Jazz or Excel
Which is Right for You?
OverVUE asks: What can you do in two ticks of a clock?

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*Requires Microsoft Basic
Jazz Is Hot, So Is Excel

A theory in personal computing holds that bit programs are what really sells computers.

Proponents of the software-sells-the-hardware theory claim that the first spreadsheet, VisiCalc, was responsible for the phenomenal success of the Apple II, that Lotus 1-2-3 made the IBM PC, and, if you want to stretch it a bit, that WordStar was responsible for the success of computers running the CP/M operating system, including the Osborne One.

You can argue that there are lots of Apple IIs in school that don't use VisiCalc and that the PC would have been successful without 1-2-3, but there is little doubt that great software and great computers go together.

Lotus's Jazz and Microsoft's Excel are both capable of doing for the Macintosh what 1-2-3, VisiCalc, and WordStar did for their respective buddies.

Never before have two super programs appeared almost simultaneously for the same computer. Jazz redefines the notion of an easy-to-use integrated program, while Excel redefines both the power and the presentation capability of spreadsheets.

And as if Jazz and Excel weren't enough, we are witnessing a deluge of other solid business software such as Crunch, OverVUE, Microsoft Chart, and Habadex. Macintosh users, some of them waiting a long time for software that shows off the real elegance and power of this machine, are entering a new era of embarrassing riches.

Suddenly, software for the Macintosh is not only easier to use but more powerful and more versatile than software for the IBM PC.

In Macworld's August issue I said that the Macintosh would be successful despite Apple's bungled attempts to market it. Unless the rules of the personal computer game have changed, software is the reason my prediction of success will be proven correct.

If I were in charge of Apple's advertising budget, I would be tempted to give away at least the television portion to Lotus and Microsoft. Jazz advertising has given the Macintosh a fresh, usable look and greatly boosted the computer's visibility when Apple needed exposure most.

Apple seems to have lost its PR touch. For several months we heard nothing but bad news. The company seems to know how to hype itself when there's something great to shout about, but it's far less experienced in handling bad news. The biggest nightmare has been the Steve Jobs affair. When Don Estridge was removed as head honcho of IBM's Personal Computer division last March, the company announced that he got a big promotion to IBM headquarters in Armonk, New York, and that the employees gave him standing ovations when he made farewell rounds of the PC division buildings. When Jobs left it seemed more like an assassination.

The barrage of bad press shatters any hopes of selling Macs in the Fortune 500 market. Corporate buyers aren't likely to turn their backs on the IBM standard as long as the Ap-

(continues on page 12)
Apple's Macintosh, "the computer for the rest of us," is probably the most advanced and easiest to use computer on earth. But until now, Mac couldn't be taken seriously for word processing. Enter Microsoft Word for the Macintosh. Mac's professional word processing program.

Word runs the most popular letter quality printers. It doesn't limit your manuscripts to 10 pages or even 50 pages. Because one Word document can hold as many pages as you can fit on a disk.

And Word not only sets up footnotes, columns and special formats in a flash, it has a whole disk full of other features to make your writing go faster.

**Word does windows.**

Unique to Word is its ability to "window" up to four pieces of work on the screen at once.

So while you're typing one document, you can have pages from three others on the screen for reference. Or to cut and paste between documents quickly. Which can save a lot of the time you'd spend opening and closing files.

**Key phrases at a keystroke.**

If you have a lot of stock paragraphs you use in your writing, Word's glossary feature puts them at the tip of your typing fingers. Just store the pieces of text you need and you can recall them instantly.

And if you want an alternative to mouse work, you can run your Mac the old fashioned way. Because Word gives you the option to execute commands from the keyboard.

By the way, you don't have to write off your MacWrite documents to convert to Word. It'll run them all right off the bat.
Reader-friendly form letters.

With Microsoft® Word, you also get a sophisticated "conditional" text merging feature that lets you make customized form letters and documents.

So instead of sending out 800 "Dear Client, we've moved" notices, you can mail a letter that will read like personal correspondence.

Get the max out of Mac.

Microsoft Word has scores of features that all have been designed to take full advantage of Mac's easy operating style. So you don't have to be a professional to use it.

Word is just one of a whole family of programs we've written for Apple's® Macintosh™.

Which means it can exchange data with Microsoft Multiplan®, Microsoft Chart, and Microsoft File. And because our programs work alike, if you learn one, you're well on your way to learning the rest.

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David Bunnell

(continued from page 9)

...ple shakeup gives people the impression that the company is teetering on the brink of disaster.

But there is good news from Cupertino, too. Apple has agreed to let Macintosh users install HyperDrive hard disks in their computers without voiding the warranty. And the expected announcement of an Apple hard disk will also help the Mac out.

If the company is sincere about opening up the Mac to peripheral manufacturers and to software publishers, overall Mac sales will improve, and Mac users will have more choices.

The Macintosh will be with us for a long time, and we are yet at the beginning of its software cycle. Five years from now the Macintosh software library will be a monument to our creativity. The Apple II and IBM PC libraries will look mundane and unimaginative in comparison.

One thing the Mac does far better than any other personal computer is package its printed output. Documents created on the Mac look so much better that they are better.

The Macintosh is so great, and its early users so enthusiastic, that it has to succeed. Otherwise something must be wrong. □
a see
there's
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Now wipe that sweat off your brow, don your helmet and gloves, strap yourself into your seat and

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You just found the right hard-disk subsystem for your MAC... Check out the Paradise MAC 10.

Easy To Look At: Beauty isn't everything but most hard disk MAC drives will scare your computer to death in the morning! The MAC 10 is artfully engineered to complement the aesthetics of the MAC.

Nice To Have Around: Just 3.5" wide and no deeper than the MAC, the MAC 10 has a smaller footprint than any other external MAC hard drive subsystem. Nice to carry around too... Only 5 pounds.

The Right Breeding: Paradise Systems is known for innovative engineering. The MAC 10 is the latest in a line of ground breaking micro computer peripheral products from Paradise.

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Your MAC Can Relate To It: 5 times faster than the add-on MAC floppy.

So Can You: Just plug in the MAC 10 and you're ready to go... That's it!

No Surprises: The MAC 10 won't void your Apple warranty, or require you to modify your system. The user interface uses pull down menus, just like the one you're used to on the MAC.

Long Term Commitment: The MAC 10 comes with a 1 year limited warranty.*

Do Your MAC A Favor: Go see your Apple dealer and look at a MAC 10 or call us toll free at (800) 822-2020 (CA.) or (800) 527-7977 (outside CA.). It will be the beginning of a wonderful relationship.

Specifications:
CAPACITY:
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10mb formatted

DISK DRIVE SEEK TIMES:
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Average ........................ 85 ms
Maximum ....................... 180 ms

ROTATIONAL SPEED:
3600 RPM

POWER REQUIREMENTS:
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DIMENSIONS:
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Width .......................... 3.5 inches
Depth .......................... 10.8 inches

WEIGHT:
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INTERFACE:
Connects to your MAC via the modem or printer port. Printer connector and integral print spooler provided on MAC-10.

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On April 29 Apple announced that it would cease production of the Macintosh XL computer, formerly known as the Lisa. As a member of the group that helped create the Lisa, I couldn’t help but feel a pang when I heard the news. Yet my overriding feeling is one of gratification. In its brief product cycle, the Lisa changed people’s expectations of a personal computer. Among Apple products, the Lisa spawned not only the Macintosh but also the MouseText option on the Apple II (see “The Lisa’s Influence”). Even IBM PC products were heavily influenced by the technology, including VisiCorp’s VisiOn, Microsoft Windows, Digital Research’s GEM, Ashton Tate’s Framework, and IBM’s TopView.

The user interface was the most publicized characteristic of the Lisa. It introduced a host of ideas that have been widely emulated, ranging from how columns are widened in a spreadsheet to how people are notified of mistakes and problems. When the Lisa development team designed the user interface, we borrowed good ideas from wherever we could find them. For example, the Lisa borrowed pop-up menus and overlapping windows from Smalltalk, status lines from VisiCalc, and automatic removal of extra spaces after text deletion from Douglas Engelbart’s research at SRI International.

But the Lisa user interface was not a copy of any that preceded it; it was distinctive. It was the first to feature the now-familiar menu bar, the one-button mouse, the Clipboard, and the Trash can. Although the Xerox Star had icons, the Lisa was the first product to let you drag them with the mouse, open them by double-clicking, and watch them zoom into overlapping windows.

To minimize the time it would take people to learn to use the Lisa, Apple technical writers, programmers, and marketers struggled for two years to find suitable terminology to appear in menus, dialogs, alerts, and manuals. Our foreign-language translators spent months more choosing the corresponding terms in French, Italian, German, Spanish, and other languages.

It may come as a surprise that terms like Revert, Plain Text, Align Left, Clipboard, and Panel were difficult to coin and even more difficult to agree upon. When we studied VisiCalc, we discovered that people had trouble interpreting the term General Format, which means that a number typed into a spreadsheet cell is right justified, while text is left justified. After extensive brainstorming and testing of LisaCalc, we chose Words left, numbers right, which was self-explanatory if a bit verbose.

Much has been made of the high cost and five-year development time of the Lisa. True, the development was expensive, but it did not take five years. The first Lisa was shipped in May 1983. Five years earlier, in 1978, Apple had launched a project code-named “Lisa,” but that project’s goal was quite different from what the Lisa eventually became. In early 1980, after Apple’s senior staff visited Xerox’s Palo Alto Research Center (PARC) to see a demonstration of Smalltalk, the goal was completely redefined. Only the code name, some of the hardware components, and a few of the staff members stayed the same.

I was the PARC employee who gave Apple the Smalltalk demonstration. Impressed by the perspicacity of the visiting Apple staff members, I resolved to join their company, which I did in July 1980. Rich Page had just built the first Lisa prototype incorporating a sample 68000
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**The Lisa's Influence**

The Lisa affected the design of many personal computers. Listed here are Lisa innovations that were incorporated into the Macintosh.

- Menu bar, pull-down menus, keyboard-activated menu commands
- Printing dialog boxes
- Appearance, structure, and operation of windows and scroll bars
- Ability to move windows and icons by dragging them with the mouse
- Windows that zoom to open and close
- Dialog and alert boxes with buttons and check boxes for selecting choices

**Individual Software Packages**

- QuickDraw graphics are identical on the Lisa and the Macintosh.
- LisaProject was converted for Macintosh to become MacProject.
- LisaDraw was converted for Macintosh to become MacDraw.
- LisaTerminal, LisaWrite, LisaCalc, LisaGraph, and LisaList influenced the design of Macintosh applications.
- The Lisa Desktop Manager influenced the design of the Macintosh Finder.
- The Lisa printing software heavily influenced the Macintosh printer-driver equivalent.
- Lisa Pascal is still the principal language used to develop software for the Macintosh.
Fonts and Images for the Macintosh

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Circle 29 on reader service card
programs, but none were satisfactory. One day, at a meeting of my staff, I described my dream scheduling system.

Steve Young mentioned the concept to his wife, Debbie Willrett. She promptly quit her job at another computer company and in a few incredible weeks created the first prototype of LisaProject. We relied heavily on that program throughout the remainder of the development period. The marketing department was impressed by its utility and decided to make it a product.

One story that was exaggerated in books and articles was the tension between the Lisa and Macintosh teams. As in any friendly rivalry, some individuals took the competition too seriously. By and large, the teams gave each other both moral and technical support. Half the Macintosh programmers came from the Lisa group, and most of those were working on both Lisa and Macintosh tasks at the same time. We were saddened when the merger of our divisions forced the elimination of many duplicate and obsolete jobs, but most of the displaced employees found positions elsewhere in the company, and the rest discovered that Lisa developers are well-regarded in Silicon Valley.

Newspapers and magazines like to feature stars, and as a result a few members of the Lisa team received the lion's share of the publicity and credit for the product. Everyone who worked on the Lisa knows that it was a team endeavor. My most lasting memory will be of how much everybody cared about the quality of the product. Every 80-hour workweek, every canceled vacation, every hot debate, and every wrenching management decision was motivated by one common driving force: we wanted our product to be the best.

By my reckoning the Lisa engineering effort took three years from product definition and first prototype to full production. In the end we had produced the first multitasking windowing system for a personal computer. In my opinion the Lisa Office System still outclasses its IBM PC imitators more than two years after its first public demonstration.

I am sure that every former member of the Lisa Development Team is proud of our accomplishment. We put our hearts, minds, and lives into fulfilling a dream. Its role in the product line will be filled by the 512K Macintosh with a 20-megabyte hard disk and integrated applications. The Lisa manufacturing line may be closed, but the accomplishment lives on in the lower-cost, higher-performance Macintosh.

Note Pad

Larry Tesler continues at Apple Computer as manager of a group exploring software development methodology.
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Now data doesn’t have to look base.
Sighting the Possibilities
Thousands of blind people could be helped by a reading system built around the Macintosh. Omni-Reader, the hardware accessory that "reads" typewritten text into the Macintosh, combined with a speech synthesis module could make the Mac an inexpensive Kurzweil-type reading machine. In case you are not familiar with it, the Kurzweil reading machine, which sells for about $10,000, creates audible output from printed text.

The Kurzweil machine has some features that a Mac system would not, such as automatic scanning and page turning. With the Omni-Reader you have to scan each line manually, which I'm sure wouldn't be a problem for a blind reader with feedback from the computer and a little practice.

The system that I envision would utilize a multiregion screen. Tones would let a blind reader know where the pointer is on screen. By clicking on a particular region, the reader could choose to enter a new file, listen to an old one, or perhaps choose some other option. The person would touch-type to enter file names to be read back or stored.

The center of a Macintosh system dedicated to blind people would be an echo capability, which would echo the pull-down menu items and other options using a speech synthesis module. It should also be possible to echo keystrokes—making possible a touch-typing tutorial for the blind—and dialog boxes.

Andrew Shalit
Cambridge, Massachusetts

Fortune Fifth Column
In "Can the Mac Save Apple?" [Macworld, June 1985], David Bunnell questions the need for Apple to be overly concerned about the office network concept in its quest for sales among the Fortune 1000 companies.

Most people don't understand that a company, like the one I work for, is really hundreds of relatively small organizations working within the large structure. At our company, individuals within the small organizations, who need to accomplish tasks quickly and at low cost, are beginning to buy Macintoshes, either by special-request purchase through the company or with their own funds. They are the network that Apple should be developing.

Our corporate systems people deal with those computer companies that deliver mainframe and communications systems, such as IBM, Digital Equipment Corporation, and Hewlett-Packard. Not surprisingly, the company encourages employees to buy personal computers from those companies and not from Apple. However, in an innovative, competitive company, productivity and performance still carry the day. In the last few weeks, I have seen evidence of Mac purchases in our company's labs and among its sales representatives. People like us who are using the Mac in the Fortune 1000 companies are Apple's best chance to dramatically increase its share of that market.

The key is for Apple to serve the individuals who are proving to management that the Mac is a valuable business tool. Apple needs to communicate with Mac owners who are employees of large corporations, whether through the mail or through a company user group. Apple should offer incentives such as upgrades or other improvements as a reward to those who assist in the sale of Macs to other employees or who share ideas and experiences in using the Mac for company business. Management looks for evidence of increased productivity but likes to be shown by its own people.

A recent Wall Street Journal article suggested that Apple was retreating from the Fortune 1000 market. I'm betting that Apple will keep on improving the Macintosh and will begin to spend more of its promotional dollars to get Mac owners to help sell more Macs. The question is, can Apple save the Mac without paying more astute attention to Mac owners?

William M. Odum
Atlanta, Georgia

(continues on page 30)
Maccaccessories. 16 ways to improve the performance of your Macintosh.

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Letters

(continued from page 27)

**Keyboard Commando**

I agree with Nicholas Lavroff’s critical remarks regarding *Lode Runner* ["The Galactic Commando Rides Again," *Macware Reviews, Macworld*, August 1985]. Using the mouse to play a round or two of the game is a genuine exercise in frustration, and I am sure that implementing his suggestions would improve the feel of the game.

While waiting for the improvements to be made, however, I recommend that all eager galactic commandos simply use the Keyboard Play option on the Options menu, which your reviewer neglected to mention. The Keyboard Play option is sufficient to maneuver our heroic commando through all 150 levels of the Bungeling Empire’s treasury. Pointer problems notwithstanding, *Lode Runner* is an excellent little addition to the Macintosh software library.

I would like to address one question to the people at Broderbund. How soon can we expect a Mac version of the strategy game *The Ancient Art of War*? The mouse would probably work well with this unique game.

*Ronald Lerner*

*Milledgeville, Georgia*

**The Apple of His Red Eye**

I recently got over my fear of computers and finally discovered how incredibly easy they are to use. I flirted with the Ile and the IIc, but when a friendly salesperson showed me the Mac, I couldn’t believe what I was seeing. It was as if I’d been stranded in a foreign country for years and finally met someone I could talk to. Even with its considerable price tag, my wife wouldn’t let me leave the store without a Mac after she saw the excitement in my eyes. Your magazine is great, too. Now if I can only get some sleep.

*Ronald Lerner*

*Milledgeville, Georgia*

**Time Is Money**

I have read letters in your magazine from pioneering Macintosh buyers complaining about how much they paid for their Macs. However, they fail to consider the benefits they obtained from having a Mac earlier than subsequent buyers. In my humble opinion, the early increase in productivity in many cases more than compensates for the higher price paid for the Mac.

For example, in June of last year I decided to write a book. I started writing it using my old method; that is, I wrote the first draft by hand, gave it to my secretary for typing, corrected and revised the results, returned the manuscript to the secretary for typing, and so on. I soon realized that this method, which worked well for short articles, would never do for a book that I had committed to finish in three months. Consequently, I started looking for a computer.

I had never used a computer; in fact, I had an unconscious animosity toward the mysterious machines. However, I knew I needed one to finish the book in time. I went to a computer store and started playing with a Mac. I liked it right away. Within 3 hours of unpacking that incredible machine, I was writing my book. Sure I made

(continues on page 34)
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Letters

(continued from page 30)

mistakes and even lost a document or two, but I was using a computer and liking it thoroughly.

I went on to finish the book, which, incidentally, became a best-seller in Panama. I could never have finished it in the required time without the Mac.

It’s true that when I bought the Mac, I paid $1000 more than I would pay now, but what I have achieved with it since then more than compensates for the additional cost.

I might never have entered the world of computers if the Mac had not been invented.

Raúl Arias de Para
Panama City, Panama

The Early Word Catches the Bugs

Word is typical untested Microsoft software. Among the 15 bugs and seven shortcomings that I have written to Microsoft about, the following are the most troublesome.

The program abandons the Macintosh’s what-you-see-is-what-you-get capability. The only way to check header and footer placement, for instance, is to print the document. Even the Apple II could show page breaks, page numbers, headers, footers, and footnotes on screen.

Since Word underlines carriage returns, you cannot simply select a line or a paragraph and underline it. You must select the text by dragging from the first character to the last character.

The program lacks macros. Deleting 1586 carriage returns from an imported document took hours. On my trusty Apple II, it would have taken a couple of minutes with macros. Along the same line, the only way to add carriage returns for an upload to CompuServe is to insert them by hand because Word is a great little machine, but patient indulgence is often required to put up with its genius.

Hansjörg W. Zeller
Zurich, Switzerland

Putting Up with Genius

All those reasons David Bunnell mentioned for owning a Mac (“Does the Mac Mean Business?” Macworld, March 1985) can easily be justified, but I doubt more and more whether the Mac truly has a professional use. Apple would like to give a business image to an egg-laying wool milk-sow; a computer that has always leaned toward the artistic. I remember when the first Macs appeared here a little over a year ago; you had to fight through seven layers of small boys to get a look at the screen. I wouldn’t have bought one then exclusively for business use, and knowing the machine better now, I wouldn’t do so yet.

Professionals will not put up with the Mac’s stuffing and other idiosyncrasies. The Mac
doesn't have a print-to-disk option, which most word processors have.

Microsoft must know that Word is slow to the point of being unusable on a 128K Mac. Sometimes it accepts a typed character only once every 5 seconds, even in Screen Draft mode. It prints only four pages per hour in high-resolution mode.

In summary, I think Word is a second-rate word processor that Microsoft released too soon and that the company needs to fix with a version 1.

Russ Coffman
Dunwoody, Georgia

Discouraging Word
One of Word's worst problems is its inability to handle documents wider than the Macintosh screen. Trying to set up the margins for a 7-inch-wide document was an exercise in frustration; the method for using the ruler is neither self-explanatory nor well documented. The secret seems to be in setting the left and right margins so that they total 2.5 inches. You can print a 7-inch document by setting a left margin of 0.8 inch and a right margin of 1.7 inches; it doesn't seem to matter that the total width of 9.5 inches is an inch wider than your paper. The document prints out with a left margin of 0.8 inch and a right margin of 0.7 inch.

In addition, horizontal scrolling is very slow; you save time by typing the document the width of the screen and--when you're finished--selecting the text and moving the margins.

Another Word bug crawls out when you add footnotes to a document that is in a 10-point font. Whenever you return to your document from the footnote, the program converts font size from 10-point to 12-point. The only simple solution is to type the document in 12-point type and change it to 10-point when you're done.

Now that MacWrite has been improved, I'm not sure that it's as weak as critics say. In many ways I prefer it to Word.

Please keep up the excellent quality of your magazine. Without it, my Mac would not be half the fun.

Peter Yudkin
Somerton Park, South Australia

A reliable source has tipped us about another Word oddity. The LaserWriter prints out boldface text in a Word document with unsightly extra space between words. Effectively, this quirk means that you have to change boldface type to plain or italic when preparing Word text for LaserWriter printing.—Ed.

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Macworld View

Macintosh typesetting shops, public-domain utilities, a world atlas at the click of a mouse, and more

Edited by Herschel Schmedick

The news this month suggests that the 512K Macintosh, the LaserWriter, and high-powered integrated software have picked up the baton from the original frontrunning hardware and software.

LaserWriters are showing up next to copy machines at copy centers, Latin American universities have purchased 6000 512K Macs, Mac music programs are booking up with synthesizers, and people are finding new ways to express themselves with their machines.

Your contributions are welcome. Macworld pays up to $50 for each item published. Send your contributions to Macworld View, 555 De Haro St., San Francisco, CA 94107. All published submissions become the property of Macworld. I look forward to hearing from you.

South of the Border

Apple's University Consortium Program is gaining momentum south of the border. The Latin American consortium consists of schools in Mexico, Puerto Rico, Venezuela, Chile, Peru, and Colombia. As in Europe and North America, Apple is offering selected schools in those countries discount pricing, technical support, and the slickest personal computer in the west. Metropolitan University in Caracas, Venezuela, agreed to purchase 6000 512K Macs over a three-year period, with 4000 to be delivered this year. This was the university's first purchase of personal computers, and school officials did extensive evaluation of other computer systems, including IBM and Hewlett-Packard, before choosing the Mac. As with the other consortium universities in North America and Europe, students and faculty receive about a 40 percent discount. Besides the Macs, the university ordered some Macintosh XLs, and 75 percent of the machines will come equipped with an Imagewriter and an external disk drive. Each student and instructor will have a Mac at home.

In addition the Monterey Institute of Technology in Mexico City, which previously used Apple IIs, has committed funds to buy 1000 Macs, and the Catholic University of Chile will purchase 1000 machines over a three-year period. The choice of the Mac by these schools indicates that Apple is winning converts worldwide.
New Laser Fonts

The LaserWriter is edging closer to becoming a real typesetting machine with the addition of several new typefaces to the printer's font library. By the end of the year Palatino, Optima, ITC Bookman, ITC Avant-Garde Gothic, ITC Zapf Chancery, American Typewriter, Century Schoolbook, ITC Souvenir, Glypha, and ITC Zapf Dingbat will be available for the LaserWriter. Each of these typefaces will have an equivalent screen typeface for the Mac in five sizes.

Liz Bond, marketing manager of Adobe Systems, the company that created Postscript (the language the LaserWriter uses to print text and graphics), explains that these typefaces were chosen to complement Helvetica and Times Roman, the original set of typefaces released for the LaserWriter.

In the Public Domain

In the old days utilities were necessities provided by uncaring monopolies. Now, in the computer age, utilities are small but appreciated programs, usually produced on a shoestring budget, that make computing more convenient. Many useful utilities are available from user groups and MicroNet Apple User's Group (MAUG) on CompuServe. A good example is Bill Atkinson's Screen Maker, found in MAUG's Data Library 5 as SCRMAK.HEX. The program lets you replace the startup screen ("Welcome to Macintosh") with one of your own design.

