THE APPLE II MAGAZINE

USE APPLEWORKS:
Design a Database,
p. 94

inCider

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GRAPHICS!

- Dazzling on the IIGS
- Colorful on the IIe/IIc
- Brilliant on RGB Monitors
- Free GS Paint Program, p. 67



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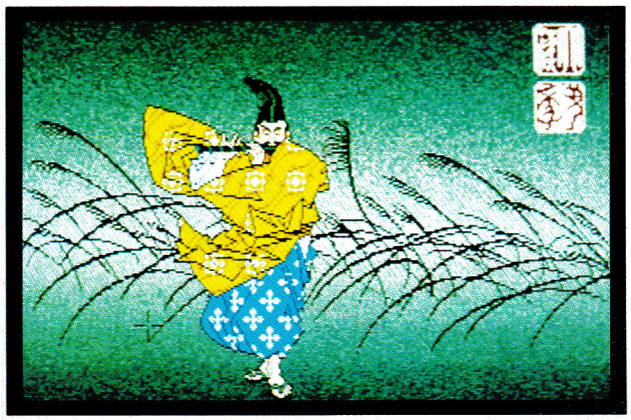
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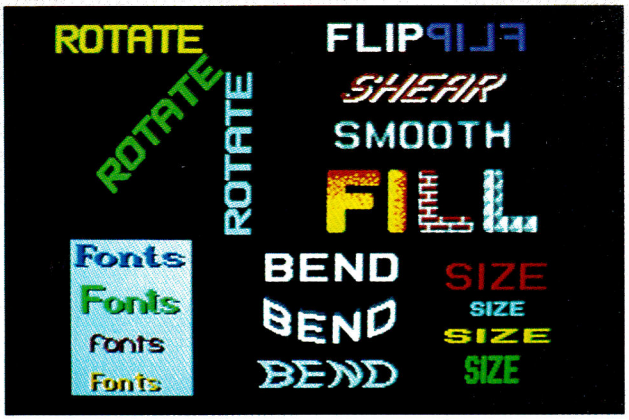
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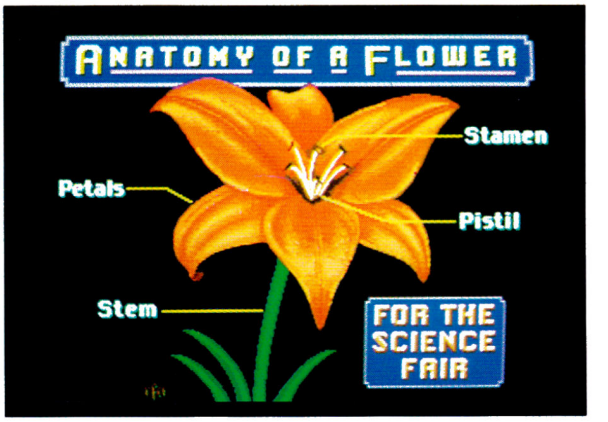
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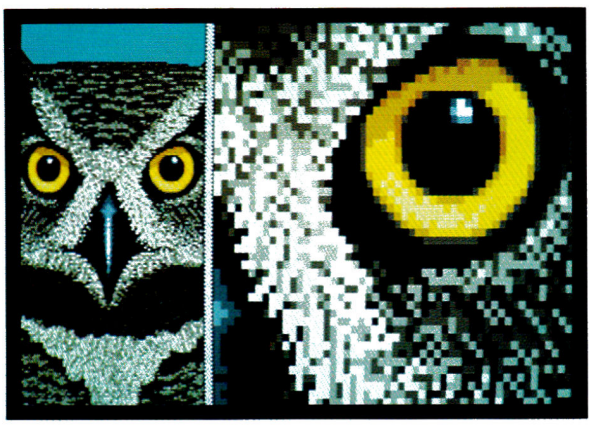
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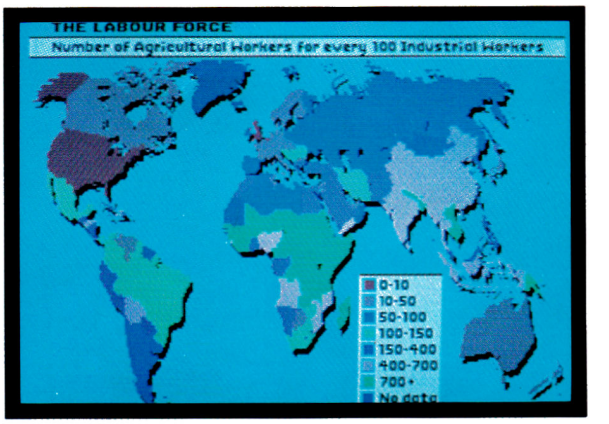
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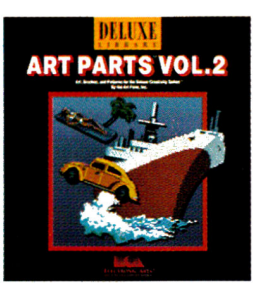
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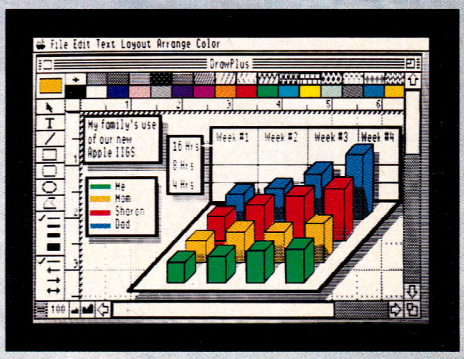


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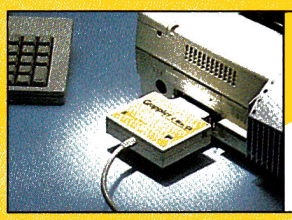
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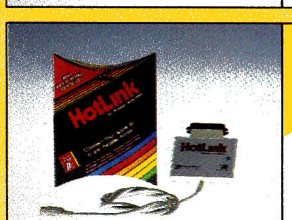
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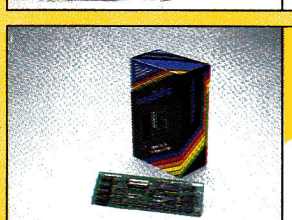


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inCider's BBS (bulletin-board system)
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inCider (ISSN #0740-0101) is published monthly by CW Communications/Peterborough, Inc., 80 Elm Street, Peterborough, NH 03458. Phone: (603) 924-9471. Second-class postage paid at Peterborough, NH, and additional mailing offices. (Canadian second class mail registration number 9590.) Subscription rates in U.S. are $24.97 for one year, $38.00 for two years and $53.00 for three years. In Canada, $47.97—Canadian funds, one year only. In Mexico, $29.97—one year only, U.S. funds drawn on a U.S. bank. Nationally distributed by International Circulation Distributors. Foreign subscriptions (surface mail), $44.97—one year only, U.S. funds drawn on a U.S. bank. Foreign subscriptions (air mail), please inquire. **Postmaster**: Send address changes to *inCider*, Subscription Services, P.O. Box 911, Farmingdale, NY 11737. (Send Canadian changes of address to: *inCider*, P.O. Box 1051, Fort Erie, Ontario L2A 5N8.)

