THE APPLE II MAGAZINE

inCider

A Sneak Preview of IIGS Software Pg. 60

October 1986
USA $2.95/Canada $3 95
A CWC/I PUBLICATION

"IT'S AMAZING!"

STEVE WOZNIAK
Apple II Creator

- SPEED
- COLOR
- SOUND
- COMPATIBILITY

The New IIGS

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We've got designs for Apple's® future.

Apple is getting faster and more versatile. And with the introduction of the IIGS™, comes AST's state-of-the-art enhancements that not only support, but augment Apple's bold claim to the future. Our design formula: compatibility, flexibility and performance.

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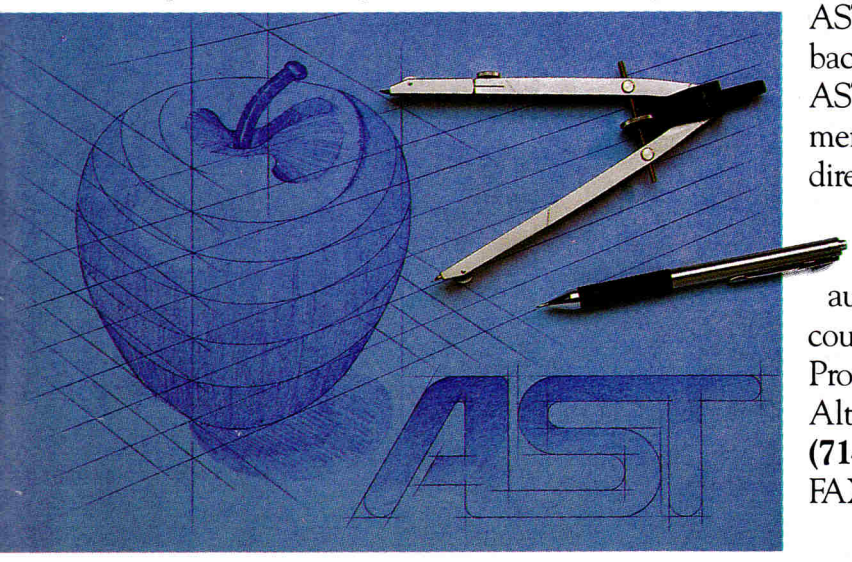

major hardware and software manufacturers to incorporate leading industry standards. With AST's Apple IIGS products, you can continue to count on instant compatibility with popular application software and peripherals.

Flexibility to suit your system needs. Our Apple IIGS products are expandable. You can buy the minimal configuration today and upgrade as your needs grow. Whether you work at home, school or in business, you'll find AST products designed to keep up with changing applications.

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We Make Apples Grow!

All of AST's solutions for the IIGS, including the SprintDisk™ 1 MB RAM disk card and AST-2000™ 20 MB hard disk/20 MB tape backup SCSI storage subsystem, incorporate AST's design formula. And our new, exciting memory and graphics products create new directions in personal computing.

For a complete layout on AST's Apple IIGS designs, contact your nearest AST-authorized Apple dealer, or fill out the coupon below and send it to the AST Apple Products Group: AST Research, Inc., 2121 Alton Avenue, Irvine, California 92714-4992. **(714) 553-0340**. BBS: (714) 660-9175. FAX: (714) 660-8063.

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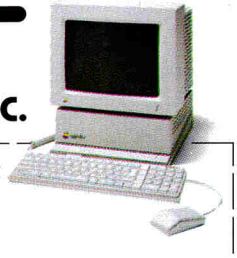

Yes, I want more information about AST Apple IIGS innovations.

☐ memory ☐ storage subsystems
☐ graphics

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Circle 222 on Reader Service Card.

BRIGHT IDEAS

Orange Micro® Innovations for the Apple® IIGS

The Revolution Continues

For over six years Orange Micro has demonstrated an unequalled ability to convert bright ideas into the high quality Apple innovations that you require. Products for the Apple II+, IIe and IIc and most recently the ImageWriter™ II have consistently been top sellers, and have enjoyed the support of experts and software publishers alike. With the new Apple IIGS computer, Orange Micro is again leading the way with three exciting new ideas to enhance your new Apple system.

ProGrappler®

Intelligent Printer Interfacing

Parallel printing is fast, and now the new **Pro-Grappler** represents the hottest technology in parallel printer interfacing. Screenshot capability (IIGS only) lets you print screens for most popular software packages. New pull-down menus accept either mouse or keyboard input, allowing you to easily select your printing options right on the IIe or IIGS screen. We've also added printer set-up, so you can select your printer's special features without complex commands or special codes. All the commands of the original Grappler+ have been kept intact, ensuring compatibility with the thousands of software products supporting the Grappler. Go with the **Pro-Grappler**, the most powerful parallel printer interface available.

RamPak 4GS™

Memory Sub-System

Orange Micro's new **RamPak 4GS** delivers unprecedented memory expansion capacity and powerful memory management utilities. With 512K of RAM standard, the **RamPak 4GS** is socketed and ready for an incredible *four megabytes* on a single card. But it's far more than just a simple memory card. The **RamPak 4GS** also includes powerful software for RAM Caching, Dynamic Memory Allocation, and utilizes Apple's RAM Disk. These features not only assure the most efficient use of your system memory in any application, but they can increase your processing speed dramatically.

COMING SOON: IIGS Maintenance System

Your new Apple IIGS will require proper care, and Orange Micro's **maintenance system** has everything you need to keep your system running strong. The **maintenance system** provides surge protected power for your Apple IIGS and any two additional peripherals from a single convenient switch; a third unswitched power outlet; a powerful fan to provide filtered, cooling air; and an hour meter that tells you how long your system has been powered up. We have even included a guide of scheduled maintenance for use with the hour meter to help you properly care for your new computer. The **maintenance system** is a complete package that lets you relax knowing that your new investment is well protected.

A Commitment to Innovation and Excellence

These high quality products represent Orange Micro's continued commitment to Apple and the landmark Apple II series of computers. Our development efforts are, and have been, totally dedicated to bright ideas for Apple Computers. We've been dedicated to it for years and we aren't going to change now. So when you pick up your IIGS, take a look at us. Enhance your system with solutions from Orange Micro.

Orange Micro® Inc.

1400 N. Lakeview Ave., Anaheim, CA 92807
(714) 779-2772 Telex: 5101001014 ORANGE MICRO

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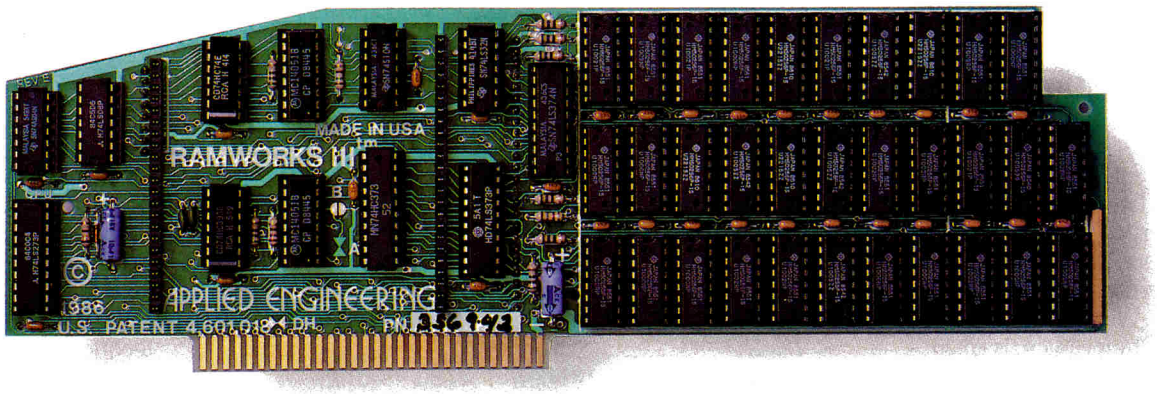
RamWorks® III

Patented Performance from the Recognized Leader



With battery backed RAM port, RGB port, increased memory capacity, full software compatibility and more compact design, RamWorks III is a generation ahead.

RamWorks III is the newest 3rd generation RAM card for the Apple IIe. It incorporates all of the technology and improvements that years of experience and over a hundred thousand sales have given us. By selling more memory cards than anyone else and listening to our customers, we were able to design a memory card that has the ultimate in performance, quality, compatibility and ease of use. A design so advanced it's patented. We call it RamWorks III, you'll call it awesome!

The AppleWorks Amplifier.

While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks III does. With a 256K or larger RamWorks III, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 25,000. *Only* RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks even expands the clipboard. And auto segments large files so they can be saved on two or more disks. You can even have Pinpoint or MacroWorks and your favorite spelling checker in RAM for instant response.

RamWorks, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks III couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-Filer, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601081) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all Apple IIe's, enhanced, unenhanced, American or European versions.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks III continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks III has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks III by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for up to 20 years.

It Even Corrects Mistakes.

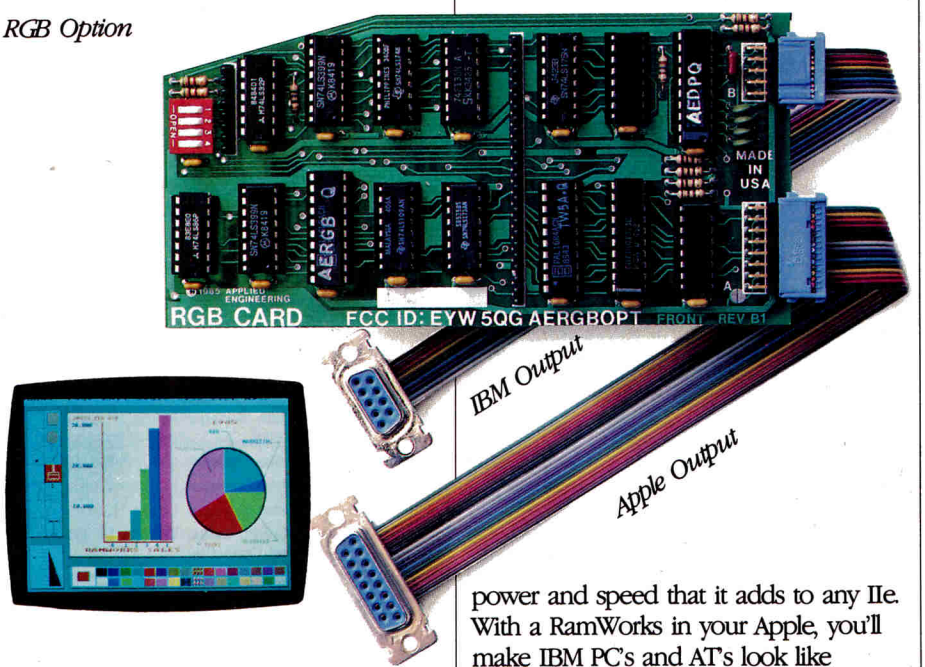
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB

Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 interference and remember you can order the RGB option with your RamWorks or add it on at a later date.

RGB Option

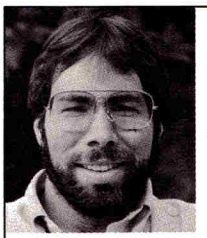


True 65C816 16 Bit Power.

RamWorks III has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."



"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

Apple experts everywhere are impressed by RamWorks's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks in your Apple, you'll make IBM PC's and AT's look like slowpokes.

Quality and Support of the Industry Leader

RamWorks III is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

It's Got It All

- 15 day money back guarantee
- 5 year hassle free warranty insures coverage no matter where you purchase
- Built-in super sharp 80 column display, (U.S. Patent #4601081)
- Expandable to 1 MEG on main card
- Expandable to 16 meg with expander cards, with NO slot 1 interference
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software
- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (U.S. Patent #4601081)
- Takes only one slot (auxiliary) even when fully expanded
- Socketed and user upgradeable
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

RamWorks III with 64K	**$179**
RamWorks III with 256K	**$219**
RamWorks III with 512K	**$269**
RamWorks III with 1 MEG	**$369**
RamWorks III with 1.5 MEG	**$539**
RamWorks III with 2 to 16 MEG	**CALL**
65C816 16 Bit Card	**$159**
RGB Option	**$129**
Optional Software:	
Pinpoint with RAM Enhancement Software	**$79**
VIP Professional	**$219**

RamWorks III. The industry standard for memory expansion of the Apple IIe.

ORDER YOUR RamWorks III TODAY. 9 a.m. to 11 p.m. 7 days, or send check or money order to Applied Engineering.

MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 if outside U.S.A.

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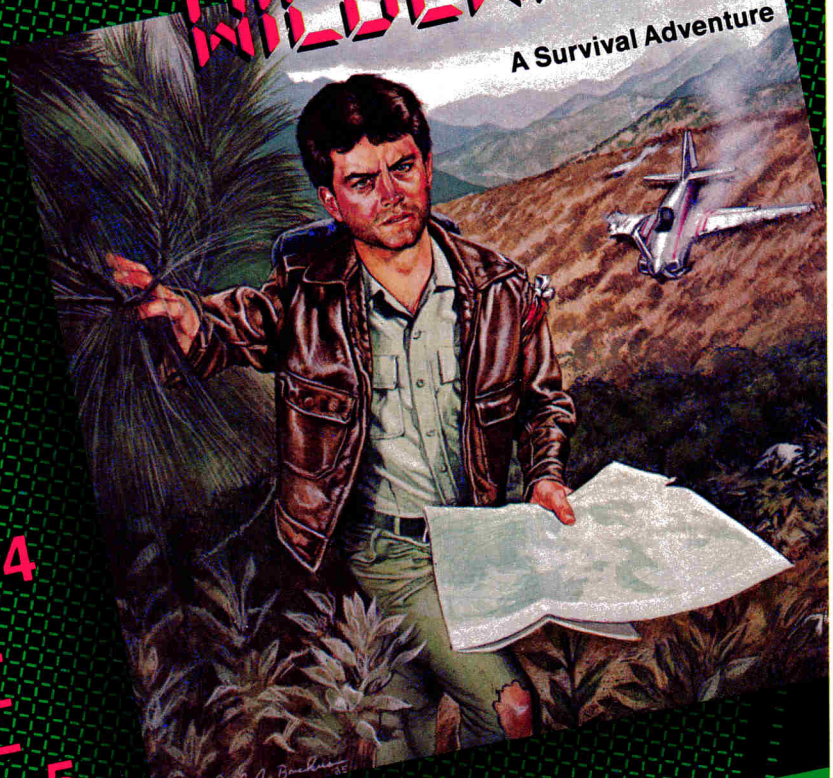
What To Do After You Crash Your Flight Simulator

WILDERNESS

A Survival Adventure



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BEST GRAPHIC ADVENTURE OF THE YEAR Family Computing
EDUCATIONAL SOFTWARE PACKAGE BEST LIST Science 86

Available for Apple // Series and IBM PC (and compatibles). Apple requires 48 K, Applesoft. IBM PC requires 256 K, one double-sided disk drive, Color Graphics adapter. Color monitor recommended.

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October 1986

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The New IIGS

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Whether you're an expert programmer or just the average computer user, you'll find something to like about the GS' firmware—from its Macintosh-like Toolbox to good old Applesoft BASIC.

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Downloaded from www.Apple2Online.com

INCIDER'S VIEW

Who Needs It?

"The IIGS seems to fill my bill: It offers me the best of the Mac, the Apple II, and then some."

by Deborah de Peyster

When something new hits the market, everyone gets excited and talks about faster this, more powerful that, better-looking these, or better-sounding those. You'd think from the way people talk that anything that's been around for a few years should be shot and buried just on principle.

The new Apple IIGS has generated the same kind of chatter and bubbling. It's faster and more powerful, it has better graphics, more color, and better sound, it leaps tall buildings. . .oops, sorry. But does it mean you should trash your old Apple //e, //c, II Plus, or Mac? That's the question I'm asking myself.

First of all, these new features combined with a UniDisk 3.5 and RGB monitor will probably set you back somewhere around $2000. If you're like me, you certainly don't need that expense. (You'll probably have to eventually buy that UniDisk, though. Apple is even packaging the new GS tutorials on 3½-inch disks, a not-very-subtle push toward the future. It would have been nice to include those same tutorials on 5¼-inch disks, too.)

And if speed isn't a high priority—if you've been happy crunching along slowly with applications like AppleWorks, you don't need it, either. The thought of getting my work done a little faster is appealing enough, though, to make me stop and listen a little more closely to what else this dazzling IIGS has to offer.

Sound. For some of you, GS sound might just be the selling point. Music students will be able to compose a symphony, play it back, and print it as a score without adding any special boards. Teachers will like the GS because it mimics the human voice without sounding like a computer—in a foreign-language lab such sound quality is critical.

And we've also seen the compelling power of an adapted Apple //e in teaching a special-education student to talk (see "Tapping the Potential of Special-Needs Students," September 1986, p. 56). The sound of the new GS can only improve on that. You or your child can even learn music at your leisure and keep a sound record of your progress.

But I don't really care about sound. I need only one straightforward beep to tell me I've done something wrong. GS sound isn't going to sell me.

Graphics. Some people don't care about graphics, don't ever need to design pie charts or have the urge to see cinema-style games on their screens. Educators, however, rely on good graphics to engage their students in the learning process. Higher-quality, more colorful graphics encourages student participation. That can lead to better learning.

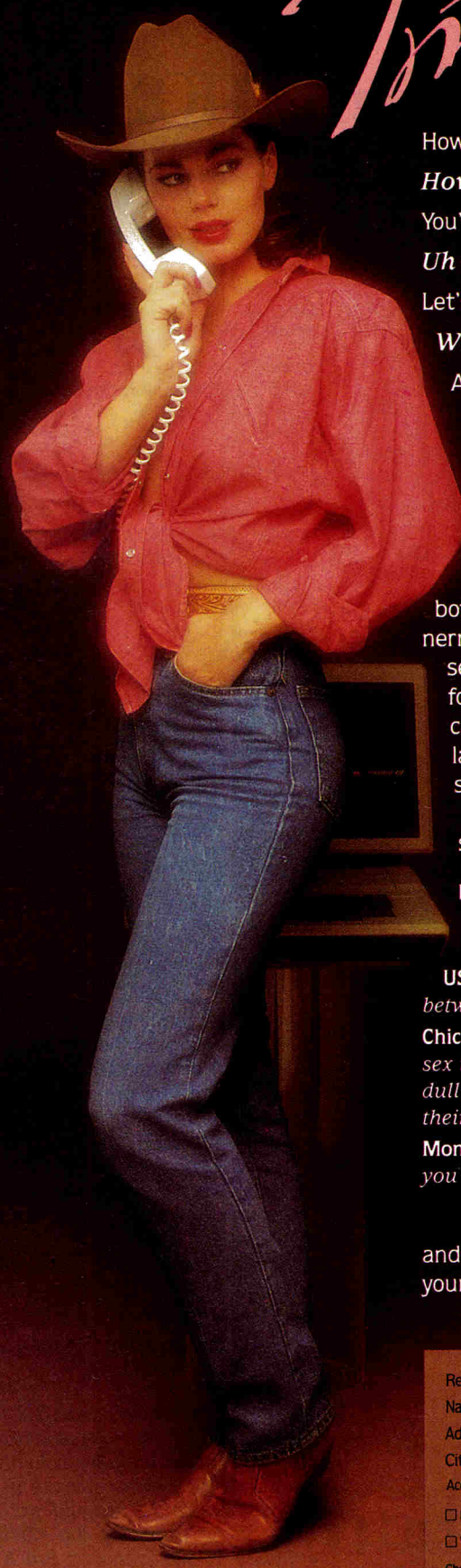
I can't live without good graphics (maybe that's a bit strong). But good graphics is like the second teaspoon of sugar in my coffee—it sweetens things a bit. But GS graphics goes beyond sweetness. Graphics on the IIGS is central to its ease of use. It illustrates the powerful software that creates the user interface. The normally time-consuming, complicated tasks of copying a disk, formatting, and file conversion become as easy as moving icons around the screen.

The graphic representation of the user interface will become the standard way of using applications, and that too sells me. It means that each GS application will appear on screen the same way—pull-down menus, icons, and mouse point-and-click-style interface—no matter who developed it. Thus, new applications are intuitively easy to use and faster to learn.

As a closet Macintosh owner (yes, I'm letting the truth out now because I'm building up to something here—my Mac is at home, my //e at the office), I've never read an application's documentation. All Mac programs work similarly. The Mac-style interface, which the GS now sports, gets me immediately using the machine, not reading about it. I like that a lot.

What I don't like about the Mac is that it doesn't run Apple II software. And it's slow (I have the 128K version). I've always thought color would be nice, too. So the IIGS seems to fill my bill: It offers me the best of the Mac, the Apple II, and then some. But it may not be the best machine for you: That's something you have to decide.

So here comes the drumroll. I've made my decision. I've found reasons why the GS is truly useful to me, and as soon as I can, I'm going to buy one. Anybody want a used Mac? ■



Interlude II

COWGIRL CAPER—Interlude #125

Howdy, partner.

Howdy, partner???

You've got a date with a cowgirl tonight.

Uh oh. Have you been playing Interlude again?

Let's see ...I'll need a hat, boots, chaps...and maybe spurs.

What time does the rodeo start?

As soon as you walk through the door, Cowboy!

Interlude II. The long-awaited sequel to the first adult computer game in history is finally here. It's provocative and playful! Outrageous and romantic! It has all the excitement of the original Interlude, plus significant new features.

The computerized interview, which is taken by one or both players, has been greatly expanded. It probes your innermost desires to discern your mood of the moment, your secret longings, your special fantasies, and then suggests for your pleasure one of its more than 160 Interludes. You can ask the computer for an Interlude for now, or one for later. Special options give each player added control over surprises and special erotica hidden in the Interludes.

The original Interlude took the computer world by storm six years ago, creating a media sensation:

FORUM Magazine: *"The Interludes are imaginatively and sensitively written... the computer's recommendations are uncannily appropriate."*

US Magazine: *"The most edifying third party to join couples between the sheets since* The Joy of Sex*."*

Chicago Tribune: *"This marriage of computer technology and sex is natural... erases forever the image of computer-users as dull guys with slide rules in their pockets and square roots on their minds."*

Money Magazine: *"Sometimes it's easier to tell a computer what you want than it is to tell your partner."*

Interlude II will take you to the outer limits of fantasy and romance. And, if the computer selects Interlude #99 your love life may never again be the same.

Interlude II. Are you ready for it?

Recreational Technology, Inc., 11011 Richmond, Suite 600, Houston, TX 77042

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Available for Apple II, II+, IIc and IIe.[1]

[1]Trademarks of Apple Computer, Inc.

$ 39.95 Interlude II
_____ Shipping $3.00 (outside U.S.A. $10.00)
_____ TX residents add 6 1/8% sales tax ($2.45)
$ _____ TOTAL

INC

Circle 253 on Reader Service Card.

LETTERS

//c on the Move

A letter in the May 1986 issue (p. 10) favors an article about accessories that could make the Apple //c really portable. I'd like to second the motion.

You must be aware of the new liquid-crystal flat-screen displays. They cost enough to make someone really regret choosing the wrong one. If you do such an article, please include strong hints regarding upcoming accessories, as well.

Richard P. Lockwood
11627 Scottsdale Drive
Meadows, TX 77477

Read "The //c—From Here to Hong Kong," by Jim Munro (August 1986, p. 38) to see how one businessman made his //c portable enough to take along to the Far East. —eds.

AppleWorks Amazement

I've enjoyed your magazine, and have watched it grow into an intelligent, practical journal for the professional Apple II user.

Feature articles are always timely and at least marginally interesting. The columns Applesoft Adviser, Apple Clinic, and, most recently, AppleWorks in Action meet my needs and interests without the heavy-handedness or snobbery found in other computer magazines.

Your continued emphasis on AppleWorks is wise. I feel the ultimate utility of any system is revealed in its ease of use. I own a modest Apple //c system, and I'm constantly amazed at the degree of ease this program affords.

Robert M. Schnick, MLS
P.O. Box 14
25½ Vermont Street
Bath, NY 14810

Positive Feedback

I'm a recent subscriber to *inCider*, only since the first of this year, but I'm hooked. I think it's great. I also read *A+*, and, in my opinion, your smaller magazine has much more going for it.

Letters to the editor are the feedback any good magazine needs, and when that's shortchanged, so is the subscriber. That's usually the first thing I read and take note of when renewing my subscription. Again, your Letters section is great. I also enjoy Hints/Techniques, program listings, and the sincere writeup of new products.

I've just finished Super Startup, by Scott Bowers (April 1986, p. 106), and I've run into some problems. The heart of the program given in line 480 is different from that shown in the text. If the problem is mine, I'll work it out, but if it's yours, I hope you'll make the corrections.

David D. Perry
317 North Wagner Street
Ridgecrest, CA 93555

See "A Fresh Start" in inCider*'s September Letters (p. 8) for Scott Bowers' modifications for Super Startup. —eds.*

Piracy Solutions

I've recently read your reader poll on software piracy (September 1985, p. 42). Both sides of this case present a problem, but both problems can be solved.

Prices for software range from $30 to $500. Most people will pay a program's steep price depending on how well rated it is. When you take the package home, you find only one program disk and a card saying you can order a back-up disk by paying a certain fee and supplying the company with a blank disk. This person has just spent a bundle of money for a software package, and doesn't feel like paying any more for a back-up or a blank disk. That's when people turn to pirated software, and that's when the companies start losing money.

To avoid this problem, software companies should provide a back-up copy of their own, or the means of making a back-up copy. (One example of this method is Software Publishing's policy regarding its PFS series.) This way, the person who bought the package doesn't have to pay extra for a backup, and the company will still make a good profit. For school use, companies should offer packages containing a number of programs that only the computer director of the school can purchase.

In my opinion, software piracy is a criminal offense and should be punished accordingly.

Beno Rubin
3845 Sedgwick Avenue, Apt. 3E
Bronx, NY 10463

In Praise of Pascal

I'm enjoying Pascal Primer very much. The examples are particularly helpful, but I wish the column could be expanded to include more news items and a question-and-answer section. There just isn't much help in the major publications for beginning Pascal users.

I stumbled into Pascal after increasing frustration while trying to write lengthy BASIC programs for classroom use. Once I got started in Pascal, I fell in love with it.

I'm having the most trouble understanding the when's, why's, and how's of using UNITS. I hope you'll be able to spend some time on this in an upcoming issue.

The most frustrating thing about using Apple Pascal is the time it takes to compile, because of the frequent disk access required. This is especially frustrating for beginners who make a lot of syntactical errors. It seems to me that one of the RAM-disk boards might speed up this process considerably. I've been reluctant to buy one because I don't know if these boards can be configured as the "Root Volume" using Apple Pascal. Do you have any thoughts on this?

Thanks again for an excellent column.

Dan Pope
5298 Highland Shore Drive
Flushing, MI 48433

Our Pascal Primer columnist, Tom Swan, says to watch for a description of UNITS in his January column. He adds that the newest release of Apple Pascal, version 1.3, should work with RAM drives, providing the interface firmware follows standard ProDOS protocol. This includes hard disks, the UniDisk 3.5, and other devices, as well as RAM disks.

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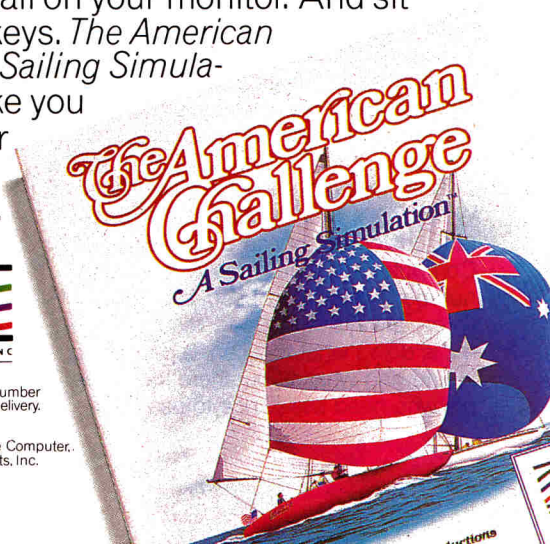

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Earlier releases of Apple Pascal (versions 1.1 and 1.2) don't recognize the ProDOS firmware protocol, and are therefore unlikely to recognize such interfaces. Rather than configure the RAM drive to your root volume, you could transfer SYSTEM.COMPILER, SYSTEM.EDITOR, and SYSTEM.FILER to RAM and remove the disk containing those files. The next time you type E to edit, for example, Pascal will automatically find the RAM copy of the editor.

Before purchasing extra RAM, you might want to ask the manufacturer if its product has been used successfully with Apple Pascal 1.3. A little investigative legwork now might save you frustration (and money) later.

—eds.

Special Software

As a visually impaired person, I can appreciate Harry DeLong's frustration in his search for information on software and hardware that lets disabled people use computers (Letters, June 1986, p. 10). Such information is scattered, and the few listings I've obtained are of questionable accuracy, sporadically updated, and always (in my experience) incomplete. This is a reflection of the magnitude of the task: trying to generalize devices to assist people with a wide range of needs.

You should know that there is at least one computer and software dealer with a special-needs division staffed by sharp, well-informed people who enjoy their work—Summit Computer Systems, 6 East Willow Grove Avenue, Chestnut Hill, PA 19118, (215) 247-3660.

I purchased Word Talk, a talking word processor you mentioned in your response to Mr. DeLong's letter, through Summit's special-needs division. It also sells a wide range of machines directly and advise people with special needs on aids and software. It's also available for special construction and programming projects if needed.

Both Summit and Computer Aids, Word Talk's manufacturer, offer first-rate customer service after a sale. Computer Aids provides a toll-free number, which I've used a number of times, always with good results. Summit is doing what few can—specializing in knowing what's "out there" for people who need assistance to use computers, and carrying a wide range of special devices and software.

David Bates
209 Yale Avenue
Swarthmore, PA 19081

Internal Hard Disks: A Manufacturer Responds

In response to Bill O'Brien's review of our internal hard-disk system for the Apple //e [see Reviews, August 1986, p. 87], I agree that installing an internal system is a job for an experienced person. We try to dissuade most users from buying this configuration, pointing out its weaknesses as well as its good points.

It seems that most customers buy our internal systems for portability and not to save space on their desks. Several bought internal drives for use at trade shows and for auditing, are very happy with them, and carry them everywhere with little fear of shock.

We sell about 50 externals to one internal system, since the former are several hundred dollars cheaper and are "plug-and-go." When a problem occurs with an external drive, you can use the computer by simply unplugging the host card and booting normally, with no need to juggle the power supply, slot cards, and cables. The ease of sharing an external system between computers is another reason many don't purchase our internal drive.

Our internal system fits only the current Apple //e and requires you to remove only the top and case; there's no need to detach the keyboard, but you must mount a bracket for our controller card under the keyboard. By installing the controller under the keyboard and not inside the hard-drive cabinet, we were able to use a larger (75-watt) power supply—25 watts for the drive, fan, and controller card, leaving a full 50 watts to power the computer. Our fan does indeed move enough air to cool a fully loaded Apple //e with a monitor sitting on top and the hard drive reading and writing constantly.

Our internal and external systems can be configured several ways and are always shipped formatted and ready to use. NovoComp utility software allows partition of ProDOS, DOS 3.3, CP/M, and Pascal 1.2 volumes of various sizes and must auto-boot only from slot 6; our ProDOS-only system can boot from any slot and auto-boot directly into ProSEL, a program selector with many useful utilities. We also sell ProFIX, a utility that allows DOS 3.3 partitions on a ProDOS device.

As to the comment that our drives aren't the best possible example of state-of-the-art technology and that it's possible to attach a 3½-inch hard drive to a card similar to the IBM products: It takes only a minute to measure a 3½-inch drive and find that it won't fit on a standard 3.0-inch card, which is the maximum you can install in an Apple //e. The power for a hard-disk card as well as the heat could be solved, but I don't think it practical in the current //e chassis.

Our external drives are reliable, fast, and well priced. Our internals are for special users and not for the average person.

Charles F. McConathy
CMC Computer Systems
1514 East Edinger
Suite H
Santa Ana, CA 92705

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inCider *welcomes readers' comments regarding articles, letters, or other topics of interest. We reserve the right to edit letters for clarity, style, and space. Please address your correspondence to Letters,* inCider, *Elm Street, Peterborough, NH 03458.*

CORRECTION

We regret that Bill O'Brien's look at "Four Leading Choices" in Apple //e memory expansion (August 1986, p. 54) may have caused some confusion.

According to Dan Pote, president of Applied Engineering, "The RamWorks ProDrive does in fact recognize ProDOS pathnames." It doesn't *prompt* the user for a pathname to a hard-disk drive, but will use one: In AppleWorks, the user has to react to the prompt "Insert the AppleWorks startup disk in Drive 1" by hitting the return key. *Then* the prompt asks for a ProDOS pathname.

Note also that Applied Engineering's memory-management scheme is an approach to the problem that was originally developed by Apple, not Applied Engineering, as our article suggested. Some of the developers involved have worked for both companies at various times.

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NEWS LINE

edited by *inCider* staff

Apples on PBS

Programs designed on an Apple II will be integrated with shows in PBS' award-winning *Newton's Apple* series—and they can run on an Apple II in your home or at a local school as children watch the segments on television.

The project, believed to be the first of its kind, will use CompuServe, The Source, user groups, and private bulletin-board systems, in addition to initiating direct contact with school districts, to get the free programs to the public.

The first show is scheduled to be aired October 18, but segments involving the off-camera computer programs will begin with the third show, November 1, when *Newton's Apple* will examine both hypothermia and the phases of the moon. Later installments will discuss such subjects as mirrors, telescopes, the effect of alcohol on the body, and principles of probability as illustrated by dice throwing and slot-machine operation.

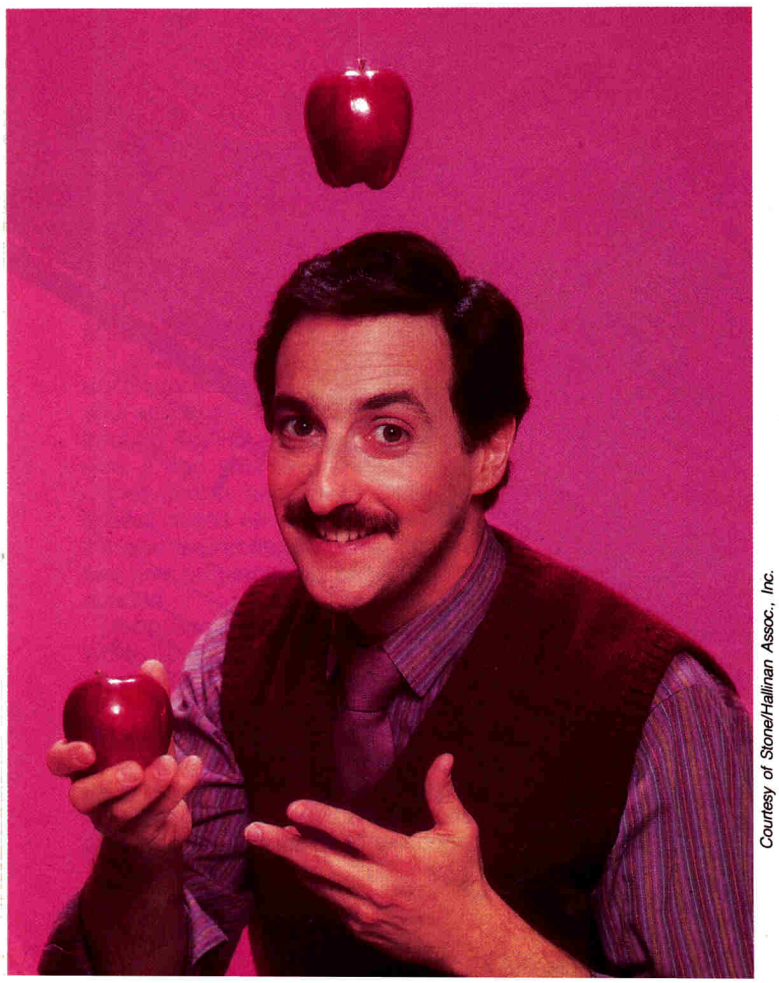
Because of limited public access to computer networks, the programs will be available through other means, as well. "We were going to do everything on bulletin boards, but as we spoke to more and more schools, we have now gone into more distribution systems," explains Gregory Cooke, senior associate of Stone/Hallinan Associates, the firm coordinating the *Newton's Apple* project. School kits will be distributed to science-department chairpersons in middle and junior-high schools, as well as teachers who are on the show's mailing list, Cooke adds.

Newton's Apple previously used computers to explore topics such as artificial intelligence and voice synthesis, explains James Steinbach, the show's executive producer. This doesn't compare, though, to the show's current venture, according to Steinbach: "It's better to have programs to use...on a person's own time."

Steinbach says he hopes *Newton's Apple* will expose more people to science and make learning interesting: "There has to be an excitement and enthusiasm for science."

"Basic design for this software is on the Apple, and it runs best on the Apple," adds Cooke, whose company has developed the six programs *Newton's Apple* will use. He notes that the original Apple programs will be converted to TRS-80 versions.

Du Pont, sponsor of *Newton's Apple*, is offering free off-air taping rights and free educational outreach materials for science teachers. **—B.J.**



Courtesy of Stone/Hallinan Assoc., Inc.

On Line Again

The *inCider* BBS is back.

After months of moving modems and a frantic phone-company fracas, *inCider* has taken its bulletin-board system down the hall and into our new offices.

We want to hear from you. We want to hear whether your Apple //c has a soldered MMU, we want to hear that AppleWorks 1.1 does indeed run on the UniDisk 3.5, that Viewtron went off the air the month we reviewed it—positively. We make mistakes, too, and the BBS is a good way to let us know about them.

Let's hear your problems. Send us technical questions, product questions, and hot gossip. Send us your best recipe for apple pie. Direct rumors to Editor in Chief Debbie de Peyster (#95), product news to Review Editor Eric Grevstad (#79), and tech trouble and pies to Technical Editor Paul Statt (#1). Compliments on *inCider* go to Debbie de Peyster; complaints to Managing Editor Dan Muse (#90).

Programs published in *inCider* will periodically pop up on the BBS. We'll take most of the free software from our Hints/Techniques column, but if enough callers ask for a favorite program from *inCider*'s past, we'll try to oblige. Some software publishers have threatened to supply demonstration programs—we'll see how that develops.

The *inCider* BBS has a television tie-in this fall: The software used on *Newton's Apple*, the popular PBS science show (see accompanying story, "Apples on PBS"), will be on line.

The *inCider* BBS uses GBBS Pro, written by Greg Schaefer at GS Software ($125 from Micro Data Products, 537 Olathe Street, Aurora, CO 80011, 303-360-6200). We have a 64K Apple //e, a Hayes Smartmodem 1200, an Apple ProFile 5-megabyte hard-disk drive, and a Pico Products 5¼-inch drive.

It's easy to talk to *inCider*—the BBS is simple.

The first time you log on, you'll answer a number of questions about yourself and your computer. If you answer honestly—no aliases, please—you'll be confirmed, usually within 24 hours (but not on weekends, when we're out picking apples). Help is available anytime by typing a question mark.

The weather in New Hampshire turns cold and lonely after the leaves fall. Talk to us—we miss you. The number is (603) 924-9801. **—P.S.**

Apple Software from Academia

Apple Computer has joined Kinko's Copies in offering the first *Kinko's Academic Courseware Exchange Catalog*. This semiannual guide will provide the academic community with information on purchasing educational software developed at universities for Apple II and Macintosh computers.

The spring 1986 edition of this catalog lists 30 educational programs; titles of more than 100 programs are expected to appear in the fall edition.

"For the first time, campuses nationwide can easily share the results of ongoing software development at leading colleges and universities," says Bud Colligan, Apple's manager of higher-education marketing. "Because university developers can now easily distribute their software while earning royalties, we anticipate this program will accelerate the development of software on campuses and will play a leading role in helping schools fully integrate university curricula."

The initial catalog lists such programs as Animated Waves and Particles, a program from the University of Tennessee that simulates wave and pulse behavior and other aspects of physics, and The Would-Be Gentleman, which simulates economic and social life in 17th-century France, from Stanford University.

Keith Lawrenz, director of the *Academic Courseware Exchange* project for Kinko, reports a "phenomenal response" to an initial mailing to more than 150,000 faculty members.

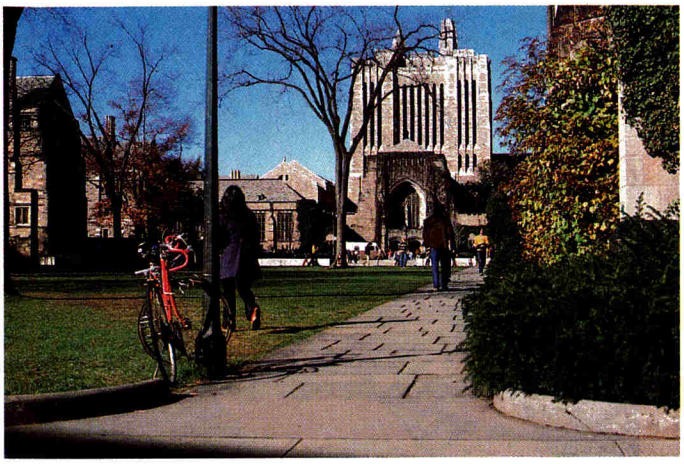
According to Kinko, the catalog will be available at any of the company's 300 stores, serving teachers at more than 500 colleges and universities: Educators should be able to assign software to their classes as easily as they assign textbooks. Program prices will range from $7 to $30.

If you're interested in purchasing educational software for yourself or your school through the *Academic Courseware Exchange*, contact Keith Lawrenz at (800) 235-6919, or at (800) 292-6640 in California. **—L.L.**

Try Before You Buy

Soon you may not be able to rent software for your computer. Congresswoman Pat Schroder (D-Colorado) has introduced a bill (HR-4949) that would make renting microcomputer programs illegal.

Although nothing in copyright law actually prohibits software rental, most software companies don't allow it in their license agreements.



Courtesy of Taurus Photos/S. Beckwith

"Software is not rented to be used once," says Ken Wasch, executive director of the Software Publishers Association. Unlike renting a videocassette of a movie you may want to watch only once or twice, programs are usually rented for the purpose of making permanent copies, according to Wasch.

"You're not going to rent dBase III to use for a couple of days, and then return it," Wasch claims, adding that complicated programs can't be learned during the usual rental period. Wasch says that if software is rented, it will be pirated "with no compensation for the copyright holder."

Three types of businesses currently offer software rental. Mail-order companies are the most dangerous, Wasch says, because "they have fewer scruples" than other rental outfits.

In addition to mail order, some stores are set up specifically to rent software. And, third, some standard software retailers also rent programs. Wasch says these dealers are "slitting their own throats": They may justify the cost of a piece of software by renting it until it pays for itself, but they're not accounting for possible piracy and loss of sales in the long run. With the growth of the software-rental industry, more programs will be stolen, and the software industry will sustain the damages, according to Wasch.

Schroder's bill is similar to a 1984 law that bans the rental of record albums for the same copyright reasons. "She [has] foresight [regarding] the danger posed to the software industry," Wasch says of Schroder.

Although Wasch notes he doesn't expect Congress to approve the bill this year, he says he believes it should pass next year and that he anticipates it will deter anyone from getting into the software-rental business. "I'd hate to invest $30,000 for inventory in a business that may be illegal next year," he comments.

Although rental isn't the biggest problem in the overall issue of software piracy, Wasch says, "we want to nip it in the bud." **—L.L.**

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NEWS LINE

Apples Link the Generations

Syracuse University's Gerontology Center is involving the elderly in computer use through two educational projects. By encouraging program participants to teach local elementary-school children about computers and taking part in a study that would establish a computer network for elders, the Center is hoping to engage the elderly in both interpersonal communications and telecommunications.

