, Writers, and Writing. I glean a few witticisms, to wit: "Always remember that if editors were so damned smart, they would know how to dress," from Dave Barry (take that, you magazine editors!), and "A little inaccuracy sometimes saves tons of explanation," from Sali. You get the picture. Just Joking can (sometimes) help you spice up writing or speeches with clever sayings. My sentiment, should anybody care, is that no amount of joking can help a bad speaker or a bad writer, but perhaps some humor can help assuage the audience's pain. Just Joking offers a pretty good selection of sayings from a diverse group of humorists, comedians, philosophers, writers, and others, including Robert Benchley, Dorothy Parker, Milton Berle, Will Rogers, Erma Bombeck, Jackie Gleason, and Morris the Cat (I guess the last legitimately falls in the "others" category, but frankly, I didn't find his quip too funny). If the inclusion of contributors such as Charles "Mr. Yeks" Baudelaire or Bertolt "Laff Riot" Brecht puzzles you, keep in mind that some of the entries are ironic or cynical, rather than flat-out funny.

Just Joking can be a handy writer's tool—if it happens to cover the topics you're looking for. If it doesn't, you can always type in your own entries, making it into your personal humor database. Its format doesn't break any new ground for an innovative look at humor, see Warner New Media's Funny, a CD ROM full of QuickTime movies of people telling jokes), but it's a serviceable collection. I'll leave you with some advice from Noel Coward: "Wit ought to be a glorious treat, like caviar; never spread it around like marmalade." —ERFERT FENTON

Network Simulation

NetVirtual 2.0

PROS: Flexible. CONS: Slow; poor interface for setting up tests; cannot save custom settings; difficult to analyze results. COMPANY: Edectec (408/462-2040). REQUIRES: Mac Plus; 4 MB of RAM; System 6.0. LIST PRICE: $995; $4985 for unlimited nodes.

NETVIRTUAL IS A ONE-OF-A-KIND network-simulation product, but sadly it is incomplete. Designed for network administrators, NetVirtual lets you determine whether a new network design will work or whether changes to an existing network will adversely affect users. The program simulates time delays through the components (such as routers or file servers) of a network you have modeled and reports results back to each workstation (represented by a named icon in a worksheet).

However, NetVirtual does not simulate errors in the network or indicate incompatibilities between products. Nor does it report network failures during boundary conditions (periods of high and low network traffic)—a major shortcoming of the product.

But NetVirtual's worst problem is its interface: Mouse performance is poor and screen redraw slow; there is no library of custom icon settings; you cannot save changes to default icon settings; and the comparison tools for analyzing differences in workstation icons are inadequate.

Additionally, even with a relatively small network (approximately 50 nodes), NetVirtual users face the daunting task of assigning work loads for each workstation.

To simplify setup, NetVirtual lets you represent several identical workstations with a single icon. For example, you can represent five users in a workgroup with one icon by setting the icon's count to five. Because grouping users means fewer icons on the screen, redraws go faster. To group workstations, however, you must be sure that all of the users represented have the same type of computer, have hard drives with similar performance, and access the network the same number of times each hour. Representing a network with only a few icons may require unrealistic assumptions. Most network administrators manage large networks with many components and many kinds of users, so characterizing network use alone can be a huge task. You can use icons to represent individual workstations, but the more icons there are, the slower the performance.

For my tests, I modeled Macworld's network of 70 users. After I generalized workgroups into 12 icons, it took me hours to set the work load for each group. I had to click on and select from as many as 21 buttons and pop-up lists for each group. For my 12 groups, it took over 400 distinct steps to set network parameters! (Default settings for each icon can be changed, but changes cannot be saved, and it is impossible to save custom settings as icons in a library.) Additionally, the onus is on you to know exactly how workgroups use the network.

Only after hours of setup will your simulation report anything meaningful about your network. If you're like me, running a simulation is only useful if you can compare the network's resilience during periods of heavy use with its performance during light use. In NetVirtual, you can duplicate a worksheet and then compare the differences by workstation, by network, or overall. NetVirtual's graphs are difficult to use, and you can automatically compare icons within the same model, or icons with different names. The detailed reports generated by NetVirtual are long and cumbersome and would be more useful if they were organized into functional groups like workgroups or departments. NetVirtual needs dialog boxes that allow users to establish connections or view results in one step. Until Edectec improves the interface, I will use my intuition and experience to design efficient networks.—TIM WARNER

160 April 1993 MACWORLD
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INCLUDES OCR TECHNOLOGY FROM CAERE." THE MAKERS OF OMNIPAGE."
Arthur's Teacher Trouble

**PROS:** Long-lasting entertainment; laughs for all ages; motivates kids to read. **CONS:** Hefty hardware requirements. **COMPANY:** Broderbund Software (415/283-4400). **REQUIRES:** Mac II; 4MB of RAM; CD ROM drive; 256-color monitor; System 6.0.7. **LIST PRICE:** $59.95.

**Focus:**

WHEN WE REVIEWED JUST GRANDMA and Me, Broderbund's first Living Book, last August, our popularity skyrocketed with the local under-ten set. So we naturally had plenty of volunteer testers for Broderbund's latest, Arthur's Teacher Trouble, by award-winning author Marc Brown.

Instead of just having young readers flip pages on screen, the computerized version of Arthur's Teacher Trouble invites them to explore and interact with the characters and objects in the story. A mouse-click almost anywhere on the screen causes something to happen (and not always the same thing twice, even for the same spot)—a hilarious animated sequence, a playful sound, a spoken phrase, or all three. Click on a trash can in the school hall and a pair of curious eyeballs peers out while a detective-style musical theme plays. Clicking on the poster reading "Learn to Fly" on the bulletin board causes the poster to fold itself into a paper airplane and fly away, accompanied by a rock guitar riff. Find the right place to click in a later screen and the paper airplane flies through again. Meanwhile, the monster in the picnic basket will eat anything it can get its hands on. Arthur's Teacher Trouble is filled with so many things to explore that after several trips through the story, a young reader will still find surprises.

This Living Book is aimed at a slightly more sophisticated audience than the first one: the six-through ten-year-old crowd that can relate to Arthur's problems at elementary school. But our preschool testers had a great time with it, too—as did the older kids and adults. Like "Sesame Street," Arthur's Teacher Trouble has an occasional dash of humor to keep parents alert and involved. For example, clicking on the classroom globe causes it to spin to the theme of the soap opera "As the World Turns."

Arthur's Teacher Trouble is also designed to subtly teach while it entertains. For example, at one point Arthur studies a long list of words for a spelling test. Rather than just watch him study, the reader can flip through the list and click on a word to hear it spelled correctly and see a related animated sequence. You can set the program to read each page aloud: highlighting words or phrases also causes the computer to pronounce them. What's more, the program is bilingual; it can present the story in English or Spanish.

Some educators and parents fear that this kind of high-tech "entertainment" will turn kids away from books. Not so for our six-year-old neighbor Jacob. After playing with the program for an hour, Jacob asked to borrow the storybook that came in the package to read it with his dad. When he returned the book the next morning, he said he liked it a lot and hoped he could play computer again soon.—GEORGE AND BEN BEERKMAN AND THE SHOOBEE DOOBEE SOFTWARE TESTING TEAM

Hellcats Over the Pacific 1.0.3

**PROS:** Smooth graphics; good special effects; spiffy documentation. **CONS:** Compatible with only one external flight stick. **COMPANY:** Graphic Simulations Corporation (214/699-7400). **REQUIRES:** Mac II; 2MB of RAM; hard drive; System 6.0. **LIST PRICE:** $69.95.

**Focus:**

IT'S A SUMMER DAY IN 1945 AND YOU'VE just lifted your F6F Hellcat off the Navy carrier deck. A strip of deep blue Pacific lies between you and your Solomon Island objective. Suddenly, an enemy plane fills your windscreen, machine guns blazing. As it flies past, you quickly roll inverted and pull through to come up on his 6 o'clock.

It's not a dream. This is Hellcats Over the Pacific, a simulation of the F6F Hellcat that earned a reputation in the latter half of WWII as a fast, agile, and powerful fighter. Hellcats is an equally fast, agile, and powerful reproduction of the F6F and its Pacific-theater environment.

The Hellcats package includes a concise manual, a period map of the Solomon Islands, and one extremely classy bonus—a facsimile of the original Navy F6F Pilot's Handbook, with detailed operating checklists and cockpit photographs, a fighter-tactics tutorial, and an introduction to aircraft aerodynamics. Although warbird fanatics will appreciate the fighter-pilot arcana, the 120-page handbook is optional reading; the Hellcat manual gives the instructions you need to fly and enjoy the program.

Hellcats visuals are stunning. In the forward view, you peer over an F6F instrument panel and through a large windscreen. You can switch between left, right, and rear views with the arrow keys, and you can change viewpoints to such outside vantage points as the control tower, a chase plane, or even an enemy plane. In 16-color mode on a Mac IIc the graphics are smooth and fast. To maintain that performance in 256 colors requires a faster Mac, but a IIci easily keeps up on a 16-inch monitor. The program adjusts to fill any size screen.

You fly using the mouse, the keyboard, or an optional Gravis ADB MouseStick (from Advanced Gravis Computer Technology), although the MouseStick limits the screen area to 848 by 848 pixels. Buttons on the MouseStick can be used to fire guns, drop bombs, or control throttle, flaps, and landing gear, adding realism. The instrument panel follows the actual F6F layout, with one concession—a radar screen, nonexistent in the actual F6F, lets you more easily find and engage enemy aircraft.

You must be at the rank of ensign and select one of eight missions, each with a dossier noting targets and other information. Hellcats keeps score as you do battle and promotes you accordingly. During a mission you encounter Hellcat's many special effects: digitized sounds for everything from engine noise to bomb release; selectable scenery detailing trees, clouds, and haze; and a bumpy ride when taxiing on grass. When you crash, a replay shows the disaster from outside the aircraft, down to the fiery explosion and resulting hole.

All in all, Hellcats is an exceptional flying experience.—MEL BECKMAN
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Who can resist MACWORLD Expo? It's the original Macintosh-exclusive show - a paradise of new hardware, software and peripherals. Mac enthusiasts go there to feast on the latest Mac toys and indulge their lust for power (RAM, ROM and otherwise). They bask in the warm glow of 21" color displays and ask questions like, "Can man's fall from grace be animated on an FX?"

Qualified Macheads are on hand to show users the tricks of the trade, and there are plenty of Macs provided on-site for impromptu practice sessions. Users try out new software for home and office, separating the quick from the dead, and getting expert critiques on a wide range of applications. In fact, there are so many experts at MACWORLD Expo, it's like you're hearing the word of G...(well, uh, you know what we mean).

In the end, it's only natural that an event as big and exciting as MACWORLD Expo would be an irresistible temptation to over 100,000 Mac enthusiasts in North America. (And it's no surprise that companies would practically part with their ribs to exhibit). True believers know that glory is never more than an upgrade (or two) away. And sticking with the same old program is almost a sin.

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The Secret Codes of C.Y.P.H.E.R.

PROS: Intriguing; unusual combination of educational information
CONS: Unescapable, repetitive animations; copy-protection scheme.
COMPANY: Tanager Software Productions

CY.P.H.E.R. IS SHORT FOR COURAGEOUS young partners in hush-hush electronic radiotelegraphy. Yes, it's another educational game where the student belongs to an organization with a mysterious acronym for a name. This one sets out to teach an intriguing, if bizarre, series of facts including information on a variety of mammals, Morse code, American Sign Language (ASL), braille, and semaphores. Of course, along the way, the student is supposed to have fun.

When you begin, you have a certain number of energy units, depending on your skill level. All your actions use up energy units, which are displayed through the watch icon. This icon contains your decoder tool and a button for saving or quitting. You also use the watch to review clues and, through the FunCyclopedia, to access a wide variety of information. There are minor flaws, including a button that clicks like a button but doesn't do anything else and some screens that carry the title "Even More Information" but are otherwise blank.

As you begin a game, you receive three contact sheets, each with a different address. A image of a city, with neighborhoods, appears on the screen. Each neighborhood has streets named after a different item, such as dogs, mountains, gemstones, and so on. Your job is to click on a neighborhood based on the addresses on your contact sheets. If you're correct, an agent gives you part of your cipher. You then see your three contacts, who tell you brief facts about a mammal.

The second part of the game uses those brief facts. Clicking on an icon of the screen takes you to the wildlife preserve, where it's your job to find the mammal described by the contacts. This is trickier than it sounds, because the facts are fairly obscure. Furthermore, an incorrect guess costs energy units. As you move through the wildlife preserve, you see pictures of the mammals, with their names underneath. Clicking on the name selects the mammal, and if your answer is correct, you receive three more contact sheets.

Contact sheets in hand, you head back to the city and go through the same thing again. If you succeed, after your third trip you have all three parts of a cryptogram, and it's time to solve a puzzle. The puzzles come in English, the ASL alphabet, braille, Morse code, and semaphore. Unfortunately, the puzzles are scrambled letters. If you choose an unfamiliar alphabet, you have to unscramble the letters, as well as decode the message. A hint button replaces letters for you, but each letter costs one energy unit. Basically you have to use the hint button to figure out the cipher. I found that disappointing. And learning the alphabets from the ciphers seems close to impossible. The ASL alphabet appears as very small pictures of hands, and some letters are almost indistinguishable from one another.

Throughout the game there are brief animated sequences. They're nice, but nothing special; and there's no way to skip them or stop them once they've started. After you've seen them 50 times, they become a long, slow torture.

Some aspects of C.Y.P.H.E.R. are both interesting and educational: in particular, the FunCyclopedia and the information on mammals. But the ciphers themselves disappointed me, and the animated sequences almost drove me crazy.—WENDY SHARP

FINANCIAL SOFTWARE

Compare-A-Loan 4.0.2
LoanLease Library 3.0.3

PROS: Compare-A-Loan accommodates variable rates and time bases. LoanLease Library has a huge variety of payment schedules, including skipping payments and computing penalties.
CONS: Both have minor eccentricities.
COMPANY: Softflair (612/894-3357).

REQUIRES: Mac Plus. LIST PRICE: $79.95 each.

LARGE FLUCTUATIONS IN INTEREST rates over the last ten years have made gamblers out of the most security-oriented, conservative citizens. Whether you like it or not, simply buying a house means that you are personally affected by every move at the Federal Reserve Board; in effect, you've become a bond trader if you have any real estate at all. Even deciding whether to lease or buy a car demands a computation that includes interest and tax deductibility.

So while software for loan evaluation might seem to be an overly narrow focus, it turns out to represent a trivial investment compared with the amount of money at stake in typical transactions. Softflair's two products for loan evaluation are oriented toward professionals (actually, they're better than the mortgage-calculation programs found in most real estate offices). The first program, Compare-A-Loan, is oriented toward home loans, and makes reports that compare payback schedules in columns. You can see, for example, whether you should choose to pay two origination points on a loan in return for a half-point break on interest; choose variable or fixed rate (you can enter different likely rate schedules for the variable); pick a bi-monthly payment schedule instead of monthly, or go for the new 15-year mortgages made plausible by lower rates.

The scope of Compare-A-Loan may be understood simply by looking at the choices under the Payments menu: Graduated or Flexible, Principal Only, Skipped, Fixed Principal, Double Every Twelfth, Round-Up on Solve, and Balloon at Term—this goes far beyond what you can do conveniently on a calculator or even with an Excel template. All these options are explained clearly in thorough documentation (I didn't know Canadian mortgages were computed differently). Use of all key combinations is a bit inconsistent and you have to select Print from the File menu to get an on-screen report, but otherwise Compare-A-Loan is a model Mac program.

LoanLease Library is structurally similar, but it assumes that you are generating a loan or lease and need to keep track of payments. That is, the program generates payment schedules, but you are expected to enter "date received" for payments. Like Compare-A-Loan it can compute penalties for late and skipped payments, but it also allows schedules of fixed payments with variable lengths of payment time (as opposed to fixed-term mortgages). Although it's oriented to lenders, consumers can use it to generate leases for a Saturn or a Quadra 950 for tax evaluation of a lease/buy decision.

As someone leasing equipment to others, you can use LoanLease Library to determine return on investment under different sets of lease terms, a complicated business if you are financing the equipment yourself. LoanLease Library is also well documented and easy to use, if you watch out for little eccentricities in every other Mac program (all-V means Paste, while here it calls up the variable interest rate dialog box).

Both these programs are professional-quality financial software but are structured and documented so that mere civilians can use them. Softflair has done a good job of taking the mystery out of a confusing topic, and unless you live your whole life on a cash-only basis, you should take a look at Compare-A-Loan and LoanLease Library.

—CHARLES SEITER
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Publisher: Fifth Generation UDN034

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MacKids Jungle Quest
By Mike Solomon. The quest to rescue captive King Kool from the perilous depths of the mysterious southern land. Along the way your kids will conquer the four basic skills they need for success in elementary school. Ages 6-12 years. Requires HyperCard 2.0. Publisher: Nordic Software. EDI-0556

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Also available: ACT! for Macintosh Competitive Upgrade BD030 $99

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Publisher: Fifth Generation UDN034

Bridge 7.0
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Publisher: Arrows ENTER1
Also available: Graal Quest- a graphic adventure. ENTER3 $10
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Accountant Inc. 3.5 Multiuser Version
Accountant Inc. 3.5 Multiuser Version 1.5 Bundle-1992 Mac User Award for Best Financial Program. Offers all the same features as single user, plus the convenience of multi user. Games with software for 3 users. FIN015 $569
Publisher: Sofftek, Inc.

AutoDoubler 2.0
AutoDoubler is the easiest way to increase your hard disk capacity. It resides in the background and automatically keeps your hard disk compressed. It's lightning quick and completely transparent, so it won't interfere with your work. In fact, AutoDoubler's new patent-pending technology lets your Macintosh use free files and applications while they are still compressed. It's fully compatible with almost all applications, disk accelerators, and system extensions.
Publisher: Fifth Generation UDN034

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ACT! keeps up-to-the-minute files for all your contacts — with customizable fields, date-stamped notes and an auto-generated history log. The improved utility scheduler, with graphical calendar views, lets you schedule unlimited activities. Redesigned using ACT!'s "drag and drop" feature. Produce professional correspondence with the included field-oriented WYSIWYG word processor with spell checker. Even includes pre-defined and custom reporting. ACT! is the professional way to manage your contacts and activities.
Publisher: Contact Software BIL1024
Also available: ACT! for Macintosh Competitive Upgrade BD030 $99

AutoDoubler 2.0
AutoDoubler is the easiest way to increase your hard disk capacity. It resides in the background and automatically keeps your hard disk compressed. It's lightning quick and completely transparent, so it won't interfere with your work. In fact, AutoDoubler's new patent-pending technology lets your Macintosh use free files and applications while they are still compressed. It's fully compatible with almost all applications, disk accelerators, and system extensions.
Publisher: Fifth Generation UDN034

Bridge 7.0
Bridge 7.0 pits you and your computer partner against two computer opponents on your Mac. Improved color graphics and screen layouts plus enhanced bidding and play, make it more fun. Your computer opponents have their own personalities, and dialogues. Bridge 7.0 recognizes the starman and blackwood conventions and allows you to adjust the style from conservative to aggressive.
Publisher: Arrows ENTER1
Also available: Graal Quest- a graphic adventure. ENTER3 $10
KaleidoRubes - a mind-bending game. ENTER2 $12

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The Lazy Dog Foundry designer (each font is “designed” by a pro) changed my a and e so that they could blend into other letters (one of the constraints imposed by Type 1); most of the other letters did a fair job of matching my handwriting (see “All in Your Connections”).