Photo & Illustration Credits: *Cover, pp. 46, 47, 55, 63, 67, Roger Goode; p. 37, Stan Obcamp Photography; p. 72, Jamie Hogan; p. 77, Richard Cowdrey; p. 87, Imagebuilder Design; p. 144, Van Garmon—Comstock Photos.*

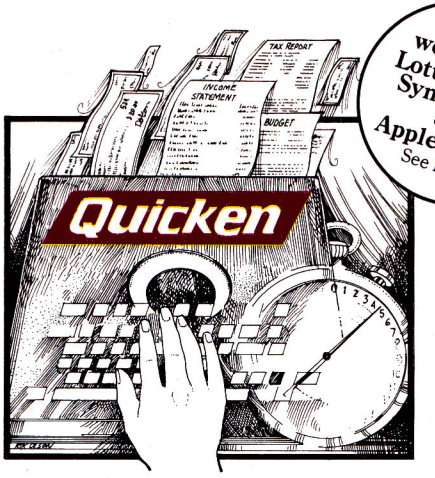
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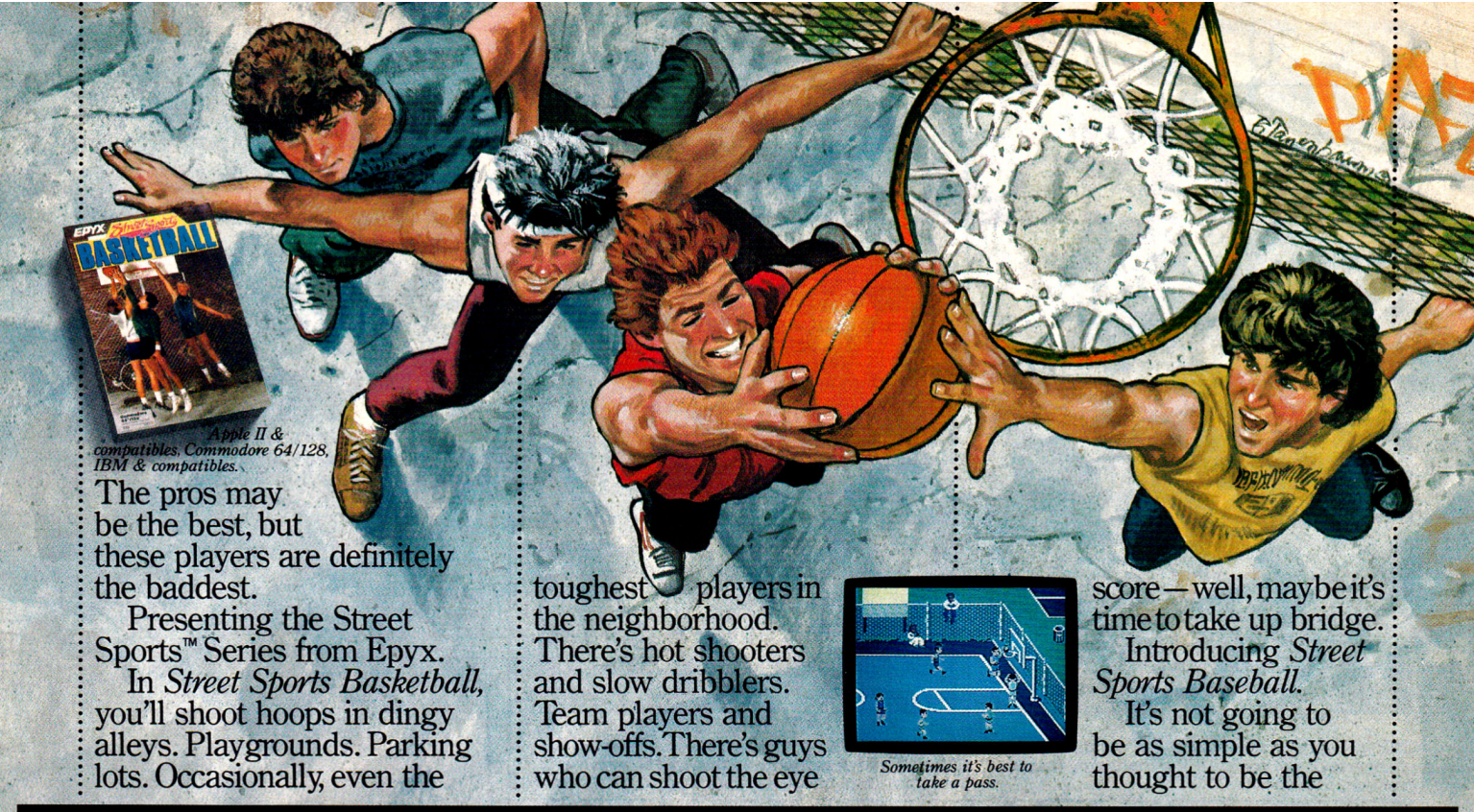
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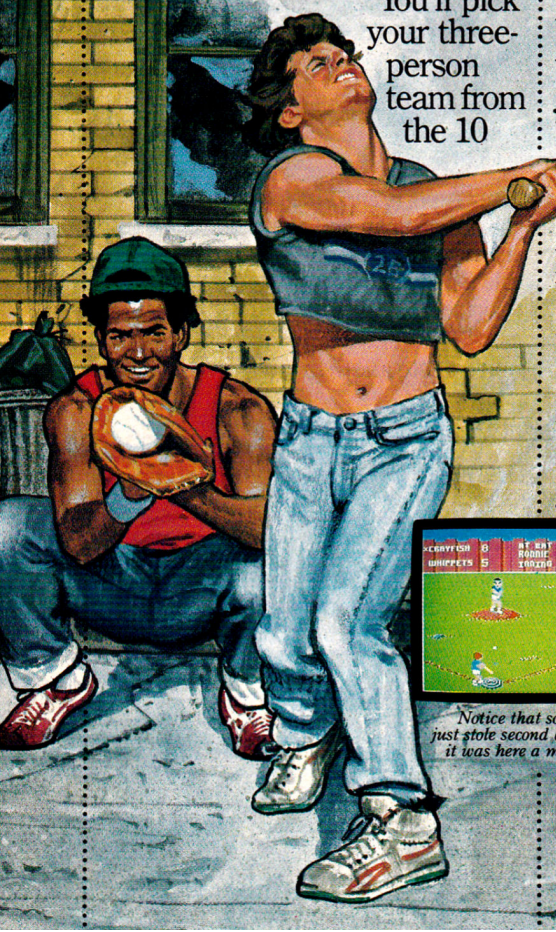
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Notice that somebody just stole second base. Funny, it was here a minute ago.