Members of one Gerontology Center project taught students at nearby Webster Elementary School about two Apple software packages, EZY Logo and Friendly Computer, a tutorial on computer hardware. This spring's pilot program began March 18 and continued through the week of June 16, with five members spending two hours a week in the classroom to instruct 88 students at Webster. The program was organized following a similar project with preschoolers as young as three years old at Syracuse University's Day Care Center last fall.

According to Maureen Goodman, assistant director of the Gerontology Center, some of the elderly were at first pessimistic about using computers. "A few of the elders involved in the project felt they didn't know enough about the computer to train others," she says. "But when it came right down to it, these people were computer literate, and they knew more than they realized." Some members are now eager to learn more sophisticated programs, she adds.

Goodman, who says Friendly Computer and EZY Logo were chosen because they are "simplified tools," views the project as "multigenerational." The elderly taught older children, who in turn trained younger children.

The program will expand to the Bellevue Elementary School this fall and possibly to students in the Fayetteville-Manilus school district. "[The projects] give the elders an opportunity to be a vital part of the community," Goodman notes.

Meanwhile, the Center will also be linked to other senior organizations and research groups around the country as part of a study being conducted by the University of San Francisco. The study will establish a computer network for the elderly and monitor its use as a way to gain insight into such areas as history and modern society.

"SeniorNet: Computers for Kids over 60" will make services such as electronic mail and information retrieval available to the users at Syracuse's Gerontology Center and four other research sites across the country, in addition to other organizations for seniors. The network will also hold monthly teleconferences featuring guest speakers on health care, financial planning, travel, and other topics of interest to seniors.

The Gerontology Center will use Apple //c and Macintosh Plus computers, loaned to the center by the University of San Francisco for an initial period of six months.

Researchers hope that users of the network will not only utilize the system's information services, but will communicate their life experiences to give researchers a firsthand view of history and society. **—B.J.**

We're always looking for news of the Apple world. If you're making news, send your press releases and photographs to News Line, inCider, Elm Street, Peterborough, NH 03458.

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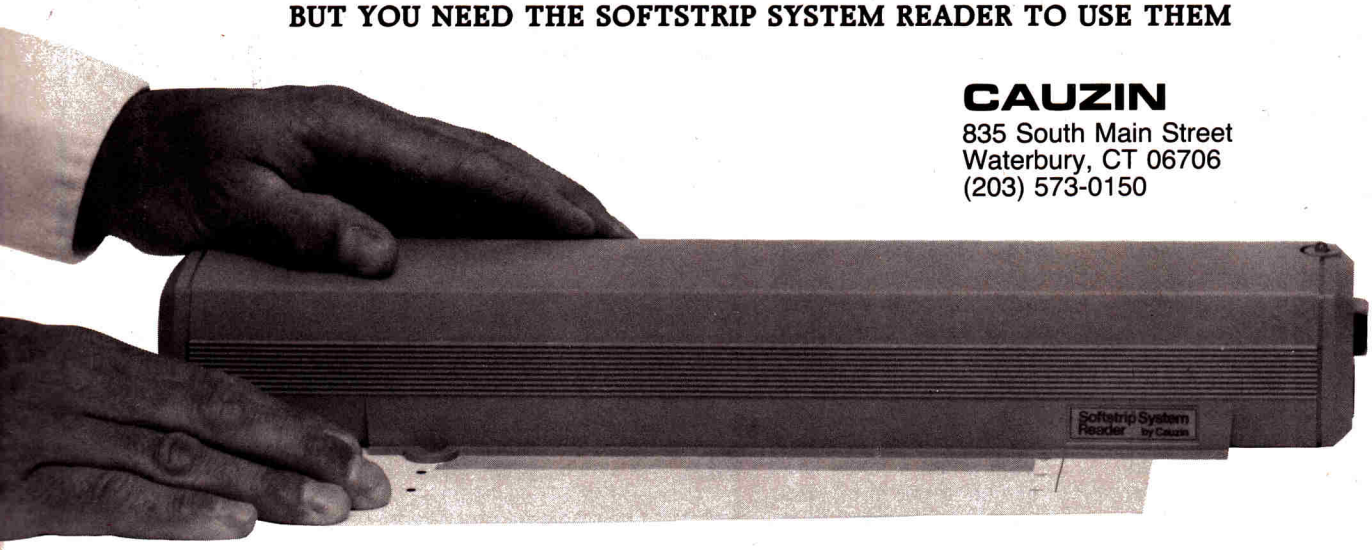

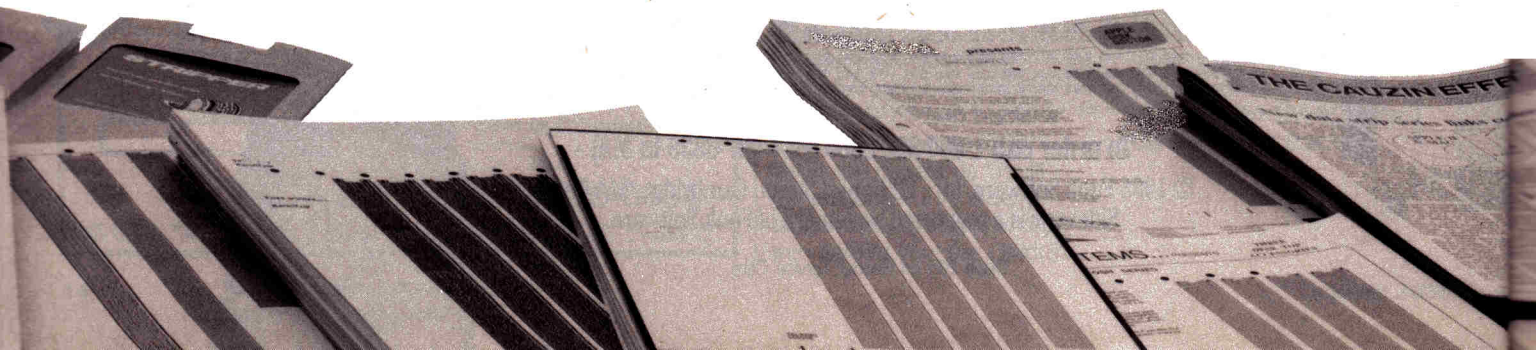

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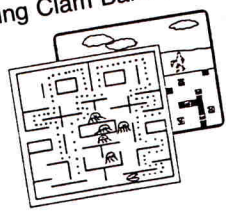

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APPLE CLINIC

by Bob Ryan

Apple Clinic is a forum for discussing Apple II hardware, software, and related subjects. If you have questions or answers, or want to make a statement, write to Apple Clinic, inCider, *Elm Street, Peterborough, NH 03458.*

Display Decisions

I'm interested in getting a new color monitor for my //e. I want to replace my Pi-3 amber monitor and BMC composite monitor with a Princeton Graphic HX series RGB monitor. I plan to use a Video-7 Color Enhancer/80-column/64K board to make the connection, but I need some information on the HX-9 and HX-12. Is the 9-inch screen of the HX-9 comfortable to read, and is the text as good as with a monochrome monitor? Is all Apple software compatible with RGB monitors? Finally, do you know of any hardware-compatibility problems with this type of monitor-interface combination?

Edward E. Brown
Vancouver, WA

I've found the Princeton Graphic HX-9 to be a superior RGB monitor. Since it has a 9-inch screen, text is smaller on it than on a standard 12-inch screen, but I find that the sharpness and clarity of the monitor more than make up for its size.

You could draw an analogy between the HX-9 and the Macintosh screen: Although the Mac doesn't have extremely high resolution (512 by 342 pixels), it outputs those 175,104 picture elements to a 9-inch screen, resulting in a very sharp—though small—display. With an HX-9, you make the same trade-off—size for clarity. The text on either of the HX-series monitors is as sharp as that on a monochrome display.

I have yet to encounter a program that doesn't work with a Video-7 RGB card, although I can't make blanket claims about compatibility. All text-based programs will work fine with an RGB monitor.

You'll encounter hardware-compatibility problems if you try to use either the HX-9 or HX-12 without a Mappler device from Video-7. The HX-12 simply won't work without this device, which translates Apple RGB signals into IBM-compatible RGB signals. The HX-9 has an Apple setting that supposedly lets you get away without a Mappler, but it's been my experience that the colors you get without the Mappler are washed out and inferior to those you get using the Mappler and setting the HX-9 to run as an IBM monitor.

Dead MMU

I own an Apple //e, but can't use it because the MMU chip (memory-management unit) is on the blink. I live in a town that doesn't have an Apple dealership, and I'm having a tough time finding a replacement for the MMU. Do you know where I can purchase an MMU for my //e? I don't want to take it to a dealer, since the nearest one is 80 miles away. Any suggestions?

Bhavesh Patel
Bay City, TX

The memory-management unit, one of the three large chips in a //e or //c, is a proprietary chip—it's made solely by Apple Computer for use in Apple machines. Consequently, you can't get it from any third-party chip supplier: The only place you can obtain it is an Apple dealership. The MMU is a socketed chip, so it doesn't require a motherboard swap. Call your nearest dealer, even if he's 80 miles away. He should be able to swap your MMU while you wait.

Compiled Subroutines

Rather than use subroutines written in Applesoft and accessed with GOSUB statements, I want to compile my subroutines and issue a CALL statement. How can I do this on a //e?

Vincent Foster
Norman, OK

You need an Applesoft compiler to translate your Applesoft subroutines into the machine-language code you can access with a CALL statement. Check with your dealer for a list of companies that make compilers for Applesoft. Compiling subroutines, however, isn't the most efficient way to create machine-language routines. Compiled Applesoft code tends to be a lot larger—and I mean a lot *larger—than tokenized Applesoft source code. And the smaller the Applesoft segment you compile, the greater the relative inefficiency. In the long run, coding subroutines in assembly language is the only efficient way to create CALLable Applesoft subroutines.*

Integer Again

I'd like to know how I can get Integer BASIC into my Apple //e so that I can run public-domain programs that require it. Also, how do I tell if my //e is enhanced? What is "enhanced," anyway? Finally, how come I can't always access all my //e's 128K of memory? I'm thinking of getting an expanded-memory card for my Apple that lets me use all the memory available. Can you recommend one to replace my lousy Apple Extended 80-Column Card?

Robert W. Krueger
Northville, MI

Applesoft BASIC is the language built into your //e. Integer BASIC was the original language built into the Apple II, but Applesoft—a floating-point language—supplanted it with the advent of the Apple II Plus in 1978. To run programs written in Integer BASIC, you have to load the language from disk and use the INT command to swap it with Applesoft. Integer BASIC is available from Apple Computer on the DOS 3.3 System Master Disk. By the way, Integer BASIC doesn't run under ProDOS. As far as I know, no one has written an Integer BASIC.SYSTEM file.

If your //e has a sticker that says "enhanced" over the power-indicator light on the keyboard, it's enhanced. An enhanced //e has a different set of

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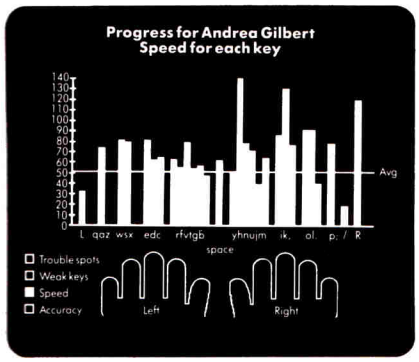

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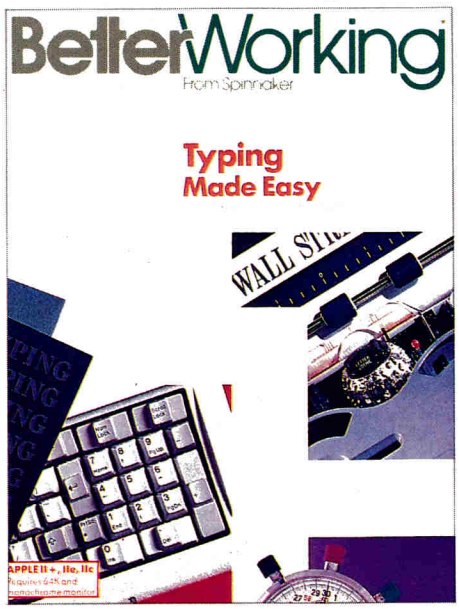

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ROM chips and a slightly different CPU from an unenhanced //e. The differences are significant only if you plan to run programs such as MouseWrite that require the mousetext characters or programs such as SuperCalc3a that need a 65C02 processor. One other difference is that enhanced //e's have the old mini-assembler built in. Of course, if you buy Integer BASIC, you also have access to the mini-assembler.

There's nothing wrong with your Apple Extended 80-Column Card. Many programs, especially older ones, don't take advantage of the extra memory provided by the Extended 80-Column Card or by any of the third-party extended-memory cards. The problem is the software, not your hardware. Many companies don't want to write programs that utilize extra memory because they want their products to run on all Apple II's, not just the newer ones. If you want to use all your extra memory all the time, I suggest you get an extended-memory card and the appropriate software to use your memory as a RAM disk.

MultiPlan Headache

Now that hard-disk drives are becoming a common peripheral for the Apple //e, the problems of using them with DOS 3.3 software are becoming current. I would appreciate any advice you can give me about how I can use MultiPlan from Microsoft with a //e. I happen to like the internal Challenger disk made by Space Coast Systems, but I'd like to know how to use the program with any hard-disk system.

H. Michael Hartmann
Chicago, IL

I've been in touch with both Microsoft and First Class Peripherals about this problem, and I'm afraid I don't have an answer for you. Microsoft has no plans to introduce a ProDOS version of MultiPlan or a noncopy-protected DOS upgrade. First Class Peripherals, makers of the popular Sider hard disk, says it knows of no way to transport MultiPlan to a hard disk. It looks as though MultiPlan and hard disks just don't go together. This is an excellent example of why copy protection is such a bad idea for any type of software except games: It gets in the way of legitimate users.

Addressing Your Buttons

I have a couple of programming questions. First, what is the Applesoft address for the joystick buttons? Second, how do I get shape tables to work in my BASIC programs? I have no trouble creating shape tables, but I can't seem to get them to work.

Inmate #423157253S
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The address of button zero is 49249; button 1 is 49250; button 2 is 49251. If the value in any of these locations is greater than 127, the button is being pressed.

To use shape tables, follow this procedure: Load the table into memory, protect it with HIMEM, set a scale (something many people forget to do), then access the individual shapes in the table with the DRAW and

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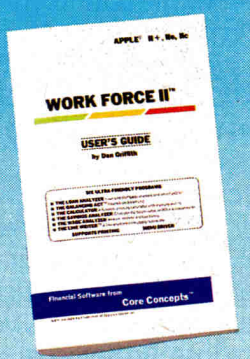

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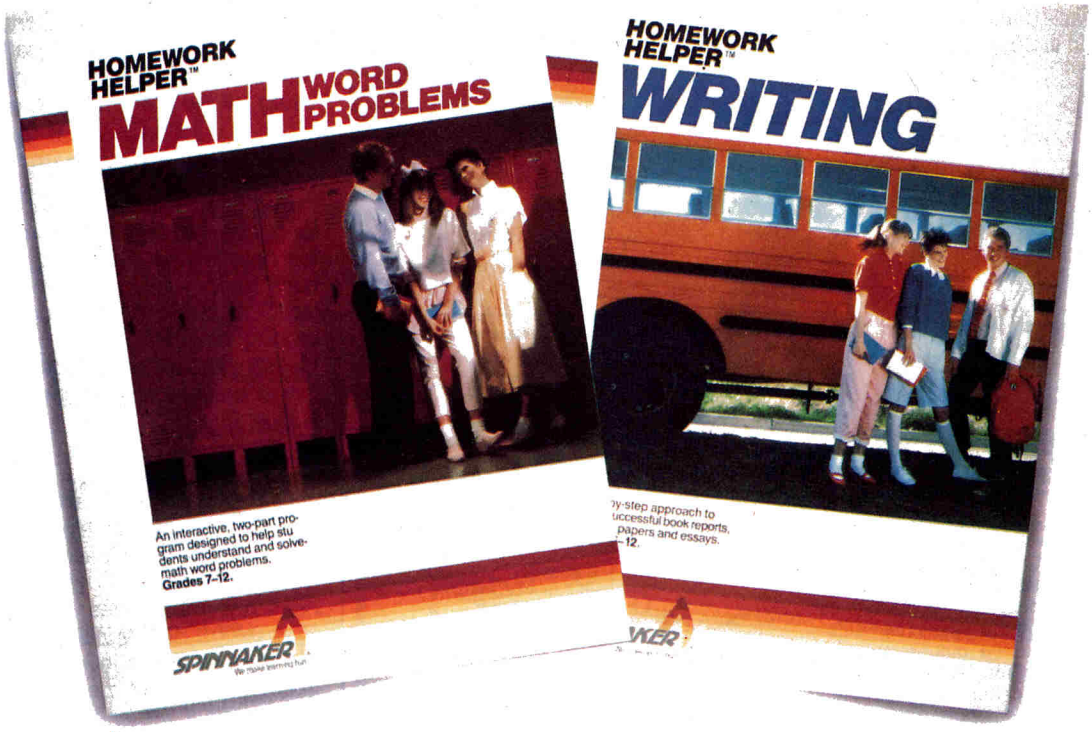

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XDRAW commands. If you're having trouble with shapes and you've read the manuals, you're probably either clobbering the shape table by not moving HIMEM or you're not setting a scale.

Missing RAM Disk

Can you tell me how to access the built-in RAM disk in my //c? I can access the /RAM pathname from BASIC, but I can't seem to do so from AppleWorks or my System Utilities disk. Any ideas?

C.R. Keith, Jr.
Niceville, FL

The RAM disk in your //c is not a physical device; it's created by software to take advantage of the upper 64K bank of your 128K RAM when the current program uses only the lower 64K of RAM. Applesoft, for instance, uses only the lower bank of memory, so you can use the upper 64K as a RAM disk. AppleWorks and System Utilities, on the other hand, are designed to take advantage of all 128K in your machine. Consequently, you can't use the /RAM pathname with these programs; they're already using all the RAM in your system.

Assembly Locations

I've been learning about assembly language for six months from a book. It's not clear in describing which locations I can safely use without destroying DOS, losing BASIC programs, erasing variables, and so on. Could you please list some good locations for my longer machine-language programs?

Eric Tully
Avon, CT

One location you can use is $0300—but first get ahold of another book. Try Don Lancaster's Assembly Cookbook *(listed above), Roger Wagner's* Assembly Lines *(Roger Wagner Publishing), or Wagner's Right of Assembly column in* inCider. *At the very least, get a good memory map of your Apple II, //e, enhanced //e, or //c. According to* What's Where in the Apple *(Micro Ink), $8F57–$91B9, $91B9–$940C, and $940D–$95FF are spaces normally available for "user use," unless you use too many DOS files. Don Lancaster recommends originating assembly programs at $6000, somewhere in the middle of the memory map. Whatever route you take, be sure you at least consult one of these other resources. —P.S.*

Have Your Cake and Eat It, Too

Last month, I answered a question for a reader who wanted to run some programs that needed the enhanced //e ROM's and others that worked only with the older //e ROM's. I've since learned of a product that lets you have it both ways. The product is Switchback from Computer Accents. Switchback is a daughterboard that carries one of the chip sets, while the other one resides on the motherboard of your //e. By flipping a switch, you can choose between the old ROM set or the enhanced ROM set—no more chip pulling! For more information, contact Computer Accents, P.O. Box 5905, Houston, TX 77325.■

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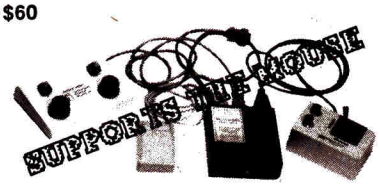

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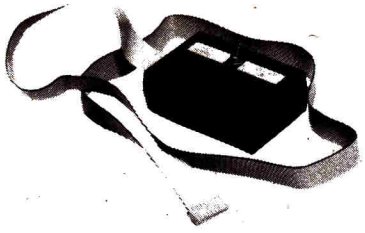

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Suitable for use on the Apple IIe or II+ computers. With the IIe, regular Apple controllers (i.e., gamepaddles, joysticks, and *Paddle Panel*) can be plugged into the computer in the normal manner with no interference. A Select-A-Port* device is recommended when used with an Apple II+ computer.

Paddle Panel

The *Paddle Panel* replaces the hand held gamepaddle devices allowing better control as well as bilateral manipulation activities. The *Paddle Panel* units are available for use with Apple IIe, IIc, Atari, and IBM computers. It plugs directly into the game I/O port on the back of the computer. Precision components were used to insure accuracy and to produce a quality "feel".

This hardware is compatible with programs produced by Psychological Software Services, Inc. and any other programs requiring standard gamepaddle input.

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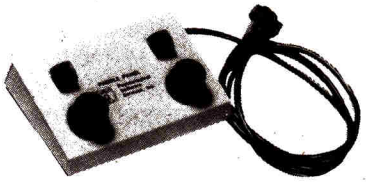

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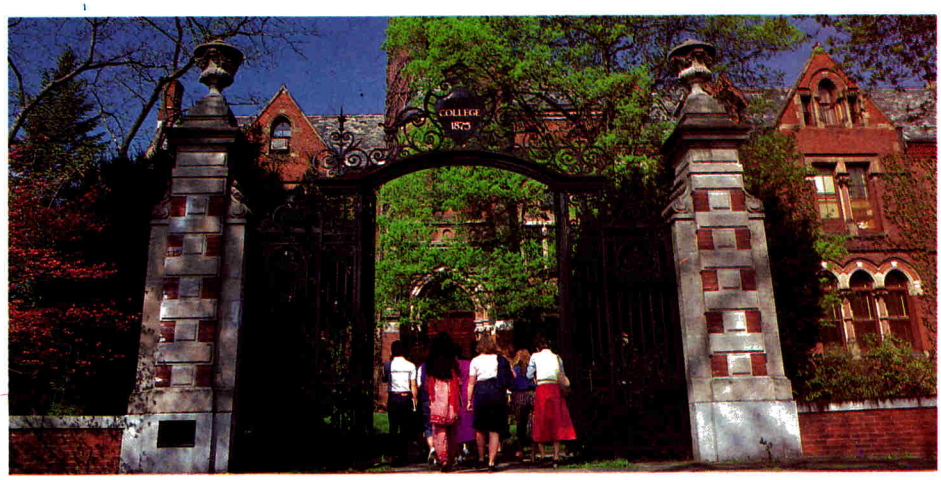

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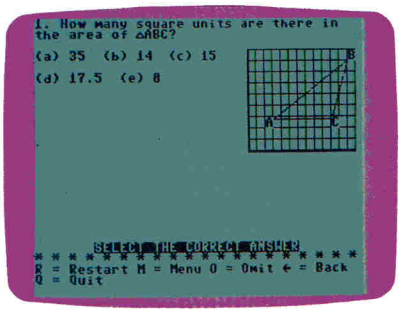

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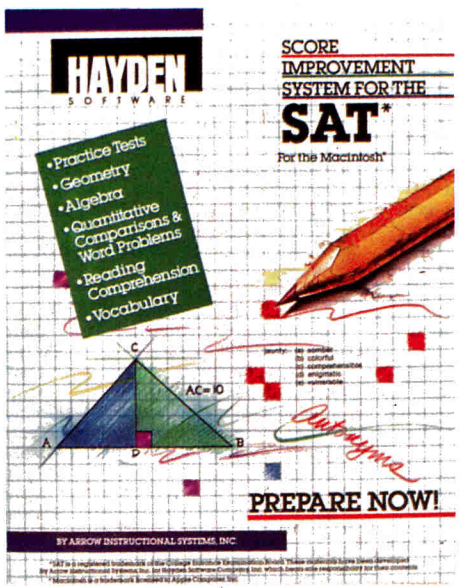

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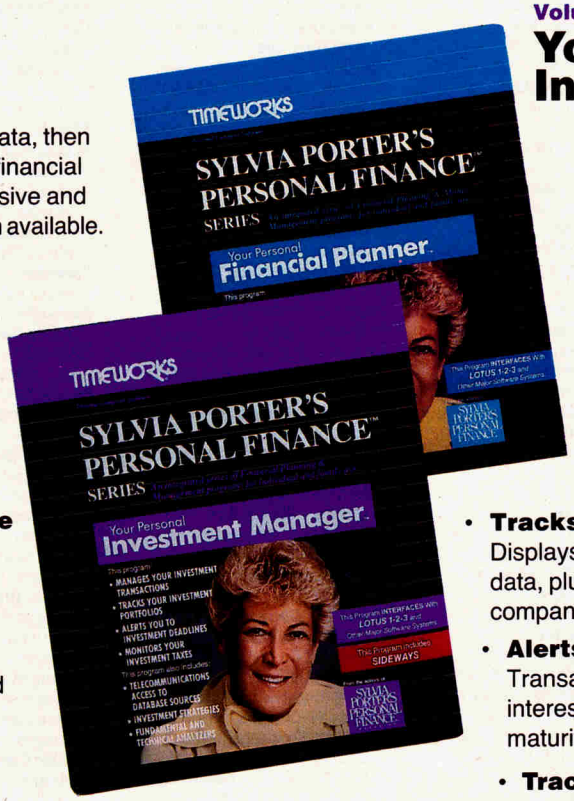

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Both Pinpoint Spelling Checker (version 1.0) and Spellbound (version 21) are designed to help you correct spelling or typographical errors in documents you create with AppleWorks. There the similarity ends.

Pinpoint Publishing's product should prove worthwhile for many people—particularly those who already own the company's popular desktop-accessory program, Pinpoint. Quorum's product, on the other hand, seems ill-conceived and bug-ridden.

Prerequisites

Pinpoint Spelling Checker is a bit finicky in its requirements: You'll need an Apple //c or an enhanced //e. If you choose not to "enhance" with the upgrade available from your Apple dealer, you can purchase the Pinpoint Upgrade Kit for $29. This do-it-yourself package includes mousetext video and Apple's character-generator ROM's, and a 65C02 microprocessor, but not Apple's proprietary "CD" and "EF" ROM's, required by most mouse-based software.

In essence, Spelling Checker is an "add-on" for Pinpoint. If you don't already own Pinpoint, it'll cost you an additional $69.

Spellbound is much less demanding. All you need are an Apple //c or unenhanced //e and AppleWorks.

New, Improved AppleWorks

Although both programs modify AppleWorks, neither changes the way it looks or operates. Like a stem grafted onto a strong root stock, a spelling checker simply makes Apple's vastly popular integrated program more fruitful.

Grafting the Pinpoint Spelling Checker onto AppleWorks is more demanding and time-consuming than installing Spellbound, though the documentation leads you through the process step by step. Simply stated, you install Spelling Checker on Pinpoint, then install Pinpoint on AppleWorks.

You can set up Spellbound much more readily. Following on-screen instructions, you quickly modify your AppleWorks Startup disk. If all goes well, an "installation successful" message appears on screen. If not, the 16-page manual leaves you in limbo: "Just try again." (Luckily I had to try it only once.)

Under the Spell

Once it's installed, invoke Pinpoint Spelling Checker just as you would any of the other accessories on Pinpoint's closed apple-P pop-up menu.

On floppy- or UniDisk 3.5-based systems, bringing the spelling checker from disk to RAM is disappointingly slow. If you have a compatible RAM card from AST Research, Applied Engineering, or Checkmate Technology, though, you can load everything—AppleWorks, Pinpoint, and all the Pinpoint accessories—into working mem-

ory when you start up your computer.

Pinpoint Spelling Checker works with AppleWorks spreadsheet and data-base files, but it seems most practical to use the spelling checker with word-processing files.

If you like to edit as you go, you can check individual words or paragraphs. Since I prefer to clean up my text after I finish writing, I favor Spelling Checker's "document" option.

In this mode, a self-directed highlighting cursor moves from word to word as it checks each against its dictionary. Gentle beeps (you can turn off the sound if you prefer) follow the cursor as it travels through the text. Unless you have a RAM card, you'll notice an extraordinary amount of disk access during the checking process. But when you consider that Spelling Checker's dictionary holds about 61,000 words, you might conclude that a program that capably searches through a volume of that size is pretty extraordinary, too.

If Spelling Checker comes to a word that doesn't appear in its dictionary, it halts, and a pop-up window appears. This Quick Check window contains a list of up to ten likely alternatives. If one of the suggested spellings is the term you want, simply move the cursor to it and press return. Spelling Checker automatically replaces the error with the right word.

If the word you want isn't in the suggested list, you can return to your document to manually edit the word. If you've spelled the word correctly but it's not in the program's dictionary, you can add it. You can reach on-line help in the customary fashion: open apple-?.

Spellbound? Not Even Close

You can't operate Quorum's program the way you do Pinpoint's—calling up the accessory when you need it. Instead, Spellbound coexists with AppleWorks from startup. The initials *SB* appear in the bottom right-hand corner of AppleWorks' Review/Add/Change screen.

Spellbound is a real-time spelling checker. Instead of checking after you've prepared a document, Spellbound is on the alert while you're typing, it's Autopilot feature fixing misspellings or typos as you make them.

This type of program operation could be annoying—even if it worked properly. Spellbound doesn't.

I tried to write a short essay with Autopilot turned on. Whenever I typed *to* as in *to be* or *to the store*, Spellbound automatically added another *o* to make my word *too*. Other unwelcome intrusions included changing *forth* to *forty*, *that* to *than*, and *is* to *its*: a spelling checker that spells worse than people do!

In addition, I was unable to check a previously saved word-processing document, and I couldn't get Spellbound's List Words command to work reliably.

Spellbound suffers from paltry dictionaries. (Two word lists come with the program: One contains the most commonly used English words; the other contains words most commonly misspelled.)

Each dictionary (including any user-created one) is restricted to about 2000 words. Worse, if a word doesn't appear in a dictionary, it won't be flagged as misspelled. For instance, the phrase *worng wrods* is acceptable to Spellbound. Pinpoint Spelling

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Circle 165 on Reader Service Card.

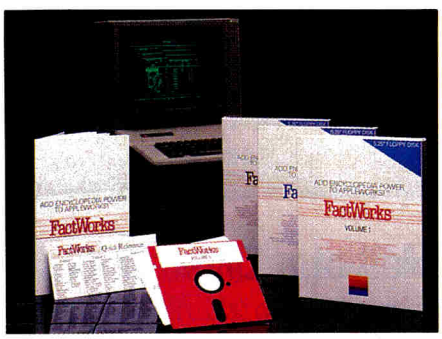
Checker, on the other hand, recognized both errors and suggested *wrong* and *words* as replacements.

Spellbound is hardly true to its name. Instead of leaving you charmed or fascinated, it ignores errors and bastardizes flawless prose. ■

Cynthia E. Field
Wakefield, RI

Editor's note: Quorum's Douglas Chew contends that comparing Spellbound, "the sports car of AppleWorks spelling checkers," to others is like saying that "a sports car makes a lousy truck." The sports car, in Chew's metaphor, is "somewhat less reliable but easy to use and faster" than a noninteractive program with an "unnecessarily huge" dictionary.

Reviewer Field's problems with "to" and "too," Chew says, resulted from using Spellbound's "most frequently misspelled" instead of "most commonly used" word list; the program, like other checkers, can be customized to a user's own vocabulary. The bug in the List Words command has been fixed in current production copies.



A Matter of Facts

FACTWORKS

ImagiMedia Software, 16640 Roscoe Place, Sepulveda, CA 91343

AppleWorks data base (three volumes); Apple //e or //c, 80-column extended-memory card (for //e), AppleWorks, one drive (two recommended)
$32.95 per disk

Ease of setup ■■■■
Ease of use ■■■■
Documentation ■■■
Support ■■■
Overall ■■■■

If you can use AppleWorks, you can use FactWorks—it's that simple. FactWorks turns your AppleWorks program into an electronic encyclopedia. In fact, the FactWorks disks are essentially AppleWorks data disks,. so using them is just a matter of putting in a disk and calling up a file.

The three FactWorks disks contain a diverse array of information: lists of dinosaurs, constellations, and Super Bowl winners, for instance. Scroll through lists of cats, dogs, mammals, and mountains or read the Declaration of Independence, the Constitution of the United States, or the Gettysburg Address.

You can use the FactWorks files for research and quick reference. The program includes files of encyclopedia-type information, and things you may need to look up every day. It's a lot easier to call up the files of area codes, toll-free airline numbers, or time zones with FactWorks than to look for that information elsewhere.

"EDITOR'S CHOICE"— *inCider*

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There's also a "friends" filer, in which you can list a variety of information about the people you know.

FactWorks can even help you with financial planning. Volumes 1 and 2 have spreadsheet files that let you plot loan and interest rates for a 36- or 48-month car loan, and a home loan amortizer for a 30-year mortgage. Volume 3 contains formats for a bill of sale, lease and rental agreements, a straight note for repayment scheduling, and a last will and testament.

Flexible Files

The biggest advantage of FactWorks is that you can modify all its files—add or delete information just as if you'd created the file from scratch. For instance, while the file of U.S. Presidents has quite a bit of information on each man, there may be a couple of notes you'd like to include. And in the Authors file, you might want to add a couple of works to the list of a writer's credits.

The only problem here is that the FactWorks master disks are quite full, so to save your new file, you'll have to use a different disk. The documentation suggests deleting the file from the disk and saving the new one from the desktop, but if the disk has only 1K left to begin with, for example, that won't be much help if you've added a lot to your file. This isn't a real problem though—just keep a couple of formatted disks on hand. You'll need some to make back-up copies anyway.

The brilliantly colored FactWorks master disks contain files on both sides. The documentation instructs you to copy each side to a separate disk, so you'll end up with six working copies of the FactWorks disks.

A Simple Explanation

FactWorks' operation is so simple, it doesn't need much explanation, but the documentation will tell you how to get the most out of using the disks with AppleWorks. It's clearly written and easy to understand. If you're not familiar with some of AppleWorks' reporting and printing functions, you might also want to have the AppleWorks manual handy while you're browsing through the FactWorks files.

Each volume of the FactWorks documentation includes an index listing the files available on all three volumes by category (Animals, Science, Sports, and so on). There's also a helpful tear-out Quick Reference card that lists the files available on each disk. Instead of searching through disks and documentation, you can just prop this card on your machine and pick a file.

FactWorks is a pretty neat addition for AppleWorks. In this first set of three, there's enough variety to satisfy just about anyone's curiosity. And the folks at ImagiMedia plan to produce more FactWorks volumes. If you're an AppleWorks user, FactWorks is an easy way to get at a lot of information. ■

Lafe Low
inCider *staff*

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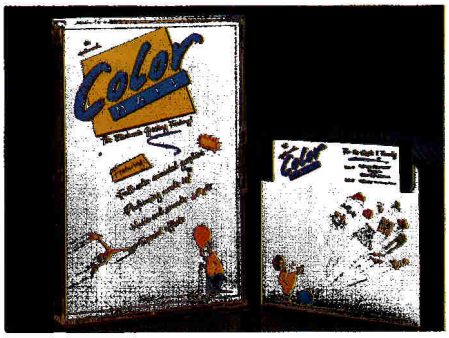

Mail of a Different Color

COLOR MAIL

Hallmark, 2440 Pershing Road, Suite G-40, Kansas City, MO 64108

Animated electronic mail; Apple II Plus (64K), *IIe, IIc*; modem, CompuServe account
$40

Ease of setup	■■■
Ease of use	■■
Documentation	■■
Support	■■
Overall	■■

Just when you were getting familiar with CompuServe and electronic mail, the folks at Hallmark have come up with something to liven up your telecommunications. Instead of plain old text, Hallmark's Color Mail lets you send your own electronic greeting cards in living color and sound. All you

800K for Apple //, Laser 128

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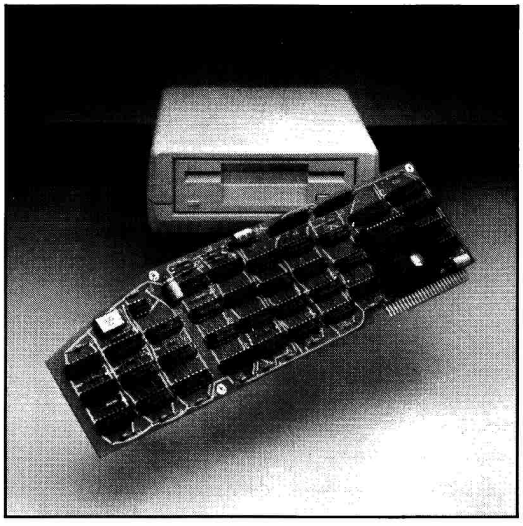
Now you can add 800K of Apple Unidisk 3.5 compatible storage to your Apple // *at an affordable price.* Our Universal Disk Controller™ allows you to directly connect virtually any drive made for any Apple (even Macintosh) to your Apple // Plus, //e or Laser 128.



Universal Disk Controller

This new controller card combines the functions of 3½ and 5¼ inch drive controllers into one card. Plug in any 5¼ inch disk drive (it supports both old-style 20 pin connectors and //c style DB-19 plugs). Or directly connect an Apple Unidisk 3.5. But most remarkable, the Universal Disk Controller directly accepts Macintosh compatible 800K and 400K external drives.

Unidisk 3.5 Compatible

When used with a Mac compatible drive, you still get the identical 800K format used by Apple's Unidisk 3.5—at a considerable price savings. Disks created in Apple's Unidisk 3.5 will work with a Mac drive connected to the Universal Disk Controller and vice-versa. Data Transfer rate is up to par, too. The Universal Disk Controller talks to any drive at full speed.

Mix and Match

You pick what two drives to connect. Plug in two 5¼ inch drives and use it as a standard floppy disk controller. Or connect two Mac drives for a total of 1.6 megabytes of storage. Of course, you can combine drives of different types, too. Connect a 5¼ inch drive and a Mac 800K drive, or an Apple Unidisk 3.5 and a Mac drive, or . . .

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Copy II Plus is included free with every Universal Disk Controller. This package of DOS/ProDOS utilities works with 5¼ and 3½ inch drives and was voted the utilities winner of the A+ Readers' Choice Awards.

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No matter what type of Apple compatible drive you have or plan to buy, everything needed to connect it to the Universal Disk Controller is included. Even older Apple // Plus drives plug in directly without adapter cables.

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And ship them to me at this street address ASAP:

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Address _____

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and expiration date_____

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Circle 62 on Reader Service Card.

need is your Apple and a modem.

The Color Mail disk contains ten library files ranging from "Holidays" to "Creatures," letting you design your greeting from a selection of various backgrounds, characters, and symbols. You can put text in two different sizes and colors anywhere on the card. You can also animate many of the pictures—simply indicate where you want the picture first displayed and mark each subsequent spot with the space bar. The chosen image—for example, a mosquito that wiggles its wings as it buzzes across the screen—will appear on cue.

A number of sound effects are available, as well. Would you like your greeting to include the sound of hoofbeats, a ringing phone, lightning, a ghost who makes haunting noises, or the whooshing of gale winds? How about one of 11 songs, including *Hail to the Chief*?

Creating your card is as simple as placing items on your screen where you want them to be and in the order you'd like them to appear. The process is quick, easy, and fun.

Colorful Extras

Color Mail comes with Vidtex, a terminal program that works with your modem to let you connect to CompuServe (and other information sources). It isn't as easy to use as Apple Access II, but it's efficient and copyable (Color Mail itself is copy-protected).

CompuServe includes special Color Mail sections to which you can download other libraries and send your best creations to be judged (and perhaps win a prize). You can also list your name and special interests, along with your CompuServe ID number, in hopes of receiving greeting cards from others on the network.

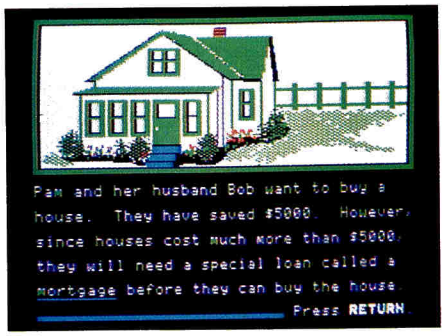
Once you've saved a picture or downloaded some Color Mail from another CompuServe user, you can edit it the same way you originally created your own greetings.

Some parts of this package aren't perfect, including the fact that you spend a lot of time waiting for information to load from disk. You're allowed to select only five items at a time from the library; each time you want to add something else, there's a bit of disk access.

The 55-page Color Mail manual includes instructions for both Apple and Commodore users, but it would be a bit more useful if it contained an index. While Vidtex includes a print option, I was surprised there's no way to print your greetings from the Color Mail program itself.

My complaints are minor, though. Color Mail is a fun program you'll enjoy and use. ■

Gregory Glau
Prescott, AZ



In the Money

BANKING
MONEY MANAGEMENT

Marshware, P.O. Box 8082, Shawnee Mission, KS 66208

Financial-management software; any 48K Apple II, one disk drive, color monitor recommended, printer optional
$49.95 each

	Banking	Money Management
Ease of setup	■■■	■■■
Ease of use	■■■	■■■
Documentation	■■■	■■■
Support	■■■	■■■
Overall	■■■	■■■■

You may think folks who can afford a personal computer don't need financial-management products like Banking and Money Management. Surprisingly enough, though, financial advisors tell us that less affluent people aren't the ones who use their services the most. It's the up-and-comers who seem to have the most trouble handling all that green stuff.

Banking and Money Management are published by the software division of Marsh Film Enterprises, a company that has been producing educational filmstrips since 1969. As you'd expect, these packages are targeted toward students. However, they work just as well at home as in school.

Bank on It

Banking, the first program in the Marshware financial series, uses graphics and an interactive tutorial to teach you about savings and checking accounts. You choose a computer friend, Pam or Bob Smith, and accompany her or him to the bank to open an account and make deposits and withdrawals.

All the usual bank forms—even the signature card—are simulated on your screen. Filling in the information is nearly identical to completing the actual paper forms your bank uses.

The program gives you a simulated monthly statement for both accounts and leads you through the reconciliation process. A four-function calculating program built into Banking helps you with this.

Banking includes an Interest Calculator utility that lets you watch your savings grow. With the help of this calculator, you can determine how much you'd need to invest at a given interest rate to buy that ten-speed bike or hard-disk drive next year—or five years from now.

Banking includes hints to help you protect your money, too. The program tells you it's a good idea to write "For Deposit Only" on the back of your paycheck before you endorse it. It also reminds you to use a pen when you write checks. Older and wiser people are already aware of these precautions, but youngsters may not be.

This preliminary money-handling program attempts to teach responsible financial habits. I chuckled when I came to the part of the program that says, "Before Bob writes the check, he looks at his bank balance to make certain he has enough money in his account to pay for the shirt." Parents might also learn a bit from the program.

From Here to Eternity

The second program in the series, Money Management, is well named. This program shows you how to prepare a budget, apply for and manage a credit card, apply for a loan or mortgage, and plan for a comfortable retirement.

All the activities take a tutorial simulation approach, with Pam and Bob as your computer friends again. In each module, you make the decisions, but be careful: If you charge too many goodies on your credit card, you'll have to take money out of savings to pay the bill when it comes. Then the program will chide you for managing your money poorly.

The loan and mortgage sections

MANAGING YOUR CHECKBOOK?
MANAGING YOUR BUDGET?
MANAGING YOUR BILLS?
MANAGING YOUR CASH FLOW?
MANAGING YOUR TAXES?
MANAGING YOUR INSURANCE?
MANAGING YOUR STOCKS?
MANAGING YOUR BONDS?
MANAGING YOUR REAL ESTATE?
MANAGING YOUR TAX SHELTERS?
MANAGING YOUR SAVINGS?
MANAGING YOUR MORTGAGE?
MANAGING YOUR AUTO LOAN?
MANAGING YOUR RETIREMENT?
MANAGING YOUR CALENDAR?
MANAGING YOUR CHARGE ACCOUNTS?
MANAGING YOUR CAPITAL GAINS?
MANAGING YOUR ANNUITIES?
MANAGING YOUR APPOINTMENTS?
MANAGING YOUR DIVIDENDS?
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Circle 105 on Reader Service Card.

teach you how to determine your down payment and the monthly payment you can afford. Financial-prison terms like "amortization" and "life" are clearly explained.