A personal handwriting style is difficult to capture in a Type 1 font. These fonts have fairly rigid structures for characters and the spacing between them; a Type 1 handwriting font does not look handwritten. Handwriting has random inconsistencies—for example, the way you join letters together or the flourish you add to the end of a word. Since handwritten letters, especially cursive, always vary, Lazy Dog Foundry’s Personal Font omits a vital element of simulating handwriting.

Signature Software’s Personal Font, which I reviewed in the December issue of Macworld, achieves the randomness inherent in handwriting by using the Type 3 format. Unlike Type 1 fonts, Type 3 fonts can incorporate additional PostScript code to make changes in letters based on their relation to other characters or words. However, that font lacks the evenness and clean line of the Lazy Dog Personal Font (see “Mano a Mano”).

Lazy Dog’s characters—even capital letters and punctuation marks—have been adjusted to be the right size relative to other characters.

So, the bottom line. If a clean, professional personal font is what you seek, Lazy Dog Foundry’s Personal Font is worth the price for a Type 1 font. But if a font faithful to your handwriting is what you desire, look elsewhere (alternatively, try a Mont Blanc).—Tim Warner

All in Your Connections  To make connections to all characters, the lines that lead into and out of the a in this example are fixed to the baseline.
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Circle 1 on reader service card
Super Mines 1.0

PROS: Easy to learn; 84 difficulty levels provide long playability; not copy protected. CONS: None. COMPANY: Callisto Corporation (508/655-0707). REQUIREMENTS: Mac Plus; 1MB of RAM (2MB for System 7 or MultiFinder). LIST PRICE: $49.95.

**Pros:**

- Easy to learn.
- 84 difficulty levels provide long playability.
- Not copy protected.

**Cons:**

- None.

**Company:** Callisto Corporation (508/655-0707).

**Requirements:** Mac Plus; 1MB of RAM (2MB for System 7 or MultiFinder).

**List Price:** $49.95.

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Super Mines 1.0

**BooM!** " Didn't expect that one."

Let's see... two mines around the 2, three mines around this 3, and four mines around the... wait, that's a 5. Good thing I still have four minesweepers!"

In Super Mines, a great game for passing time or relaxing, you're part of a group of minesweepers combing a field chock-full of mines. In the beginning, part of the field is uncovered. Numerical clues indicate the locations of the mines. Using the clues, you map the rest of the minefield, marking suspect sectors with flags. If you make a mistake and uncover a bomb, you lose a minesweeper. Every time you clear a field, a new one appears.

**In the lower right-hand corner of the Minesweeper screen, you see arrows bordering each row and column.** You use the arrows to move the tile, the goal is to replicate the pattern shown in a small box in the lower right-hand corner of the Minesweeper screen.

If you think a game based on pattern recognition would be b-o-r-i-n-g, read on. Cogito adds a deviously simple twist that makes this baby a real brain-buster. As you reach higher levels, Cogito deletes arrows from rows and columns and changes some arrows' functions to move different lines or to move more than one line at a time. As if remaining, fast and furious play is rewarded by treasure hidden in the grid—sometimes it's extra points and sometimes it's extra minesweepers. If you make lots of mistakes, the extra minesweepers let you keep playing. If time runs out, however, you lose your minesweeper and start over with a new minefield.

Although Super Mines is not really a puzzle game, it's a true brain-twister that requires a logical approach and fast thinking. The less difficult (or at least more predictable) Mini Mines mode is a good place for the wary to get lots of practice. Practice definitely helps.

After you have mastered the basic grid form, Super Mines keeps things interesting by challenging you with different grid patterns, such as hexagons or parquet (the toughest), and with obstacles, such as walls, without changing the basic game. After completing a few fields, you are promoted to a new rank. Each rank is a little harder, until you reach the final rank, 21. General of the Army.

If that is not enough, there are four skill levels, from easy to brutally hard.

The harder skill levels contain more bombs in the same space. Obviously, you play more cautiously when there are more bombs to avoid and map. But Super Mines forces you to face your fear by setting shorter time limits for the higher-level fields. On fields where you will be promoted, the time limits are short even on the lowest skill level and are painfully short on the hardest level. I had to cheat by making judicious use of the Save Game feature to make it past Private in the hardest level; the game doesn't allow self-promotion.

The depth of the difficulty levels is not immediately obvious. When I first sat down to play Super Mines, I thought it was too easy. I had already played a shareware version, called Minesweeper, available on DOS and Unix machines. As my skill level increased, however, the game became much more intriguing.

I recommend Super Mines. If you like games of logic and strategy, this one is sure to challenge your mental agility and physical dexterity.
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April Foolishness

BY DAVID POGUE

INTERESTING BIOLOGICAL FACT: evidently, the chromosomes that determine wit and Macintosh programming skills in humans are mutually exclusive. Here’s the world’s most creative computer, and April 1 is approaching—the perfect opportunity to explore the world of mirthmaking, fun-loving, prankster software—and the only shareware programs in the prank category are about as witty as knee surgery. One displays a fake message that the system has crashed. Another displays a fake message that it’s erasing your hard drive. A third scrambles your typing. Ha ha.

I’ve got a better idea: let’s forget about playing jokes on other people and focus instead on stuff that makes you laugh. The Macintosh world has done much better in this category, as you’re about to find out.

Totally Rad Mac Programs

THE LATEST RAGE IN MACINTOSH BOOK publishing is to scrape together a bunch of shareware programs and sell them as a book-disk combination (the book contains instructions). For Macintosh users with neither a modem nor a local user group, I guess these $20 or $25 books make sense; otherwise, you can usually get the same stuff directly from America Online or CompuServe for less money.

The exception—a standout in the shareware-book field, if you ask me—is Owen Linnzayer’s Totally Rad Mac Programs (Sybex, $19.95, 510/523-8233). Many of these 20 programs strike me as little-known gems. As in any book-disk combo, some of the stuff is redundant, not for everybody, or good for only a one-shot chuckle. And some of the included programs aren’t funny (or even “rad”) but are useful—there are shareware lookalikes of Berkeley Systems’ After Dark (a screen saver) and Thought I Could’s Wallpaper (a desktop-pattern editor), and a sampler of “Star Trek” sounds.

But Kilroy (see “Kilroy Is Here”), while slightly buggy, is continually enjoyable (and useful on a PowerBook, where Kilroy’s pointer-pulled pupils help you find a cursor that’s disappeared on the limpid LCD screen). The Ripper tears a window in half, with a horrifying ripping sound, when you press a key. And 99 Bottles is positively hilarious. In a halting, deadpan voice, it sings “99 Bottles of Beer on the Wall.” Over and over and over, all the way down to one. You can and even change the number of bottles. Try typing 9999999999. I defy you to keep from laughing when your computer actually sings the words “Nine billion, nine hundred ninety-nine million, nine hundred ninety-nine thousand nine hundred ninety-nine bottles of beer on the wall . . .” Good thing you can choose Quit at any time.

Talking Moose 4.0.2

THIS GUY IS STILL AROUND, and he’s still funny. If you don’t remember, Talking Moose is an animated cartoon critter who appears after a specified period of inactivity, in his own little 2-inch window, and stays just long enough to mutter some sarcastic comment like “We never go out anymore.” Or “Who wants a smug-guy?” Or “You’re getting sleepy.” Believe it or not, I’ve found that the Talking Moose is the first confirmation many new Mac owners feel that they’ve made a worthwhile purchase.

The Antlered One has had chronic incompatibilities ever since his original debut as shareware a few years ago (Baseline Publishing, 901/682-9676, $39.95). Even today, he doesn’t work on the Classic II or the Quadra, and he clashes with certain software. But there’s something so absurd, so existentially freakish, about the mere presence of a moose on your screen, about his inexplicable Swedish accent, about the devil-may-care weirdness of his utterances, that—for a few weeks, anyway—it all seems worth it.

Funny: The Movie in QuickTime

I’M SURE ALL SORTS OF POSSIBLE uses for QuickTime crossed Apple engineers’ minds when they dreamed up their on-screen digital movie format. But nobody could have envisioned this CD ROM disc from Warner New Media (818/955-9999; $39.99; a CD ROM player, of course, is required). It’s a collection of 100 jokes—or, rather, 100 short movies, each showing a celebrity or Ordinary Person telling a favorite joke. Broadway lyricist Fred Ebb’s contribution: “A man walks into a paper goods store, and says to the girl behind the counter, ‘Do you keep stationery?’ She says, ‘For the first couple of minutes, and then I go crazy.’”

Sometimes the joke is funny. Sometimes it isn’t, but the person telling it thinks it’s funny, and that’s funny. But the most interesting aspect of Funny is what you learn about joke-telling: how much of the humor comes from the gestures, the inflection, the attitude of the teller—something this QuickTime collection offers that no other medium can match.

I’m not exactly sure what you’re supposed to do with the disc after you’ve heard all the jokes a couple of times; after all, most jokes’ punchlines are built on the element of surprise. I guess you can do with the disc after watching it exactly what you do with a joke after hearing it: pass it on to a friend.

Just Joking

THE BACK OF THE JUST JOKING BOX SAYS: “If you like a good joke, you’ll love Just Joking—the electronic library of jokes, one-liners, quips, and quotations by the funniest writers . . . in America.” Not! Half the quips in this HyperCard stack ($49; WordStar International, 800/523-3520) aren’t funny. You get such thigh-slappers as: “Be quick, but never hurry” (John Wooden). Or: “To betray, you must first belong” (Harold Phily). And the astonishingly witty: “A winner never whines” (Paul Brown).

Maybe I’m unsophisticated or something, but even the Robin Williams quote featured in the Just Joking promotional material doesn’t twitch the needle on my Mirth-O-Meter: “What’s right is what’s left if you do everything wrong.”

So what’s a speechwriter to do? One idea: spend one-tenth the money and get a good cross-referenced paperback book of humor. Another idea: if you have a modem, dial continuer
up services like America Online, where there are not only bulletin boards devoted to jokes, but even text files full of jokes. I found a text file of 65 lawyer jokes.

Q: What do you get if you send the Godfather to law school?
A: An offer you can’t understand.

Wallpaper 1.02
WALLPAPER, OF COURSE, ISN’T A JOKE collection of any kind (Thought I Could, 212/673-9724). But its witiness quotient wins it a place in this list of ideas for April Fooling. It’s a collection of brightly colored, jumbo background patterns for your desktop. (You can, of course, also create your own.) I wondered what the point was of paying $59.99 when there are shareware programs that do pretty much the same thing. I found out that the answer lies in Wallpaper’s ready-made patterns, several of which are a delight. One of them turns your screen into a gorgeous torchlit brick wall. Another makes your desktop resemble the facade of an apartment building, whose flower boxes and weather you can change for each season.

If you’re serious about April Fooling a friend, yet aren’t quite sickenough to inflect the fake erasing-the-hard-drive stunt, try the clever but nondestructive multiple cursor backdrop (see “Cursors—Foiled Again”). (You want real originality? They actually had the guts to call it Wallpaper and not WallPaper.)

NetBunny 2 1/2
THE ONE. THE ONLY. THE CLASSIC. You drop the NetBunny system extension (free) into each Mac on a network. Then, when you’re ready for the hilarity to begin, you launch a little trigger program called StartWabbit. And suddenly the NetBunny—an animated, colorful rip-off of the “Still going! . . .” Energizer battery TV mascot—parades across the bottom of your screen, hanging away on his big bass drum. When he reaches the edge of your monitor, he plods directly onto the monitor of the next Mac on the network, and so on, until he’s made his startling appearance on every screen.

The joke is brilliant, but you’ll find this hare raising some issues. For example, NetBunny requires color Macs, and prefers System 7 with plenty of memory. Second, the wonderfully lighthearted people at Eveready told author Dean Yu that he’s infringing copyright, or something, and ordered him to stop distributing NetBunny (although it’s still available on America Online and CompuServe). And third, for some inexplicable reason, actor Leslie Nielsen’s face has been pasted over the bunny’s visage, somewhat confusing the issue and diminishing the impact of the gag. Still, if you think you might enjoy the rabbit habit, grab it.

Stupid Mac Tricks
WHEN THIS SHAREWARE-COMBO first appeared, it was really something. A disk? Taped inside the back cover of a book? And you can use the stuff on your Mac? Neat!

On the disk are 14 goofy or fun- inducing software trinkets: a demo version of Talking Moose; the SoundMaster control panel (which lets you assign wacky sounds to Mac activities like ejecting a disk or shutting down); EyeCon (a program that puts a floating pair of eyeballs on your screen, whose pupils follow your cursor’s movement); and so on. Of the collection, the best prank was the classic Sexplosion, an icon whose name prompts the victim to double-click on the icon, only to get the “Sorry, a System Error has occurred!” bomb box, only to find that the Restart button darts skittlishly away from the cursor, and thus can’t be clicked at all.

This collection by Bob LeVitus, while ground-breaking, is about a century old (measured in computer years, which are like dog years but you multiply by 50 instead of 7). Several of these mirth-making morsels don’t work under System 7. Yo, Addison-Wesley (617/944-3710)—if you are going to keep selling this book ($19.95), how about updating it?

Son of Stupid Mac Tricks
FAR FROM BEING A PALLID RIP-OFF of the original book, this later volume is actually superior (same price/author/publisher). The jokes and stunts are less tired; most of them were new even to me, a grizzled shareware junkie. Reagan is watching a window featuring a grizzly likeness of our ex-president, whose pupils again follow your cursor, and who actually mutters a few Reaganisms now and then. Unfortunately, I couldn’t get either the pupill-rolling nor the comments to work. But it’s a hilarious and inexplicable concept.

Eyeballs is much like the EyeCon program in the original Stupid Mac Tricks—but this one is a system extension that puts the eyeballs discreetly in your menu bar, so it’s less trouble, doesn’t cover up your work, and is even more useful for PowerBook users who occasionally need to be shown where the cursor is. These eyeballs are also funnier: they blink, look around, and even close sleepy if your cursor isn’t moving. Mouse Odometer, an ingenious system extension, logs the distance your cursor travels each day, in miles. To honor April Fools’ Day in style, you could install Subliminal, which occasionally flashes one-second messages on your victim’s screen (“Send Pogue chocolate”). Since you can write the messages yourself, Subliminal is a perfect prank that almost certainly won’t get you fired.

True, the collection is a little uneven (although less so than the first). But the wit quotient is high; the “hey!” factor is superb; and a blinking, yakking, noisy Mac with all of these tricks loaded simultaneously will wipe that serious look off of any passerby’s face.

The Upshot
I TAKE IT BACK. THERE REALLY ARE SOME programmers with a kinder, gentler humor streak. I still think the “your system has crashed” kind of joke isn’t so much funny as it is dumb and/or mean. But then there’s the guy who writes utterances for the Talking Moose . . . the guy who made 100 mininovies of people telling jokes . . . and the guy who sat up all night long making his $3000 computer sing “99 Bottles of Beer.” These people are not only good programmers, but they possess that elusive, oddball quality that makes their creations so unusual: to wit, wit.

Contributing editor David Pogue’s first novel, Hard Drive, a $5 Macintosh techno-thriller, will be published in April 1993 by Berkeley Publishing Group.
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Edited by Carolyn Bickford

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Hardware

Address Express

Inkjet printer especially designed to handle envelopes, postcards, and cut-sheet labels; bundled with addressing software. Printer handles up to 100 items at once and prints 2 to 4 envelopes per minute, according to the company. Software has wide variety of templates. 2MB min. memory. $795. CoStar, 203/661-9700, 800/426-7827; fax 203/661-1540.

Athena 200i and 400i

Internal drives for PowerBook Duo Docking station; come with a five-year warranty. Athena 200i has 204MB capacity, a 12ms seek time, and a data-transfer rate of up to 5MB per second, according to the company. Athena 400i has 435MB capacity, a 12ms seek time, and a data-transfer rate of up to 10MB per second, according to the company. Both drives are bundled with Apple's in-line Sync disk-synchronization program. Athena 200i $1499; Athena 400i $2299. Microtech International, 203/468-6223, 800/626-4276; fax 203/468-6456.

CorrectColor/30T

Calibrated, multimage, 24-bit display; has a sensor that measures individual cells across the monitor and stores each cell's luminance level in a color-integration processor, which averages luminance values for smoothness and applies the correction to the monitor whenever the system is turned on. This 20-inch color monitor has resolution up to 1280 by 1024 and a 72Hz refresh rate, according to the company. $4699. RadieOps, 408/562-4200, 800/7729-2696; fax 408/562-4065.

EasyModem

A line of external modems and fax modems; each modem comes with a videotape tutorial for setup, a reference sheet for first-time users, and Smith Micro Software's Quick Link II communications software. EasyModem 24Mac sends and receives data only, at 2400 bps; EasyModem 24F Mac adds 9600-bps send/receive fax capability, and EasyModem 24F Plus Mac sends and receives data and faxes at 9600 bps faster with data compression. PDC144/Mac sends and receives data at 14,400 bps and sends/receives faxes at 9600 bps. 24Mac $309; 24F Mac $389; 24F Plus Mac $520; PDC144/Mac $995. PerfectData Corp., 805/581-4000; fax 805/522-5788.

EthernetPrint-3 and EthernetPrint-3 Plus

Connectors for routing a single LocalTalk device to Ethernet; support AppleTalk Phase 1 and Phase 2 protocols. EthernetPrint-3 Plus supports up to four devices. Ethernet-Print-3 $549; EthernetPrint-3 Plus $699. Dayna Communications, 801/531-0600; fax 801/359-9135.

FlexFax with 48t

Network-capable fax modem with software that allows up to 8 fax lines to operate simultaneously, expandable to 12 modems. Software integrates with E-mail systems such as Microsoft Mail and CE Software's QuickMail. Additional features include accounting, archiving, inbound/outbound printer support, and multiple cover-page selections. Modem sends and receives data at 2400 bps and sends and receives faxes at 9600 bps. 48tFax Software for fax modem sold separately. $595 min. memory. $795; 48tFax for up to 5 users $749. Circuit Research Corp., 603/880-4000, fax 603/880-8297.

Infinity Optical 3.5" E

A rewritable optical drive that stores 128MB of data on 3.5-inch cartridges. Has data-transfer rate of 768 Kbps and average access time of 46.3ms, according to the company. $7199; internal for Quadra $1699. PLI, 800/288-8754, 801/693-2211; fax 810/693-9713.

LocalTalk Accelerator

Accelerator board for LocalTalk networks increases number of ports available to four and increases data-transmission rate to 920 Kbps, as opposed to standard LocalTalk rate of 230 Kbps, according to the company. $895. Velan, 415/949-9150; fax 415/949-9170.

Mk-53FBB

High-capacity (1.2GB) hard drive with SCSI-2 controller; has 12ms average seek time and 10MB-per-second data-transfer rate, according to company. $2395. Toshiba America Information Systems, 714/583-3000; fax 714/583-3133.