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Vol. 5 No. 10
October 1987



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55 IIe/IIc Graphics

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63 The Cadillac of Monitors

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67 BasicPaint

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72 Three Programs in Progress

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77 Gradebooks Revisited

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With a modem and communications software, you can earn college credits without leaving your home, through the Electronic University Network.

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Instant Music: Be-Bop-a-Lula

This month's cover was created by computer artist Roger Goode, using Electronic Arts' Deluxe Paint II on an Apple IIGS equipped with one megabyte of memory.

One Year Later, It's Not Love Yet

by Deborah de Peyster, Editor in Chief



"It's time to take a closer look at how well the GS has lived up to its promise."

One year ago this month, we introduced the Apple IIGS on the cover of *inCider* with the words "It's Amazing!" We've had our GS for about a year, and, after using it awhile, it's time to take a closer look at how well the machine has lived up to its promise.

After talking with many of you, reviewing solicited comments on the *inCider* BBS, and adding our own thoughts, we conclude that the GS has done fairly well. After tallying the points, it earns a grade of B. But the GS clearly hasn't lived up to all your expectations or ours—at least not yet.

"I do wish more software were available. That has been my biggest disappointment," says Jan Porter, responding to our questions on the BBS. Jan's complaint is only one of many about the lack of GS software.

The GS lost some points early on because software was slow to arrive. In the first seven months, only about half the announced 31 GS software programs were released. At the nine-month mark, however, products had begun to flow. The latest GS software list from Apple (July 1987) includes 43 programs and utilites designed for the GS. Now that's a fair number, and it includes some interesting programs, such as the Mac-like word processor Writer's Choice Elite from Activision, the powerful painting program Deluxe Paint II from Electronic Arts, and the desktop utility SoftSwitch from Roger Wagner Publishing.

And many of those new products were surprises, including Electronic Arts' Instant Music (see this month's Editors' Choice), the database Notes 'n' Files from DataPak Software, the macro program Diversi-Key from Diversified Software Research, and a number of great graphics-rich games, such as Activision's popular Shanghai. So in software, what would have been a grade of D or C has now become a B+. It could even be an A if a 16-bit BASIC were to be released. Says Ken Levetag of Salem, Oregon, "With no new 16-bit BASIC, all I can do is run packaged software."

Early on again the GS stumbled when manufacturing problems curtailed quantities and postponed Apple's own plans for a marketing promotion. Manufacturing has since evened out, and this summer Apple launched its marketing program to support the GS. That should help build the market, but we don't expect to see the push the Mac got, so even at best, marketing rates a B.

The need for additional memory to run GS software is a technical flaw, however, and adds to what we feel is an already pricey system. While the GS comes with what seems to be ample memory—256K—the new graphics and sound software eats it up quickly.

Most GS programs require a minimum of 512K. A complete new GS system, including RGB monitor, 3½-inch disk drive, and 5¼-inch disk drive, is priced at roughly $2000. But add some software, plus the extra memory you'll need to run that software (at about $250), and it gets more expensive. Interestingly, however, few readers have complained about price; they believe the Apple name and reputation for reliability (at least in the II family) justify top dollar.

"I've had my new IIGS for about two months. But I haven't looked at the Desktop yet," says Edward Flowers of Chicago. That's understandable; the Desktop's hard to find. Ironically, the mouse-driven, icon-rich interface was supposed to be the new Apple II ease-of-use standard. But to use it, you first have to start up the Program Launcher (which looks nothing like the Desktop and is itself a strange concept to owners of earlier Apples) and search for the Desktop icon. Why doesn't the new interface just appear, as on the Macintosh, ready to go when you turn on the system?

So is it amazing? Maybe not. Could it be? Yes. But to win our highest praise, Apple would have to issue a revised system disk. It would have to offer more support to third-party software and hardware developers to encourage more innovative applications, and it would have to offer better pricing.

As Dan Richardson from Teaneck, New Jersey, says, "Well, I still like my IIGS . . . not love yet, but it's decent." ■

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LETTERS

Out of Line

Several readers looked closely at the sample letter in my April column (AppleWorks in Action, p. 68) and found that the first lines of paragraphs don't quite line up. The problem lies strictly with AppleWorks. AppleWorks, unfortunately, doesn't produce perfect indentation with justification.

According to the AppleWorks manual (p. 243), "When you choose to justify text, AppleWorks inserts full spaces and fractions of spaces between words to make the right margin line up as neatly as the left one ordinarily does. . . . Do not use justification in passages in which you have indented some text. . . . The process of justification can leave your alignment a little uneven."

This means that justification causes words to shift in varying increments to produce an even right margin. On an indented line these shifts can invade the area of indentation. The extent of the incursion depends on the mix of characters in the indented line. Therefore, the first character in each indented line can start at a fractionally different distance from the left margin. Ergo, jagged indentation.

With the tricks our eyes sometimes play, many people wouldn't even notice the jags. Still, let's hope Apple corrects this problem in the next version of AppleWorks.

Ruth K. Witkin
5 Patricia Street
Plainview, NY 11803

Labeled

The office where I work uses half-inch-high labels on standard manila folders and audio cassettes. We had to type them manually because the AppleWorks database printer-options function doesn't accept a page length (label height) shorter than one inch. I solved this problem by transferring the database report to a word-processor file, then printing the labels from the word processor.

First, I set up a database report in label format containing two lines of data and one blank spacing line, a total of three lines. I set the printer options (Open apple-O) to the width of the labels (3.4 inches) with a narrow left margin (.2 inch). A setting of 12 characters per inch yields 38 characters per line. I set the paper length to the minimum one inch and the formatting options PH (print header), OL (omit line), and KS (keep number of lines the same) to No.

This setup, if sent to a printer from the database, yields two lines of data on a one-inch label. To switch to half-inch spacing, I printed the report to the clipboard to transfer to a word-processor file. This file (called short-label) is empty save for the following printer options:

```
CI = 12
PL = 11
TM = 0
BM = 0
LM = .2
```

When you transfer the data from the clipboard, the word processor formats them to print a new entry every three lines, spaced perfectly for half-inch labels. At the end of the file, I inserted the PH (pause here) printer option to stop the printer.

Bob Volin
330 Alpine Drive
Peekskill, NY 10566

Apple Support

I agree with your May editorial, "Too Good to Disappear" (*inCider*'s View, p. 8). The Apple II Plus with 48K was a business machine, the Apple IIe with 128K is a good business machine, and the GS with 256K will be an excellent business machine.

As you say, the only reason the Apple II hasn't reached its potential as a business machine is Apple's ostrich-like attitude toward its own creation. For six years my company has been producing and selling a very large business-software package for the Apple II; we're the second- or third-largest company in our market. Our competitors write exclusively for the IBM AT, and we compete on even terms.

But while our significant competition has all the power of IBM helping to promote its software, Apple has told us consistently that our system can't work. (Apple won't accept the argument that this system has worked for six years.)

We're not complaining—our company wouldn't exist without the Apple II. But it seems a pity that the huge potential of this machine has been allowed to trickle away into maze games.