Another program, Menu Editor (MENUED.HCX in Data Library 5 of MAUG), by Andy Hertzfeld, lets you assign # key equivalents to menu options. Two suggestions: always have the Menu Editor on the same disk as the program you are customizing, and always select Save from the File menu before quitting the program if you want to preserve your modifications.

While many helpful desk accessory utilities are available, two in particular are worth mentioning. Transfer, TRANS2.HCX in Data Library 4, passes you from one application to another without going back to the Finder. The time saved is significant, to say the least. David Dunham's DiskInfo desk accessory, DSK1DA.HCX or DSKINF.DOC in Data Library 3, allows you to check the amount of free RAM and disk space, the size of every file, and other information. Best of all, you can delete files from within an application to free up disk space or just to clean house. With Transfer and DiskInfo in the Apple menu, you can avoid unnecessary trips to the Finder.

—Robert C. Eckhardt
Industrial Light and Macintosh

Would Luke Skywalker use a Mac? Of course, and the Empire's starships would be fully equipped Macintosh offices, complete with laser printers for sending finely printed documents throughout the galaxy. As for Chewbacca, how could that hairy fellow possibly operate a computer unless he laid his paw on a mouse? If the entire cast of *Star Wars* is potential Mac partisans, what about the folks at Lucasfilm, who created those characters? Scattered throughout the Marin County, California, facilities of George Lucas's entertainment empire are numerous Macs, now being used for word processing, storyboarding, and other business tasks. At Industrial Light and Magic, the special effects arm of the company, programmer Craig Hosoda has begun to work up a system that can be run from a Mac with *MacTerminal* to control motion of the special effects cameras and scale models.

The Lucasfilm games division is not currently developing home video games for the Macintosh, but according to programmer David Levine, that's primarily because there are "not enough Macs out in the market to make it feasible. I hope that the Mac really takes off, but on the other hand, as a game designer, the lack of dedicated processors for graphics, sound, and faster input and output on the Mac makes it difficult to do the kinds of real-time simulation games we do. Getting all that stuff working with one 68000 processor is pretty tough." Levine thinks that the best games on the Mac will be interactive games in which several players participate on a network.

"We have one big disadvantage when it comes to creating new software. Hundreds of movie theaters around the world show our boss's state-of-the-art software, so every game we produce has to be pretty sensational."--Jeffrey S. Young

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**Electronic Atlas**

Software Concepts of Wallingford, Connecticut, has come up with the electronic equivalent of a world atlas. Instead of spinning a globe or hunting through the vast index of a 10-pound atlas of the world, you can look up maps of countries, states, and cities by typing in a name and zooming in on sections of a map. You can magnify portions of the map up to five times. The maps are linked to a database of fact sheets on 2500 cities. Distances between cities or countries can be calculated automatically in miles, nautical miles, or kilometers.

An interesting aspect of this product is the Phoenix Plan, a unique marketing concept. The company's president, William J. Tobin, devised a clever way to let people sample a special version of the product in their homes or offices. You can use the program on three occasions for 30-minute sessions to help you decide if you want to purchase *Atlas*. The fourth time you try to run the program, it refuses to start up. You can obtain the trial version by sending $6.95 to Software Concepts, P.O. Box 3323, Wallingford, CT 06494, or check with your local Macintosh dealer. If you like the program, you call the company, purchase the program via credit card, and get the code to unlock the program. If you decide not to buy the program, you can reformat the disk for your own use.

--Janet McCandless
Laser Copia

It looks like the LaserWriter has spawned a new subspecies of business: inexpensive typesetting shops. Two copy centers in Berkeley, California, may foreshadow two of the forms this new enterprise could take.

Krishna Copy aims its LaserWriter services at students, small-business owners, and graphic artists who occasionally need to print out a thesis, a business proposal, or camera-ready art. The shop has two 512K Macs, a LaserWriter, and a ThunderScan digitizer. Krishna charges $6 per hour for the Macs, which can be used to prepare files for the LaserWriter, and 30 cents per page for printing. The store provides the necessary software, a program that installs the LaserWriter fonts and printer driver on disk, to alter customers' word processing programs to work with the LaserWriter. It also has an IBM PC and translation software that enables PC owners to use the LaserWriter. Translation costs $35 per hour; a 20-page paper takes about 15 minutes to convert, according to Krishna staff.

On the other side of town, Cleo's Duplication Service pursues a different tack: "Our LaserWriter business is focused toward commercial accounts," says David Marshall, Cleo's operations manager, who's a graduate student in computer science at the University of California. Cleo's is going head to head against typesetting operations, courting large, mostly computer-related companies that in the past have brought their typesetting business—documentation, newsletters, forms—to the type shops.

Cleo's prices favor people who print large documents: $3.50 per page for 1 page, $1.80 per page for 2 to 3 pages, $1.35 per page for 4 to 7 pages, down to 45 cents per page for 500 pages or more. To induce customers to use the store's photocopying facilities for printing, Cleo's gives rebates of up to 80 cents of free copying for each dollar spent on typesetting. Cleo's lends Macs free of charge to its larger customers, and the company is installing three data lines to enable customers to phone in their work.

As David Marshall explains, "Right now the LaserWriter is a boon for small print shops. The typesetting industry is losing some of its work, and it'll have to get up and start running to try to match our setup." No doubt it will. And no doubt we've seen only the merest beginning of some of the ideas entrepreneurs will come up with for putting LaserWriter technology to work.

--J. Van Norden

Moscow

Macintosh

Sanjay Sakkija of Krishna Copy hopes to create a personalized publishing center where customers keep dozens of Macintoshes, LaserWriters, and copy machines busy.

Lewis created a Russian-language version of MacWrite and the Macintosh System and Finder files. Moscow and Gorky replace Geneva and New York as the system fonts, and all menus, dialog boxes, and alert boxes are displayed in Russian. Lewis is considering converting other applications to Russian, and he is extending his font development to more arcane languages. He is currently designing a font based on Mayan hieroglyphics. The Font Editor, the Resource Editor, and Screen Maker are all available on CompuServe or from user groups.
New Music

While the current batch of music programs for the Macintosh gives you the equivalent of word processing for music composition, creating music with a mouse and a computer keyboard leaves much to be desired. Occasionally you might find a Mac performing in public, but most serious musicians agree that the Mac's four-voice sound reproduction capabilities are limited. The key to overcoming the Mac's limitations is a small box called the musical instrument digital interface (MIDI). By attaching a MIDI box to one of the Mac's serial ports, you can send and receive encoded musical messages to and from an instrument connected to the MIDI box.

Several companies are actively working on MIDI products for the Mac, including Macromind, the originator of Hayden Software's MusicWorks; Mark of the Unicorn, developer of Professional Composer; Electronic Arts, creator of Music Construction Set; and MusicWorks, not to be confused with the program of the same name.

The MIDI products enter your compositions from a synthesizer keyboard and store them on the Mac as well as playback creations, using up to 16 tracks of synthesizer output. Just play on and let the Mac commit your creations to memory.
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The Document Modeler is also much like an expert system. Except that it's "just plain folks"—a professor going for a beer with the boys. More street smart and flexible than an expert system, it allows for the umpteen variables of the business world and doesn't demand fluency in a cryptic computer language.

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This month I take an early look at memory upgrades beyond 512K. A Microsoft BASIC programmer needs help controlling his modem from his specialized communications program. Another reader sends a word of caution for Mac users who don't have grounded electrical outlets. And a number of long-time mouse pushers have worn out the feet of their mice and wonder about replacements.

Some MacPainters discuss fine points of the program. Two readers present their methods for pasting text into MacPaint while preserving special attributes like bold or italic. Several users want to know why MacWrite can't print high-quality pictures like MacPaint does. Finally, a MacPaint user wants to save the special patterns he makes to reuse them with other documents.

Modem Control with MBASIC 2.0

Q. I am writing a bulletin board service (BBS) program in Microsoft BASIC (MBASIC) 2.0. How can I make the program sense that the phone is ringing and answer it? How can I make the program hang up the phone? How can I keep it from printing input such as a password?

Mike Durler  
San Diego, California

A. First, your BBS program must set up the serial port for the proper communications protocol, including baud rate, parity, data bits, stop bits, buffers, and handshake as described in Inside Macintosh. Then the program must wait for input from the modem through the serial port. The waiting can be accomplished by an INPUTS() function inside a WHILE...WEND loop.

When the phone rings, the modem sends a result code—typically the word RING—to the serial port. Since the program is waiting for input from the serial port, it will pick up the result code. When it recognizes that the phone is ringing, it can send the modem a command to answer the phone and try to establish a connection with the remote modem. The command ATA works with modems that respond to Hayes commands. However, the command to answer the phone is not required if your modem is set up to answer the phone automatically. In that case the program can ignore the RING result code; the modem will automatically answer and try to connect with the remote modem.

When your modem successfully connects with the remote modem, your modem sends the program another result code—typically the word CONNECT—through the serial port. If the modem cannot make a connection, it sends the program a different result code, such as NO CARRIER. When the program concludes that the modem has connected with the remote modem, it can begin interactive communications, perhaps by asking you for an account number and a password.

The terminal program on the remote computer should have its local echo feature turned off so the computer displays only what you send it. Unlike a regular terminal program, a BBS program should send the characters it receives from the remote computer back to the remote computer. Input from the remote keyboard gets sent to you but isn't displayed on the remote screen unless you send it back. Anytime you want the person at the remote computer to "type blind," as is the case with passwords, you don't send back the characters you receive.
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Get Info

The program hangs up the phone by sending the modem another command—ATH for Hayes-equivalent modems. However, once your modem has connected with a remote modem, it stops listening for commands from your program. To get its attention before sending it the hang-up command, your program must wait 1 second, then + + + (three plus signs in a row), and wait another second.

Unfortunately, there isn't room here to show an example program. I suggest you study MacTip, a public-domain terminal program written in MBASIC by Dennis Brothers, available from CompuServe or a user group. For the specific syntax and commands that apply to your modem, consult its manual.

You can obtain Inside Macintosh from Apple Computer, 467 Saratoga Ave., #621, San Jose, CA 95129, 408/988-6009. The “phone book” edition costs $28.

Worn-Out Mouse Feet

Q. I've owned my Macintosh for six months, and now the two "feet" that support the front of the mouse—the shallow dots embossed on either side of "Apple Computer, Inc."—have begun to wear down. Other Mac owners I know have experienced similar problems. This wear hampers operation of the mouse because it no longer rests smoothly on three pivot points.

My dealer says I need to replace the entire mouse, at a cost of $100. Replacement of the mouse's base plate seems the ideal solution for this problem.

Eric Bailey
Grinnell, Iowa

A. According to Apple Computer's Barbara Knaster, the whole mouse is available as a service part, but the base plate is not. Since the mouse has no official price, I suggest you check with other Apple dealers; their prices might differ from that of the dealer you contacted first.

To keep the mouse feet from wearing further, get a mouse pad. You can buy one or make one from a piece of the nylon-covered neoprene used for wet suits. Use the type called Nylon 3, with nylon on one side only; place it nylon side up, rubber side down. A piece 4 by 6 inches is adequate; 8 by 10 inches is ample.

Fatter Macs

Q. I've been using the Switcher and have found it very useful. However, I want to put Jazz, MacPaint, and MacDraw in the Switcher, and there isn't enough room. Is there any way to get more than 512K of memory for my Mac?

A. Gordon McComb answers:

The 512K Fat Mac has become the standard machine, but independent companies offer memory upgrades that double or quadruple random access memory (RAM).

Beck-Tech, of Berkeley, California, is shipping Mac-Megabytes, a plug-in circuit board with 512K of additional RAM. In order to mount Beck-Tech's board, four chips must be removed and replaced with a two-way connector that allows the Beck-Tech board to be piggybacked onto the existing digital board. According to Beck-Tech president Stephen Beck, the extra memory chips won't overheat the machine. The price to upgrade, including RAM disk software, is $549 from 512K to 1024K and $849 from 128K to 1024K. For $150 less you can do your own installation. Beck notes that not all applications can take advantage of the extra memory. The company provides a 90-day limited warranty on its products.

If a Macintosh with 512K of RAM has been nicknamed a "Fat Mac," and 1024K a "Mega-Mac," what would you call a Macintosh with 2 megabytes of RAM? Levco Enterprises, a San Diego startup firm specializing in memory upgrades for the Mac, has named its new 2-megabyte Mac upgrade MonsterMac. Rather than some grotesque beast that wanders the streets at night looking for disks to rob and files to corrupt, a MonsterMac is an everyday 512K Macintosh with an extra 1½ megabytes of RAM tucked away inside.

According to Doug Gilbert, a design engineer at Levco, the MonsterMac upgrade consists of a single printed circuit board 6 inches square, filled to the brim with 48 256K RAM chips. The board, which fits in the space behind the internal disk drive, connects to the Mac via a thick cable that plugs into the digital board and the 68000 microprocessor. Since the 68000 is permanently soldered in place on the Mac's digital board, the chip has to be cut out and replaced. The new chip plugs into a two-way connector. The MonsterMac upgrade costs $974 installed. The MonsterMac board without memory chips costs $349. Installation of the board only is $100. Levco extends a 90-day warranty for its product.

I tested a Mac that had been given the Levco Frankenstein treatment with Apple's Switcher. With the Switcher, I was able to load three 512K applications—Lotus's Jazz, Aldus's PageMaker, and Mega haus's MegaForm—and still had plenty of room to spare. I then loaded three more 128K applications: MacWrite, MacPaint, and the public-domain robot game Daleks. I was able to switch among all six with no problem, and I had similar good luck with RAM disks.

Are there any caveats to upgrading a Macintosh to 2 megabytes? Yes. First, the extra 48 RAM chips create a lot of heat, which can damage the computer. Fortunately, Levco has addressed this problem and installs a small piezoelectric fan inside the Mac at the time of the upgrade. Because of the way the fan works, it makes no sound.

The second problem is one of sufficient power. Apple didn't intentionally design the Mac's power supply to support an extra 1½ megabytes of RAM. Yet the power supply of most Macs can take the extra drain anyway, so it's not a serious problem for most Mac owners. However, according to Gilbert some of the earlier Macs were given a "marginal" power supply at birth and may not be able to support the upgrade. The result: blown fuses or damage to the analog board. Levco is working on a test to determine if the power supply on a given Macintosh is strong enough to handle the MonsterMac upgrade.
Want to hear a demonstration of Hewlett-Packard's ThinkJet Printer?
The third problem is that upgrading to a MonsterMac voids your original Apple warranty or extended service warranty. Generally, having any company other than Apple upgrade a Mac, even to 512K, voids the warranty. Apple has not yet come out with an official policy regarding hardware changes made by unauthorized dealers, so you may have a difficult time getting Apple to service your Mac or give you a warranty on a future Apple upgrade in your customized machine. If your Apple warranty has expired, you want some serious memory at a reasonable price, and you are willing to take a chance on the wings of a new company, go for it.

**Picture-Perfect Printing in MacWrite**

**Q.** MacPaint graphics inserted into MacWrite text appear to be printed in standard quality even if I specify high quality for printing. The inserted graphics also seem to be stretched vertically. Consequently, what I see in MacPaint is not what I get in MacWrite. Any suggestions?

**A.** The discrepancies you noticed occur because MacWrite and MacPaint use different programming for preparing the image of a page for the printer. MacWrite uses standard instructions from the Imagewriter file, usually located on disk in the System Folder, and the QuickDraw procedures built into the Mac's Toolbox ROM (see "The Imagewriter and Beyond," *Macworld*, September/October 1984). When you choose high-quality printing for a MacWrite document, the darker, more refined characters are formed by making a 50 percent reduction of a font twice the displayed point size. That is, if you write a document using 12-point New York, the 24-point New York font is used for high-quality printing. However, embedded graphics must always be printed as-is, because they have no double-size version to reduce by 50 percent.

In contrast MacPaint has its own special programming that smooths and enhances the image when you choose Print Final. Since the programming is part of MacPaint, not the QuickDraw procedures or the Imagewriter file, it is not available to another application such as MacWrite.

You can, however, make correctly proportioned pictures in a printed MacWrite document. Before printing, choose Page Setup from the File menu and select Tall Adjusted orientation in the dialog box that appears. The normal Tall orientation results in a horizontal dot density of 80 dots per inch. The Tall Adjusted orientation results in 72 dots per inch, the same as MacPaint.

Tall Adjusted does have some side effects, however. The whole document, text as well as pictures, widens about 15 percent on the printed page. For example, text that was supposed to take 5½ inches will take 6½ inches instead. The expanded letters that result from selecting Tall Adjusted orientation are somewhat lower in quality than the normal letters.
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Unfortunately, you can't please everyone. One software developer used to watch the Phil Donahue show while waiting for his Macintosh to compile. But once he started using HyperDrive, he didn't have that free time. And as he said, "I don't know what's going on in the world anymore."

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Saving Custom Patterns in MacPaint

Q. I was working on my brand new Mac, customizing the patterns in MacPaint, and spent 2 hours making even shades from black to gray to white. Then I quit MacPaint. When I came back to it later, all of my custom patterns were gone. Is there any way to permanently change the pre-programmed patterns so when I start a new document, my patterns will be there?

Dale Meyer
Arnold, Missouri

A. You cannot permanently change MacPaint’s standard patterns, but you can still achieve your goal by creating a template document. Whenever you choose Save or Save As from MacPaint’s File menu, you save the current pattern palette—including any changes you have made—along with the document. The next time you open that document, MacPaint uses the pattern palette last saved with the document.

To create a blank template document with a custom pattern palette, start a new, untitled MacPaint document and modify the pattern palette as you like. You can also change the standard Font and Style menu settings; they’re saved with each document too. Then save the document using a descriptive name, perhaps Gray Scale in your case. As a safeguard, quit MacPaint and select from the desktop the document you just saved, choose

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*The Mac-Turbo-Touch is another way to enhance your Macintosh’s performance. This high speed input device is designed to respond as quickly as you do. The slightest touch of the gyroscopic ball positions the pointer quickly and accurately on the screen. The result is software that works even better, faster and more precisely.
Flashware...the company that does say No!

We've said no to membership fees, cost plus pricing, credit card charges and deliveries that take weeks. Why? Because we want you to be satisfied with every purchase you make. The only charge added to your purchase is four dollars for shipping. We accept Master Card and Visa and deliveries will be made within 10 days after placing your order. A 6% sales tax will be added to California residents only. So if you're looking for quality and price, just give us a call. We're FLASHWARE and we'd like to hear from you.

1-800-547-0900 1-800-932-4900 (Product price shown on TV screens.)

- Call

HabaDisk by Haba — Double density 800K 3.5" disk drive. Bundled with some exciting new programs. A sneak preview for Flashware customers.

- $299

HabaDisk by Haba — 400K 3.5" external disk drive. Includes HabaDisk, WindowDialer and Quick Finder.

- $119

Multiplan by Microsoft — A spreadsheet of dazzling analytical power and graceful simplicity. Move mountains of figures with a click.

- $80

Chart by Microsoft — A presentation quality graphics program that allows you to chart anything. Pie charts, bar charts, line, etc.

- $119

File by Microsoft — A professional data manager. Not only organizes and retrieves detailed information but can customize your own forms.

- $19

Word by Microsoft — Mac's word processing program. Capable of merging mailing lists and will "window" up to 4 pieces of work.

- $99

Basic new version by Microsoft — Put control buttons in windows, invent menus for a menu bar and dive into Mac's graphics.

- $89

Dollars and Sense by Monogram — A home accounting package. Just right for the small business. Bar and pie charts, etc.

- $104

1st Base by DeskTop — Create your own files. Enter, edit, sort on multiple fields and produce reports from single or joined files.

- $55

1st Port by DeskTop — A communication package which enables you to convert different data formats with a variety of Macintosh programs.

- $55

1st Merge by DeskTop — Merge your MacWrite documents, memo's, and letters with your own MacWrite file to produce mass mailings.

- Call

Jazz by Lotus — The most sophisticated, integrated product created for business use. Includes spreadsheet, graphics, database, and communication capabilities. (Requires 52K & 2nd Drive)

- Call

Excel by Microsoft — One of the finest integrated packages for business available. Complete with database, graphics, and spreadsheet.

- $174

Ensemble by Hayden — An integrated package which includes spreadsheet database, and word processing. Runs on 128K with one Drive.

- $49

HabaCheck by Haba — A home accounting package. Write checks, analyze cash flow, produce income statements and more.

- $39

WindowDialer by Haba — Will work simultaneously with any program you're using. Dial up to 200 numbers automatically.

- $239

Helix by Okasta — An interactive information system that lets you control the shape and form of information according to your needs.

- $219

OverVue by ProVue — A database management system which will enable you to organize mailing lists, inventories.

- $159

Layered — Will schedule, keep track, analyze, and report, the cost efficiency of your business. Coordinates time and use of your people.

- $74

Crunch by Paladin — The world's most powerful spreadsheet and database system, very slick.

- $189

ThinkTank by Living Videotex — Organize ideas in a logical manner. Its flexible outline format creates a spreadsheet for ideas.

- $85

MegaFiler by Megahaus — A file management system that lets you file and retrieve information. Mailing lists, orders, invoices, inventory.

- $119

MegaMerge by Megahaus — The mail merge program for MacWrite. Create form letters, print mailing labels, and combine documents.

- $75

MegaForm by Megahaus — A revolutionary new product enabling you to create any business form. And then will fill them in automatically.

- $175

Advanced DB Master by Stoneware — A complete database management system which holds more information than any other system today.

- $119

PFS File and Report — Are simple software programs to help you organize your business and require no computer experience.

- $119

MacStation by MicroRain — Save desk top space. Has plenty of storage space for a printer, disk drive, modern and manuals.

- $9

Mind Prober by Human Edge — A software program designed to reveal a person's hidden thoughts. If Freud only knew...

- $79

Mac-Spell-Right by Assimilation Process — Get the power of Webster's Dictionary and Roget's Thesaurus with the click of a button.

- $269

Omnis 3 by Blyth Computers — Designed at Cambridge it's the best selling database in Europe. It's compatible with Jazz by Lotus.

- $29


- $35

Airborne! by Silicon Beach Software — A battle game with the most dramatic and realistic sound generation available on Macintosh.

- $164

Verbatim by DataLife — A 3.5" single and doubledisc precision floppy disk.

- $9

Maccountant by digital, etc. — Small business accounting/financial package. Prepare ledgers, statements, payables, receivables, and write checks.

- $189

FlashPad — A brand new pad for your mouse. Flashware introduces a larger, more durable way to move your mouse around.

- $5

ThunderScan by Thunderware — Digitize any printed image. Forms, half-tones, photos. No camera required.

- Call

Advanced DB Master by Stoneware — A complete database management system which holds more information than any other system today.

- $119

PFS File and Report — Are simple software programs to help you organize your business and require no computer experience.

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- $5

ThunderScan by Thunderware — Digitize any printed image. Forms, half-tones, photos. No camera required.
Introducing the Mac·Port·Adaptor.™ Your Macintosh™ connection to the world of IBM-compatible peripherals. Designed to expand the capabilities of your Macintosh, the Mac·Port·Adaptor allows you to team your Mac with top-of-the-line parallel peripherals. And keep your standard Macintosh serial port.

Simply plug the Mac·Port·Adaptor into Mac's printer or modem port. You keep your original port while adding an IBM-type parallel connector. So, you get more out of your Macintosh, for very little.

List price $79.
Introducing the Most Powerful Business Software Ever!

FOR YOUR IBM • APPLE • MAC • TRS-80 • KAYPRO • COMMODORE • MS-DOS OR CP/M COMPUTER

OVER 100,000 SOLD

The VERSA BUSINESS™ Series

Each VERSA BUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

VERSARECEIVABLES™ $99.95
VERSARECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement-generating system. It keeps track of all the information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSALEGGER II and VERSAINVENTORY™.

VERSAPAYABLES™ $99.95
VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all the information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, bank fees, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™ you can even let your computer automatically select which vouchers are to be paid.

VERSAPAYROLL™ $99.95
VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, labels may be posted to the VERSAPAYROLL™ system.

VERSAINVENTORY™ $99.95
VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on back-order, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listing, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

VERSALEDGER II™ $149.95
VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system without any additional software.

• VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
• stores all check and general ledger information forever,
• prints checkbook checks,
• handles multiple checkbooks and general ledgers,
• prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

SATISFACTION GUARANTEED!

Every VERSA BUSINESS™ module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any VERSA BUSINESS™ module, you may return it within 30 days for a refund. Manuals for any VERSA BUSINESS™ module may be purchased for $25 each, credited toward a later purchase of that module. All CP/M-based Computers must be equipped with Microsoft BASIC (MBASIC or BASIC 80).