MT1432Mu-Mac

Fax modem transmits and receives data at 14,400 bps or 9600 bps and sends and receives Group III fax transmissions at 9600 bps or 4800 bps. Power from adapter or 3-volt battery, which operates modem for 1.5 hours on line or 6 hours in stand-by mode. Ships with Smith Micro's Quick Link II communications software. 1MB min. memory. $729. MultiTech Systems, 612/785-3500, 800/328-9717; fax 612/785-9874.

PowerTrax 3000

Surge-suppression device clamps transient voltages at 60 volts above the sine wave, according to the company. Has lifetime full replacement warranty. $149.95. EFI Electronics, 815/977-9000, 800/877-1174; fax 815/977-0200.

QMS 1725

Multinetwork printer serves up to 20 users in a mixed-platform environment. Features 600- by-600dpi resolution, 25MHz, Intel 80560CFC RISC-based controller, 8MB of RAM, and 39 PostScript-compatible typefaces. $5995. QMS, 205/633-4300, 800/631-2692; fax 205/633-4666.

RGB/Videolink 15000X

Video scan converter converts computer output to video for taping, transmission, or projection; includes built-in linear keyer for oversizing text and graphics on a composite video or S-video background. Provides anti-aliasing, 24-bit color processing and real-time operation. $12,995. RGB Spectrum, 510/814-7000; fax 510/814-7026.

RIPServer

System runs software raster image processor (RIPs) up to 100 times faster than a Quartz, according to the company. This network peripheral has 8MB of RAM, on-board Ethernet, a 200MB SCSI hard drive, a 1.44MB floppy drive, and three slots; attaches to a Mac that runs the RIPServer manager front end. Requires System 7. $14,500. Torque Systems, 415/312-1200; fax 415/312-1298.

SCSI-II Dart

External RAM (memory) drive comes with 128MB of RAM and can be upgraded to hold up to 512MB. Uses SCSI-II interface and gives 0.5ms access time to a server, according to the company. Built-continues
SCSI-II Dart

SCSI Monitor Plus
When installed in computer with multiple peripheral devices, this monitor regenerates and conditions internal SCSI bus signals to improve internal and external computer and peripheral performance. $345. Applied Concepts, 619/453-0090; fax 619/453-6715.

XM-3401 Series
A line of CD ROM drives that have 330 KBps transfer rate and 200ms access time, according to company. XM-3401B internal drive measures 1.63 by 9.76 by 8 inches. TXM-3401E external drive measures 2.7 by 8.7 by 9.8 inches. Subsystem kit for connecting drive to Mac sold separately. XM-3401B $695; TXM-3401E $895; subsystem kit $115. Toshiba America Information Systems, 714/583-3000; fax 714/583-3133.

SOFTWARE

2Way Network Speaker Phone
Allows two users on a Mac EtherTalk or LocalTalk network to communicate using Mac's microphone and speaker. This software-only product requires System 7. 2MB min. memory. $19 per station. 2 Way Computing, 619/452-3888; fax 619/452-3077.

Alphabet Blocks
A monkey and a jack-in-the-box guide child through four different games teaching letter sounds, letter names, word sounds, vowel/consonant recognition, and simple vocabulary. Requires SuperDrive and System 7. 4MB min. memory. $69.95. Sierra On-line, 209/683-4468; 800/325-6654; fax 209/683-4297.

Contact Ease
Version 2 of this sales software has todo list, word processing module, automatic dialing, call timing, built-in management reports, and scripting for automating sales follow-up. 1MB min. memory. $395 per user; five-user version $1495. WestWare, 619/660-0356; 800/669-0871; fax 619/660-0233.

Data-Areas
Information manager maintains information about an individual’s daily events, business or personal contacts, schedules and appointments, daily activities, notes and memos, and world time. 2MB min. memory. $59. numa Technology, 203/256-1973; 800/274-5221; fax 203/254-2590.

Funny Business
Selection of 15 cartoons monthly in EPS format. Cartoons are classified by more than 40 keywords including computers/technology, office scenes, employee relations, women in business, travel, holidays, and health/fitness. 2MB min. memory. Subscription $279 per year; individual issue $49.95; sampler disk $10.95. Sandhill Arts, 415/854-0717; 800/854-0717; fax 415/854-9739.

The Deal
Collection of ten utilities allows users to enter date, time, or any other text with a keystroke; automatically switch screen depths to suit each application; switch mouse speed to suit task and application; change clock for daylight savings time; make any character in any font show up in a pop-up menu; and have a pop-up menu for putting PowerBook to sleep. 2MB min. memory. $30. PaperClip Products, 918/745-7417; 800/497-5508; fax 918/749-7417; 800/497-5508.

DiskFit Direct
Backup program that copies contents of hard drive onto a set of floppy disks; Berkeley or SyQuest cartridge drives; opticals; or flopticals. Subsequent incremental backups copy only files that have changes. 1MB min. memory. $49.95. Dantz Development, 510/849-0293; fax 510/849-1708.

FileDuo
Personal backup utility automatically backs up file to any mountable volume when Mac is unattended. Copies original files and can back up modified files only, make generational copies (several versions of a document over a period of time), or perform several different back-ups according to preset scripts. 1MB min. memory. $149. ASD Software, 714/624-2954; fax 714/624-9574.

Gallery Effects: Texture Art
Collection of effects for artwork has 125 textures in 12 categories: Brick, Fabric, Gravel, Ground, Marble, Metal, Plant, Stone, Tile, Wood. 2MB min. memory. $199. Aldus Corp., 619/695-6956; fax 619/695-7902.

HomeWorks, BizWorks, and TravelWorks
Template programs for Microsoft Works 3.0; each program consists of a collect-
MacDatabus
Business programming language provides support for string manipulation, fixed-point arithmetic, interactive input/output, ISAM (Sequential Access Method) file access, and ADAM (Associative Index Access Method) file access. Language requires System 7. 1MB min. memory. $140 plus $10/s/h. Kzech Computer Software. 703/495-1232; no fax.

MacMainframe for NetWare SAA
Allows Macs on an AppleTalk network to access host sessions via Novell's NetWare SAA communications server. 2MB min. memory. $395 per user. Avatar Corp., 508/435-3000, 800/282-3270; fax 508/435-2470.

MacMainframe for SNA ps
Allows Macs on an AppleTalk network to access host information via an Apple Computer SNA ps Gateway. 2MB min. memory. $395 per user. Avatar Corp., 508/435-3000, 800/282-3270; fax 508/435-2470.

MacVittles
A program that helps food brokers prepare for and manage food-show participation. Program automates the creation of survey sheets; allows orders to be entered at any time; and prints all reports necessary for retailers, manufacturers, and wholesalers. Includes one week of on-site installation, customization, and training. 4MB min. memory. $495. Software Solutions, 812/477-3181; no fax.

MapArt Volume 4: Metro Areas USA
This collection of maps in EPS format for 25 major metropolitan areas in the United States shows coastlines of oceans, lakes, and rivers; major roads; and city landmarks including parks, universities, airports, and stadiums. 4MB min. memory. $92. MicroMaps Software, 609/397-1611, 800/334-4291; fax 609/397-5724.

Millie's Math House
Six math activities teach children how to count, solve problems, and recognize sizes and shapes. For ages 2 to 6. 2MB min. memory. $49.95. Edmark, 206/556-8464; fax 206/861-6958.

Peanuts Interactive Comic Book
Interactive games and exercises that help children improve their mathematics, geography, reading, and computer skills; five separate activities, with varying levels of difficulty. For ages 4 to 12. Also available on CD-ROM. 5MB min. memory. $64.95. Image Smith, 310/325-1429, 800/876-6679; fax 310/539-9784.

PICTPorter XTND Interface
Converts graphics files directly from within any application that includes the Class XTND system, such as MacWrite II, MacPaint 2.0, and MacDraw Professional. Includes PICTPorter translation driver; control panel device for changing options; and drop-in translators for Compuserve GIF, Amiga IFF, PICT, Silicon Graphics RGB, TIFF, Sun Raster, and more. 1MB min. memory. $99. FGM Softworks, 703/478-9881, 800/783-7428; fax 703/478-9883.

PMPKis
This collection of add-ons for PageMaker includes a ruler tool that lets user create complex rulers; a tab text tool that lets user establish tab settings; based on the width of text lines; a type distortion tool that expands and condenses type based on points settings; a visual kerning tool; and a pica gauge. 2MB min. memory. $149. Edco Services, 813/962-7800, 800/523-8973; fax 813/960-2356.

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**FlipNotes**
An erasable keyboard reference template for users of macro-writing software such as QuickKeys. Enables users to record and reference defined keyboard commands on five spiral-bound panels. Clear plastic base plate fits above the F-keys on Mac extended keyboards. Marker, eraser, and Velcro fasteners included. $29.95. Multicom, 915/676-0844, 800/541-4351; fax 915/675-5944.

**PowerBook Monitor Stand**
Stand supports 13'-16', or 19-inch monitor while PowerBook sits beneath. Open section in back allows user to connect PowerBook to monitor and other peripherals. $99.95. F & F Enterprises, 716/248-8265; fax 716/381-7159.

**WordySturdy**
Copy holder attaches to computer and is capable of holding software manuals, reports and full-size books, as well as single documents. Product mounts on left or right side. $39.95. Products That Work, 801/221-9212, 800/443-7792; fax 801/221-0225.

**Backbone Applications Guide**
Tutorial focuses on connecting local area networks into an enterprise-wide backbone network; features sample applications. Chapters cover such topics as statistical and time-division multiplexing, fiber-distributed data interface backbones, and router-based backbones. Also explains ATM technology and how it can be applied to enterprise networks. 73 pages. Free. Fibermax, 818/709-6000, ext. 500, 800/800-4624, ext. 500; fax 818/709-1556.

**Hayden's QuickTime Handbook**
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**Programming with 4th Dimension**
Two volumes demonstrate the use of a commercial business program written with ACI US's 4th Dimension and include a review of many common programming concepts and practices. A compiled demo version of the program is included on disk. Volume I, 316 pages; Volume II, 654 pages. Written by Mark Yelich. 2MB min. memory. $54.95 plus $4.95 s/h. Blackledge Publishing, 507/452-0023, 800/424-4855; fax 507/452-0037.

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Questions and Tips from Macworld Readers

BY LON POOLE

As I explained in last December's Quick Tips, the stack and heap are two parts of the memory partition that the system software allocates to a program you've just opened. However, contrary to my advice for avoiding the system error "Stack collision with heap," increasing the memory size in an application's Get Info window won't help.

While boosting a program's memory size does increase the heap, it has no effect on the stack size. That's because, when you open an application, the system software allocates a standard minimum stack size for the Mac you're using. The size differs on different Mac models; for example, the standard stack size on a Mac SE is 8K, on a IIgs it is 24K. So an application that needs a 10K stack works fine on a high-end Mac, but not on an SE.

Fred Huxham of Apple says such collision problems can be rectified only by the application's developer, who must add program instructions that increase the size of the stack allocated to that application, as detailed in New Inside Macintosh: Memory (Addison-Wesley, 1992). Unless software developers test their programs on a wide range of machines, warns Huxham, they can easily (but unforgivably) miss these stack-into-heap bugs.

Upgrade Quandary

Q. I have a IIsi with 5MB of RAM, 8-bit video, and a VideoSpigot board—which I use mostly to create hi-res Photoshop illustrations (3MB to 15MB each) and QuickTime movies.

I have thought about upgrading with either 17MB of RAM, a 24-bit graphics board, or a 33MHz DayStar PowerCache. Considering the work I do, which would be the best choice?

I'm also considering a 68882 math coprocessor chip for 3-D rendering; would the speed of the 68882 affect the rendering time? Should I get a 20MHz 68882 (to match the 68030 main processor in my 20MHz IIsi) or get a faster one?

One more question: Is there any way I can install a restart button (programmer's switch) on my Mac? I am getting annoyed at having to switch my computer on and off to restart it when it bombs!

Jeffry Gugick
Liverpool, New York

A. Your best bet is to increase your IIsi's RAM. Additional RAM will improve Adobe Photoshop's performance when editing large images. To realize this speed gain, you must increase Photoshop's memory size (using the Finder's Get Info command) after installing more RAM. Do the same to Adobe Premiere, which probably came with your VideoSpigot board, and you will speed up movie editing and viewing of movie previews. You can also set aside part of your increased RAM as a RAM disk, which functions like a very fast hard drive.

Installing an accelerator would be a better choice than more RAM only if you mostly edit small Photoshop images (3MB or less). But it would mean giving up your VideoSpigot, because your IIsi has only one expansion slot. Forget 24-bit video. Some people must have it, but if you were one of them you would never have installed a VideoSpigot. Performance bottlenecks are probably more of a burden to you than the annoyance of viewing 24-bit images (millions of colors) in 8-bit video (256 colors).

If you decide to add a numeric coprocessor, get a 20MHz 68882. The computer's main processor and numeric processor must match the computer's internal instruction cycle clock, which is 20MHz on a IIsi. A faster-rated 68882 will not work any faster, and may not work at all.

The IIsi has no programmer's switch, but you can restart after a crash by pressing #control-power on. Similarly, #power on simulates pressing the interrupt button of a programmer's switch on other Mac models. After pressing #power on, you'll see a dialog box with a prompt character in the shape of a greater-than symbol (>). After a system crash, you can sometimes return to the Finder by typing C-FINDER and pressing the return key; then use the Finder's Restart command to effect an orderly system restart. These key combinations work on an LC, LC II, and a Classic II. Note: You must hold down a key combination at least one second to allow the ADB controller chip inside the computer to respond.

Handy Discovery

Q. What the heck goes on when you hit the shift key five times in a row? Few people probably ever do that, and so never notice the little sequence of icons that jumps up at the right end of the menu bar. In System 7, a bizarre sound goes with the icon sequence, as I discovered when my cat rolled over my keyboard. Why does the inkywell icon fill up?

E. Gary Hill
Mountain View, California

A. You have discovered Sticky Keys, one of the Easy Access control panel's three alternative methods of using the keyboard. With Sticky Keys you can type combination keystrokes such as #shift-3 (which puts a snapshot of your screen in a file format most graphics programs can open) one key at a time. You can also lock down any modifier key (shift, option, control) by pressing it twice. You turn on Sticky Keys by pressing shift five times without moving the mouse, or by using the Easy Access control panel. When Sticky Keys is on, an icon at the right end of the menu bar shows its status (see "Sticky Keys Status"). Pressing shift five times again, or pressing any two modifier keys simultaneously, turns it off.

Mouse Keys, also part of Easy Access, lets you click, continues.
drag, and move the pointer with the numeric keypad. To turn on Mouse Keys, press `mac-key-clear`; to turn it off, press clear.

With Mouse Keys on, the eight keys around the 5 key move the pointer left, right, up, down, and diagonally. The 5 key on the keypad acts like a mouse button. Press it once to click; twice to double-click or hold it down and press one of the keys around the 5 key to drag. Pressing the 0 key on the keypad locks down the mouse button until you press the period key (.) on the keypad. Mouse Keys is very handy for precisely moving graphic objects.

Slow Keys, the third keyboard modification provided by Easy Access, filters out accidental keystrokes by forcing you to type more deliberately. You have to hold down keys for several seconds in order for your typing to appear on the screen (the actual time depends on the setting in the Easy Access control panel, which ranges from long to short).

## Improved Gray-Scale Printing

**TIP** Can't get a decent print of a scanned image on a LaserWriter lacking Photograde, Apple's image-enhancement technology? At 300 dots per inch, the printer's halftone screen obliterates most of your image's detail. You can use Adobe Photoshop to improve image detail and realism and to shorten printing time (see “Bitmapped Photo Grays”).

Start by scanning your image at 300 pixels per inch and 256 gray levels. These settings produce a large file and probably slow the performance of your computer, but don’t worry about it. You’ll soon reduce the file size.

Open the scanned image in Photoshop. If you scanned a printed photograph (from a magazine or another source), apply Photoshop's Despeckle filter to blend the dots introduced in the image by the magazine printer's halftone screen.

Convert the gray-scale image to a 300-dpi bitmap by choosing Bitmap from Photoshop's Mode menu and selecting the Diffusion Dither option in the Gray Scale to Bitmap dialog box. This conversion greatly reduces the image’s file size.

Turning a gray-scale image into a bitmap may darken it, so make a test print of the bitmap. If it’s too dark, revert to the saved gray-scale and, before converting to

### Bitmapped Photo Grays

Because of the standard halftone screen it uses for gray-scale printing, a LaserWriter produces coarse, fuzzy output (top). Converting the gray-scale image to a 300-dpi bitmap with Photoshop yields more detail, more realism, a smaller file size, and faster printing (bottom).

Instead of adjusting brightness and contrast (using the Brightness/Contrast command in the Adjust submenu of Photoshop's Image menu), try adjusting the gamma using the Levels command as described in the tutorial manual that comes with Photoshop. I got good results with a gamma of 2.2.—L.P.

## A Few More Lines

**TIP** To squeeze a little more onto a letter-size page without reducing text size, shrinking graphics, changing spacing, or otherwise modifying the content of your document, try changing the paper size to US Legal with the Page Setup command before printing on letter-size paper. With this action, my 8½-by-11-inch file printed perfectly on my HP DeskWriter without any continues
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**Dingbat Patterns**

You can make great patterns by layering rows of Zapf Dingbat characters with any page-layout or draw program that lets you specify text color, shade, kerning, and leading. Jay Babina of Branford, Connecticut, suggests you use filled graphic shapes (lines, rectangles, and so on) for background layers, and white borderless shapes to mask out parts of the pattern as desired. For a ghost image over an entire page, specify light shades for all layers. Set all items you place on top of the pattern to have no background fill and no text runaround (text wrap). Laser printers and imagesetters spit out Zapf patterns in no time, unlike complicated patterns made with draw programs such as Adobe Illustrator and Aldus FreeHand, which may choke a printer no matter how much RAM it has.

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**What’s Your Time?**

**TIP** When I joined the marketing group of a multinational company that has sales offices and salespeople scattered all over the world, I had to become accustomed to dealing with more than three time zones. I found a way to use the Map control panel to keep track of local times for various people and offices without having to remember the names of their cities. Here’s what you do:

1. Open the Map control panel (in System 6, open the Control Panel desk accessory and select the Map icon in it).
2. Have Map locate the person’s city by typing the name of the city and pressing the Find button.
3. Type the person’s name over the city name and click the Add City button.

Now you need only type a person’s name in Map and click the Find button to see if it’s a polite time to call.

*Greg Snidick*
San Luis Obispo, California

If you want Map to remember a person whose city isn’t on the map, you can either substitute a known city in the same time zone or add the new city. To add a city, click its location on the map or type its latitude and longitude in the spaces provided. Then type the name and click the Add City button.

Whenever you add a new place or person to Map, verify the time zone and correct it if necessary. Map estimates the time zone of a new place based on its latitude and longitude, but time zone boundaries have many irregularities. Also, Map does not know about daylight saving time. If you are on daylight saving time and someone else is not (or vice versa), Map will be off by one hour in computing the other person’s local time.