For adults, the loan and amortization utilities alone may make Money Management worth its price. You can also print calculated results to help you plan for major purchases. I checked these against another financial program, and the calculations were right on the mark.

Money Management is not a financial-planning program—the company's disclaimer is clear on that issue. Nevertheless, the program is an excellent teaching tool—one you could probably adapt to your specific goals.

The Retirement Income Plan lets you accompany Pam and Bob as they visit a financial counselor. The advice he gives is prudent, emphasizing the importance of adequate insurance and savings. The counselor also tells Pam and Bob it's a good idea to invest some money in an IRA for certain tax benefits.

Finally, the counselor discusses an investment program, graphically demonstrating how inflation erodes the value of money and how greater risk taking can result in greater gains (or losses). Stocks, bonds, and mutual funds are discussed, but real estate, precious metals, and collectibles are not.

Using the Retirement Income Plan utility, you can play "what if" with projected savings, IRA contributions, and taxable and tax-exempt investments. The screen display or printed copy shows you the amounts invested, their earnings, and the effects of taxes and inflation. The bottom line tells you what your monthly retirement income would be, given the financial-planning assumptions the program uses.

Both Banking and Money Management come with small, tidy user's guides. Those pamphlets explain the software, and include exercises using the built-in calculator, copyable worksheets, and a dictionary of financial terms.

The company offers above-average warranty and support service. Defective disks are replaced free for 30 days after purchase and for $10 any time after that (back-up disks are also $10). A toll-free telephone number is clearly printed on the program's cover.

Marshware's financial-management series takes advantage of the Apple's number-crunching capability and its attractiveness as a teaching tool. Banking and Money Management should appeal to parents and teachers who realize the importance of financial responsibility and want their children and students to enjoy the satisfaction and rewards that come from using their money well. As the publisher asserts, its programs develop skills for lifelong activities, and hardly anyone is exempt from the joy of paying bills. ■

Cynthia E. Field
Wakefield, RI

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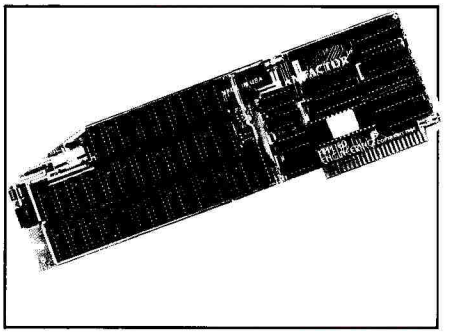


The Best of Both RAM's

RAMFACTOR

Applied Engineering, P.O. Box 798, Carrollton, TX 75006

Expanded-memory card; Apple II, II Plus, IIe, Franklin 1000/2000, Laser 128
$239 (256K), $289 (512K), $389 (1MB)

Ease of setup	■■■■
Ease of use	■■■■
Documentation	■■■
Support	■■■
Overall	■■■■

If you were playing roulette and cared more about winning than the thrill of gambling, you'd place bets on both red and black if you had enough chips. Applied Engineering has plenty of chips, and it's covering all bets in the memory-expansion game with its new RamFactor card.

While Applied Engineering's RamWorks cards and desktop-whopper AppleWorks patches lead the market in IIe auxiliary-slot memory expanders, the "Apple standard" points to peripheral-slot cards such as Cupertino's own

Circle 28 on Reader Service Card.

256K–1MB model (see "Two Roads to Memory Expansion," August 1986, p. 46). The rival standard got a boost when AppleWorks 1.3 appeared, automatically using peripheral-slot RAM to break the 55K desktop barrier. Cirtech and AST have hopped onto the Apple bandwagon, and Apple's announced a peripheral-type memory card for the //c.

Seeing the handwriting on the wall, Applied Engineering has adopted the motto, "If you can't beat 'em, beat 'em." RamFactor is a competitively priced ($389 with 1MB), soundly built card that follows the Apple standard, fits in any peripheral slot (except slot 3), is as easy to use as the Apple Memory Expansion card, Cirtech Flipster, and AST SprintDisk, and adds extras those cards lack—power-user frills in the RamWorks tradition. If you're wavering between the two standards, RamFactor could be the best of both worlds.

AppleWorks: Plain and Fancy

Like the Apple, AST, and Cirtech cards, RamFactor is great for users who don't want to bother with software patches. Stick it into a slot, close the top, and boot your system; ProDOS automatically sees the added memory as a RAM disk with the volume name /RAM7, /RAM4, or whatever (depending on the number of the slot in which it's installed). You can copy files to the RAM disk and run programs from it with no fuss. Use ProDOS' Filer to format it and copy the system files, and it becomes a bootable drive—in slot 7 of an enhanced //e, starting your Apple after a control-open apple-reset.

You don't care about RAM disks, but just want to run AppleWorks? Since RamFactor follows the Apple Memory Expansion standard, the same AppleWorks 1.3 disks that said "55K Avail." with your 128K //e will say "1012K Avail." with a 1-megabyte RamFactor—an instantaneous, painless, 18-fold increase in the desktop. (As a bonus, supplied software patches let AppleWorks 1.2 and 1.3 run on a II Plus with 48K, a 16K language card, and an 80-column display card such as Applied's Viewmaster.)

A big desktop is one way AppleWorks benefits from RamFactor, but other Apple-standard cards do the same. Applied Engineering adds a version of the AppleWorks 1.3 Expander software that's won the hearts of RamWorks owners: a menu-driven installation program that yields not only a larger desktop but larger files (up to 5100 word-processing lines or database records, versus 2250 and 1350, respectively), plus the ability to split 140K-plus files across multiple disks when saving and to load all program disk functions except printing into RAM. The last is far and away the most useful, adding a minute or so to start-up time, but letting even one-drive AppleWorkers switch files and applications at wizard speed.

Do the High-Speed Shuffle

AppleWorks is reason enough to like RamFactor, but if you don't mind a little hacking, you can turn your Apple into a whiz-bang RAM-disk jukebox: switching among up to nine memory partitions, each containing different programs or even operating systems (ProDOS and AppleWorks in one, DOS 3.3 and Apple Writer in another, your Pascal 1.3 programs in a third).

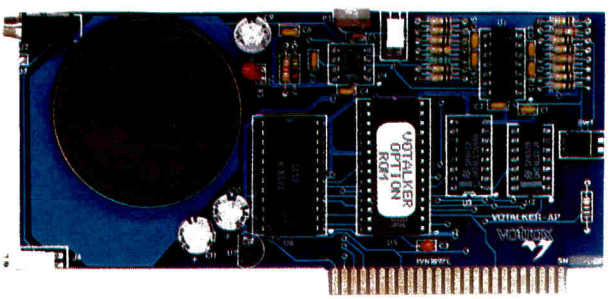
From Applesoft, typing PR#*n* (where *n* is the RamFactor slot) calls the card's Partition Manager firmware, letting you use the arrow or number keys to select, size, and name partitions. The partition you select when you exit the manager becomes the active RAM disk, while the others hold their programs and wait their turn. If you've formatted and transferred an operating system to it, pressing return instead of the escape key will not only activate but instantly reboot your system from the chosen partition.

Since the operating systems and your specified start-up programs load at RAM speed, the Partition Manager is the next best thing to a concurrent or multitasking system—you must exit one program before loading another, but can spend all day jumping in and out of applications without ever seeing a disk-access light. If you don't want to repeat the rigmarole of setting up and filling partitions every morning, Applied Engineering offers a $179 battery back-up unit, a Disk II-sized AC adapter that stays plugged into a

Continued on p. 110.

YOUR COMPUTER WAS MADE TO BE SEEN AND HEARD

BUT *HOW* YOU SAY IT IS EQUALLY IMPORTANT AS WHAT YOU SAY



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The New IIGS

BACK TO THE FUTURE: APPLE'S AMAZING GS

by Eric Grevstad, *inCider* staff

The sensational Apple IIGS boasts something old and something new: compatibility with thousands of existing Apple II software packages, plus vibrant graphics, superb sound, and the Mac interface.

It's got expansion slots like the //e, built-in interface ports like the //c, and mouse-and-menu firmware like the Macintosh. It's got 16-bit speed, dazzling color graphics, and synthesized sound to die for, yet it'll run nearly all of your existing Apple II software at regular or double speed. In fact, except for the new keyboard, it'll fit inside your Apple //e case.

In short, the Apple IIGS (the initials stand for "graphics and sound") is a phenomenal achievement. If you thought the new II would be priced to stem the tide of $1000 PC clones, you'll be disappointed: Its custom chips make it a more costly high-end consumer product, leaving the //e and //c (with expected price cuts) to slug it out in the market trenches. But otherwise, the IIGS looks like a world-beater.

There's never been a computer like the IIGS. More accurately, there are several computers like it—the Commodore Amiga and Atari ST for color and sound, the Mac for ease of use, and the Apple II family for its software base—but the reason there's no precedent is that the IIGS is both a new and an old machine at the same time. (It's as if Commodore had announced a fast, flashy Amiga that also ran C64 programs.)

The IIGS is for Apple owners who've been tempted by newer machines' speed, memory, and powerful programs but don't want to lose their investment in Apple II software and peripherals—a good description of the situation in many schoolrooms, as well as that of individual owners.

To say that it's the most significant Apple II news in years is an understatement. It combines two of the most significant computers ever (the II and Mac), and represents a landmark commitment—dare we say recommitment?—to the market audience that made Apple a success. That audience has grown more sophisticated over the years, and Apple has responded with a II that's second to none in sophistication.

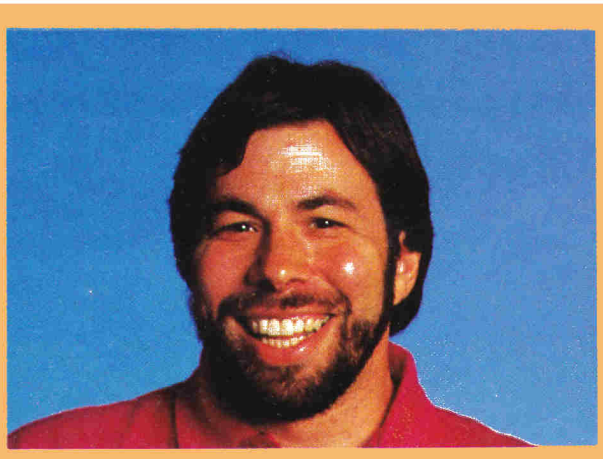
At first, the IIGS' role as a faster, more convenient II compatible will overshadow its gee-whiz abilities; *inCider*'s preview in Cupertino came too early (June 11–12) to see the machine's new operating system, ProDOS 16, or any 16-bit, super-hi-res software except demos. Indeed, Apple's IIGS product manager Curtis Sasaki described the machines we tested as "two or three revs [revisions] away from production," complete with a minor glitch in the new video modes (the two rightmost pixels wrapped around to the left). Apple's plan then was to offer a free dealer replacement for the faulty graphics chip around January, but hardware manager Robin Moore told us at press time (mid-July) that the debugged chip should be ready for the IIGS' debut in September.

Even in not-quite-final form, though, the IIGS is important enough to dominate *inCider*'s feature section this month. The following features detail the new Apple's software (both built-in and third-party) and its place in Apple Computer's product line. The rest of this article describes the IIGS hardware—a high-tech *tour de force*, with roots leading straight back to the hackers' garage.

The Platinum Package

The rainbow logo is unchanged, but beige and white have been replaced: All new Apple computers and peripherals are platinum (Apple's word for silver-gray). This fall's "new" //c, unchanged except for officially supporting Apple's //c memory-expansion card (which fits older machines as well), is white with a platinum keyboard.

Apple IIGS



Wozniak on the IIGS

Take it from one who knows his Apple II's: The new IIGS is "amazing."

So says Steve Wozniak, one of the founders of Apple Computer and the designer of the Apple II. Although Wozniak is no longer working full-time at Apple, he manages to keep up with new developments, especially of the Apple II variety. When *inCider* talked with him in June, he was anxiously awaiting delivery of his new Apple IIGS.

"It's a very good machine for people like myself—technicians—who need a computer right in the lab to develop hardware and software," he says. Wozniak plans to use the GS in engineering projects for his new company, CL-9, in Los Gatos, California. The extra speed a 16-bit processor offers is particularly attractive to him. "The higher speed gives me faster assembly-language code. I'll only have to wait eight seconds, as opposed to 40 seconds," he adds.

But Wozniak is also "very impressed" with the color and quality of graphics achieved by the GS: "One of the most impressive features is to see Mac-style graphics moving faster than on the Mac and in color." But the Mac-style interface goes beyond graphics and will bring the mouse-driven menu interface to all applications—Wozniak is excited about that. "I'm looking forward to getting a chance at mouse-based word processing on a II, in addition to painting and color," he says.

As for the sound, Wozniak predicts that enhancement will "have the most impact of all on education." Some applications that have been discussed include foreign-language lessons and training in musical instruments and composition.

In general, Wozniak is glad to see so many enhancements over the existing Apple II offered in one machine. "It's amazing to see so much done at once," he comments. And yet, at the same time, he's pleased to see that Apple has given some very serious thought to maintaining software compatibility with existing Apple II's: "I have hopes that it is very compatible and have reason to believe that it is very compatible."

Wozniak is so impressed with the new machine that he even predicts it will snare 50 percent of the installed Apple II user base in the next few years. And we can certainly count on him to be one of those IIGS users.□

—Deborah de Peyster

The IIGS system unit is half wedge and half rectangle, about the size of a //e (counting its keyboard). Like older Apples, it serves as a stand for a composite monochrome or new hi-res analog RGB color monitor.

After what IIGS engineers say were lengthy debates about extra cost and classroom reliability, the Apple team decided on a detached keyboard. The 80-key, low-profile board contains the familiar //e or //c layout with two notable exceptions. One is a numeric keypad with its own clear and enter (return) keys.

The other is the solid-apple key—renamed the option key and moved just to the left of the open-apple (which also bears the Mac's cloverleaf command-key symbol). The bottom row of the keyboard, from left to right, contains caps lock, option (solid-apple), open-apple, single left quote (tilde), space bar, backslash (vertical bar), and then the four arrow keys. The reset button is centered above the top row.

Minor layout differences aside, the keyboard passed *inCider*'s typing tests with flying colors—a bit firmer than a //e board, but not as shallow or stiff as a //c's. There are connectors for the IIGS' Apple Desktop Bus input port on both the left and right sides of the keyboard; whichever you don't use for the keyboard, depending on whether you're left- or right-handed, fits the IIGS' standard mouse.

16 Bits, No Waiting

Under the hood, the IIGS bears a family resemblance to the //e: There's a 60-watt power supply on the left, seven expansion slots along the rear of the motherboard, a dedicated eighth slot, and even some familiar antiques like the Apple II game I/O (input/output) socket. There's no cooling fan, though Sasaki says the company recommends and will sell one to users who fill three or more slots; it will fit inside the case, under the power-supply box.

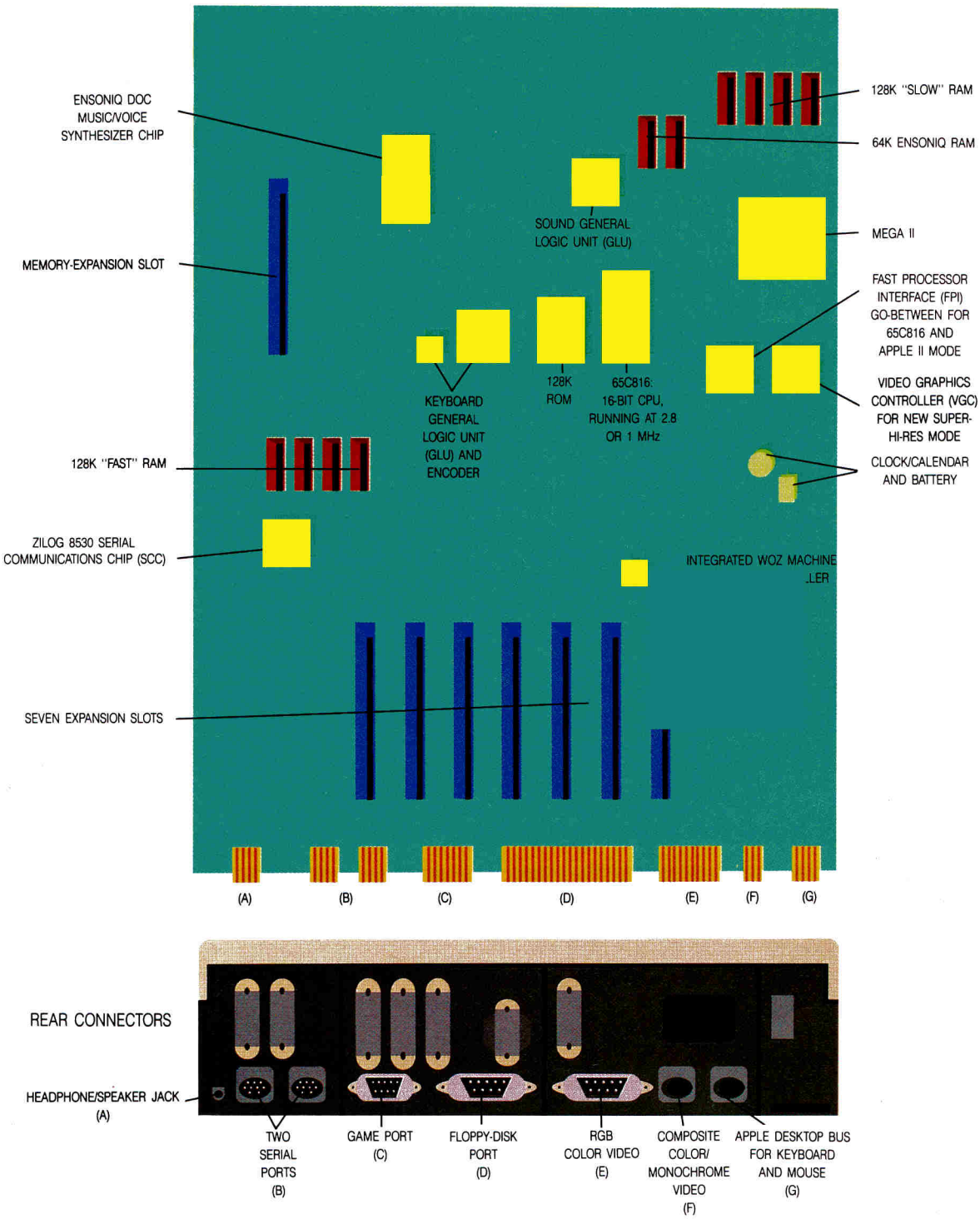
At second glance, though, the IIGS is clearly a brand-new animal. For one thing, the 6502 microprocessor has finally retired. The new Apple is built around the 16-bit 65C816 (or 65SC816, to read the GTE chip in one of the units we saw), which runs at either the familiar 1 MHz or a fast 2.8 MHz clock rate. (Apple technical documentation confesses that housekeeping chores reduce speed to an effective 2.5 MHz, except for system programs running in ROM.)

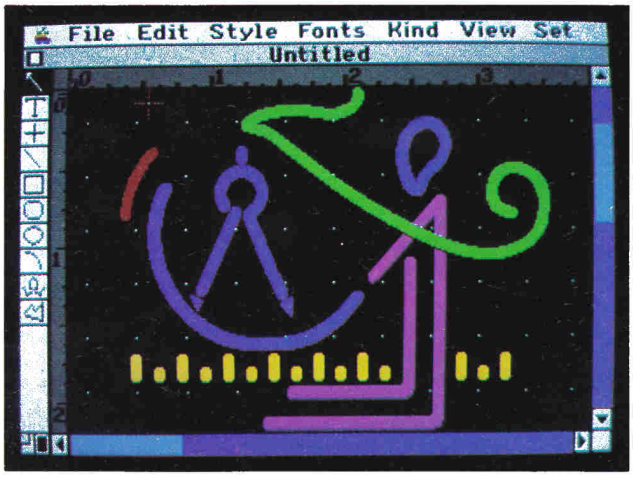
The 65C816 is a split-personality CPU. In emulation mode, it works exactly like the 8-bit 65C02, answering to the same instructions, running the same software (though with a choice of two speeds), and limited to the same 64K of memory at any one time. In native mode, it's a true 16-bit chip, not bottlenecked by an 8-bit address bus like the IBM PC's Intel 8088; in fact, its 24-bit bus can address up to 16 megabytes of memory simultaneously, with no bank-switching shenanigans. Sixteen megabytes is twice the maximum currently planned for the IIGS, or at least twice what's been said publicly.

Memory Matters

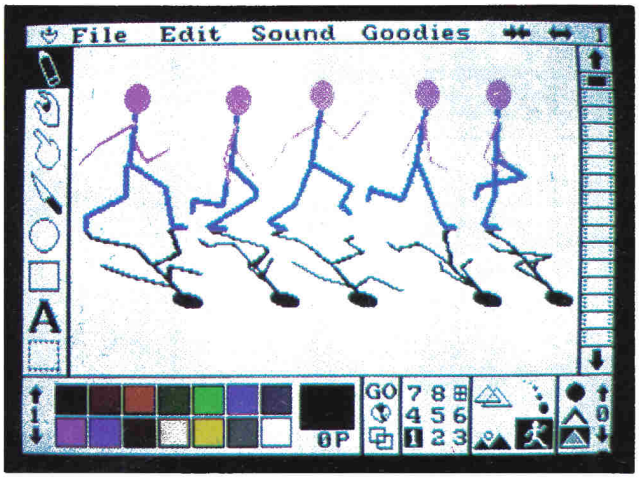
The IIGS comes with 256K of memory, arranged on the motherboard in two sets of four 256K-bit chips. When running Apple II programs, one 128K set, with slightly slower access than its companion, is reserved for display, I/O, and system memory, while the faster RAM becomes two 64K banks for program use. New IIGS programs fit mostly into fast RAM, but can spill over into the slower space; Apple technical papers say that roughly 176K of the standard 256K will be available for 16-bit programs.

Figure. Diagram of sample IIGS motherboard and rear panel. Since the IIGS prototypes inCider *saw in Cupertino were three months shy of being production models, Apple representatives wouldn't allow topless photos of the machines showing the interior logic board, or motherboard. However, they were too polite (though visibly uneasy) to prevent an* inCider *editor from drawing a freehand sketch of a sample board. This stylized diagram isn't guaranteed to accurately reflect final hardware, but shows some of the IIGS' main components and their positions relative to each other in the machines we saw. One thing the diagram can't convey is the flat profile yielded by Apple's use of newer surface-mounted instead of socketed technology. Except for the socketed CPU, RAM, ROM, and graphics controller, the IIGS' chips are efficiently mounted almost flush with the board.*





Broderbund Software's The Drawing Table (above) and Fantavision (below) take advantage of the GS' graphics capabilities.



To surpass 256K, there's the IIGS' eighth slot—not equivalent to the //e auxiliary slot, but dedicated to memory expansion. This slot can carry up to 8 megabytes of RAM; according to Sasaki, Apple's own memory-slot card will stop at 1 megabyte, but third parties are expected to release 4- and 8-megabyte cards. The memory-expansion slot can also hold up to 1 megabyte of ROM, serving as an application ROM disk or adding extra convenience (an operating system, perhaps) to the standard 128K of ROM.

Does this mean current //e memory-card owners are out of luck? Partially. Auxiliary-slot cards such as Applied Engineering's RamWorks are useful only as sources of chips to plug into the socketed new board, but a peripheral-slot card such as Apple's //e expander will fit into one of the IIGS' seven expansion slots and will be recognized as a RAM disk.

The IIGS has a built-in real-time clock, powered by a lithium battery providing five to ten years' use (and soldered to the motherboard, upsetting *inCider*'s consumer advocates, who think changing the battery in 1996 shouldn't require a trip to your dealer). The clock serves to time- and date-stamp disk files, though it uses different commands from those of current third-party timers such as the Thunderclock.

II Compatibility: From El Grando to Mega II

Computers today commonly use VLSI (very large-scale integrated) circuits, but the new Apple carries the technology to extremes. The first four IIGS prototypes, dubbed "El Grandos" by the engineering team, were computers the size of conference tables, lashed together from old-fashioned wire-wrapped circuit boards with hundreds of IC's each. Once the design was debugged, it could be shrunk. Along the way, the Apple II—the whole computer, except for the processor and memory—was squeezed onto a single chip. It's called the Mega II, and it's the heart of the IIGS' compatibility with ProDOS, DOS 3.3, and Pascal 1.3 software. (Yes, WordStar and Studebaker lovers, Apple says the IIGS will run CP/M software with one of today's Z-80 cards, though some cards require a software patch.)

The Mega II encompasses the //e's MMU (memory-management unit), IOU (input/output unit), general-logic unit, timing generator, and character-generator ROM's (for upper- and lowercase and mousetext, with Swedish, German, Italian, Spanish, Danish, French, and U.K. as well as U.S. English). It also provides II-compatible composite and RGB video, including low-, hi-, and double hi-res graphics.

The Apple IIGS: Fast Facts

- The new Apple has a 16-bit (65C816) processor and 256K of memory, expandable to 8MB. It uses two operating systems: ProDOS 16, supporting a Macintosh-style Finder for new 16-bit software, and ProDOS 8 for Apple II emulation. One of its custom chips, the Mega II, is a complete //e except for the CPU and memory.
- Except for communications programs, the IIGS will boot and run nearly all existing ProDOS, DOS 3.3, and Pascal 1.3 software. You can temporarily leave a program to use a firmware Control Panel—changing options such as screen colors or switching between the traditional 1 MHz and a swift 2.8 MHz clock speed.
- New programs can take advantage of two super-hi-res modes, with bit-mapped graphics in 320-by-200 (256 colors on screen) or 640-by-200 (64 colors) resolution.
- The IIGS' sound capacity matches a music synthesizer's, with a digital oscillator chip supplying 15 voices or instruments. With proper software and I/O hardware, it can sample (record) and play back music or speech.
- There are seven expansion slots plus a dedicated RAM/ROM memory-expansion slot, as well as an array of built-in interfaces (disk drive, composite and analog RGB video, and two serial ports including AppleTalk network firmware). A mouse is standard equipment, as is a keyboard with numeric keypad.□

Another new chip, the FPI (fast processor interface), is the link between the old and new architecture, controlling 65C816 access to the Mega II and Mega II access to the faster RAM. Together, they ensure that the IIGS will boot and run practically anything your II Plus, //e, or //c can—in the case of *inCider*'s trip to Apple headquarters, everything in a box of office disks ranging from AppleWorks, Mouse Desk, and SuperCalc3a to F-15 Strike Eagle and Stickybear Spellgrabber. One IIGS hung up after the title screen of Epyx' Ballblazer; another, with newer ROM's, ran the game successfully.

The major exceptions are communications programs, most of which (even Apple's own Access //) bypass formal I/O channels to directly address the II's serial hardware. Since the IIGS has a different communications chip (see below), Apple expects vendors to issue revised versions of their programs, as it's doing for Access.

You're in Control

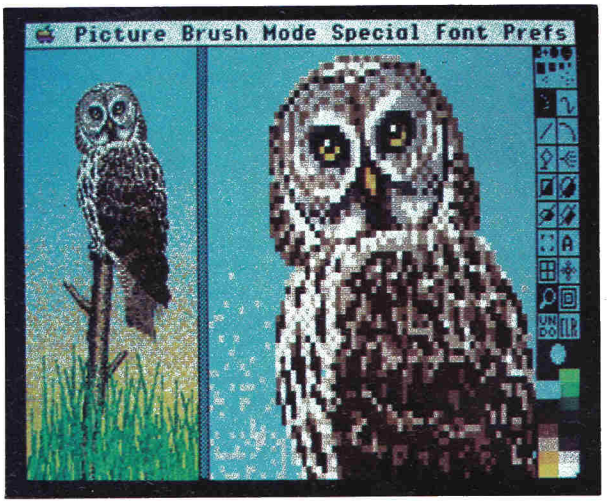
Users of self-booting software, as always, won't have to think about operating systems. New 8-bit (6502 emulation mode) programs will run under one of the IIGS' two operating systems, ProDOS 8, which doesn't look very different from the current ProDOS 1.1.1. (Screens we saw booted to a "ProDOS 8 1.2" message.) ProDOS 8 becomes the official operating system for the //e and //c, as well. At startup, it automatically checks to see whether it's on a IIGS and should read the clock.

But even when running an old program in an old graphics mode, you're never far from the IIGS firmware. Press the control, open-apple, and escape keys (except under ProDOS 1.1.1, which disables interrupts), and your program is temporarily frozen while a Macintosh-like Control Panel takes over the screen.

The 8-bit Control Panel is a 40- or 80-column text display, compared to the bit-mapped, mouse-driven dashboard that waits behind ProDOS 16 software. But it offers the same range of options, from setting serial-port parameters to setting the time and date, choosing a foreign character set and keyboard layout, controlling sound (such as error beep) pitch and volume, or sizing a RAM disk. Default choices are preserved in battery-backed memory until you change them again.

Speeding Up Software

You'll probably use two Control Panel choices more often than any other. One lets you choose among 16



Above and below are examples of Electronic Arts' Deluxe Paint program running on the Apple IIGS. The above illustration was designed by Richard Antaki. The illustration below is by Avril Harrison.

IIGS Specifications

Processor: 65C816 (16-bit CPU with 24-bit address bus). Switchable 1 and 2.8 MHz clock speeds in both native (ProDOS 16) and 65C02 emulation (ProDOS 8, DOS 3.3, Pascal 1.3) modes.

Memory: 256K of RAM expandable to 8.25MB. 128K of ROM expandable to 1.125MB.

Graphics: Apple II-compatible 40- and 80-column text and low-, hi-, and double hi-res graphics modes. Super-hi-res at 320 by 200 pixels (256 on-screen colors) and 640 by 200 pixels (64 on-screen colors). Palette of 4096 colors.

Sound: Ensoniq 15-voice music/speech synthesizer chip with 64K of dedicated RAM and 32 digital oscillators.

Expansion: Seven Apple II-compatible expansion slots; one dedicated RAM/ROM memory-expansion slot. Clock/calendar standard.

Ports: Composite and analog RGB color video. Disk-drive port (daisy-chain up to four 3½-inch 800K or 5¼-inch 140K drives). Apple Desktop Bus for keyboard and mouse. Two serial ports for printer, modem, AppleTalk (network firmware built in). Game/joystick port. Sound port/headphone jack.□

colors for text, background, or border display—blue AppleWorks on a yellow background within a green frame, for example. The other lets you toggle between slow (1 MHz) and normal (2.8 MHz) speeds.

The faster speed is a barely controllable riot for graphics games ("Go, Stickybear, go!"), but will be the usual choice for applications. Our unofficial stopwatch tests yielded approximately double speed—a SuperCalc3a recalculation in 0.6 instead of 1.3 seconds, an AppleWorks word-processing search-and-replace in 15.5 seconds instead of 35.1. Sasaki claimed Apple's tests show a somewhat greater improvement, though he admitted that a //e with an accelerator card like Applied Engineering's TransWarp is still faster by 5 to 10 percent. (Our test times are for IIGS slow versus fast modes; the IIGS at 1 MHz was trivially slower than a regular //e, but differences were within the margin of stopwatch reflex error.)

Super Graphics

The following articles contain more detail about 65C816 native mode and ProDOS 16 software, though at press time we don't know as much as we'd like to. Suffice it to say that IIGS programs will work like Macintosh programs, with pull-down menus and point-and-click mouse control, and that the centerpiece of ProDOS 16 will be a Mac-style Finder that makes file copying, for example, as easy as dragging icons from one disk to another (even, according to Apple literature, formatting and handling file conversion among ProDOS, DOS 3.3, and Pascal disks). Software developers' jobs will be eased by a Mac-type toolbox of standard ROM- and RAM- or disk-based routines for such tasks as managing memory, menus, and windows, drawing and shading graphics, and handling a clipboard or scrap buffer.

The most obvious differences between IIGS and Mac programs will lie in graphics and sound. The third of the IIGS' major custom chips, the VGC (video graphics controller), supplies two functions: the QuickDraw II set of screen graphics tools and the GS' two new super-hi-res modes.

The VGC produces a gorgeous 16-shade gray scale on the IIGS' composite monochrome monitor, but most buyers will want the high-contrast (black-matrix background) analog RGB display to show off super-hi-res color—a palette of 4096 colors available in either mode, though not all at once.

The first super mode supports a resolution of 320 (horizontal) by 200 (vertical) pixels, using 4 bits of memory per pixel to show up to 16 colors on any one scan line and a maximum of 256 different colors on screen. The second super mode doubles that resolution to 640 by 200 using 2 bits per pixel, though maximums drop to four colors per scan line and 64 colors on screen. Those colors, Sasaki admits, are technically shades achieved through dithering (mixing blue with white, for instance); the number of true simultaneous colors in 640 mode is more like 16.

Symphonic Sound

As for sound, an adjustable error beep is only the beginning. The IIGS has the same Ensoniq DOC (digital oscillator chip) found in that company's Mirage music synthesizer, with its own 64K of RAM to store and manipulate digitized waveform representations or samples. The synthesizer chip includes an analog-to-digital converter and 32 oscillators; since one serves as a clock and most applications will use two for each voice (loading and playing waveforms, respectively), that lets the IIGS play 15 voices or instruments at once.

While there's room for the IIGS' sound capabilities to grow—neither stereo output nor the popular MIDI (Musical Instrument Digital Interface) are standard, though both are likely add-on products—the Ensoniq chip is already reason enough to hook up an external speaker to the IIGS sound port. (The IIGS has the same built-in low-fidelity speaker as the //e.) With the proper software, for instance, the IIGS can be a string quartet or a 15-piece band—it sounds like a musical instrument, not like a computer imitating one.

According to software engineer Gus Andrate, digitally sampled music, though it hogs disk and memory space, is good enough to make office coworkers ask "What CD [compact disk] is playing?" A sample tape-deck program and external mike recorded and played our voices with dictation quality. The entertainment, educational, and business possibilities—from French or music lessons (perhaps with a low-cost piano keyboard?) to communications software that answers phone calls with your voice—are some of the most rewarding areas for IIGS speculation.

Mass-Storage Decisions

Got an old Disk II? Plug its controller card into a IIGS slot and load your software; the combination, Apple promises, will run with no problems. If you're building a IIGS system from scratch, however, or want to leave the new machine's expansion slots free for future gadgets, you'll probably rely on its //c-style IWM (Integrated Woz Machine) controller chip and SmartPort disk interface—a port that's flexible enough to be no help at all in your decision whether to use 3½- or 5¼-inch disks.

According to Apple documentation, the IIGS' disk port can daisy-chain up to four floppy drives in a mix of one DuoDisk (which counts as two 5¼-inch drives), one or two 5¼-inch (140K) UniDisks, and one or two 3½-inch (800K)

The //e Upgrade

Apple II and II Plus users are out of luck, but //e owners will be able to convert their computers to Clark Kents: the mild-mannered exterior and keyboard of the original //e case, concealing a new IIGS logic board with 65C816 processor, 256K of RAM, and all the features, ports, and expansion capacity of the new model. (Keyboard and mouse are available separately; Apple feels owners who already have a //e mouse and card will want to keep their investment.)

Since the retrofit involves much more than putting a card in a slot—it's a replacement of the entire motherboard and base pan, with a new back panel for IIGS ports—Apple discourages owners from making the change themselves. That means dealer labor will probably hike the upgrade price; at press time, that price is still as unclear as the IIGS' cost. IIGS marketing manager Tom Virden predicted a $300–$400 difference between the two, however, which might put the upgrade in the $1000 range. In late June, IIGS product manager Curtis Sasaki said that Apple had not set a policy as to whether or not upgraders could keep their //e motherboards.□

What you'll get when you open your IIGS package: a system unit, keyboard, mouse, 3½-inch system (ProDOS 16 and utilities) and tutorial disks, and Applesoft BASIC, system disk, owner's guide, and setup manuals.

drives. Single drives can be either existing UniDisks of either size or the new 3½- and 5¼-inch Apple drives scheduled for release at IIGS rollout. (They're platinum color, and the 3½-inch drive plugs into either a IIGS or a Macintosh.) If you want a fifth or sixth floppy, a pair of 5¼-inch disks will run off a controller card in slot 6.

As far as the 3½- versus 5¼-inch drive decision goes, Apple and its customers are in an awkward position. The smaller disks are faster, quieter, sturdier, and more spacious, and deserve to become the market standard; Apple supplies the IIGS tutorial, ProDOS 16, and Finder on two 3½-inch disks, and new 16-bit software will presumably appear in 800K format. On the other hand, the IIGS can run thousands of existing Apple II programs, and they're on 5¼-inch floppies. Current owners can use their old drives with their new machines, but will ultimately have to buy a 3½-inch drive if they haven't already. Novices, at least for a while, will almost have to buy one of each.

Apple's Macintosh Plus has a SCSI (Small Computer Systems Interface, pronounced "scuzzy") port, used primarily for fast transfer of hard-disk data, as standard equipment. This led market watchers to guess that the IIGS would have one, and it does—on an optional card for the IIGS and //e, not as standard. Along with the SCSI card, Apple announced a matching 20-megabyte hard drive. The Hard Disk 20SC takes up extra desk space (10 by 11 inches) beside the computer, but can load programs or data at the breathless rate of 1.25 megabytes per second, according to Apple press information.

Communications and Networking

So far, we've mentioned almost every port along the IIGS' rear panel, from composite and RGB video to the disk port and Apple Desktop Bus (which can take input devices such as graphics tablets as well as the keyboard and mouse). If you've been waiting in suspense all this time, there's a game/joystick port back there, too.

And there are two built-in //c-style serial ports, which most buyers should use for the traditional connections to printer and modem. There are, however, two changes in the IIGS' communications architecture. One is that the machine uses the same Zilog 8530 SCC (Serial Communications Chip) as the Macintosh—that's why communications software that expects to find earlier models' 6551 ACIA's

Another AppleWorks

As reported in our September News Line (p. 14), a new AppleWorks will appear when the IIGS does, but it won't be a mouse-driven, Macintosh-style program. Instead, the ProDOS 8 upgrade of Apple's best-selling multifunction package (for the //e and //c as well as the IIGS) adds two evolutionary features: a mail-merge function for word processing form letters, and extra memory support similar to the AppleWorks patches supplied with current memory-expansion cards. In short, the new AppleWorks will have as standard some of the features now sold as third-party enhancements.

In a 128K system, the revised AppleWorks' 56K desktop is only 1K larger than version 1.3's; word-processor files are still limited to 2250 lines, data bases to 1350 records, and spreadsheets to 2K of data per row. In a IIGS or a //e or //c with an Apple expander card, however, not only does the desktop grow (up to 1012K in 1-megabyte machines, as with AppleWorks 1.3), but so do allowable files: word processing to 7250 lines, data bases to 6350 records, and spreadsheets to 10K per row.

What about the 16-bit, mouse-and-menu version of AppleWorks? According to *inCider*'s sources, there might not be one. While today's AppleWorks will continue to be supported, Apple reportedly feels that the required rewrite would make little sense, considering the array of 65C816 software due from other developers. Possible candidates include Microsoft Works, the high-powered integrated package currently being prepared for the Macintosh.□

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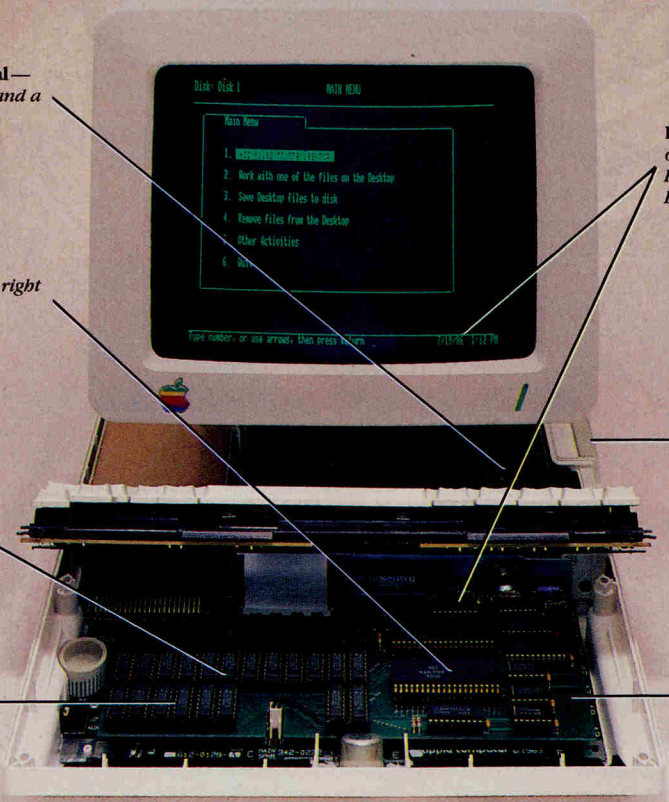

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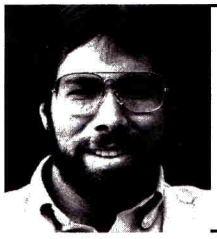

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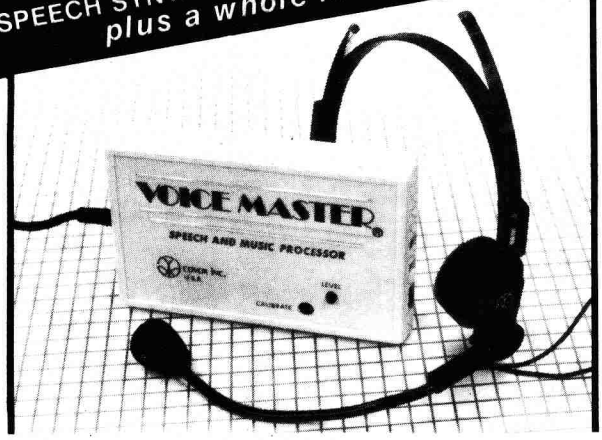

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(asynchronous communications interface adapters) won't work, as mentioned earlier. It's a matter of hardware compatibility; the IIGS firmware emulates the familiar Super Serial Card, as far as software commands are concerned.

The other difference is that printer and modem connections are only two of the IIGS' three communications abilities, any two of which you can use at a given time. The third is AppleTalk, protocol firmware for which is built into the IIGS just as into the Mac—a significant statement of Apple's plans for the new II in local-area networks, particularly since networking is an increasingly hot topic in educational-computing circles these days.

AppleTalk, announced in January 1985, is currently languishing as a system used primarily to connect multiple Macs to an office LaserWriter, as Apple still hasn't released the critical file-server component that will let networked computers share programs and data (if you want to ruin a friendship with an Apple official, say "AppleTalk file server"). But once complete, the network promises to be an affordable alternative to big corporate LAN's like 3Com's Ethernet, although its speed (230,000 bits per second) and size (300 meters maximum) are correspondingly less. If networking makes the transition to America's schools and small businesses, it'll be good to see the IIGS side by side with the Macintosh.

The Wish List

The IIGS doesn't have absolutely everything an Apple hacker could wish for, as project engineers confessed to us while our escort from Apple's public-relations staff blanched and sputtered. While the machine's 8-bit expansion slots provide compatibility with most Apple II add-ons, the designers considered adding 16-bit slots for more powerful peripherals. The video circuitry's place on the motherboard doesn't allow for quick upgrading as even more colorful, higher-resolution displays become feasible. The firmware Monitor includes new commands for the 65C816's extra functions, but Applesoft is boringly unchanged, with no support for the new graphics and sound (although ampersand routines may let programmers tap some of the toolbox firmware).