To Order:
Write or call Toll-free (800) 431-2818
(N.Y.S. residents call 914-425-1535)
• add $3 for shipping in UPS areas
• add $4 for C.O.D. or non-UPS areas
• add $5 to CANADA or MEXICO
• add proper postage elsewhere

DEALER INQUIRIES WELCOME
All prices and specifications subject to change / Delivery subject to availability
Get Info

Get Info from the File menu, click the Locked box, and close the window. That final step prevents accidentally saving another document on top of the template.

To start a new document with the gray scale patterns, make a copy of the template document and save the copy under a new name.

Grounding Feedback

Q. In April you told people whose homes have no grounded electrical outlets to ground their computers to a cold water pipe. I recommend that before you do so, they test the cold water pipe with a voltage and amp meter. You would not believe the number of homes—especially older apartments—that have faulty wiring leaking electrical current across the ground, which is usually the cold water system. I work for a water company; I have been knocked down more than once when removing the water meter to install a replacement. The amount of current in the line can be amazing. Incidentally, utility companies routinely remove meters every few years to check their accuracy, and while the meter is removed, the electrical ground may be interrupted. Also, to combat the disintegration of the water supply pipes caused by electrolysis from faulty wiring, many utilities are installing insulators or using plastic piping. This interferes with grounding too. I would hate to see someone end up with a baked Apple after going to the trouble of trying to ground it.

If a computer owner is that concerned about grounding the computer, I recommend they consider connecting di-

(continues on page 67)
Introducing ThunderScan.

Now you can turn any printed image into a detailed, high-resolution Macintosh graphic.

Just roll your original into your Imagewriter
ThunderScan scans and digitizes the image.

Presto! A high-resolution MacPaint document.

No lights, no camera, just action.

What you see here is the complete ThunderScan system. You don’t have to buy an expensive video camera. Just pop out your Imagewriter’s ribbon cartridge, snap in ThunderScan and you’re set. It can even work in the dark (maybe you can think of an application for that).

If you bought a Mac at least partly for its graphics, only to find you couldn’t take full advantage of them, now you can. With ThunderScan.

At an introductory price of just $229, it’s a small price to pay for a whole new graphics capability.

For more information or a ThunderScan of your own, see your dealer or call us today.

(415) 254-6581

ThunderScan
Thunderware Inc., 21 Orinda Way, Orinda, CA 94563

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Mac and MacPaint are trademarks of Apple Computer, Inc. / Macintosh is a trademark licensed to Apple Computer, Inc. / Ice cream courtesy of Farrell’s Restaurant & Ice Cream Parlor, Inc.

Circle 167 on reader service card
**FOR YOUR MACINTOSH**

**COMPUTERS**

- **CENTRAL POINT, Copy II Mac**
- **APPLE, 400K External Drive**
- **HABA, 800D External Drive**
- **IOMEA, 5 Meg Bernoulli Box**
- **QUARK, QC 10 meg hard disk**

**MODEMS**

- **APPLE, 300 baud Modem**
- **HAYES, Smartmodem 300 (RS.232)**
- **NOVATION, Smartool Plus视线tool**
- **MackSet 1000 Modem withwin**
- **COMPUCOMP, Smartcommodem Cable**

**BUSINESS SOFTWARE**

- **AEGIS, Challenge or Pyramid, ea.**
- **BLUECHIP, Microsoft, ea.**
- **JIM, Mac Pigeon**
- **MIRAGE, Trivia Fever**
- **Jamboree, MacAnon, ea.**
- **SILICON BEACH, Airborne**
- **FIRST BYTE, Smooth Talker**
- **BEAM, MacAttack or Mac the Knife, v.2**
- **MAILMAN, MacFireflies, ea.**
- **CASH-CARRY COMPUTER STORES, INC.**
- **ORDERING INFO & TERMS:**
  - mail: CONROY-LaPointe, Inc, 12660 SW Garden Place, Portland, OR 97223
  - telephone: (503) 547-1289
  - fax: (503) 629-5876
  - computer: Apple, IBM, Commodore, etc.
  - software: Apple, Microsoft, etc.
  - equipment: monitors, keyboards, etc.
  - shipping: UPS, FEDEX, etc.
  - returns: within 14 days of receipt of goods
  - payment: net 30 days

**PRINTERS & INTERFACES**

- **APPLE, LaserWriter Printer**
- **CREIGHTON, ProPrint**
- **JX600 - Color Printer, 160 cps**
- **LO150 - 200 cps DQ/57 cps LQ**
- **Star Interface Board**
- **TOSHIBA, 1340-144 cps, DQ & 54 cps LQ**

**ACCESSORIES**

- **ASIMILATION, TurboTouch**
- **Memory Fonts or Tracks, ea.**
- **CURTIS, Diamond**
- **EMERALD, Ruby**
- **HAYES, Smartmodem Cable**
- **HEAD COMPUTER, Head Clearing Kit**
- **INNOVATIVE, Flip-Flops, etc.**
- **INTERMEDIATIX, Mac Phone**
- **KENSINGTON, Surge Protector**
- **KOBAL, Mac/Vision**
- **MICROSOFT, Mac Enhancer**
- **THUNDERWEAR, Thunderscan**

**BUSINESS SOFTWARE**

- **SOFTWARE PUB, File and Report Covers**
- **ESTONWARE, 76 Master**
- **TELOS, File Vision**
- **VIDEX, MacCalendar**
- **WARRNER, Desk Organizer**
- **WINOFFICE, Calculator, Proview, Ace & 8 bits**

**UTILITIES SOFTWARE**

- **CENTRAL POINT, Copy II MAC**
- **CREATIVESOLUTIONS, MacTorch Level I**
- **EXPERTELLIGENCE, ExperLogo**
- **HIPPOROTAMUS, Basic Interpreter**

**HOME & TRAINING**

- **BRAINWORKS, Chip Wits**
- **CONTINENTAL, Home Accountant**
- **CREIGHTON, Home Pack**
- **MIRAGE, Trivia Fever**
- **HAYDEN, Music Works**
- **MONGRAM, Dollars & Sense**
- **SCARBOROUGH, Masterpoynt**
- **SIMON & SCHUSTER, Typing Tutor III**
- **TINKER, Clickart, Letters, or Pubs, ea.**
- **SOFTWARE ARTS, T1k Solver**

**DISKETTES**

- **CONROY-LAPOINTE, Top Quality, 5 yr. Ltd Wty**
- **MAXELL, 10 each, 3 1/2" SS/DD**
- **VERBATIM, 10 each, 3 1/2" SS/DD**

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  - software: Apple, Microsoft, etc.
  - equipment: monitors, keyboards, etc.
  - shipping: UPS, FEDEX, etc.
  - returns: within 14 days of receipt of goods
  - payment: net 30 days

**STOP WAITING**

ALL ORDERS ARE NOW SHIPPED 2ND DAY AIR
Make Your Mac Sing, Dance,
and Create Great Art.

VideoWorks™ puts your ideas in motion.
Create your own animations. Anything you can imagine, you can bring to life on your screen. Assemble your characters using the artwork included with VideoWorks. Or use MacPaint™ to create characters and locales of your own. Then use VideoWorks to get your creations moving. This could be your first step to an Academy Award!

MusicWorks™ brings out the music in you.
Compose music directly on your Macintosh™ and hear the results instantly. Even if you can't read a note, you can produce musical scores with just a sweep and click of the mouse. Play back your whole composition, or any part of it, whenever you want. Hear your music played by any of eight instruments. And write that Top 40 hit you've always dreamed of.

Art Grabber™ with BodyShop™ improves your image.
Art Grabber speeds up your design process by letting you instantly transfer screen images from one MacPaint document to another. BodyShop gives you a selection of human forms which you can assemble any way you want. You get both for the price of one.

Hayden creativity tools are available for the Macintosh at your local software dealer or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, or call 800-343-1218.

Make faces in a blink of an eye with BodyShop.
Copying Text to MacPaint with Style

Q. As you said in April, if you copy a selection from *MacWrite* onto the Clipboard and then paste it into *MacPaint*, it arrives in *MacPaint*'s standard font, style, and size. While the transplanted text is still highlighted, however, you can easily change any of those text attributes. Using the mouse, choose the font, style, and size you desire from the *MacPaint* menus. You can also change the text's alignment, using the Align Left, Align Center, and Align Right commands in the Style menu.

David A. Alden
Cincinnati, Ohio

A. You're right. *MacPaint* recognizes text from the Clipboard as text and lets you change its attributes and formatting until you deselect it, at which time it loses its identity as text and becomes part of the picture. The dimensions of the marquee into which you paste the text from the Clipboard determine the left, right, top, and bottom margins. If the text from the Clipboard is too wide or long for the marquee at the font, size, and style you select, *MacPaint* discards the excess, though you can retrieve it by choosing a smaller size or by stretching the marquee.

Of course, since the text attributes you choose in *MacPaint* affect all the selected text, you can't mix fonts, sizes, and styles in the same selection. Also, it is difficult to duplicate *MacWrite*'s margin, indentation, and tab formatting by adjusting the size of the marquee. If you want to copy elaborately formatted text, you have to resort to the more cumbersome procedure suggested in the next letter.

More Style

Q. You can get text from *MacWrite* to *MacPaint* without losing the formatting by pressing Shift-5 to take a snapshot of the screen. The snapshot is saved as a *MacPaint* document on the same disk as the application program—*MacWrite*—under the name Screen 0.

Stephen V. Overton
Normal, Illinois

A. Right, and use *MacPaint* to select the text you need from the Screen 0 document, cut the selection to the Clipboard, and paste it into the final *MacPaint* document. If the formatted text is too long to fit on a single screen, you can take additional snapshots after scrolling the appropriate text into view. Each time you press Shift-3, another *MacPaint* document is recorded, named Screen 1, Screen 2, and so on. A beep when you press Shift-3 means the disk is too full to record another snapshot.

Etch-A-Screen?

Q. If the Macintosh is left on unattended for long periods, is etching of the screen or burning in a possibility? How hard would it be to control dimming of the screen with software?

Joe Hannan
Kingman, Arizona

A. A stationary image, such as the Mac's menu bar, displayed continuously for weeks or months may etch the screen's phosphor, leaving a shadow. The Macintosh owner manual suggests dimming the screen with the brightness control, located at the front of the Mac on the overhang under the Apple logo, whenever you leave the machine on and unattended for a long time.

You can also use the *Desk Accessory Mover* program to install the ScreenSave desk accessory in your System files. Once activated, ScreenSave automatically paints the entire screen black after a period of time without keyboard or mouse button activity, leaving only a ghostly pointer visible to remind you that the Mac is still switched on. A click of the mouse brings the screen back to life. You choose the delay period: 2, 5, or 10 minutes.

The *Desk Accessory Mover* is available from CE Software, 801 73rd St., Des Moines, IA 50312, 515/224-1995. Its list price is $15 (on approval). You can obtain ScreenSave from John R. Dance, 471 East 500 North #1, Provo, UT 84601. It is also available through MAUG on CompuServe.

Get Info answers questions about the Macintosh and how it works. When you need advice about using the Mac, drop me a line. I cannot respond to all letters, but I will answer the most representative questions. Send your questions about the Macintosh, *MacWrite* software, and *Macintosh* programming to Get Info, *MacWorld*, 555 De Haro St., San Francisco, CA 94107. Send electronic mail to CompuServe 70370, 702 or The Source BCW440. All published submissions become the property of *MacWorld*.

Lon Poole is a Contributing Editor of *MacWorld*. 

Get Info
No more teachers no more books. (Just give me a Mac to do my work.)

Back in the old days, college meant four years of ingesting, digesting, and recapturing great gobs of data. In exchange you got to use the tennis courts, saunas, and various controlled substances with more or less reckless abandon.

It was a good deal. Especially if your parents or some foreign government was paying for it. But now it's even a better deal. Mac does all the dirty lines, the rewrites. Why pretty soon you'll be able to walk up to your work. The filing, the storage, the out-

when the lecture's over."

better deal. Mac does all the dirty parents or some foreign government

It was a good deal. Especially if your parents or some foreign government was paying for it. But now it's even a better deal. Mac does all the dirty lines, the rewrites. Why pretty soon you'll be able to walk up to your pro-

fessors and say, "Look, buddy, if you have anything important to say, say it to my micro friend here. Wake me up when the lecture's over."

Now the more powerful your Mac is, the less work you have to do. Which means buying add-ons and software. From us. Have we got some deals for you.

First, find out the list price on the product you want. Then call your folks, or other benefactor, and say "Oooh, oooh, oooh, gotta have it, gotta have it." Get the check for the retail amount. Order from us. Pocket the difference.

If you're a parent, do the old bait and switch. Your kid calls up and gives you the retail price. You tell them not to worry, you'll get it for them. Buy from us and then dock the retail price from your grateful student's next allowance check!

Hey, at MacConnection everybody graduates with honors.

**SOFTWARE**

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<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>Altsys</td>
<td>Fantistic</td>
<td>$37.</td>
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<td></td>
<td>Create your own fonts.</td>
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<td>Ann Arbor Softworks</td>
<td>Animation Toolkit 1</td>
<td>32.</td>
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<td></td>
<td>Create, edit, and animate pictures.</td>
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<td>Apropos</td>
<td>You must have Multiplan to use.</td>
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<td>Financial Planning</td>
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<td>Investment Planning</td>
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<td>Arrays/Continental</td>
<td>Home Accountant</td>
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<td></td>
<td>External drive recommended.</td>
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<td>Assimilation</td>
<td>Mac-Tracks.</td>
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<td>Lock-it</td>
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<td>Mac-Memory-Disk</td>
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<td></td>
<td>Mac-SpellRight</td>
<td>59.</td>
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<tr>
<td></td>
<td>Requires version 3.3 or later of MacWrite.</td>
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<td>Axton</td>
<td>Art Portfolio.</td>
<td>$36.</td>
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<td>Card Shoppe</td>
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<td>Casady Company</td>
<td>Fluent Fonts (two-disk set)</td>
<td>36.</td>
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<td>Central Point Software</td>
<td>Copy II Mac - includes MacTools</td>
<td>23.</td>
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<tr>
<td>Computer Software Design</td>
<td>MacLion</td>
<td>219.</td>
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<td></td>
<td>External drive recommended.</td>
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<td>Creative Solutions</td>
<td>MacForth - Level 1</td>
<td>89.</td>
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<td>MacForth - Level 2</td>
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<td></td>
<td>Level 2 includes an assembler, floating point, and advanced graphics.</td>
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<td>DataFood</td>
<td>MacForms</td>
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<td>Turbo Turtle</td>
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<td></td>
<td>I Know It's Here Somewhere</td>
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<td>Get organized with this foolproof filter.</td>
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<td>Hippo-C - Level 2</td>
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<td>Upgrade Hippo-C Level 1 to Level 2</td>
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<td>Linguist's Software</td>
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<td>Professional Composer (requires 512k)</td>
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<td>Business Pack</td>
<td>357.</td>
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<td></td>
<td>Includes Word, File, Chart, and Multiplan.</td>
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WALK ON THE WILD SIDE.
When Bob Davison says he's going out, don't be surprised if he ends up spending the night filming a wild cougar giving birth. His choice of co-pilots for a cross-country lecture tour was a bear named Coco. And his housepets include coyotes, mule deer, pelicans, and bobcats.

Bob's philosophy is pretty straightforward—"to live in genuine good fellowship with all creatures." His business, for the last twenty odd years, has been managing and photographing wild animals for shows like Wild Kingdom, Profiles of Nature, and Audubon Theater. He's establishing an organization, Nature-On-Cue, Inc. to help him keep up with the demand for wild animals who can act.

Bob's computer? One guess. His Connection? MacConnection—that wild mail order house in the untamed New Hampshire hills.

Bob has found that, "more and more people are finding reassurance and peace of mind in companionship beyond the boundaries of humanity." A sentiment all our customers can appreciate. No doubt.
What Is Integration?
Danny Goodman

Among the latest products to vie for space on dealers' shelves is a new breed of Macintosh software: integrated programs. These programs, including Jazz, Excel, Crunch, Quartet, and Ensemble, are the Swiss Army knives of Mac software; instead of combining blades, scissors, screwdrivers, and a corkscrew in one unit, they combine two or more applications, such as spreadsheet, graphics, word processing, database, or communications, within a single program. Because an integrated program lets you share data among applications without quitting the application you're running, you can significantly reduce the time you spend working in front of the Mac.

Packaged integrated programs, however, are not the only route to integration. You can assemble a system that
Getting Started

You can achieve a measure of integration by including desk accessories on your startup disk. If you are working on a Crunch spreadsheet, for example, you can bring out your appointment calendar without leaving the spreadsheet.

Desk accessories range from calculators and alarm clocks to applications like ClickOn Worksheet and MockTerminal. By loading the System file with desk accessories and using the Switcher, you can create an efficient integrated system.

The degree of Macintosh integration you achieve depends on how you combine programs. At the very least, an integrated system allows you to flip back and forth between the applications that you use together—such as a spreadsheet and a word processing program—without quitting the current application and returning to the Finder or the MiniFinder. The applications within an integrated system also usually have the ability to share data, and they have features in common with each other, such as similar menus and commands.

On computers other than the Macintosh, a common set of commands is a tall order, especially if you attempt to join programs from different publishers. Each program has a unique approach to sending instructions, even for basic tasks such as opening files and saving data. Macintosh programs, on the other hand, share a common set of commands; in fact, once you have worked with one Mac program, you know how to open files, edit text, save work, and exit in nearly all Mac programs.

Sharing data among programs means that you can put the information from a document in one application into a document in another application. Although most database programs cannot accept MacPaint pictures—almost every Macintosh application uses the Mac's cut and paste commands to transfer data via the Clipboard. For example, you can copy the data in spreadsheet cells into the Clipboard and paste the data into a word processing document. With most programs, unfortunately, if the information in the spreadsheet changes and you want to update the word processing document, you have to recopy the data from the spreadsheet to the Clipboard and paste it again into the word processing document.

Programs like Jazz, Excel, and Crunch, however, utilize a data-sharing technique that circumvents the Mac's Clipboard (see the "Review" section of this issue). If you create a chart based on data from a spreadsheet, for example, and later alter the spreadsheet data, the chart is updated automatically. In effect, the information in both documents is dynamically linked. As you change the data in one document, its duplicate in the other document is similarly updated.
Desk Accessories

If you've ever selected the Calculator from the Apple menu to add numbers while typing a letter in *MacWrite* or *Microsoft Word*, you've had a taste of how desk accessories can build a rudimentary integrated system.

Desk accessories are miniature programs that can be opened from within a Macintosh application, even an integrated program like *Jazz* (see "Decking Out the Mac's Desktop," *Macworld*, March 1985). Some applications allow you to keep several desk accessories open simultaneously. Because desk accessories are limited in size, they often perform minor tasks like calculating simple equations or keeping the date and time. The larger desk accessories, however, are scaled-down versions of complete applications.

If you need to integrate graphics into a word processing document, for example, Hayden's Art Grabber desk accessory lets you open a *MacPaint* document in a window atop the current application. You can then copy up to one screen-sized picture into the Clipboard for subsequent pasting into a document.

Some desk accessories, like Videx's MacCalendar, combine a notepad, a calendar, an alarm clock, and an appointment book in one accessory. Whether you are working on a spreadsheet in *Crunch* or writing a report in *MacWrite*, you can keep your appointment calendar and notes close at hand (see Figure 1). For people who need a simple spreadsheet with modest graphics, T/Maker's ClickOn Worksheet desk accessory gives you a worksheet of up to 1000 cells, depending on available memory, plus bar, line, and pie charts (see Figure 2).

The Switcher

Another way to integrate single-function applications is with the Switcher. Designed for the 512K Macintosh, the Switcher allows you to load two or more applications into a portion of the Mac's memory. The Switcher lets you go between applications almost instantaneously. However, the performance of applications and how many you can install in the Switcher depend on how much memory you allocate for each one. *MacWrite*, for instance, performs well in 128K, but *Microsoft Word* generally requires more memory to run smoothly.

The Switcher is a natural integration tool if you already use single-function applications like *MacPaint*, *Word*, *Filevision*, *Desk Organizer*, *FactFinder*, or *OverVUE* and have stored large amounts of data. Applications loaded into the Switcher must use the Clipboard to share data with other applications.

Primary Program Integration

Most integrated programs combine two or three applications, but their functions revolve around a primary application such as a spreadsheet. *Excel*, *Crunch*, and Haba Systems' *Quartet* are primarily spreadsheets, while Hayden Software's *Ensemble* is primarily a database. In some cases the secondary ap-
### Products for Macintosh Integration

<table>
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<th>Application</th>
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<th>City, State, Zip</th>
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<tr>
<td><strong>Ensemble</strong></td>
<td>Hayden Software Co.</td>
<td>600 Suffolk St.</td>
<td>Lowell, MA 01854</td>
<td>800/343-1218</td>
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<tr>
<td><strong>Crunch</strong></td>
<td>Paladin Software Corp.</td>
<td>2895 Zanker Rd.</td>
<td>San Jose, CA 95134</td>
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<tr>
<td><strong>MockTerminal</strong></td>
<td>CE Software</td>
<td>801 73rd St.</td>
<td>Des Moines, IA 50312</td>
<td>515/224-1995</td>
<td>$30 (includes MockWrite and MockPrinter)</td>
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<td><strong>Quartet</strong></td>
<td>Habxi Systems</td>
<td>15154 Stagg St.</td>
<td>Van Nuys, CA 91405-1025</td>
<td>818/989-5822</td>
<td>$199.95</td>
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<td><strong>Jazz</strong></td>
<td>Lotus Development Corp.</td>
<td>55 Cambridge Pkwy.</td>
<td>Cambridge, MA 02142</td>
<td>617/577-8500</td>
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<tr>
<td><strong>ClickOn Worksheet</strong></td>
<td>T/Maker Graphics</td>
<td>2115 Landings Dr.</td>
<td>Mountain View, CA 94043</td>
<td>415/962-0195</td>
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<td><strong>Switcher</strong></td>
<td>Apple Computer, Inc.</td>
<td>20525 Mariani Ave.</td>
<td>Cupertino, CA 95014</td>
<td>800/538-6096, 800/662-9238</td>
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Applications are well-executed extensions of the primary program; in most cases, however, the secondary programs are like square pegs crudely whittled down to fit into the primary program's round holes.

*Quartet*'s on-screen structure, for example, is a spreadsheet, which makes assembling numbers, graphs, and words into a multipage printed report difficult (see Figure 3). The other applications—graphics, text editing, and database—function inside the structure of the spreadsheet.

*Ensemble* has spreadsheet, graphics, and text-editing capabilities, but the database form serves as the primary program. You create a spreadsheet as a form with columns and rows of fields; each field can accept a number or perform a calculation on numbers in other cells. *Ensemble*'s text-editing capability is limited to printing merged database reports, such as form letters and invoices. With the exception of its charting feature, *Ensemble* is no more integrated than a single-function database program such as *Helix*.

In general, the secondary applications in integrated programs are less powerful than their single-function counterparts. One exception, however, is *Excel*'s prodigious graphics capabilities, which are based on Microsoft Chart (see Figure 4).

#### Jazz Integration

So far, Lotus's *Jazz* is the only Macintosh program that combines five applications in one (see Figure 5). Each application—spreadsheet, graphics, data management, communications, and word processing—has its own menu bar and control panel, yet the applications are similar enough to prevent confusion when you switch among them. With *Jazz*, data can be shared among the documents of different applications. Spreadsheet data, for example, can be linked to a
graph or a word processing document. Database information can be linked to a graph or merged into a word processing document. The communications program can transfer data received from another computer into a jazz document, such as a spreadsheet.

Unfortunately, jazz's dynamic data sharing among documents from its different applications doesn't flow in all directions. I wanted to design a template in jazz that would allow me to generate a spreadsheet and graphs from financial information that was entered automatically into the computer via database-type forms. However, jazz's dynamic data-sharing feature does not operate in that direction; information that originates in the database must be copied to the Clipboard to transfer it to a spreadsheet.

The integrated system that jazz offers is not the right one for everyone. While the modules of jazz can indeed be used successfully as individual applications, they lack the depth of single-function competitors. Fitting five applications into one 512K program means compromises. You can accomplish much more with Microsoft's Multiplan, Chart, Word, and File and MacTerminal than with jazz's five modules, though you may miss jazz's data sharing and ease of use. You have to judge, for example, whether jazz's spreadsheet is large enough for your work and whether you need power, such as Excel's ability to automatically calculate data tables.

Integrated Choices

Nearly every Macintosh owner can benefit from some kind of integration. The type of integrated system you choose is important because you commit yourself to programs and data-storage formats that you will work with for some time.