If you haven’t already set your Mac’s location, the base location, do that by finding or adding your city and then clicking the Set button. Map marks the spot with a flashing dark cross and changes the time and date of your system clock according to the difference between the former base location and the new base location.

To enlarge the map, press the option key while opening the Map control panel. To magnify more, press shift-option while opening.—L.P.

**Gradient Fill for Text**

**TIP** Filling text with an ordinary pattern is well documented in Canvas 3.0, but not filling text with a container.
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Mail Merge

BY JIM HEID

Dear «Name»: If you are like many «job titles», you have compiled a database of customers who use your «product.» Now and then, you want to notify your customers of a «sale/special offer.» Or perhaps you want to inform them that their accounts are «paid up/past due.» In any case, you want your letters to be personally addressed—none of that Dear valued customer stuff.

You’re a candidate for mail merge.

Mail merge is the science behind all those publishers’ sweepstakes mailings, magazine subscription offers, and check-up reminders from your dentist. Mail merge, also called print merge, is the process of combining, or merging, a data file with a text document. Usually created in a word processor, a text document contains the letter’s boilerplate text—the stuff that doesn’t change from one recipient to the next. The data file contains the names, addresses, account information, and so on. You create the data file by extracting data from a database or spreadsheet program or by typing it directly into a word processor. You then merge the data file with the boilerplate text to create that oxymoronic marvel of the computer age: the personalized form letter.

The Macintosh world’s most popular word processors have mail merge features that go beyond simple form letters. Microsoft Word 5.1, MacWrite II (Claris), and WriteNow 3.0 (T/Maker) allow conditional merges—if x is true, then insert text y; otherwise insert text z. If an account is paid up, thank the recipient; if not, remind the deadbeat to mail that check. Word, WordPerfect 2.1, and WriteNow let you type in text during the merge, so you can add personal comments to letters. You can also use this capability to prepare other types of documents, such as legal contracts—store all the boilerplate contract text in one document, and then type the information specific to a particular contract during the merge.

Mail merge is one of those word processor features that gets dusty from disuse. True, many people don’t need to send personalized form letters. But another reason may be that the merging process isn’t as easy as point-and-click. Merging data with canned text usually means walking the dark alleys of data export and import—transferring information out of a database (or spreadsheet) program and into a word processor. Mail merge also requires some advance setup time and troubleshooting, lest you get weird results like “Dear Mr. 123 Main Street.”

This month I give step-by-step instructions for using the mail merge features in Word, WordPerfect, and WriteNow. For a database program, I’ll use Claris’s popular FileMaker Pro 2.0. See “Easier Merging” for an introduction to the mail merge features in two popular integrated programs, ClarisWorks and Microsoft Works. Their mail merge features aren’t as sophisticated as those of the word processors, but they’re easier to use because you don’t have to move data from one program to another.

Prepare to Merge

A MAIL MERGE PROJECT GENERALLY requires three components (see “Mail Merge Illustrated”):

- A data file containing the information to be inserted in each letter. The data is arranged in typical database fashion: a collection of fields (the name, address, city, state, zip code, and so forth) and records (all the fields for one entry—for example, one person’s name and address).
- A word processor document with the boilerplate text, including field-name codes that show where the information from the data document is supposed to go. In Word, this is called the main document. In WriteNow, it’s the template document, and in WordPerfect, it’s the primary file. (I use the term template document here, since it reflects the fact that the document is a template for each custom form letter.)
- A word processor document into which you import the data file. In Word and WriteNow, this is called the data document. In WordPerfect, it’s called the secondary file or the address file. (I use the term data document, since it’s more descriptive.)

After you assemble these three pieces, you tell your word processor to begin merging. The word processor then creates a new, untitled document—the merge document—containing the boilerplate text as well as the data from each record of the data document, with page breaks separating each form letter.

There are several variations to these basic steps. You can instruct your program to discard the merge document after it’s printed, or you can choose to save it. You can work without a data document, typing in all your information from the keyboard as each new letter appears instead. As I mentioned earlier, you can dispense with a database or spreadsheet program entirely by creating the data document within your word processor; Word’s table feature comes in handy for this. In WordPerfect, you can run a macro (an autopilot-like series of commands) during the merge. I’ll look at some of these merge variations shortly.

Exporting the Data

BEFORE YOU START UP A WORD PROCESSOR, you need to export your data, creating a text-only file that you will then import into the word processor to create the data document. This export-import routine is one of mail merge’s tallest hurdles—it’s the reason many people resort to the Dear valued customer approach.

Exporting and importing is necessary because a word processor can’t directly read the files created by a database or spreadsheet program—they are different types of tools. You can’t use a word processor to open a FileMaker Pro database any more than you can use a can opener to open a bottle of wine.

For your word processor to be able to distinguish one data field from another and one record from the next, fields and records must be separated by special characters called delimiters. The most common delimiting scheme involves separating each field by a tab character and each record by a carriage return. A
Mail Merge Illustrated

Mail merge begins with a database's fields and records (1). You prepare a data document by exporting the database as a text-only file (2). This example is a comma-delimited file—each field is separated by commas, and each field item is enclosed within quotes. The first line of the data document is a header record (3) that tells the word processor which fields to export. If you previously used the Find command to select only certain records, then only those records will be exported. To export the entire database, choose Find All from the Select menu. Next, choose Export from the File menu, type a name for the merge file, and choose Merge from the File Type pop-up menu. Click on New, and up comes a dialog box that lets you choose which fields to export. If there are fields you don't want to export, click on the check mark next to their names. Click on OK when you've finished, and FileMaker Pro exports the database.

The file you just created is a data document—it contains information that will be inserted into your form letters. Your next job is to prepare the template document—the one that tells your word processor where and how to insert information from the data document. If you use a database or spreadsheet program to create your data file, you can quit it now. From this point on, you'll use only your word processor.

Merging with Microsoft Word

How to choose a data document: Choose New from the File menu and then choose Print Merge from the File menu. In Word's Print Merge dialog box, select the Merge and Save Results in New File option, and then click on the Show Helper button. A dialog box asks you to select the data document. Locate the data file you previously created and double-click on its name. If a dialog box appears asking you to select the Text or Text With Layout format, choose Text. In a moment you'll see the Print Merge Helper bar (see "Merging with Word"). Below it, a special instruction line called the data statement, tells Word which field to use for the data document.

The data statement—and all other merge-related commands that appear in a template document—must be surrounded by the international quotation mark characters, « and ». Word's Print Merge Helper bar inserts these characters automatically as you choose field names and other merge statements. You can also type the characters by hand: press the key-stroke combination option-backslash (~) for the « character and shift-option-backslash (~) for the » character.

How to create the template document: Type and format the boilerplate text of the form letter. When you want to insert the contents of a certain field, choose its name from the Insert Field Name pop-up menu. Some lines—such as the recipient's address in a business letter—continue...
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Merging with Word

THE BASIC STEPS BEHIND MERGING with WriteNow are very similar. WriteNow uses the same merge characters (« and ») and keywords as Word; you can generally move template and data documents between Word and WriteNow and use them without modification.

There is one big difference: WriteNow doesn’t provide a Print Merge Helper, so you must type field names and keywords yourself. See page 244 in the WriteNow 3.0 manual for details.

How to create the merge document: When you’ve finished creating the template document, save it. To perform the merge, choose Merge from the File menu. In the dialog box that appears, click on the New Document button. (You could click on the Printer button, but it’s better to merge to a new document that you can proofread for errors.) After you click on New Document (or Printer), a dialog box appears asking if the data document has line breaks inserted. Click on No, and the merge takes place. Like Word, WriteNow formats the merge document so that each form letter begins on a new page.
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HOW TO / GETTING STARTED

Easier Merging

If you don’t need conditional merges or the ability to supply information from the keyboard during a merge, you might consider using an integrated program for mail merge. ClarisWorks and Microsoft Works both have straightforward, approachable mail merge features that don’t force you to grapple with text-only files, export and import, delimiters, and arcane field codes.

With either program, create the database document as you normally would. Next, create a word processor document containing the template text. Before continuing, be sure the database document is open.

How to: Microsoft Works

To insert a field at a given spot, choose Merge Fields from the Document menu and select the desired database and field. Use the Print Preview command to preview the form letters. To print the letters, choose Print and check the Print Merge Fields option.

How to: ClarisWorks

To insert a field in the template, choose Mail Merge from the File menu. Select the database and click on OK, then select the desired field. To print the letters, click on the Print Merge button in the Mail Merge dialog box.

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest book is the second edition of Inside the Apple Macintosh (Brady, 1992), which he coauthored with Peter Norton.

mailings of bar-coded envelopes without having to pay a small fortune to a mailing house. (For details on database publishing, see “Publish Your Database,” Macworld, February 1991.)

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Keeping Your Work in Sync

IF YOU USE TWO OR MORE COMPUTERS regularly, how can you be sure you have the most current files on whichever computer you are using? If you have a PowerBook, you probably have a desktop Mac as well, so you face this problem every time you switch from one to the other.

For years, people have transferred files from one Mac to another via floppy disk—renaming versions as needed. This process works adequately when you have only one or two files to transfer and can remember which computer has the most recent versions. But many projects involve multiple files—the monthly report that was once a simple text file might now include several graphics, a linked table from a spreadsheet, and a page-layout file, in addition to the text. And computerized address books and appointment schedulers must always be available and up-to-date. Even the most meticulous of us may have difficulty keeping track of which file versions are on which computer and whether every necessary file has been copied.

A new class of software addresses this problem by automatically synchronizing files between two Mac volumes. You specify two folders containing the files to be synchronized, and the program automatically copies the newer version of each file to the volume that contains the older one, so that both folders end up with an identical set of up-to-date files. If you create a new file in one folder, it is automatically copied to the other folder the next time you synchronize.

A volume can be any storage device recognized by the Finder: a hard drive, a floppy disk, a file-shared folder on another computer on a network, a PowerBook connected to a desktop Mac via SCSI cable. The volumes or Macs don’t even have to be near each other; a PowerBook can connect to another Mac by modem through AppleTalk Remote Access (ARA).

Because they deal with two mounted volumes, synchronization programs need only reside on one computer, unless you use a floppy disk as the transfer medium. In that case the sync program should be on both computers, since both have to synchronize to the floppy. Although the most obvious use of file synchronization is to keep a PowerBook and a desktop Mac in step, sync software is useful for many other functions. You can create backup disks organized by projects or folders. You can use sync software to distribute and maintain files throughout a company. Branch offices could gain access to central databases and a company bulletin board by modem, all synchronized with a network server.

The Features List

ALTHOUGH SYNCHRONIZATION PROGRAMS began appearing only in the past year, six are already available and more are on the way. The feature wars have begun (see “Comparing Sync Programs” for a summary of features found in each program). But what features do you actually need? To help you sort out the truly useful from the merely decorative, here’s a description of each feature, starting with the most basic and important ones.

- **Synchronizes folders** All the programs offer this basic operation, directing you to specify two folders to synchronize. You then issue a synchronize command, and the program does the rest. If you only need to sync a few files regularly on your own computers, basic operation is probably sufficient.

- **Synchronizes multiple folders** What if you need to sync two or more projects, each with its own folders? You could put the folders in one larger folder and proceed with simple folder synchronization, but then you are organizing folders for synchronization rather than for your own logic. If you select multiple folders and save your selections, the sync process can adapt to your work.

- **Excludes files** Suppose your project folder contains some large graphics files that you need only on your desktop Mac. This feature lets you selectively exclude files from the sync process.

- **Resolves aliases** What happens if you put an alias in the folder for synchronization? Most sync programs do not resolve aliases—they treat an alias the same way the Finder does—they copy just the alias, not the original file. A few programs can resolve aliases by copying the original file; in rare cases this can create storage space problems if a large file has
If you might someday forget to save a file with the same name, the sync program simply closes the unchanged file without saving it. The danger, of course, is that if you save a file, even if you’ve made no changes (rename one), or simply overwrite one of those that were both changed since the last synchronization, you risk losing data as one closing without saving becomes routine, you might someday forget to save a file you’ve actually revised. But some programs may not even give you that choice. For example, FileMaker Pro always changes the file date and time when you open a file; it has no save command.

- **Senses name/type conflicts** If the folders to be synchronized contain two files with the same name but with mismatched attributes (for example, a text file named Building Plans and a graphics file with the same name), the sync program should warn you. Similarly, by checking the original date and time of file creation, a sync program should warn you if you have two independently created files with the same names and attributes.

- **Senses if both files have been changed** If you synchronize two versions of a file that were both changed since the last synchronization, you risk losing data as one overwrites the other. Some programs warn you and give you several choices: leave the file unchanged, copy both files (rename one), or simply overwrite one of them. You’re likely to run into more problems if you use one of the many applications that automatically revise the file date and time whenever you open and save a file, even if you’ve made no changes to it. In a program like Aldus PageMaker—which always asks if you want to save changes when you close or quit—you can simply close the unchanged file without saving it. The danger, of course, is that if closing without saving becomes routine, you might someday forget to save a file you’ve actually revised. But some programs may not even give you that choice. For example, FileMaker Pro always changes the file date and time when you open a file; it has no save command.

- **Locks volume** Often, a central database file shouldn’t be overwritten even if another volume has a later version of that file. If you lock a volume or file, you avoid the unwanted overwriting. Volume locking forces one-way synchronization; most programs alert you if both versions have changed.

- **Selects by attribute** Some programs let you sync files anywhere in a volume, based on their date (everything before, after, or between dates), file type, file creator, or label (color). You can, therefore, keep the files in any suitable location without reorganizing your folders for synchronization purposes. Such searches generally must cover entire volumes, so the process can be slow on large hard drives. Programs that select by attribute can usually exclude by attribute also.

- **Maintains icon position and label** A few programs optionally copy file icon positions and label, so the files appear in the same positions after synchronization.

- **Performs scheduled synchronization** Automatic synchronization can be scheduled at regular specified times—for example, to update computers every day at 6 p.m. or make backups at midnight.

- **Allows background operation** Most of the programs can operate in the background if you start another program, so you can continue working even during large file transfers.

- **Provides scripting** Scripting allows you to select a group of files or folders and perform a series of synchronization steps with different volumes. Functionally similar to a simple programming language, scripting is—by Macintosh standards—moderately difficult to set up.

- **Displays activity logs** Did you really sync that giant database? An activity log tells you what’s been done and when.

- **Displays both volumes’ contents** All programs let you browse a volume for folders or files you want to sync; only a few display both volumes at the same time along with synchronization status, a capability that makes searching simpler.

- **Keeps files compressed** Automatic file-compression programs such as AutoDoubler compress all or nearly all files on a drive and automatically decompress files copied to a floppy disk (manual compression programs compress only files you specify). Most synchronization programs let you leave AutoDoubler files compressed when synchronizing to a floppy disk so that the file remains small.

- **Does synchronized deletion** If you delete a file in one folder of a set, and the file remains in the other folder, the file reappears when you synchronize the folders. Synchronized deletion removes the

---

**Comparing Sync Programs**

<table>
<thead>
<tr>
<th>Program</th>
<th>Zync 1.0a4</th>
<th>Synchronize 2.0</th>
<th>Inline Synch 1.0</th>
<th>Power/Merge 1.03</th>
<th>Norton Essentials 1.0</th>
<th>Magnet 1.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Ricardo</td>
<td>Qded</td>
<td>Leader</td>
<td>Syntact</td>
<td>No Hands</td>
<td>Software</td>
</tr>
<tr>
<td>Telephone</td>
<td>available</td>
<td>612/779-0995</td>
<td>203/435-8995</td>
<td>714/757-1787</td>
<td>408/233-9600</td>
<td>415/321-7340</td>
</tr>
<tr>
<td>Price</td>
<td>free</td>
<td>$19/995</td>
<td>$129</td>
<td>$129</td>
<td>$129.95</td>
<td>$129.95</td>
</tr>
<tr>
<td>Includes files</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Excludes files</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Resolves aliases</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Senses conflicts name/type</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Senses if both files have been changed</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Locks volume</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Selects by attribute</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>Maintains icon position and label</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>yes</td>
</tr>
<tr>
<td>Performs scheduled synchronization</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Allows background operation</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Provides scripting</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Displays activity logs</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Displays both volumes’ contents</td>
<td>limited</td>
<td>limited</td>
<td>limited</td>
<td>limited</td>
<td>limited</td>
<td>limited</td>
</tr>
<tr>
<td>Keeps files compressed</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Does synchronized deletion</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Automatically synchronizes on disk mount/connect/shut down</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

- = yes; 0 = no  
1 Formerly called Update.  
2 Shows files and folders to be synchronized; does not show full directories.  
* Upcoming version 1.1 will do this.  
* Upcoming version 2.0 will do this.  
* Upcoming version 1.04 will automatically sync on connect and shutdown.
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                686S: L 14", H 11", W 4"
                686S: L 14", H 11", W 4"
                686S: L 13", H 12", W 3"
                $516.00
                $490.00
                $599.00

Colors:
Port 786: Colors: Black, Burgundy, Gray
        Styles: 786L: L 16", H 15", W 4"
                786S: L 16", H 15", W 4"
                786S: L 16", H 15", W 4"
                786S: L 13", H 12", W 3"
                $513.00
                $529.00
                $539.00

Colors:
Port 586: Colors: Black
        Styles: 586L: L 13", H 12", W 3"
                586S: L 13", H 12", W 3"
                586S: L 13", H 12", W 3"
                $516.00
                $529.00
                $549.00

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file in the matching folder at the next synchronization. This feature should be used with care, since one advantage of having synchronized files is the ability to recover from an accidental deletion.

- **Automatically synchronizes on disk mount/connect/shutdown** Some programs automatically synchronize whenever a disk is mounted, upon connection to a network, and during shutdown.

## No Perfect Fit

**FOR ALL THEIR FEATURES, FILE-SYNCHRONIZATION PROGRAMS STILL LEAVE SOME GAPS.** If a folder or a file is too big for a floppy disk, you have to break it down first. None of the programs can synchronize across multiple floppy disks. Similarly, none support automatic compression to shoehorn more data onto a floppy. You must compress both versions of the files before syncing, and install decompression software on both computers.

Some programs cannot be easily addressed by any sync program. Many files need resources that are external to the file. A page-layout file, for example, may not include graphics, but only pointers to the necessary graphics files. A sync program knows nothing about pointers and will not copy any separate graphics files. Similarly, there is no general, non-application-specific way to determine that a given file has subscribed to information published by another file.

Files use fonts and other system resources that cannot be easily found and automatically added to a list of files to sync. Any two Macs will almost certainly have different configurations, so once a file is synchronized, you may have to adjust page setup, modem initialization, and more.

Since a sync program copies the entire file, even if the two versions being synchronized are only slightly different—and they often are—the process is inherently inefficient. Copying only the changes in a file would be much faster. The most efficient method of extracting and copying only the changes between files would have to be application-specific, requiring special code within the application that creates the files. For example, a database program could track changes and then create a difference file to be merged with other copies of the file. I know of no program that currently has this capability.

UpDiff, a S169 program from KyZen Corporation (609/354-3863), provides a more general solution. It compares two versions of any file, then computes and creates a difference file that can be used with UpDiff to update other copies of the file. Because it must operate at both ends of a link, UpDiff is sold in pairs. It isn’t nearly as efficient as a differencing function built into a program would be, but it takes less time than sending an entire file. Sync programs could incorporate its features in the future.