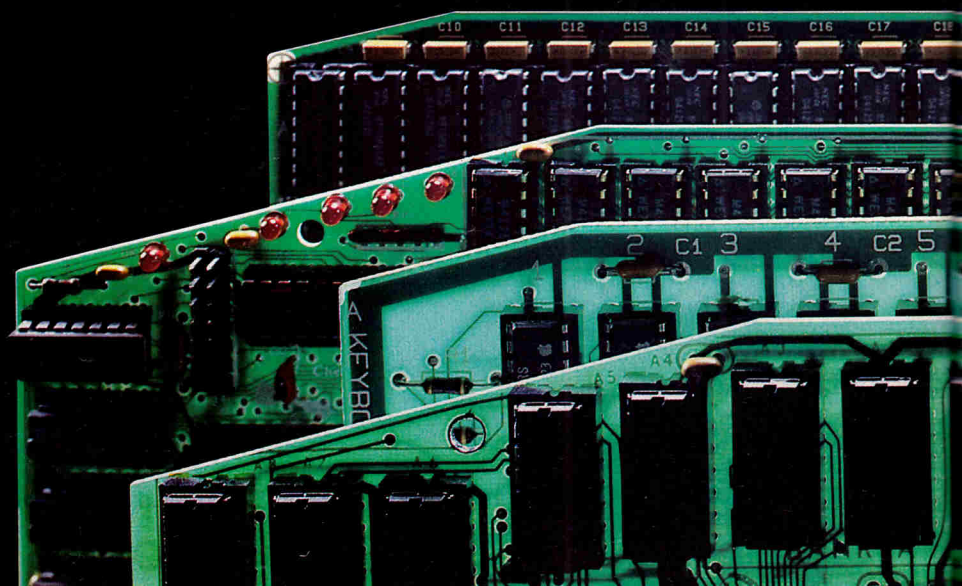
Also, while the IIGS is definitely inspired by the Macintosh interface, the Mac remains Apple's performance leader. It has a faster processor, higher resolution (albeit in black-and-white), and more ROM- instead of disk-based programming tools. The Mac's 68000 CPU also allows such conveniences as a switcher that supports multiple programs in memory at once, a feature Apple won't promise for the weaker 65C816.

On the other hand, Apple's Vice President for Product Development, Jean-Louis Gassée, told us, "We are already working on the successor to this machine. . .[and ensuring] that the software for [the IIGS] will run on it, even if we make hardware changes at the lowest level." When it comes to upward compatibility, Apple is clearly hanging on to its good habits.

Besides, for now the IIGS isn't meant to be Apple's top of the line. It's meant to revitalize the Apple II world—which it does with a vengeance, with fireworks, with choirs singing. No other microcomputer company has ever made a totally new machine that's hardware- and software-compatible with an old one; no other company has ever had such a large, loyal installed base to benefit from the maneuver. Seeing the sensational IIGS, you realize the slogan "Apple II Forever" was wasted on the //c. ■

The New IIGS

Whether you're a full-fledged programmer or a novice computerist, an array of software and firmware tools will let you take full advantage of the power, sound, and graphics of the new Apple IIGS.



LOOKING INTO ROM

by Paul Statt, *inCider* staff

Turn on the Apple IIGS. If you own an Apple //e or //c, you have some software for the GS already. Boot a disk you like—it'll probably run.

So what's new? Try control-open apple-escape (not control-open apple-reset: that still resets), and you reach the first "new" software for the Apple IIGS—the Control Panel. It's a memory-resident desk accessory that lets you set certain parameters for your new machine.

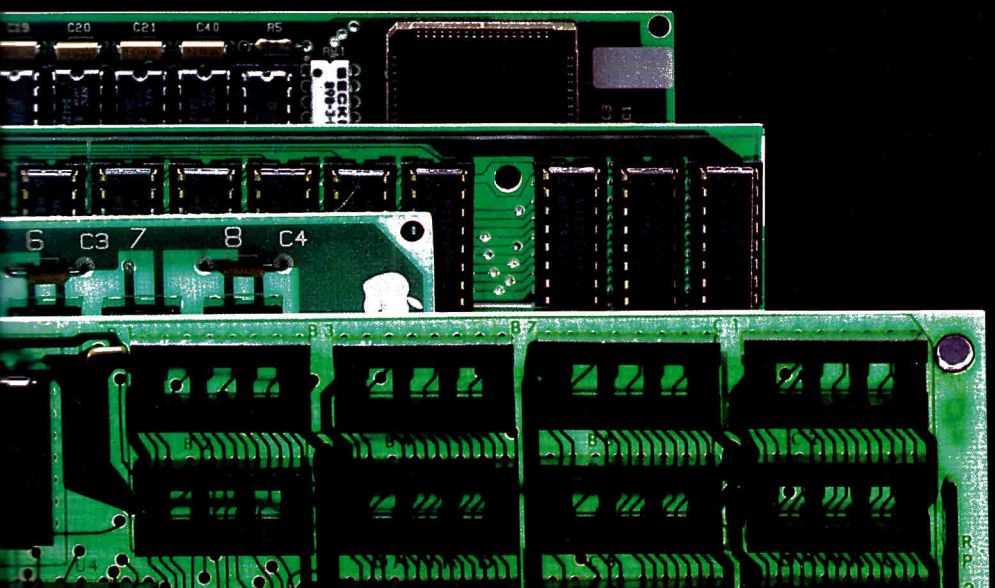
For instance, you can set the operating speed. The 65C816 microprocessor races along at 2½ million cycles per second (MegaHertz). Your old //e or //c toddled along at 1 MHz. You can set the throttle on the IIGS for either speed: If you run applications written for the //e or //c at the fast rate, they work as if you had an accelerator card.

You can set the clock and calendar with the Control Panel. You can allocate slots for various peripherals. You can choose the language in which you want to type: The IIGS isn't a translation machine, but it does have several foreign character sets and keyboard layouts in ROM. You can modify the display—set it for 40 or 80 columns, or choose your favorite colors for the text and background. You can set parameters for various input/output ports—line length or carriage feeds for printers, baud rate for modems.

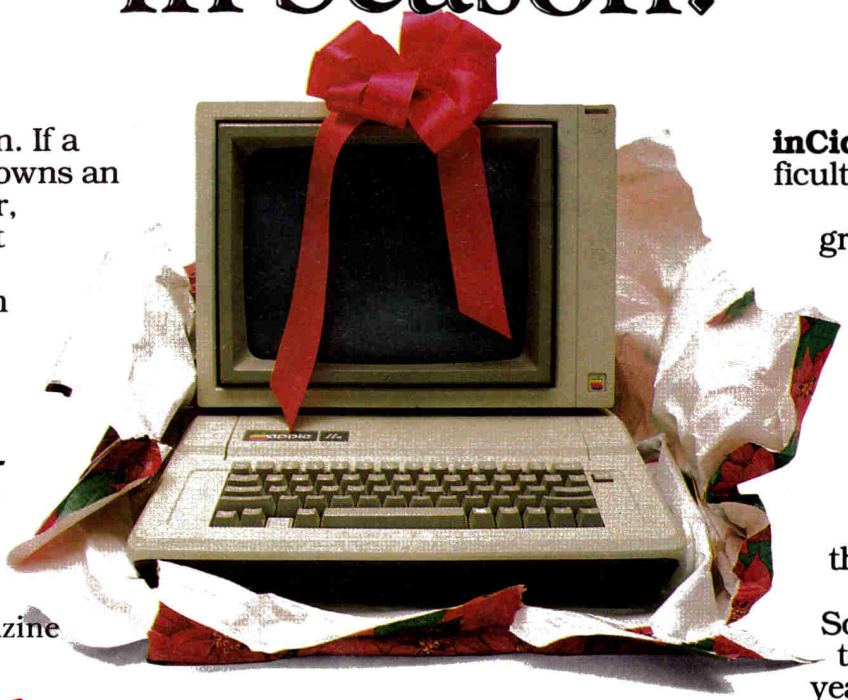
The Control Panel allows people who don't program the sort of control over their software that Apple //e and //c owners need a bit of BASIC to master. It does the work of all the "PR#1" or "escape" commands the older machine requires to control the way software communicates with the world.

The intent of the GS is akin to that of Apple's Macintosh: to make the computer more accessible to nonprogrammers. In fact, Apple promises a Control Panel for the production version of the IIGS that will resemble the Mac desktop, and will use icons and the point-and-click mouse interface to set up the computer.

Apple also promises a Finder. The Macintosh Finder, on which it's modeled, is an application in ROM that selects programs and takes care of disk upkeep—formatting, for instance. The Apple IIGS Finder should do the same.



It's Christmas and Apples are in Season.



Christmas again. If a relative or friend owns an Apple II computer, you ought to start thinking about what to give them for Christmas.

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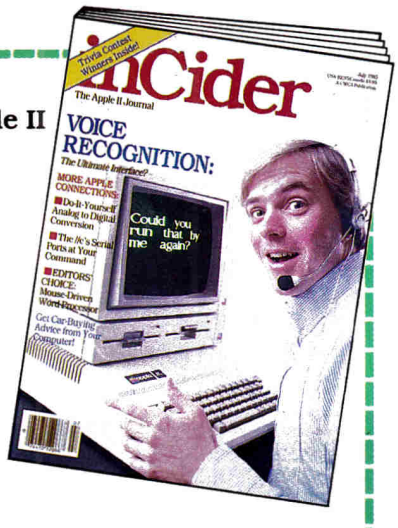

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Variations on a ProDOS Theme

The Apple tradition—in the II as well as the Mac—is an invisible operating system: The op system is there, but you can boot up Stickybear without ever seeing it. In keeping with that tradition, and that of Apple compatibility, the IIGS uses ProDOS.

Apple's Professional Disk Operating System, ProDOS, is the software the IIGS uses to get to its storage medium—5¼-inch disk, 3½-inch disk, or hard disk. The Apple IIGS has two versions of ProDOS: ProDOS 8 and ProDOS 16. The former runs like the old 8-bit ProDOS the Apple //e and //c use, but the latter takes the 16-bit power of the Apple IIGS into account. ProDOS 16 requires at least 256K of RAM—and that makes it impossible for an old Apple II to run it—and can use up to 16 million bytes. Because it's a part of the Apple IIGS system, ProDOS 16 doesn't require the complex global bit page map to manage memory, but instead uses built-in memory-manager firmware (see below).

All three flavors of ProDOS—plain, 8, and 16—use the same disk formats and file structures, and thus can read data files from each other. Your data in old ProDOS format will not be lost to your Apple IIGS software.

ProDOS 16 will let you open an unlimited number of files; ProDOS held you to eight. Unlike ProDOS, which supported two devices per slot (for a total of 14), ProDOS 16 will support any number of peripherals. At least three separate device protocols are possible under ProDOS 16. It supports named devices, unlike ProDOS, which requires volume names. ProDOS 16 also offers several new operating-system calls, including GET ENTRY, WRITE PROTECT, GET DIB, SAVE STORE, RESTORE STATE, and SET INIT MODE.

Programs working under ProDOS 16 won't run under older versions of ProDOS; software written for the older ProDOS will run under ProDOS 16.

In short, the Apple IIGS is compatible with the Apple //e and //c. Software written for the older machines will run on the new one—if it was written to Apple's specifications. Software that bypasses the operating system and firmware in the old Apple //e and //c and goes directly to the hardware won't cut it on the GS; the only way Apple engineers could ensure compatibility was to create a machine that followed the rules to the letter.

What this means to you is that an old program that won't run, that hangs up after the title screen, or displays just a half screen may require only a small change in its code to make it run perfectly. The programmer probably cheated and wrote the software using "illegal entry points." You can make most of them legitimate, if the code is accessible.

ROM: The Heart of the IIGS

Programmers, particularly beginners, will be glad to hear that the IIGS has Applesoft BASIC in ROM. The more experienced among you won't be happy to learn that it's the same old Applesoft with which graphics magicians have been struggling for years: The display memory is still in the middle of program memory, bit-mapped graphics-animation routines are lacking, CIRCLE and BOX commands are missing. Applesoft in ROM on the Apple IIGS is a language for the old Apple, not for the high-powered GS. Apple seems to feel that its Toolbox (see below) makes additions to Applesoft superfluous, but there's no route from Applesoft to the Toolbox routines. Not yet.

Included with the Apple IIGS is a neat introduction to BASIC. It's not as complete as the *Applesoft Reference Manual* that comes with //e's and //c's, but it's a good beginning.

A big part of the Apple IIGS ROM is taken up with new Tools for programmers. The Toolbox is familiar to the Mac programmer; it's anathema to the Apple II programmer, who would as soon write into RAM with a soldering iron if he thought he could save a few lines of code. A software tool in the Mac or Apple IIGS creates a window on the display screen, so that the programmer doesn't need to write that code—he "calls the tool" that does the job. It's like using PEEKs and POKEs in BASIC to call Monitor routines, except that tools do more than "ring a bell and return an error message."

"In short, the Apple IIGS is compatible with the Apple //e and //c. Software written for the older machines will run on the new one—if it was written to Apple's specifications."

The Apple IIGS Monitor itself is bigger than the old one. The display is improved: For instance, hexadecimal and ASCII values appear simultaneously. Since the 65C816 has 16-bit registers and a 24-bit address bus, the new Monitor needs extra digits in the bank address to get at it all. The Apple IIGS Monitor also adds altogether new features, such as a search function that can find any pattern up to 236 bytes long, hex-to-dec or back conversions, and base 16 addition and subtraction.

The Apple IIGS Monitor includes a mini-assembler and disassembler for the 65C816. They support all of the microprocessor's 91 instructions and all 24 addressing modes for a total of 256 operation codes.

Another part of the Apple IIGS hard memory takes care of all the interrupts the new hardware requires—routines that keep the keyboard, sound chip, graphics chip, clock chip, and so forth all in order.

All together, the Apple IIGS has 128K bytes of built-in firmware. That's as much ROM as the //c had RAM. The sudden need for all that permanent memory is that the Apple IIGS is two machines in one case—a programming feat performed with shadows, not mirrors. Programmers will also need to remember that a great deal of the personality of the new machine is in ROM.

GS Magic

Apple has breathed the soul of an old machine into its newest one. The Apple IIGS knows two tricks that let it run almost all of today's Apple II software as well as tomorrow's—the software that will make the computer act like a

television or a record player. The hardware trick is the Mega II integrated circuit, which is a lot smarter than you are and probably smaller—it's an Apple II on a chip (see "Back to the Future: Apple's Amazing GS," p. 36, for details).

The software trick is harder to see: It's memory sleight-of-hand that assigns two 64K banks in the Apple IIGS—half of its total 256K in four banks—to emulate the //e and //c.

Why bother? The Apple //e and //c—that is, the Mega II in the Apple IIGS—can address only 128K. It addresses those two 64K banks at the speed of the old Apple processor, the 6502, which is 1.02 million cycles per second (MHz). The 65C816 in the Apple IIGS works two and a half times faster, at 2.5 MHz. Input and output slots on the IIGS run at 1.5 MHz, as must display pages. The memory the Mega II doesn't handle is addressed and refreshed by a GS fast processor interface (FPI) chip.

Apple engineers solved the speed problem by *memory shadowing*—writing instructions into two banks of memory simultaneously. One bank runs slowly to control input, output, and display pages, while the other bank moves quickly to accomplish the actual processing of information.

The fast banks are banks $00 and $01; the slow memory is in $E0 and $E1. When the Apple IIGS pretends to be a //e or //c, banks $00 and $01 emulate the main and auxiliary banks of memory—what Apple calls Fast RAM. The effect is that the //e or //c program runs as it would on a //e with an accelerator card.

"When Apple designed the IIGS, its engineers drew on the company's experience with the Mac and selected the most useful Mac routines. Tools come in Tool Sets, and the ten Tool Sets in the Apple IIGS comprise the Toolbox."

Tools for the IIGS

But the Apple IIGS would hardly be news if it were a mere //e with an accelerator. In addition, the machine's faster microprocessor and dedicated sound and graphics chips will make possible a number of new programs—indeed, entirely new kinds of programs. Using the Toolbox, programmers can easily write code for the Apple IIGS with its complex of chips and levels.

The Toolbox is a notion familiar to Macintosh programmers. The Mac includes a series of firmware routines—software "hard-wired" into the Mac hardware—that take care of all the functions that give the machine its distinctive "point-and-click" interface. A Toolbox manages windows, menus, fonts, dialog boxes, and more.

When Apple designed the IIGS, its engineers drew on the company's experience with the Mac and selected the most useful Mac routines. Tools come in Tool Sets, and the ten Tool Sets in the Apple IIGS comprise the Toolbox.

The Apple IIGS, with its limited memory (compared to that of the 512K Macintosh) and greater need for ROM space to run Apple //e and //c programs, has to keep some Tool Sets on disk to load into RAM. Apple decided which tools would be stored on disk and which would be in ROM in the IIGS, but preliminary documentation hints that programmers will be able to reassign tools at will.

Tools are assigned places in ROM or RAM by yet another tool—the Tool Locator, which itself resides in ROM. The Memory Manager in ROM allocates memory in RAM—a considerable feat of navigation through the complex memory map of the IIGS. It does what the system global page in ProDOS does, and makes it possible for the Apple IIGS to easily handle large coresident applications such as spelling checkers and telecommunications programs.

QuickDraw II is a tool whose inspiration and namesake is the graphics wizard QuickDraw. QuickDraw managed the Mac's black-and-white pictures; QuickDraw II uses a number of QuickDraw subroutines and adds color. QuickDraw draws lines and text characters and fills areas. In the IIGS, super-hi-res is the standard display mode, so QuickDraw will have an important job in every application written for the new machine. The most important QuickDraw II routines are in ROM, while less crucial ones are assigned to RAM.

To make arithmetic easy, the Apple IIGS includes a floating-point numerics tool, the Standard Apple Numerics Environment (SANE). It adds, subtracts, multiplies, and so forth, as well as accomplishing more esoteric jobs such as converting hex numbers to decimals and returning true random numbers.

The Apple IIGS Control Panel, a ROM program you can use to change the machine configuration and set the clock at any time, is the responsibility of the Desk Accessory Manager, which also controls small coresident applications like calculators and appointment books.

Application programs such as word processors and spreadsheets respond continuously to your tickling the keyboard or mouse. The GS Event Manager keeps the machine informed of your behavior and tells the application what to do in response to your keystrokes. The Event Manager also manages to draw windows within windows, and to know where the pointer was on the screen when you clicked the mouse button.

The Sound Manager sets up the music and speech generators in your Apple IIGS sound chips, without intensive programming on your part. Sound Manager tools also read and write sound code into and from RAM, start and stop the music, and turn the volume up or down. (In addition, it handles the single-bit sounds of the Apple //e and //c with ease.)

Other tools reside in ROM: Integer Math Tools, Text Screen Tools that let applications use text modes without switching banks (graphics is the standard mode on the IIGS), and a Scheduler that tracks and allocates time on the CPU to system code. Still other routines perform a variety of minor functions.

Apple has an interesting idea for Disk Tools: "ROM" routines you load from disk into RAM. Without saying how, Apple claims you can locate the tools of your choice in ROM and reserve the others to disk; that would likely require burning an EPROM.

The disk-based tools are the menu manager, window manager, control manager, line editor, dialog manager,

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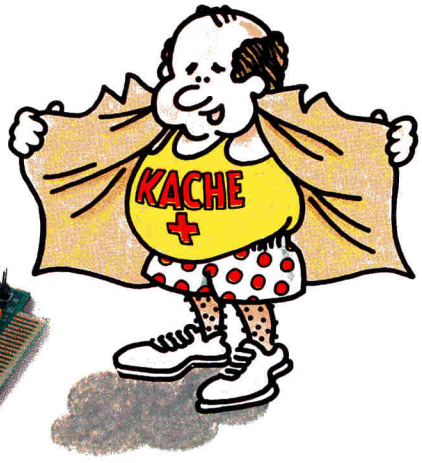

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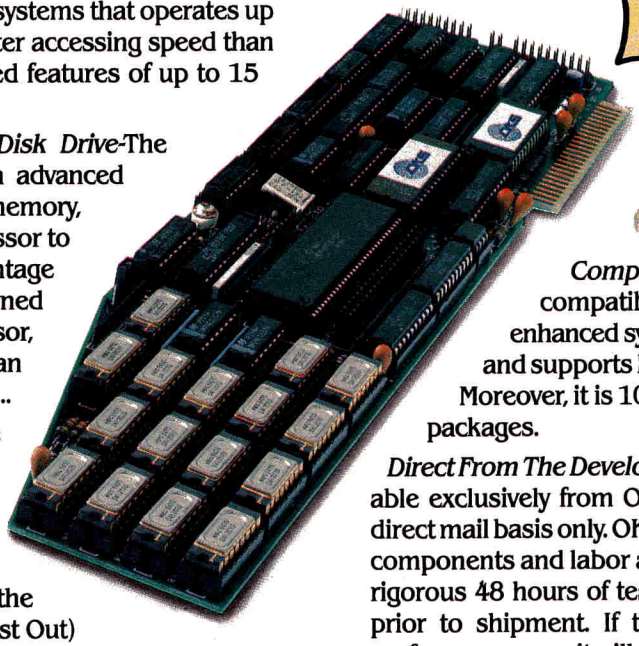

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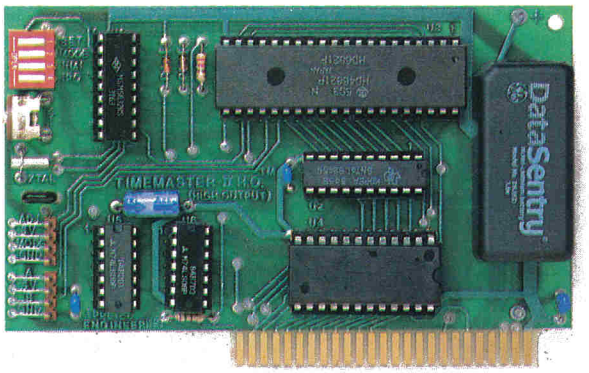

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scrap manager, and print manager. What these tools have in common, aside from a disk, is that they're the most "Mac-like" tools on the Apple IIGS, except for QuickDraw. It appears that you load them into RAM, and into "high RAM" at that, since the smallest banks, $00 and $01, are reserved for Apple //e and //c emulation. Some sacrifice in speed of execution seems unavoidable.

Another advantage to which we can look forward is a set of built-in drivers in the print-manager software/firmware that can control all kinds of printers—including new ones such as the LaserWriter and other laser printers.

Programming for the GS

Apple says programming for the IIGS will be easy. Not only do the Tools make this possible, but other standards help, as well. Object files in the Apple IIGS follow a standard format, regardless of their source—that means programs written in different languages will be presented to the machine the same way. A "linker" and a "loader," working with those standard object files, can create modular programs and combine segments written in different source languages into a single program. The advantages of *team*-written software are immediate: Each programmer can write his or her own part of the whole in the language that best suits that segment. (The choice of development language isn't wide open, though. The Apple IIGS standard object code is available from assembly language, C, and Pascal.)

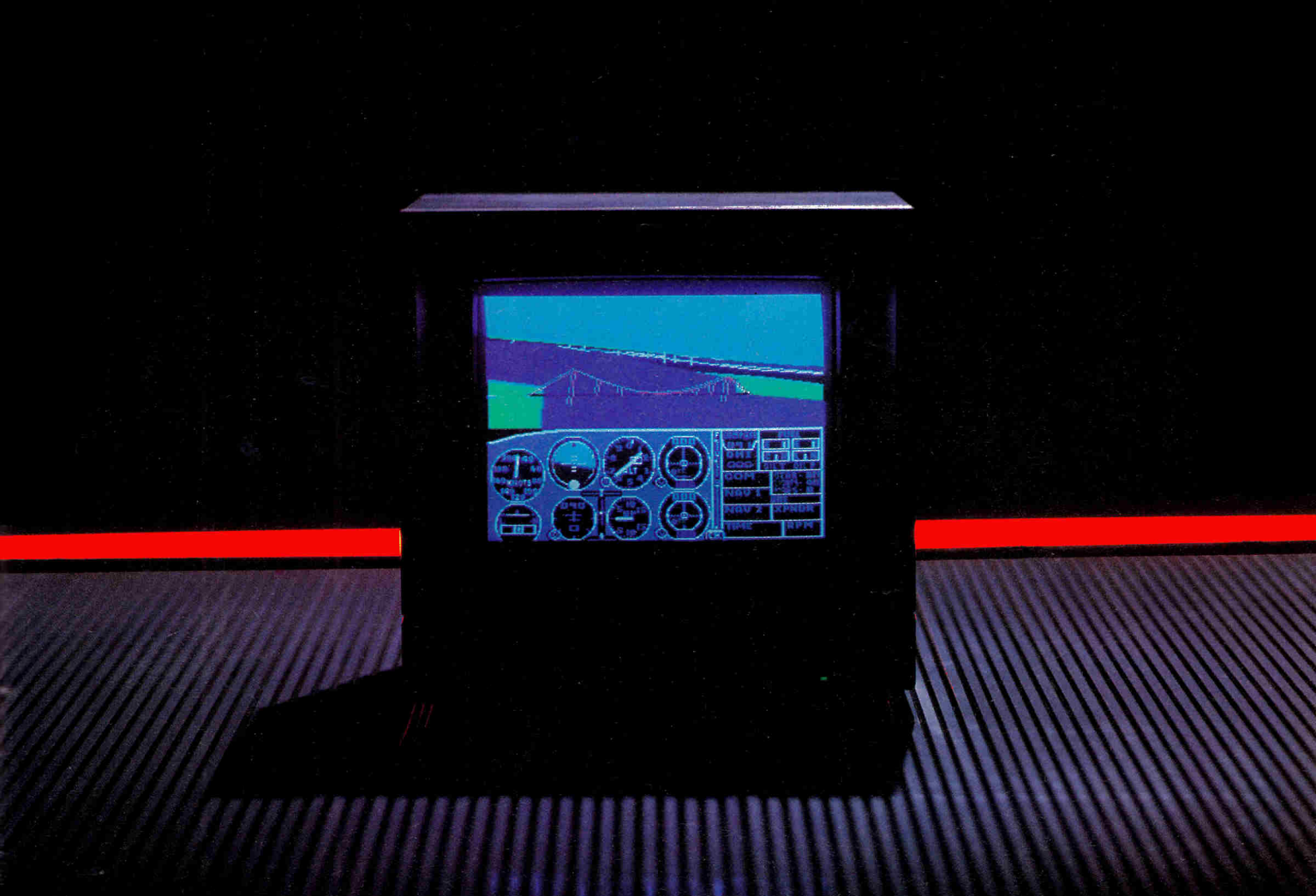
The Apple IIGS assembler is based on the ORCA/M assembler—it's not a version of the Apple //e and //c EdSam assembler. But it does support the instruction sets and addressing modes of the 6502, 65C02, and 65816 microprocessors. It features assembler directives, macros (including predefined macros for I/O, ProDOS calls, graphics, and other common assembly-language routines), segmented object files, and partial assembly so that changes don't require reassembly of the entire program.

While it's similar to Macintosh C, IIGS C includes some changes to accommodate the smaller microprocessor. C programs for the IIGS can easily include segments written in Pascal or assembler.

Pascal for the IIGS resembles Macintosh Pascal; hence, it's also similar to Instant Pascal for the Apple II, but it's unlike UCSD Pascal.

In June as this was written, information about much of the software/firmware for the Apple IIGS was sketchy. ProDOS 16, for example, wasn't completed yet; developers had been using a preliminary version called ProDOS 12. We couldn't find the Finder, and the Mac-style interface was nowhere to be seen, in either the Control Panel or applications. We did see early attempts at a paint program that were stunning, and a "digital tape recorder" that digitized our probing questions.

As you read this in October, a load of new programs for the new Apple IIGS should be on your dealer's shelves. It will look like Macintosh software in color, and the interface will have the Mac feel. That look and feel is the offer of the firmware in the Apple IIGS, if programmers choose to take it. ■



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The New IIGS

WHO WILL BUY THE IIGS?

"The reincarnation of the Apple II spirit": For education, home, and small business, the powerful, high-end IIGS combines open architecture with sophisticated graphics and sound.

by Dan Muse, *inCider* staff

What's platinum and goes between the Apple //e and the Apple Macintosh? The answer: the new Apple IIGS. Its color is platinum, and its position in the Apple II product line is between the //e and the Mac. Officially, Apple says, the GS is the high end of the Apple II family, and the company will market the machine for educational and home-business applications. Unofficially, the GS has no bounds, and you, the user, will decide where the GS fits in.

The GS in Perspective

With the release of the GS, the Apple Computer product line looks like this, ranging from least powerful and expensive to most powerful and expensive: Apple //c, Apple //e, Apple IIGS, Macintosh 512, and Macintosh Plus. According to Apple's New Product Manager Randy Battat, the GS represents the high end of the II family, but doesn't change the positioning of the //c and //e (although Apple says we can expect price cuts). "The GS is a new II. It doesn't replace anything," says Apple's Battat.

Apple had four objectives in designing the IIGS, says Battat:

- It had to be an Apple II and run existing II software.
- It had to be faster.
- It needed increased memory addressing.
- It needed sophisticated graphics and sound capability.

In many ways the GS offers the best of both worlds. It combines the Macintosh's user interface and sophistication with the Apple II's software base and open architecture. But the GS isn't a merger of the Macintosh and the II. The Mac and II will each retain a "unique identity," according to Battat.

"In terms of power and capability, there's some overlap with the Mac. Is the market going to be confused? I don't think so," says Apple's Vice President of Product Development Jean-Louis Gassée.

What makes an Apple II unique, Battat says, is its "special base" of thousands of software packages and the company's ten years of experience in designing Apple II computers. Battat says this experience let Apple build a II that's comparable to the Mac for less money.

If you were expecting to buy the new GS at a price that rivals the Atari 520 ST or one of the popular IBM clones, you'll be disappointed.

When *inCider* editors viewed the Apple IIGS in June, Apple officials were reluctant to talk pricing. They did indicate, however, that the cost would be in the $1300 range. Add an RGB monitor and a disk drive, and the price for a complete system is about $2000. "It's an expen-

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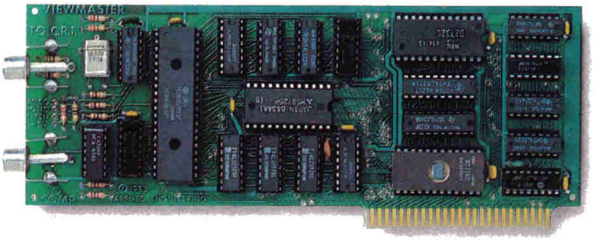

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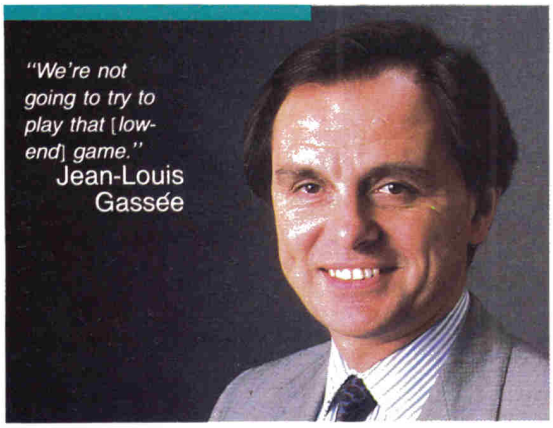


Photos courtesy of Apple Computer, Inc.

sive product to build. When you try to build two software bases under the same roof, there is no way we can make it as low as the Apple II is today. We're not going to try to play that [low-end] game," Gassée says.

"I don't expect the economy-oriented customer to be necessarily wanting this [product]," he adds.

"Apple //e users who want to upgrade to the IIGS can retrofit their systems for $300–$400 less than the price of the IIGS," Tom Virden, Apple's IIGS introduction marketing manager told *inCider*.

The GS Goes to School

While price is important to everyone, educators are particularly sensitive to the bottom line. Betsy Pace, Apple's marketing manager for K–12 education, says Apple is aware of this. The IIGS will replace the //e at the top of the K–12 price scale, but, Pace says, the price structure of the various educational packages shouldn't change radically.

"The GS is the home-education connection," explains Pace. She says she doesn't see a parent buying a IIGS just for home education, but if a child uses an Apple II at school and the parents want a powerful computer for home business or productivity, the GS is a likely candidate.

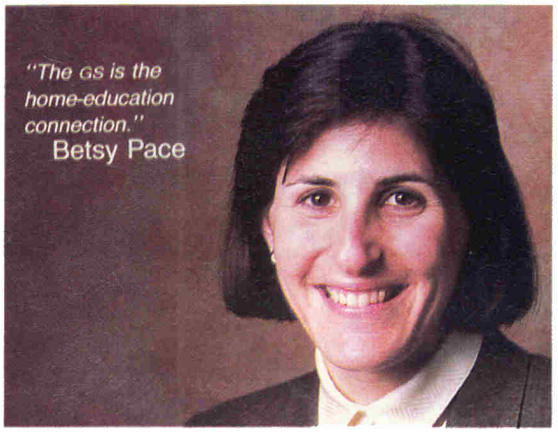
In developing the IIGS, Pace says, Apple recognized the value of Apple II's already in schools and the investment those schools have made in Apple II products. "The progress of the Apple IIGS doesn't leave the older computers behind," Pace says. Because educators don't have a lot of money to spend on computers and software, it's important that what they already have doesn't become obsolete.

The GS will naturally replace the //e at the high end of the K–12 price scale. Pace says she believes educators will continue to buy //e's, however, because they know they have the option of upgrading to the GS. The //e will continue to be the computer Apple recommends for use in kindergarten through grade 8. The GS will be used in grades K–8 for higher-level applications, though—for example, reading programs that take advantage of the GS' sound and graphics capability.

The GS' power and speed (and software that takes advantage of them) make it the Apple best suited for the high-school classroom, according to Pace.

For teachers, Pace says, Apple recommends the IIGS because of its strength as "a productivity workstation." It will let teachers run the instructional programs they use in the classroom as well as their own classroom-management software. Another important aspect of the GS for teachers is its ability to talk to other computers on the AppleTalk local-area network.

The GS is compatible with AppleTalk through its RS-422 interface. Apple expects the GS to play a pivotal role in



the educational network. According to Virden, "The GS is the network master."

The network capabilities of the GS and its ability to run 16-bit business software make the new II the primary machine for school administrators, according to Pace. The Macintosh is reserved for district-level administrators, who need sophisticated business programs and data communications. The Macintosh will also be used for niche applications in grades 9–12 (for example, desktop publishing), she says.

Pace says the option of retrofitting the //e (replacing the //e's motherboard with the IIGS motherboard) will eliminate educators' fear of obsolescence. Educators can expect the prices of the //e and //c to drop as the GS enters the scene. At press time, though, Pace said a figure for the GS hadn't been set, but she did note it would be "aggressively priced."

On the Home Front

GS should strengthen Apple's solid foothold in the educational market. Outside school, however, the market positioning of the GS isn't as clear-cut.

Apple's game plan is to market the IIGS as it has marketed the //c and //e, relying on dealer sales and avoiding at all costs the low end of the market (as well as low prices). Apple's Virden calls the //e and //c high-end consumer products, and the IIGS the high end of the II line.

According to Virden, Apple will not market the GS directly against low-priced mass-merchandized computers, such as those from Atari and Commodore. "We are aware of competition," says Virden, but he makes it clear Apple has no intention of getting into a price war. "You know damned well that we're not going to match the Atari 520," he adds.

Instead, he explains, Apple will rely on its strength: "We are committed to our dealers." In launching the GS, Virden says, Apple has focused on "how can it work best for the dealers." He notes, "We also want to build a grass-roots movement [by] talking to user groups."

According to Ellen Petry Leanse, Apple's user-group evangelist, user groups will be involved with the IIGS at the product roll-out phase through a cooperative effort with dealers.

Representatives from about 500 user groups will receive modified presentations by dealers. "We want to reach out to end users and make them more comfortable with the machine," Leanse says. As "unbiased third parties," she adds, the involvement of user groups will benefit the dealer and the end user.

Moving Toward the Fringes

According to Virden, the GS will attract users who were on the fringes of deciding which computer to buy: "A lot

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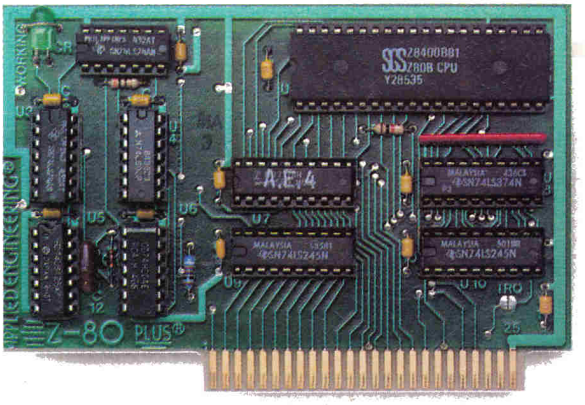

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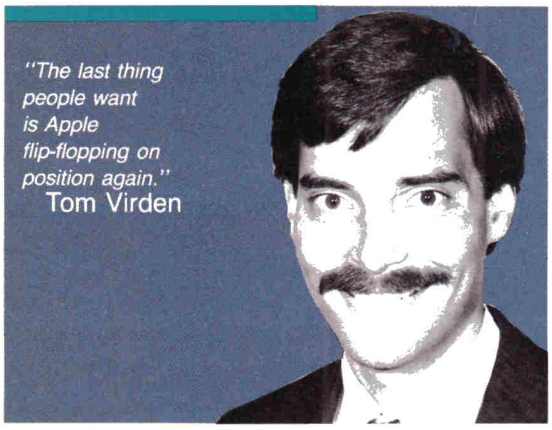

of business users with //e's have accelerator cards and upgrades. They're right on the ragged edge." They're considering going to MS-DOS and 16 bits, but they don't want to give up their Apple II software, according to Virden.

The existence of a computer that runs current Apple II software and offers sophisticated sound and graphics and powerful 16-bit software—a computer that seems to combine the best features of the //e and the Macintosh—may confuse users trying to decide on a machine. Virden maintains that the Mac 512K and Mac Plus will still be the high-end Apple business systems. "The last thing people want is Apple flip-flopping on position again," Virden says, alluding to Apple's previous positioning of the Apple ///, Lisa, and Mac as top-of-the-line systems.

But if the customer's toughest decision is which Apple computer to buy, Apple isn't worried. Gassée says there's a philosophical difference between the II and the Mac.

Users who want to "lift the hood" and get inside the computer will be more likely to look at a IIGS; others will want only the easier-to-use Mac. "There are people who would not touch an Apple II, and there are people who would not touch a Mac," Gassée says.

New Life for the II

While a number of Apple officials are planning the marketing and positioning of the IIGS, Gassée prefers to talk about the computer itself: "I'd rather talk about usages than markets and niches."

The Apple IIGS is "the reincarnation of the Apple II spirit," says Apple's Gassée. "There's so much users can do [with the GS]." It has more power and sophistication than earlier II's, but for those so inclined, the hood still lifts easily.

"It's better than compatible, because it's faster," Gassée says. He warns, however, that "100-percent compatibility is not something you want to guarantee."

Gassée realizes that the best-laid marketing plans often go astray. He jokes about his "Zen theory of marketing": Put the computer out there and see who buys it.

When Gassée refers to his "Zen theory," though, he's only half kidding. While Apple has carefully positioned the GS in the educational and high-end home markets, Gassée hints at the IIGS' greater potential: "We should not try to artificially constrain this product by positioning it as an educational computer or a home computer. . . . It could be an interesting small-business type of machine. My idea of positioning tends to be simplistic: It's the high-end-technology Apple II." ■

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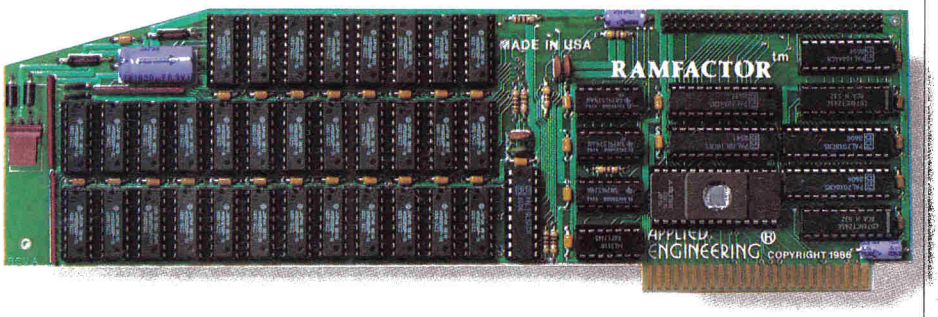

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The New IIGS

Activision's new paint program for the IIGS resembles MacPaint, but sports 4096 colors and makes animation possible.

GS SOFTWARE: A SNEAK PREVIEW

What's in store for Apple IIGS software? A visual interface, exciting color graphics, sophisticated desktop publishing, and more promise to show off the talents of the versatile new II.

by Paul Statt, *inCider* staff

Remember the Macintosh. If you're wondering what kind of software you can buy for your shining new Apple IIGS, just keep Apple's flashy new machine of 1984 in mind. GS programs will look like Mac software—dialog boxes, windows, and menus in bars across the top of the screen—and will use the mouse as the Mac does.

Some distinctively Mac-like applications—desktop-publishing software, painting programs, and graphics, for example—have found their way to the Apple IIGS. The difference is color: The IIGS has it, the Mac doesn't.

The beauty of the IIGS isn't wholly an inheritance from Mother Macintosh. The Apple IIGS has also picked up some talent—notably musical talent—from its cousins, the Commodore Amiga and Atari 1040ST. Sound and music programs are naturals for the IIGS.

At press time in July, not every developer was willing to tell us all we needed to know about software for the Apple IIGS. Prices, dates of availability, system requirements, and features were not always clear. In November we'll look more closely at what runs on the IIGS, but for now, a passing glance, a tease. (See the accompanying Product Information box for details.)

Learning Frenzy

Apple Computer wants the Apple IIGS to be as much a part of secondary school as reading, writing, and the venerable Apple II. To realize that philosophy, developers such as Learningways and Scholastic have been charged with the creation of educational software that takes advantage of the Apple IIGS—especially, we hope, of its superior graphics and sound.

Learningways' Explore-a-Story series was developed for earlier Apple II's, but makes good use of the IIGS speed. These programs let kids "jump into a story feet first, like Bert jumping into his chalk drawings in *Mary Poppins*," claims Learningways' president Art Bardage. He says he hopes that a product that runs on both the Apple II and IIGS will attract schools with an eye on their budgets. Learningways also plans to release a "visual programming language" for schools soon.

Scholastic's new Talking TextWriter is a natural for the Apple IIGS sound chip. The IIGS version is an educational word processor that uses a speech synthesizer to pronounce each letter or word as it's typed. Connie Connors at Scholastic says that the Apple IIGS version will be faster and more colorful than the II incarnation.

PBI Software will offer a "reader animation" product that will let children bring life to text on the Apple IIGS screen.

TML Systems, in Jacksonville, Florida, has a Pascal compiler that should interest both educators and "midnight hackers," according to company president Tom Leonard. TML reports it expects to convert its Mac Pascal compiler—née MacLanguage Series Pascal—to the IIGS by the end of this month and to have source-code libraries and other enhancements before Christmas. "With all the ROM firmware—the Toolboxes—in the IIGS practically identical to those in the Mac, we're not having any troubles at all in porting," said Leonard in July, with an encouraging nod to other developers. The Pascal compiler should cost less than $100.

Desktop Madness

Quark, Megahaus, and Broderbund will offer desktop-publishing software that can take advantage of the built-in LaserWriter drivers in the Apple IIGS firmware.

The Quark product, which we expect the company will call Opus, includes a word processor for "one-stop" publishing. Quark has word-processing experience with its Word Juggler, but Fred Ebrahimi, president of the company, swears Opus will be significantly different. He says he thinks desktop publishing has a future in "school administration, for handouts that go to parents and such"; that fits neatly into Apple's marketing scheme for the IIGS. Opus should sell for less than $500.

Megahaus will be the price leader in desktop publishing if it keeps the cost of Pager at $125, as hoped in July (it won't include its own word processor).