If your work revolves around one application, then your best bet is a single-function program. For power users the limitations built into the components of an integrated program may prove frustrating. However, the primary applications of integrated programs like Excel and Crunch are designed for power users. Remember, though, that the program's secondary applications may waste disk space and memory, not to mention the extra cost you pay for functions you seldom use.

It is also important to analyze how the data is shared among applications. If your primary job is to analyze rapidly changing financial data in a spreadsheet, generate related business graphics, and combine the data and graphics into a word processed report, then jazz would be a boon to your work. But if you want to create a database and perform minor graphic analyses of the data, Ensemble would be the appropriate choice.

Integrating applications with the Switcher is practical when the applications you use are not part of an integrated program. Installing MacDraw in a Switcher sequence with MacPaint and Word, for example, makes an impressive integrated system for people in the graphic arts business.

If spreadsheets are your major application and you find that you occasionally need another program—say, you need the depth of an Excel spreadsheet but write only simple reports about the data once in a while—then I would put Excel and MacWrite or Word in the Switcher. On the other hand, if you use primarily a word processor, then load up the System file on your Microsoft Word program disk with desk accessories like Art Grabber, MockTerminal, Mac Spell Right, and MacCalendar.

In your search for the ideal integrated system, follow this guiding principle: each element should streamline your work. That is what integration is all about.

Danny Goodman
is a Contributing Editor of Macworld.

Figure 5
Jazz integrates five applications in one program. Although the individual applications have fewer features than their non-integrated counterparts, jazz's simplicity and data-sharing capability make it an attractive integrated system.
All That Jazz

Gordon McComb

In the ballyhoo that surrounded the introduction of Lotus Development Corporation's integrated spreadsheet for the Macintosh, Jazz was looked to as the answer to every Mac owner's prayers: a serious productivity tool that would outshine all others. My overall impression is positive, but weigh the pros and cons before you decide if the program is right for you.

Like a small band, Jazz has five players that make a big sound. The Jazz quintet—spreadsheet, graphics, database management, communications, and word processing—is grouped together to let you work on a single stage. Because of the way the five applications share commands and data, creating a whole that is in some respects greater than the parts, it is best to consider Jazz as one program that carries out five functions.

At $595, you pay for the all-in-one personality of Jazz. Furthermore, to take advantage of the program's unique features, you need a 512K Macintosh and an external disk drive. A well-designed spreadsheet stands at Jazz's center, although the word processor is the star of the show because of its strength as a presentation tool. The applications, as might be expected, are not quite as powerful as their single-function counterparts. The word processor, for example, is not as flexible as MacWrite nor as powerful as Microsoft Word, while the graphics application lacks some of the features of Microsoft Chart.

Scrutinizing Jazz only by the features of each application, however, misses the point. Jazz reveals its power in ease of use and integration—the ability to share data created by one application with the others. Jazz has two types of integration: dynamic and cut-and-paste. With dynamic integration, Jazz establishes a pipeline between the source and the destination application. If you change a number in the spreadsheet, for example, Jazz automatically updates the graph. When you no longer want the updates made, you can usually sever the link with the Freeze command.

Jazz's dynamic integration transfers data more efficiently than cutting and pasting. The dynamic data sharing paths, however, don't work in all directions (see Figure 1). For instance, the spreadsheet and the database can be linked dynamically to the graphics, but you can't link the spreadsheet and the database. Since the word processor can be linked to all other Jazz applications, the word processing application is where Jazz is most integrated. To make connections between Jazz applications that lack dynamic links, the program falls back on the cut-and-paste method used to transfer information between other Macintosh programs.

The Big Band

Jazz comes with four disks—tutorial, startup, program, and backup—and impressive documentation. Crammed on the program disk is Jazz itself, all 380K of it. The startup disk contains the System Folder, a 12K conversion utility, and a file that allows you to update the System files of startup disks with code related to Jazz's communications application. Jazz comes with version 1.1 of the Finder but works with version 4.1, which opens and closes documents faster than the earlier version.

You can move the conversion utility and the System update file to another disk, leaving about 160K free on the startup disk. Lotus recommends that you store data on copies of the startup disk. Because of the limited amount of available space on a startup disk, I strongly recommend using a hard disk with Jazz.

You can copy the Jazz program disk but must insert the original disk at startup. After the program loads, you can eject the original and insert a copy. Although I successfully copied Jazz to several hard
disks, including a HyperDrive and a MacDrive. I recommend that you thoroughly test compatibility between the program and any hard disk you own or plan to purchase.

When you start the program, you're greeted with the Jazz desktop, which contains four menus: Apple, File, Edit, and Window. All the applications have those menus as well as others specific to the application.

To create a new document, you choose New from the File menu, and a dialog box appears that allows you to choose the type of document you want to create. To open an existing file, you choose the Open command and select from the files listed in a dialog box (see Figure 2).

When you open a document, it appears in a window approximately two-thirds the size of the screen. You can resize and move the window or make it full size with the Zoom Up command on the Window menu.

The 512K Barrier
Jazz can keep up to eight windows open at once. But because Jazz keeps the contents of open documents in RAM, the maximum number actually depends on which applications you have open and how much data you have stored in the documents. For example, you may receive out-of-memory messages when you try to add information to a spreadsheet, a chart, or a double-spaced, 15-page word processing document—all of which are linked. The way Jazz uses memory also restricts the size of individual documents. If you have one large spreadsheet with formulas in the cells, you are again likely to run into the 512K memory barrier.

Jazz makes the problem worse by sometimes allowing you to get into a situation that causes you to lose a document. Several times I received an out-of-memory message from which there was no escape. I tried a number of techniques to reclaim memory, including reducing the size of the document, but whenever I issued a command, the out-of-memory message reappeared, like a tiger blocking every exit from a dungeon. I was unable to save or quit the document and finally had to restart the computer. To avoid losing documents, routinely check the About Jazz option on the Apple menu to see how much memory is available.

The way Jazz limits the number and size of documents to available memory is the program's most serious limitation, one that you should carefully consider before purchasing Jazz or, for that matter, any other memory-based program. Jazz's strength is the way its design lets you share information among several applications, but memory management problems severely restrict the number and size of documents you can work with at once. If, like most people, you tend to produce modest-sized documents, such as a brief report with one or two charts and a one-page selection from a small database, Jazz is adequate. But if you expect to work with a single large document or with two or more fairly large documents at once, Jazz may not be a good choice.

In fact, the way Jazz uses memory makes it seem like it was designed for a Macintosh with more than 512K of memory. Perhaps with the advent of 1- or 2-megabyte Macs, Jazz can dress in a suit it doesn't outgrow so quickly.

Rationing Memory
Until you upgrade to a 1- or 2-megabyte Macintosh, you can stretch available memory in several ways. You gain memory by turning off the program's Undo feature to save the space normally allocated to the Undo buffer, but you then have no way of restoring deleted or changed information. You can also keep the Clipboard empty when it's not being used. Also, if you have finished making changes to a document, you can save memory by freezing that document and any associated documents that you don't plan to update. For example, if you have a database that is linked to a chart that, in turn, is linked to a word processing document, you can choose Freeze All on the word processor's HotView menu to save the memory used to dynamically link the three documents. If you want to continue updating the documents, be careful to sever only those links you no longer need. Keep in mind...
that when a document includes data that is linked to documents in other applications, those applications are active and using memory even if the documents themselves do not appear on screen.

Each Jazz application has its own menu bar; the menu bar changes to match the application in the active window. You can switch between documents by clicking the appropriate window or by selecting the document name from the list on the Window menu. The Window menu also contains a Reference Board option, which allows you to display the name of the last Jazz document you used, in case you get lost among the windows.

Though it's easy to switch between applications, the switch isn't always instantaneous. If several modules and document windows are open, you may have to wait as long as 10 seconds. Also, if a few applications are open and you're near the Macintosh's memory limit, you notice a slowdown in such tasks as formatting or entering information.

The Bass Line

Jazz's foundation is its spreadsheet, which is designed to accommodate 8192 rows by 256 columns of data. However, it's impossible to reach that theoretical maximum on a 512K Macintosh. Apart from this limitation, the spreadsheet's number-crunching capabilities compare to any spreadsheet available for the IBM PC.

With a full-sized window, the spreadsheet displays 6 columns by 16 rows, or 96 cells. You can display more columns and rows by selecting a smaller font. Any font, size, or style selection applies to the entire spreadsheet.

Each cell can accept one of three types of data: numbers, text, and formulas. As you'd expect from a Macintosh spreadsheet, you select cells by dragging or clicking. You move to adjacent cells with the Tab, Return, or Shift keys. You use either the navigator icons in the upper-right corner of the spreadsheet console or the scroll bars to display other parts of the spreadsheet (see Figure 3).

Jazz has nearly 100 functions for financial, database, mathematical, or statistical calculations. The functions, shortcuts to creating complex formulas, resemble those found in 1-2-3, Symphony, and Excel. Jazz lets you use a function either by typing it or by selecting it from a list in a dialog box. You have to scroll through the long list of functions to find the one you want. Wish the program could automatically scroll to the approximate location of a desired function when you type its first letter.

Jazz provides features found in most spreadsheet programs, including cell protection, variable column width, range names, absolute and relative cell addresses, logical operators in formulas, and several text and number formats. The spreadsheet sorts cell entries alphabetically or numerically with up to three sort keys and finds the frequency distribution in a set of values.

![Figure 3](image)

You can move around a selected spreadsheet range with the corner navigator, the small four-headed arrow icon highlighted in the upper right of the screen. The large symbol is the end navigator, which displays the cell at the end of the spreadsheet in the direction of the arrow that you click.

Figure 2

Jazz lets you open documents from its own desktop or directly from the Macintosh desktop. When you choose Open from Jazz's File menu, a dialog box appears showing a list of existing documents. You click All Types or one of the six application icons to view the document names in the selected application.
Like Excel, Jazz lets you calculate a range of numerical possibilities based on one or two variables with "what-if" tables. The tables help with tasks such as creating loan schedules and making business projections.

**Missing Features**
Lotus disappointed many would-be Jazz owners when it disclosed that the program would not provide macros. Macros save you time and effort by letting you assign a sequence of commonly used commands to a single key so that the program performs the sequence when you press the assigned key. I think most people would have preferred macros in the program over, say, the communications facility.

You can create a rough substitute for macros with Assimilation's Mac Tracks, which lets you record and "play back" a series of mouse movements and command selections. If you want to save a set of movements and commands, however, you need the storage space of a hard disk.

The Jazz spreadsheet also lacks split windows, a feature that lets you view two parts of a large spreadsheet at once. Split windows let you see the impact of entering a set of numbers in one part of the spreadsheet on another part without scrolling back and forth.

You can effect a split window by copying a range of cells from a spreadsheet into a word processing document and linking the two documents. Arrange the two windows so you can see both documents on screen. However, you can amend the spreadsheet only in its own application, not in the word processing document.

The spreadsheet's most serious shortcoming, however, is that it can't link spreadsheet documents. Linking spreadsheets allows you to see the effect of changes made in one spreadsheet on another. This capability is valuable, for example, if you want to see how adjustments to departmental budgets affect the division's bottom line.

**Musical Bars**
After the spreadsheet, Jazz's strongest component is its graphics application. Jazz has a surprising number of graphics features for a program that has four other applications. You can create pie, bar, overlapped bar, stacked bar, line, stock marker (hi-lo), area, and scatter charts. You can mix and match chart types in one graph—a line chart superimposed over a bar chart, for instance.

To make a chart, you first select the data in a spreadsheet or a database that forms the basis of the chart. Then you open a graph document and choose a chart type from the Type and Plot menus. In a matter of seconds, the chart appears on screen. You can make an overlay chart by repeating the process. You can instantly change the chart type by clicking the graph and changing the Type and Plot menu selections. If you change a pertinent value in the spreadsheet or the database, Jazz automatically updates the graph.

Although the graphics module is dynamically linked to the spreadsheet and database manager, you can't freeze a graphics document so that it remains unaffected by changes to the spreadsheet or the database. The Jazz word processor has a similar feature, and its absence in the graphics application is an oversight.

**Jazzing Up Charts**
Jazz gives you a lot of creative control over a chart's final appearance. You can transfer labels from the spreadsheet or the database to the graph or type in your own. You can also specify and position a title and a legend (see Figure 4). Jazz lets you add a subtitle or an annotation anywhere on the chart.

You can embellish charts by adding tick marks and grids; altering the patterns in bar, area, and pie charts; and picking new symbols for line charts. You can draw straight lines and arrows and change the font, style, and size of text in a chart.

Jazz's graphics module lacks built-in data analysis for drawing trend lines and moving averages and plotting a mean. This capability would help take the menial math out of creating statistical graphs.
**JazzBase**

Jazz's database manager doesn't match sophisticated single-function programs like OverVUE or Helix. Its strength lies in its ability to share data with other program components. Like the Jazz spreadsheet, the database manager can be linked dynamically to the graphics and the word processor. As previously described, you can create charts instantly from information in the database. You can merge names, addresses, and other data in a memo or a report created with the word processing application.

Theoretically, a Jazz database can store several thousand records, each composed of 100 fields. However, the size of files in Jazz is limited by available memory. Jazz provides several numeric and text formats. The program lets you enter information of any kind or, if you want, restricts the type of information you can enter to a selected format. You can also define formula fields, which calculate a specific entry based on information from other fields, or define an initial value so you don't have to retype information that remains the same throughout a field.

You determine the viewing width of the field column on screen, but regardless of what you see, Jazz stores a maximum of 254 characters per field. You add and complete records in any order, and you can leave fields blank.

**A Database with Two Views**

You can enter information in two ways: on a spreadsheet-like grid, in which each row is a record and each column is a field, or on a form you design yourself using Jazz's form designer. With the form designer, you make a template to position fields of a specified length and type. You can choose type font, size, and style for each field (see Figure 5). As you type information into the custom form, the data is backed up automatically in the database grid. You can edit, add, or delete records and fields on either the custom form or the grid.

You can sort entered data to reorganize the information or search to find specific data. Like the spreadsheet, the database manager can sort up to three fields in either ascending or descending order.

You can search for exact or partial matches. When searching for partial matches, you use wild-card symbols such as an asterisk (*) or a question mark (?) to represent variable characters.

Jazz lets you define sorts and searches in the database with the logical operators also found in the spreadsheet, such as equal to, not equal to, greater than, and less than. You can also correlate information in two or more fields by using the AND or OR Boolean operator. You might use the AND statement, for example, to find all records with the same city and state, while you could use the OR statement to find all records of employees in the same department or job position.

**Reports**

The database manager also generates reports of the outcome of your sorts and searches. The report generator, however, is harder to understand and use than other Jazz tools. You create a report by using the commands in the Report menu and by filling out a Report Definition that tells Jazz which fields to include. You can add headers and footers to the report and print summaries, which can show totals, averages, or other information.

The database manager and the form designer are adequate for simple databases, such as lists of business contacts that you want to merge with letters, or records of sales revenues that you want to present graphically. I felt the real power and convenience of Jazz when I worked in the database manager, creating forms, reports, and graphs with ease. But people who create large and complex databases should purchase a single-function database program.

**JazzTalk**

Jazz lets you communicate with other computers. Since you can transmit Jazz documents and text files, you can, for example, send a report to a business associate who also uses Jazz. The communications facility also lets you connect to electronic bulletin boards or time-sharing services such as The Source. It also allows you to operate the Macintosh as a DEC (Digital Equipment Corporation) VF100 or VF-52 terminal and

![Figure 5](image-url)
tap a DEC mainframe. You can search large databases, use programs, or send electronic mail using the mainframe.

The program's most valuable communications feature is that it provides a temporary link between incoming data and jazz spreadsheet, database, or word processing documents, enabling the documents to receive data directly, without cutting and pasting.

The communications application also lets you specify how incoming data is parsed—broken down into chunks that jazz can interpret and use. The parser allows you to control the interpretation of blank characters, carriage returns, tabs, commas, and other specialized characters. For example, the parsing feature lets you convert the columnar format of data from the Dow Jones News/Retrieval service so that jazz automatically enters the information into cells for use with the spreadsheet or the database manager. If you want to avoid on-line service charges, you can receive data as a text file and later use the parser to transfer the text file into a spreadsheet or a database.

The communications application works with any modem, though its automatic answering and dialing functions work only with Apple, Hayes, or Hayes-compatible modems. You can store the telephone number and other communications settings, such as baud rate, by saving them with a communications document. The communications application can't automatically redial busy telephone numbers. Jazz also lacks communications macros, which let you automate the tedious logging procedures of information services such as Dow Jones or CompuServe.

Tying It All Together

Jazz's spreadsheet forms the basis of the program, but the integration of all five functions is greatest in the word processor. The word processor allows you to tie together in one document all the information you need from the assorted jazz applications. As a result, the word processor makes an excellent reporting and presentation tool.

You can establish a dynamic link to a word processing document from any jazz application except the communications module. To establish a link, you select the information you want to transfer, such as a chart. You open the word processing document in which you want to put the selected data and choose the Include command from the word processor's HotView menu. Once the information is included, any change to data in the original document automatically updates the word processing document (see Figure 6). If you do not want information in the word processing document to change, you sever the link by selecting the Freeze command from the HotView menu. Once the link is severed, it cannot be reestablished.

The jazz word processor is comparable in performance and features to the original MacWrite. You can create headers and footers, insert formatting rulers, search and replace text, and control the font, size, and style of any character in the document. But the word processor doesn't set up multiple columns or allow superscripts and subscripts.

Still, the jazz word processor has a few extra features over MacWrite. It lets you merge data from a database with a word processing template. The word processor also allows you to create documents up to 14 inches wide (the document window scrolls as you type). You can also set top and bottom page margins from the Page Setup dialog box. Jazz takes a considerably longer time than MacWrite to open an existing word processing document. I measured the amount of time jazz took to open a six-page, single-spaced document. The result: 51 seconds, compared with less than 8 seconds for a similar MacWrite document. A hard disk would reduce the wait.

Once again, because all jazz's applications are RAM based, available memory limits the size of word processing documents. In my tests, with no other applications open, I was able to write a 17-page, single-spaced document before I started getting out-of-memory messages. If you write long documents or reports and were annoyed by the length restrictions of early versions of MacWrite, avoid jazz as a primary writing tool. However, for business correspondence and brief reports, the flexibility of the word processor and its...
Reconcilable Differences

Jazz’s capabilities take care of the most common computing tasks, but you may still want to use Jazz with other programs. Fortunately, Jazz has a high level of compatibility with other software. I tried Jazz with MacWrite, MacPaint, Multiplan, and other programs. In all cases I could cut and paste data between programs.

Jazz reads files created by Microsoft Word or MacWrite, but in text format only. It also reads Multiplan files if they are saved as SYLK files (SYLK is Microsoft’s Symbolic Link format). Jazz translates all data from a Multiplan spreadsheet, including formulas and notation, except union ranges and the Show Formula and Link features.

In addition to converting Macintosh Multiplan files, Jazz also reads Multiplan files created on the IBM Personal Computer. You must first transfer all files to the Mac from the IBM PC before you convert them into Jazz format. You can complete the transfer of files between the Mac and the IBM PC with specialized software, such as MacLink, or over a network such as the one from Sunol Systems.

You can transfer Lotus 1-2-3 and Symphony files to the Mac from the IBM PC and convert them to Jazz files with a process similar to the one used to convert SYLK files. However, Jazz disregards window settings, macros, graph and query settings, and window splits. For the present, the reverse process—from Jazz to Multiplan, Symphony, or 1-2-3—is not available, but a spokesperson from Lotus claims that new Jazz-compatible versions of 1-2-3 and Symphony will be available by the end of the year.

You might also want to use another application program, such as MacPaint, with Jazz to embellish charts and word processing documents. You can place both programs in the Switcher, but the size of the Jazz program and the way it uses memory leave little, if any, room to open a document.

ability to share data dynamically with Jazz’s other applications is more important than length limitations. But remember that the more applications you have active, the less memory you have to work with.

Overall Impressions

Jazz is not the Macintosh equivalent of the philosopher’s stone. It is well thought out but has both strong and weak points. If you’ve already invested in other business-oriented Macintosh applications, like Microsoft Word, Crunch, or Multiplan, Jazz shouldn’t force your expensive Mac software into early retirement. With the exception of the spreadsheet, the individual Jazz applications don’t offer much over single-function programs. Furthermore, Jazz’s applications are restricted by the way the program manages memory. When you begin to attempt ambitious projects with Jazz, you may find yourself planning a 1- or 2-megabyte memory upgrade for the Mac.

Jazz is a good choice if you regularly exchange data between applications but don’t want to fool with the Switcher. The way Jazz integrates tools for managing numbers and marshaling data with tools for creating reports is impressive. People who gather figures for presentation should seriously investigate Jazz.

Once you’ve considered Jazz’s strengths and weaknesses, deciding whether the program is for you is ultimately a question of cost and convenience. Jazz plays a new tune in software integration, creating an elegant environment that is easy to use and relatively simple to learn. And after all, simplicity and ease characterize the Macintosh spirit. •

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Jazz
Lotus Development Corp.
161 First St.
Cambridge, MA 02142
617/253-9150
List price: $595

Mac Tracks
Assimilation
485 Alberto Way
Los Gatos, CA 95030
800/622-5464, 800/421-0243 in California
List price: $29
Spreadsheet programs have a history of forming symbiotic relationships with personal computers. VisiCalc and the Apple II helped sell each other starting in 1979; 1-2-3 and the IBM PC have done the same since 1983. Microsoft undoubtedly hopes Excel and the Macintosh will do the same starting now.

Microsoft's Excel combines an advanced spreadsheet with presentation-quality graphics, a limited database manager, and macro capabilities. Microsoft's concept of "appropriate integration" contrasts markedly with the approach taken by manufacturers of other integrated products, which offer word processing, forms generation, communications, or a better database at the expense of advanced spreadsheet functions, graphics, and macros. If you want to integrate Excel with a word processor or another application, you need to use Apple's Switcher program, which is included on the Excel disk.

This preview is based on a prerelease version of Excel in which all of the commands and most of the convenience features were in their final form. However, it was impossible to conclusively evaluate the program's performance or reliability. Performance of the prerelease version, coupled with Microsoft's newly developed techniques for minimizing worksheet recalculation time, suggests the final version will be fast.

The reliability question is less certain. Naturally, the prerelease version was not bulletproof. Microsoft's track record for reliability is mixed; some of its products have been free of serious errors upon release, but others have had problems.

Memory and Storage

The size of an Excel worksheet is limited by the amount of memory available. When Excel runs low on memory, it appropriates program memory for documents. Performance suffers because parts of the program must be copied from disk to memory more frequently. Excel can use up to 1 megabyte (1024K) of memory, although you cannot save a single worksheet that large on a 400K disk.

If you're a masochist, you can use Excel with one disk drive, but two drives are a practical minimum. The program is too large to fit on one 400K disk with the System file. Chances are you'll need one disk for the program, one for the System file and the Finder, and another for your documents. Using three disks requires disk swapping, even with two drives.
One way to eliminate the disk swapping is to use a hard disk. Its shorter access times improve program performance, too, especially when you're working with spreadsheets that fill up memory. Also, a hard disk has enough capacity to store any document you create, regardless of size. If you work extensively with spreadsheets, you'll find a hard disk indispensable.

**Excel's Desktop**

In a typical Excel scenario, several document windows are open simultaneously, showing different charts and worksheets (see Figure 1). Several windows can provide different views of the same worksheet. Only the amount of available memory restricts the number of documents and windows you can have open at the same time.

Worksheet and macro sheet windows can be split vertically or horizontally into two or four panes. Each pane can provide a different view of the same document, but the panes are semidependent because each one scrolls in unison with the pane above or beside it. Chart windows cannot be split.

To activate a window, point to it and click—if you can find it. On a cluttered desktop you could spend several minutes looking for a window buried beneath layers of full-sized windows. Fortunately, Excel has a Windows menu that lets you activate a window by choosing from a list of up to 18 window names; desk accessory windows are not listed.

**Excel Worksheets**

An Excel worksheet nominally has 256 columns and 16,384 rows—over 4 million cells. But in fact, you can create a worksheet that spans at most 10,000 to 45,000 cells in 512K of memory. With the prerelease version, I found that a 15,000-cell spreadsheet consisting of a simple mix of formulas and constant data pushed Excel to the limits of the Macintosh's memory. The more complex the worksheet and the more windows that are open at once, the fewer cells Excel can handle.