What if you synchronize Macs across different time zones? AppleTalk adjusts the time for networked computers, but if you synchronize using a SCSI connection or a floppy disk, time differences can trip you up. For example, say you sync your Mac, whose system clock is set to Pacific time, with a Mac on Eastern time (three hours later), and you change a file on your computer within three hours after synchronizing. When you resynchronize with the East Coast Mac, your changed file will be overwritten by the previously synchronized one, since the sync program thinks your changed file is actually the older of the two. (The MSDOS program FileRunner does correct for time zones if you manually enter a profile for each disk and computer.) By the way, is your Mac’s clock set accurately? (Most run fast; I’d never buy a watch with the accuracy of a Macintosh clock.)

---

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Making a Choice

ALL THE PROGRAMS I LOOKED AT worked reasonably well for straightforward synchronization. For basic folder synchronization, Zync, available from user groups and online services, works fine. And the price is right—it's freeware. (Zync's author, Ricardo Batista, says he will make no further upgrades to Zync.) If Zync does not meet your needs, check "Comparing Sync Programs" to find something that does. The synchronization feature of Norton Essentials—originally based on the code in Zync—is just part of a PowerBook utilities collection that includes power management and cursor highlighting. Synchronize offers greater functionality and simple operation at a modest price. The other programs are much more complex. Inline Sync and PowerMerge compete head-on; both have intricate status displays and are fairly difficult to master. PowerMerge has a slight edge in raw features, but Inline Sync's scripting might make it more appealing to power users. Magnet is conceptually the most flexible of all. You do have to learn how to use magnets, little agents that search for and manipulate files, but once you've done that you can use magnets to help with many file-main-

enance functions, not just synchronization. While they can help organize your hard drive, they also create their own clutter. If you really need power—and most users don't—Magnet is the best choice.

If you need to synchronize files between a Mac and a PC, you should perform the synchronization on the PC side, because MS-DOS synchronization programs can handle Mac files in MS-DOS form more easily than Mac sync programs can handle MS-DOS files. (The Mac programs expect a lot of file information that MS-DOS doesn't supply.) Make sure to keep file names within the PC's eight-character limit even when you use the file on a Mac, to minimize confusion and constant renaming. FileRunner ($69, MBS Technologies, 412/941-9076, 800/860-8700) synchronizes MS-DOS files, and the information you supply during its setup overcomes some of the MS-DOS file-information limitations (incidentally, a Mac version of FileRunner is in development). You can transfer MS-DOS files on a floppy disk to a Mac with an MS-DOS disk-mounting program such as Access PC (Insigia Solutions, 415/694-7600, 800/848-7677), DOS Mounter (Dana Communications, 801/531-0600), or Macintosh PC Exchange (Apple Computer). For cross-platform synchronize-

ation, don't use the file-compression feature built into FileRunner, since the files can only be decompressed by FileRunner itself.

What the Future Holds

FILE SYNCHRONIZATION IS SUCH AN important feature of computing that operating systems will eventually be forced to incorporate at least basic synchronization features. Apple has been shipping a minimal backup program with its system software for several years, and System 7 has basic version control—it warns you if are about to overwrite a file with an older version.

In a few years we'll see a new kind of operating system, based on files as objects, that will manage version control and synchronization far more effectively. Object-oriented files could also effectively support a differencing function. But for now, file-synchronization software is the best option for people who routinely use more than one computer.

CARY LU is a Macworld contributing editor who covers PowerBook-related issues in this monthly column. He first wrote about the need for synchronization software in the fall of 1983.

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**Software**

**ACCOUNTING/FINANCE**

- **4th Dimension 3.0.1, ACI US, 408/252-4444, $595.** Multitasking, which greatly improves speed when used carefully, makes this upgraded relational database delightful for both developers and end users. It's impressively easy to use even for a relational database.

- **DataPivot 1.02 (1.1), Brio Technology, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price.

- **GraphMaster 1.31a (1.33), Visual Business Systems, 404/956-0325, $295.** Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and 360-degree free rotation. A frequent inability to undo actions is the only serious irritation.

- **GreatWorks 2.0, Symantec, 408/253-9600, $299.** High marks to this integrated program for including an outlining module and a color paint module. While the integration may not be ideal, it's a solid program for a good price.

- **Lotus 1-2-3 for Macintosh 1.0 (1.1), Lotus Development Corp., 800/343-5414, $495.** Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system.

**BUSINESS TOOLS**

- **Aspects 1.01 (1.03), Group Technology, 703/528-1555, $285 to $1295.** Collaborative software allows up to 16 people to edit a project. Controlled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limits its usefulness.

- **3rd Dimension TimeSlips, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is without its bugs and flaws.

- **Bar Code Pro 1.0, Synex, 713/890-6293, $249.** Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling.

- **Bar Code Reader 2.1, Timeslips Corp., 508/755-7400, $299.** Complex is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started.

- **Comprehensive 1.0, A.C.I. US, 408/252-4444, $595.** Multitasking, which greatly improves speed when used carefully, makes this upgraded relational database delightful for both developers and end users. It's impressively easy to use even for a relational database.

- **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is without its bugs and flaws.

- **DataPivot 1.02 (1.1), Brio Technology, 408/727-8227, $249.** Advanced features come within easy reach of spreadsheet enthusiasts with this program. Anyone can learn how to use it in 10 minutes and how to customize it in 20.

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The number of stars at the beginning of each capsule review indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones.

**Accounting/Finance**

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**Business Tools**

- **Atlas Pro 1.0.6 (1.5), Strategic Mapping, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price.

- **Bar Code Reader 2.1, Timeslips Corp., 508/755-7400, $299.** Complex is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started.

- **Comprehensive 1.0, A.C.I. US, 408/252-4444, $595.** Multitasking, which greatly improves speed when used carefully, makes this upgraded relational database delightful for both developers and end users. It's impressively easy to use even for a relational database.

- **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is without its bugs and flaws.

**Best** | **Worst**

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**4th Dimension 3.0.1, ACI US, 408/252-4444, $595.** Multitasking, which greatly improves speed when used carefully, makes this upgraded relational database delightful for both developers and end users. It's impressively easy to use even for a relational database.

**Aspects 1.01 (1.03), Group Technology, 703/528-1555, $285 to $1295.** Collaborative software allows up to 16 people to edit a project. Controlled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limits its usefulness.

**Bar Code Reader 2.1, Timeslips Corp., 508/755-7400, $299.** Complex is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started.

**Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is without its bugs and flaws.

**GreatWorks 2.0, Symantec, 408/253-9600, $299.** High marks to this integrated program for including an outlining module and a color paint module. While the integration may not be ideal, it's a solid program, worth a close look.

**Lotus 1-2-3 for Macintosh 1.0 (1.1), Lotus Development Corp., 800/343-5414, $495.** Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system.
**Star Ratings**

<table>
<thead>
<tr>
<th>Product</th>
<th>Rating</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Excel 4.0</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>Upgrade project-management software. The improved tool helps novices schedule tasks with push-button ease.</td>
</tr>
<tr>
<td>Microsoft Project 3.0</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>An amazing range of functions, including new scheduling and formatting, making it the leading project-management software.</td>
</tr>
<tr>
<td>Microsoft Works 3.0</td>
<td>3⭐️⭐️⭐️⭐️⭐️</td>
<td>Capable but unexceptional upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program.</td>
</tr>
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<td>Microsoft Excel 4.0</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>High-end Macs. An impressive data-analysis software that lets you record and play back almost any series of data.</td>
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<tr>
<td>Microsoft Works 3.0</td>
<td>3⭐️⭐️⭐️⭐️⭐️</td>
<td>A solid performer with useful features, including a rich feature-set of 4th and a very limited range of data-handling.</td>
</tr>
<tr>
<td>Muse 1.0</td>
<td>1⭐️⭐️⭐️⭐️⭐️</td>
<td>A useful database for simple accounting for a multiuser environment.</td>
</tr>
<tr>
<td>Office Manager 2.1</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>An appealing color interface and increased speed are signs of success, but there's room for improvement.</td>
</tr>
<tr>
<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>Disappointing ease-to-use, but the complexity of the interface requires a substantial investment in start-up time.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>PowerTrax 1.1 (1.2), Soft Solutions, 404/457-9400, $495. Convoluted and repetitive data-entry processes slow you down.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>AccessPC 2.0, Insignia Solutions, 415/694-7600, $59.95. A welcome data-management system that makes it possible for users with no programming experience to design a useful database.</td>
</tr>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>Carbon Copy for the Mac 2.0 (2.04), Micromac, 919/490-1277, single-user $99, multi-user $299. Sharing-heavy file transfer is convenient and economical for occasional use.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>Compuserve Information Manager 2.0 (2.0.2), Compuserve, 614/457-8600, $49.95. The goal of this product is to give friendly information access.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>DataClub Classic, DataClub Elite 2.0, Novell, 800/638-9273, $175, $1395. Fully distributed file servers allow users to pool the free space on their drives into one virtual server.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>DOS Mounter 3.0, Dayna Communications, 801/531-0600, $89.95. If you need to use wild cards in extension mapping, this file-transfer utility is the only option, although it's slower than other file-transfer programs.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, $79. For basic file-transfer, this control panel device allowing cross-platform file-sharing is fine, but it's barely state-of-the-art.</td>
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<td>Office Works 1.1 (1.2)</td>
<td>2⭐️⭐️⭐️⭐️⭐️</td>
<td>Microphone II 4.0 (4.0.2), Software Ventures Corp., 510/644-3232, $295. Refinements are evident throughout this telecommunications software's upgrade.</td>
</tr>
<tr>
<td>PowerTrax 1.1 (1.2)</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>NetWare for the Macintosh 3.011, Novell, 800/638-9273, $495-1995. NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage.</td>
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<td>PowerTrax 1.1 (1.2)</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>Network SuperVisor 2.0.1 (2.1), CSG Technologies, 412/471-7170, $495. Fast and accurate data collection is the strongest point of this network-management utility, but the interface isn't that intuitive.</td>
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<td>PowerTrax 1.1 (1.2)</td>
<td>4⭐️⭐️⭐️⭐️⭐️</td>
<td>Network Virtual Signs 1.0 (1.1), Dayna Communications, 801/531-0600, $499. Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors.</td>
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</tbody>
</table>
you to use resources almost anywhere on a network. Despite minor blemishes, such as its inability to cut and paste between Macs and Windows PCs, it's a clear winner.

VersaTerm/Pro 3.1 (3.6.2), Synergy Software, 215/779-0522, $295. It's a great tool for working with VAXes or when you want Textrix-terminal emulation, but this communications software lacks the scripting many people use for working with BBS or commercial information services.

Versatex 6.0, Winter Software, 515/298-4068, $49.95. This is the best choice for scientific and technical publishing. It has a fine table editor and allows the manipulation of objects. However, it's expensive.

WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, $195. In the right hands, this product is the precise tool of communications software, but it does assume familiarity with telecommunications and programming concepts.

Adobe Type Manager (ATM) 1.0 (2.03), Adobe Systems, 415/961-4400, $99. Radically improve the quality of screen fonts and the versatility of QuickDraw printers with this font-optimizing utility that uses information from a printer font (also called an outline font) to produce accurate character representations on-screen.

Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, $795. Introducing screen redraw is one of the dozehs of enhancements that make this upgrade well worth its price. Even so, some of the features that users need most—opening multiple documents, for instance—are still missing.

QuarkXPress 2.0, Aldus Corp., 206/628-2320, $199. Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners.

Apple Font Pack, Apple Computer, 408/996-1010, $99. Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's a good deal, considering that Adobe PostScript fonts cost four times as much.

Fontographer 3.5, Altsys Corp., 214/680-2060, $495. Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome.

FrameMaker 3.0 (3.0.1), Frame Technology, 408/433-3511, $795. Powerful and well-designed, this page-layout software is the best choice for scientific and technical publishing. It has a fine table editor and allows manual kerning, but its power demands commitment—and a Mac II-class machine.

Lettus Studio 2.0, Lettus USA, 201/845-6100, $249. Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects; such as gradient fills.

MacQuill 1.0, Nest Software, 408/441-1944, $999.55. Friendly, inexpensive page-layout program is missing basic features, such as kerning and import, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable.

MenuFonts 4.03 (4.04), Dumb-Click Software, 818/888-2068, $69.95. A control panel device that groups type styles in families and displays font names in their own typefaces sounds like a great idea, and it would be if there were fewer incompatibilities.

Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, $370. Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection.

Personal Font, Signature Software, 408/458-0241, $719.95. Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0.

Publish It Easy 3.0, Timeworks, 708/559-1300, $195.95. Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone.

QuarkXPress 3.1, Quark, 800/788-7835, $895. Dozens of updated features and frustration-reducers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and fullfeatured.

Renaissance 1.0, Eastman Kodak, 800/433-2839, $695. A strange mixture of power and oversight, this page-design and layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores basic Acrobat conventions, such as some keyboard shortcuts.

Spectacular 1.2, FontHaus, 203/846-3087, $79.95. Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch.

American Discovery 3.0, Great Wave Software, 408/438-1990, $49.95. Without glib graphics or sound, this educational game, intended mainly for classroom use, provides an excellent drill in geography, state capitals, and state flags.

The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, $49.95. After applying for a job as a lab assistant with the local mad scientist, you must use logic and raw brain-power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious.

Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chordit Software Group, 619/298-2020, $59.95. Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students.

Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, $59.95. Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun.

MacGlobe 1.3.0, Broderbund Software, 415/382-4400, $59.95. Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for home and school use.

Math Shop, Math Shop Jr., Advanced Math Shop 1.0, Scholastic, 800/541-5513, $24.95. The hard-bound workbook format is converted into bits and bytes with these mathematics education games.

NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8000, $5623. Although this Japanese language CD ROM offers solid instruction, it's expensive and so limited in its word selection that it's not an economical choice for individual users.

Number Munchers 1.1 (1.2), MEC, 612/569-1500, $29.95 to $69. Fun, educational arcade game builds arithmetic skills through arcade action. Munchers gobble your choice of multiples, factors, primes, equalities, and inequalities, but the game can't accept custom data sets.

Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, $59.95. If you add custom word lists, this interactive French-English picture dictionary may serve as a decent aid to a more complete curriculum, but it's buggy and of uneven quality.

StudyWare for the SAT 3.7N (4.0), Cliffs Notes, 402/423-5050, $49.95. Four full SATs, a TSWF (Test of Standard Written English), and a series of drills are included with this inexpensive SAT-training program. It doesn't provide a lot of tutorial assistance, but may be appropriate for students who need a quick brushup.

Super Munchers 1.0, MEC, 612/569-1500, $49.95 to $69. From a kid's point of view, this educational arcade game offers long-lasting appeal. The player maneuvers a cartoon Muncher around a game board, gobbling up words that fit target rules, such as Romanic compounds or European countries.

Time Troks 1.0, Earthquest, 415/321-5838, $59.95. An eccentric archaeologist opens portals through time, and you must close them in this educational HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fine way to browse through history.

Transparent Language 1.04M, Transparent Language, 603/465-2230, $139. Without an iota of glitz or glamour (no sounds, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading.

Where in America's Past Is Carmen Sandiego?, Broderbund Software, 415/382-4400, $44.95. Travel through time and the United States while chasing those V.I.E. crooks in this clever educational history/geography game that's challenging for all ages.

Where in the World Is Carmen Sandiego?
Star Ratings

San Diego? Deluxe Edition, Broderbund Software, 415/382-4400, $99.95. The V.I.P.E. Gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

★★★★ Word Munchers 1.0 (1.2), MECC, 612/569-1500, $29.95 to $69. Match the words with matching vowel sounds in this educational game for repetitive cartoon sequences get tiresome. Jun 92

★★★★ World Atlas 1.2, Software Toolworks, 415/883-3000, $79.95. Extensive, detailed maps of countries and regions are the highlight of this software. In addition, descriptive headings report interesting text-based demographic data. Apr 92

ENTERTAINMENT

★★★★ 4-D Boxing 1.0, Electronic Arts, 415/571-7171, $49.95. Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-screen copy protection, geometric figures, and the inability to save games in progress make it less enticing. Sep 92

★★★★ America Alive, MediaAlive/CD Technology, 408/752-8500, $99. Quick-time movies, color photographs and maps, text, and audio mingle in this multimedia CD-ROM guide to the United States. It's a promising concept, but it doesn't yield much useful information. Mar 93

★★★★ Audiochip 1.0 (1.03), Opcode Systems, 415/856-3333, $89.95. Audiophiles will get a kick out of applying sound effects to any sound file on their Mac. You can also control the order of songs or sounds on an audio CD played on a CD-ROM player. A number of quirks may confuse new users. Sep 92

★★★★ Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, $79.95. Elaborately detailed character cartoons act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. Mar 93

★★★★ The Battle of Britain, Deadly Games, 215/295-2284, $54.95. It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. Dec 92

★★★★ Blade 1.1, Leviathan Corp., 313/826-3560, $59.95. Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—although the arcade action is extremely difficult to master. Sep 92

★★★★ Capitalist Pig 1.0 (1.02), Pluma Software, 603/754-8151, $59.95. Terrible attacks, embarrassment, tax—keeping a cool head is half the challenge if you are to become successful in this business simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. Sep 92

★★★★ The Complete Annotated Alice 1.0, The Voyager Company, 310/451-1383, $19.95. Fans of Alice's Adventures in Wonderland will love the "lost" out-of-print chapter in this HyperCard book designed primarily for PowerBook users. As literary hypekite hide-and-seek, it works. Jun 92

★★★★ Creepy Castle 1.0, Reactor, 312/573-0800, $49.95. Wolfman, the Bride of Frankenstein, and other ghoulies from classic horror movies populate this clever arcade-style game. Still, delightful movie trivia doesn't compensate for frustrating performance delays and limited scenarios. Jun 92

★★★★ Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, $179.95. No unnecessary frills complicate this efficient, inexpensive instrument-flight trainer. It doesn't have a true aerodynamic feel, but that's flaw's not critical. Jul 92

★★★★ Cyberblast 2.0, Innerprise Software, 410/324-1284, $199.50. Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's nice, basic shoot-'em-up with clever execution and appealing graphics. Sep 92

★★★★ Go Master 5, Toyogo, 808/396-5526, $69. Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. Dec 92

★★★★ HardBall II, Accolade, 408/885-1700, $54.95. From the pitcher's windup to the batter's swing, this baseball game comes astonishingly close to natural human motion. The upgrade adds more teams, more stadiums, instant replay, and the ability to create your own league. May 92

★★★★ Insanity 1.0, UV Wave, 312/688-9944, $28.95. Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. Feb 93

★★★★ Just Grandma and Me, Broderbund Software, 415/382-4400, $49.95. Mercer Mayer's Little Critter comes to life in this charming, captivating, wonderfully entertaining, interactive storybook on CD-ROM. Aug 92

★★★★ Kid Pix 1.0 (2.0), Broderbund Software, 415/382-4400, $59.95. An entertaining, enchanting color paint program aimed at children but delightful for grown-ups, too. Hilarious sounds, hidden surprises, spectacular effects, zany and creative tools—it's a classic. Oct 92