Broderbund's Front Page, a page-layout and desktop-publishing program that will support both AppleWorks word-processor files and the LaserWriter, also sports color text.

Gonzo Graphics

At Electronic Arts, Bing Gordon says he expects to have Deluxe Paint, the popular Amiga graphics program, ready for the GS by Christmas. "In fact,"

Electronic Arts' Deluxe Paint graphics program should be available for the IIGS by Christmas.

he notes, "we'll have all our Amiga stuff ported over to the IIGS soon. But all the Amiga programs are written in C, and the C compiler Apple promised us in April isn't here in July. We don't want to write software that doesn't take full advantage of the features of the IIGS."

Another product of a somewhat different nature is PBI's Visualizer—a business-graphics program PBI president Will Lowe describes as "an enhanced GraphWorks." (We assume that Visualizer will work with enhanced AppleWorks.)

Broderbund Software will upgrade several products—The Print Shop and Fantavision—for the Apple IIGS and add some new ones. Among those being developed is a drawing product that will be for the IIGS what MacDraw is to the Mac, with a customized color palette and drafting capability.

Activision promises two programs for the Apple IIGS at less than $100 each: painting software and a word processor developed in the United States by Luc Barthelet and VersionSoft, the French company that created Mouse Calc and Mouse Word for the //e and //c.

The paint program resembles MacPaint, according to Bill Cleary at Activision, "only better. It has all the features of MacPaint—fatbits, fonts—but it also has 4096 colors. It makes 'real' animation possible, not just 'color cycling.' "

Words, Numbers, and the Telecommunications Craze

The single new word processor for the Apple IIGS (at this writing) is Activision's. According to Cleary, it's "a superset of MacWrite," combining the ease of use of the Mac interface—with as many as 16 simultaneous windows, on-screen highlighting and fonts, and so forth—with color. "It's also faster than MacWrite," claims Cleary.

MouseWrite from Roger Wagner Publishing is an example of a word processor that uses the power of the Apple IIGS with an Apple II program. "MouseWrite for the GS," says Roger Wagner, "basically includes all the features MouseWrite could have on the old Apple II, but you don't have to add any hardware." The new MouseWrite offers 3½-inch-disk support, mouse interface, and print spooling, and takes advantage of as much memory as you pack into your Apple IIGS. Roger Wagner was impressed by the way the IIGS handles interrupts and the fact that MouseWrite now lets you keep as many as 12 documents open on the desktop at once.

Look for accessory packages for MouseWrite that let you run a LaserWriter or tie into the AppleTalk local-area network soon.

A "switcher" program that lets you jump quickly from one application into another without rebooting—if you have the RAM in your IIGS—is one utility of which Wagner is particularly proud. It's called Carousel.

Other application programs that are expected to be immediately available for the IIGS include MECA's Managing Your Money (less than $200), Monogram's Dollars & Sense, and Chang Labs' Rags to Riches. These financial programs should use more color graphics than their Apple II predecessors, and should work faster.

The telecommunications race looks like a walkover: PBI's CommWorks is the sole entry in the field at this time. CommWorks is a relatively new product that works with AppleWorks and operates in a similar fashion; it was probably developed with an eye to the Apple IIGS. Will Lowe at PBI reports that CommWorks will be "modular—that means you don't need to buy more features than you really need. If you have no need for terminal emulation, you don't pay for it." He adds that the price will be "well under $100."

Bill Cleary at Activision was willing to talk about "future products" that may be released for Christmas or early in 1987. He hinted that "we have a capability for music and sound, and the talent, too," referring to Activision's MusicMaker. Music is one art that isn't yet electronic on the Apple IIGS, and it's one of the machine's obvious fortes.

Activision and other developers will be "porting over" programs to the IIGS from the Mac, the Atari ST, and the Amiga, too. Apple has tried to ease the transfer, and the strength of the IIGS is crying for software that will show off its power.

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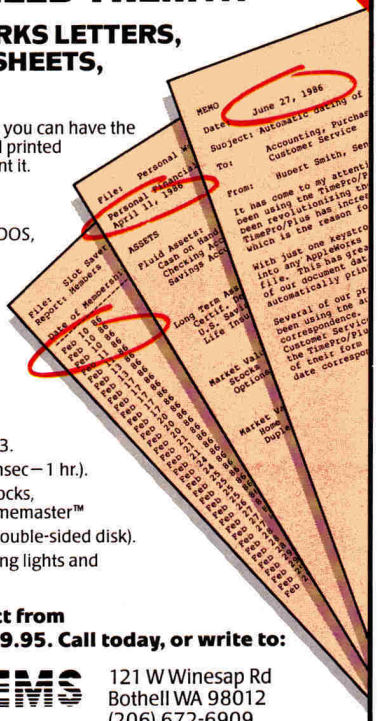

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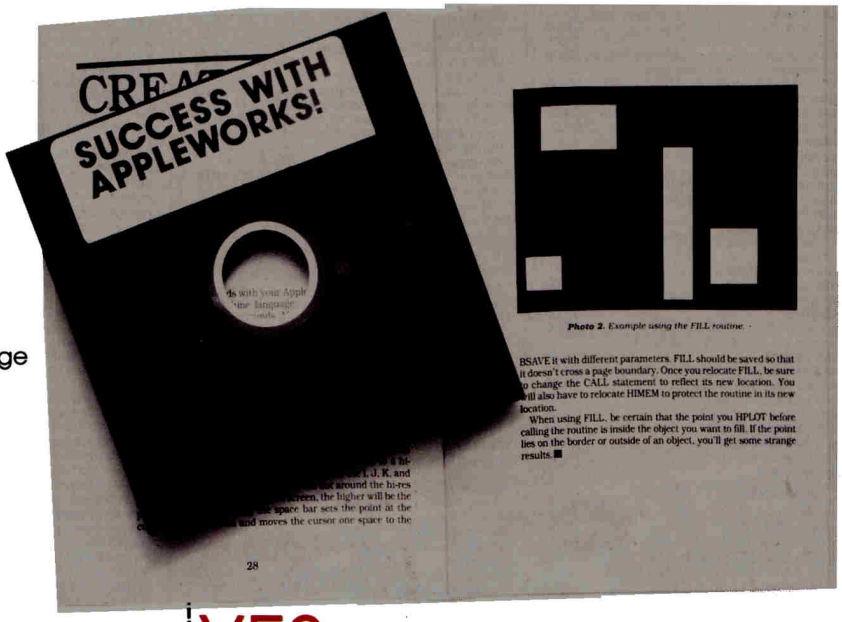

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APPLEWORKS IN ACTION

Converting a Data-Base Report to a Spreadsheet

"Converting the sales-to-date report to a spreadsheet provides a good opportunity to sharpen your skills."

by Ruth K. Witkin

When a data-base report contains financial information, converting it to a spreadsheet has significant advantages. You can create formulas that work with numbers in diverse cells, not only column to column, and use built-in calculating functions, not just simple arithmetic. Best of all, you don't have to retype anything that's already in the data base.

In this session, you'll use the Data-Interchange Format (DIF) to convert the sales-to-date report in the Customers data base (see last month's AppleWorks in Action, September 1986, p. 81) to a spreadsheet. **Figure 1** shows the report reborn as a spreadsheet, **Figure 2** shows how it looks at maturity. If you haven't yet created the Customers data base, now is the time to do it.

Every instruction this month is step by step, unlike the set-up summaries I often give. If you haven't tried converting files yet or you're just getting up to speed with AppleWorks, this is a good opportunity to sharpen your skills and pick up techniques of which you may not be aware.

You'll need a pathname when AppleWorks asks for it. The pathname, which tells AppleWorks where to look for a file, is a combination of diskname and filename, each preceded by a slash. Check the name of the disk on which your CUSTOMERS file is stored and jot down the pathname on a piece of paper in this form: */DISKNAME/SALES*. For example, my data disk is *DATA17*, so my pathname is */DATA17/SALES*.

Converting the Data-Base Report

Start up the AppleWorks program and load the *CUSTOMERS* file. You should now see the multiple-record layout of the Review/Add/Change screen. First, display the sales-to-date report on the Report Format screen: Press OA-P to start the Print command, press the return key to confirm *Get a report format*, type **2**, and press the return key again to select *SALES-TO-DATE*.

Next, have AppleWorks print the report to disk as a DIF file: Press OA-P, type **5** (or the number that selects *A DIF file*), and press the return key. When AppleWorks asks for a pathname, type it in this form: */DISKNAME/SALES* and press the return key. The file is written to disk and the Report Format screen returns. Press the escape key three times to return to the main menu.

Now bring the DIF file to the screen as a spreadsheet. Press the return key to confirm *Add files to the Desktop*, type **5** and press the return key to select *Make a new file for the Spreadsheet*, type **2** and press the return key again to select *From a DIF (TM) file*.

AppleWorks now asks for the pathname. Type your pathname in the same form as before—*/DISKNAME/SALES*—and press Return. AppleWorks asks you to name this new file. Type **COMP SALES** (for comparative sales) and press the return key again.

That mess on the screen is indeed a spreadsheet, barely recognizable as such except for the cell contents line that displays A1, the cell on which the cursor rests, and *(Value) 179*, the contents of A1. Only the hard data are transferred from a data-base report, so the calculated category you inserted into the sales-to-date report between columns F and G is missing, as are the totals of columns E and F.

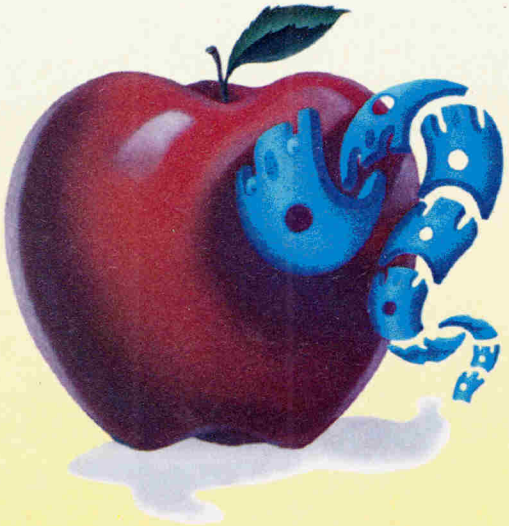
Setting Up the Spreadsheet

First, insert the rows that will make the spreadsheet look more like the one in **Figure 2**: Leave the cursor on A1, press OA-I, and press Return to confirm *Rows*. Type **3** and press Return again.

Next, insert two columns, one before column B to separate the right-justified numbers in column A from the left-justified labels in column B, and the other before column G to make room for the percentage-of-sales calculations: Place the cursor on B1 and press OA-I. Type **C1** and press Return. Move the cursor to G1. Again press OA-I, type **C1**, and press Return.

The contact names aren't needed in this report. Place the cursor on I1, and delete the column by pressing OA-D, typing **C**, and pressing Return.

AppleWorks allows only 70 characters across a row and enters information only in columns on the screen,



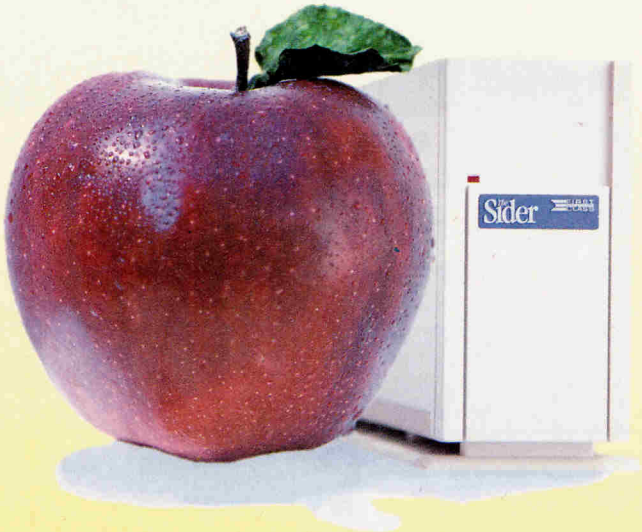


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Figure 1. The data-base report in its debut as a spreadsheet.

```
File: COMP SALES                REVIEW/ADD/CHANGE                Escape: Main Menu
========A========B========C========D========E========F========G========H====
  1|      179Ace SuperCT      Food          33722    35999Gil Freem
  2|       85Allied GrNY      Food          32100    32645Evelyn Av
  3|      153American NY      Variety                 93210llie O'D
  4|      142Arbor SalNJ      Discount      28560    32742Ben W. Sm
  5|       43Crown SupMA      Food          19517    18203Homer Cap
  6|       56Dollar ShFL      Discount      30450    32345Don Johns
  7|       87Family CeNJ      Variety       12564    11070Fay L. By
  8|       22Key MarkeMD      Food          10987    13450Ken Wolin
  9|       63Off The SCT      Discount      25000    28567Connie Do
 10|
 11|
 12|
 13|
 14|
 15|
 16|
 17|
 18|
--------------------------------------------------------------------------------
A1: (Value) 179

Type entry or use @ commands                                    @-? for Help
```

Figure 2. The data-base report, now a fully functioning spreadsheet. The highlighted cells show where the formulas are first entered.

```
=====A==B==========C============D======E========F========G=========H=========I====
  1|                                COMPARATIVE SALES TO DATE
  2|==========================================================================
  3|ACC#  CUSTOMER                HQ   BUSINESS   1985     P/SALES    1986     P/SALES
  4|==========================================================================
  5|179   Ace Supermarkets        CT   Food       33,722    17.5% ②  35,999    16.8%
  6| 85   Allied Grocers          NY   Food       32,100    16.6%    32,645    15.2%
  7|153   American Stores         NY   Variety                0.0%     9,321     4.3%
  8|142   Arbor Sales Co.         NJ   Discount   28,560    14.8%    32,742    15.3%
  9| 43   Crown Supermarts        MA   Food       19,517    10.1%    18,203     8.5%
 10| 56   Dollar Shops Inc.       FL   Discount   30,450    15.8%    32,345    15.1%
 11| 87   Family Centers          NJ   Variety    12,564     6.5%    11,070     5.2%
 12| 22   Key Markets             MD   Food       10,987     5.7%    13,450     6.3%
 13| 63   Off The Shelf, Inc.     CT   Discount   25,000    13.0%    28,567    13.3%
 14|                                               ------              -------
 15|                    TOTALS                    192,900 ①  100.0%   214,342   100.0%
 16|
 17|
```

so you'll enter the line across row 2 in two steps. Place the cursor on A2 and type quotation marks. Hold down the equal sign key until the sign reaches the right edge of the highlight in G2.

There's no need to press the return key. Just press the right arrow key eight times to bring column I on screen, then the left arrow key to move the cursor back to column H. Type quotation marks and hold down the equal sign key until the sign reaches the right edge of the highlight in I2. Now press the return key.

Using the clipboard to enter the line in row 4 is easier and faster than repeating the hold-down-the-key process. Leave the cursor on H2 and copy the line to the clipboard: Press OA-C, type **T** to select *To clipboard*, and press Return. This technique adds a whole new row and shoves the entries down one row. Place the cursor on H4 (atop *35999*) and press OA-C again. This time, type **F** to select *From clipboard*. Presto. If you needed more of these lines, you could just keep copying from the clipboard in the same way.

Adjusting the Column Widths

Next, give the entries the room they need. Place the cursor on A4. Press OA-L to start the Layout command. Type **C** to select *Columns*, and press Return. Type **C** again to select *Column width*. Now reduce the width of column A by holding down the open apple key while you tap the left arrow key five times, then press Return.

Follow the same procedure for the other columns. In each case, place the cursor on a cell in row 4 (B4, C4, and so on) and press OA-L. Type **C**, press Return, and type **C** again. Then

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Captain's Log . . . War Date 10.01.44

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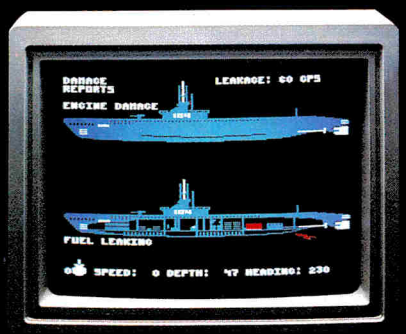
"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable cargo ships is part of convoy formation."

"0400 Hours. Lookouts on the bridge. Target identification party reports one cargo ship, 4,000 tons, troopship of 10,250 tons, with two *Kaibokan*-type escorts. Moving into attack position."

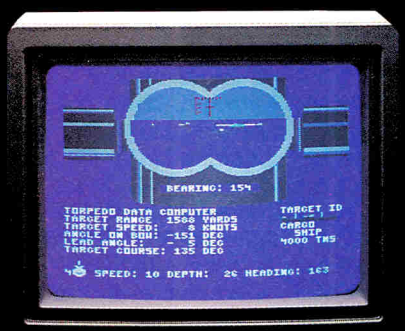
"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope OK. Charts and Attack Plot Board OK. All mechanical systems OK."

"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."

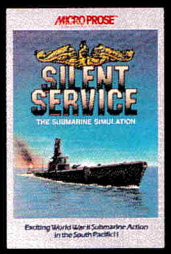
"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly . . . Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent."



"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propellèr noises receding. We'll come to periscope depth for our return punch."



"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last cargo ships coming into 'scope view — an ideal target position. On my mark . . . Fire Tube 4! Fire 5!"



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change the width as follows and press the return key: In column B, press OA-left arrow seven times; in column C, press OA-right arrow 13 times; in column D, press OA-left arrow four times; in column H, press OA-right arrow twice. Things are really beginning to take shape.

Press OA-9 to jump the cursor to row 13. Now enter the short lines in columns F and H. Place the cursor on H14 and type quotation marks. Press the space bar three times, type seven minus signs (one character shorter than the numbers), and press the left arrow key twice to move to F14. Type quotation marks, press the space bar once, type seven minus signs (again, one character short), and press the return key.

Entering and Formatting the Labels

Press OA-1 to jump the cursor to row 1. Now enter the new labels. Place the cursor on D1 and type **COMPARATIVE SALES TO DATE**. There's no need to press the return key between labels. Move the cursor to A3 and type **ACC#**. Enter the other labels in the same way: In C3, type **CUSTOMER**. In D3, type **HQ** (for headquarters). In E3, type **BUSINESS**. In F3, first type quotation marks (or else AppleWorks will think the year is a value) and type **1985**. In G3, type **P/SALES** (for percentage of sales). In H3, type quotation marks, then **1986**. In I3, type **P/SALES**. In C15, type **TOTALS**. Now press Return.

Leave the cursor on C15 and right-justify TOTALS by pressing OA-L, the return key to confirm *Entry*, and typing **LR**. Press OA-2 to jump the cursor to row 2. Now center the headings in row 3, columns F to I. Place the cursor on F3 and press OA-L, type **B** (for *Block*), press the OA-right arrow combination, and press the return key. Type **LC**.

Formatting the Numbers

The numbers in columns F and H are dollar amounts, but dollar signs will only crowd the spreadsheet. Instead, set a standard value of Commas with no decimal places. The Commas format places the numbers one character shy of the right edge of the cell, to align them better with the headings. Leave the cursor on F3, press OA-V, and press Return. Type **C** and press Return again.

The numbers in columns G and I are percentages. A neat technique for reducing the number of format steps is to override the standard value in *only one* cell. Then, when you enter a formula in that cell and copy it, the formula will carry the percent format with it. Place the cursor on G5 and press OA-L. Now press the return key twice to confirm *Entry* and *Value format*, type **P1**, and press Return. Press OA-S to store your work on disk.

Entering the Formulas

Figure 2 shows the formula locations. Some people type everything into a formula, including the cell locations, a practice that increases the risk of typos and inaccurate results. The better way is to move the cursor to the cell locations and type everything else.

Formula 1: 1985 Total

Formula 1 adds the sales in 1985 and produces the total in F15. Place the cursor on F15 and type **@SUM(**. Press the up arrow key, type a period, press OA-3, and press Return. Type a closed parenthesis. The formula on the entry line should be: *@SUM(F14. . .F4)*. Press the return key.

Copy Formula 1 into H15 so that it adds the 1986 sales figures: Leave the cursor on F15 and press OA-C. Press the return key twice, press the right arrow key twice, and press Return. AppleWorks asks if F14 is a *No change* or *Relative* reference. Relative references are cells that are in the same direction and distance to the copied formula as they are to the original formula. Tell AppleWorks that both F14 and F4 are relative by typing **R** twice.

Formula 2: Each Entry as a Percentage of Sales

Formula 2 calculates the Ace Supermarkets sales (F5) as a percentage of 1985 sales (F15). Place the cursor on G5 and type a plus sign. Press the left arrow key and type a slash. Move the cursor to F15. The formula on the entry line should be: *+F5/F15*. Press the return key.

Now copy Formula 2 down column G so that it calculates each entry as a percentage of sales: Leave the cursor on G5 and press OA-C. Press the return key twice to confirm *Within worksheet* and the *Source*. It's often more efficient to copy a formula straight down a column, even into a cell that doesn't need it (in this case,

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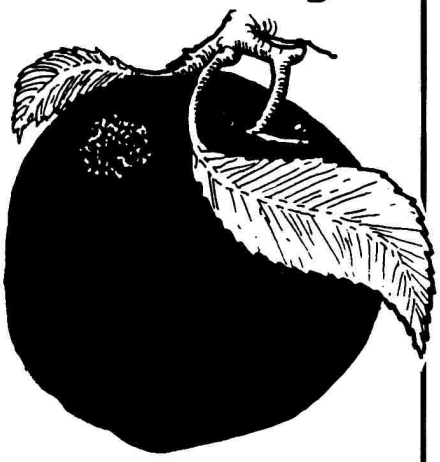

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APPLEWORKS IN ACTION

Figure 3. The printed spreadsheet.

File: COMP SALES — Page 1 — 10-12-86

COMPARATIVE SALES TO DATE

ACC#	CUSTOMER	HQ	BUSINESS	1985	P/SALES	1986	P/SALES
179	Ace Supermarkets	CT	Food	33,722	17.5%	35,999	16.8%
85	Allied Grocers	NY	Food	32,100	16.6%	32,645	15.2%
153	American Stores	NY	Variety		0.0%	9,321	4.3%
142	Arbor Sales Co.	NJ	Discount	28,560	14.8%	32,742	15.3%
43	Crown Supermarts	MA	Food	19,517	10.1%	18,203	8.5%
56	Dollar Shops Inc.	FL	Discount	30,450	15.8%	32,345	15.1%
87	Family Centers	NJ	Variety	12,564	6.5%	11,070	5.2%
22	Key Markets	MD	Food	10,987	5.7%	13,450	6.3%
63	Off The Shelf, Inc.	CT	Discount	25,000	13.0%	28,567	13.3%
	TOTALS			192,900	100.0%	214,342	100.0%

G14) because it's faster to blank out a cell than repeat the copy steps. Press the down arrow key, type a period, press OA-9, and press Return.

AppleWorks again asks about *No change* and *Relative* references. A *No change* reference is a target cell. Regardless of the cell into which you copy the formula, it will continue to refer to the target cell to do its calculations. Tell AppleWorks that F5 is a relative cell reference and F15 is *No change* by typing **R** and pressing Return.

Next, copy Formula 2 into the first cell in column I. Leave the cursor on G5 and press OA-C. Press the return key twice, the right arrow key twice, and the return key again. This time, both F5 and F15 are relative cell references, so type **R** twice.

To calculate each customer's contribution to sales in 1986, copy Formula 2 down column I: Place the cursor on I5 and press OA-C. Press Return twice, press the down arrow key, and type a period. Now press OA-9 and press Return again. Cell H5 is a relative reference, H15 is *No change* (a target), so type **R** and press Return.

Now blank out the unneeded formulas: Place the cursor on I14, press OA-B, then the return key. Place the cursor on G14, press OA-B, and the return key. Press OA-S to store the spreadsheet on disk.

It's always a good idea to protect formulas from accidental change: Place the cursor on G5 and press OA-L. Now type **B**, press OA-9, press Return, and type **PN**. Move the cursor to I5 and press OA-L. Type **B**, press OA-9, press Return, and type **PN** again. Place the cursor on F15 and press OA-L. Type **B**, press OA-right arrow, press Return, and type **PN**.

Printing the Spreadsheet

The last step before printing is to increase the top margin and change the line spacing, which is a combination of eight lines to the inch and double spacing, an interesting alternative to standard single or double spacing. Press OA-O to bring up the Printer Options screen. Type **TM** and press Return. Type **.5** and press Return. Type **LI** and press Return. Type **8** and press Return. Type **DS** and press Return. Press the escape key to exit the Printer Options screen.

Now turn on your printer. Press OA-P to start the Print command and press Return to confirm *All*. Press the return key to select the printer (or type a printer number, then Return). Type today's date and press the return key twice. When the printer stops, here's your spreadsheet report, looking just like the one in **Figure 3**. Press OA-S to store this final version on disk.

Next month, I'll tell you how to use the AppleWorks word processor to create a company newsletter.■

Ruth K. Witkin is a consultant in computer applications for business. She is the author of the hotCider Success with AppleWorks (inCider, *CW Communications),* Managing Your Business with Multiplan *(Microsoft Press),* Managing with AppleWorks *(Howard W. Sams & Co.),* Personal Money Management with Multiplan *(Hayden Books), and* Personal Money Management with AppleWorks *(Hayden Books). Write to her at 5 Patricia Street, Plainview, NY 11803. Please enclose a stamped, self-addressed envelope if you'd like a reply.*

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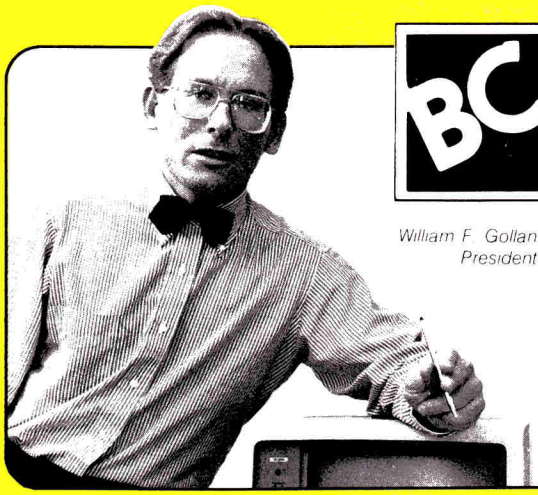

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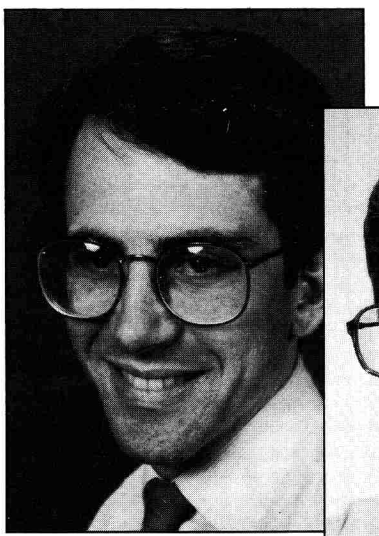
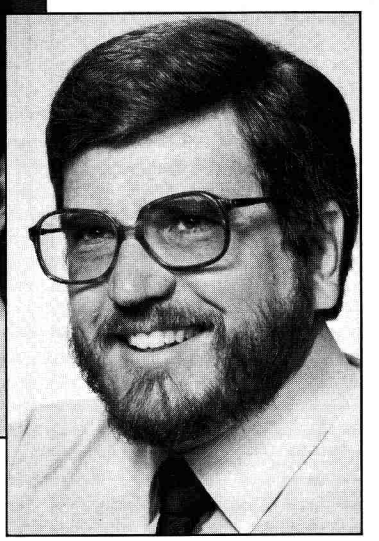
An AppleWorks Bar-Graph Template

"To effectively show information in a graphics format, bar graphs may be just what you're looking for."





by David Goodrum and Joel Robbins

inCider *presents the first of a series of articles for the more than one million Apple II owners who use AppleWorks in the home, school, or office. It will be specifically tailored for teachers and administrators who want to take advantage of integrated software. If you're not an educator, though, don't turn the page. School is a microcosm of society—and every AppleWorks owner will find useful information in this column.*

Suppose your principal has asked you to submit a written proposal justifying your request for more computers for your department. How can you highlight the four-year increase in student and teacher use of the current computers?

Or perhaps your government students don't understand the changes in voter registration in the last 50 years, and you'd like to show them a graphic illustration. Maybe your English students haven't used enough facts in their research reports and they need to add clear statistical information.

If you have similar problems and goals, the following AppleWorks tutorial on bar graphs may be just what you're looking for. You can fill the Bar Graph spreadsheet template with data of your choice, "clipboard" it to the AppleWorks word processor, then copy it into the middle of any report. At first, your bar graph may seem a little strange because it's composed of symbols rather than solid boxes. But it still effectively shows information in a graphics format. Refer to **Figure 1**, a graph showing the change in number of students in one school's newspaper class during a six-year period.

The first template you'll create is called Bar Graph. As its name implies, this template will help you set up a display to graphically present statistical data to your class, committee, or boss. You can include the chart as part of a larger report. It doesn't represent the usual spreadsheet application, but it's simple to set up, it's of general interest, and it illustrates the idea of integrated software as a "shapeless container."

First boot up AppleWorks and choose to add a new file for the spreadsheet from scratch. Name it BAR GRAPH. Then press OA-V (the open-apple key and the letter V for *standard values*) to change the Recalculation Frequency to Manual; otherwise, the template would try to recalculate every time you enter information, and that would slow down the set-up process.

General Formatting

Now look at **Figure 1** and follow these steps:

1) Type seven 5's in cell A1. Any seven-digit number will suffice; this makes the symbols ###### fill the bars in the graph.

2) Type "FILLER ^" in cell A2 to label the place where the fill number goes.

3) Type "1" into cell A3. This will print only a "1" above the tops of the bars. (A number is necessary so that the spreadsheet has something to calculate.)

4) Type "BLANK ^" in cell A4 to point to the "1" you've just put in.

5) Enter the rest of the information in column A as labels. You can enter numbers as labels by starting with a shift-quote mark.

6) Place the cursor anywhere in column B and hit OA-L (layout), and select *column*.

7) Highlight column B and hit the return key.

8) Choose the column-width option.

Continued on p. 81

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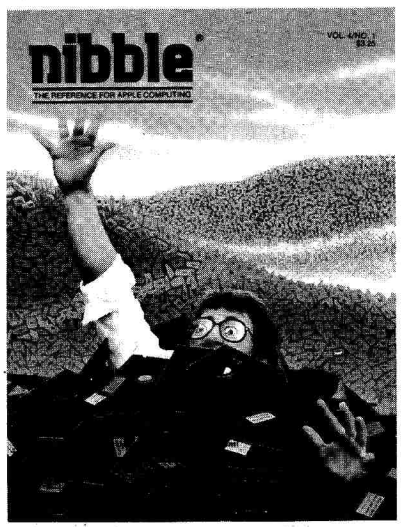

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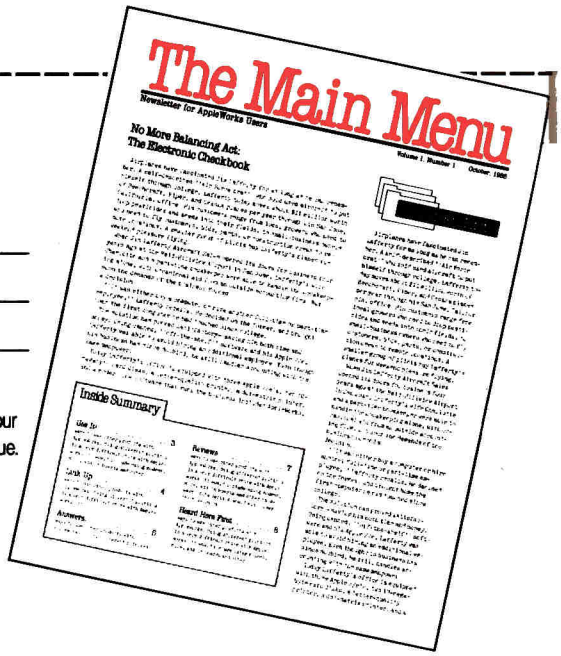
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Continued from p. 78.

9) Use OA-left arrow to shrink column B to four spaces.

10) Fill in column B, starting at cell B3, with the numbers 15 down to zero, as shown in **Figure 1**.

Use a process similar to the one shown in steps 6 through 9 to narrow columns C and D to a width of one space each. Now to complete the formatting before we start formulas, hit shift-" and "|" to place a vertical bar in cell C3, then complete the following steps:

1) Leave the cursor in cell C3.

2) Hit OA-C (copy).

3) Press return to confirm *within worksheet* prompt.

4) The source is already highlighted, so press return again.

5) Enter a period, which tells AppleWorks you're going to highlight a range of cells starting at cell C3.

6) Then use the down arrow to highlight the destination down through cell C18.

7) Press return.

Narrow columns E, G, I, K, M, and O to six spaces each—three less than the default width. Similarly, reduce columns F, H, J, L, and N to three spaces each. This lets you have up to six bars in your chart.

Type the sample numbers from cells E1, G1, I1, K1, M1, and O1 of **Figure 1** into the same cells in your template. Then type six hyphens (remember that you must press shift-quote mark before pressing the hyphen so that you enter a label) into cell E2. After inserting the first set of hyphens, repeat the process for cells G2, I2, K2, M2, and O2, or use OA-C to copy E2 individually into the other cells.

Look at the information in cells E18 through O18 in **Figure 1**. You can type in this descriptive row of labels by starting with a shift-quote mark and entering the entire line before hitting return.

Our template contains only one basic formula, but it varies slightly with the cell and row into which it's placed. For example, the formula in E3 picks up a number from E1, G3 picks up a number from G1, J3 from J1, and so on.

Let's pause to interpret the formula: @IF(E1>B4+.5,A1,A3). Users of BASIC should recognize the logic: If the contents of cell E1 are greater than the contents of cell B4 plus .5, then display in cell E3 the number currently in cell A1, else display the number from A3. The .5 has a rounding effect on the result of the formula. If you don't understand this right away, don't feel lonely. Working with spreadsheet formulas takes some getting used to.

Type the information found in cell E3 of **Figure 2** (you can expand it and zoom in on it with OA-Z to show the formulas) into cell E3 of your template, then press OA-C and follow these steps to copy the formula down column E:

Figure 1. Bar Graph, an AppleWorks spreadsheet template.

```
R
O
W
S     COLUMNS
=======A====B==CD==E====F===G====H===I====J===K====L===M====N===O=====
1   5555555          12       11       10       12       13       14
2  FILLER ^        ------   ------   ------   ------   ------   ------
3          1  15|      1        1        1        1        1        1
4  BLANK   ^  14|      1        1        1        1        1   ######
5             13|      1        1        1        1   ######   ######
6  LEGEND >   12| ######        1        1   ######   ######   ######
7  l's    >   11| ######   ######        1   ######   ######   ######
8  of units   10| ######   ######   ######   ######   ######   ######
9              9| ######   ######   ######   ######   ######   ######
10 STUDENTS    8| ######   ######   ######   ######   ######   ######
11 IN          7| ######   ######   ######   ######   ######   ######
12 NEWSPAPER   6| ######   ######   ######   ######   ######   ######
13 CLASS       5| ######   ######   ######   ######   ######   ######
14 1981-86     4| ######   ######   ######   ######   ######   ######
15             3| ######   ######   ######   ######   ######   ######
16             2| ######   ######   ######   ######   ######   ######
17             1| ######   ######   ######   ######   ######   ######
18             0|---1981-----1982-----1983-----1984-----1985-----1986
```

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1) Press return for prompt *within worksheet.*

2) Press return if E3 is highlighted.

3) Use "." and then the down arrow to highlight destination cells through E17, and press return.

4) AppleWorks will now ask whether each part of the formula is *relative* or requires *no change.* The only part of the formula that's relative to other cells is "B4," so press N (no change), R (relative), N, and N again as each one of the four parts of the formula is highlighted.

Don't enter the formulas into the rest of the template until you've finished the other steps listed below.

You're now ready to test the template by hitting OA-K (calculate). A bar graph should appear. If it doesn't, check your layout against **Figures 1** and **2** and the text.

If this part of the template works,

Figure 2. Bar Graph expanded to show formulas.

```
R
O
W
S  ===A=====B==CD==========E================F==================G=====COLUMN
1  5555555        12                                            11
2  FILLER ^       ----------------------                        --------------------
3  1          15| @IF(E1>B4+.5,A1,A3)                          @IF(G1>B4+.5,A1,A3)
4  BLANK    ^ 14| @IF(E1>B5+.5,A1,A3)                          @IF(G1>B5+.5,A1,A3)
5            13| @IF(E1>B6+.5,A1,A3)                          @IF(G1>B6+.5,A1,A3)
6  LEGEND >   12| @IF(E1>B7+.5,A1,A3)                          @IF(G1>B7+.5,A1,A3)
7  1's      > 11| @IF(E1>B8+.5,A1,A3)                          @IF(G1>B8+.5,A1,A3)
8  of units   10| @IF(E1>B9+.5,A1,A3)                          @IF(G1>B9+.5,A1,A3)
9              9| @IF(E1>B10+.5,A1,A3)                         @IF(G1>B10+.5,A1,A3)
10 STUDENTS    8| @IF(E1>B11+.5,A1,A3)                         @IF(G1>B11+.5,A1,A3)
11 IN          7| @IF(E1>B12+.5,A1,A3)                         @IF(G1>B12+.5,A1,A3)
12 NEWSPAPER   6| @IF(E1>B13+.5,A1,A3)                         @IF(G1>B13+.5,A1,A3)
13 CLASS       5| @IF(E1>B14+.5,A1,A3)                         @IF(G1>B14+.5,A1,A3)
14 1981-86     4| @IF(E1>B15+.5,A1,A3)                         @IF(G1>B15+.5,A1,A3)
15             3| @IF(E1>B16+.5,A1,A3)                         @IF(G1>B16+.5,A1,A3)
16             2| @IF(E1>B17+.5,A1,A3)                         @IF(G1>B17+.5,A1,A3)
17             1| @IF(E1>B18+.5,A1,A3)                         @IF(G1>B18+.5,A1,A3)
18             0|---1981                  -----                --1982

        Putting in the Formulas
```

Figure 3. Quick documentation for Bar Graph template.

```
TEMPLATE:  BAR GRAPH, spreadsheet

USES:  Make a simple bar graph to illustrate lessons in your
       classroom or to present information to committees.

REMEMBER:
          1.  The bar of the graph must be made of numbers.
              Type in those in cell A1. If you want #'s to
              appear, type a number longer than six digits.

          2.  Use the left column, starting with row 6, to
              mention your legend and name the graph.

          3.  The top row of the template should be filled
              with the appropriate numbers. Divide your
              numbers by 10; 100; 1000; 10,000; 100,000; or
              1,000,000 so that the bar graph will work with
              the numbers in column C. Change the legend
              accordingly.

          4.  The bottom row can contain dates or
              categories.

          5.  After you've entered your data into the
              appropriate cells, type OA-K to display new
              bars.

          6.  You can extend the graph beyond the border of
              the screen if you need more columns.

          7.  When you use OA-P to print, choose the BLOCK
              option, then highlight only the section you
              want to print.
```

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follow these steps to move the formula in E3 to G3:

1) Place cursor in cell E3.

2) Press OA-C and return to choose *within worksheet.*

3) Press return if E3 is highlighted.

4) Use right arrow to move cursor to G3, then hit return.

5) AppleWorks will now ask whether each part of the formula is *relative* or requires *no change.* Press R, N, N, and N as each one of the four parts of the formula is highlighted.

6) Now, starting with your cursor in G3, use the steps given in the previous directions to copy G3 down column G. (The pattern here is N, R, N, N.)

7) Use this set and the previous set of directions to place the formula into cells I3, K3, M3, and O3, then copy it down those respective columns.

Editing Your Graph

Remember that you can make the template wider and longer. You can also change the numbers in row 18 to names or titles; you can change the amounts in row 1 and use decimals. **Figure 3** contains quick documentation, which you should store in a word-processing file on the same disk with your new template.

We used OA-L (layout) in conjunction with the block option in our template to designate cells for labels (words) or values (numbers) only, or to protect cells with formulas. You'll learn more about those options in future articles.

You should now have a good idea of the procedure for entering formulas and creating a format in the spreadsheet. It takes some time to set up the template, but now whenever you need a bar graph, you'll have to enter only a few numbers, a legend, and a title. You can even make your bar chart part of a larger document: Print it to the clipboard, switch to a word-processing file, copy it from the clipboard, and adjust your margins. Next month we'll set up a multiple-choice-test template in the AppleWorks data base. ■

David Goodrum and Joel Robbins are the developers of SchoolWorks, AppleWorks templates for education, published by K–12 MicroMedia Publishing. Write to them at Tulip Tree House 1016, Bloomington, IN 47401. Enclose a self-addressed, stamped envelope if you want a personal reply.

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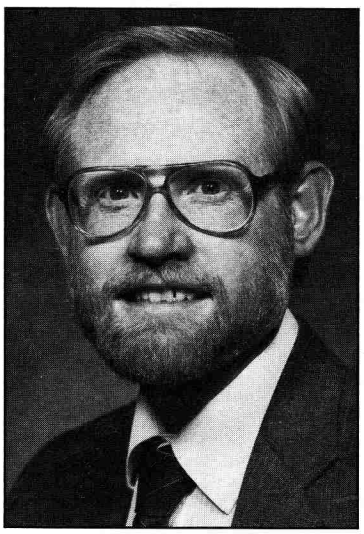

by Dan Bishop

Data-base management programs are among the most popular software packages in today's microcomputer arena, ranging in price from $50–$100 at the low end of the spectrum to more than $1000. Most of the more expensive packages offer more options and greater versatility than the less expensive ones. Because of this, you must carefully analyze the projects for which you intend to use a data base, and decide which functions you need and which you can do without before laying your cash on the line.

Data-base programs are often used only for simple information filing. If this is your need, and if you aren't afraid of a little simple programming, you can use BASIC to handle the task with ease and save your hard-earned money for the latest computer adventure game or more time on your favorite information service. In this month's column, I'll show you how to set up a data archive using BASIC's READ/DATA command structure.

Data Filer (see the **Program listing**) is a sample data-filing program for recording your credit cards, card numbers, and expiration dates. You can set up a similar archive program for listing your household goods and their values for insurance purposes. It might be handy to have an archive containing a list of your office equipment with their serial numbers, in case of burglary. With this simple program, anything you keep in a list you can put on disk and retrieve when you need it.

The Data Statement

BASIC lets you input information directly from within the program itself via the data statement. You can introduce any type of information into the program this way—integers, real numbers, and character strings are all fair game. Information can be related (such as names and phone numbers) or totally unrelated.

A BASIC data statement is a single program line that consists of the word DATA followed by a list of items separated by commas. Each item is an individual piece of information you want to pass to the computer program. For example,

```
500 DATA MARY SMITH,"303-222-
    1234",23,SINGLE
```

is a data statement containing four items. In this case, all four items are related.

Character strings, such as MARY SMITH and SINGLE, aren't placed between quotes unless they begin with numbers or blank spaces. (The Applesoft manual refers to these unquoted strings as *literals*.) The telephone number in this statement is treated as a character string also, but requires quotation marks, since it begins with a digit.

You enter numeric data without quotes, and can use negative numbers, decimals, or scientific notation. For example, enter the number 0.0000003256 as 3.256E – 7.

A few other rules to keep in mind: Don't use quotation marks within a quoted string; the computer will accept an embedded quotation mark, though, unless you begin an unquoted literal with one. Use colons, semicolons, and commas only within quoted character strings.

Finally, to indicate a null character or a numeric zero, type the data line with the same number of commas you'd use if all items were present. For example, the statement

```
510 DATA ,"303-222-9876",,
```

uses the same name/phone/age/status format as the previous example, but only a phone number is included. This statement presents four items. Since there's no entry before the first comma, the first item is taken to be a null character. The second item is the phone number as shown. The third item is taken to be null or zero. Since the statement ends with a comma, Applesoft assumes there's one more item at the end, and that this item also is null or zero.