A cell can contain text, a number, a date, a time, or a true or false value. Instead of a specific value, a cell can also contain a formula. The formula can contain text, numbers, cell references, dates, true or false values, names, other formulas, and the operators that specify how to combine the elements of the formula. Excel has three cell-reference operators for producing a range, union, or intersection of cells in addition to the usual arithmetic, text, and comparison operators.

You can put together formulas using any of Excel's 93 predefined functions, or you can define your own functions using Excel's macro language. The range of predefined functions is wide, spanning mathematical, trigonometric, statistical, database, logical, text, financial, date, and special-purpose functions.

One of Excel's unique capabilities lets you create formulas that include references to cell ranges, called arrays. For example, computing the total value of a stock portfolio without arrays requires a separate formula for each stock—value equals number of shares times price—and one formula to sum the values. With arrays, you can do the whole calculation with one formula.

If you're experienced with Multiplan or 1-2-3, you'll appreciate the fact that Excel uses either 1-2-3's Al or Multiplan's RICI style of referencing cells in formulas. You can change conventions by choosing a menu option. Regardless of the convention you choose, you can use relative or absolute references, or you can mix the two.

**Editing Worksheets**

Excel offers the usual editing commands to use with the Macintosh Clipboard: Undo, Cut, Copy, and Paste. When you use Cut or Copy and Paste to move cells, Excel moves both the contents and the formats of the cells. With the Paste Special command, you can paste just formulas, just values, or just formats from the Clipboard to cells you have selected on any worksheet. Paste Special also lets you use arithmetic operations—addition, subtraction, multiplication, and division—to combine values copied to the Clipboard with the selected cells on the worksheet.

Excel has two Fill commands that are indispensable when you want to propagate formulas throughout the columns or rows of a worksheet. The Fill Right command...
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command allows you to propagate the contents and formats of cells at the left edge of a selection across the rows to the right edge of the selection. The Fill Down command works from top to bottom. You can also set up a “data series” in a row or a column, wherein Excel adds (or subtracts) a constant value to each succeeding cell. Values in the series can increase or decrease linearly or geometrically or, if they are dates, by day, weekday, month, or year.

With Excel you can create a table from a set of formulas and a list of values for one variable; for example, you can construct a table of shipping charges from a list of weights and formulas for different shipping methods. You can also construct a table from one formula and lists of values for two variables; an example would be a table of monthly payments on a loan using lists of data for the interest rates and number of payments.

Worksheet Formatting

No other spreadsheet program matches Excel’s worksheet formatting flexibility; and for that reason, none matches its formatting complexity. You can show or hide grid lines; show or hide row and column headings; select any font and size for the whole worksheet; choose a normal, italic, bold, or bold italic type style for individual cells; align values within a cell; draw borders completely or partly around a cell or a group of cells; adjust column widths; and hide columns (but not rows). And though the display options are numerous, all are easy to use.

Formatting numbers, however, takes more practice. Excel uses pictorial templates to format numbers, a method that sounds intuitive but isn’t. To format a number, you must arrange symbols, such as a pound sign or a zero, which act as place holders for digits. Then you must insert other symbols, such as a period or a comma, to indicate things like a decimal point or thousands punctuation. You can, however, avoid the symbols by choosing from 19 standard formats or by editing an existing format.

Linking, Printing, and Protecting Worksheets

Many spreadsheet programs let you link cells on one worksheet to cells on another. If a linked cell on the supporting worksheet changes, so does the linked cell on the dependent worksheet. Excel goes beyond other spreadsheets, allowing you to refer to external cells directly in formulas. This linking within formulas enables you to consolidate worksheets so that the formulas on a summary worksheet can refer directly to cells on the supporting worksheets.

Printing is another area where Excel goes beyond other integrated spreadsheets. You can print 50 percent reductions, preview a printed page easily, add headers and footers, and even configure the program for different printers.

For people concerned about security, Excel provides password protection. Worksheet cells can be individually locked, have their formulas hidden, or both. Access to a protected worksheet can be controlled with a password that you provide. However, the password is displayed when you type it, and anyone can read it over your shoulder unless you turn the screen brightness down.

Database Features

Excel allows you to designate any part of a worksheet as a database by selecting a block of cells and choosing Set Database from the Data menu. The first row of the database contains the names of the fields. Each succeeding row constitutes a different record, and each column a different field.

Excel’s database is limited compared to a single-function database program and might better be termed a list processor: Excel can find, extract, or delete records from a database according to criteria you designate. You set up the criteria in any unused part of the worksheet or in a separate window (see Figure 2).
Your criteria can include requests for records that have a specific value in a field or that have a value that bears a desired relationship to a stated value—for example, greater than, less than, or not equal to. Criteria can also be computed from formulas, since Excel evaluates the formulas when it inspects each record.

When you tell Excel to find the records that meet your criteria, the first matching record is highlighted. Clicking on the up or down arrow displays the next matching record in the corresponding direction.

The Excel database also lets you delete records or place copies in other parts of the worksheet. This feature comes in handy when you need to extract information for summaries and reports. You specify which fields you want copied and whether you want all, part, or even more than one copy of a field.

Sorting a selected block of cells by row or column is another task for which the database is well suited. You designate up to three key rows or columns and indicate whether each should be sorted in ascending or descending order.

### Charts

Excel's strengths is charting. The program incorporates nearly all the features of Microsoft Chart. You have a choice of 42 predefined chart formats, organized by type: area, bar, column, line, pie, scatter, and combination. You choose a type and then pick one of the standard formats from samples presented in a dialog box. You can customize any of the standard formats as well as reposition or eliminate the axes, the tick marks, the grid lines, and the tick mark labels.

For clarity, you can attach a pattern legend at the top, the corner, the side, or the bottom of a chart. If you want to label the chart with text, you can attach a title, an additional description of either axis, or a description of a single data point or a whole data series. You can select the style, the font, and the size of any text selection. You can also type unattached text and drag it anywhere in the chart window. However, I found that Excel gave me a limited choice of orientation, alignment, and position for unattached text.

If you need to point out a particular area of a chart, Excel allows you to draw arrows. You can move, resize, or change the direction of any arrow or assemble your own arrows by choosing from three sizes of shafts and 27 combinations of heads.

In addition to offering the formatting flexibility already described, the program lets you change the patterns of data markers, axes, the chart background, the plot area background, and arrows. You can change the pattern and weight of borders for the chart area, the plot area, the legend, the title, data markers, or text se-
lections. You can even add a shadow border to the chart area, the plot area, the legend, the title, or text selections.

One of Excel's most advanced charting features allows you to overlay one chart on another (see Figure 3). The two charts may be different types and may even have different axes. For example, you might overlay a trend line on a column chart of actual sales figures.

**Macros**

A macro is a set of instructions that tell a program how to carry out a procedure or calculate a value. Once you set up a macro, you can execute the procedure or calculation with a few keystrokes or mouse clicks. Macros save you time when you perform repetitive tasks and allow you to create your own functions. The concept has proved immensely popular with users of 1-2-3 and other advanced spreadsheets whose macros are nowhere near as powerful or easy to use as the macros in Excel.

The ease with which you can create macros is another of Excel's strengths. Many macros can be set up simply by carrying out the function you want the macro to do. Although you must carefully plan a macro in advance, Excel's macro recorder eliminates the drudgery of typing instructions to carry out a particular calculation.

Excel can record your every working move. Your actions—selecting cells, entering formulas, and choosing from menus and dialog boxes—are translated into a sequence of formulas and stored on a macro sheet (see Figure 4). Most macro formulas use functions from Excel's macro language. Some macro functions duplicate Excel menu commands. Others carry out actions that aren't accessible from a menu, such as selecting cells. Some functions ask for information using Excel dialog boxes or dialog boxes that you create. Excel's macro language also includes functions for branches, loops, and subroutines, all of which control the order of macro instruction execution.

The macro recorder works well for basic calculations, but if you want to do something complex, such as automatically generating custom worksheets that prompt you for required information, you must write a program with Excel's macro language.

**Compatibility**

With Excel you can exchange information with other application programs via the Clipboard. Cell values can be cut or copied as tabular text and pasted into a word processing document. Also, a worksheet selection or a whole chart can be copied as a fully formatted MacPaint-style picture.

If you need to work with spreadsheets created by other programs, Excel is extremely accommodating. You can open and save worksheets in Multiplan's SYLK format and in 1-2-3's WKS format. You can also open, but not save, worksheets in Multiplan's internal format and charts in Microsoft Chart's internal format.

**Documentation**

Excel comes with two manuals, a quick reference guide, and on-screen help. The first manual has three sections: a tutorial, a how-to guide, and a reference manual. The second manual covers arrays, functions, and macros. The preliminary manuals are mostly clear, concise, thorough, and, not surprisingly, lengthy—about 400 pages, not including the reference section. You probably won't understand Excel's more exotic features after a quick read of the manuals. Plan on several hours of study and experimentation to learn how to create a table, set up criteria for finding database records, use macros, and so on. The on-screen help, which you reach through the About Excel dialog box, was not included in the prerelease version of Excel, so I was unable to evaluate it.

**In Conclusion**

Excel is unquestionably the most powerful spreadsheet program available on any personal computer. Its closest competitor, the 4-megabyte (4096K) IBM PC version of Lotus Development's 1-2-3, can create larger spreadsheets but has considerably fewer features and is far more difficult to use than Excel. Crunch is probably Excel's main competition for Macintosh power spreadsheet users (see "The Multi-million-Cell Promise" in this issue). While Crunch has enough advanced features to make it interesting, Excel has so many more that it's worth the few dollars extra.

Less demanding spreadsheet users should not rule out Excel. Although the program's complexity makes it more difficult to learn than the other Macintosh spreadsheet programs, its convenience compensates for the handicap. Microsoft has built in an amazing number of useful double-click and keyboard shortcuts. Besides, the ability to open many windows concurrently, to split the windows, to make individual cells bold or italic, and to create first-rate charts make Excel a good choice even if you never use custom number formats, database features, arrays, or macros. □

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**Contributing Editor of Macworld**

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**Excel**

Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
206/828-8080
List price: $395
The Multimillion-Cell Promise

Bill Grout

This integrated spreadsheet won't turn your Macintosh into a number-crunching powerhouse, but it is flexible and easy to use.

The name Crunch implies a monster spreadsheet with mainframe number-crunching power. The program is a promising spreadsheet, but it makes a few promises it can't keep. You could potentially create a 2½-million-cell model with Crunch that would physically occupy a 20-by-208-foot ledger sheet. However, spreadsheets that large are well beyond the memory capacity of a 512K Macintosh, which can hold models of only about 11,000 cells—enough cells to create a desktop-sized spreadsheet about 4½ feet square. So Crunch keeps less than 1 percent of its multimillion-cell promise. If you're time conscious, consider that a Macintosh disk drive runs steadily for more than 3½ minutes to load a Crunch spreadsheet containing 11,000 cells. At that rate the Mac couldn't load a million-cell spreadsheet in less than 8 hours.

Yet Crunch has excellent features. It promises to be an excellent integrated spreadsheet if one or two performance shortcomings are eliminated in future releases.

One Good Icon Deserves Another

On screen, Crunch looks like a spreadsheet wearing an Indian headband (see Figure 1). Just below the menu bar appears a bar of 21 icons. Each icon provides push-button access to spreadsheet options, such as changing column widths or formatting cells to display dollar amounts. Although I intuitively understood the function of only half the icons on first sight, I quickly learned them all and used them constantly. The icon bar is Crunch's most outstanding feature, providing an efficient and easy-to-use means of building spreadsheets.

Clicking the first icon on the left erases the icon bar, yielding more room to view the spreadsheet on screen. Clicking the second icon brings up a print menu, from which you can elect to print an entire worksheet, a selected section of a spreadsheet, graphs associated with the sheet, or notes describing a model. You can also print a directory of spreadsheet cell references, links to other spreadsheets, and graphs. Spreadsheets can be printed with the Imagewriter or the LaserWriter, and a printing option lets you reduce a spreadsheet's printed size by 50 percent.

Crunch's eraser icon deletes cells from the sheet and also gives you an inkling of the program's main strength: ease of use. After clicking on a cell and dragging until a block of cells is selected, you effortlessly complete a deletion by clicking the eraser icon. Crunch takes about 3 seconds to erase 300 cells—an adequate speed for a task that Lotus's 1-2-3 completes in 1 second on the IBM PC.

Crunch's fourth and fifth icons represent useful fill commands that automatically copy text, numbers, or formulas into ranges of rows or columns. Crunch's fill functions can even produce sequences of numbers or names of the months in cell ranges. A common spreadsheet task is placing month names across or down the side of a model. With Crunch you can enter a starting month in a cell and automatically fill neighboring cells with consecutive month labels. With the Fill command or the similar Append command, you can also...
create number sequences. A growth factor increases or decreases the figures in each cell according to an amount you specify. In a forecasting spreadsheet, for example, the Append command's growth factor might be employed to predict future profits by extending present profit figures several months into the future. A formula or a percentage of estimated growth would spread the figures into adjacent cells.

The Well-Dressed Cell
Crunch's next nine icons make spreadsheet formatting a pleasure. To perform any of the icons' functions, you select a group of cells for formatting and click the desired icon. Two icons display figures as dollar amounts or with dividing commas. Three adjacent icons display cell contents centered or left or right justified. An icon sporting a two-headed arrow enables you to increase column width one character at a time for quick fixes when labels or figures don't fit in a cell.

Cells can also be dressed up to display boldface, italic, or underlined characters. You choose outlined and shadowed characters by using the formatting menu, which also lets you display figures as percentages, in scientific notation, with a fixed number of decimal places, or as units of thousands or millions. You can also format cells to automatically fill with a repeating character, such as a minus sign.

The icon bar also lets you create four types of charts and provides two icons for database functions. The bar's last icon, an equal sign, forces the spreadsheet to recalculate a model when automatic recalculation is turned off. For those who don't favor icons, all icon functions can also be carried out with Crunch's pull-down menus.

Ready for Crunching
Crunch's assortment of number-crunching capabilities compares favorably to that of other spreadsheets. The program provides mathematical functions that sum and average ranges of cells. In addition, complex functions find square roots and exponential values, solve polynomials, round off numbers, compute factorials, and calculate logarithms.

Crunch provides 13 statistical functions for finding values such as the maximum, minimum, mode, and median values of a range, standard deviations, variance, random numbers, weighted averages of a range, and the highest- and lowest-ranked values in a list. Eight trigonometric functions can calculate values such as sine, cosine, tangent, arc cosine, and arcsine. One function represents pi carried out to 15 decimal places. With such financial, mathematical, statistical, and logical functions, Crunch is on equal footing with most sophisticated spreadsheets.

A Performance Crunch
Crunch's performance as a spreadsheet is disappointing. Scrolling by one row or column is slow, and the more cells that display information on screen, the slower the scrolling speed. I eventually avoided scrolling whenever possible. I also found Crunch's vertical scroll bar irksome. Because Crunch is set up to scroll 9999 rows, small movements of the scroll bar box jump a view of the spreadsheet hundreds of rows. Frustrating hairbreadth adjustments are needed to scroll within 50 rows of a desired cell. The only satisfactory scrolling function I found was clicking on either side of the scroll box to move one screen's worth of rows at a time—with a tedious slow screen refresh.

Crunch also occasionally mismanages the Macintosh's memory, displaying out-of-memory error messages when memory is not entirely filled. When I created a spreadsheet that took up 88 percent of the Mac's memory, Crunch did not allow me to use its Fill function because not enough room was available to load and execute it. After saving the spreadsheet on disk and reloading it, I discovered that 30 percent of memory had been freed, and I could then execute Fill commands. Saving and reloading a spreadsheet is an important technique to remember if you get in a jam for memory space.

For research or scientific applications, Crunch provides 13 statistical functions for finding values such as the maximum, minimum, mode, and median values of a range, standard deviations, variance, random numbers, weighted averages of a range, and the highest- and lowest-ranked values in a list. Eight trigonometric functions can calculate values such as sine, cosine, tangent, arc cosine, and arcsine. One function represents pi carried out to 15 decimal places. With such financial, mathematical, statistical, and logical functions, Crunch is on equal footing with most sophisticated spreadsheets.
Although the program is no speed demon, I found that Crunch's execution of long recalculations was comparable to execution of identical recalculations with 1-2-3 on the PC. As spreadsheet sizes near the Mac's memory limit, however, the time required to enter numbers in cells slows. I found I could type the contents of a cell and press Enter and not see the results until about 2 seconds later.

Of the performance problems mentioned in this article, Crunch's slow scrolling speed most hampers what I feel is an otherwise satisfactory spreadsheet. You should test Crunch's scrolling before buying the first release. If you balance the program's performance against the ease of use afforded by the icon bar, Crunch is adequate for the spreadsheet needs of most users, but I don't recommend it if you expect your spreadsheets to fill large amounts of memory.

**One-Button Graphs**

Crunch produces graphs with the ease of taking Polaroid pictures; you click a button and watch a graph develop instantly on screen. You can produce a pie chart by selecting a row of cells and clicking the pie chart icon. Up pops a fully sliced pie on screen, complete with a legend and percentage comparisons (see Figure 2). For creating charts Crunch provides a much simpler method than do spreadsheets such as 1-2-3 and Symphony.

Crunch also lets you create bar, area, and line graphs. Labels and legends are automatically taken from the row and column that hold the text labels nearest the data range to be plotted. Graphs are drawn in three sizes: full screen, half screen, and matchbox size. A spreadsheet and a graph can share the screen, and you can plug values into the spreadsheet and watch the chart update immediately. Double-clicking on a graph brings up a menu for changing chart size and legends and for choosing whether a chart plots in column or row orientation. You can also title a graph, change its contrasting patterns, label the X and Y axes, and respecify the tick mark intervals along an axis.

Crunch's menus and automatic labeling work well most of the time. Some inflexibility crops up, of course, in the preset sizes and look of graphs. Axis labels sometimes overlap and become unreadable in small graphs. Also, to create charts that compare the data in two rows or columns that are not contiguous, you have to move the data together in the spreadsheet. But overall, Crunch has simplified the process of creating charts to selecting a range of data and clicking an icon. Crunch's charts can also be transferred easily through the Clipboard to other programs like MacPaint and MacWrite.

**A Database behind Venetian Blinds**

Crunch's database capability is straightforward. It's easy to specify a range of cells as a database and query the database to find specific records. Sorting is swift and effective.

Database records are stored one per spreadsheet row. You specify a database by selecting a range of rows and making a menu selection that marks the database range. Since Crunch does not provide data entry screens and does not let you create your own, you always view records row by row.

You carry out a search by placing criteria in an empty cell above a database. For example, when you place the formula \textit{? = 1000} in a column, you initiate a search for any cell in the column that contains the value 1000. Searches can be made with several criteria for one or several columns of a database. You click the question mark icon to begin the search.

Records that don't match the criteria you set are masked from view, as if a venetian blind with missing slats were pulled to shield the view of the database. Records that match the criteria shine through. You review the results of the search by scrolling the database or clicking on the Next Match icon. Crunch also provides easy-to-use functions that delete records or copy records found during a search to a new location in the spreadsheet for examination or processing. A query function searches databases and makes mathematical calculations based on the search results. Crunch's method of searching and displaying records is awkward compared to that of programs like Symphony that use data entry screens to simplify scanning and retrieving individual records. Searching a Crunch database, however, does not require setting up complex and sometimes confusing ranges, such as the criteria and output ranges needed for 1-2-3.

Crunch's sorting runs quickly and smoothly. A database can be sorted on one key field in ascending or descending order. I specified a database of 300 records, each composed of five fields. One field held text, and four held numbers (not formulas). Sorting the database took only 3 seconds, whereas 1-2-3 sorted the same 300-record database in 8 seconds.
**Review**

**A Touch of Class**

*Crunch* offers a number of classy special features. Up to six windows can be displayed and easily resized for compartmentalized views of spreadsheets. A zoom feature instantly enlarges a selected window to fill the screen. You can set spreadsheet labels to remain constantly in view as references during scrolling. Cells and ranges of cells can be named and used in easy-to-understand formulas. You might use cell names such as *Sales* and *Costs*, for example, to produce a formula like *Sales-Costs* instead of using less understandable cell references such as *B12-G55*. A spreadsheet can be displayed in a choice of fonts and type sizes, although you can’t mix different fonts on one spreadsheet.

Additional features let you hide confidential information from view, protect cells from accidental changes, display and print spreadsheets without grid lines, assign passwords to spreadsheets to prevent unauthorized use, and record up to 2½ pages of text as notes for each spreadsheet. Although *Crunch*’s note taker is not a full-fledged word processor, it lets you enter and edit text, and notes can be transferred to other word processors through the Clipboard.

You can avoid squeezing large spreadsheets into limited memory space, since *Crunch* enables you to link spreadsheets so that one provides another with information. A central spreadsheet, for example, with links to several other spreadsheets saved on disk, automatically updates by using information gathered from the donor spreadsheets. Since linking consolidates several spreadsheets, you don’t have to limit models to a size that fits the computer’s memory.

If you frequently use functions or formulas specific to your business, *Crunch* lets you create formulas that you name and store in the program directory. Once you store the formulas, you can apply them to a spreadsheet model by invoking a directory name, which eliminates the need to type the same formula repeatedly.

With such sophisticated features, *Crunch* would be an excellent choice as a spreadsheet program if it weren’t for the flawed scrolling ability. I recommend that until the problem is fixed, you request a demonstration of *Crunch* before buying.

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Computer novices and people who do not require large, complex spreadsheets will welcome *Crunch*’s ease of use. I appreciated the program’s simplicity when it came to creating charts and working with databases. Despite *Crunch* not meeting its multimillion-cell promise, it has excellent potential as an effective, easy-to-use program.

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How to find a Needleman in a haystack.
Before the modern age, battles began with great ceremony. Opposing armies deployed across from each other in formations so well ordered as to be geometric. Once positioned, the forces awaited the fanfare that signaled the commencement of battle.

On the battlefield of Macintosh integrated software the fanfare has sounded loudly, but conflict between the two major contenders is unlikely to follow. It’s as if the two would-be combatants marched onto the field only to discover battle lines so well drawn that actual conflict seemed unnecessary.

Both Jazz and Excel are designed for people who work with numbers—people, for example, who create and monitor departmental budgets or who calculate profits in relation to expenses. But Jazz and Excel have distinct identities. Both programs manipulate the same type of information, but each places a different emphasis on how the information is used. Excel is equipped for analyzing large and complex groups of numbers, while Jazz is the better tool if you want to share the significance of numbers with other people.

All for One or One for All?

At the root of the difference between Jazz and Excel are two philosophies of integration. Excel combines a spreadsheet, which can double as a database, with graphics. Jazz integrates five distinct applications: spreadsheet, database, graphics, word processing, and communications.

Critics of the Jazz approach say that when people work, they tend to focus their efforts on one basic task, such as working with numbers. They believe that providing several applications only dilutes a program’s effectiveness for the single task at hand.

Excel’s single-purpose design represents a reformed approach to integration by emphasizing the analysis of numeric information. Excel is a good choice if, for example, you’re a financial analyst who makes projections to investigate the impact of complex investment opportunities on profitability. Excel can handle large amounts of numeric information. The program has macros and user-definable functions to help automate a complex spreadsheet. The program also lets you create split windows to help you see how calculations in one portion of a large spreadsheet’s landscape affect numbers in a remote section.

Jazz, on the other hand, is designed for people who regularly share numbers and other data with business associates. Although it has fewer features for analyzing numbers than Excel, Jazz is a more powerful tool for creating reports.

Jazz lets you combine all the information you create with the program, including numbers, data, and charts, into a word processing document. Once you include information from another application, such as the spreadsheet, you can embellish the otherwise plain appearance of that information with many font and style options available to the word processor. The word processor also lets you see immediately the impact of any change to figures, data, and graphics from the perspective of the person reading the report.

Furthermore, the way Jazz lets you organize numbers and data and then show them in well-designed graphs and reports encourages you to be creative with the in-
formation you present. Say you’re creating a financial report that includes one graph showing quarterly earnings and another graph showing quarterly expenses. When you see the expenses graph in the word processing document, it strikes you that the bars are too short. You recall that this year’s expenses are considerably lower than last year’s as a result of a cost-cutting plan you implemented. So you decide to mention your achievement in the report and reinforce the point by creating a stacked-bar chart comparing both years’ expenses.

**Ease of Use**

You might suspect that with applications and features linked together under one software roof, integrated programs would be difficult to learn. Even though they are complex, both Jazz and Excel benefit from the Macintosh user interface. The two programs use menus, dialog boxes, and the mouse to minimize the amount of information you have to remember as you run the software. For example, Excel makes macros, an advanced feature, easy to use; you record a series of operations by choosing a command from a menu rather than programming from the keyboard. But just as the programs have different approaches to integration, they also differ in the way they create ease of use. Jazz reduces the amount of information you have to assimilate at once, whereas Excel emphasizes consistency between applications.