David Allen, President
Harts Systems Ltd.
202-1035 West 13th Avenue
Vancouver, B.C.
Canada V6H 1N1

Library Reference

After reading "Educational Software: Who's Winning the Race?" (May 1987, p. 58), I thought your readers might be interested in information about one of the largest educational-software libraries—The Educational Software Preview Center (ESPC), part of the New York City Board of Education's Office of Technology.

The library maintains a collection of more than 10,000 titles for all major microcomputers used in New York City public schools. The collection expands by 200–400 titles per month. (We've added more than 2100 new programs since July 1986.)

Teachers, administrators, and other educators worldwide have come to our Center to preview and compare software, obtain advice, and borrow software for evaluation. A listing of our software is accessible by modem at (718) 935-4946. Anyone interested in visiting the ESPC can call (718) 935-4040.

Jeffrey L. Branzburg
Software Coordinator
New York City Board of Education
131 Livingston Street
Brooklyn, NY 11201

Broderbund Responds

I've just read Frank Naylor's letter in the July 1987 *inCider* (p. 10). I was disappointed to read about his troubles receiving an answer from our company.

Frankly, I could understand if one of his letters "fell through the cracks," but not three. Currently, our technical-support department requires a four-

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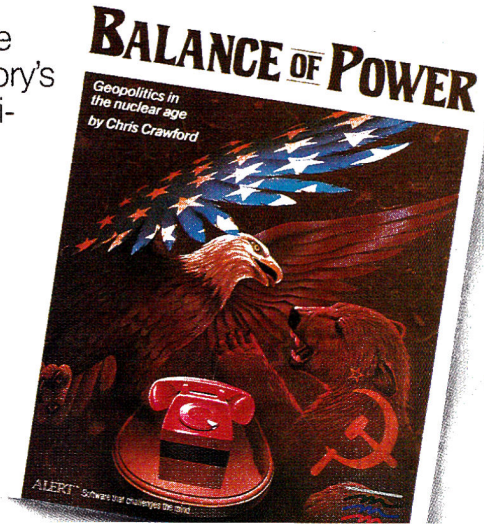
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day mail turnaround once we receive it. Not only should we have answered Mr. Naylor's letters, but he should have received a timely response.

Perhaps Mr. Naylor sent them to one of our old addresses. (It happens.) Sometimes people get confused and send Print Shop-related letters to Pixelite Computer Products, the program's developers.

To receive information concerning Broderbund and its products, you must address your inquiries to Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101, (415) 492-3500 (technical support) or (415) 492-3200 (corporate offices). If Mr. Naylor sends me copies of his letters, I'll investigate his problem and let him know the findings.

David A. Ross
Technical-Support Supervisor
Broderbund Software
17 Paul Drive
San Rafael, CA 94903-2101

Timely Advice

Your spreadsheet formulas for "Running with the Apple" (July 1987, p. 60) require the user to mentally convert minutes and seconds to minutes—a task the computer ought to do. By adding the following few lines to the spreadsheets, you can tell your Apple to calculate your pace. I've broken the formula into four parts to avoid calculation problems, and hidden the titles for the columns and partial calculations. In part, my spreadsheet looks like this:

	A	B	C	DEFG	H
1	DATE	DISTANCE	TIME		PACE
2					
3	4/1/86	3.9	22.3		5.46

Enter the following formulas:

Cell D3: (C3 – @INT(C3))/ . 6 + @INT(C3)
Cell E3: E3/B3
Cell F3: (F3 – @INT(F3))* . 6 + @INT(F3)
Cell G3: @ROUND(F3,2)

Use the decimal point where the colon usually goes to enter the time. For example, 22 minutes 13 seconds becomes 22.13. The formulas display your pace similarly.

Tom Addicks
Box 703
Housatonic, MA 01236

Checkmate Checkup

After reading "Pumping Up the IIe" (May 1987, p. 44), I must clarify one point. While you did mention Checkmate Technology as a supplier of RAM boards, you stated that only Applied Engineering offers a special partitioning program to divide RAM into a larger desktop for programs (such as AppleWorks) and a RAM disk.

Checkmate Technology was the first RAM-card manufacturer to provide memory partitioning with its software. Our software, which we've been shipping for more than a year and a half, makes it easy to patch and install partitioned memory, and maintains our RAM drive's integrity even when the user warm-boots a new program. The user can partition memory to create a RAM drive in which to store files, reboot and run a DOS program, then simply reboot the RAM-disk driver Checkmate provides and return to the original RAM disk without losing any files.

Don M. Ascoli, Sr., President
Checkmate Technology, Inc.
509 South Rockford Drive
Tempe, AZ 85281-3021

inCider *regrets the error.* —*eds.*

Mailing Labels: Power of Ten

Ruth Witkin's article, "Three-Across Mailing Labels" (AppleWorks in Action, June 1987, p. 65) was a welcome expansion on Judith Classen's earlier letter. Ms. Witkin failed, however, to caution the reader that printing three-across labels is impossible if a record contains more than ten categories. I couldn't print even two-across labels from my database with 14 categories per record. But I'll admit it works great with ten or fewer categories.

Henry R. Ninde
2906 Cedar Avenue
Durango, CO 81301

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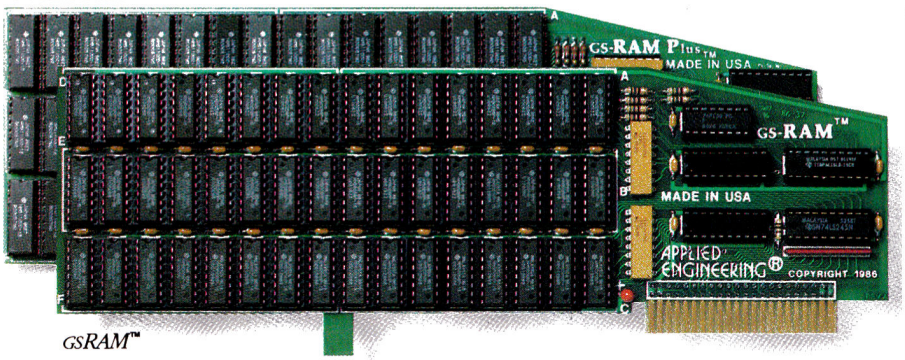
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GSRAM and GSRAM Plus are available now, allowing up to 8 MEG of memory expansion. That's 8 times the memory capacity of Apple's card and just look at the benefits that only GSRAM and GSRAM Plus have over Apple's card:

- Lower cost
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- Has memory expansion port
- Has ROM expansion port
- No configuration blocks to set
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- Expands AppleWorks internal limits
- Built-in Hi-Res self-diagnostic software
- 5 year hassle free warranty (Apple has a 90 day warranty)
- Made in USA

GSRAM for More AppleWorks Power

Only GSRAM and GSRAM Plus eliminate AppleWorks internal memory limits, increasing the maximum number of records available from 6,000 to over 25,000 and only GSRAM and GSRAM Plus increase the number of lines permitted in the word processing mode from 6,000 to over 15,000. And only GSRAM and GSRAM Plus offer a built-in printer buffer so you can continue using Appleworks while your printer is printing. GSRAM and GSRAM Plus even expand the number of lines in the clipboard from 255 to 2047 and will auto segment 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. GSRAM and GSRAM Plus will even display the time and date right on the AppleWorks screen. Nothing comes close to enhancing AppleWorks so much.