Adding or omitting a comma in a data statement is one of the most common typos when you're entering a program into the computer (and one of the most difficult errors to detect). A missing comma frequently results in an OUT OF DATA error; too many commas usually result in strange or outrageous output.

You could write the above example as four separate data statements with

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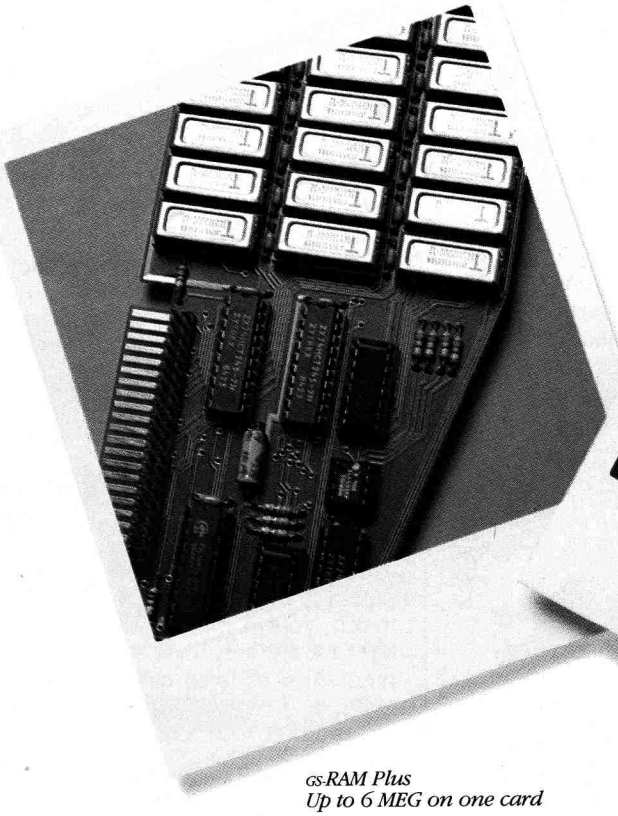

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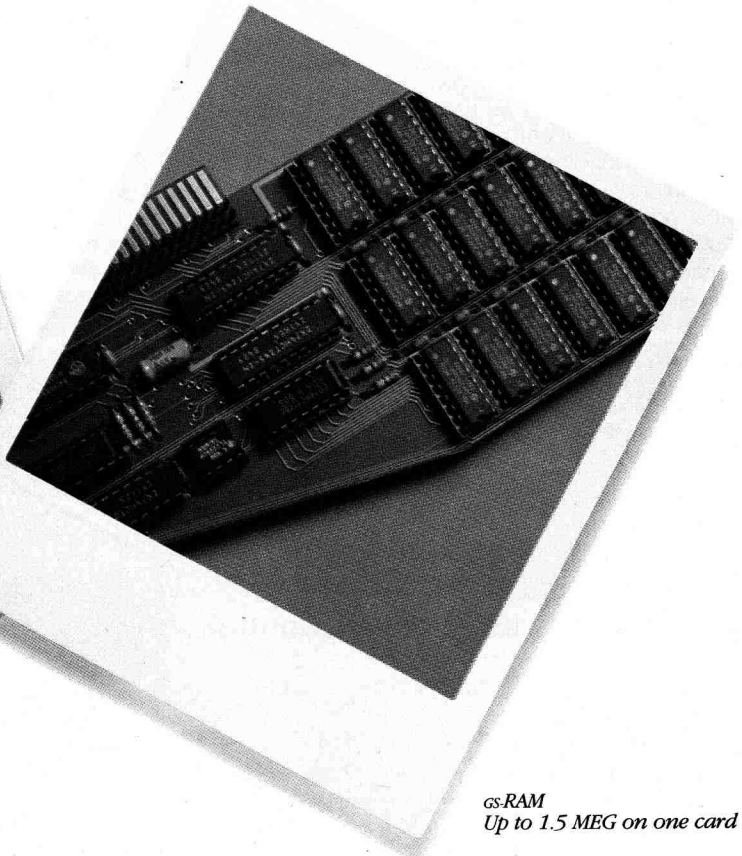

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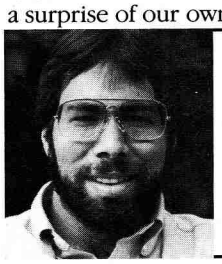

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one item per line. On the other hand, a single data statement could contain 15 or 20 items. The only restriction is the 239-character maximum in an Applesoft instruction line.

You can use as many data statements in a program as you need, and can place them anywhere in the program. Only the order in which they appear is important (see below). Most programmers prefer to include them as a block of program lines, usually near the beginning or at the end of the program, but BASIC doesn't require this. It's good organizational practice, though—reminiscent of the "good old days" when programs and data were entered on punched cards and submitted to the computer center as a "batch job."

The Read Statement

Merely putting information into the program as a sequence of items in a data statement isn't enough. Though the information is present in the computer's memory when you load the program, it isn't available for the program to use until you instruct the program to look for the data and "read" them into the variable-storage memory space. You must assign each item an appropriate variable name before the program can use it.

BASIC uses the READ command for this purpose. The READ command consists of the word READ followed by a list of the variable names you want to use. Use commas to separate the variable names. An appropriate READ command for the data example given earlier would be

```
130 READ NM$, PH$, AG, SM$
```

This statement instructs the computer to read the next four values in the data statements and assign them to the four variables listed. Note that the variable type (string or numeric) absolutely must match the type of datum being read. If they don't match, your computer will generate a SYNTAX ERROR. In this case, the program uses three string variables (NM$, PH$, and SM$) to read the first, second, and fourth data items, which are all character strings. One numeric variable, AG (the third in the READ list), matches the third item in the data list, a number.

You can use the same read statement to read data from the second data statement shown above. In this case, null values are given to NM$ and SM$, while AG is assigned a value of zero. If you leave the commas out of that statement, the computer will read the phone number into NM$, then, finding no more data items, display the OUT OF DATA error message (assuming no data statements appear in the program after line 510).

As with the data statement, the read statement above could be written as four separate read statements. Furthermore (except for maintaining good program organization), one read statement could read data from several data statements, or several read statements could sequentially read data items from a single data statement.

Applesoft maintains a "pointer" that always indicates the location in program memory where the next data item begins. When one item is read, the pointer advances to the next item, which may be in the same data statement or in another data statement further along in the program. The data item the pointer indicates is assigned

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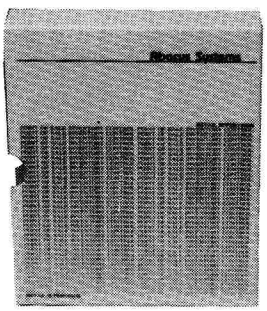

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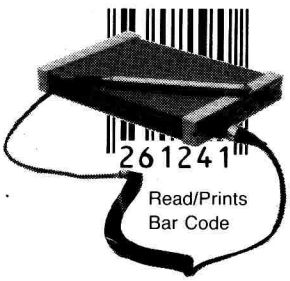

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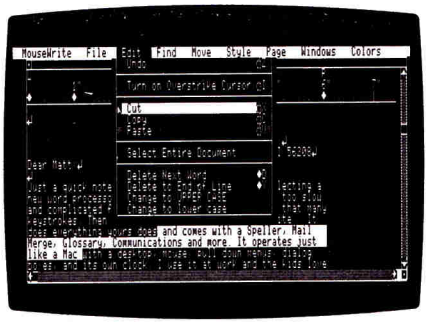

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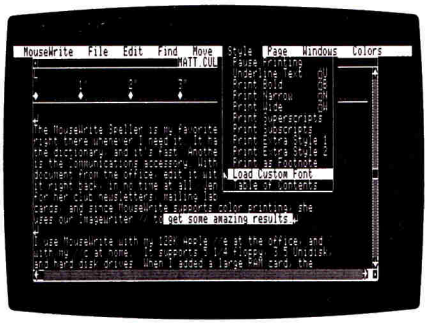

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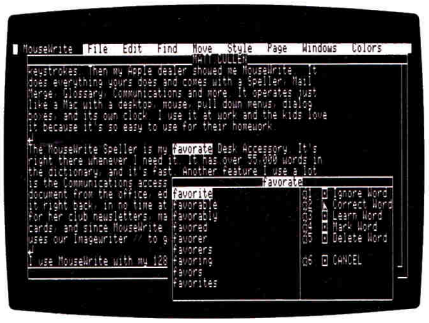

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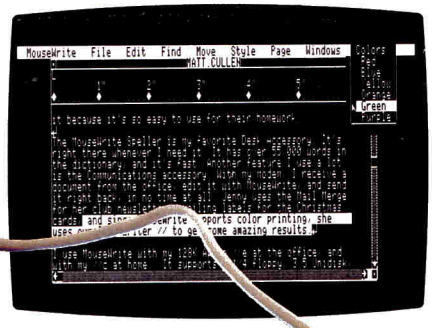

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to the next variable the program encounters in a read statement, and the memory pointer advances again.

Only one thing can interrupt this sequential reading of data items. RESTORE, a one-word BASIC command, resets the data pointer to the first data item in the program. You could use RESTORE in a program containing a data list through which you want to search several times for different matching items.

The number of data items in your program should match the number of variables you use in the read statements, though there's no penalty for having more data items. READ simply ignores the extra data items at the end of the list.

Data Filer

The accompanying **Program listing** is the simplest form of data-base program. Note that I didn't use the term *data-base management.* This program merely serves as an electronic file into which you enter data and from which you can retrieve and display those data. The order of retrieval is the same as the order in which the data records appear in the program. Data entry isn't interactive; there are no entry screens or prompts. You, as the programmer, enter data by adding appropriate data statements to the program itself.

The program consists of two subroutines. The first handles the title captions at the top of the screen. Line 100 clears the screen, and line 110 reads the first data item in the program, which appears in line 498 and should contain the title of the data-base file. Line 120 displays this title with a PRINT command.

Line 160 contains the PRINT command that displays the column headers. You'll want to alter this line to suit your particular data base. Since the program is a data-base filer for credit cards, line 160 reflects the column titles needed for this application.

The subroutine in lines 200–360 reads the data, three elements at a time, and displays these three elements before cycling on to the next record. First, the program reads the numbers in the variables in line 200. NR (entered in line 499) is the number of records displayed on screen at one time. NE (from line 500) is the number of records (credit-card entries in this example) in the data-base file. CT (a counter) is initialized to zero in line 210 and will be incremented after each new record is read. The program compares CT and NE after each cycle so that it knows when the last item has been read.

Because of the display screen's size, Data Filer displays only eight items at a time (NR = 8). A FOR... NEXT loop handles item count, using J as the loop counter. Each time through the loop, the program reads the three data elements CD$, CN$, and ED$ (line 230). You can see from the data block that these three variables correspond to the company name, the credit-card number, and the card's expiration date.

When a record is read, the program increments the counter by one (line 240) and displays the counter and company name, followed on the next line by the card number and expiration date. Finally, if CT now equals NE (indicating there are no more data items to be read), J is set equal to NR so that the loop terminates at once. At line 280 (the last line in the loop), the computer automatically increments J by one. If J is

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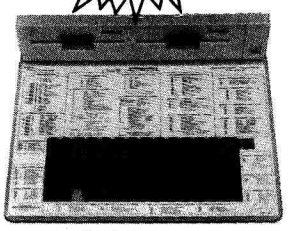

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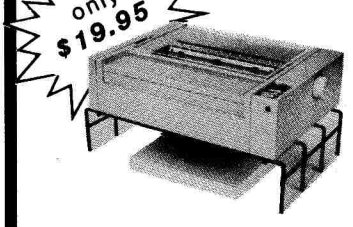

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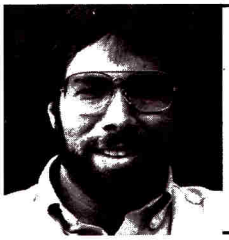

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less than NR at this time, the computer cycles back to line 220 and goes through the loop again.

Lines 290–360 are executed when J equals NR + 1 (either by cycling through the loop NR times, or by receiving a value of NR when CT equals NE). First, CT is again compared to NE, and, if they're equal, the subroutine is terminated (GOTO 360 jumps the program to the RETURN command) and the program ends. If more records remain to be read, though, the prompt PRESS RETURN TO CONTINUE. . . appears, and the INPUT X$ command halts execution until you press the return key.

Finally, the program clears the screen and executes the title-display subroutine, beginning at line 120 rather than 100 to bypass the READ T$ command. The data read/display subroutine is then restarted (GOTO 220) so that the next eight records can be displayed.

Customizing Data Filer

To create a data-base filer for your own needs, decide which data items you want to keep for each record and how to display them. Then change line 160 (the column header) to reflect the appropriate headings and display them where you want them.

Enter data lines for each record, beginning at line 501. For good organization, enter all items for one data record into one data statement, as in the example. Be sure to use the correct record count in line 500.

Next, determine the number of lines each record requires on the display screen. In my example, each record uses two lines, so I restricted the display to eight records (16 lines). The program requires seven display lines for titles and prompt. When you've decided the number of records you can display at once, enter that number into the data statement in line 499. Change line 498 so that it contains an appropriate title for your application.

You must alter line 230 so that your READ command contains the same number of variables as there are data items in each record. You must also be sure that the variable types match the data types. If the data item is a character string, follow the variable name with a dollar sign. If it's numeric, use one or two alphabetic characters for the variable name and *no* dollar sign.

Finally, change lines 250 and 260 so that the PRINT commands display your data the way you want them to appear. Be sure you use the same variable names you chose for line 230. Data Filer uses Applesoft's built-in tab columns to display expiration dates in a column. You'll find, however, that if your credit-card number is too long or too short, this simplistic approach won't work. Next month, I'll suggest an easy solution to this problem. See if you can come up with your own before then.

Conclusion

The **Program listing** provides the nucleus for a number of more advanced concepts. In the months to come, we'll deal with arrays and array-handling procedures, such as sorting and searching. In contrast to a series of data statements, arrays let you keep several related items in RAM at the same time and process large chunks of information with short code segments. By adding the subroutines we'll cover in those articles to Data Filer, your simple filing program will expand to become a simple, but useful, data-base management program. ■

Program listing. Data Filer.

```
10  GOSUB 100
20  GOSUB 200
90  END
98  REM  ROUTINE FOR SCREEN TITLES
100  HOME
110  READ T$
120  PRINT T$
130 L$ = "---------"
140 L$ = "    " + L$ + L$ + L$ + L$
150  PRINT L$
160  PRINT "COMPANY / CARD NO.","EXP.DT."
170  PRINT L$
180  PRINT
190  RETURN
197  REM  ROUTINE TO READ AND
198  REM  DISPLAY DATA
200  READ NR,NE
210 CT = 0
220  FOR J = 1 TO NR
230  READ CD$,CN$,ED$
240 CT = CT + 1
250  PRINT CT;". ";CD$
260  PRINT "          "CN$,ED$
270  IF CT = NE THEN J = NR
280  NEXT J
290  PRINT L$
300  IF CT = NE THEN  GOTO 360
310  PRINT "PRESS <RETURN> TO CONTINUE...";
320  INPUT X$
330  HOME
340  GOSUB 120
350  GOTO 220
360  RETURN
497  REM  DATA BLOCK FOR DATABASE FILES
498  DATA  CREDIT CARD INVENTORY
499  DATA  8: REM  # OF RECORDS/SCREEN
500  DATA  11: REM  # OF ENTRIES IN LIST
501  DATA  JACK'S PIZZA,"8-6211-48","12/99"
502  DATA  SUE'S SHOES, "421-37-8","05/88"
503  DATA  THE MERCANTILE,"0817-2553","11/86"
504  DATA  DRIVER'S LICENSE,"A-222115","08/89"
505  DATA  HAPPY HOUR BAR & GRILL, "000-00-001","09/99"
506  DATA  SALLY'S HAIR SALON, "5-928-3",
507  DATA  MARTY'S MECHANICS,"522-88-6178","02/88"
508  DATA  XYZ INVESTMENTS,"3-6211-8497","10/86"
509  DATA  SLICKER OIL CO.,"41-28545","08/88"
510  DATA    JOE'S TOOL CO.,"   83214","09/90"
511  DATA  LE CAFE CLUB,"523-523-9929","01/87"
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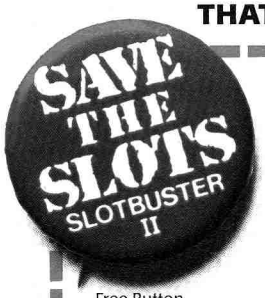

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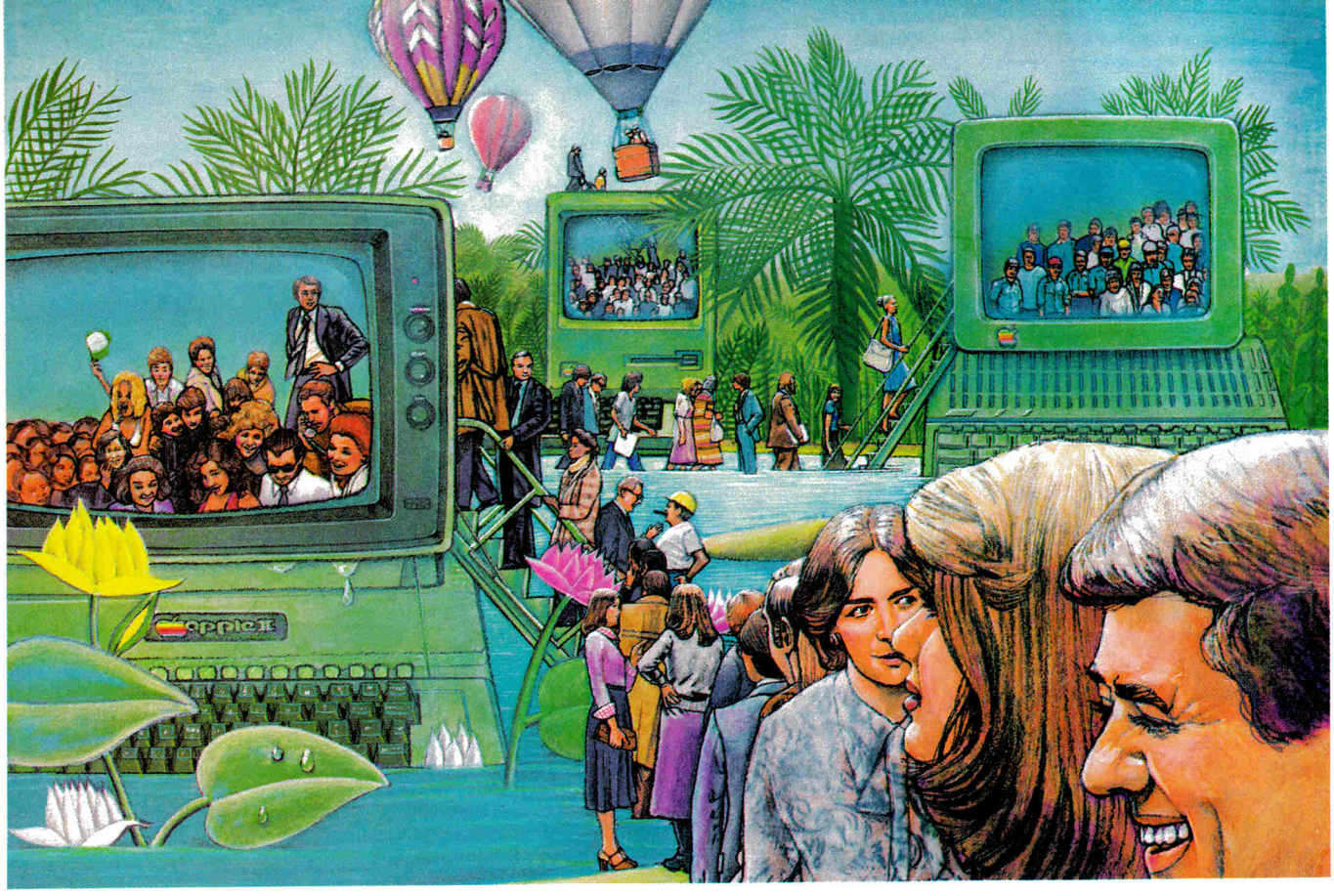

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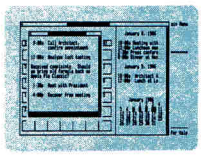

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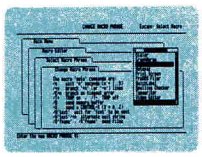

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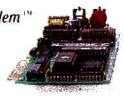

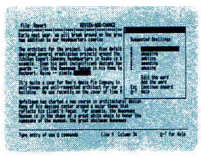

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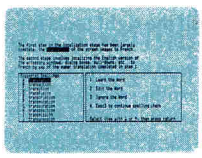

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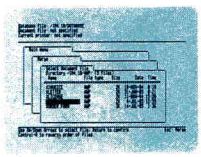

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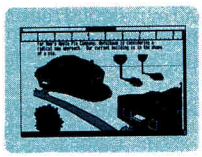

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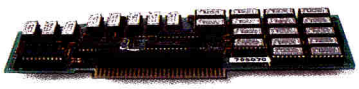

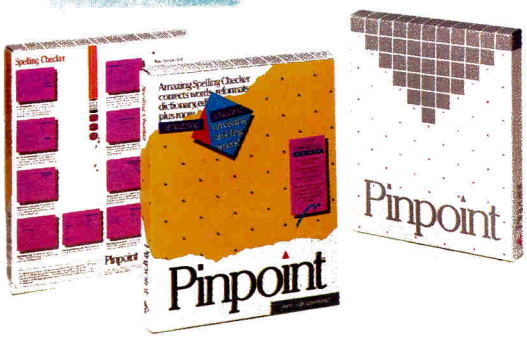

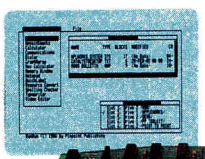

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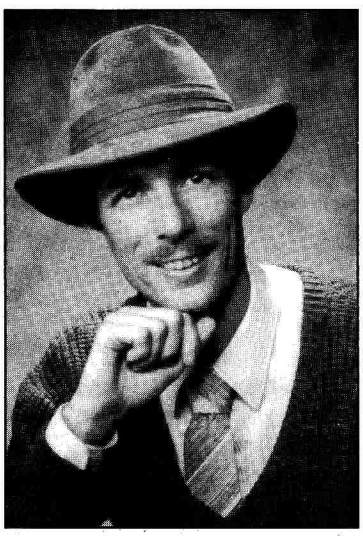

by Roger Wagner

In this and the next installments of Right of Assembly, I'll show you how to do basic addition and subtraction in machine language. To some extent, we've already done this—the increment (INC) and decrement (DEC) commands add and subtract for us. Unfortunately, though, they add or subtract by only *one* each time, as in VALUE + 1 or VALUE – 1.

If you're really ambitious, you could add or subtract any number by using a loop of repetitive operations and the commands you've already learned. But this would be a bit tedious, not to mention slow. Fortunately a better method exists, but first I'll quickly review some binary-math facts.

Counting in Binary

Earlier in this series I discussed the idea behind binary numbers and why they're so important in computing. In case you missed it or your memory has faded, here's a fresh look.

By now you know that a *byte* is an individual memory location that holds a value from $00 to $FF (zero to 255). The number 255 came about as a direct result of the way the computer is constructed, and the way you count in base two.

Think of each byte as physically made up of eight individual switches, which can be either *on* or *off*. You can "count" by assigning a unique number value to each possible combination of on and off switches.

If a particular position in a byte is off, it's represented by a zero in that position. A one is shown if it's on. When all the switches are off, the value is zero (see **Table 1**).

In base two, each position of the byte is called a *bit*, and the positions are numbered zero to seven from right to left.

The counting pattern is similar to normal decimal or hexadecimal (hex) notation. You increase the value by adding one each time to the digit on the far right, *carrying* as it becomes necessary. In base ten, you carry every tenth count; in hex every 16th. In base two, the carry is performed every other count!

Notice that in counting from one to two, you add one to the 1 already at the first position (bit zero), which generates the carry to increment the second position (bit 1). The end of the series is shown in **Table 1**.

Now the most important part: Observe what happens when you reach the counter's upper limit. At $FF (255), all positions are full. At the next increment, you'd carry a one to the next position to the left—but, unfortunately, that next position doesn't exist!

In this case, the carry bit of the status register is used again. It was used before in the compare (CMP) operations, but, as it happens, it's also conditioned by the command ADC (Add with Carry). When the next step uses an ADC command (*not* an INC), the numbers will look like this:

			Carry
$100	256	0 0 0 0 0 0 0 0	1

The byte returns to a value of zero, and the carry bit is set to one.

The Carry Flag and ADC

I've discussed this wraparound to zero earlier with the increment/decrement commands, but didn't mention the carry—because the INC/DEC commands don't affect the carry flag.

The ADC command, though, *does* set the carry flag, whenever the addition result is greater than $FF. With the ADC command, your counters can increment by values other than one—rather like the FOR I = 1 TO 10 STEP 5 statement in BASIC. You'd use it more often, though, for general math operations, such as calculating new addresses and screen positions, and a wide variety of other applications.

ADC adds the indicated value to the contents of the accumulator. You can state the value directly by using an immediate value, or with an indirect value as you've done previously with commands such as LDA.

It's important to note that ADC sets the carry only when there's an overflow past $FF. It *doesn't clear it* (set it to zero) if the result is $FF or less. Also, you'll notice that ADC stands for Add *with* Carry, meaning if the carry bit is set before the addition, an extra unit will be added along with the value you wanted (see the example in **Table 2**). This is to accommodate

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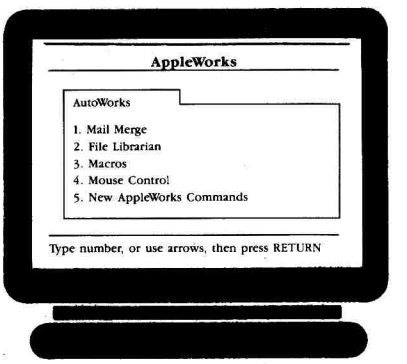

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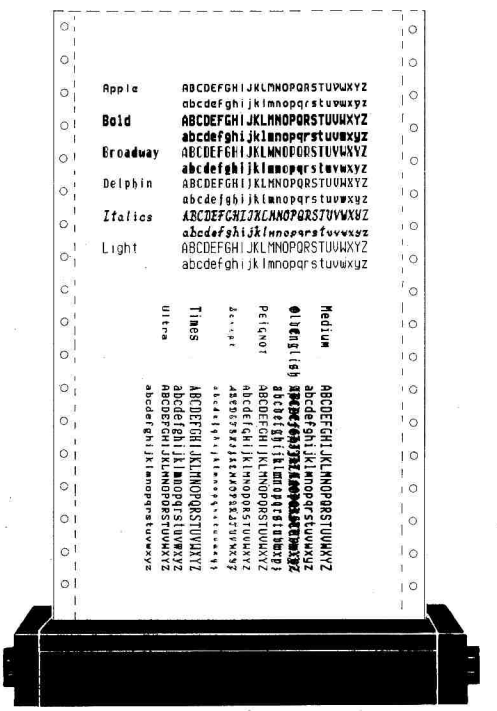

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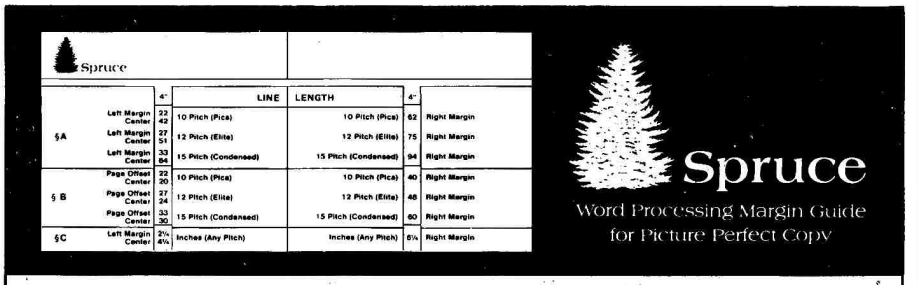
Table 1. Decimal and hexadecimal numbers with binary equivalents.

Hexadecimal	Decimal	Binary
$00	0	0 0 0 0 0 0 0 0
$01	1	0 0 0 0 0 0 0 1
$02	2	0 0 0 0 0 0 1 0
$03	3	0 0 0 0 0 0 1 1
$04	4	0 0 0 0 0 1 0 0
.	.	.
.	.	.
$FD	253	1 1 1 1 1 1 0 1
$FE	254	1 1 1 1 1 1 1 0
$FF	255	1 1 1 1 1 1 1 1

Table 2. Example showing results of the carry flag set by the ADC command.

Accumulator	Value	Carry Set?	Result
$80	$05	no (0)	$85
$80	$05	yes (1)	$86



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2-byte numbers such as addresses, which I'll discuss shortly.

What all this means is that the carry bit must be cleared *before* the ADC operation. The command with which to do this is CLC, for Clear Carry.

The sample programs in **Listings 1** through **4** show how to use the ADC command. Note that the CLC command is used before each ADC.

Listings 1 and **2** add the value in N1 to either the contents of N1 or the immediate value #$80. (Note that the CLC is placed before the ADC to ensure an accurate result.) The result is then returned in location $0A. You could use this routine as a subroutine for another assembly-language program, or call it from BASIC after passing the values to locations 6 and 8.

The Indirect Modes

The next two programs (**Listings 3** and **4**) are more elaborate examples in which you use the indirect modes to find the value from a table starting at $300. The program in **Listing 3** passes an index value to location $08, used as an offset via the X register. **Listing 4** first puts the low- and high-order bytes for the address $300 into a pair of pointer bytes ($1E,1F) and the offset into the Y register.

The main disadvantage with these programs is that you're limited to 1-byte values for the original values and the result of the addition. The solution is to use the carry flag to create a 2-byte addition routine, shown in **Listing 5**.

Adding in 2 Bytes

Notice in **Listing 5** that N1, N2, and RSLT are all 2-byte numbers. Each pair's second byte is used for the high-order byte, letting you use values and results from $00 to $FFFF (zero to 65535). This is sufficient for any address in the Apple II, although by using 3 or more bytes you could accommodate numbers much larger than $FFFF.

A few words of explanation about this program. First, the CLC has been moved to the beginning of the routine. Although it needs to precede only the ADC command, CLC has no effect on the LDA, so you can put it at the beginning of the routine for aesthetic purposes. It also helps identify the overall unit as a math routine.

The program adds the two low-order bytes of N1 and N2, stores the partial result, and then adds the high-order bytes. If the first addition generates a result greater than $FF, the pro-

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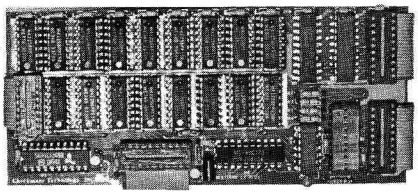

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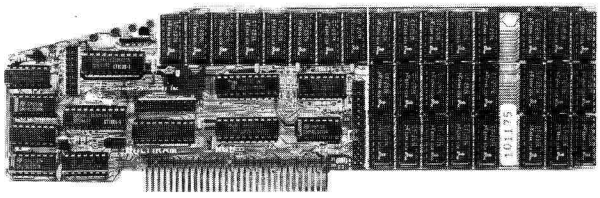

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gram sets the carry and adds an extra unit in the second addition. Note that the carry remains unaffected during the LDA N1 + 1 operation.

You may want to BLOAD the object code for **Listing 5**, then call it from the BASIC program in **Listing 6**. The ABS( ) statements in line 30 eliminate values less than zero. Although there are conventions for handling negative numbers, this routine isn't that sophisticated.

The number you're adding to a base address is often $FF or less, so you need only 1 byte for N2. **Listing 7** is an example of a two/one addition routine. For speed, the program skips directly to the end if line 15 doesn't generate a carry. If the carry is set, the program increments the value in N1 + 1 by one, even though the ADC indicates an immediate $00. The $00 acts as a *dummy* value to let the carry do its job. If you aren't concerned with speed, you can even [illegible] the [illegible] effect. **Listing 8** shows an alternate method using the INC command, but the BCC *is* required for the program to operate properly.

The most common reason to add one to a 2-byte number is to increment an address pointer by one. In that case, the result is usually put right back into the original location rather than in a separate RESULT. A more compact routine for this is shown in **Listing 9**.

In my next column, we'll cover subtraction and negative numbers. In the meantime, Happy Appling!■

Roger Wagner is the author of Assembly Lines: The Book *and is president of Roger Wagner Publishing, the publisher of Merlin and MerlinPro assemblers. Write to him at Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, P.O. Box 582, Santee, CA 92071.*

CORRECTION

In the June 1986 Right of Assembly (p. 96), line 9 in Listings 2 and 3 should read:

9 KYBD EQU $C000

$C000 is the correct location for reading the keyboard, as mentioned in the text.

Listing 1. Sample program with the ADC and CLC commands.

```
                 1   ********************************
                 2   *    MATH DEMO PROGRAM #1      *
                 3   *          10/1/86             *
                 4   *      MERLIN ASSEMBLER        *
                 5   ********************************
                 6   *
                 7            ORG  $300
                 8   *
                 9   N1       EQU  $06
                 10  N2       EQU  $08
                 11  RSLT     EQU  $0A
                 12  *
0300: A5 06      13  START    LDA  N1          ; GET 1ST NUMBER
0302: 18         14           CLC              ; GET READY FOR
                                                  ADDITION
0303: 65 08      15           ADC  N2          ; ADD 2ND NUMBER
0305: 85 0A      16           STA  RSLT        ; STORE RESULT
0307: 60         17  END      RTS              ; ALL DONE!
```

Listing 2. Sample program with the ADC and CLC commands.

```
                 1   ********************* **********
                 2   *    MATH DEMO PROGR  #2       *
                 3   *          10/1/86             *
                 4   *      ME  ASSEM  R
                 5   **********.              ***
                 6   *
                 7            ORG  $300
                 8   *
                 9   N1       EQU  $06
                 10  *
                 11  RSLT     EQU  $0A
                 12  *
0300: A5 06      13  START    LDA  N1          ; GET 1ST NUMBER
0302: 18         14           CLC              ; GET READY FOR
                                                  ADDITION
0303: 69 80      15           ADC  #$80        ; ADD #$80 TO ACC.
0305: 85 0A      16           STA  RSLT        ; STORE RESULT
0307: 60         17  END      RTS              ; ALL DONE
```

Listing 3. Example using indirect modes.

```
                 1   ********************************
                 2   *    MATH DEMO PROGRAM #3      *
                 3   *          10/1/86             *
                 4   *      MERLIN ASSEMBLER        *
                 5   ********************************
                 6   *
                 7            ORG  $300
                 8   *
                 9   N1       EQU  $06
                 10  INDX     EQU  $08
                 11  RSLT     EQU  $0A
                 12  TBL      EQU  $300
                 13  *
0300: A5 06      14  START    LDA  N1          ; GET 1ST NUMBER
0302: A6 08      15           LDX  INDX        ; GET VALUE FOR
                                                  X-REG
0304: 18         16           CLC              ; GET READY FOR
                                                  ADDITION
0305: 7D 00 03   17           ADC  TBL,X       ; ADD VALUE FROM
                                                  TABLE
0308: 85 0A      18           STA  RSLT        ; STORE RESULT
030A: 60         19  END      RTS              ; ALL DONE!
```

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Listing 4. Example using indirect modes.

```
                 1   ********************************
                 2   *    MATH DEMO PROGRAM #4      *
                 3   *          10/1/86             *
                 4   *      MERLIN ASSEMBLER        *
                 5   ********************************
                 6   *
                 7            ORG  $300
                 8   *
                 9   N1       EQU  $06
                 10  INDX     EQU  $08
                 11  RSLT     EQU  $0A
                 12  PTR      EQU  $1E
                 13  *
0300: A9 00      14  START    LDA  #$00        ; LO BYTE OF '$300
0302: 85 1E      15           STA  PTR
0304: A9 03      16           LDA  #$03        ; HI BYTE OF '$300
0306: 85 1F      17           STA  PTR+1       ; (PTR) = $300
0308: A5 06      18           LDA  N1          ; GET 1ST NUMBER
030A: A4 08      19           LDY  INDX        ; SET Y-REG = INDEX
030C: 18         20           CLC              ; GET READY FOR
                                                  ADDITION
030D: 71 1E      21           ADC  (PTR),Y     ; ADD VALUE VIA PTR
030F: 85 0A      22           STA  RSLT        ; STORE RESULT
0311: 60         23  END      RTS              ; ALL DONE
```

Listing 5. Two-byte addition routine using the carry flag.

```
                 1   ********************************
                 2   *    MATH DEMO PROGRAM #5A     *
                 3   *          10/1/86             *
                 4   *      MERLIN ASSEMBLER        *
                 5   ********************************
                 6   *
                 7            ORG  $300
                 8   *
                 9   N1       EQU  $06
                 10  N2       EQU  $08
                 11  RSLT     EQU  $0A
                 12  *
0300: 18         13  START    CLC              ; GET READY FOR
                                                  ADDITION
0301: A5 06      14           LDA  N1          ; GET 1ST NUMBER, LO
                                                  BYTE
0303: 65 08      15           ADC  N2          ; ADD 2ND NUMBER, LO
                                                  BYTE
0305: 85 0A      16           STA  RSLT        ; STORE RESULT, LO
                                                  BYTE
0307: A5 07      17           LDA  N1+1        ; GET 1ST NUMBER, HI
                                                  BYTE
0309: 65 09      18           ADC  N2+1        ; ADD 2ND NUMBER, HI
                                                  BYTE
030B: 85 0B      19           STA  RSLT+1      ; STORE RESULT, HI
                                                  BYTE
030D: 60         20  END      RTS              ; ALL DONE
```

Listing 6. BASIC program for BLOADing ***Listing 5*** *object code.*

```
0  REM MACHINE ADDITION ROUTINE
10  HOME
20  INPUT "N1,N2?";N1,N2
30 N1 =  ABS (N1):N2 =  ABS (N2)
40  POKE 6,N1 -  INT (N1 / 256) * 256: POKE 7, INT (N1 / 256)
50  POKE 8,N2 -  INT (N2 / 256) * 256: POKE 9, INT (N2 / 256)
60  CALL 768
70  PRINT : PRINT "RESULT IS: "; PEEK (10) + 256 *  PEEK (11)
80  PRINT : GOTO 20
```

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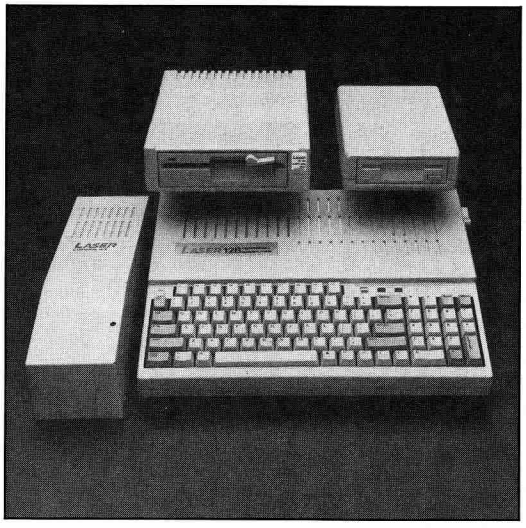

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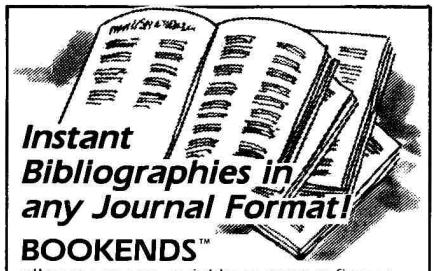

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Listing 7. Two/one addition routine.

```
                 1    ********************************
                 2    *    MATH DEMO PROGRAM #5B     *
                 3    *          10/1/86             *
                 4    *      MERLIN ASSEMBLER        *
                 5    ********************************
                 6    *
                 7              ORG   $300
                 8    *
                 9    N1        EQU   $06
                 10   N2        EQU   $08
                 11   RSLT      EQU   $0A
                 12   *
0300: 18         13   START     CLC              ; GET READY FOR
                                                    ADDITION
0301: A5 06      14             LDA   N1         ; GET 1ST NUMBER, LO
                                                    BYTE
0303: 65 08      15             ADC   N2         ; ADD 2ND NUMBER, LO
                                                    BYTE
0305: 85 0A      16             STA   RSLT       ; STORE RESULT, LO
                                                    BYTE
0307: 90 06      17             BCC   END        ; BRANCH IF NO CARRY
0309: A5 07      18             LDA   N1+1       ; GET 1ST NUMBER, HI
                                                    BYTE
030B: 69 00      19             ADC   #$00       ; ADD CARRY ONLY (NO
                                                    2ND HI-BYTE)
030D: 85 0B      20             STA   RSLT+1     ; STORE RESULT, HI
                                                    BYTE
030F: 60         21   END       RTS              ; ALL DONE
```

Listing 8. Alternate two/one addition routine.

```
                 1    ********************************
                 2    *    MATH DEMO PROGRAM #5C     *
                 3    *         10LER          *
                 5    ********************************
                 6    *
                 7              ORG   $300
                 8    *
                 9    N1        EQU   $06
                 10   N2        EQU   $08
                 11   RSLT      EQU   $0A
                 12   *
0300: 18         13   START     CLC              ; GET READY FOR
                                                    ADDITION
0301: A5 06      14             LDA   N1         ; GET 1ST NUMBER, LO
                                                    BYTE
0303: 65 08      15             ADC   N2         ; ADD 2ND NUMBER, LO
                                                    BYTE
0305: 85 0A      16             STA   RSLT       ; STORE RESULT, LO
                                                    BYTE
0307: 90 06      17             BCC   END        ; BRANCH IF NO CARRY
0309: A5 07      18             LDA   N1+1       ; GET 1ST NUMBER, HI
                                                    BYTE
030B: 85 0B      19             STA   RSLT+1     ; TRANSFER TO
                                                    RESULT,HI BYTE
030D: E6 0B      20             INC   RSLT+1     ; ADD 1 TO IT
030F: 60         21   END       RTS              ; ALL DONE
```

Listing 9. Incrementing an address pointer.