As a general rule, the features of integrated software become confusing when they present people with too many choices at once. When this happens, menus appear cluttered, and simple commands get lost among advanced commands. Jazz compartmentalizes applications so that you see only the menus and commands you need to run the application you’re using. For example, you don’t see communications commands when you use Jazz’s database. The compartmentalization of applications also lets you learn a single application at a time.

Excel approaches ease of use in a different way than Jazz. One reason for using an integrated application is the convenience of sharing data and commands. Some people believe that integrated programs should maintain the same commands and menus for all applications. Excel provides only two on-screen formats—one for the graphics application and one for the spreadsheet that does double duty as a grid for the database. The program is easy to use because you don’t have to become familiar with three applications and sets of menus. Of course, Excel joins together fewer applications than Jazz and consequently lacks Jazz’s built-in word processing and communications capabilities.

Both programs go a long way to make complex software easy to use. But because Jazz provides fewer menus and commands on each screen than Excel does, it is easier to learn. In fact, Jazz would set the standard for ease of use in the arena of complex integrated programs except for one problem. To take advantage of the program’s convenience on a 512K Mac requires an awareness of memory management that contradicts the program’s fluidity. Understanding the way the program uses memory is something that should not be expected of beginners.

**The Crunch Alternative**

Jazz and Excel provide a pair of complementary alternatives for Macintosh owners, but the field of choices is even richer. People who chiefly analyze numbers and want to save a little money may want to investigate a third integrated spreadsheet called Crunch. Crunch provides a compromise between Jazz’s ease of use and Excel’s number-crunching capabilities. Unlike Jazz, Crunch’s first release has split windows and user-definable functions but lacks Excel’s macros. Many people will find that Crunch’s icons for menu functions make the program easy to use. However, Crunch has annoying scrolling habits and the most limited graphics capability of the three spreadsheets. It has the fewest chart types, patterns, and fonts but may suffice for people who require simple graphics. Crunch’s most serious limitation is that it can’t share data files with other spreadsheet programs. This limitation prevents you from updating spreadsheets you’ve already created with another program, such as Multiplan.

The best reason to choose Crunch over Jazz or Excel is that the program leaves free a reasonable amount of storage space on a Macintosh with floppy disk drives. Jazz and Excel use so much disk space that they monopolize a single floppy disk. This means that the System Folder must be stored on a second disk, usurping most of the space used for documents. As a result, both Jazz and Excel need a hard disk to

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**Hands On**

At the root of the difference between Jazz and Excel are two philosophies of integration.
meet most people's storage requirements. In contrast, Crunch fits on a single disk with the System Folder; albeit with no room for desk accessories, leaving a second floppy disk entirely free for document storage.

**Trials and Comparisons**

Before deciding on the basis of design alone, check whether the program you're leaning toward has the features you require (see "Vital Statistics" on the following pages). Taking features at face value, however, can be misleading. For example, although the figure for maximum spreadsheet size indicates that all three programs can create huge spreadsheets, Macintosh systems currently available can't approach the maximums. To provide a more realistic comparison, I created a model spreadsheet with three columns of constant figures and two columns of formulas that average and sum the three columns of constants. I used the model to test the memory capacity of each program with the following results: Excel, 15,000 cells; Crunch, 7000 cells; and Jazz, 5700 cells (see Figure 1).

The same model tested the relative speed that the three programs took to complete a sample calculation. I changed a constant that triggered the recalculation of three columns of cells in a 1500-cell spreadsheet. Jazz and Crunch took 3 seconds to complete the calculations, and Excel took 4 seconds (see Figure 2). In Excel's case the timing comparison is not a completely fair test because I was working with a prerelease copy of the program. The release version of Excel should be at least as fast as the other two programs.

Also, as each program approaches the Mac's memory limits, performance tends to slow. However, because of the different way each program uses memory, performance problems depend on the program. For example, Excel works comfortably within the Mac's 512K of memory, but Jazz manages memory in a way that makes 512K barely adequate.

With the release of the three programs, the Macintosh has been blessed with powerful integrated software to fill out the application repertoire. These spreadsheets offer ease of use and power unprecedented on any personal computer. You must first decide whether an integrated program is right for you. But if you can benefit from the convenience and power of joining different tools in a single program, Jazz, Excel, and Crunch create powerful new possibilities for tailoring computers to your work.

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Adrian Mello is an Assistant Editor of Macworld.
**Vital Statistics**

A comparison of the features and capabilities of Jazz, Crunch, and Excel reveals the overall strengths and weaknesses of the programs. Based on the table, Excel offers more number-crunching power than its competitors. Jazz appears to be best at creating reports and sharing data, while Crunch is less powerful but easier to use than Excel. However, the vital statistics don't always provide the full picture—see "The Spreadsheet Choice" for an in-depth comparison.

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<th>Excel</th>
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<td>Financial</td>
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<td>String manipulation</td>
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<tr>
<td>Other</td>
<td>12</td>
<td>11</td>
<td>13</td>
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<tr>
<td><strong>Total predefined functions</strong></td>
<td>96</td>
<td>74</td>
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<td>User-definable functions</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Perform arithmetic on dates</td>
<td>yes</td>
<td>yes</td>
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<td>Cell naming</td>
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<td>Macros</td>
<td>no</td>
<td>no</td>
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<td>Macintosh fonts</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Mix fonts within worksheet</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Mix styles within worksheet</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Ability to split windows</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Graphics Features</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Chart types available</td>
<td>10</td>
<td>4</td>
<td>42</td>
</tr>
<tr>
<td>Graphs linked to worksheets</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Manual scaling permitted</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Combine chart styles</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<td>Patterns available</td>
<td>24</td>
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<td>15</td>
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<tr>
<td>Fonts available</td>
<td>any</td>
<td>1</td>
<td>any</td>
</tr>
<tr>
<td>Ability to create arrows</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
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<td><strong>Database Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum number of records</td>
<td>8000(^2)</td>
<td>9999</td>
<td>16,384</td>
</tr>
<tr>
<td>Maximum field length (characters)</td>
<td>254</td>
<td>125</td>
<td>255</td>
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<tr>
<td>Maximum number of fields</td>
<td>100(^2)</td>
<td>250</td>
<td>256</td>
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<tr>
<td>Number of sorting levels</td>
<td>3</td>
<td>1</td>
<td>3</td>
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<td>Form design capability</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
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<td>Entry checking</td>
<td>yes</td>
<td>no</td>
<td>no</td>
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<tr>
<td>Computed fields</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Preset field contents(^3)</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>Jazz</td>
<td>Crunch</td>
<td>Excel</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Word Processing Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum document length (single-spaced)</td>
<td>17-20^4 pages</td>
<td>2½ pages</td>
<td>n/a</td>
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<tr>
<td>Search and replace</td>
<td>yes</td>
<td>no</td>
<td>n/a</td>
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<tr>
<td>Footers and footers</td>
<td>yes</td>
<td>no</td>
<td>n/a</td>
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<td>Alterable typewriter styles</td>
<td>yes</td>
<td>no</td>
<td>n/a</td>
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<tr>
<td>Include graphics in document</td>
<td>yes</td>
<td>no</td>
<td>n/a</td>
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<tr>
<td><strong>Data Interchange Features</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>We as Lotus 1-2-3 document (IBM PC)</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Pen Lotus 1-2-3 documents (IBM PC)</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>We as Jazz document</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Pen Jazz documents</td>
<td>yes</td>
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<td>We as Microsoft SYLK document</td>
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<tr>
<td>Pen SYLK documents</td>
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</tr>
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<td>We as Macintosh Multiplan document</td>
<td>no</td>
<td>no</td>
<td>yes</td>
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<td>Pen Multiplan documents</td>
<td>no</td>
<td>no</td>
<td>yes</td>
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<tr>
<td><strong>Communications</strong></td>
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<tr>
<td>Terminal emulation</td>
<td>yes</td>
<td>n/a</td>
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<tr>
<td>File conversion</td>
<td>yes</td>
<td>n/a</td>
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<tr>
<td>Modem</td>
<td>yes</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>No-dial</td>
<td>yes</td>
<td>n/a</td>
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</tr>
<tr>
<td><strong>Printing</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Desktop printing (Imagewriter)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>5-inch Imagewriter</td>
<td>yes</td>
<td>yes</td>
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<td>UserWriter</td>
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<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Convenience Features</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Change column widths by dragging</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Undo command</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Screen help</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Number of windows opened at once</td>
<td>8</td>
<td>6</td>
<td>unlimited</td>
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<tr>
<td>Window menu for switching between open documents</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Tools for common commands</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Switcher compatible</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

1. The listed figures represent each program's actual limits. The maximum size of a worksheet depends on its design and on how much data from other portions of the program is in memory.

2. Because Jazz stores all information in memory, the actual number of records and fields permitted varies depending on the size of the fields and on the amount of memory used by other open documents.

3. While Crunch and Excel provide no specific field preset feature, you can obtain a field preset by typing the information in the appropriate field of the first record and using the Fill Down command to copy the information to subsequent records.

4. Because an entire document is stored in memory, its maximum length depends on the amount of memory used by other active documents.

5. The actual number of windows you can open at once depends on available memory.

6. You can load both Jazz and Crunch into the Switcher, but because of memory limits imposed by the programs, you cannot work with another application.
Macworld: Jazz seems to depart from the approach that Lotus took with 1-2-3. How did Jazz evolve?

Kapor: We actually put together the effort to do Jazz in October 1983, before the Macintosh came out. We were impressed with the Mac and recognized two things right away. First, a successful business program would not work at 128K; we knew it just wouldn't fit. We understood that Apple would probably do a 512K Mac when the chips became available. So we weren't under time pressure; there was no machine to run the program yet.

Second, for Jazz to be what we wanted it to be, it would have to be completely written around the Macintosh user interface so that anyone who knows how to use MacPaint already knows how to use a lot of Jazz.

It didn't make sense to recreate a Symphony for the Mac except for a few concepts, such as the choice of the five functions for the integrated package. We also borrowed practically all of the worksheet internals, how the memory is organized in cells, and the original worksheet specification. That's it. Everything else is new, especially HotView, which is how Jazz shares data between functions.

Jazz is a much more general-purpose tool than, say, 1-2-3, which appeals to people who work with numbers because of the quality of its spreadsheet and the way it increases productivity. We haven't targeted Jazz at power spreadsheet users who are heavily involved with 1-2-3 and Symphony. There are no macros in Jazz, for one thing. For another, the screen update on the Mac doesn't have the instantaneous zippiness of the IBM PC AT, though it's more than adequate for normal use. And there is no hard disk from Apple yet, though there will be shortly. So Jazz just doesn't have a power-user configuration.

But there are different kinds of power users. The vast majority of people will find Jazz more than adequate, and they would only be confused if they were

continued
Soon after the unexpected announcement of Microsoft Corporation's "multi-functional" Excel, Macworld Publisher David Bunnell and Editor Kearney Rietmann had lunch with William H. Gates, chairman and cofounder of Microsoft. Excel represents a turning point of sorts for the Seattle-based company, which has distinguished itself as a developer and purveyor of stand-alone programs (see "The Excel Numbers Game" in this issue).

As a Seattle high school student, Bill Gates teamed up with Paul Allen to start a company that used computers to analyze traffic patterns. Years later, while Gates was attempting to complete a Harvard education, he and Allen developed the first BASIC for personal computers and founded Microsoft to develop and market personal computer software.

Over lunch Gates was relaxed and informal, as freely associative in his humor as he was analytical about Microsoft's programs compared to others. In many ways he did not seem at all like the head of the second largest personal computer software company, using expressions like "Gimme a break" to punctuate a discussion of the vagaries of the software marketplace and a disclaiming, "No, I was just kidding—don't print that" after making a hyperbolic aside about certain software entreprenuers. He deemed Steve Jobs's forecast of war clouds between Lotus and Microsoft "totally false," although he ventured, as both a non sequitur and an apology, that he talked longer than Mitch Kapor because Microsoft has more products.

Macworld: What was your goal when you began work on Excel?

Gates: We've been working on this thing for two years now. We set out to set the state of the art in numbers tools, which really meant taking the standard set by 1-2-3 on the IBM PC and going one step beyond that. So Excel has incredible depth and amazing spreadsheet features, including the way it recalculates a sheet. Excel doesn't recalculate all the cells. The way it lets you work with and consolidate multiple sheets is totally different, and it offers simple things, like the ability to make a cell bold or italic, that Jazz doesn't.

Macworld: With features like a macro capability and the ability to link several spreadsheets, is Excel meant for the power spreadsheet user?

Gates: Yes, but power makes it sound like you have to pay a price to get those features. Being able to make a cell bold or to put sales data on one sheet and cost data on another sheet—those features don't make Excel a power sheet; they're just useful to people who get lost using large spreadsheets. People don't know where they put their data; their data crowds into each other. I think spreadsheets are super intimidating, so I'd say that anybody who works with numbers would use Excel—not just a power user.

In fact, the main thing people who are serious about working with numbers will have to decide is, do they buy an IBM PC with 1-2-3, or do they say, hey—the Mac with Excel and the LaserWriter is a generation beyond—and make that choice.

I know people who have been very frustrated using 1-2-3. There's this phenomenon in the computer market that if something's popular enough, everyone forgets it's hard to use. Because it's so damned popular, and there're so many books about it, and so many people use it, and you're stupid if you don't learn it, and everyone thinks it's going to be around—so why talk about the fact that it's hard to use? It's like traffic jams or something.
told that it’s not for power users. No product is a panacea. No product solves everybody’s problems 100 percent. With jazz we are trying to reach people in business, not just big business, who have general productivity needs and want a powerful program that is easy to learn and use.

**Macworld:** Is jazz meant for beginners then, for those who aren’t familiar with spreadsheets?

Kapor: It’s for beginners, and it’s for other people as well. Jazz isn’t an underpowered product; it has substantial functionality. It’s far more sophisticated than most people would ever want it to be. I think people will start using it, like it, and keep using it. Jazz is just such a pleasure to use.

**Macworld:** It doesn’t offer the pleasures of a macro capability, though.

Kapor: Macros in jazz would only scare people. And like I said, we’ve learned not to try to be everything to everybody with our programs, not to put in features that aren’t expressly for our target population—features that would just wind up confusing everybody—which is not to say we could not do a power user’s spreadsheet with macros based on jazz technology. We certainly could, and the Macintosh could certainly handle it.

**Macworld:** Jazz integrates spreadsheet, database, graphics, word processing, and communications functions. What is the rationale behind this approach to integration?

Kapor: Our view of the universe is that there’s clearly a need for a single product that you can stay inside of, that lets you do word processing, if that’s your primary application, but gives you a spreadsheet if you need it and a database if you want that. The integration is convenient.

Let’s say you’re using a spreadsheet to do a report. You can include the spreadsheet in your document with the HotView command, and if you go back and change the spreadsheet, your report updates itself.

**Jazz** will probably distinguish itself as the product of choice because of its five functions, which are the most common business tasks. Even people who may not need all five functions will probably buy jazz because the functions they do need offer so much that they get enough value out of the whole package. But if at the far extreme someone uses only one function, say a writer who’s writing a book and doesn’t use the computer for anything else, then quite possibly there’s an argument to be made for buying another product. We’re really targeting jazz at the businessperson or professional, from the first-time user on up, who needs a product that is extremely straightforward but isn’t short on power.

**Macworld:** What do you think of combining several stand-alone applications, such as Microsoft Multiplan, Chart, and Word, with the Switcher as an alternative to jazz?

Kapor: For capturing files directly from communications into word processing, for example, the Switcher is great, but you have to go through the Clipboard to move data from one application to another. The Clipboard is good at what it does, but there are other kinds of meaningful interapplication integration such as the HotView feature. We really think we have that integration right, which can make some difference to a lot of people. Plus, the Switcher has its limitations. You probably run out of memory faster than you would with jazz, but—fine—I think the Switcher will find a place.

**Macworld:** Many people have been waiting for the arrival of jazz to establish the Macintosh in Fortune 1000 companies. Do you think the Mac will succeed in business?

Kapor: I certainly hope so. But it’s up to more than Lotus to make that happen. It’s up to Apple Computer, Apple dealers, and the whole software community. The Mac really has the potential for business, and jazz is one of the first in the crop of software designed explicitly for the Fortune 1000 companies.

The software, the AppleTalk network, and the LaserWriter have all come out just this year, so the fair test of the Mac in business is this year and next. But there is more to business and business computing than the Fortune 1000, in which Lotus is doing extremely well, of course. The vast middle market of smaller firms is not being outstandingly well served in all cases. We see the greatest opportunity for Apple and others where IBM doesn’t have a lock.

**Macworld:** In what directions do you plan to take jazz in the future?

Kapor: We see jazz as the first in a family of products, but it’s too soon to know where we might go in terms of functionality and architecture. We have firm plans at this point to carry on jazz in new projects, but first we’re taking a vacation.
Macworld: What was the philosophy behind the decision not to make Excel an all-in-one program as Lotus did with Jazz?

Gates: Lotus is a great software company that we cooperate with in many ways. Lotus and Microsoft—surprisingly—have taken different philosophies of integration on the Mac. We both believe in the graphic user interface, and we each put a real investment into developing a great product for the Macintosh—but it just so happens we think they took the wrong philosophy and we took the right one. We’ll see how that works out in the end.

When we announced Excel, we announced our entire philosophy for applications software. We said we’d go for depth products that really do the job the full way. We believe that we should offer such a product in each of three areas: numbers, words, and data. On the Mac, Microsoft’s products are Excel, Word, and File. We should also offer the operating environment, whether it be Windows or the Mac, to tie those products together through simultaneous execution, data interchange, and a common user interface. In addition to giving you depth in the individual areas, part of our philosophy is to let you buy the pieces when you want them, or someone else’s piece for one of the other functions if you want it.

Although 1-2-3 may have been developed under the rallying cry of integration, in fact the reason for its incredible success is not that integrating anything with anything else is a good idea but that 1-2-3 appropriately integrates the functions that people who work with numbers want to have, namely charts and an on-sheet database.

Macworld: One of Jazz’s most talked-about features is HotView, the ability to make a change in one document and have that change reflected in another document. Does Excel have a similar feature?

Gates: You can create formulas in Excel that dynamically link all its numbers activities, like between spreadsheets, between databases, between database and spreadsheet, and between chart and spreadsheet—as long as you’re working with numbers.

But if you’re writing a memo and you’re switching back and forth between document and spreadsheet, then using the Switcher with Excel and Word would be a little more cumbersome than HotView. But in fact you’d do it differently. You’d do your numbers analysis and say, okay, I want to put it in a memo. In Excel you have to cut and paste your numbers analysis into your memo, which we don’t think is a barrier at all. Jazz has hot links that let you edit the spreadsheet, and immediately the document changes.

But if you want to change a font or anything in Jazz, then you’re in exactly the same situation as with a Word document. You have to break the link and edit the text. Then if you want to update the numbers, you have to get the numbers again and paste them in, like you would with Excel and the Switcher.

When somebody integrates functions so you can make this bold, make that italic, change the numbers, and have your changes carried over to another application—that’s very impressive. Some tough technical issues get in the way of having that level of integration. That’s one of the toughest problems of integrated programming, which there’ll be some solutions to.

Macworld: How will the availability of more memory on the Macintosh affect the future direction of Excel?

Gates: Memory is so cheap nowadays that there’s no reason for Apple and others not to offer more than 512K in the Mac. Current versions of all Mac applications could take advantage of as many megabytes as you install in the machine because the 68000 architecture has a clean, large linear address space.

Macworld: The business world has been anxiously awaiting the arrival of so-called serious business software for the Mac. To what extent do you think Excel and Jazz will help the Macintosh gain popularity among the Fortune 1000?

Gates: The Mac has been viewed as a wimp’s machine. It’s easy to use, so people immediately get the idea that there must be some trade-offs. We’ve got to break this false impression that this machine has some lack of power, that ease of use equals simple. And Excel will go further to break that than anything.

I think the Mac will have a significant presence as the number-two machine in the Fortune 1000, no question. But that’s really something. The graphic user interface is very compelling. The only reason I don’t sit here and expound—hey, it’ll really be dominant—is that windows and graphics are coming into the fore on the IBM PC. As a graphic-interface generation of applications is developed for the PC, then its position in business will remain dominant because while the PC will never be quite as good a graphics performer as the Mac, there are benefits from its upward compatibility. Over time Apple will have to continue to do other innovative things to capture a very large share of that marketplace.
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Playing It by Eye

As I used SongPainter, I was reminded of synesthesia, a psychological phenomenon involving a perceptual crossover, in which stimulation of one sense produces experiences in another. The most common example of synesthesia is the phenomenon of "color hearing," in which particular musical notes consistently evoke the experience of particular colors. In one study, a subject reported the sensation of red on hearing the note C, violet on hearing D, pink on hearing E, and blue on hearing G, with identical results when the experiment was repeated seven years later.

One wonders if the programmers at Starcor, the company that created SongPainter, were thinking in terms of synesthesia when they developed this program. While it does not translate notes into colors, SongPainter uses visual images in the form of patterns and icons to represent tonal frequencies and waveforms. The note B is represented by a polka-dot pattern, the note A by checks, the note G by vertical stripes, and so on (see "Musical Windows"). In addition a note's waveform, or timbre—"the quality that gives each instrument its unique sound"—is represented graphically by a musical instrument group, such as strings or woodwinds. Each group is broken down into individual instruments to represent a specific octave range for the waveform. The top left window in the figure "Musical Windows," for example, shows four of the eight instrument groups and the four tonal ranges within each group. The other four groups appear when you click the More Instruments box.

When you finally get around to placing a note in the Song window, it bears no resemblance to standard musical notation; a printout of your composition would be about as useful as a novel written in Egyptian hieroglyphics.

SongPainter has other limitations as well. When you play back a musical selection, for example, every feature except the stop button is disabled. That means you can't pull down any menus, scroll through the Song window, or even turn the repeat function on or off. And the stop button doesn't just stop the music; it also rewinds the selection, so that when you restart, the music starts again from the beginning. Thus SongPainter doesn't let you stop the music and restart it where you left off, a useful feature in any musical playback device, be it tape deck, turntable, or computer.

A Positive Note

Nevertheless, SongPainter has a number of redeeming features. One of those is its collection of ready-made chords, which you can enter into the Song window instead of single tones. The chords are all there: the major and minor chords, the diminished and augmented chords,
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512/454-5004
List price: $59.95

Musical Windows

SongPainte r's main screen shows the Song window on the right. The Voice window is at top left, and the loudness, duration, and playback controls at bottom left. The center window shows the range of tones, with each tone's corresponding pattern.

InstantHelp

SongPainte r's help screens make it easy to learn about the software without reading the manual. Here the help screen sounds off about the Voice window.

and all the seventh chords. In addition SongPainte r has 12 built-in scales for playback—a useful educational device—or for entry into the Song window. Finally, the program's InstantHelp feature can be useful when you are trying to find your way through the maze of instruments, tonal ranges, and windows. When you select Help On from the Help menu, the paintbrush pointer changes into a question mark, and a magic wand of information. Clicking on any of SongPainte r's windows, menus, or menu items with the question mark produces a screenful of information about the queried item, an effective way of finding out about the software without reading the manual (see "InstantHelp").

SongPainte r's sound quality is as good as that of any other Macintosh music processor, and its range of features is adequate for most applications; for example, you can create your own waveforms and modify each note's rate of onset and offset. However, its user interface could have been designed to provide greater convenience. As it stands, the program is cumbersome. And if SongPainte r were a true song painter, the Song window would scroll in sync with the music, and the individual notes would flash or highlight as they played, making it possible to "see" the music as you hear it.—Nicholas Layoff
The Sounds of Battle

Countless explosions and the sound of gunfire ring out as a lone defender, armed with only a small-caliber antiaircraft gun and a mortar, valiantly attempts to stave off an onslaught of clattering helicopters. Wave after wave of helicopters approach, disgorging a payload of paratroopers who land on the desert plain below. There they mass in preparation for an assault against the gunner’s enclave. The drone of military cargo planes signals the imminent airdrop of a tank. As the tank rumbles nearer, the earsplitting roar of a jet fighter suddenly sears the air. A guided missile inexorably zeros in on the gunner’s position.