Turn Your IIGS into a Giant

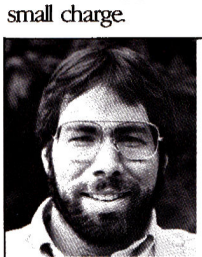
Simply plug GSRAM into the IIGS memory expansion slot and you've got up to *8 megabytes* of RAM at your fingertips—all of it instantly and automatically recognized by the IIGS. GSRAM is compatible with all IIGS software, including AppleWorks, as well as BASIC®, ProDos, DOS 3.3, PASCAL®, "C" and CP/M®.

Grow by Bytes or Megabytes

We offer GSRAM in two configurations so you can increase your memory 256K at a time (GSRAM) or a megabyte at a time (GSRAM Plus). Both offer full compatibility, lower cost than other boards, and easy expandability. And both are extremely low in power consumption. A fully expanded GSRAM operates at only 375 ma, and GSRAM Plus at only 270 ma (even with 6 megabytes on board!)

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GSRAM is available with 256K, 512K, 1 MEG or 1.5 MEG of memory already on board. If you don't need the full 1.5 MEG now, you can choose a GSRAM with less memory and expand it up to 1.5 MEG in the future—or upgrade to GSRAM Plus for a small charge.



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Steve Wozniak, the creator of Apple Computer

With an optional piggyback card, you can expand GSRAM even higher than 1.5 MEG! (Other cards are only expandable to 1 MEG.)

GSRAM Plus—for Growing by Leaps and Bounds

GSRAM Plus is the first Apple memory card to use 1 MEG RAM chips on the main board. It's available with 1 to 6 MEG on board. If you don't need the whole 6 MEG now, you can buy a GSRAM Plus with less memory and easily expand it in the future.

GSRAM Plus can be expanded up to 8 MEG with an optional piggyback card.

Easy Expansion

Both GSRAM and GSRAM Plus use standard RAM chips that are readily available and just plug right in. So unlike other cards, you'll find expanding your GSRAM or GSRAM Plus easy, convenient and very economical. And with our optional ROM expansion module you can even increase the IIGS's ROM space and all in just one slot.

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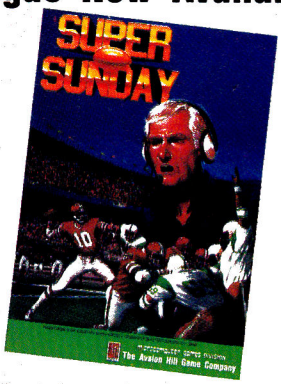
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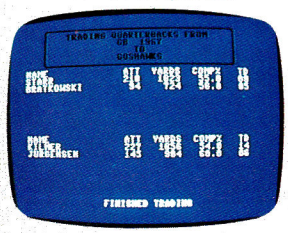
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LETTERS

Bug Control

Dan Bishop's article on debugging in Applesoft BASIC (Applesoft Adviser, June 1987, p. 72) neglected to mention one very powerful technique—using Control-C and CONT to stop and restart a running program.

While a program is running, hit Control-C to temporarily stop it so that you can examine or modify variables, or even drop into the monitor. Don't change any lines in your program at this time. When you're ready to continue execution, type CONT. This technique is particularly useful for interrupting a program that seems to have fallen asleep, but is more likely caught in an endless loop.

William K. Woo
P.O. Box 116
Harvard, MA 01451

Customer Service

I've written to four software companies since the beginning of this year and have yet to hear from any of them. In each situation, I'm a "registered owner" of the program.

The manuals for two of the programs list a toll-free telephone number for customer service, but neither number was in service when I called. Although one lists a toll number, all I got when I called was a busy signal.

When will software companies learn that it's not enough to publish a good program? If I pay $30 or $40 for a game program, I don't expect much except some fun playing it. But when I spend $80–$200 for a business program, I expect after-purchase support, and I don't think I'm getting it. Even if a company doesn't know the answers to my questions, a reply stating so would be useful.

The bottom line is this: Will I buy another program from a company that doesn't answer my request for customer service? Not if I can find a program that does what I want from some other company that will at least respond to my questions.

R.E. Sattler
1245 Grandview Road
Bartlesville, OK 74006

I'd like to acknowledge Roger Wagner Publishing, Inc., (El Cajon, CA) for its positive user-service attitude.

I had a technical question about its Merlin Pro program, and sent a letter along with my product-registration card on May 25th. The company's personal answer was postmarked May 29th. It explained the solution, which I implemented without an update disk or any other cumbersome method. Its user support is excellent and cost-free. This alone is worth the price of the program.

Thomas G. Gahl
9620 North 73rd Avenue
Peoria, AZ 85345

Boot It

I have some additions to the "Tricks, Tips, and Tidbits" sidebar (Mastering the IIGS, June 1987, p. 80) regarding booting to RAM disks (for ProDOS). Here's the technique I use:

1) Use /MYDISK with /PRODOS, /SYSTEM, /DESKTOP, and /DESKTOP.SYS16 from the IIGS SYSTEM.DISK, along with /AW2.SMW (AppleWorks 2.0 with Super Macro-Works) and /PTP (Point to Point). These occupy almost 800K of memory.

2) Boot /MYDISK and run the Desktop.

3) Format slot 5, drive 2 and name it RAM5. (/RAM5 will be slot 5, drive 1 after a warm boot because drive 1, in any slot, is the bootable drive.)

4) Copy /MYDISK to /RAM5 and remove /MYDISK from the drive.

5) All the Selector choices refer to /MYDISK as the volume name, so rename /RAM5 to /MYDISK.

6) Press Open apple-Control-Escape and choose the control panel. Using the Slots option, set the Startup slot to RAM Disk. Then press Return to save and press Escape, Return, Return to go back to the Desktop.

7) Now reboot using the Startup slot 5 option or warm boot with Open apple-Control-Reset.

With this method, you can fly among the Desktop, AppleWorks, and Point to Point. You can use the Start-up slot 6 option on the Desktop to boot programs such as Quicken or Back to Basics from slot 6, drive 1. When you're finished, you can return to the Launcher instantly with a warm boot. You can start slot 5, drive 2 or slot 2, drive 1 with the Desktop

pointer or the Launcher. Note that some heavily copy-protected 3½-inch-disk programs may not start up properly; you may also lose your RAM disk.

Since the Selector choices refer to /MYDISK as the volume name, you can use them from either the 3½-inch drive or the RAM disk. If you're going to use the computer for a long period, use the method above to load /MYDISK to RAM; otherwise just run /MYDISK from the 3½-inch drive.