★★★★ Kid Pix Companion, Broderbund Software, 415/382-4400, $99.95. Additional features include, among the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. Oct 92

★★★★ Nebunaga's Ambition 1.0, Koel Corp., 415/348-0200, $59.95. Visit the Warring States period of feudal Japan, unify the country, and usher in an era of peace. Strategy game is absorbing and challenging, but the interface can be annoying. Jun 92

★★★★ Patton Strikes Back: The Battle of the Bulge, Broderbund Software, 415/382-4400, $19.95. Military simulation game with superior graphics is simple to learn and satisfyingly complex. If only they'd skipped the off-screen copy protection. Jun 92

★★★★ Poetry in Motion, The Voyager Company, 310/451-1383, $29.95. Poetry videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD-ROM that combines the excitement of the stage with the reflective appeal of the page. Feb 93

★★★★ Prince of Persia, Broderbund Software, 415/382-4400, $49.95. A high tolerance for frustration is necessary to negotiate the 12 maze-like levels of dungeon and palace in this arcade adventure, but amusingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it all worthwhile. Sep 92

★★★★ Red Baron 1.0, Dynamic, 800/326-6654, $69.95. The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. Nov 92

★★★★ Rodney's Wonder Window, The Voyager Company, 310/661-1383, $99.95. Collection of 23 colorful, wacky graphics and animations by Rodney Alan Greenblat is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. May 93

★★★★ The Secret of Monkey Island 1.0, LucasArts Games, 415/721-3100, $59.95. A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and idiosyncratic copy protection are slight blemishes. Sep 92

★★★★ Shanghai II: The Dragon's Eye, Activision, 310/207-4500, $49.95. Classic life game is more addictive than ever; flashy enhancements include new tile and layouts, plus an additional, entirely new game that's a variation on the life-removal theme. May 92

★★★★ Sherlock Holmes, Consulting Detective 1.0, Icon Simulations, 708/520-4440, $69.95. As company Sherlock Holmes and Watson as they investigate three CD-ROM-based mysteries. Primarily made up of video scenes, the game's only slightly more interactive than TV, and the pictures aren't as good. Aug 92

★★★★ A Silly Nousy House 1.0, The Voyager Company, 310/451-1383, $59.95. A brightly colored animated world awaits exploration; this CD-ROM's simple scenes and syrupy songs are perfect for preschoolers. May 92

★★★★ SimAnt 1.0, Maxis, 510/254-9700, $59.95. Marauding red ants, ants, spiders, even power mowers—an ant's life is likely to be short in this remarkably detailed simulation game in which the object is to have black ants ansu territory in a suburban backyard. Apr 93

★★★★ SimLife, Maxis, 510/254-9700, $69.95. A megabolism's dream come true, this amazingly intricate simulation game allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, $24.95. Engaging test by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD-ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. Feb 93

★★★★ Spaceward Ho 2.0, Delta Tao Software, 415/754-9700, $59.95. A megabolism's dream come true, this stunningly intricate simulation game allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ Spectra 1.0, Velocity Development Corp., 415/776-8000, $59.95. Fight enemy tanks
in a 3-D arcade game that is at once basic and extremely addictive. When installed on a network, it's one of the great antiproductivity tools of all time. May 92

Spelunca and the Caves of Mr. Seudo, Broderbund Software, 415/382-4400, $49.95. Un卜mated jiggles, rick graphics, entertaining sounds, and creative learning activities fill this interactive hypertextual. We recommend it, despite its tiny bugs. Jul 92

Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95. Teeny tiles are a very minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

Surgeon 3, The Brain 1.0 (1.1), I3M, 410/560-0973, $59.95. Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

Warlords, Strategic Studies Group, 904/494-9373, $59.95. A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer. Sep 92

WordTris, Spectrum HoloByte, 510/522-3584, $49.95. Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. Jun 92

Adobe Illustrator 3.01. Adobe Systems, 415/961-4460, $695. Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

Adobe Photoshop 2.0.1, Adobe Systems, 415/961-4400, $895. With complete mastery of the bitmapped, continuous-tone environment, this product is the industry standard for image manipulation. Although it's not perfect, it's so good that if you make your living in graphic art, it's worth the price of a Mac itself.

Alidos Freeland 3.1, Alidos Corp., 206/628-2300, $595. A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. May 92

Alidos Gallery Effects 1.0 (1.5), Alidos Corp., 206/628-2300, $199. Uninspiring collection of 16 image-editing filters has an unusually strong manual. Apr 93

Alias Sketch 1.0.2 (1.5), Alias Research, 800/447-2542, $595. The unique collection of tools makes this the only program that allows you to sit down and play with 3-D rendering. Failures include quirky navigation and sluggish performance. Aug 92

ArchCAD 4.02 (4.1), Graphisoft USA, 415/737-8665, $4450. The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most of the features an architect needs. Jun 92

AutoCAD Release 11, Autodesk, 415/332-2344, $3500. Customizable, bare-bonesdrafting upgrade partially implements a graphical user interface. Few add-ons are currently available. Dec 92

CA-CricketDraw III 1.0, Computer Associates International, 408/492-1727, $249. Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. May 92

Cachet 1.0, Electronics for Imaging, 415/742-3400, $595. The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. Dec 92

Canvas 3.0 (3.0.6), Deno6a Software, 305/596-5644, $399. Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision drawing functions in particular should appeal to many users. May 92

Claris CAD, Claris Corp., 408/727-8227, $599. Serious but basic CAD package has fallen behind the competition after a long period without an upgrade. Still, this is one of the fastest products available for scrolling and zooming—important for work on large, complex drawings.

Color It 2.0.1, Timeworx, 708/559-1300, $299.95. Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic wand tool, but its naming conventions are bewildering. Apr 93

DesignCAD 20/3D 3.0.1, DesignCAD, 918/825-4848, $299.95. Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. Nov 92

ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495. The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. Feb 93

Expert Color Paint 1.0, Expert Software, 305/567-9950, $49.95. A wonderful value for novices, this color paint program offers a tidy collection of features for an attractive and low price. Beware of low memory settings, though, or it gets buggy. Jun 92

Fractal Design Painter 1.2, Fractal Design Corp., 408/688-8800, $349. An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unoptimized gradation and hill capabilities and an insensitive Undo command. Aug 92

Infini-D 2.0, Specular International, 413/549-7600, $595. Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. Jan 93

IntelliDraw 1.0, Alidos Corp., 206/628-2300, $299. Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. Nov 92

MacDraw Pro 1.01 (1.5), Claris Corp., 408/727-8227, $399. The shallow array of integrated features in this draw program is perfect for the new or moderately experienced user, but compared with other programs in the same price range, it's slow and deficient.

MacPaint 2.0, Claris Corp., 408/727-8227, $125. Easy-to-use black-and-white paint program takes up very little RAM, but it adds few capabilities beyond those it offered eight years ago.

MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695. This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

MiniCAD+ 4, Graphisoft, 410/461-9488, $795. Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features—champion status and is easier to use. Mar 93

Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, $895. Experienced 3-D aficionados will find this 3-D-imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. Sep 92

ScanMatch 1.01 (1.02), Savitar, 415/243-3030, $199. Basically half a color-calibration system. Software quickly and easily adjusts color scan files for screen display, with somewhat uneven results; those wishing to adjust images for print purposes need to use another application. May 92

Showplace 1.1 (1.1.1), Pixar, 510/236-4000, $695. Straightforward graphics application organizes shading and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. Jun 92

Sketcher, Fractal Design, 408/688-8800, $149. A variety of effects reproduce the styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

Smoothie 1.02, Peice Software, 415/244-6554, $149. Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. Nov 92

StrataType 3d 1.0, Strata, 801/628-5218, $295. The rulers, texture palette, custom levels, and layered positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. Mar 93

Swivel 3D Professional 1.0 (2.0), Macromedia, 415/252-2000, $695. Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

Typposity 1.0, Pixar, 510/236-4000, $299. Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. Nov 92

continues
**TypeStyler (2.0), Broderbund Software, 415/382-4400, $219.95.** The 35 shapes of this product's library let you reshape PostScript or TrueType fonts to create decorative special effects such as arches and perspectives. TypeStyler turns fonts into graphics, enabling you to stretch, compress, or rotate text, as well as add colors, grays, or patterns.

**Zeus 0.81 (0.92), Delta Tan Software, 408/730-9366, $499.** Color paint program ties hard to match capabilities found in more expensive programs, but not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

**Sky from any location In the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this Is a great educational tool for beginners.**

**JMP 2.0 (2.05), SAS Institute, 919/677-1415, $695.** Its raw speed. Oct 92

**MATH/SCIENCE**

**Caduceus Physics 1.0, Scientia, 617/776-3427, $159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

**DataDesk 3.0, Data Description, 607/257-1000, $595.** Users with limited formal backgrounds in statistics can perform better analyses with this statistics program than with others.

**Entrapag 3.0, Albatthone Software, 415/824-2737, $149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. Nov 92

**Expert Astronomer 1.0, Expert Software, 305/567-9990, $49.95.** Drawn maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

**Expressionist 3.0, Prescience Corp., 415/543-2252, $199.95.** If you work regularly on similar topics, you can customize this equation-writing software so that it produces equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

**HiQ 1.0 (1.1), Bimillennium Corp., 408/866-2010, $695.** A script language, which exhibits an enabling nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

**Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

**JMP 2.0 (2.05), SAS Institute, 919/677-8000, $695.** You get lots of value for your money with this statistical-analysis program and its vast assortment of functions, including strong classical statistics and visualizations, 3-D spin features, quality-control statistics, and a manual that is a model of concise clarity.

**MacBreadboard 1.1, Yoeriq Software, 919/644-1620, $59.95.** Useful educational/engineering software simulates excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

**Maple V, Brooks/Cole Publishing, 800/354-9706, $450.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

**Mathematica 2.0 (2.1), Wolfram Research, 217/398-0700, $595.** While its memory demands are high, this symbolic-math program offers a truly vast array of functions, including over 800 numerical and symbolic routines. The quality and quantity of its support literature are outstanding.

**MathType 3.0, Design Science, 310/433-0685, $199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

**Minibit 2.8, Minibit, 814/238-3280, $695.** These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Minibit an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jan 92

**Nuex 1.1 (1.3), Charles River Analytics, 617/491-3747, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

**Sequencer 2.0, Gene Codes Corp., 313/769-7249, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

**SigmaPlot for the Macintosh 4.1, Jandel Scientific, 415/924-8640, $495.** It's a short path from raw data to publishable graphs with this scientific graphing software. The Mac fundamentals need polish. Simulations are available but not always successful. Jun 92

**Simulink 1.2, The MathWorks, 508/653-1415, $3995.** If you hear the word "node" plotted on a spreadsheet, you can add this to your list of well-organized tools. Oct 92

**StatView 4.0m, Abacus Concepts, 510/540-1949, $595.** A nice mix of statistical prowess and recording among many other features. Nov 92

**TeMath 1.0, Brooks/Cole Publishing, 800/354-9706, $39.95.** For roughly the price of a textbook, this mathematical-exploration software provides the help a student needs to understand what's really happening in differential and integral calculus. Apr 92

**ORGANIZATION/PRODUCTIVITY**

**ACT 1.0, Contact Software International, 214/919-9500, $395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

**Active Memory 2.0, ASD Software, 714/624-2594, $199.** Personal organizer distinguishes itself by providing strong network support, although it may be overwhelming for a lone user. Aug 92

**Address Book Plus, PowerUp Software, 415/345-5900, $99.95.** What you see is what you get with this field-based address-book software that sorts, selects, formats, and prints names and addresses in every conceivable way. The disadvantage is that the product is slow, especially with more than 200 addresses in a file.

**Agent DA 2.0 (2.1), TeamBuilding Technologies, 514/278-3010, $129.** Simple, flexible calendar/remind program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward forward mail. Sep 92

**Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/93), Amaze, 206/820-7007, $59.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

**Connections 2.1, Concentrix Technology, 415/958-8600, $199.** A wide range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

**DateBook 1.5.1, After Hours Software, 818/780-2220, $125.** Personal time manager offers a flexible approach to event scheduling and to-do list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

**DayMaker 1.01 (2.0), Pastel Development Corp., 212/941-7500, $99.95.** In spite of a few rough edges and missed opportunities, this personal organizer is a versatile tool for creating to-do lists, prioritizing tasks, and maintaining a calendar with alarms. Apr 92

**Dynodex 3.0, Portfolio Software, 408/292-0420, $199.95.** The speed and printing options of this field-based address book manager are still its strengths, but this upgrade adds welcome interface improvements, including automatic phone-number formatting. Apr 92

**EasyAlarms 2.0, Essential Software, 914/889-8365, $99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

**First Things First 2.0 (3.0), Visionary Software, 503/246-6220, $69.95.** The nifty on-screen clock that floats serenely above your windows is the most appealing feature of this good but basic event-reminder utility. Apr 92

**Hello, Atelier Systems, 619/453-4300, $99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

**In Control 1.0 (1.1), Attain Corp., 617/776-1110, $129.95.** Shrink an immense list down to a bare skeleton and expand it again using this to-do-list manager's clean interface and collapsible row-and-column format. May 92

**Inspiration 4.0, Inspiration Software, 503/245-9011, $295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

**Intouch 2.0.4, Advanced Software, 408/733-0745, $99.95.** Free-form database is a fast and easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although this version adds a handy reminder system, it falls short as a...
PresentaTion tools

Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/361-4400, $495. A dream command post for video professionals. This QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being non-professional's dream as well. Jan 93

Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, $495. For slide presentations, this product provides an all-in-one studio where each element-outlines, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automatic cross-platform compatibility, as well as pre-pack presentation capabilities more than compensate. Feb 93

Action 1.0, Macromedia, 415/252-2000, $495. Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

Animation Clips 1.0, Modia Interactive, arc frustrating. Oct 92

AppleWorks 2.0 (2.0.1), Apple, 408/996-1010, $599. This is an excellent tool for anyone willing to explore what QuickTime can do. Sep 92

MetaDesign for the Macintosh 3.0, MetaVision Software, 617/576-6920, $250. This diagramming tool for structured analysis systems offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at abstract, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

MetaVision Software, 408/996-1010, $599. While this program itself is satisfactory, the included disk optimizer and resource manager (DiskExpress II and Masterjuggler) separately, but the other five utilities are unimpressive. Aug 92

Motion Works ProMotion 1.0 (1.02), Motion Works, 604/685-9725, $395. Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and automatic support for Apple events, but the capabilities are strong enough for animation lacks, with a weak and problem-prone interface. Nov 92

MotionWorks 1.0, MotionWorks, 415/454-6836, $149. With patience and practice, you can become a high-tech special-effects wizard using this image-molding movie utility that "melts" one image into another. While using its simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

MusicWorks 1.0, Gryphon Software Corp., 619/454-6836, $149. With patience and practice, you can become a high-tech special-effects wizard using this image-molding movie utility that "melts" one image into another. While using its simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

Multipurpose 1.0, Aldus Corp., 206/628-2320, $495. For slide presentations, this product provides an all-in-one studio where each element-outlines, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automatic cross-platform compatibility, as well as pre-pack presentation capabilities more than compensate. Feb 93

Morph 1.0, Gryphon Software Corp., 619/454-6836, $149. With patience and practice, you can become a high-tech special-effects wizard using this image-molding movie utility that "melts" one image into another. While using its simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

Macromedia, 415/252-2000, $1195. This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping $149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

Presentation tools

After Dark 2.0, Berkeley Systems, 510/540-5536, $49.95. Turn your screen into an aquarium or a view of a night skyline with this whimsical screen saver that includes more than 30 different modules. Aug 92

AutoDoubler 1.0, 7 (2.0), Salient Software, 415/494-2111, $495. Easy-to-use program merges animation, interactivity, and presentation features, but the image- and text-handling capabilities are less than stellar. Jul 92

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MACWORLD Star Ratings

Microcom, 919/490-1277, $149.95. Simple, convenient set of system-security tools covers all the bases, including password protection, encryption, permanent erase, and more. Jan 93

Conflict Catcher and Other Innovative Utilities 1.0, Casady & Greene, 408/484-9228, $79.95. Enable or disable your INITs and start-up items when you boot-up, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you already own another INIT manager. Mar 93

Crash Barrier 1.0.1 (1.1), Casady & Greene, 408/484-9228, $79.95. Control panel device is supposed to intervene during system crashes. It's a great idea but only works for certain types of crashes. Apr 92

DiskDoubler 3.7 (3.76), Salient Software, 415/321-5375, $79.95. With its impressive safety features, extremely tight compression, and respectable speed, this file-compression utility is a must-have for anyone who could use more hard drive space.

DiskFit Pro 1.0 (1.1), Dantz Development Corp., 510/849-0293, $125. Effective backup utility requires a time-and-date-consuming initial full backup, but subsequent incremental backups are simple and speedy. It does not support tape drives. Apr 92

Drive 2.3, Casa Blanca Works, 415/461-2227, $79.95. Universal hard drive update and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

easyPrint 1.0, SF/O, 402/291-0113, $29.95. Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

Exposure Pro 1.0.2 (1.02), Baseline Publishing, 901/682-9676, $139.95. A floating palette in this screen-capture utility lets you edit your screen shots before you save them. It's a decent idea for those who don't own a paint program, but it creates only 72-dpi bitmaps.

Fastback Plus 2.6 (3.0), Fifth Generation Systems, 504/291-7221, $189. Even the most hardened shirker should be inspired to back up by the marvelous simplicity of this software. One warning—memory shortages can cause it to quit unexpectedly when running in the background. Apr 92

Folder Bolt 1.02 (1.02c), Kent Marsh, 713/672-5625, $52.95. These designated levels of folder protection, plus flexible options for password-handing, among other actions, are the assets of this utility. File encryption, however, is not included. Jun 92

Gofer 2.0, Microlytics, 716/248-9150, $79.95. Polky processing time is the trade-off for flexible text-search options without indexing by this file-finding utility. Our reviewers vetoed the trade. Jan 92

HAM 1.0, Microsense Publishing, 203/435-4995, $79.95. Apple-menu-enhanced submenus, allows reordering, and includes a folder of recently opened items in your Apple menu. Apr 92

Hard Disk Toolkit Personal Edition 1.1.2, FWB Software, 415/474-8055, $79. The more arcane features of the heavy-duty Hard Disk Toolkit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is still included. Jan 93

INITPicker 3.0, Inline Design, 203/435-4995, $79.95. This INIT manager's ability to load and unload INITs on a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

Inline Sync 1.0, Inline Design, 203/435-4995, $129.95. Keep the latest version of your work on both your portable machine and your desktop Mac with this file-synchronization software. It's easy to install, easy to use, easy on the wallet, and does the job well.