Shortly after Macworld’s editors received a new arcade game called Airborne!, visitors to the office must have been puzzled by the din. Airborne! incorporates digitized sound effects to make an otherwise playable but mundane game truly fascinating. The game begins with a brief rendition of Wagner’s “Ride of the Valkyries,” which was probably inspired by the use of the theme during the helicopter assault in Francis Ford Coppola’s movie Apocalypse Now. The introductory theme plays for 8 seconds on a 128K Mac and 20 seconds on a 512K Mac. When you hear Wagner’s rousing music, it’s hard to believe the sound is coming from the Mac.

Survival

The object of the game is to survive while scoring as many points as possible by destroying enemy aircraft and troops (see “Air Assault”). You hold off enemy aircraft and paratroopers by firing an antiaircraft gun and a mortar. You control the weapons’ trajectory and rate of fire with the mouse and switch between weapons by pressing the space bar. Helicopters and cargo planes don’t attack directly but drop paratroopers and tanks. Once enough ground troops land, they attack, at which point your only defense is the mortar. It’s best to stave off a ground attack as long as possible by destroying the enemy in the air.

Other than the eventual threat of a ground assault, the greatest danger to continued play is the jet fighter, which crosses the screen so quickly that it’s difficult to shoot down. The fighter launches an air-to-ground missile that never misses. Here’s a tip: jets enter the screen in a pattern; by learning the pattern you can predict the jet’s altitude and set up a field of fire to destroy each jet as it enters the screen.

Effective Sound

As military shoot-em-up games go, Airborne! is nicely balanced between playability and challenge. The graphics are adequate though uninspiring. The game’s chief interest comes from the digitized sound effects, which include helicopters, air transports, tanks, and jets. It’s amazing how much texture a few sounds can add to a game. The first time I heard the jet, I was petrified. When I first got the game, I often found myself playing it just to hear the sound effects. In fact, the worst thing about Airborne! is the potential embarrassment you may suffer when you can’t stop yourself from playing the game at the office.

To create the sound effects, Airborne’s designers recorded sounds of planes, tanks, helicopters, and explosions with a cassette tape recorder. Then they used a VAX minicomputer to transform the recorded sounds into a digital format that the Mac could interpret. They had difficulty getting all the sounds on disk because digitized sound requires large portions of disk space. The jet roar alone takes up 17K, and the Wagner theme requires a whopping 156K.

Another Opinion

Some young readers will undoubtedly suspect my qualifications as a game reviewer due to my adult status, so I decided
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Macware Reviews

to get a couple of expert opinions. I asked 11-year-old Matthew Rhoades and 10-year-old Andrew Rhoades to play the game and tell me what they thought. They reported: "We liked the sound in the introduction, which plays like a full orchestration, not just beeps. We also liked being able to erase high scores, which we did several times [as the top ten scores get higher, the game becomes more difficult].

"However, Airborne! is for hard-core game players who have the time and patience to play for a long time. With only one gunner the game may last only a short time, which is frustrating. We were amused by the paratrooper landing in the cactus, but the game was too difficult to play, even at the beginner’s level."

It appears that the experts and I disagree. I found the game easy to play but challenging enough to hold my interest. At any rate, believe who you will, Airborne! is a fun game worth investigating for the sound effects alone.—Adrian Mello

Airborne!
Silicon Beach Software
11212 Dalby Pl. #201
San Diego, CA 92126
619/695-6956
List price: $34.95

An Ever-Present Spreadsheet

ClickOn Worksheet is a spreadsheet and charting desk accessory that you can integrate with almost any Macintosh application. Because the spreadsheet is a desk accessory, you can use it while you work on another document, whether it’s text, a picture, a database, or an outline. There’s no need to close a document, quit an application, return to the Finder, swap disks, and start a separate spreadsheet application. You simply select ClickOn Worksheet from a program’s Apple menu, and the spreadsheet immediately appears.

The standard spreadsheet window shows a formula bar, 8 of the 20 available columns, and 20 of the 50 available rows. You can change the width of any column by dragging its left boundary line. A size box in the lower-right corner allows you to re-

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Now there's a Mouse that flies.

Introducing the View Control System.™
Ultrasonic technology that moves your cursor at the speed of sight.
Your relationship with your Mac is about to change. Dramatically. Because now the View Control System (or VCS) from Personics™ gives you a powerful new way to control the cursor. Fast. Direct. Intuitive. It's the best thing since the Mouse. In fact, it's better.

**View Control**

The VCS uses a remarkable new technology for moving the cursor where you look on the screen. A lightweight headset translates subtle, natural head rotation into cursor movement commands. Look to the right and the cursor moves right. Look down and to the left and the cursor moves accordingly. Zip from corner to corner, or point to a tiny target with ease, even an individual pixel!

**Look Ma, Both Hands!**

Now you don't have to take your hand off the keyboard to reach for the Mouse. The VCS features a unique button pad which clips on your keyboard just below the space bar. One button activates the headset. Use the second button for clicking and dragging. The VCS gives you instant cursor control without forcing your hands off the home keys. No more reach, grab, roll, click, return.

**Faster than a Speeding Mouse**

The VCS is accurate. Just like a mouse. But since you can look much faster than you can reach and roll, it gives you far greater speed. And because your hands stay on the keyboard you maintain continuity and concentration. For keystroke-intensive applications like word processing and spreadsheet, expect a real boost in productivity.

**Reclaim Your Desktop**

The VCS flies above the ordinary mouse, leaving more space on your desktop. Now you have room for books, papers and your favorite coffee cup. Of course, if you want your mouse within reach, there's no problem. You can connect your mouse and VCS to the Mac at the same time and use them interchangeably.

**State-of-the-art Technology**

Personics has developed a proprietary ultrasonic technology for the VCS.* The headset receives an ultrasonic signal transmitted from the VCS Control Unit which sits on top of the Mac. Changes in the rotation and angle of the head are tracked and electronically translated into quadrature signals just like those produced by the Mouse. And the VCS works with any 128K or 512K Mac and off-the-shelf software. Plug it in and you're ready to go. No hardware or software modifications are required.

*Patent Pending. IBM PC and Apple II versions available soon.

**Get Acquainted in 15 Minutes**

The VCS is easy to use. Learning is fun and, before long, view control becomes almost second nature. You'll simply look and click. The VCS headset is comfortable, lightweight and adjustable. It accommodates eyeglasses and won't muss up your hair. And since the VCS headset doesn't rest on your ears, you're free to talk on the phone.

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The VCS is available right now, directly from Personics. Call us toll free. A member of our sales staff will be happy to answer your questions and provide additional information. If you're ready to order, please have your major credit card at hand when you call. All orders are processed immediately and shipped within 24 hours. And we back the VCS with a full one year limited warranty.

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size the window. The window has no scroll bars and can't be split. Instead, you bring outlying sections of the spreadsheet into view by "folding" a part that's out of view over a section that's in view. Folding a spreadsheet may sound odd if you're accustomed to using scroll bars, but it works effectively.

**Formulas and Functions**

So-called "power users," who create mammoth, complex spreadsheets, will find ClickOn Worksheet lean on features, but it has enough meat for an average spreadsheet. For example, you can put a cell reference into a formula by typing or by pointing at the cell and clicking. Either way, you can make the cell references relative or absolute, but you can't name cells and refer to them by name.

In addition to cell references, formulas can contain the usual arithmetic and comparison operators plus a surprisingly rich set of built-in functions. You can choose from seven financial, three depreciation, twelve mathematical and statistical, two value-not-available, one conditional, one table-lookup, and two date-aging functions.

ClickOn Worksheet is somewhat sparsely endowed with cell-formatting options. Text is always aligned at the left edge of a cell, and only what fits between the cell walls appears on the spreadsheet. Numbers are always aligned at the right edge of a cell. Values of 1000 and over are punctuated with commas; this feature cannot be suppressed, say for years calculated from formulas. However, a value too large for its cell always appears in scientific notation, without commas. All numbers observe those rules, and you can impose additional format rules, such as dollars, dollars and cents, or percent, on any cell. There is no way to specify a number of decimal places or to eliminate them altogether.

Cell contents can be duplicated, or replicated, to other cells with the Paste command. Relative cell references in replicated formulas are adjusted automatically. This ingenious approach to fill and replicate can cause you to fill more or fewer cells than you intended if done improperly. The manual shows how to do it right but doesn't mention what can go wrong.

**Graphics**

ClickOn Worksheet can draw a bar graph, a stacked bar graph, a line graph, or a pie chart using data from the spreadsheet (see "Apple Menu Pie"). Up to four series of values can appear on one graph. A pie chart handles just one series. You can select cells to use as labels on a graph's horizontal axis or as a legend for a pie chart or a multiple-series graph. The graphs look decent, but the ClickOn Worksheet has no provision for customizing or editing them.

Cutting and pasting to and from other documents via the Clipboard works, with some limitations. The commas in numbers make the numbers look like text to applications such as Microsoft Chart, rendering them virtually useless. However, the ability to compute a table or draw a graph for a report without leaving a word processor is invaluable. Unless you print a screen with Shift-4, spreadsheets and graphs must be pasted into word processing or other documents for printing.

**Apple Menu Pie**

ClickOn Worksheet lets you display spreadsheet calculations as bar graphs, line graphs, or pie charts.
Introducing Crunch.
It has all the features that every spreadsheet user could use. On a computer that anybody can use.

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If you can find all this in any other spreadsheet that retails for just $295; more power to you.

See your local Paladin dealer for your free Crunch trial size disk.

* Suggested retail. Macros capability contained in Crunch version 1.5. Crunch version 1.0 purchasers can obtain a free upgrade by sending in their registration card.
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Let's get right to the point: the computer for the rest of us can bring out the best in us. All it takes is your Mac, your imagination, and Macworld as your guide. And, of course, the tip of your finger. Experts have called the Macintosh the only "whole-brain" computer. So here's a chance for you to use your entire cerebral creativity with push-button ease.

With more than $20,000 being awarded to winners of the Macworld Art Contest for your Macintosh graphics published in this magazine, you could profit considerably from your subscription to Macworld.

Which brings us to the next point. Right now, unleash your fingertips and remove the post-paid card facing this page. Complete. Mail. Compute! Let your fingers do the talking.
DATA-PAK SOFTWARE SUPRIZES INDUSTRY WITH LOW PRICED QUALITY SOFTWARE SUCCESS

LOS ANGELES: GRASS ROOTS END USER POPULARITY DEEMED REASON FOR SUCCESS OF "SLEEPER" IN THE SOFTWARE MARKETPLACE.

The term “sleeper” is usually used in the motion picture industry to describe a box office success in spite of a small advertising budget due to its grass roots popularity and word of mouth advertising.

The word “sleeper” was also chosen to describe DataPak Software’s new product “My Office” because it almost takes the Macintosh concept to the edge of calling it a motion picture.

One paragraph in an article published by “ICON REVIEW” described it in this way:

"The clever animation of the file drawers as they open and display the folders within is the most highly developed desktop metaphor we’ve seen anywhere..."

The review goes on to say more about “My Office”’s simplicity of operation, how it wouldn’t intimidate your secretary or grandmother, and describes it as “the office information management solution.”

But one review does not make a winner. It takes product strength and the popularity that results when end-users have booted it up, used it, tested it, gone on “bug” hunts, and have come away with sincere admiration for the software which they then tell others about.

This results in testimonials like this one from the director of “Micro Age Companion”:

"My Office packs quite a bit of power and versatility into the simple desktop environment. It is very intuitive and is deceptive in its hidden power."

Focusing that comes recognition from MUGS (Mac Users Group) where My Office has been chosen as “Best Software Program of the Year” by a 1,000 member “MUG”, headquartered in Oregon.

Its president, Jerry Koszut, states “It’s the one program that does everything for everybody up to and including the small business.”

Koszut has also recommended “My Office” and its automatic math calculation capability combined with clip art spreadsheets to many of the members instead of “JAZZ”.

According to Koszut, unless an individual needs heavy accounting capability, they would lose too much by choosing another program.

The two biggest barriers which DataPak had to overcome in its underfinanced marketing campaign was the Mac public’s apprehension toward “another software package” and, strangely enough, the low price.

“My Office” was initially offered to the public at an introductory price of only $79.95 and was then raised to $129.95. But even at $129.95 “My Office” is priced far below its technically inferior competition.

The effect of this low price is typified in this testimonial from user “Tom Larson” from Fresno, California:

"I almost didn’t buy “My Office” because I thought the price was too low for a program that would do all the things I wanted to do. “My Office” does everything all my other programs combined can’t do."

Even with all the end-user talk about wanting low cost, quality software, it took the tough technical quality of “My Office” coupled with a tough marketing strategy which consisted of an unconditional inspection guarantee to get them over the last hurdle.

I don’t think many software manufacturers would be willing to put their products to that kind of test, but DataPak’s attitude can be seen in some of their promotional literature, where they state:

"You wouldn’t buy a car without a test drive — so why would you want to buy software that way?"

For those of you who still feel you’re not quite ready to jump in for that test-drive just yet, perhaps the old Chinese saying about one picture...or should I say..."one dump is worth a thousand words?" is true, and I suggest that you request DataPak to send you their free catalog containing 40 screen dumps which illustrate what “My Office” and its new “clip art” companion product “CompuForm” can do.

To get the catalog and receive more information on DataPak’s no risk inspection guarantee, simply call (818) 905-6419 or circle the bingo card number listed below.

You can’t be disappointed!

Macware Reviews

Make Sure There’s Room

ClickOn Worksheet’s documentation is good overall. No on-screen help is available, but the well-written manual explains procedures and features clearly and concisely. The manual also covers the 12 sample spreadsheets included on the disk. An installation program adds the 35K ClickOn Worksheet program to your System files.

Before you buy this desk accessory, make sure the application disks on which you want to use the spreadsheet have enough space available. A few programs, such as The Home Accountant, simply don’t have enough room for ClickOn Worksheet. Others, such as Microsoft Word, require considerable juggling to use with the worksheet installed.

ClickOn Worksheet works on both 512K and 128K Macs. However, being an unusually large desk accessory, it may run out of memory while you’re using it on a 128K Mac.

ClickOn Worksheet is easy to use and accurate; it has enough features to handle average spreadsheets and simple graphing. If you can live with restricted cell formatting and your disks have 35K to spare, this desk accessory is worth adding to your Apple menu.—Lon Poole

ClickOn Worksheet
T/Maker Graphics
2115 Landings Dr.
Mountain View, CA 94043
415/962-0195
List price: $79.95

Accounting Gets Personal

“How am I doing?” is the well-known cry of New York’s mayor Ed Koch. That same question should be asked by anyone who wants a good picture of his or her finances. Softsync’s Personal Accountant is an excellent program that can help Macintosh users do just that.

Personal Accountant tells you where you are spending your money, the sources and amount of your income, and how much you owe and to whom. And come tax time, the program lists all your tax-deductible expenses. I like the program because it is designed for nonaccountants. It doesn’t
make you work through unnecessary steps to record your finances yet lets you make changes easily.

One reason the program works so well is that you can have an unlimited number of accounts of any type. When your disk is full, you can forward all balances to another disk. Accounts are divided into five categories: deposits (assets), loans (liabilities), expenses, income, and equity (existing assets, liabilities, expenses, and income to date). The program suggests entries for each category, which you can easily delete.

**Entering Transactions:**

*More or Less?*

*Personal Accountant* uses the double-entry accounting system, which means that each transaction must be recorded in two of the five account categories. However, unlike some programs that use the double-entry system, *Personal Accountant* doesn’t require you to know accounting, nowhere will you find the dreaded words *credits* and *debits.*

You enter transactions in the Make Entries window (see "Entering Transactions"). You indicate for each transaction whether you are increasing or decreasing one account. Then you enter the name of the second account, and the program knows whether to increase or decrease it. For instance, if you write a check at the supermarket, you tell the program to decrease the amount in checking. When you indicate that you spent the money on food, the program automatically increases that expense category.

Despite the program's automatic operation, you still have to be alert because whether you increase or decrease a category depends on the transaction. If you made the same food purchase with your credit card, for example, you would have to indicate that you were increasing the credit card account because you are borrowing money.

Deciding whether to increase or decrease an account is the program's hardest concept to grasp, while its operation is the
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simplest. The manual does a good job of explaining how to enter transactions and gives clear and specific examples of when to increase or decrease an account. The program and the 31-page manual are designed for the nonaccountant, and only rarely does a technical term intrude.

If a transaction results in a tax-deductible expense, type Y in the box marked Tax Deductible. When you type Y, the entire amount of the transaction is listed automatically in the box labeled Deductible Amount. If only part of the transaction is tax deductible, you must change the amount.

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Correcting transactions is a breeze; you scroll through a list of current accounts and choose a category. Click the category, and all transactions are listed. Click the transaction you want to correct, and it instantly appears, letting you reenter just the information you need.

While the data entry process is excellent overall, it does have two deficiencies. If you write a check for two purposes, you have to enter each expense category as a

**Entering Transactions**

For each transaction, you decide whether to increase or decrease two accounts. In the example shown, payment is made with a credit card, so you increase the account because you are adding to the amount you owe.

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<tr>
<td>Anchor Automation</td>
<td>Mark XII Badlands Modern 239.00</td>
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<td>Apple Computer</td>
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<td>Haynes Microcomputing</td>
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<td>Macrom</td>
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<td>Novation</td>
<td>QComm Computations Communications 299.00</td>
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<td>Prentice</td>
<td>Popcom X-100 Modern (Mac) 269.00</td>
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<td>Kingston</td>
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<td>3M 31/2&quot; (S)</td>
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<td>Apple</td>
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Macware Reviews

Silent Printing

If you are looking for a compact, quiet alternative to the Imagewriter, Hewlett-Packard's Thinkjet printer is an ideal candidate. Tipping the scales at a trim 7 pounds, the Thinkjet is about the size of two external disk drives side by side. You can print both text and graphics with the Thinkjet, and the quality of the output is equal to if not better than that produced by the Imagewriter. In addition, the only noise you'll hear from the printer is the gentle whirring of the motor—no high-frequency, machine-gun sound effects like those of the Imagewriter.

Ink Jets

The Thinkjet is relatively silent because it is an ink jet, or nonimpact, dot-matrix printer. Unlike the Imagewriter, which has a print head consisting of nine pins that are hammered against a ribbon to form images on the paper, the Thinkjet has a cartridge that sprays ink onto the paper through a series of 12 tiny channels. The Thinkjet's sprayed dots are slightly smaller than the Imagewriter's impact dots; as a result, the characters produced by the Thinkjet look more refined (see "Thinkjet Versus Imagewriter").

One advantage of ink jet printing is that the image produced by the printer is uniformly dark, whereas a ribbon pro-

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“...at the back of the book there is the ground of the book. In back of the ground there is immense space, and hidden in this immense space, the book we are going to write in its enigmatic sequence.”

Edmond Jabès, Eliya

Compact Printing

Like the Imagewriter, the ThinkJet lets you print in draft, standard, or high resolution and use single-sheet or continuous-form paper. But when you start printing, be prepared for a surprise. The ThinkJet significantly reduces the size of both text and graphics. The length of a line of text in a MacWrite document is reduced by about 17 percent, and screen fonts are reduced by about 25 percent during printing; for example, a document displayed in a 12-point font on the screen is printed in 9-point type. MacPaint and MacDraw graphics are reduced by about 30 percent when printed.

The reduction occurs because the ThinkJet adds an extra inch to the left margin to allow the print head to accelerate to its optimal speed. As a result, both text and graphics must be scaled down to accommodate the smaller space. A larger platen would solve the reduction problem, but then the ThinkJet wouldn’t fit in a briefcase.

You can overcome some of the ThinkJet’s limitations by reformatting your documents before printing. If you want to print 11-point text (you can’t get 12-point on the ThinkJet), for instance, you need to format the document in 14-point on the screen. Since the margins are also reduced when you print documents on the ThinkJet, you

---

“...at the back of the book there is the ground of the book. In back of the ground there is immense space, and hidden in this immense space, the book we are going to write in its enigmatic sequence.”

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can extend the margin marker to the full width of the MacWrite or Microsoft Word ruler so the left and right margins are not so large.

The ThinkJet uses its own monospaced font in draft mode. Unlike the Imagewriter's draft mode, this font doesn't leave large gaps between words. But the ThinkJet's monospaced font may cause characters to extend beyond the right margin, pushing them to a separate line. Adjusting the left and right margins of the document alleviates the problem.

**Silent but Slower**

Even though the ThinkJet reduces the size of text and graphics, it prints more slowly than the Imagewriter in standard or high resolution. When I ran sample pages of MacWrite and Microsoft Word text through both printers, the Imagewriter was about 20 percent faster than the ThinkJet in standard resolution and about 10 percent faster in high resolution. In draft mode, however, the ThinkJet printed significantly faster than the Imagewriter.

If you want to be able to talk on the phone while your printer is humming in the background, and you need a dependable, portable printer that provides high-quality, albeit reduced, output from the Macintosh, the ThinkJet is a clear choice. But if you want to maintain a close approximation of the text and graphics you see on the screen, you'll need the Imagewriter or another printer with similar capabilities.

— Daniel Farber

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MacFORTH (Level 1) lets you do amazing things on the Macintosh... CSI has done an excellent job... The documentation is easy to read and use... I can now create my own windows, graphics and pull down menus, and the “fun quotient” of my Mac has taken a quantum leap.

Bruce Webster, BYTE

It gives programmers full and easy access to the treasures of the Mac’s 64K ROM and produces code so tight and fast that 128K of memory is more than enough for most useful programs... CSI went to extraordinary lengths in making their system fast and their work paid off... because MacFORTH enables you to get closer to the machine’s hardware and software than any other language now available, it is an ideal language for enthusiastic Mac programmers who want to squeeze extra power from their computers...

Richard Sprague, MacWORLD

If you want to develop Macintosh software, MacFORTH is an alternative language to BASIC, Pascal or 68000 assembly language that, once mastered, offers greater productivity and compactness of code than the others.

Greg Williams, BYTE

Level Three

I must praise CSI for the very fine job they did right from the beginning. MacFORTH was a real language and I could do real programming with it. Meanwhile the BASIC and Pascal bunch were left with toy languages or the need for a Lisa. As I learned how to control the Mac I felt lucky to be pulling away from the crowd who were itching to do great deeds on the Mac. The more I used MacFORTH the more I was impressed at how they had put the features of the Mac into the programmers hands.

Chipwits Developer, Doug Sharp, Macazine

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Harry Wilker, Macintosh developer of Back to Basics Accounting and CYBORG
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• A utility program that allows you to create sub-files from existing files, chain files together, and pack your data on your disk is now available.

• Form Design enhancements have been added. You can now import a MacPaint™ image into a data base, and either preserve its original scale or re-size it to a new picture area of your choosing.

• Art Grabber,™ the picture-import device by MacroMind, Inc. is provided as an already-installed desk accessory. Art Grabber allows you to pull images from disk and paste them into Ensemble documents without any disk swapping or opening and closing files.

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Open Window

An exchange of Macintosh discoveries

Edited by Jim Heid

Open Window offers tips to help you use your Macintosh more efficiently. Submitted by readers, industry experts, and the Macworld staff, items in this department address all facets of Mac work, from applications to programming routines to capabilities of the Mac and software not covered in documentation.

This month's column tells of a quirk in the Finder's Get Info command and outlines instructions for creating quilt designs with MacPaint. We also include a reminder of how Multiplan stores and computes values and one reader's solution to electrical power problems. For Word smiths we report on some undocumented editing features, and for the curious—or the desperate—we look at a program that lets you examine the technical details of disks.

Mac Quilt

As a quilter I find the Macintosh a perfect way to try out designs for the quilts I'd like to make. Using MacPaint, you can quickly multiply one quilt square into many to make intriguing designs [see "Quilting I"]. Similarly, you can design patterns for Seminole patchwork, a procedure devised by Seminole native American women, in which strips of material are sewn together, cut, and rearranged to make a geometric border [see "Quilting II"].

Sue Knopp
La Crosse, Wisconsin

Quilting I

All the quilt patterns shown here were produced by flipping, rotating, and copying the single square at the center. Use MacPaint's Grid feature to keep the squares lined up properly.

Quilting II

To simulate Seminole patchwork with MacPaint, activate the grid, then press the Shift key and use the line tool to create a 45-degree parallelogram containing any design you like. Next, use the line tool to make horizontal cuts. Finally, use the marquee to select and shift to the right successive slices.
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Open Window

Multiplan Sums

Recently, while using Multiplan to track hours and wages at a job site, I gained some insight into how the program stores numbers. In my report the Earnings + Overhead column was calculated by adding an overhead charge to the Total Earnings column. Much to my embarrassment, the sum of all the cells in the Earnings + Overhead column was off by 3 cents.