Jim Rietz
6150 Chase Avenue
Downers Grove, IL 60516

The Works Work

Paul Statt's comments about AppleWorks (Stattus Report, April 1987, p. 18) miss the big point because he's hooked on power—so of course AppleWorks sags and dies for the power user. But for the many folks who buy an Apple to use once a day for an hour, or once or twice a week for two hours, AppleWorks is darned close to perfect because, *in this context*, AppleWorks *is* powerful.

AppleWorks is also probably the easiest, fastest, least-intimidating multipurpose program you can just plug in and use—a big plus for occasional home users, of whom there are many.

Apple Computer, like any fast-growing, large corporation, made its share of mistakes. But AppleWorks surely wasn't one of them. The power user wasn't Apple's target—the home-computer user was. Apple hit the bull's-eye with AppleWorks.

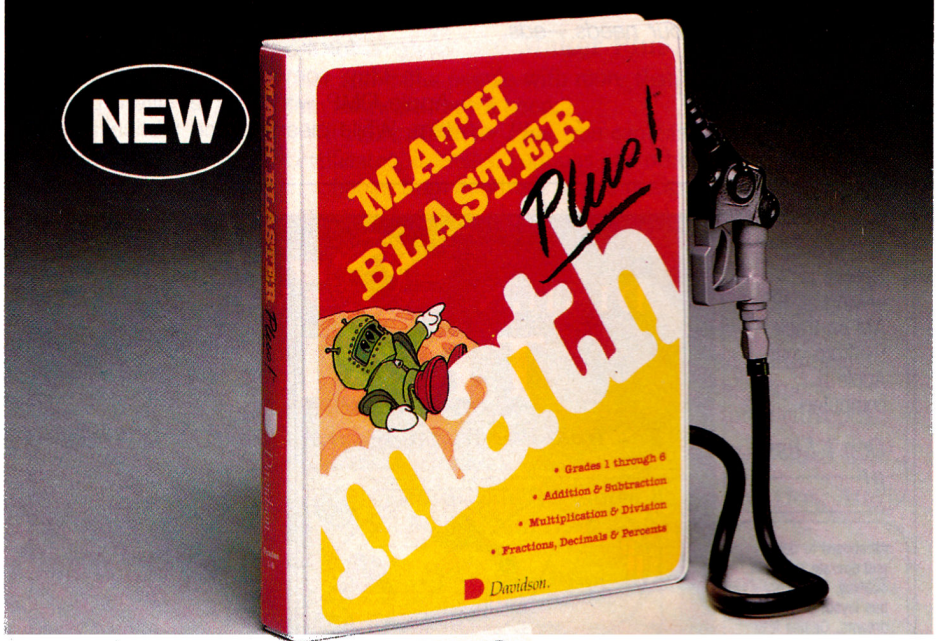
Gerald E. Myers
P.O. Box 284
Redway, CA 95560

Mouse Drawn

I'm looking for a graphics program that will let me create title slides on a color monitor with my mouse-driven Apple IIc. The slides will contain primarily lists and other text that will be photographed to produce 35mm transparencies. I need to be able to switch the color of the background, change the color and type of letters, and use high-resolution text.

R.M. Pohjola
4377-L White Street
Fort Wainwright, AK 99703

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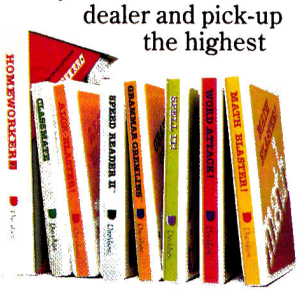
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Two programs, Dazzle Draw from Broderbund Software (P.O. Box 12947, San Rafael, CA 94903, 415-492-3200, $59.95) and Blazing Paddles from Baudville (1001 Medical Park Drive S.E., Suite 201, Grand Rapids, MI 49506, 616-957-3036 $34.95), should suit your needs.—eds.

What a Catch

Since this is a bit unusual, I thought you'd like to know what we found in an Apple Dot-Matrix Printer.

In the last two quarters of our Electronic Technology course, we do limited repairs on Apple computer systems for the local school district.

In May, someone brought in an Apple DMP with an intermittent problem. While cleaning and lubricating this printer, I found the usual dust and bits of paper. Next to the carrier motor I also found a one-inch-long angelfish. After I removed the dead fish, the printer worked fine and hasn't been returned for further repair.

Hershel D. Standard, Instructor
Electronics Technology Department
Houston Vocational Center
1311 Corder Road
Warner Robins, GA 31088

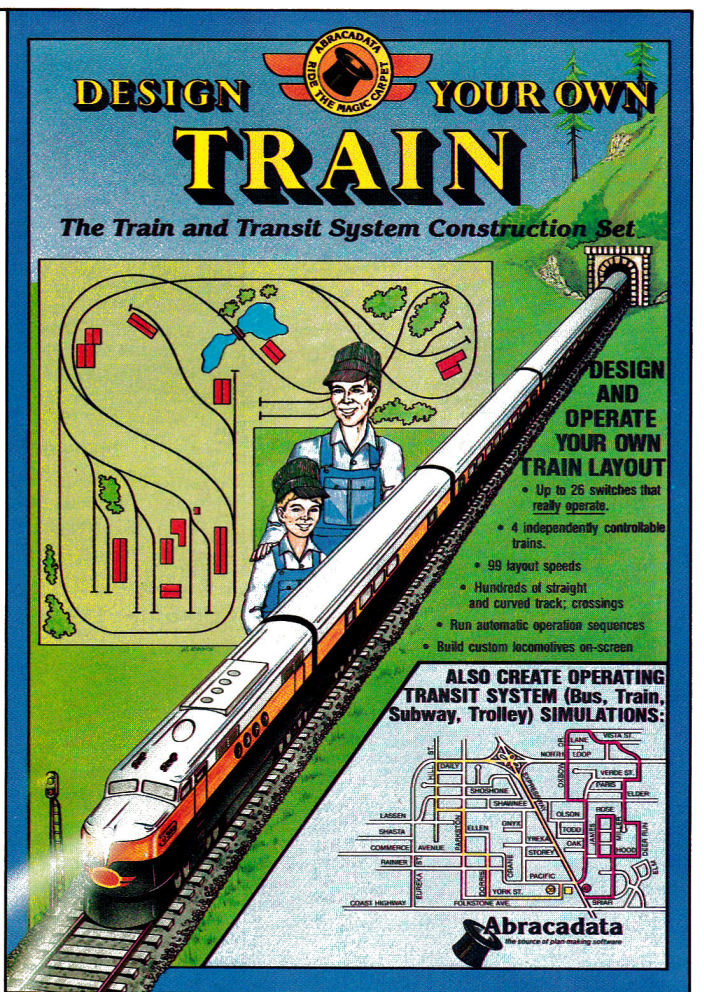
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Central Point Update

In response to recent letters (August 1987, p. 10) concerning Central Point Software's repair program, we'd like to reiterate the company's revised policy as of April 1987. According to President Mike Brown, Central Point has lowered its Laser 128 repair prices and will install a new motherboard for $110 with trade-in. (See New Products, August 1987, p. 94.)