Kiwi Power Menus 1.0, Kiwi Software, 805/685-4951, $39.95. Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and enabling you to change the font and size in the menus. Dec 92

Kiwi Power Windows 1.5 (1.5.2), Kiwi Software, 805/685-4031, $79.95. Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. Jul 92

Macalette II 2.2, Micropolis USA, 408/253-2000, $69. You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that eliminates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

MacTools 2.0, Central Point Software, 503/690-8090, $149. The consistent, 3-D-style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

Magnets 1.0, No Hands Software, 415/331-7340, $129.95. Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, $149. Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and stores catalogs of offline volumes, but the many features require some effort to learn. Nov 92

More Disk Space 1.1 (1.2), Alysis Software, 415/566-2263, $39.95. Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

NightWatch 2.0.1b, Kent Marsh, 713/522-5625, $139.95. Although skillful knobs can override the screen-lock feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, $49.95. Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac. Alerts you when someone does connect, and sets time limits for file share users. Oct 92

Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, $149. Everything-including-the-kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

New Utilities 3.0.2 (4.0.1), Now Software, 503/274-2800, $149. Despite minor imperfections, this collection of utilities, including ten separate programs and a variety of sample and support files, provides lots of highly polished bang for your buck.

On Location 2.0.1, On Technology, 617/876-0900, $129.95. Fast file-finding utility with improved functionality shows formatted files, and updates index in background. Also, the initial indexing is time-consuming, and the search functions are incomplete. Jan 92

PicturePress 2.5, Storm Technology, 415/691-6600, $159. This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

QuickDraw 1.0, MVP Software, 415/599-7204, $129. It's great that this nondominated file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching.

Shredder 1.0.1, DLM Software, 619/453-4984, $69. Permanently blitz your data with this quick and easy trash-management tool that writes over deleted data—indeed with accordance with Department of Defense specifications—so that file-removal programs can't bring it back. Jul 92

Silverlining 5.4, La Cie, 800/999-3919, $149. Extensive and detailed testing is only one of many advanced features offered by this hard drive-management utility. The interface is lackluster and apt to confuse beginners. Jan 93

SnapBack 1.0, Golden Triangle Computers, 619/279-2100, $129. For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive.

SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, $70. Get info faster with this CD ROM-access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD ROM folders, this product might save you enough time for it to be worth the $70. Nov 92

SuperDuper 1.7, NeoConcepts, 408/899-4821, $79.75. If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing.

Symantec AntiVirus for the Mac (SAA) (3.0.9), Symantec, 408/253-9600, $99. No-held barred virus-fighter monitors your Mac and alerts you when it sees suspicious activity. Advanced users and network managers will appreciate its customization features and extensive scanning options.

TimeLog 1.01 (1.02), Coral Research, 617/465-4761, $129.95. Tracks your time spent on both your portable machine and your desk-top Mac with this file-synchronization software. It's easy to install, easy to use, easy on the wallet, and does the job well.
**WRITING TOOLS**

- **Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, $99.** Illegible and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in formatting styles.

- **Correct Letters 1.1 (1.0), Wordstar International, 415/282-8000, $49.** In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online guide to Letter Writing.

- **Correct Writing 2.0, Wordstar International, 415/382-8000, $49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete.

- **EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, $249.** Reference database and tool for creating citations and bibliographies is inaccessible from Microsoft Word 5.0, representing a significant enhancement to this excellent product.

- **IDEA Fisher 2.0, Fisher Idea Systems, 714/474-8111, $595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing.

- **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface.

- **Microsoft Word 5.1, Microsoft, 206/882-8080, $495.** Small, solid upgrade, featuring some plug-ins and newly added modules including an icon toolbar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it won't give Word 5.0 users goosebumps.

- **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, $150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem.

- **Pro-Cite 2.0, Personal Bibliographic Software, 313/996-1580, $395.** Valuable bibliographic database program generates large, complex bibliographies. Some features aren't easy to use, but it does have 20 predefined and 6 user-defined forms, plus flexible sorting options.

- **StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, $345.** Frustrating and sometimes hap hazard HyperCard-based program attempts to offer expert training in the craft of plot development.

- **Taste 1.0 (1.02), DeltaPoint, 408/648-4000, $149.** The view, WYSIWYG orientation of this word processor with page-layout features makes it considerably slower than text-oriented word processors. Redraw and translate bugs are other problems.

- **WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, $495.** Plays QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features.
**MAC WORLD**

**Star Ratings**

### Hardware

#### INPUT DEVICES

- **A'1 Mouse**, Mouse Systems Corp., 510/656-1117, $134.95. A smooth ride and light resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. Jun 92

- **Accept for Macintosh**, AccCAD, 408/655-1900, $149. It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

- **The Bat**, Infogrip, 504/766-8082, $495. Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our review considered it the best ergonomic device she's seen; the downside is learning to type all over again. Oct 92

- **DrawingBoard II**, Drawing Pad, CalComp, 800/932-1212, $645, $395. Two haptic features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Nov 92

- **Mouse-Trak**, ItS, Inc., 214/494-3073, $179. Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

- **Mouse-Man**, Logitech, 510/795-8500, $129. Bean-shaped mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

- **TrackMan**, Logitech, 510/795-8500, $149. There's a right-hand bias to this trackball with three programmable buttons and a handy click-lock feature. Jun 92

- **Turbo Mouse 4.0**, Kensington Microware, 415/572-2700, $169.95. The large buttons on either side of this trackball provide just the right measure of tactile feedback while the removable ball glides freely. The break-through feature, though, is the software that lets you customize many of the trackball's functions. Nov 92

- **Voice Express**, MacSema, 503/757-1520, $399. Voice-recognition board allows you to record words or phrases that trigger simple key sequences, but unfortunately, commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features. Apr 92

#### MISCELLANEOUS HARDWARE

- **AC5300 Computer Speaker System**, Altera Imaging Corporation/Products, 717/396-4434, $400. Clamshell shape high/medium speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. Nov 92

- **Bose RoomMate speakers**, Bose Corp., 508/879-7330, $329. Shelded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddied. Jun 92

- **MacSpeaker MS-1**, Monster Cable, 415/871-6000, $239.5. Crystal-clear highs and a midrange are the best features of these shielded speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

- **Media Control Station**, J.C. Cooper Electronics, 310/306-4131, $269.95. This versatile tool connects to the Mac through an ADB port and offers an intuitive and easy-to-use interface to configure MacPaint, MIDI files, multimedia playlists, and other dynamic data. Jan 93

- **The Miracle Piano Teaching System 1.0**, Software Toolworks, 415/083-3000, $499.95. Painstakingly crafted music and piano instruction that lets you customize many of the trackball's functions. It's functional, but does have some minor weaknesses. Jan 93

- **The Mouse Yoke**, Colorado Spectrum, 303/225-6929, $34.95. Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or joystick, for use with flight simulators. Simple, elegantly executed concepts use quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

- **Organizer Link II** (Model OZ-893), Sharp Corp., 800/321-8877, $129.99. If you own a 5000, 7000, or 8000-series Sharp Wizard, this program and cable allow you to connect it to an Mac serial port to exchange data. It's functional, but does have some minor weaknesses. Jan 93

- **PhonePro 1.0.3** (1.1), Cypress Research Corporation, 408/752-2700, $95. Application makes it relatively easy to develop a multiple-choice voice-mail system using your Mac, especially for those with programming backgrounds. The product includes a 9600-bps modem and a handset/microphone. Feb 92

- **PowerKey 2.0**, Sophisticated Circuits, 206/485-7977, $119. Ingeniously well-designed automated power strip has surge-protection outlets that are controlled by the keyboard's on/off switch. The equally clever software can turn on your Mac, unattended, run a QuicksKeys macro (QuickKeys Lite included), and shut down again. Apr 92

- **Ringo LM**, MacSema, 503/757-1520, $169.95. If your Mac-telephone line is doing double duty as a fax and voice line, this telephone-line manager is the answer to your prayers. May 92

#### MODEMS/NETWORK HARDWARE

- **Comstation 2**, PSI Integration, 408/559-8544, $399. Unusually well-designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. Jun 92

- **Comstation 4**, PSI Integration, 408/559-8564, $499. An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, but the need for a separate file server and fax server. Jun 92

- **EtherPrint**, Dayna Communications, 801/531-0600, $499. It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. Dec 92

- **EtherPrint Plus**, Dayna Communications, 801/531-0600, $649. Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

- **EtherWrite**, Computer Systems Corp., 303/444-9532, $695. Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

- **PathFinder**, Dayna Communications, 801/531-0600, $899. For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

- **PowerModem**, PSI Integration, 408/559-8544, $299. Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

- **PowerPort/Gold**, Global Village Communications, 415/329-0700, $499. If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modem. Dec 92

- **QBlazer**, Telebit Corp., 408/734-4333, $599. If portability is an important issue, this 9600-bps modem's port size and battery power make it an attractive choice; otherwise, its high price plus the lack of Mac software and send/fax features work against it. May 92

- **QuickTel Xebra 9600**, Logcode Technology, 805/499-4443, $519. Sleek, slanty, futuristic-looking fax modem offers all the features you'd expect, including acceptable fax software. Apr 92

- **Sparstick**, U.S. Robotics, 708/982-5001, $599. Several nice features, including an easily accessible power button and a front-mounted voice-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than ever. Feb 92

- **SupraFax Modem V.32bis**, Supra Corp., 503/967-2400, $399.95. Send and receive continues
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Ultima Home Office, Prometheos Products, 503/692-9600, $649. When it can reliably transmit data at high speeds and the voice bugs are fixed, this fax modem with voice mail will be worth a second look. Sep 92

Viva 14.4/Fax, Computer Peripherals, 805/695-5751, $469. In data mode, this 14.400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

WorldPort 9600/MPNS, U.S. Robotics, 708/952-5001, $475. Only slightly larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatible. Jan 93

PRINTERS

C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, $2395. Not only is this laser printer more expensive than most personal page printers, it also offers less-impressive features and so-so output. Nov 92

HP LaserJet 4M, Hewlett-Packard, 800/752-0900, $2999. An Intel 80286 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LPB-EX print engine and microscopic toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. Feb 93

HP PaintJet XL300, Hewlett-Packard, 800/752-0900, $3945. The output of this color ink-jet printer won't satisfy demanding graphic artists professionals, but it's great for business users interested in punching up their presentations. Oct 92

IBA LaserPrinter 10A, IBM Corp., 800/358-5835, $3995. Beautifully detailed text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under $4000. Aug 92

LZR 1560, Dataproducts Corp., 818/887-8000, $3395. Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. Sep 92

LZR 960, Dataproducts Corp., 818/887-8000, $2195. This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewers experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. Jul 92

RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, $8999. The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8½ by 11 inches on letter-size media) print area is the only significant flaw. Oct 92

RealTech Laser 400, Hardware That Fits, 409/760-2400, $3195. Exactly the same tabloid-size, 400-dpi printer at the Dataproducts LZR 1560, but for slightly less money. And it does produce output that is perceptibly better than that of 300-dpi printers. Sep 92

StyleWriter, Apple Computer, 408/596-1010, $3999. If money is tight, you want nice-looking output, and you have a little extra time to spare, this is a good personal printer with a new driver that makes it even better. Sep 92

TI microLaser Turbo, Texas Instruments, 800/527-3500, $2349. An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra $500 is worth it. Jul 92

WideWriter, GCC Technologies, 617/890-0880, $1699. Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. Feb 93

SCANNERS

HP ScanJet HP, Hewlett-Packard, 800/752-0900, $1095. An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around $750. Muddled online help and a flimsy hinge are minor problems. Aug 92

LightningScan Pro 256, Thunderware, 510/254-6581, $649. A well-executed hand-held gray-scale scanner worth the cost. It creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scanning in software. Jun 92

Mirror 600 Color Scanner, Mirror Technologies, 612/683-4450, $1199. Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. Apr 92

Nikon LS-3510AF Film Scanner, Nikon, 516/547-6355, 8-bit $5953, 24-bit $11,316. The bread-box-style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Shiny new 3-bit users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. Sep 92

PageReader Professional, Mitsubishi International, 415/544-2781, $795. A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. Jun 92

RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, $8499. Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. Apr 92

SYSTEMS/STORAGE

Duo Dock, Apple Computer, 408/996-1010, $1079. Immensely clever desktop-Mac-size housing for the Duo laptop provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of continues

faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

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Integrated Database/Spreadsheet:
- none

Programmability:
- none

Blueprint $295.00

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- Smart Cursor for locating snaps
- advanced auto-dimensioning
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MacWorld Star Ratings

Installing Nullis boards, belle Apple's usual attention to detail. Mar 93

FlopTek 20/M, Procom Technology, 714/852-1000, $585. It is easy to recommend this floppy drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. Sep 92

Freedom 120, Maxen, 619/944-0818, $699. Battery-powered hard drive provides three to four hours of hard drive storage without a power cable. It performs at a respectable speed, but lacks a battery-power and gauge automatic sleep. The skimpy manual is the most serious problem. Sep 92

Infinity Floptical 21MB, Peripheral Land, 510/657-2211, $599. The good point about this floppy drive is the built-in documentation, switchable termination, and an autostart function, but the bad points are the size, the incompatibility of the bundled software with System 7, and inappropiate formatting of 800K disks. Sep 92

Outbound Notebook System 2030S, Outbound Systems, 303/786-9200, 4/40 $799, 8/80 $3299, 14/24 $3999. If raw power is what you're looking for in a laptop computer, this is the hands-down choice. It's lightweight, upgradable, and performs at a level between a iMac and a life, but the screen is only adequate. Sep 92

Performance/040 (33MHz), Impulse Technology, 408/889-8294, $2399. For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator cards. It is compatible with all Mac IIs. Oct 92

PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, $6999. These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price is more than $5000. Jan 93

PowerBook 145, Apple Computer, 408/996-1010, $2149 to $2499. Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

PowerBook 160, Apple Computer, 408/996-1010, $2429 to $3149. A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. Feb 93

PowerBook 180, Apple Computer, 408/996-1010, $4109 to $4469. An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra $1000. Feb 93

PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) $2249, 230 (4/80) $2690. Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackpad") feel small, these computers virtually cut out to be picked up, handled, and used. Mar 93

QuadFlexta, Quadram, 404/923-6666, $495. Remarkable super-high-density floppy drive uses an ingenious disk-forming method to put just over 20MB on a single 3 1/2-inch floppy disk, but it may not be as cost-efficient as other options. Apr 92

Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis $469, 240MB drive $979. An excellent piece of engineering, this fast, trouble-free, removable hard drive is designed to solve the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

Radius Rocket 33, Radius, 408/434-1010, $2499. The accelerator board of choice for our reviewer, this 68040 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROMs). It's fast, or it's not. Oct 92

TokaMac II FX 33, Fusion Data Systems, 512/338-5326, $2995. CPU and FPU tasks on a Mac IIx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be the best if your life already has a fast video board and more than enough memory. Oct 92

BookView Imperial, Computer Care, 612/371-0061, $1399 (includes 6MB of RAM). This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

Canon RC250, Canon USA, 714/475-4320, $799. A good choice for users looking for an inexpensive still-video system. Camera captures up to 50 color images per video floppy disk and hooks up to any television. June 92

Dycam Model 1, Dycam, 818/988-8008, $95. Compact, point-and-shoot, still-video camera and downloads images in 8-bit gray-scale—for as long as the battery doesn’t die first. June 92

Macintosh 16" Color Display, Apple Computer, 408/996-1010, $1599. The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. June 92

Power Portrait, Sigma Designs, 510/770-0160, $899 or $999. Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

PowerVision, Mirror Technologies, 612/633-4450, with no RAM $499, with 2MB of RAM $699, with 4MB of RAM $999. Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait grayscale and black-and-white monitors. Feb 93

VideoSpigot, SuperMac Technology, 408/245-2202, $499 to $1599. Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92
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<td>Mac LC II  4/80, MPC 105 Ext.</td>
<td>85mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>219</td>
</tr>
<tr>
<td>Kod. Sony 14&quot;</td>
<td>SP-240AP</td>
<td>Monitor &amp; Seikosha</td>
<td>$3959</td>
<td></td>
</tr>
</tbody>
</table>

**Designer Starter Package**

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac IIX 4/80, MPC 105 Ext.</td>
<td>120mb</td>
<td>21ms</td>
<td>5&quot; HH</td>
<td>1399</td>
</tr>
<tr>
<td>Kod. Apple 14&quot;</td>
<td>Color Monitor &amp; HP 550C Color Printer.</td>
<td>$5369</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Business Package

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Quadra 700 8/230 MPC 105 Ext.</td>
<td>700mb</td>
<td>19ms</td>
<td>5.25&quot; FH</td>
<td>5699</td>
</tr>
<tr>
<td>Kbd. Apple 14&quot;</td>
<td>Color Monitor &amp; NewGen GO 44 Laser Printer</td>
<td>$8999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphic Artist Package**

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Quadra 950 20/425 MPC 105 Ext.</td>
<td>128mb</td>
<td>9ms</td>
<td>3.5&quot; HH</td>
<td>9395</td>
</tr>
<tr>
<td>Kbd. Sony 1604S 16&quot; S/E</td>
<td>Color Monitor &amp; DataProducts</td>
<td>$4959</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Laser Printer**

- **Unformatted**
  - Capacity: 21mb Floptical | 3.5" HH | $295 |
  - Model: 21mb Floptical 3M Cartridge | $295 |

#### TOSHIBA

**Unformatted**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>85mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1095</td>
</tr>
<tr>
<td>120mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$1395</td>
</tr>
</tbody>
</table>

**CD-ROM**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>600mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$549</td>
</tr>
</tbody>
</table>

**FUJITSU**

**Optical Drive**

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Speed</th>
<th>Size</th>
<th>Year Warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEAC</td>
<td>600mb</td>
<td>25ms</td>
<td>15&quot;</td>
<td>$299</td>
</tr>
</tbody>
</table>

**MACINTOSH SIMMS**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size</th>
<th>Year Warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8/2x/4x/8x</td>
<td>6/8</td>
<td>$31/59</td>
<td>$395</td>
</tr>
<tr>
<td>Quadro 700/950/6x8/8x8</td>
<td>$115/195</td>
<td>$495</td>
<td></td>
</tr>
</tbody>
</table>

### Quantum

#### "An Apple Authorized Brand"

**Unformatted**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>85mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$955</td>
</tr>
<tr>
<td>120mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$995</td>
</tr>
<tr>
<td>212mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1055</td>
</tr>
</tbody>
</table>

**Graphic Artist Package**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>85mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$955</td>
</tr>
<tr>
<td>120mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$995</td>
</tr>
<tr>
<td>212mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1055</td>
</tr>
</tbody>
</table>

**Laser Printer**

- **Unformatted**
  - Capacity: 21mb Floptical | 3.5" HH | $295 |
  - Model: 21mb Floptical 3M Cartridge | $295 |

**External Fixed or Removable Drive Cases**


### NEC

| MultiSync 3FGX - 15" Monitor | $435 |
| MultiSync 4FG - 15" Monitor | $785 |
| MultiSync 5FG - 21" Monitor | $1315 |
| FG8x 8-bit board           | $665 |
| FG2x 24-bit board          | $1255 |
| CD-ROM CDR-37              | $425 |
| CD-ROM CDR-74              | $245 |
| SilentWriter 69F Printer   | $1385 |
| SilentWriter 99F Printer   | $1865 |
| SilentWriter 99F Printer   | $1755 |
| ColorMate PS-40 Color Printer | $439 |

### Mac Systems - Capacity, Speed, Size

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>85mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$295</td>
</tr>
<tr>
<td>120mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$385</td>
</tr>
<tr>
<td>212mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1425</td>
</tr>
<tr>
<td>75mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1725</td>
</tr>
</tbody>
</table>