The problem arose because, even though I specified Dollar formatting for the columns, Multiplan was still storing in memory the fractional portions of the calculated amounts. While the display showed the figures rounded to the nearest even cent, the summation used the entire number as it was stored.

I solved the problem by using Multiplan’s ROUND function [see “Multiplan Sums”]. As shown in the formula bar, the revised formula uses ROUND to limit the number of decimal places to two.

The moral? Be aware that simply choosing Dollar from the Format menu does not limit a stored number to two decimal places.

Richard A. Shuren
Boardman, Oregon

Indeed, the Multiplan documentation states, “What you enter, what Multiplan stores to use in calculation, and what you see in a cell are not always the same.” For more information on how the program stores numbers, refer to page 38 of the Multiplan documentation.—Ed.

Getting the Wrong Info

I’ve found an unusual quirk in the Macintosh version 1.1g. Occasionally, if you type text in the comment box of one document’s Get Info window and then open a Get Info window for another document, the text you just entered will also appear in the comment box of the new window. And if you change the text in the comment box of one window, the text in the comment box of the other window changes, too.

If you want to try this for yourself, create two documents; I used MacWrite documents named Note and Editor.

Open a Get Info window for one, type in some comments, and close the window. Now open a Get Info window for the other document, and you’ll see that the text is identical in both comment boxes. If two Get Info windows are open when you enter the text, the text in the window you close last will be duplicated in the command box of the other window.

Mike Norton
Boston, Massachusetts

According to Finder programmer Steve Gepp, the problem occurs because of the method the Finder uses to store the text in the comment box of the Get Info window. The problem occurs in version 4.1 of the Finder as well. Each document’s name is processed by a hashing, or scrambling, algorithm that outputs what should be a unique number. Then the Get Info comments are stored in an area of the Desktop.

(continues on page 152)
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Not Enough Juice
Surge suppressors help protect a computer system from damage due to excess line voltage. However, they address only one of the hazards of commercial power. The other problem is low or fluctuating voltages.

Not long after I bought my Macintosh, it developed a disk drive problem. My dealer replaced the drive, but within 4 hours my Mac was again experiencing disk errors. This time the dealer concluded that the digital board was faulty and replaced it. Again, the repair was quick but didn't last.

I began to suspect that the problem wasn't the Mac's hardware but rather my power line. I called the local power company and requested that they come to my house and set up a recording voltmeter, a device that measures all voltage changes that occur on the power line. It measured my house's power for three days and recorded power fluctuations on a chart.

When the power company technician returned to read the chart, he told me he was not surprised by my problems. Although the power was within the limits required by the Illinois Commerce Commission, the charts indicated that the pole transformer that supplied my house and those of my neighbors was inadequate for the task. Within two weeks the power company installed a pole transformer with a much higher load rating. My problems disappeared.

The technician told me he had seen similar problems in other homes. To prevent problems, he suggested requesting a measurement of the line voltage before installing a computer system.
MacDraft™ is the most powerful object oriented drawing tool available for the Macintosh™ today. Its ease of use, combined with its powerful capabilities, allows even the most casual user to produce professional looking drawings. The versatility of MacDraft™ makes it ideal for the beginner, as well as the professional.

**Features**

- Continuous drawing mode.
- 16 Different scales.
- Zoom In and Zoom Out.
- Automatic dimension lines.
- Circles by radius or diameter.
- Arrows by radius or 3-points.
- Distribute objects along a line.
- Rotate objects in 1 degree increments.
- Create objects by inside or outside diameter.
- 4 Separate documents on the screen at the same time.
- Paste illustrations to and from other documents.
- Paste pictures and objects from MacPaint™ & MacDraw™.
- 64 Patterns for Fill & Ink.
- Flip objects.

**Drawing Scale:**

MacDraft™ offers 16 different Feet & Inch scales, as well as 12 Metric scales for your use. This versatility allows you to create a drawing at one scale, and then if you wish, have it automatically converted to a different scale. You can also have several drawings, all at different scales, displayed on the screen at the same time, and can copy and paste between them. When you paste an object into a drawing with a different scale, the object will automatically adjust in size to conform to the scale of the new drawing.

**Zoom:**

The Zoom functions allow you to see either a reduced or magnified view of a drawing, while still enabling you to have full access to all of the drawing capabilities of MacDraft™. You can Zoom Out from the normal viewing window, until you can see an entire drawing, regardless of its size. While at a zoomed out view, you can easily add large objects or lines to your drawing that may actually extend beyond the viewing window. Or, you can Zoom In to magnify your drawing, and add fine details that may not be convenient to create at a normal view. You can zoom in on any part of your drawing up to eight times its normal magnification.

**Rotation:**

MacDraft™ allows you to rotate single or grouped objects in as little as one degree increments. You can also rotate multiple objects about their individual centers, or group them, and rotate them about the center of the group.

**Auto Dimensioning:**

This feature allows you to automatically add dimension lines to your drawing, so you can display the sizes of various lines and objects. The dimension lines display the proper size of the object, regardless of the scale of the drawing.

Suggested Retail Price $239.00

Innovative Data Design, Inc.
1975 Willow Pass Road, Suite 8, Concord, California 94520, (415) 680-6818

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Circle 308 on reader service card
Open Window

(continued from page 152)

While I'm sure each power company has its own policies regarding line voltage measurements, my company performed the service and upgraded the power transfer at no cost. Now my Mac works properly, and I can rest assured that other appliances in my home are getting enough voltage, too.

Thomas R. Fernandez
Rockford, Illinois

The Mac's power supply can operate on line voltages ranging from 105 to 130 volts. Problems attributable to voltage fluctuations should, therefore, rarely occur. If, however, your Mac is acting up and your dealer's attempts to repair it are unsuccessful, check to see whether the lights in your house dim from time to time or the image on your TV set flickers. If so, the problem might be caused by a power-hungry appliance such as a refrigerator or an electric dryer turning on. If that's the case, you might be able to fix the problem by plugging in a different circuit from the one used by the appliance. If that doesn't work, check with your local power company about measuring the line voltage.—Ed.

Word Selecting Keys

I've found another undocumented feature in Microsoft Word: instant highlighting. Hold a Shift key down while pressing the Backspace key to select the previous word. To select more than one word, hold both keys down and release them when you have highlighted the desired text. Using this technique is often faster and more convenient than using the mouse because you don't have to take your hands off the keyboard.

Shel Horowitz
Northampton, Massachusetts

Here's another time-saving discovery: pressing Option-Backspace selects and erases the previous word, allowing you to delete words faster than backspacing one character at a time.—Ed.

(continues on page 158)
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Examining Your Disks

It happened about an hour before the overnight courier was due to arrive. I was putting the finishing touches on an article when my Macintosh crashed, taking the entire article's file with it. The culprit was an untested public-domain desk accessory, but it didn't matter; my article was gone, and so was my will to live.

Then I remembered I had recently received a program called Fedit, short for File Editor, by John Mitchell. Fedit lets you examine and alter any area of a floppy disk, whether it's used by a file or not. When I started Fedit and opened my damaged file, I found that only a small portion of my article's file was damaged, just enough that Microsoft Word refused to open it. By scrolling through the Fedit display (see "Spying on Sectors") and printing it using 96-Shift-4, I was able to get a hard copy of my article, from which I could retype the Word file.

Not only does Fedit make it possible to salvage information from damaged files, but it's also fascinating to experiment with. You can study the structure of Mac files and learn more about how they work. You can also learn how copy-protection schemes work and how the Mac's file directories are structured.

One word of advice: perform examinations on a copy of the original disk, in case something goes wrong. In the hands of the careless, this safety net can damage disks, too.

Fedit is available from CompuServe's MAUG and from user groups. It's distributed on the "shareware" basis: copy and use the program, and if you like it, send a contribution to the author. I certainly did.

After all, how many applications can renew your will to live?

Jim Heid
Peterborough, New Hampshire

Perhaps you've come up with a nifty routine, gained some insight into how the Mac or an application program works, or even written a short program that performs a useful function or creates an interesting diversion. Tell us about it, and we'll pass your discovery along. We'll also pay $25 to $100 for each Open Window item published. Please send your Macintosh discoveries on disk (which we will return) along with a brief hard copy description to Open Window, Macworld, 555 De Haro St., San Francisco, CA 94107, or electronically to CompuServe 70370,702 or The Source BCW440. All published submissions become the property of Macworld.

Spying on Sectors

John Mitchell's Fedit, available through MAUG and user groups, lets you examine and alter any area of a Macintosh disk. You can use Fedit to read and salvage a damaged document that cannot be opened by the application that created it. Fedit displays the hexadecimal (base 16) values corresponding to a file's contents on the left portion of the screen and their ASCII equivalents on the right side.
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Each month Macworld Gallery displays the winners of the Macworld Art Contest, as well as several other drawings. To enter the contest send a paper copy of your artwork to Macworld Gallery, 555 De Haro St., San Francisco, CA 94107. Five judges award a first prize of $500 and a Sun-magnographics MacTablet and two second prizes of $250. If your drawing is exhibited in the regular Gallery section, you will receive $25. In November 1985 a grand prize of $5000 and two $2500 second prizes will be awarded. Winners will be notified upon acceptance; we are unable to acknowledge all entries. Prize-winning drawings become the property of Apple Computer.

$500—First Prize
Zebra Icon
Rather than using MacPaint’s tools to create an illustration that could have been done with traditional artist’s tools, I tried to take advantage of MacPaint’s unique qualities. I used Brush Mirrors with various patterns to make the background panels, then selected Trace Edges from the Edit menu. I drew the zebra head in a separate document, then cut it to the Clipboard and pasted it in over the background.

Michael Tidmus
Los Angeles, California
$250—Second Prize

Under the Kitchen Sink

In order to make a drawing that was placed horizontally on an entire 8½- by 11-inch page, I had to draw the items sideways. This proved surprisingly easy to do. I began by blocking out the major shapes with the straight line tool. I then used the pencil to modify those shapes and finally used the paintbrush to add shading and texture.

Terry Reynolds
Glendale, Arizona

$250—Second Prize

Cartesian Flies

This image came to mind when I filled the MacPaint window with the grid pattern. The grid simultaneously reminded me of graph paper and of a wire window screen. I drew a single fly and then made three copies and rotated them, saving each in the Scrapbook. I pasted the flies onto the grid and added details to complete the drawing.

Robert Ishi
Oakland, California
J. P.'s Hat
I set up this still life near my Macintosh. I used a lamp as a light source to produce highlights and a strong shadow. After completing a rough free-hand drawing of the hat, I filled the entire screen with a medium gray tone with the paint bucket. I placed a variety of patterns on the hat's brim and finished the drawing by adding white highlights.

Carol C. Meyers
Fort Meyers, Florida

Don't Laugh
To create this image I first painted a dark-to-light streak with the spray can. Then, using the marquee, I cut out small squares ranging from light gray to black. I built the face from the small squares, duplicating them with the Option key. I feel the picture makes good use of the Mac's features; it would have been extremely difficult to draw a picture like this using pen and ink.

Robyn C. Miller
Henderson, Texas
Big Dog
I drew the dog with the pencil, selected Trace Edges, and then filled him in using the paint bucket. The city skyline and the other background shapes are filled rectangles of various sizes. I used the spray can to make the cloud, and a standard pattern to fill in the sky.

John Stephen Gratz
Reston, Virginia

Electrical Memory
I started by roughing in the figures with a small paintbrush and gray paint, then added outlines in black. After that, I cleaned up the drawing using white paint, the pencil, and FatBits. I used the straight line tool and the single-dot brush to make the background.

John Parker
St. Louis, Missouri
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Mirror Totem
I'm a graphic designer and a painter, and I love working on the Mac. To create this drawing I used Brush Mirrors, with only the vertical mirror selected. I started drawing and watched as several creatures developed on their own.

Laurie Kaplan
New York, New York
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Macworld Directory

The Macworld Directory is a comprehensive listing, by category, of products and services available for the Apple Macintosh. It provides advertisers with a low-cost advertising alternative and our readers with an easy reference guide.

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and a company name, address, and telephone number.

Advertisers may choose among categories already in use, or they may create their own. Display advertisers can cross-reference their current ad to the Macworld Directory for increased exposure.

RATES: Listings are accepted for a three-time consecutive insertion at a rate of $726. We offer a six-time insertion at $1230 that reflects a 15% frequency discount. Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, Visa, and MasterCard are accepted.

DEADLINE: For copy deadlines and further information please contact Niki Stranz, your Macworld Directory Account Manager, at 415/861-3861 or 800/872-7800 (800/872-7808 in California). Please send copy and prepayment to the Macworld Directory, 555 De Haro St., San Francisco, CA 94107.

■ Accessories

Cables

Mac Custom Cables
The Mac-Modern cables mate with the Hayes (RS232) 1200 and compatible modems and match Mac's original molded cable style and color. The Mac-Printer cable mates with any Mac-compatible RS232 serial printer both are complete with Thumb-screws and full shielding. $29.95.

N² Products, Inc., 408/415-0227, 679/243-3832

Supplies

Oak Disk Cube™
This beautiful 3½” disk file is made of solid oak, then hand rubbed in a light stain and tung oil finish. It measures 8½” by 5¼”. Index tabs are included for organizing up to 50 disks. All hardware is brass. Priced at $39.95 plus $5.00 shipping. Order by mail directly from M & M Micro Accessories, 1533 Radston Ave., Burlingame, CA 94010, 415/342-2591

Under $9.00 Helpers

Mouse MAR II™, the preferred, long-lasting, PORON tracking pad: $8.95.

MacBelt with Mouse Holster™, the colorful disk slot protector and mouse holder in one: RED, WHITE, or BLUE $5.95; dePlug™, rubber disk slot insert for dust/dirt protection: $2.95. Add $2 SLH. Visa/MC. For brochure send SASE to Windsock Corporation, P.O. Box 93, Multive, KS 67110, 316/777-4926

MacDrawers
Improve typing posture and comfort and add almost 100 sq. inches of desktop space. Made to fit the Mac keyboard, sturdy, and easily mounts under any desk, table, or computer furniture. Built-in padded wrist rest and dust seal. Detaches for use wherever you go. Satisfaction gtd. $49.

Cass Tool Co., P.O. Box 21, Cassville, MO 65625, 800/336-7502

Diskpac 3.5
A unique carrying case for 3½-inch disks. Diskpac organizes and stores up to six disks and folds into thirds, making it small enough to fit into a suit pocket or briefcase. The case is made of nylon with a velcro closure and comes in black, navy, or red. Custom silk-screening and colors avail. $14.95.

edTech Marketing Corporation, 1110 Morse Rd., Columbus, OH 43229, 614/885-1985

MacStac™ Work Station
Tired of stiff necks and cluttered desk tops? MacStac™ raises the screen to eye level and holds the external drive, disks, and modem underneath (no tilting) in the same space as the Mac. Sturdy construction of the highest quality clear or bronze acrylic. Call or write today! Visa/MC $54.95 + $5 s/h.

Adex, Inc., P.O. Box 74142, Metairie, LA 70033, 504/286-5472

Colored Printer Ribbons
For your ImageWriter—$6.50 each. Available in red, green, blue, purple, brown (black—$5.50). Also available for a variety of other printers. Call toll-free and find out how you can save money by recycling your used ribbons. MC/VISA accepted. Competitive pricing on diskettes and paper.

Golden Ribbon Corp., 6317 Arapahoe, Boulder, CO 80303, 800/621-8385 ext. 104

Switches

Mac A/B Switch
Switch conveniently between your letter-quality and imagewriter printers with only a flip of a switch. Occupies only one port and provides instant access to either printer. Compatible with all LQ printers. Complete with one cable $99

Add'l cable for LQ printer (Std.) $25

Add'l cable for LQ printer (API) $39

Visa/MC welcome. See display ad in this issue.

Creighton Development, Inc., 714/472-0488

Business Opportunities

Looking for a Publisher
for your Mac application? CSI, the publisher of many microcomputer software products, would like to talk with you about publishing your innovative product ideas. Complete publishing services—documentation through distribution. In-depth technical knowledge of the Mac. Flexible royalty %s.

Creative Solutions, Inc., 4701 Randolph Rd. #12, Rockville, MD 20852, 301/984-0262

Hardware

Interfaces

Granny Smith Connection
A parallel printer interface for your Macintosh that gives you the freedom to use parallel printers & plotters. Comes with integral cable & software for dot matrix, daisy wheel, ink jet, laser, & more. (Epson, IBM, HP etc.) Also available for Apple Ile and
Accessories & Supplies
A catalog of Mac products for Mac users containing 100s of super-valued items for the everyday use of the Macintosh. Books to help explore the unlimited potential of you and the machine. Supplies to store and show off your creativity. Accessories to keep it all organized. Aids to tap the graphic power. Call or write for free catalog.

Desktop Supplies, Ltd., P.O. Box 441, Lake Geneva, WI 53147, 414/248-2422

■ Software

■ Accounting
COMBO & Mac Movie
Combo includes inventory with POS (prints price lists, reorder lists, invoices, tracks inventory items + ) & Accounts Receivable (prints invoices, statements, aged receivables +).

Mac Movie combines inventory control, customer control, and register activity (with bar codes). Especially for video retailers.

Eureka Computer Systems, 1419 W. Seventh Ave., P.O. Box 2308, Cor­
sicana, TX 75110, 214/872-2501

■ Backup Restore
MacCrack Pak II
Allows any Mac owner to BACK UP protected software & also UPLOAD most software pkgs. to HARD/RAM disks. No more "Insert Master Disk" messages w/copies made w/our software, so you need not shuffle floppy! Works on all the latest pkgs. Comprehensive documentation makes it easy to use, and technical info. makes it a must for the hardware hacker. Only $79.95 + $5.20 (CA) + $3 s/h.

FWB Co., 2040 Polk St. #215, San Francisco, CA 94109, 415/474-8055

■ Building Design
Architects and Engineers
Structural design templates for wood-frame projects (req. Multiplan). Save hours of analysis, calculation, and design time on each. Easy to Use—Well Documented—Money-Back Guaranteed THE DESIGNER SOFTWARE SERIES

• Vol. I (Rafter/Joists/Beams) $150
• Vol. II (Seismic/Shear Walls) $125
Shebean and Associates, 3509
Ocean Dr., Hollywood Beach, Ox­
ard, CA 93030, 805/585-5318

■ Business
Zipfinder
Analyzes your mailing list files cre­ated with virtually any database program and automatically inserts the correct zip codes into the zip code fields. Also verifies existing zip codes on file and finds zips according to addresses entered by operator. Sold by state or partial state.

Softidea, 8177 S. Harvard #619, Tulsa, OK 74137, 918/745-9792.

Profit Planning
Technically advanced & easy-to-use spreadsheets for Multiplan™:

• Operating Plans (order Forecasts, Production Plans, Inventory, and Shipments)

• Income Plans

• Income Plans: Automatic computation & summarization of multiple business units & company Profit Plans. $29 per plan or $75 for the set of 3. Send for brochure.

Softidea Software, Inc., P.O. Box 1744, Lake Oswego, OR 97034, 503/638-1400

■ Data Management

DATAFAST
A powerful yet SUPER-EASY-to-use professional database management program. Create mailing lists, directories of customers, inventories, etc. Use predefined formats or create your own. Easy entering, sorting, and updating of data. "Copy" and "Paste" records into your MacWrite documents. $49. Req. 128K, 1dd.

Statsoft, 2831 E. Tenth St. #3, Tulsa, OK 74104, 918/583-4149

■ Educational

New Test Generation Pkg.
MicroTest II creates, updates, genera­tes, and stores a wide variety of tests. Easy question entry, on-screen edit, prints multiple versions with separate answer keys. Writes MacWrite/MacPaint compatible files for WP and graphics. Ideal for trainers, educators. Send for free brochure.

Chariot Software Group, 3659
Indiana St., San Diego, CA 92103, 619/298-0202

Digital Logic Design Aid
LogiMac is an interactive digital logic drawing and simulation package for the Macintosh. It is intended for use by engineers, students, teachers, and hobbyists interested in designing, documenting, and experimenting with digital logic hardware. It supports most common gates, flip-flops, etc., $79.95 (U.S.).

Capilano Computing, 554 Beaty St., Vancouver, B.C. V8B 2L3 Canada, 604/669-6343

■ Font System

TECH, SuperGreek, Hebrew
TECH for Math/Science Equations, Greek & over 1000 different symbols all from one font! 9, 10, 12, 18, 20, 24-point sizes. $19.95. Speed-typing,
Games

ADVENTURE—The Original
Explore Colossal Cave in the exciting
vou the unsecured BASICsource
your GATO-class submarine as It pa­
for all ages. MC/Visa accepted.

GATO for the Mac—$39.95
Authentic WWII submarine warfare simulation. Use the mouse to control your GATO-class submarine as it pat­rols the Pacific looking for enemy ships. Adjustable skill levels & pro­grammable missions make this game a continuing source of entertainment for all ages. MGVisa accepted.

Digitize anything
Digitize your picture into the MacPaint program. You can draw with pen, rotate, step, and change to disk or data files in seconds. Many active objects and moving scenery. Sample programs and prewritten sequences. Complete tutorial, DISK, s/h $39.95 (in TX add tax $1.83).

Maps

MacAtlas™ Volume 1
Tired of pie charts? Make maps with MacAtlas! MacAtlas documents of professionally designed maps. USA at 8x10, 5x7, and clipboard sizes. Many active objects and moving elements. Incl. 54 maps ($79). MacPaint, MacDraw, Mymaps, P.O. Box 1353, Morris­town, NJ 07960, 201/658-3333

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The Language of Innovation. Create windows, menus, graphics, mouse events quickly & easily using this in­teractive & fast language.
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Creative Solutions, Inc., 4701 Ran­dolph Rd. #12, Rockville, MD 20852, 301/384-0262

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Mac Public Domain Software—Hundreds available, $10 per disk. Choose from applications, Multiplan templates, games, art, utilities, backup programs, disk editors, music, templates for business, desk accessories. Carefully organized with documentation. Send $1 for a catalog.

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Have access to hundreds of public­domain programs by mail! Members pay $1 per disk plus $1 postage & handling. Send $15 for 1-year sub­scription. Includes intro disk with ten new programs, plus listing of all disks in library, plus quarterly news­letter describing latest public­domain software.

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Perfrom powerful investment analy­sis on your Macintosh. Over ten dif­ferent loan types, latest depreciation, variable assumptions, industry standard reports. Stand-alone program uses all the Mac features. Easy to learn. For more information ask your dealer or call REMS direct.
REMS Software, 526 N.W. Second St., Corvallis, OR 97330, 503/757-8887

Science

MacStronomy
Displays and prints maps of the stars, moon, planets, and Halley's comet at correct location in the sky for any selected date, time, direction, and field of view. Displays descriptions of objects when selected with the mouse. Users can add their own stars/plan­ets. Runs on 128K or 512K Mac. $90.

Statistics

Number Cruncher Stat Sys
Integrated, menu-driven, Mac statisti­cal system including: Multiple and stepwise regression, t-tests, correla­tion, scatter plots, up to 4-way ANOVA, principal components, cross tabulation, transformation, nonparametrics and much more. Complete Mac interface. Transfer data to/ from clipboard. $149. Requires 2dd.

Speech Synthesis

SmoothTalker
SmoothTalker is a software-only Macintosh speech synthesizer. Give your Macintosh the freedom of speech. Hear a demonstration of this "hottest" best-seller 24 hours a day at 213/427-0178. Now available at better software dealers worldwide.

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Professional but easy-to-use. SUPER-FAST statistical package. Unlimited size of data files. Incl. two flexible data editors (can access MULTIVAN & other files). Descriptive stats, t-tests, correlations, cross-tabulation, non-parametric stats, general multivariable ANOVA, multiple regression, charts, plots, and more. $99. Req: 128K, 1dd.
Statsoft, 2831 E. Tomb St. #3, Tulsa, OK 74104, 918/583-0149

StatWorks
A powerful statistics package with graphics designed for a wide variety of applications on the Macintosh. Regression analysis, descriptive stats, ANOVA, nonparametric tests, and more. Uses data from different sources including other Macintosh applications and mainframes via MacTerminal. $125.
Heyden & Son, Inc., 247 S. 41st St., Philadelphia, PA 19104, 215/382-6673

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COPY II MAC
COPY II MAC is the backup insurance you need to protect your software investment. COPY II MAC makes a backup of most protected software quickly & easily, recovers data from damaged disks, and undeletes files. For 128K or 512K Mac, 1 or 2 drives. Also available for IBM, Apple II, Comm 64. $99.95 + $5 s/h ($8 overseas). Visa/Check.
Central Point Software, 9700 SW Capitol Hwy #100, Portland, OR 97219, 503/244-5782

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