```
                 1    ********************************
                 2    *    MATH DEMO PROGRAM #5D     *
                 3    *          10/1/86             *
                 4    *      MERLIN ASSEMBLER        *
                 5    ********************************
                 6    *
                 7              ORG   $300
                 8    *
                 9    N1        EQU   $06
                 10   *
0300: E6 06      11   START     INC   N1         ; ADD 1 TO 1ST
                                                    NUMBER, LO BYTE
0302: D0 02      12             BNE   END        ; BRANCH WASN'T $FF
                                                    + 1
0304: E6 07      13             INC   N1+1       ; ADD 1 TO HI BYTE
0306: 60         14   END       RTS              ; ALL DONE
```

BEGINNER'S PAGE

From time to time *inCider* will run Beginner's Page—step-by-step instructions to help novice Apple users type in and enjoy the programs *inCider* publishes.

The instructions assume that you have an Apple II, II Plus, *II*e, or *II*c computer with one disk drive and either DOS 3.3 or ProDOS. You also need one blank, 5¼-inch disk. If you're using the UniDisk 3.5, you will be restricted to ProDOS and, of course, you will need a blank 3.5 inch disk. To type in and run *inCider*'s programs, just follow the instructions.

Creating a BASIC Program Disk

This first step is to format a blank disk on which to save your programs. This process is called *formatting*. In addition, ProDOS requires you to copy two files, PRODOS and BASIC.SYSTEM, to create a start-up disk. For details about creating a DOS 3.3 disk, see the *DOS Programmer's Manual*. You will find information about creating a ProDOS start-up disk in *BASIC Programming with ProDOS* or the *System Utilities Manual*.

Typing in BASIC Programs

- When you find a program you'd like to type in, put your programs disk into drive 1 (the internal drive on the *II*c) and turn on your computer. After the disk stops, the Applesoft BASIC prompt "]" appears on the screen. At this point, type in HOME and hit the return key to move the prompt to the upper-left corner of the screen. Next, enter NEW and press the return key.
- Having cleared memory with the NEW command, you are now ready to enter the first line of the BASIC program. First, type in the line number (most BASIC programs begin with line 10), and then type the rest of the line exactly as it appears in the magazine. Don't worry if the line is longer than the width of your screen display. The program line will automatically jump to the next line on your screen. Once you have entered the entire program line, hit the return key.
- Continue to enter program lines in this manner until the entire program is in memory. Now, even before you run the program, save it to disk so that all of your work won't accidentally be lost. The SAVE command copies a program from main memory (RAM) to disk. Just type SAVE *file name* (where file name is the name of the program) and press the return key.
- Since the program is still in memory, you can run it with the RUN command. Unless you are a very careful typist, you now face the task of removing syntax errors from the program. For example, if, when you run the program, you get a message saying SYNTAX ERROR IN 1050, it's a good bet that you made a typing error in line 1050. The simplest way to correct it is to retype the entire line. The computer will automatically delete the old line and replace it with the new one.
- When you have the program running properly, save the corrected version by typing SAVE file name again. This command overwrites the old version of the program with the corrected version.

Typing in Machine-Language Programs and Shape Tables

Many programs in *inCider* use machine-language routines and shape tables. The listings for machine code consist of hexadecimal RAM addresses followed by the hex code (5E00- A9 04 30 65 FA 8C 1B 09, for example). To type in such a listing, follow the guidelines below:

- Turn on your computer with your programs disk in drive 1.
- From the Applesoft prompt, type in CALL –151 (the dash is a minus sign) and hit the return key.
- An asterisk, the Monitor prompt, now replaces the Applesoft prompt.
- At this point, get the first address of the machine-language program from the listing. This address is the first four characters in the listing.
- Type in this address, followed by a colon (*not* a minus sign!). Now type in the hex numbers as they appear in the magazine. For example, if the hex line shown above were the first line of a hex program, you would enter:

  5E00: A9 04 30 65 FA 8C 1B 09

  and then hit the return key.
- For subsequent lines in the machine-language listing, you don't have to type in the address. Just type in a colon at the start of each line and then the hex bytes, followed by a return-key press.
- To check your typing before you save the listing, type in the starting address of the program and hit the return key. The number that appears is the content of the byte at the address shown. Hitting it again produces the rest of the first program line on the screen. Pressing the return key subsequent times makes additional program lines appear for your inspection. If any line requires changing, just retype that line, being sure to include the address and to use a colon in place of the minus sign.
- Once the entire listing is correct, you have to save it. First, type in 3D0G and hit the return key to return to the Applesoft prompt.
- Now type BSAVE file name,A*a*,L*l* (where a is the starting address of the routine and l is the length). If these are hexadecimal instead of decimal values, a $ will precede them. Don't worry about having to figure out the address and length parameters yourself; these are always published with the program.

You now know what it takes to type in and use the programs published by *inCider*.■

EXTRACT

A reprise of the reviews that have appeared in inCider *in the last seven months. Prices subject to change without notice.*

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Continued from p. 35.

wall outlet to keep RAM-disk contents intact even during five-hour blackouts.

The Version 1.0 Blues

Even without the external power supply or piggyback add-ons (a 65C816 coprocessor card and a 2–16MB memory boost), RamFactor's flexibility won me over—even though my test model, which worked perfectly in slot 7 of an enhanced //e, kicked up its heels in slot 4 of an unenhanced unit. Under DOS 3.3, for example, the IN#4 command to activate the RAM disk (DOS 3.3, unlike ProDOS, doesn't automatically recognize RamFactor) produced endlessly scrolling Applesoft prompts. The INSTALL DOS utility on the 3.3 side of the Applied Engineering disk filled the screen with beeping inverse-video @ signs.

The technical-support engineer I called (getting through after several busy signals) was so helpful that he anticipated my questions; as it turned out, Applied had just found that some of its first batch of RamFactor EPROM's rendered the card unusable in slot 4, and sent me a replacement chip straightaway. With the new chip installed, the card proved trouble-free.

The engineer also said that the ProDOS Filer is supplied on the RamFactor disk as the manual claims; again, I seem to have gotten an early shipment. Personally, I was content with the other ProDOS utilities, such as an easily customizable BASIC program to copy one or more floppies to a RAM disk and start a program from there. I like source code with comments like "Display all kinds of documentation."

My only other complaint is that the manual could be clearer on one point: If you format and copy system files to RamFactor right after startup, PR#*n* will simply boot the full-sized RAM disk. If you want to use the Partition Manager, you'll have to set up partitions before doing anything else.

Many RamFactor buyers would probably never use DOS 3.3 or the Partition Manager; they'll like the card's ease of installation and aplomb with AppleWorks. I'm happy that Applied Engineering can please both audiences: It offers both plug-and-play convenience and tinkering power in the best RAM-disk product I've seen for any computer. RamFactor is the memory card of choice among contenders of both types. ■

Eric Grevstad
inCider *staff*

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POWER PRINT software lets you "download" a second typestyle into your printer's memory. Now you can alternate between your printer's standard font and a custom font with special characters and symbols:

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OUTLINE:XYZ OLD ENGLISH

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The images shown here were typed with AppleWorks (along with regular text) and printed on an ImageWriter printer. Other software and printers work equally well.

Honestly,
A. Lincoln
Uncle Abe

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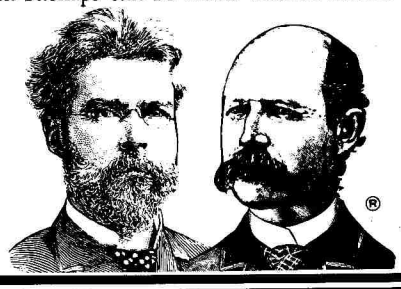

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AD #PP2

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program SideKick—you'll appreciate Synergistic Software's Fingertips desktop enhancer. Priced lower than its rivals ($39.95), Fingertips adds the convenience of a communications program, scientific calculator, notepad, calendar, appointment planner, and Rolodex-type address book to many existing applications. It's even good enough to use in the foreground as a stand-alone program.

By itself, Fingertips will work with virtually any hardware configuration under DOS 3.3 or ProDOS, from a 48K, 40-column Apple II to an enhanced //e with Applied Engineering's RamWorks board. However, it runs in background mode behind ProDOS programs only on a 128K or larger //e or //c.

The manual indicates that Fingertips has been extensively tested with AppleWorks only, but lists various compatible Apple and third-party software. Installed behind AppleWorks or other programs (even ones of your own design), Fingertips' desktop-accessory menu is as close as typing a control-] sequence. After carving out a section of your foreground program and saving it to disk, Fingertips loads itself into the vacant memory and opens its menu. When you press the escape key, the process is reversed and your original program returns intact.

Fingertips works much faster when a RAM disk is available for swapping your application and desk accessories back and forth (I used a //e with a 512K RamWorks card), though swapping is quite fast even with a conventional disk. I installed the program on AppleWorks 1.3 and on my ProDOS user's disk, which I use for programming.

Installing and Calling

Setting up Fingertips should present no problem to someone familiar with the Apple system, though the instructions could be a little more detailed for the novice user (a problem cured, Synergistic says, by a simpler set-up program in copies sold after July 1). The manual includes sections for both ProDOS and DOS 3.3 versions, depending on which system your favorite applications require. The disk is not copy-protected and Synergistic encourages you to make a backup before using the program.

I encountered one installation problem concerning AppleWorks and my RamWorks card. The difficulty arose because I didn't have the most recent version of Applied Engineering's desktop-expander software (the Fingertips manual refers to a program not found on older expander disks). When I called Synergistic's technical-support number, a staff member diagnosed the problem quickly and offered helpful suggestions. The support group is a credit to the company.

My favorite Fingertips accessory is the telecommunications module. You can work on an AppleWorks file and periodically pop into terminal mode to call an information service without having to exit AppleWorks and load a separate communications program—especially nice since several of the local bulletin boards I call are often busy and require several attempts to

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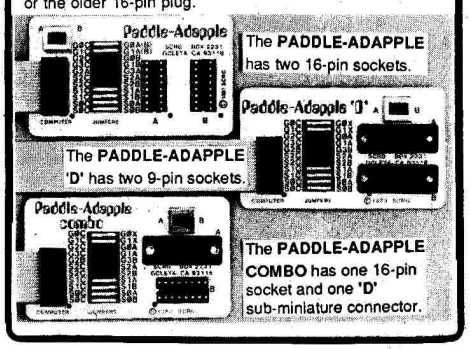

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get through. The communications accessory will even look up a phone number in Fingertips' Rolodex so that you can dial information services by name (for instance, CompuServe) if you like, as well as upload and download text files.

While it doesn't keep me from recommending the program, the communications module produced my only complaint aside from the scant instructions for novices. Compared to stand-alone terminal packages, Fingertips is slow on the uptake: Using the system at 1200 baud, I had to instruct most bulletin boards to send five or more null characters after each carriage return to keep Fingertips from dropping the first few characters of each line. According to Synergistic president Robert Clardy, this is a price Fingertips pays for compatibility with interface boards other than Apple's Super Serial Card.

Numbers and Notes

Second place on my list of favorite options is a tie between the calculator and notepad. The former offers a 17-digit display and an on-screen "tape" (which you can send to the printer) to show your calculations in progress; it includes all the usual math, plus scientific and trigonometric functions. Calculations can include parentheses and exponentiation (the caret symbol raises a number to a power).

All functions operate with 15-digit accuracy, with scientific notation used on overflow. One function not so common on desktop calculators is the ability to do hexadecimal math. Hex math doesn't support trig functions and is limited to four digits, but that covers the usual range of numbers of interest to Apple programmers.

While the notepad is fine for ordinary notes or memos, I found it very useful for programming. With it, I could keep track of my Applesoft programs' starting line numbers for subroutines and bugs that needed correcting, all stored on the same disk as the program.

As mentioned earlier, Fingertips' Rolodex can be used to store phone numbers used by the communications program. It also holds names and addresses of anyone or any company you need to call for quick access from within your program. The Rolodex can print hard copies of addresses and automatically dial a voice call for you (with modems other than my ADC unit, which renders the handset unusable once the modem goes on line).

Fingertips' next two accessories, the calendar and planner, work as a pair to list your appointments or items you need to accomplish each day. The program will quickly display a calendar for any month and year from 1900 through 2099. Like the other functions, the planner works well, though I personally prefer something a little more portable for keeping track of my commitments.

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gistic calls it the Disk Accesser; it clears your screen and presents the standard Applesoft prompt, letting you execute any DOS 3.3 or ProDOS immediate-mode command from within your program.

The Programmer's Fingertips version released during my test shares regular Fingertips' calculator, calendar, notepad, and $39.95 price, but replaces the other functions with utilities such as disk and file copying and DOS/ProDOS conversion. If your Apple has 128K, it can pop up an enhanced Monitor, mini-assembler, and BASIC line editor.

Except for the two complaints I mentioned earlier, there's little I'd want changed in Fingertips. An auto-installation program for AppleWorks would be nice. Also, an error-checking protocol such as XModem, to handle binary files or compensate for noisy phone lines, would be a welcome addition.

Otherwise, Fingertips is an exceptional value (especially for AppleWorks users). It offers a lot of performance and support for very few dollars, something not common in the software industry.■

Tim McDonough
Springfield, IL

Fun and Games

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The group shares an electronic bulletin board to help members get answers to their questions. The board includes an on-line library of AppleWorks word processing, spreadsheet and data base templates.

NAUG maintains a small but growing library of public domain files that work with AppleWorks. Most of these files are templates submitted by members, reviewed by AppleWorks experts, and collected on disks maintained by the group's public domain librarian.

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dances to music while you watch an on-screen fireworks display. When was the last time anyone appreciated what you did that much?

Four other games—Numbers, Count, Add, and Subtract—use encouraging words, graphics, and music to help with arithmetic. Your tasks include matching a number, counting colorful objects, and doing simple math problems such as adding and subtracting triangles, stars, boots, and computer disks. Shapes helps you distinguish pictures that don't belong in a numbered series—picking out the lamp among the sailboats, for example.

The last program on the Elf Games disk, Names, helps a young 'un recognize his or her name or any other typed word as it flashes and dances across the screen. If you've had a tough day at work, you can type in your own name for a harmless ego boost.

You almost want to yell, "Gimme an E! Gimme an R! Gimme a C!" as the name is spelled out in large colorful letters. The next sequence shows the name wavering across the screen, randomly cloning itself in a multicolored array, and finally appearing in 3-D. Names is a fine way for little ones to learn how to spell simple words.

Although Elf Games give you unlimited opportunities to succeed, there isn't any help if you keep getting something wrong. For instance, the number 9 on screen doesn't look like the keyboard number 9, so it's possible this number would be hard to match.

Colorful Creatures

Like Elf Games, Elf Coloring Book is entertaining and educational. It's like an electronic version of the alphabet books we used as children. In Elf Coloring Book, your child presses any letter of the alphabet. If he or she presses the letter Q, for instance, a picture of a quail appears, along with an uppercase Q and the word "quail."

Using the keyboard or joystick, the child then moves to the palette screen, choosing from 20 colors and patterns and moving them around on the picture. Disk and question-mark icons lead to a menu that lets you load a new picture, save or retrieve a color picture, go back to color, or turn the music on and off. Pressing the escape key takes you back to the instructions.

Programmer Mike Culver's childlike cleverness shows in his pictures. Each animal looks real, but is imaginatively drawn to appeal to elves young and old. Culver's walrus is probably the cutest toothy guy you'll ever see. Sometimes Culver takes artistic license and draws fictitious critters such as the xylophone bug. It sure beats coloring in a xema or xanthocephalus!

Elf Games and Elf Coloring Book are a fine, not to mention inexpensive, way to introduce young people to computing, graphics, and some basic educational concepts.■

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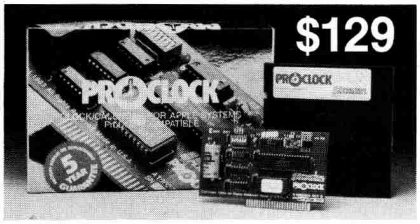

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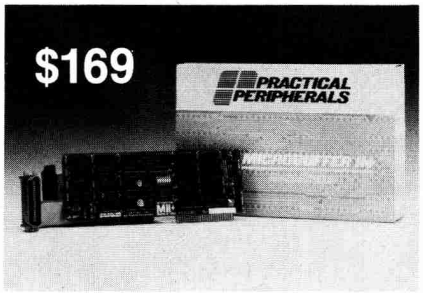

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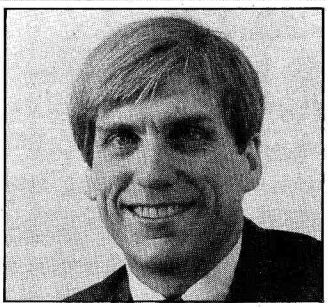

Charmed, I'm Sure

by Paul Statt, *inCider* staff

"Programmers will have to suffer with Apple's firmware. But didn't I hear someone talking about 'writing on the metal'?"

I saw the new Apple IIGS in June. It's a deep computer: It hides its microprocessor beneath a pile of tools that eliminate programming tasks like managing memory and drawing super-high-resolution graphics, and under a blanket called ProDOS 16, a disk-operating system that warms up to the large continuous-memory space of the 65816 microprocessor. Its color and sound captivated me—it's a charming machine.

I also spoke with Jean-Louis Gassée, Apple's Vice President of Product Development. You don't so much hear Gassée talk about computers and marketing as you see him. You miss a great deal if you don't see him clutch his throat when he mentions the original Mac marketing style, or hold his palms out flat in front of him in answer to a question about the "market position" of the Apple IIGS.

He's a deep man, and well worth reading. His tie is perfectly knotted, its color a perfect contrast. The effect is charming, and his voice has that Gallic tint that, I hear, makes a Frenchman's every word fascinating to American women—even if the topic is marketing.

It would be a shame to listen to Jean-Louis Gassée and not hear what he has to say. But he's not easy to hear. He has the poet's charm—he doesn't necessarily say what he means: "The enthusiast—the traditional Apple II user—will love to go into this machine [the Apple IIGS]." He digs into the air with his hands. "There's so much here—and it's very accessible. Lifting the hood—that's the Apple II spirit."

Gassée likes computers; he likes hacking. He probably likes writing code on "the bare metal." That's how Apple describes the "attitude" of programmers who don't like sneaking into the CPU by way of firmware toolboxes and operating systems. Some programmers—I think Jean-Louis Gassée may be among them—would rather drive the machine with their bare hands, making everything happen just the way they want it.

The Apple IIGS charmed me: a color photograph of a bowl of apples on the screen, the "Guess Who" digitally rocking—is it live or is it Apple? Who could resist such a charming machine?

But does the IIGS breathe the spirit of the Apple II? Hasn't Apple, by concealing the 65816 metal under a coat of firmware, forced programmers to program Apple's way, perhaps making it difficult to write substantial software? The developer documentation claims that the IIGS "continues the Apple II tradition of programmer accessibility at the lowest level." But while "that makes it possible to program. . .on the lowest level. . .it does not make it advisable."

The advantages of built-in firmware are clear. The machine is built to use these routines; the programmer has to write less code. And compatibility with future Apple products is likely, if not guaranteed. *Compatible*, Gassée reminded me, has Latin roots that mean "to suffer with."

Programmers will have to suffer with Apple's firmware if they want their programs to be compatible with future Apple products. For instance, Apple couldn't demonstrate a communications program on the Apple IIGS to us. All communications software written for the //e and //c was written directly on the metal, directly to the modem, not to Apple's serial standards. Apple's own Apple Access was not standard. Apple admits that if enterprising kids in a garage had hacked out a telecommunications package that exactly followed Apple's guidelines for the //e and //c—one that didn't cheat—it would run on the Apple IIGS today.

So Apple seems to advise, "Suffer with us. Use our firmware." It will help you capture the charm of the Apple IIGS and ensure compatibility in the future. Good advice. But didn't I hear someone talking about "getting inside the machine" and praising the "Apple II mindset" of "writing on the metal"?

Mais oui. This Jean-Louis is hard to read. "All this firmware—it might be seen as a perverse attempt on the part of Apple Computer to get programmers to write on the metal," he says with a smile that is almost a wink.

An author I know once wrote me, "Always write complete sentences if you want to be clear. Fragments? Never." He would have winked if I'd been watching. ■

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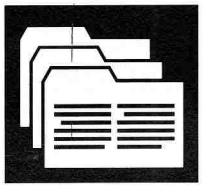

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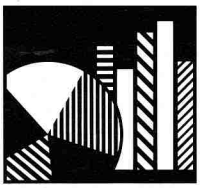

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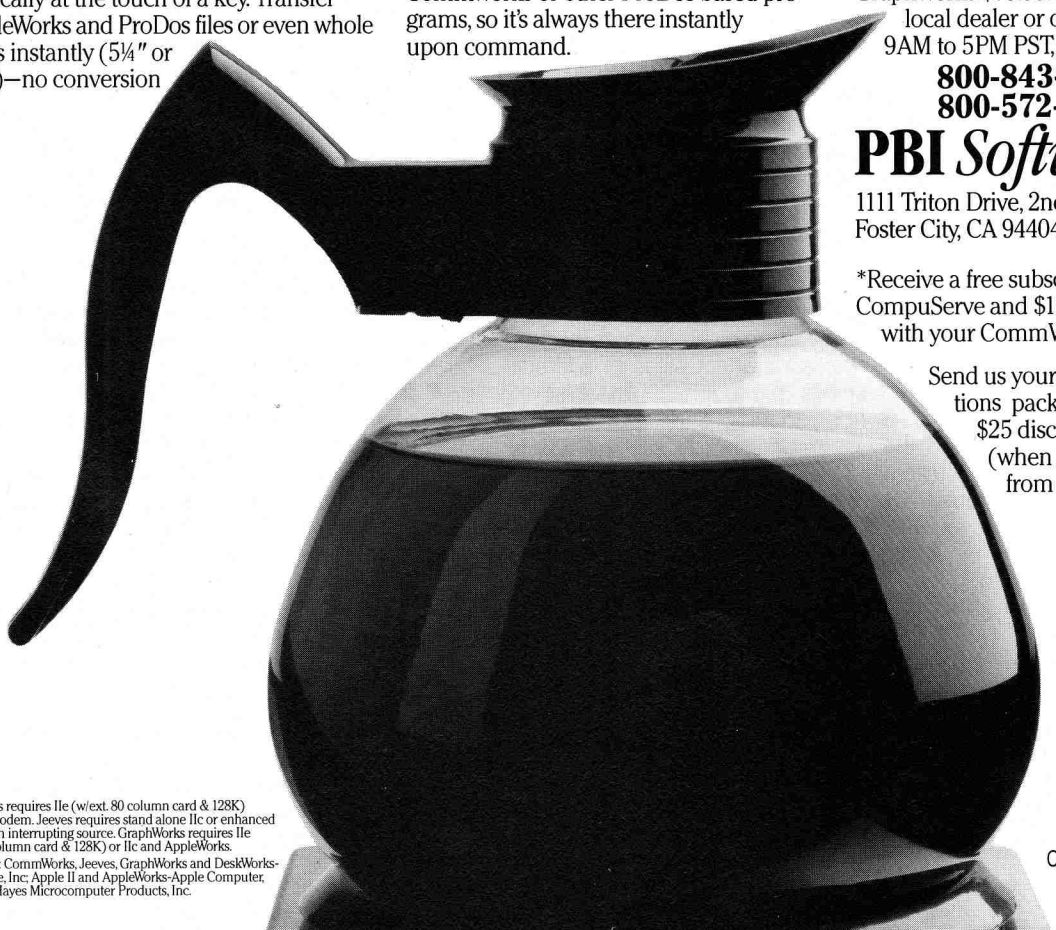

CommWorks requires IIe (w/ext. 80 column card & 128K) or IIc and modem. Jeeves requires stand alone IIc or enhanced 128K IIe with interrupting source. GraphWorks requires IIe (w/ext. 80 column card & 128K) or IIc and AppleWorks.

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Circle 52 on Reader Service Card.

E.G. FOR EXAMPLE

Backtalk from the Bar

by Eric Grevstad, *inCider* staff

"To me, the most significant point is that Apple and IBM have changed places."

I admit to mixed feelings about Apple Computer. One minute I'm fondling a IIGS at *inCider*'s sneak preview and saying, "This is the one they should have called insanely great." The next minute I'm glum at the hotel bar, glaring into my drink and muttering, "They could knock out Commodore with one blow, and they think they'll do the world a favor by cutting the //c to $500." The IIGS is a splendid product. My fear is that Apple will hide its light under a bushel.

One bushel is labeled "Educational Computing"—Apple's historical playground, but grounds for underselling a machine as good as the IIGS. On the first of our two days at Apple HQ, marketing managers told us all kinds of sensible things about playing to your strength, ad campaigns' being limited to one message, and the IIGS' natural position as a great K–12 computer. By the second day, we were objecting so loudly that Jean-Louis Gassée and others admitted it would be wrong to restrict or pigeonhole the product (see "Who Will Buy the IIGS?" p. 54).

Nevertheless, the thought persists that Apple doesn't want to confuse buyers or split the mainstream applications audience it so laboriously lured to the Macintosh. Except for the top third of the market, users who need the extra speed or the scientific or university potential of the Mac Plus, the IIGS is a Mac beater.

Apple has done itself proud, resisting the temptation to handicap a low-cost model's performance lest it affect sales of a predecessor (exhibits 1 through 20: the IBM PCjr). But can they fight the urge to handicap the IIGS' marketing, to say the IIGS is the family Chevy and the Macintosh the racy Corvette? Chevrolet sells Z28 Camaros as well as Corvettes.

Another burden could be the IIGS' price—indefinite at press time, but likely to be around $2000 with drive and monitor. It's true that Apple has never been a bargain brand, but it's also true that my dad just bought a PC clone with 640K of RAM, a 30-megabyte hard disk, and compatibility with the magic talisman Lotus 1-2-3 for $1700.

Despite that—and despite the potential for cheaper, Mega II chip-based //e's and //c's to destroy Commodore—we could have filled this issue with the voices of Apple and Regis McKenna (Apple's public-relations agency) representatives saying, "We won't go that low," "We don't want to be one of those computers that end up in closets" (a good argument during the 1982–83 Timex and VIC-20 boom), and "There's a certain price/value relationship we feel comfortable with." It sent me back to the hotel bar snarling, "Apple could have the market span of Chevrolet, but they want to be BMW. It's that inane, yuppie, image-conscious image Steve Jobs left them."

What does this mixed bag—wonderful power in an upscale position—mean? To me, the most significant point is that Apple and IBM have changed places. Earlier, 8-bit Apples were affordable workhorses while the PC represented higher tech at a higher price. By this Christmas, MS-DOS will flood the mid-priced market and leave scores of families to grapple with the A> prompt and FORMAT /S command. The more costly IIGS will offer a dazzling display, superb sound, and, most importantly, superior ease of use. It'll be a premium machine.

As Apple shifts position, so should makers of third-party products for the II lineup, both in terms of what'll be available and how they'll be sold. Software companies will emphasize point-and-click convenience, as friendliness becomes Apple's selling point against cheaper PC clones. Hardware makers, on the other hand, are used to customers' asking about aux slots and bank switching; they'll now have an even more sophisticated audience buying more exotic products than ever. Software will lure buyers who don't care what's under the hood, but those who do will move from floppy drives and clock cards to speech samplers, MIDI music interfaces, and video digitizers.

Except for AppleWorks, outside developers have a history of taking the II market from Apple's hands and running with it; it'll be fun to watch that happen with the IIGS. In the meantime, Apple deserves congratulations—even from the grouch at the hotel bar. ■

This month marks the debut of E.G. For Example, a monthly commentary on the world of Apple products by inCider*'s review editor, Eric Grevstad.*

7 Meg IIe/1 Meg IIc

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Apple IIe Enhancement Kit	**62.**
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Checkmate Technology's MultiRam CX card easily expands your IIc to 640k and next month has a **CX+ Piggyback to add another 512k (over 1.1 Meg total)!** It's 100% compatible with all IIc software/hardware & unlike Z-Ram II™ & other IIc cards, can be upgraded with a 65C816 kit ($129) to likely run new technology software! It comes with the **SAME FREE SOFTWARE, UPDATES & 5 YR WARRANTY AS IIe CARDS** (see above).

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NEW PRODUCTS

edited by Lafe Low

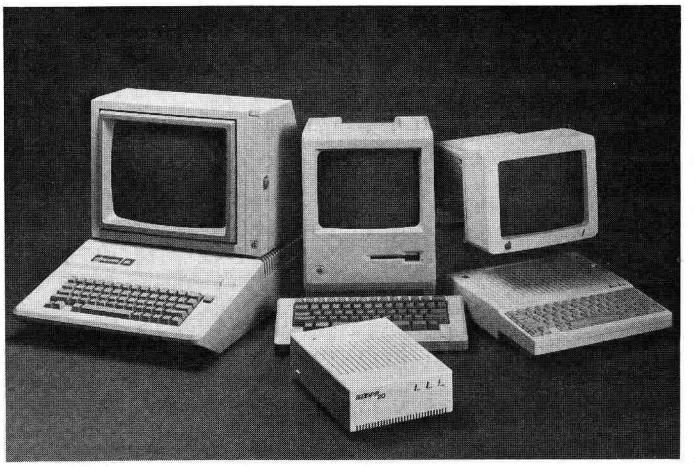
Hardware

Hard Switch

Transferring these **10- and 20-megabyte hard-disk systems** from one Apple II or Mac to another is as simple as unplugging and reconnecting with the right cable. The ProApp 10 and ProApp 20 each include a drive, controller, and port circuits, with an external power supply. You can plug the unit into the floppy-drive port on the //e, //c, and earlier Macs, or the SCSI port. You can also use the ProApp to transfer files between an Apple II and a Mac. The ProApp 10 sells for $795, the ProApp 20 for $995, from ProApp, 1475 South Bascom Avenue, Campbell, CA 95008, (800) 424-2425. Circle Reader Service number 363 for more information.

"C" This

Legend Industries has an **upgradable memory-expansion card for the //c**. The Legend C′ Card can be upgraded from 256K to as much as 1 megabyte, providing up to 1152K of total memory for your //c, configured as either RAM or electronic-disk emulation. The package includes DOS 3.3 and ProDOS emulators and a wide range of utility programs. The C′ Card sells for $219 for 256K, $269 for 512K, $319 for 768K, and $369 for 1 megabyte, from Legend Industries, 2220 Scott Lake Road, Pontiac, MI 48054, (313) 674-0953. Circle Reader Service number 376.



Transferring files between your Apple II and the Mac is easy with the ProApp 20 20-megabyte hard-disk drive.

Lend a Hand

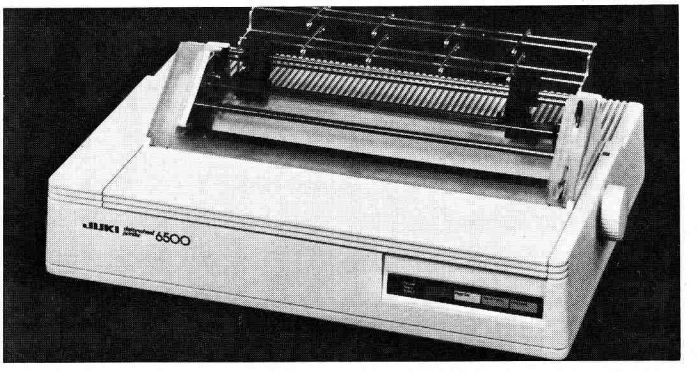
Interface to your Apple with a wave of your hand—wearing HandCommand, a sophisticated **transmitting device** integrated into a lightweight cotton glove. HandCommand, in conjunction with GRASP, a newly developed graphics-based programming language, measures the position, tilt, and bend of your hand in three dimensions and translates these measurements into computer operations: Each gesture correlates to one or a series of GRASP commands. Handle your computer with HandCommand, from ShareData, 7122 Shady Oak Road, Eden Prairie, MN 55344, (612) 829-0409. For more information, circle Reader Service number 362.

A Quick Letter

Juki's newest **letter-quality printer** is its fastest yet. The Juki 6500 has a maximum print speed of 60 characters per second (50 cps in Shannon Text) and features 10/12/15 characters-per-inch proportional spacing, a 3K buffer memory (expandable to 15K), graphics capability, and a number of print options. With a standard Centronics parallel interface and an RS-232C serial interface, the 6500 retails for $1395, from Juki Office Machines, 20437 South Western Avenue, Torrance, CA 90501, (800) 325-6134, (800) 435-6315 within California. Circle Reader Service number 375 for more information.

Cable Connections

Brooksar Data's new C2P cable lets you interface your Apple to a parallel printer. This **RS-232 serial-to-Centronics parallel cable** features a switch-selectable baud rate of 150 to 19,200 bits per second and 7- or 8-bit data. The C2P retails for $100, from Brooksar Data, 19W113 Avenue Normandy South, Oakbrook, IL 60521, (312) 964-0660. Circle Reader Service number 377 for more information.



The Juki 6500: letter-quality print at 60 characters per second.

Software

Keeping Dates

Keep track of your appointments, dates, and upcoming holidays with DateWorks, an **AppleWorks calendar data base** that highlights holidays and gives you space for 11 entries per day. Introduction and program instructions are included on disk. DateWorks sells for an introductory price of $19.95, from David Sachs Associates, 2274 56th Drive, Brooklyn, NY 11234, (718) 531-5737. Circle Reader Service number 350 for more information.

Leather and Lace

Visitors from outer space and attempted murder in a moonlit castle are the subjects of Infocom's newest **interactive adventures**.

Leather Goddesses of Phobos pits you against invaders from one of the

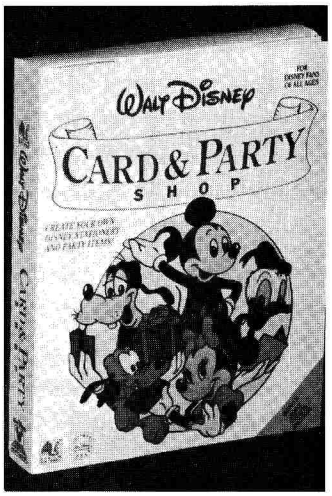
moons of Mars: You learn of their plan to turn Earth into their personal playground, then you're off on a trip through the solar system with a companion to search for parts for an anti-goddess machine.

If crossing solar systems isn't your style, cross the Atlantic to Tresyllian Castle in England to help solve a mystery for an old friend. Moonmist brings you into a Gothic world of spirits and secret treasures. Your friend, Tamara, thinks someone is trying to kill her. Besides trying to find out who and why, you must look for a valuable object hidden somewhere in the castle and track down the resident ghost.

Leather Goddesses of Phobos and Moonmist retail for $39.95 each, from Infocom, 125 CambridgePark Drive, Cambridge, MA 02140, (617) 492-6000. Circle Reader Service number 371 for more information.

The Right Type

People who want to **learn to type** and intermediate typists who want to improve their skills can benefit from Type, a program that uses real sentences instead of random-letter drills. Type diagnoses your skill level according to speed and accuracy for each finger, hand, and letter. You can also create custom drills for particular needs, and the program includes Type-Athlon, an arcade game to strengthen your typing skills. Type sells for $44.95, from Broderbund, 17 Paul Drive, San Rafael, CA 94903, (415) 479-1700. Circle Reader Service number 358 for more information.



Create your own greeting cards, invitations, and wrapping paper with Card and Party Shop.

In the Cards

With two new Bantam programs, you can **create greeting cards, comic strips, and party favors** featuring Mickey and Minnie Mouse, Goofy, Donald Duck, and other Disney characters. Comic Strip Maker lets kids choose from more than 180 hi-res color graphics to design cartoons, and fill in the balloons with original or preprogrammed phrases. Kids can use Card and Party Shop to make personalized stationery, greeting cards, and party goods such as invitations and wrapping paper. Each program includes an easy-to-use art toolbox and word processor. Comic Strip Maker and Card and Party Shop retail for $39.95 each, from Bantam Electronic Publishing, 666 Fifth Avenue, New York, NY 10103, (212) 765-6500. Circle Reader Service number 361 for more information.

Easy as Pie

How would you slice up a pizza? Enroll in Pizza Fractions' Pizza Institute and find out. This animated game **teaches fractions** by letting you cut up a pizza for varying numbers of customers. There are five levels of difficulty, and students can progress from first assistant pizza cutter to pizza slicer first class. Pizza Fractions sells for $59, from HRM Software, 175 Tompkins Avenue, Pleasantville, NY 10570, (914) 769-6900. Circle Reader Service number 360 for more information.

Hop to It

Children can **learn to write clear sentences, stories, and paragraphs** with Writer Rabbit. This program uses simple phrases as building blocks for sentences and paragraphs, and entertains your child with its birthday-party format. Writer Rabbit sells for $39.95, from The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025, (415) 328-5410, or circle Reader Service number 355 for more information.

Customized awards and diplomas are a snap with Certificate Maker.

Gaming Gremlins

Elementary-school students can supplement and reinforce classroom **grammar lessons** with Grammar Gremlins. This game presents basic rules of grammar and more than 700 practice examples covering abbreviations, subject-verb agreement, capitalization, contractions, plurals, and punctuation. Suggested retail price for Grammar Gremlins is $49.95, from Davidson & Associates, 3135 Kashiwa Street, Torrance, CA 90505, (213) 534-4070. For more information, circle Reader Service number 353.

In Honor of...

When it's time to hand out awards, you can use Certificate Maker to **print customized certificates** for your home, school, or business. The program provides more than 200 predesigned certificates, diplomas, and licenses, including a Community Service Award, World's Greatest Athlete award, and Best Friends Certificate. On the lighter side, the program also includes forms for a Couch Potato Award, Bad Haircut Award, and a variety of others. Certificate

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NEW PRODUCTS

Maker retails for $49.95, from Springboard Software, 7808 Creekridge Circle, Minneapolis, MN 55435, (612) 944-3915. For more information, circle Reader Service number 356.

Bag of Tricks

Grab this diverse set of **templates for AppleWorks and SuperCalc3a**: Super Grab Bag contains templates for home finance, your college fund, shopping lists, and an expert system, and features paging, maps, standard notation, and self-documentation for ease of use. Super Grab Bag is available for an introductory price of $12, from Petit Design and Engineering, 1344 North 31st Street, Milwaukee, WI 53208, (414) 933-4627. Circle Reader Service number 352 for more information.

Supposing Angles

Geometric Supposers encourages students to take a more active role in learning **concepts of geometry**. The first two programs, Triangles and Quadrilaterals, let students in grades 8 and up design figures by

Product Updates

- **FontWorks version 2.0** can now read AppleWorks word-processor and spreadsheet files directly from disk and print them, and you no longer have to convert your files to formatted text before printing. FontWorks can produce four simultaneous fonts in normal mode and two in sideways mode. Version 2.0 retails for $49.95, from The Software Touch, 9842 Hibert Street, Suite 192, San Diego, CA 92131, (619) 549-3091.
- The Learning Company is releasing **School Editions** of ten of its programs, previously published in conjunction with Addison-Wesley: **Reader Rabbit**, **Rocky's Boots**, **Magic Spells**, **Juggles Rainbow**, **Bumble Games**, **Bumble Plot**, **Gertrude's Secrets**, **Gertrude's Puzzles**, **Moptown Parade**, and **Moptown Hotel**. Each school edition will retail for $15 more than the standard version. Contact The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025, (415) 328-5410.
- Nite Owl Productions has added a second volume of programming tools to its developer disk series. **Developer Disk #2** contains seven new programs on help-screen files, demonstration programs, and exercise files. Programmers can get Developer Disk #2 for $39.95, from Nite Owl Productions, 5734 Lamar, Mission, KS 66202, (913) 362-9898.
- Manzanita completes its BusinessWorks accounting series with the **BusinessWorks Payroll System**. This latest addition is designed for small- to medium-sized businesses with fewer than 1000 employees and produces payroll checks and government tax forms. BusinessWorks Payroll retails for $445, from Manzanita Software Systems, One SierraGate Plaza, Suite 200-A, Roseville, CA 95678, (916) 781-3880.

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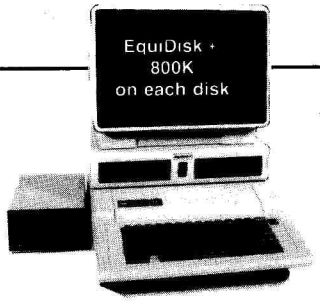

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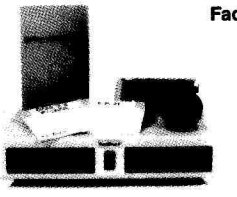

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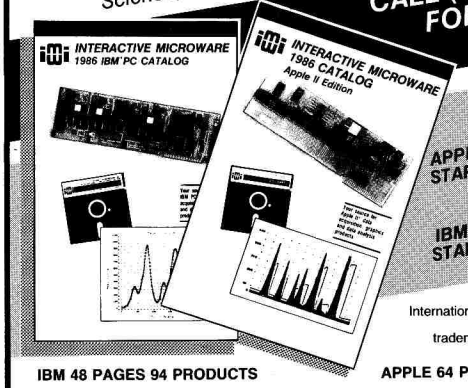

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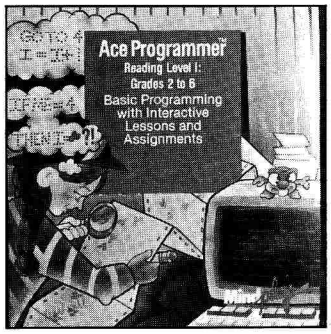

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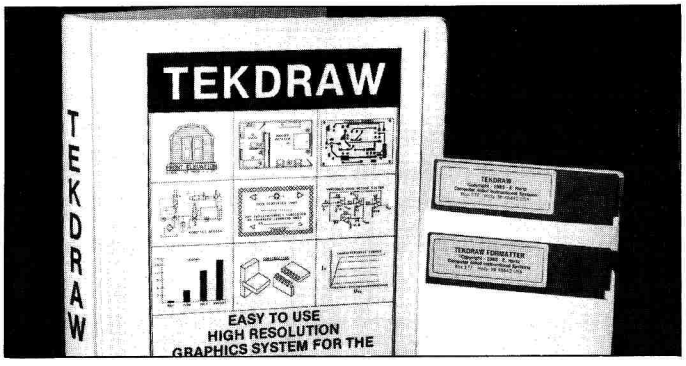

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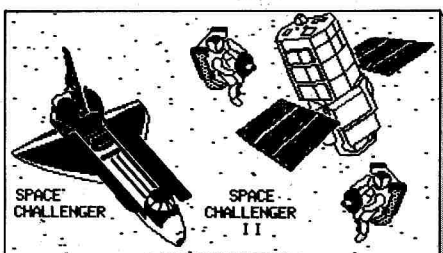

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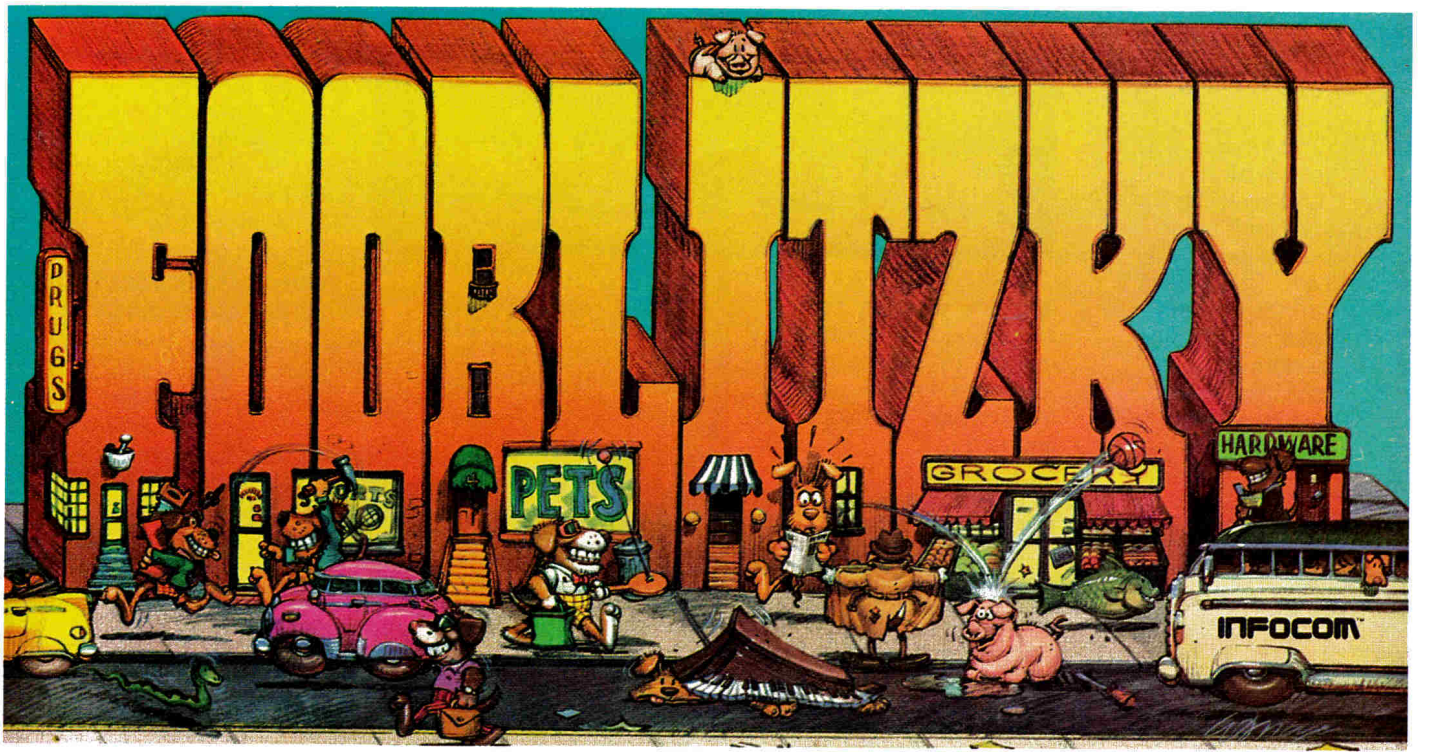


by Brian J. Murphy

In Game Room, Brian Murphy tells us what's new in the world of Apple games. Look here for inCider*'s scoop on the latest fun.*

Fooblitzky

★★★★

Infocom
125 CambridgePark Drive
Cambridge, MA 02140
Illustrated scavenger hunt
Apple //c or 128K //e, one disk drive; joystick optional
$39.95

If you're familiar with Infocom games, **Fooblitzky** will surprise you—it features graphics. Infocom has always taken pride in the fact that its software didn't need pictures—its interactive fiction stimulated the imagination far more than visual art could.

Perhaps Infocom chose to illustrate Fooblitzky because it isn't an interactive novel. It's a multiple-player game that's a seemingly simple scavenger hunt.

To win this game, all you have to do is find four secret items hidden in the village and bring them to a checkpoint. It seems easy, but, as you may expect, Infocom has added a few twists.

It's a Dog's Life

For starters, you and your fellow gamesters are dogs. You carry in your mouth a shopping bag that can hold exactly four items. You have enough foobles (the coin of the realm in Fooblitzky) to buy these items, which are all available over the counter at any store in Fooblitzky.

You can find one of the four types of stores (and one of each secret item) in each of the four quadrants of the town. You have plenty of opportunity to complete the scavenger hunt, provided you can stay out of harm's way, and assuming the other dogs don't buy what you need before you can get to it.

The trick is to figure out what the secret objects are. Since each player gets to select one, you begin the game knowing one-quarter of the puzzle. If there are four players, each picks one. You can study your opponents' behavior and deduce what the other items are. If there are fewer than four players, the computer selects the remaining items, and the game gets a little harder.

Before the game starts, the computer gives you the prices of the four objects. Write these figures down. Since anything you can buy costs either four, eight, or 16 foobles, and because there are only 18 items from which to choose, you can figure out what the secret items are by a simple process of elimination. As you search, you can store unwanted objects in a locker, or, better still, sell them for about half value at a pawnshop. If you want to empty a whole bag, just head for a charity drop.

Getting around town is easy—most of the time. At the beginning of your turn, the "Wheel of Fortune" spins to determine the number of spaces you can

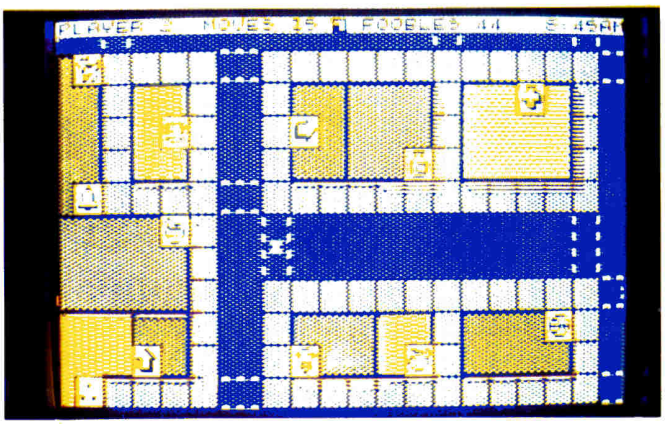
inCider's Ratings

★★★★	Excellent
★★★	Above average
★★	Good enough
★	Not up to standards
☆	The empty set

travel. If the traffic makes it hard to cross the street or if you want to travel a long distance, hop the UGH (Underground Gliding Highway). You'll move fast, but you may later miss the money you paid for the privilege.

As you might expect, a few hazards and opportunities face the traveler. If you opt to cross against the lights at an intersection, you may find yourself being knocked for a loop by a passing van. That means a stay in the hospital and medical bills, to boot (the doctors perform an automatic cashectomy). You should also be wary of falling pianos, which will send you on another trip to the hospital.

You'll meet the Chance Man at unpredictable moments. Depending on luck and skill, you may come into a sudden packet of money, the chance to buy a needed item, or a few free moves. You might also find him reaching into your bag to steal an item.



Get Your Licks In

If you run out of cash before completing your quest, you have the option of becoming a dishwasher at one of Fooblitzky's restaurants—you'll be licking dishes for four foobles a turn. You'll be surprised how little progress your friends make while you're cleaning up.

Of all of Infocom's games, this one just might be the most fun to play—it's certainly the most accessible. It's recommended for ages 14 and up, but I believe anyone from age 9 or 10 on would enjoy this game. The graphics screens are lively and amusing. The action is fast, and the unusual situations in which you find yourself are frustratingly funny. Fooblitzky is a guaranteed good time and perfect for family fun. ■

Brian Murphy is anxious to learn what you think of the current state of computer games. Write him at inCider, *Elm Street, Peterborough, NH 03458, and let him know your opinion.*

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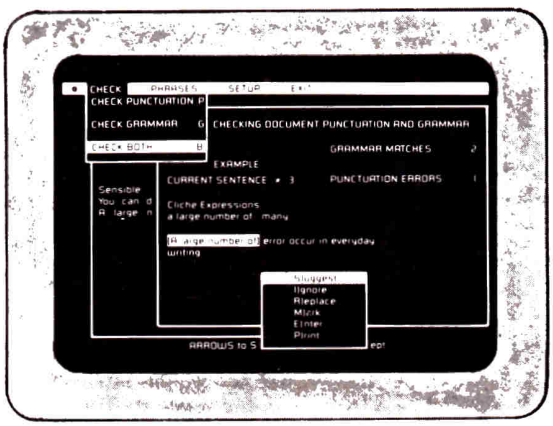

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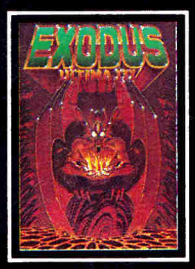

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Rebooting DOS 3.3

by Darrell W. Hajek

Almost anyone with more than a bare minimum of experience with the Apple II has at some time typed in a BASIC program only to find that DOS is inoperative. The problem may arise because you've neglected to boot DOS in the first place, but it may also come about because of a defective disk or a miscalculated POKE or two. Whatever the cause, the result is generally the same: a lost program. Any attempt to boot or reboot DOS will usually destroy a resident program.

It's possible to create a reboot disk with a slightly modified DOS, though, to salvage your programs. The instructions for making such a disk are as follows:

Step 1. Boot your system with a good (48K) DOS disk. Remove it and insert a blank disk. Enter the Monitor (CALL −151) and insert hex 34 at address 9E42 (9E42:34). Return to the Applesoft operating system (E003G) and initialize the disk (INIT HELLO).

This procedure creates a disk with a DOS that expects to BRUN a machine-language boot program rather than RUN a BASIC program. It also saves whatever was available as an Applesoft program, so the next step is to eliminate it and store a machine-language program in its place.

Step 2. Erase the HELLO program (DELETE HELLO), and type in the program shown in **Listing 1**. Store **Listing 1** as the boot program

Listing 1. *Machine-language program replacing Applesoft.*