DATA STRIPS

Because of limited space, we can't always include data strips with every program we print. If you have reader hardware, write us at *inCider*'s editorial offices (80 Elm Street, Peterborough, NH 03458) to request your free copy of these strips. Please enclose a self-addressed, stamped envelope.

CORRECTION

In our August issue, the photo at the bottom of p. 97 (Mace on Games) is a screen shot from Origin Systems' Ultima IV, not Electronic Arts' Bard's Tale II, as indicated in the caption.

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.*

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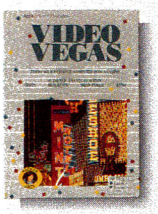


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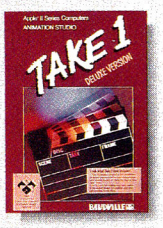
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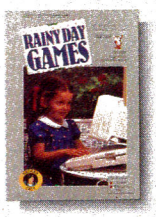
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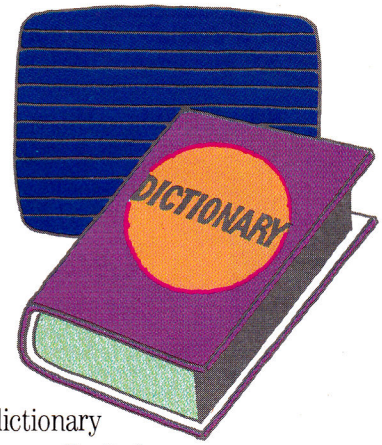
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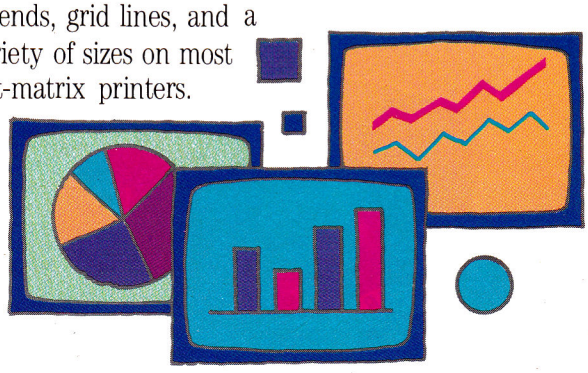
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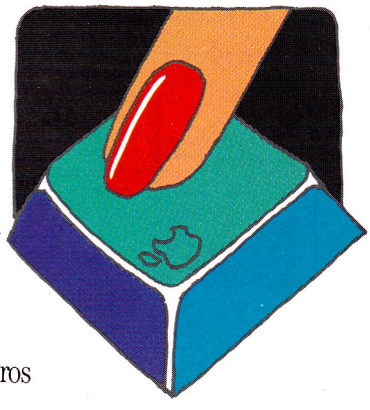
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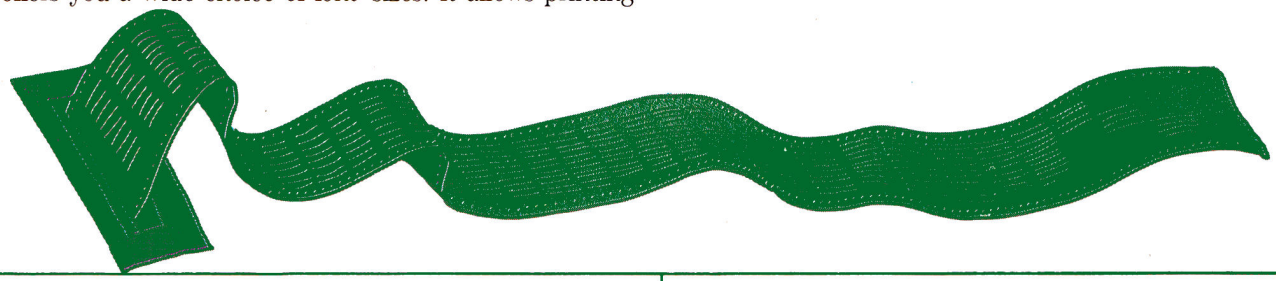
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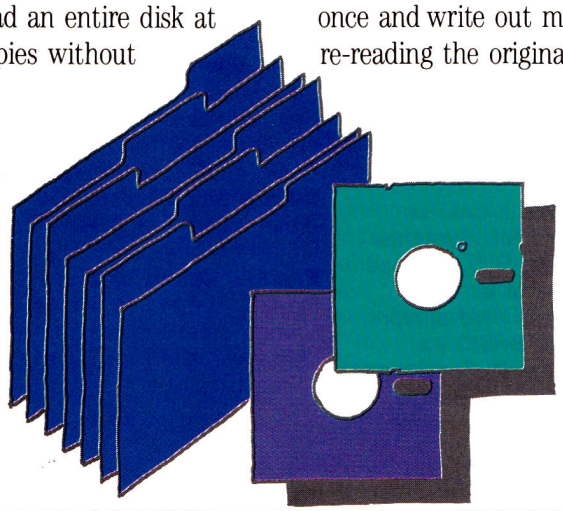
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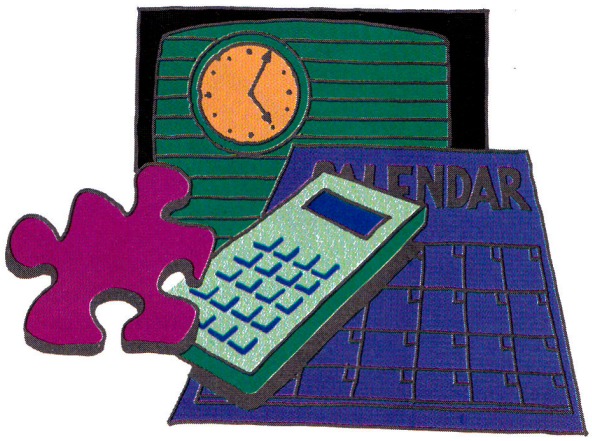
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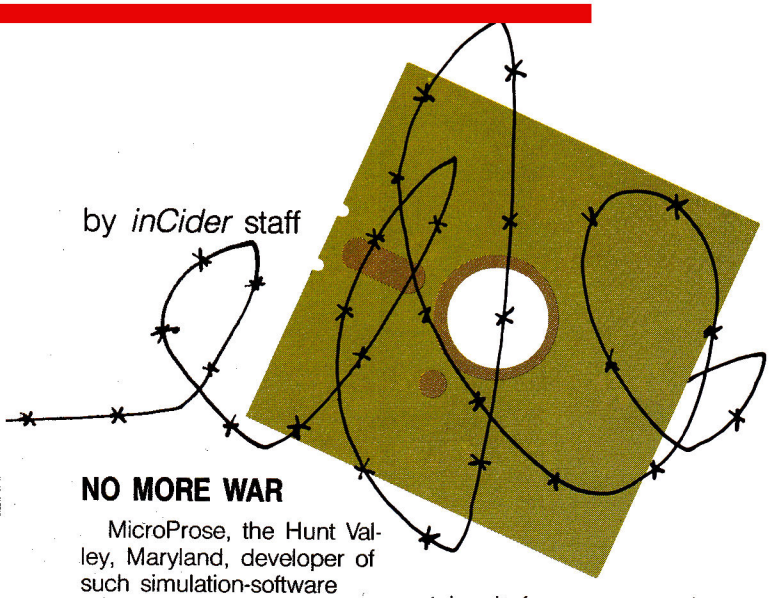
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NEWS LINE

by *inCider* staff



NO MORE WAR

MicroProse, the Hunt Valley, Maryland, developer of such simulation-software packages as F-15 Strike Eagle and Silent Service, is facing challenges on two continents, but President William "Wild Bill" Stealy says he isn't worried.