**Maxtor®**

**Unformatted**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Speed</th>
<th>Size Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>85mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$265</td>
</tr>
<tr>
<td>125mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$402</td>
</tr>
<tr>
<td>212mb</td>
<td>12ms</td>
<td>3.5&quot; HH</td>
<td>$1425</td>
</tr>
<tr>
<td>125mb</td>
<td>17ms</td>
<td>3.5&quot; HH</td>
<td>$402</td>
</tr>
</tbody>
</table>

**Laser Printer**

- **Unformatted**
  - Capacity: 21mb Floptical 3M Cartridge | $295 |

**Inside Model**

- **21mb Floptical** |
- **3M Cartridge** |
- **$295** |

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  - < 1 ms Short Seek Time

- **128REM Turbo Epson**
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  - < 1 ms Short Seek Time

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  - 12 ms Short Seek Time
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- GCC PLP II, 300dpi: 849
- GCC Write Move II (portable): Call

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- Procom 44 MB Removable: $469

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#### SII
- Seiko Instruments
  - Seiko 2070LR 20" Trinitron: Multi-frequency, Trinitron display, 2x MPR II $2,295
  - Seiko 1445 14" Trinitron display: 469
  - Seiko 177 Trinitron display: 1095
  - Smart Label Printer Plus: 139
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- Sony 1304/1604: Call 1095
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**Modems**

LOGICODE

Supra V.32 bis
Fax/Receive

**Mac Systems**

**Mac Cpu's**

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Sony 14" Trinitron Color Display, Apple
Keyboard, Mouse, System 7 & Hypercard

**Mac Systems**

**LC II Color System**

Mac LC II, 4MB RAM/80HD,
Sony 14" Trinitron Color Display, Apple
Keyboard, Mouse, System 7 & Hypercard

**Mac IIfx Color System**

Mac IIfx, 4MB RAM/80HD,
14" Trinitron Color Display, Apple
Keyboard, Mouse, System 7 & Hypercard

**Mac Ilvx System**

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- 6MB FB 160 & 180 ............... $329
- 8MB FB 160 & 180 ............... $399
- 10MB FB 160 & 180 ............... $499
- 4MB FB 210 & 230 ............... $229
- 8MB FB 210 & 230 ............... $349
- 10MB FB 210 & 230 ............... $499
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- L2502/Realtech/Quickor 8MB .... $49
- NEC SilenWriter 2 M90 2MB .... $29
- NEC Silenwriter M9579 2MB .... $129
- NEC Silenwriter M9579 4MB .... $199
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- ClubMac 44MB Internal $369
- ClubMac 44MB Dual $729

**ClubMac 88MB REMOVABLES**
- ClubMac 88MB External (SQ51110) $489
- ClubMac 88MB Internal $469
- ClubMac 88MB Dual $999

**SyQuest REMOVABLE TECHNOLOGY**
- SyQuest Drives include a TWO Year Warranty, one cartridge & accessory cable. SCSI Director™, Removable Utility - SyQuest Cartridges carry a ONE Year Warranty.

### SyQuest

**CLUB MAC 88c REMOVABLES**
- ClubMac 88c External (SQ5110C) $619
- ClubMac 88c Internal $999
- ClubMac 88c Dual $1149

**CLUB MAC 444MB REMOVABLES**
- ClubMac 444MB External (SQ5115) $369
- ClubMac 444MB Internal $369
- ClubMac 444MB Dual $729

**CLUB MAC 888MB REMOVABLES**
- ClubMac 888MB External (SQ51120) $489
- ClubMac 888MB Internal $469
- ClubMac 888MB Dual $999

**SyQuest REMOVABLE CARTRIDGES**
- 44MB Cartridge $63
- 88MB Cartridge $97

### Seagate

**ELITE SERIES**
- 1.6GB ST416000N $1795
- 2.0GB ST42000N $2099
- 4.0GB ST44000N $3699
- 8.0GB ST48000N $5299

**PANTHER SERIES**
- XT SERIES (3.5" LOW PROFILE)
  - 120MB 7200XT $429
  - 207MB 7213 $449
  - 330MB LXT-330 $699
  - 535MB LXT-535 $1035
- XT-B8000 AND PANTHER SERIES (5.25" FULL HEIGHT)
  - 645MB XT-B8050 $1279
  - 1.2GB XT-B8100 $1529

**CONNER**
- 85MB CP30250 $285
- 120MB CP30300 $345
- 170MB CP30350 $375
- 540MB CP30540 $4029

### Quantum

**GO•DRIVE SERIES (2.5" HARD DRIVE DESIGNED FOR NOTEBOOKS)**
- 60MB GO-60 17ms $325
- 120MB GO-120 17ms $455
- 160MB GO-160 17ms $649

**ELS SERIES (0.9" LOW PROFILE AND LOW POWER)**
- 42MB ELS42 19ms $185
- 85MB ELS85 17ms $235
- 127MB ELS127 17ms $305
- 170MB ELS170 17ms $345

**LPB SERIES (0.9" LOW PROFILE)**
- 240MB LP9240 10ms $515
- 525MB LP9525 10ms $1105

**PRODRIVE SERIES (3.5" HALF HEIGHT)**
- 425MB PRO-425 19ms $899
- 700MB PRO-700 10ms $1305
- 1.0GB PRO-1000 10ms $1585
- 1.2GB PRO-1225 10ms $1755

### SyQuest

**CLUB MAC TAPE BACKUP Systems**
- TapeDrive MD-50 Analog $469
- TapeDrive MD-50F Analog $679
- Afast DAT DAT, DDS 4mm $1219
- WangDAT DAT, DDS 4mm $1249
- HP 35470A DAT, DDS 4mm $1309
- HP 35480A DAT, DDS, DDS 4mm $1599
- Exabyte EXB-8200 Digital/Helical 8mm $2619
- Exabyte EXB-8500 Digital/Helical 8mm $2849

### Fujitsu

**FIVE YEAR WARRANTY**

### ClubMac OPTICAL Drives

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### NEC CD EXPRESS (CDR-25) $395

CD Express is the easiest, most complete and most affordable way for your family to experience the world of advanced interactive CD-ROM technology.

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<tr>
<td>NEC CD Multimedia PC compatible CD-ROM reader</td>
<td>$799</td>
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<td>(6 software titles)</td>
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### NEC CD EXPRESS (CDR-74) $619

CDR-74 with MAC Interface

- MultiSync 5FGX (15" Color) $629
- MultiSync 4FG (15" with AccuColor) $759
- MultiSync 5FG (17" with AccuColor) $1315
- MultiSync 6FG (21" with AccuColor) $2399
- MacFG 24Xp (14-46 video card for NEC 15" & 17") $759
- MacFG 8X $649
- MacFG 24X $1249

### NEC CD EXPRESS (CDR-74 with MAC INTERFACE) $619

- Quicklime compatible NEC CDR-74
- CD-ROM reader with MultiSync technology
- Averaged stereo speakers & headphones
- 330KB data transfer
- Video cache memory
- Two Door Dual Protection
- MultiSync technology, the CDR-74 spins CD twice as fast when accessing data.

### NEC MULTIMEDIA GALLERY

- QuickTime compatible NEC CDR-74
- CD-ROM reader with MultiSync technology
- Averaged stereo speakers & headphones
- 330KB data transfer
- Video cache memory
- Two Door Dual Protection
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<tr>
<td>Carol Johnstone</td>
<td>Account Manager</td>
<td>415.678.3152</td>
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<td>Shannon Smith</td>
<td>Account Manager</td>
<td>415.674.7414</td>
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<td>Niko Stranz</td>
<td>Account Manager</td>
<td>415.678.3105</td>
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24 XL accelerated color card  
**$1949.**

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**$189.**

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**$299.**

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8 Bit System $2099  
24 Bit System $2649

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<td>$2377</td>
<td>Call Power Book 210 4/8 (23777) NEC 500 15”</td>
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<tr>
<td></td>
<td></td>
<td>$1337</td>
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<tr>
<td>Centris 610 4/80</td>
<td>$2377</td>
<td>Call Apple Color Printer (23777) E Machine</td>
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<td>1167</td>
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<tr>
<td>Centris 650 4/80</td>
<td>$339</td>
<td>Call StyleWriter II (339)</td>
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<td>E Machine T16 II (327)</td>
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<td>MAC II 8/32</td>
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<td>Macintosh Printers (2447)</td>
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<td>E Machine are In Stock.</td>
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<tr>
<td>MAC II 17/170</td>
<td>$1937</td>
<td>LaserWriter Pro 600 (1937)</td>
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<tr>
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<td>LaserWriter Pro 630 (1937)</td>
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<td>MAC LC II 6/40</td>
<td>$1237</td>
<td>LaserWriter Pro 630 (1237)</td>
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<td>MAC LC III</td>
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<td>HP Desk Writer 550 Color (1237)</td>
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<tr>
<td>Color Classic 4/80</td>
<td>$1947</td>
<td>HP 4M 6 MB Postscript (1947)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Color One Scanner (1947)</td>
</tr>
</tbody>
</table>

---

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#### Macintosh

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>Classic II 4/80</td>
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<td>LC II 4/80</td>
<td>$1,250</td>
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<tr>
<td>II 5/160</td>
<td>$1,189</td>
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<tr>
<td>II 5/300</td>
<td>$1,495</td>
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<tr>
<td>II 5/320</td>
<td>$1,495</td>
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<tr>
<td>II 5/420</td>
<td>$1,820</td>
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<tr>
<td>II 5/450</td>
<td>$1,820</td>
</tr>
<tr>
<td>II VX 4/80</td>
<td>$2,095</td>
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<tr>
<td>II VX 4/80 w/CD ROM</td>
<td>$2,095</td>
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<tr>
<td>Quadra 700</td>
<td>$2,475</td>
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<tr>
<td>Quadra 950 w/GIG RAM</td>
<td>$4,415</td>
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#### Powerbooks

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<th>Model</th>
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<td>145/400</td>
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<tr>
<td>160/420</td>
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<td>160/420/80</td>
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<td>170/460</td>
<td>$1,795</td>
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<td>$2,475</td>
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#### SONY

<table>
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<th>Model</th>
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<tr>
<td>1320</td>
<td>$2,320</td>
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<td>1340s</td>
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#### RasterOps

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<th>Model</th>
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<td>Radius</td>
<td>$545</td>
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<tr>
<td>Full Pant Mono 500</td>
<td>$1,685</td>
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<td>19&quot; Mono</td>
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<td>21&quot; Mono</td>
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<td>20s Color</td>
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<td>24x Card</td>
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<td>Precision 8x2</td>
<td>$725</td>
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<td>20x Ultrac</td>
<td>$1,785</td>
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<td>20&quot; Unilith</td>
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<td>17&quot; Slimline Welcome</td>
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<td>Salt Pro</td>
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<td>Image Vision</td>
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#### SONY

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<th>Model</th>
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<tr>
<td>PS-815</td>
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<td>PS-815L</td>
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<td>PS-815M</td>
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<td>PS-860</td>
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<td>Color/ColorL</td>
<td>$1,195</td>
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<td>Script 10</td>
<td>$1,195</td>
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#### Micro USA

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
<td>(800) 227-6888</td>
<td></td>
</tr>
<tr>
<td>800-888-6922</td>
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#### Upgrades

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<th>Upgrade</th>
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<tr>
<td>PowerBook Modem</td>
<td>$99.99</td>
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<td>145/400</td>
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<td>160/400</td>
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<td>1320</td>
<td>$329.99</td>
</tr>
<tr>
<td>1340s</td>
<td>$329.99</td>
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#### Mac II

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
<td>Mac II 1/0 (six slots)</td>
<td>$599.99</td>
</tr>
<tr>
<td>Mac SE 1/20 (no keyboard)</td>
<td>$499.99</td>
</tr>
<tr>
<td>Mac Portable</td>
<td>$1,199.99</td>
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#### Personal Laserwriter NT

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<th>Model</th>
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<tr>
<td>Personal Laserwriter NT</td>
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#### New Products

<table>
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<th>Model</th>
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<tr>
<td>Hewlett Packard PS NT</td>
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<td>HP LaserJet II</td>
<td>$1,299.99</td>
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<tr>
<td>Deskwriter</td>
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<tr>
<td>Deskwriter 550C</td>
<td>$799.99</td>
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<tr>
<td>Laserwriter</td>
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#### Macintosh CPU's

<table>
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<tr>
<th>Model</th>
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<td>LC II/Classic II</td>
<td>$2,245.00</td>
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<tr>
<td>LC III</td>
<td>$2,245.00</td>
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<tr>
<td>LC 5/120</td>
<td>$2,245.00</td>
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#### Macintosh Problems

- **Shrinking Macintosh**
  - Austin, Texas - Recent Macintosh sightings have revealed smaller units with fewer NuBus slots. Observers note that this trend has become a real problem with the rapidly increasing quantities of NuBus option boards available in the marketplace. A spokesman went on to say that power supplies were also becoming smaller, with less ability to provide power to the sophisticated NuBus systems.

- **Second Wave Solves the Macintosh Slot Problem**
  - Austin, Texas - A family of NuBus expansion chassis systems has solved the problem of NuBus slot shortages in the Macintosh. The two models are: (1) the Macintosh II (2) the Macintosh IIc. Both models are available now.

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Ranger 20" color... $399
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Power Mac 2MB 3.5... $399
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SuperMac 24-Bit ISA... $999
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MACWORLD April 1993 283
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<td>Applotalk Connectors</td>
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<td>HP Deskwriter 550C</td>
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<td>Newgen Turbo PS 660B (600x600 dpi)</td>
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## DRIVES

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<td>Quantum 127 MB ELS</td>
<td>$445</td>
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<td>Quantum Pro Drive 240</td>
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<td>Quantum 425 MB</td>
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<td>Maxtor 120</td>
<td>$489</td>
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<td>Maxtor 213</td>
<td>$729</td>
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<td>Maxtor 340</td>
<td>$1229</td>
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<tr>
<td>Maxtor 100 meg</td>
<td>$1800</td>
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<tr>
<td>Seagate 1.2 gigabyte</td>
<td>$2299</td>
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<tr>
<td>Syquest 44MB</td>
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<td>Syquest 80MB</td>
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## SOFTWARE

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<td>Microsoft Word</td>
<td>$289</td>
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<td>Microsoft Excel</td>
<td>$399</td>
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<td>Aldus Pagemaker</td>
<td>$497</td>
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<td>Callera Wordscan</td>
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<td>Adobe Photoshop 2.0</td>
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<td>Quark Express 3.0</td>
<td>$579</td>
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<td>Corel Omnigrafix</td>
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## MODEMS

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<td>Zoom</td>
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<tr>
<td>modem MX 2400/5 w/SendFax 9600 BPS</td>
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<td>Thomson Pico 14.4 v.32bis (ext.)</td>
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<td>Supra Fax Modem 96/96 (ext)</td>
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<td>PSI Comstation 5</td>
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<td>Global Village Bronze 96/24 for Powerbook</td>
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<td>Global Village Silver 96/96 for Powerbook</td>
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<td>50 MHz Powercache</td>
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<td>Radius Rocketshare</td>
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## MEMORY

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<td>Powerbook 140 &amp; 170 6 meg</td>
<td>$259</td>
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<td>Adapter and memory</td>
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## CD-ROMS

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<tr>
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<td>NEC CDR-74</td>
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<tr>
<td>NEC CDR-57</td>
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## SMART & FRIENDLY

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<tr>
<td>Classic CD Collection</td>
<td>$399</td>
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<tr>
<td>Super CD Collection</td>
<td>$499</td>
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- 1736 People at Leisure* $99.95
- 2066 People of the World $79.95
- 1686 Kids* $99.95
- 1863 African Wildlife $79.95

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- 1919 ClipTime v.2... $199.00

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Published by Infovision Technol. Inc.

1659 Wrapture Reels One... $179.95
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Published by Gazelle Technologies, Inc.

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Published by REMedia

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1190 Wrapture Two $95
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**The AmCoEx Index of Used Mac Prices**

<table>
<thead>
<tr>
<th>Machine/RAM/ Hard Drive</th>
<th>Average Sale Price</th>
<th>Monthly Change</th>
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<tbody>
<tr>
<td>Mac SE/2MB/20MB</td>
<td>$875</td>
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<tr>
<td>Mac Portable/1MB/40MB</td>
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<tr>
<td>PowerBook 100/4MB/40MB</td>
<td>$900</td>
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<tr>
<td>PowerBook 140/4MB/40MB</td>
<td>$1400</td>
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<td>Mac Classic/2MB/40MB</td>
<td>$675</td>
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<td>Mac SE/30/2MB/40MB</td>
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<td>Mac LC/2MB/40MB</td>
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<td>Mac II/30/4MB/80MB</td>
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<td>Mac IIx/4MB/80MB</td>
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<td>B&amp;W display/board</td>
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<td>Apple 13-inch RGB</td>
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<td>LaserWriter Plus</td>
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<td>LaserWriter UNT</td>
<td>$1175</td>
<td>+$25</td>
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</table>

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during December 1992.
Announcing a better mousetrap.
In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the remarkable MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they’d ever used for testing monitors, *MacUser* magazine concluded, “If you’re looking for the sharpest display, the NEC MultiSync 4FG should be your top choice.”

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Another big idea—the display area. The large 15” screen coupled with FullScan™ capability for edge-to-edge images gives you a considerably larger display area than typical 13” or 14” RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using NEC’s free FG/Mac cable adapter. It works with the Mac’s on-board video, so you won’t need an add-in video board.

Both monitors are compatible with the Mac II family, Quadra™ series, LC’s, PowerBooks™ and PC systems. So you can use just one monitor for both types of platforms. *MacUser* noted the “powerful and versatile controls make switching from a Mac to a PC a snap.”

And to make these monitors as user-friendly as possible, we’ve included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field™ technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

There are lots of reasons for considering an NEC MultiSync monitor for your Mac—the sharp, bright images, the vibrant colors, the large display area, the flexibility, the compatibility—to name five. And the to name five more.

For more information on our award-winning monitors, call 1-800-NEC-INFO (in Canada: 1-800-343-4418). Or for information via fax, call NEC FastFacts™ at 1-800-366-0476, request #62234.

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-The NEC MultiSync 4FG: The ultimate monitor for your Macintosh.

-MacUser Magazine
Aug. '92
Cursor control. After all, that's what a pointing device really is all about. And now, with the introduction of Turbo Mouse™ 4.0, cursor control takes on a whole new meaning.

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- Want a really fast cursor? Our new Brilliant Cursor™ technology will jump your cursor from one programmed HotSpot to another. A real plus for large screen and multiple monitor setups.

And Turbo Mouse 4.0 features Enhanced Mouse Buttons that let you execute one of seven useful commands. You can even have the same button perform different commands in different applications.

Combine all this with onscreen help, System 7 compatibility, two ADB ports for chaining — not to mention a large comfortable ball with an ultra-responsive feel — and you'll understand why Turbo Mouse has won more awards than any other Macintosh input device in history.

For more information, call 800-535-4242. For information by fax, press 82 and request document 320. Outside the US and Canada, call 415-572-2700.