```
2200 - A9 06        LDA #06
2202 - 8D 42 9E     STA $9E42
2205 - AD 00 21     LDA $2100        g
2208 - 85 69        STA $69
220A - AD 01 21     LDA $2101        g
220D - 85 6A        STA $6A
220F - 18           CLC
2210 - AD 00 20     LDA $2000        g
2213 - 8D 00 08     STA $800
2216 - A9 01        LDA #01
2218 - 6D 11 22     ADC $2211        g
221B - 8D 11 22     STA $2211        g
221E - 8D 14 22     STA $2214        g
2221 - 90 ED        BCC $2210        g
2223 - 4C 03 E0     JMP $E003
```

(BSAVE HELLO, A$2200, L$26). (Note that this program is self-modifying. *Don't* execute the program before storing it.)

When it's time to use your reboot disk (you've typed in a BASIC program and DOS isn't functioning), follow this procedure: Enter the Monitor (CALL −151). Move the vulnerable portion of your program out of harm's way:

```
2000<800.900M                    g
```

Store LOMEM where your programs can find it again:

```
2100<69.6AM                      g
```

Insert the reboot disk, and boot (C600G).

Although these steps will let you save your BASIC program, they will, in the process, destroy any graphics you have on HIRES page 1. Programmers who work in graphics might consider modifying the program to use other locations in memory. For convenience, *g* denotes the affected commands. ■

Write to Darrell Hajek at the Department of Mathematics, University of Puerto Rico, Mayaguez, PR 00708.

Graphics Grace

by Nadeem Hussain

As computer artists know, high-resolution graphics screens use a lot of disk space and consume valuable time during loading into memory. Here's a solution.

First, type in **Listing 2**. Then save it by entering SAVE <filename>. Type in **Listing 3** and save it by entering BSAVE <filename>,A$300,L$A3.

The method shown here works best on pictures containing large sections of black or white pixels. Load the graphics screen onto high-resolution graphics-page 1 by typing BLOAD <picture>,A$2000. Then execute **Listing 2**. This program will condense the bits of your picture into fewer bytes. (Be patient, though, because this process will take approximately three minutes to execute.) After the program completes the main procedure, it saves the condensed version of your picture with the filename you chose. This file will now load into memory up to 11 times faster (depending on the color distribution).

To display your picture, RUN the following routine:

```
10 BLOAD <condensed picture>,A$6000
20 BLOAD <Listing 2>,A$300
30 HGR
40 CALL 768
```

You don't have to load **Listing 3** and the condensed picture file again. You can retrieve the picture with CALL 768 when high-resolution graphics-page 1 is on screen. For example, the following lines will display your picture a second time:

```
50 HGR
60 CALL 768
```

To display your picture on graphics-page 2, RUN the following routine:

```
10 BLOAD <condensed picture>
20 BLOAD <Listing 2>
30 POKE 787,64
40 POKE 835,96
50 POKE 866,96
60 HGR2
70 CALL 768
```

To switch the display back to graphics-page 1, use the following lines:

```
100 POKE 787,32
110 POKE 835,64
120 POKE 866,64
130 HGR
140 CALL 768
```

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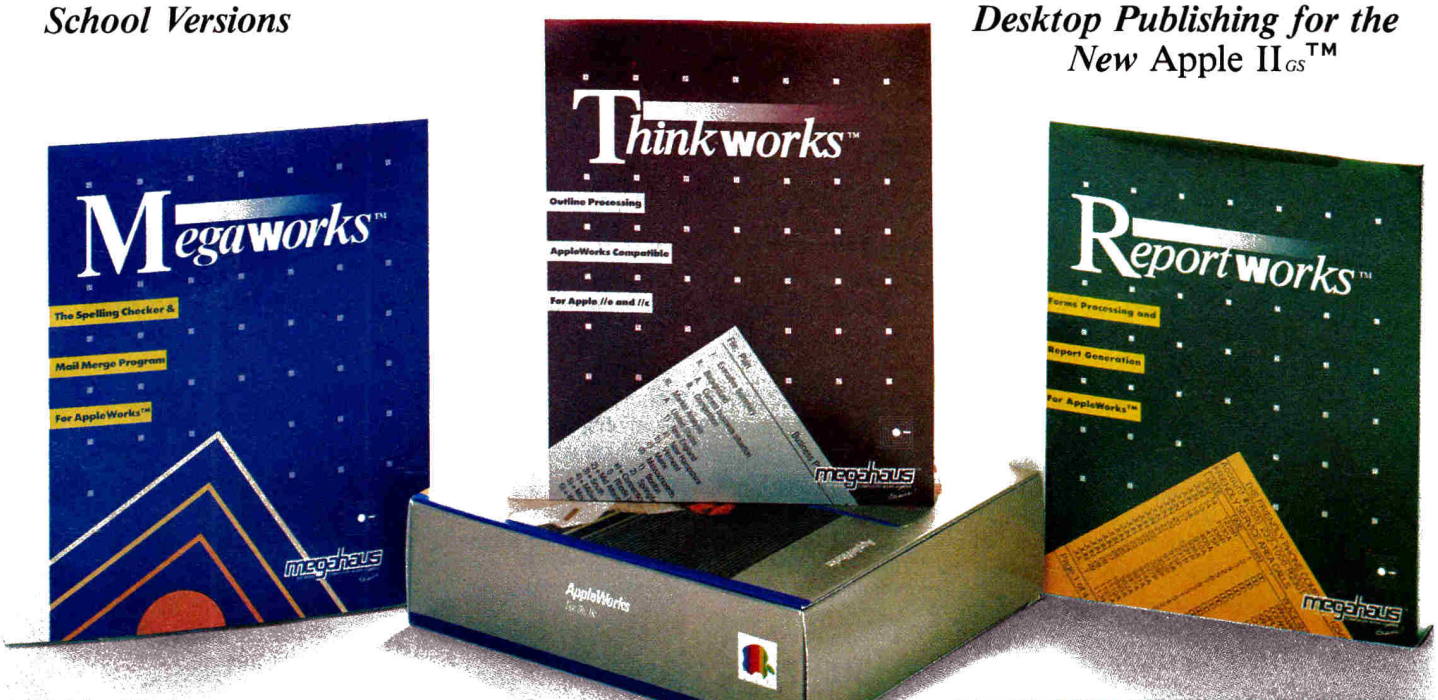

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Listing 2. Graphics-Display Condenser.

```
 10  REM  **** GRAPHICS DISPLAY CONDENSER ****
 20  REM  ****       BY NADEEM HUSSAIN      ****
 30  HOME
 40  INPUT "TYPE IN PREDOMINANT COLOR                ('BLACK' OR 'WHI
     TE'):";A$:A = 0: IF A$ = "WHITE" THEN A = 255
 50 B = 24576: POKE B,AB:B = B + 1
 60  HOME
 70  INVERSE : PRINT "************ PLEASE WAIT ***************** TRA
     NSLATING WILL TAKE APPROXIMATELY ************ THREE MINUTES **
     ************": NORMAL
 80  FOR C = 8192 TO 16384
 90  IF  PEEK (C) = A AND D = 2 THEN  POKE B, PEEK (B) + 1: GOTO 130
100  IF A =  PEEK (C) THEN D = 2: POKE B,A:B = B + 1: POKE B,2: GOTO
     130
110  IF D = 2 THEN D = 1:B = B + 1
120  POKE B, PEEK (C):B = B + 1
130  IF D = 2 AND  PEEK (B) = 255 THEN D = 1:B = B + 1
140  NEXT
150  PRINT "ENTER NAME OF FILE TO BE SAVED": INPUT A$: PRINT  CHR$
     (4);"BSAVE ";A$;",A$6000,L";B - 24570
```

Listing 3. Graphics Displayer.

```
0300- A9 60 8D 2A 03 8D 24 03
0308- A9 01 8D 23 03 A9 02 8D
0310- 29 03 A9 20 8D 52 03 8D
0318- 71 03 A9 00 8D 51 03 8D
0320- 70 03 AD 01 60 8D CF 03
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0368- 20 76 03 60 AD CF 03 8D
0370- 00 20 20 91 03 60 EE 23
0378- 03 EE 29 03 AD 23 03 C9
0380- FF F0 06 AD 23 03 F0 05
0388- 60 EE 2A 03 60 EE 24 03
0390- 60 EE 51 03 EE 70 03 AD
0398- 51 03 D0 06 EE 52 03 EE
03A0- 71 03 60
```

Try this time-saving technique in a number of different applications, including your animated graphics and adventure games.■

Write to Nadeem Hussain at 25 Sycamore Drive, Medford, NJ 08055.

ProDOS Portal Update

by David O. Bone

When you run the ProDOS Portal windows routine modified for a single-line border (August 1986, p. 105) on an enhanced Apple //e, you'll have problems when you open the first window. It doesn't have a border, and the bottom line of the text window may creep up the screen after you close it, depending on the sizes to which the windows were set. But don't worry—you can cure the problem in about five minutes.

First type BLOAD PRO.PORTAL.OBJ, then execute **Listing 4** from the keyboard. Type BSAVE PRO.PORTAL.OBJ ,A$7B90,L$024C. Add **Listing 5** to the BASIC program with which you're using windows, and the program will run on either a //e or an enhanced //e. If you want to run the window program on an enhanced machine only, add just the three POKEs from **Listing 5** before you execute the BSAVE.

One word of caution. Don't try to use the enhanced version of ProDOS Portal on an unenhanced Apple—your program will be finished before you are.■

Write to David Bone at 827 Columbine Street, Sterling, CO 80751.

Mouse Cat

by Travis Jones

Mouse Cat (see **Listing 6**) lets you scan your ProDOS volumes and their subdirectories at the click of the mouse button. When you find the file or system you want, you can RUN, BRUN, or EXEC that file by clicking it. If you select a DIRectory, the program will catalog that subdirectory.

The second version (**Listing 7**) is for 40-column catalog display. Mousetext isn't available in 40-column mode, so this version can also work on any Apple II with ProDOS and an Apple Mouse.

If your mouse isn't in slot 4, then you need to change only the PR#4 and IN#4 in the listings to reflect the appropriate slot.

Text continued on p. 140.

Listing 4. Addition to ProDOS Portal: creating borders on an enhanced Apple //e.

```
POKE 31646,32: POKE 31649,32: POKE 31652,32: POKE 31655,32:
POKE 31678,33: POKE 31681,33: POKE 31684,33: POKE 31715,32:
POKE 31721,33: POKE 31732,32
```

Listing 5. Addition to BASIC program.

```
15 IF PEEK (64448) = 224 THEN POKE 31712,56: POKE 31718,56:
POKE 31728,56
```

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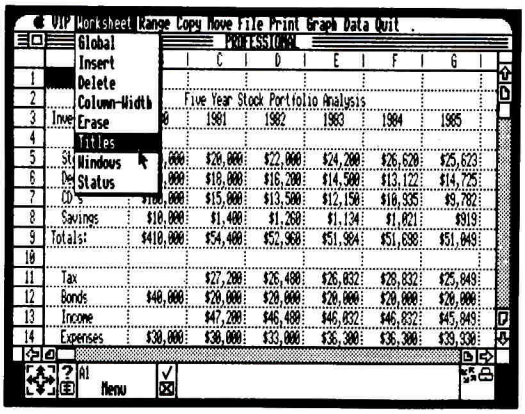

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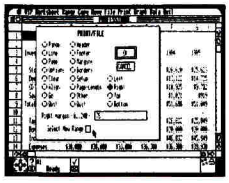

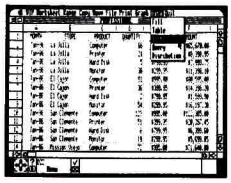

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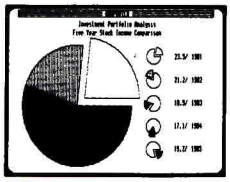

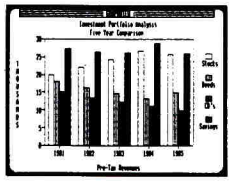

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Uses Lotus Files	Yes	No	No	No
Uses Mouse	Yes	No	Yes	No
Uses Icons	Yes	No	No	No
Math Functions	51	49	24	13
Fast Natural Recalc	Yes	No	No	No
Speed	Fast	Fast	Slow	Fast
Supports 16-Bit*	Yes	No	No	No

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Listing 6. Mouse Cat (80-column version).

```
1299  REM   MOUSE SELECTION STARTUP PROGRAM
1300  REM          BY TRAVIS JONES
1301 D$ =  CHR$ (4): REM   CONTROL-D
1302 AUX =  - 16299: REM   AUXILLARY MEMORY
1303 MBD =  - 16300: REM   MOTHERBOARD MEMORY
1304 NA$ = "": REM    NAME READ FROM SCREEN
1305 C1 = 0: REM      FLAG ON IF /RAM
1308  PRINT D$;"PR#3": PRINT D$;"CAT"
1309 VT =  PEEK (37) - 2
1310  IF NA$ = "" THEN  VTAB VT: HTAB 2: PRINT "/RAM"
1319  REM
          INSTRUCTIONS
1320  VTAB 4: HTAB 52: PRINT "THE MOUSE BUTTON SELECTS"
1321  VTAB 6: HTAB 52: PRINT "ANY KEY PRESS WILL QUIT!"
1322  VTAB 9: HTAB 51: PRINT "SOME TEXT AND BINARY FILES"
1323  VTAB 11: HTAB 52: PRINT "ARE ONLY FOR USE THROUGH"
1324  VTAB 13: HTAB 55: PRINT "APPLESOFT PROGRAMS"
1325  VTAB 7: HTAB 52: PRINT "                        "
1327  VTAB 17: HTAB 52: PRINT "SELECT A SUBDIRECTORY TO"
1328  VTAB 19: HTAB 52: PRINT "CATALOG THE SUBDIRECTORY"
1330  VTAB 20: HTAB 52: PRINT "                        "
1332  VTAB 15: HTAB 52: PRINT "                        "
1350  REM
          TURN ON MOUSE TO SELECT WITH!!!
1351  PRINT D$;"PR#4": PRINT  CHR$ (1): PRINT D$;"PR#0": PRINT
     D$;"IN#4"
1352  VTAB 3: INPUT "";X,I,S: REM   X=NOT USED  I=VERTICAL  S
     =SWITCH
1355  IF I < 5 THEN I = 5: REM   LIMIT VERTICAL DISPLAY
1357  IF I > 22 THEN I = 22
1359  PRINT  CHR$ (27);: INVERSE : VTAB I: HTAB 22: PRINT "HI
     FG";: NORMAL : PRINT  CHR$ (24): REM   DISPLAY CURSOR
1361  IF S < 0 THEN  PRINT D$;"IN#0": PRINT D$;"PR#4": PRINT
     CHR$ (0): PRINT D$;"PR#0": VTAB 22: END
1362  IF S > 1 THEN  FOR P = 1 TO 80: NEXT : VTAB I: HTAB 22:
     PRINT "      ";: GOTO 1352: REM   ERASE CURSOR AND GO GE
     T NEW POSITION
1363  REM
         NEXT THREE LINES DECIDE WHERE TO PEEK TO READ SELEC
     TION
1364  IF I < 9 THEN ST = ((I - 1) * 128) + 1023
1365  IF I > 16 THEN ST = ((I - 17) * 128) + 1103
1366  IF I > 8 AND I < 17 THEN ST = ((I - 9) * 128) + 1063
1367  REM
          FOR/NEXT READS YOUR SELECTION
1368 SD = ST + 8:AI =  PEEK (ST + 1):NA$ = NA$ +  CHR$ (AI)
1370  FOR PB = ST + 2 TO SD: POKE AUX,0:AI =  PEEK (PB): IF A
     I = 160 THEN PB = SD: NEXT : POKE MBD,0: GOTO 1382
1372 NA$ = NA$ +  CHR$ (AI)
1378  POKE MBD,0:AI =  PEEK (PB): IF AI = 160 THEN PB = SD: NEXT
     : GOTO 1382
1380 NA$ = NA$ +  CHR$ (AI): NEXT PB
1381  REM
          IF BLANK LINE OR /RAM HAS BEEN SELECTED
1382  IF  RIGHT$ (NA$,1) =  CHR$ (160) THEN  RUN
1383  IF C1 = 1 THEN 1385
1384 C =  ASC (NA$): IF C = 175 THEN C = 196:C1 = 1: GOTO 139
     1
1385 C$ = "":AI =  PEEK (ST + 9):C$ = C$ +  CHR$ (AI)
1386  FOR PB = ST + 10 TO ST + 12: POKE AUX,0:AI =  PEEK (PB)
     : IF AI = 160 THEN PB = ST + 12: NEXT PB: POKE MBD,0: GOTO
     1390
1387 C$ = C$ +  CHR$ (AI)
1388  POKE MBD,0:AI =  PEEK (PB): IF AI = 160 THEN PB = ST +
     12: NEXT PB: GOTO 1390
1389 C$ = C$ +  CHR$ (AI): NEXT PB
1390 C =  ASC (C$)
1391 L =  LEN (NA$): REM
```

Listing continued.

Listing continued.

```
                          NOW DECIDE WHAT TO DO
1392  IF C = 196 THEN  HOME :NA$ = NA$ + "/": FOR LL = 1 TO L
      + 2: PRINT "_";: NEXT LL: PRINT : INVERSE : PRINT " ";:
      PRINT NA$: NORMAL : PRINT D$;"CAT";NA$:CK$ = NA$: GOTO
     1410
1393  IF C = 211 THEN 1420: REM  IF SYSTEM TYPE FILE IS SELEC
     TED
1394  IF C = 212 THEN 1420: REM  IF TEXT FILE IS SELECTED
1395  IF  RIGHT$ (C$,1) =  CHR$ (206) AND C = 194 THEN 1420: REM
      IF BINARY FILE
1396  IF  RIGHT$ (C$,1) =  CHR$ (211) AND C = 194 THEN  GOSUB
     2000: PRINT D$;"RUN";NA$:: END : REM   IF BASIC FILE IS
     SELECTED
1400 NA$ = CK$: VTAB I: HTAB 22: PRINT "      ": GOTO 1352
1409  REM
            IF A DIRECTORY IS SELECTED MORE INSTRUCTIONS
1410  VTAB 7: HTAB 52: PRINT "THE MOUSE BUTTON SELECTS": VTAB
     10: HTAB 52: PRINT "ANY KEY PRESS WILL QUIT!"
1412  VTAB 12: HTAB 52: PRINT "                    ": VTAB
     15: HTAB 52: PRINT "SELECT A BLANK LINE TO": VTAB 17: HTAB
     54: PRINT "RETURN TO MAIN MENU": GOTO 1352
1419  REM
          SECOND CHANCE TO TURN BACK IF NOT BASIC
1420  GOSUB 2000: HOME : PRINT : VTAB 10: HTAB 1: PRINT NA$: PRINT
     : PRINT "IS A ";C$;" TYPE OF FILE": PRINT : PRINT : HTAB
     10: INPUT "ARE YOU SURE YOU WANT IT?  (Y/N) ";YN$
1421  IF YN$ = "Y" OR YN$ = "y" THEN  PRINT D$;"-";NA$::: END
1422  PRINT  CHR$ (7): RUN
1999  REM
            TURN MOUSE OFF!
2000  PRINT D$;"IN#0": PRINT D$;"PR#4": PRINT  CHR$ (0): PRINT
     D$;"PR#0": REM     TURN  THE  MOUSE  OFF!!!
2002  RETURN
```

End of listing.

Listing 7. Mouse Cat (40-column version).

```
1300  REM            BY TRAVIS JONES
1301 D$ =  CHR$ (4): REM    CONTROL-D
1304 NA$ = "": REM    INITIATE STRING VARIABLE
1308  HOME : PRINT  CHR$ (21);: PRINT D$;"CAT"
1319  REM                                INSTRUCTIONS
1320  VTAB 23: HTAB 10: PRINT "PRESS ANY KEY TO QUIT"
1350  REM    TURN ON MOUSE TO SELECT WITH!!!
1351  PRINT D$;"PR#4": PRINT  CHR$ (1): PRINT D$;"PR#0": PRINT
     D$;"IN#4"
1352  VTAB 3: INPUT "";X,I,S: REM    X=NOT USED  I=VERTICAL
     S=SWITCH
1355  IF I < 5 THEN I = 5: REM    LIMIT VERTICAL DISPLAY
1357  IF I > 22 THEN I = 22
1359  VTAB I: HTAB 22: PRINT "<-CAT": REM    DISPLAY CURSOR
1361  IF S < 0 THEN  POKE CL,0: PRINT D$;"IN#0": PRINT D$;"PR
     #4": PRINT  CHR$ (0): PRINT D$;"PR#0": VTAB 23: END
1362  IF S > 1 THEN  FOR P = 1 TO 80: NEXT : VTAB I: HTAB 22:
      PRINT "     ";: GOTO 1352: REM    ERASE CURSOR AND GO G
     ET NEW POSITION
1363  REM   NEXT THREE LINES DECIDE WHERE TO PEEK TO READ SEL
     ECTION
1364  IF I < 9 THEN ST = ((I - 1) * 128) + 1023
1365  IF I > 16 THEN ST = ((I - 17) * 128) + 1103
1366  IF I > 8 AND I < 17 THEN ST = ((I - 9) * 128) + 1063
1367  REM   FOR/NEXT READS YOUR SELECTION
1368 SD = ST + 16: REM   MAXIMUM CHARACTERS OF A FILE NAME
1370  FOR PB = ST + 2 TO SD
1378 AI =  PEEK (PB): IF AI = 160 THEN PB = SD: NEXT : GOTO 1
     385
1380 NA$ = NA$ +  CHR$ (AI): NEXT PB
1384  REM   FOR/NEXT READS THE FILE TYPE OF SELECTION
1385 C$ = ""
1386  FOR PB = ST + 18 TO ST + 21
```

Listing continued.

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Listing continued.

```
1388 AI =  PEEK (PB): IF AI = 160 THEN PB = ST + 21: NEXT PB:
      GOTO 1390
1389 C$ = C$ +  CHR$ (AI): NEXT PB
1390  IF C$ = "" THEN  RUN : REM   IF BLANK LINE IS SELECTED
1391 C =  ASC (C$):L =  LEN (NA$): REM   NOW DECIDE WHAT TO D
     O
1392  IF C = 196 THEN  HOME :NA$ = NA$ + "/": FOR LL = 1 TO L
      + 2: PRINT " ";: NEXT LL: PRINT : INVERSE : PRINT " ";:
      PRINT NA$: NORMAL : PRINT D$;"CAT";NA$:CK$ = NA$: VTAB
     23: HTAB 8: PRINT "SELECT A BLANK TO RETURN": GOTO 1352
1393  IF C = 211 THEN 1420: REM   IF SYSTEM TYPE FILE IS SELE
     CTED
1394  IF C = 212 THEN 1420: REM   IF TEXT FILE IS SELECTED
1395  IF  RIGHT$ (C$,1) =  CHR$ (206) AND C = 194 THEN 1420
1396  IF  RIGHT$ (C$,1) =  CHR$ (211) AND C = 194 THEN  GOSUB
     2000: PRINT D$;"RUN";NA$:: END : REM    IF BASIC FILE IS
      SELECTED
1400 NA$ = CK$: VTAB I: HTAB E: PRINT "      ": GOTO 1352
1419  REM   SECOND CHANCE TO TURN BACK IF NOT BASIC
1420  GOSUB 2000: HOME : PRINT : VTAB 10: HTAB 10: PRINT NA$:
      PRINT "IS A ";C$;" TYPE OF FILE": PRINT : PRINT : HTAB
     10: INPUT "ARE YOU SURE YOU WANT IT?  (Y/N) ";YN$
1421  IF YN$ = "Y" OR YN$ = "y" THEN  PRINT D$;"-";NA$::: END
1422  PRINT  CHR$ (7): RUN
1999  REM   TURN MOUSE OFF!
2000  PRINT D$;"IN#0": PRINT D$;"PR#4": PRINT  CHR$ (0): PRINT
     D$;"PR#0": REM  TURN  THE  MOUSE  OFF!!!
2002  RETURN
```

End of listing.

Continued from p. 136.

To convert the //c version to 80 columns for the //e, make the following changes: If your 80-column card is in a slot other than 3, change the PR#3 and delete : PRINT "/RAM" in line 1310 (**Listing 6**). Some older 80-column cards don't accept HTAB commands above 40 very well, so change all HTAB statements above 40 to POKE 1403,xx (where xx stands for the HTAB below 40 you used in the listings). ■

Write to Travis Jones at P.O. Box 193, Hinckley, UT 84635.

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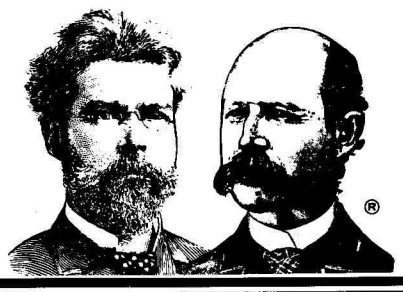

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```
COUNT WORD
----- ----------
10    A
1     ADDRESS
1     ADDRESSES
6     ALL
1     ALMOST
1     ALWAYS
```

```
1     WORK
1     WRITING
9     YOU
1     YOU'VE
8     YOUR
----------------
TOTAL WORDS: 402
CHARACTERS : 2013
CHARS/WORD : 5.0
```

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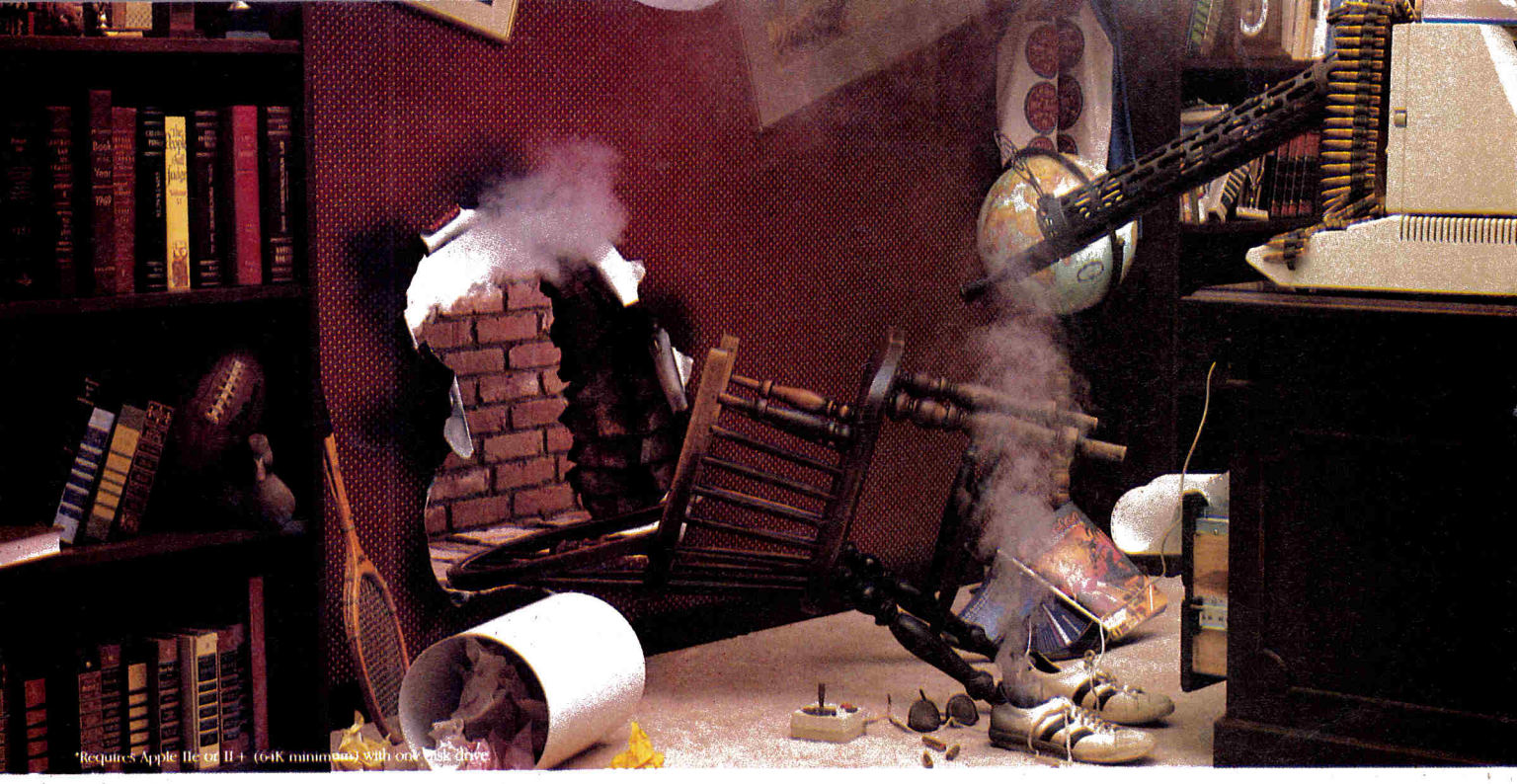

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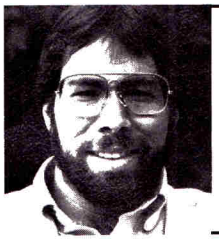

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The Phasor has *four times* the output power and *twice* the accuracy of any other sound card — but of course, you can easily turn down the volume if you need a rest. The Phasor is equipped with 12 simultaneous sound channels, 4 white noise generators, and a voice channel expandable to 2 voices. Programs written for other sound cards, including Mockingboard™, ALF music card™, Synphonix™ and the Super Music Synthesizer™, sound even better with the Phasor. And you can control speech, pitch, volume and more with simple commands.

The Phasor comes with its own easy-to-use software (ProDOS based), including 30 ready-to-run, non-copy protected songs and sound effects along with a Music Editor, Sound Effects Editor and Text to Speech program. And of course, it carries our no-hassle, five-year warranty.

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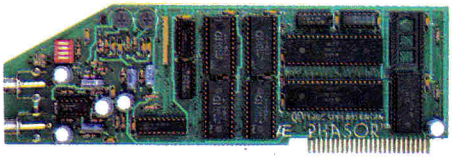

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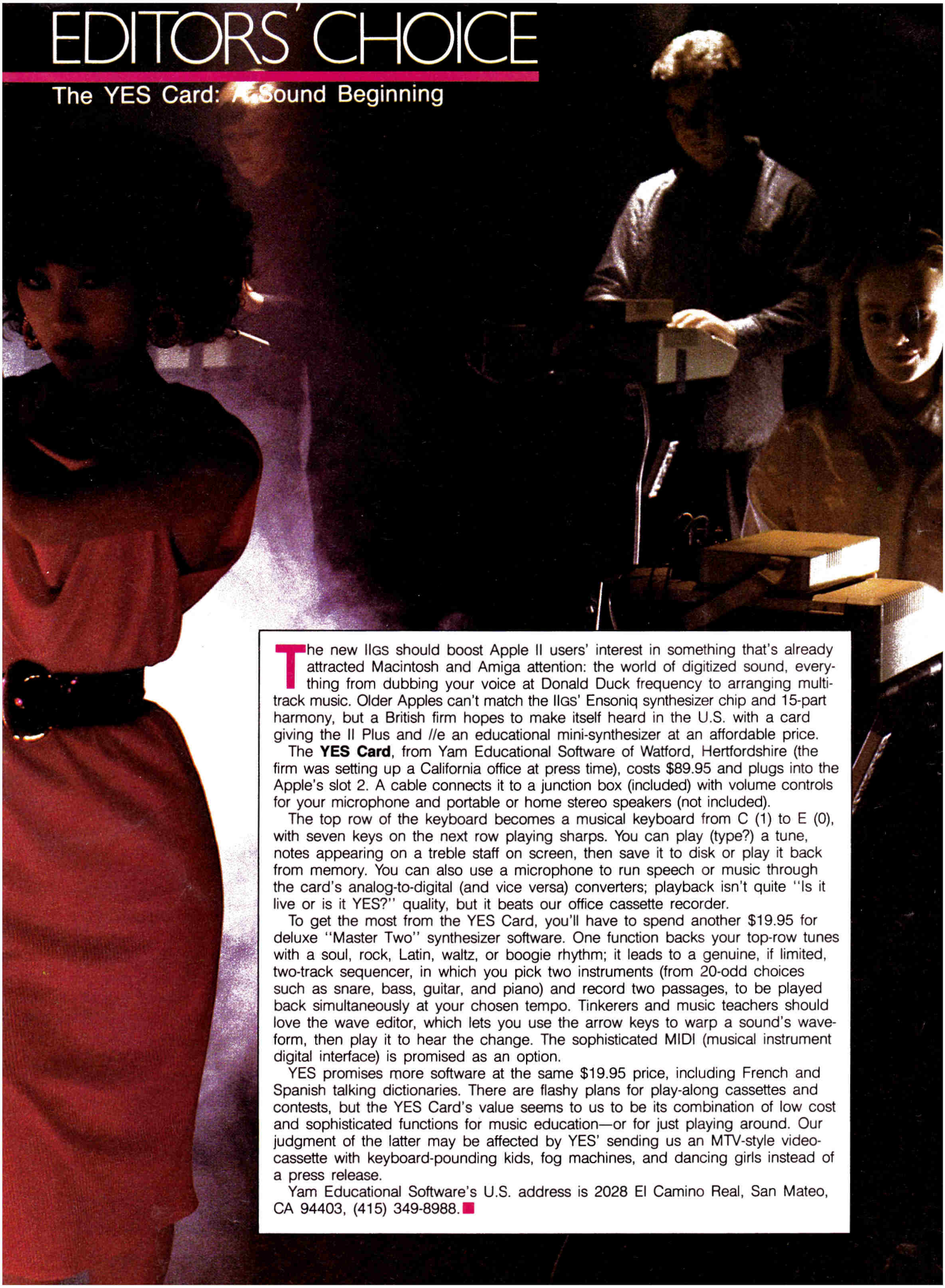
EDITORS' CHOICE

The YES Card: A Sound Beginning



The new IIGS should boost Apple II users' interest in something that's already attracted Macintosh and Amiga attention: the world of digitized sound, everything from dubbing your voice at Donald Duck frequency to arranging multitrack music. Older Apples can't match the IIGS' Ensoniq synthesizer chip and 15-part harmony, but a British firm hopes to make itself heard in the U.S. with a card giving the II Plus and //e an educational mini-synthesizer at an affordable price.

The **YES Card**, from Yam Educational Software of Watford, Hertfordshire (the firm was setting up a California office at press time), costs $89.95 and plugs into the Apple's slot 2. A cable connects it to a junction box (included) with volume controls for your microphone and portable or home stereo speakers (not included).

The top row of the keyboard becomes a musical keyboard from C (1) to E (0), with seven keys on the next row playing sharps. You can play (type?) a tune, notes appearing on a treble staff on screen, then save it to disk or play it back from memory. You can also use a microphone to run speech or music through the card's analog-to-digital (and vice versa) converters; playback isn't quite "Is it live or is it YES?" quality, but it beats our office cassette recorder.

To get the most from the YES Card, you'll have to spend another $19.95 for deluxe "Master Two" synthesizer software. One function backs your top-row tunes with a soul, rock, Latin, waltz, or boogie rhythm; it leads to a genuine, if limited, two-track sequencer, in which you pick two instruments (from 20-odd choices such as snare, bass, guitar, and piano) and record two passages, to be played back simultaneously at your chosen tempo. Tinkerers and music teachers should love the wave editor, which lets you use the arrow keys to warp a sound's waveform, then play it to hear the change. The sophisticated MIDI (musical instrument digital interface) is promised as an option.

YES promises more software at the same $19.95 price, including French and Spanish talking dictionaries. There are flashy plans for play-along cassettes and contests, but the YES Card's value seems to us to be its combination of low cost and sophisticated functions for music education—or for just playing around. Our judgment of the latter may be affected by YES' sending us an MTV-style videocassette with keyboard-pounding kids, fog machines, and dancing girls instead of a press release.

Yam Educational Software's U.S. address is 2028 El Camino Real, San Mateo, CA 94403, (415) 349-8988. ■

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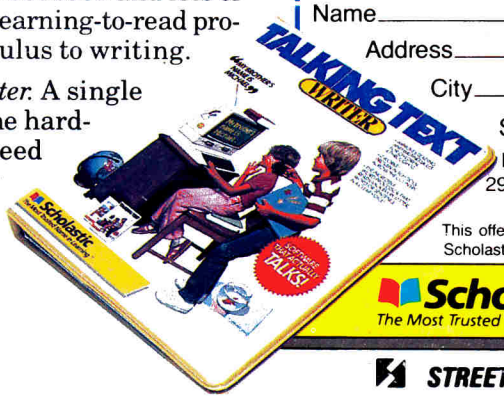

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