At home, MicroProse will soon change its name, as a result of a suit brought by MicroPro International of San Rafael, California, developer of WordStar and other productivity software. According to MicroPro, the names are simply too similar, and the California firm says it came first. The two companies settled the suit out of court.

In Europe, MicroProse faces a tougher challenge from the West German Senator (Minister) for Youth and Family. It seems that the Germans, ever sensitive to creeping militarism in postwar Deutschland, would like to ban many battle simulations from sale.

Three MicroProse titles—Silent Service, Gunship, and F-15 Strike Eagle—appear on a list of 39 forbidden games compiled by the National Evaluation Board for Work Liable to Corrupt the Young. According to Mike Harrison, a spokesman for MicroProse, the presence of his company's products on that list reflects the ease with which "militaristic" games can be banned: "It seems that all it takes is for one person to complain."

At press time, a hearing had been scheduled for September. Harrison would like to see this one settled out of court, too. "We agree with the intent of the law—our games are targeted at adults," he notes. "Some precocious kids certainly play them, but we wouldn't object to a ruling requiring that war games be sold only to adults."

Harrison adds that although MicroProse has heard "isolated complaints" in the U.S. about its war simulations, no action has been taken to ban their sale here. **—P.S.**

UPGRADE UPDATE

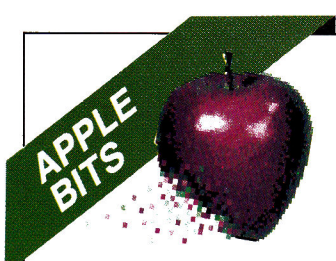
Since January you've had the option of bringing your Apple IIe to your local dealer for conversion to a GS. Sound like a good deal?

Not according to our survey of Apple dealers—people don't seem to be too interested. John Ennis, of the Microcomputer Center in Belair, Maryland, says he's sold "about eight or ten" upgrades since last winter—most of them shortly after they became available. No one who's upgraded, however, has gone on to purchase a GS analog RGB monitor, Ennis says; they've "stuck with their composite monitors."

Instead of buying the GS upgrade, most people sell their old IIes and get complete GS systems, or buy GSs and keep their IIes as second computers, dealers say. Naren Nehta, sales manager for the Professional Computer Center in Philadelphia, Pennsylvania, reports that many people shun the GS offer because "by the time they upgrade and get all the other products—the mouse, UniDisk 3.5, and RGB monitor—they find it's worth it to get a new IIGS."

Taking the upgrade path is expensive. Most dealers will upgrade your IIe for $495 or $499. Then you'll want a UniDisk 3½-inch disk drive (for another $399), the RGB monitor ($499), and the IIGS mouse ($99) to make your "almost IIGS" complete—for a total of about $1495. A new GS with 3½-inch drive, 5¼-inch drive, and RGB monitor is roughly $2000.

But for some Apple IIe owners who have invested a lot in add-in boards, the upgrade can be a good deal, Ennis says. "There's no requirement to turn in an 80-column card or other boards to qualify for the upgrade," he adds. All you need is a bare-bones, working IIe motherboard. The upgraded machine will run software faster and have extra memory and 80 columns built in—basically the IIGS in a IIe case, lacking the numeric keypad. **—L.L.**



■We hear that **Broderbund Software** (San Rafael, CA) is aggressively promoting its affiliated-label program with some of the smaller software companies that had been associated originally with **Electronic Arts** (San Mateo, CA). Look for a major game developer to jump ship soon.

■Rumor has it that Tom Leonard of **TML Systems** (Jacksonville, FL), developer of TML Pascal for the Apple IIGS, is hard at work on a **16-bit BASIC** for Apple's latest II. Come on, Tom: We thought Beagle Bros was trying to corner that market.

■**Bill Basham**'s busy. After knocking out Diversi-Key, a macro program for the Apple IIGS, and Diversi-Hack, a GS monitor utility that's a programmer's dream come true, Basham turned his attention to the **Ensoniq sound chip** in the GS. "What I've written sounds great," raves Bill. "My baby daughter listens all the time."

IMAGEWRITER III

"Sure it's neat that it's the only 27-pin dot-matrix printer, but what makes the ImageWriter LQ really special is its paper handling," boasts Omar Kalifa, Apple's product manager for the newest, most-expensive (expected to cost $1200–$1300), highest-quality member of the ImageWriter family.

Part of the news is the superior quality of the product: The LQ prints at 216 dots per square inch in letter-quality mode. The old ImageWriter struggled through with 144; Apple's high-priced LaserWriter offers 300 dots per square inch. (By comparison, *inCider* is printed at 900 dots per square inch.) The LQ sports a unique 27-pin printhead: an approximate square consisting of three rectangular sets of nine pins apiece, each set three pins high and three wide.

But, as Kalifa notes, the big news is the LQ's paper handling. You can add three separate cut-sheet feeders—at additional cost—to the LQ. One bin is designed especially for envelopes, while the other two, according to Kalifa, take care of letterhead stationery and plain pages. "Obviously we're trying to reach the small-business market," Kalifa says, "the company that wants one printer to meet a breadth of needs."

AppleTalk, Apple's fabled local-area network for Macintosh, Apple II, and even IBM micros, is built into the ImageWriter LQ. AppleTalk should make the model appealing to small businesses that want to share one printer among several computers. Printer drivers supporting all standard IIGS fonts will be built in as well, as soon as Apple makes final decisions about them.

"Nobody bought the 32-kilobyte printer-buffer option on the ImageWriter II," Kalifa recalls, so at press time Apple was "considering a print-buffer option" larger than the 5K standard on the ImageWriter LQ. That option doesn't look likely, however.

Like the ImageWriter II, the LQ can print in color with an optional color ribbon and runs at a quiet 55 decibels—somewhere between the rustling of autumn leaves (30 db) and the noise of a busy street (70 db).

The ImageWriter LQ won't replace the ImageWriter II, but it will offer businesspeople a choice if they can't afford several printers: The LQ is cheaper than three ImageWriter IIs.

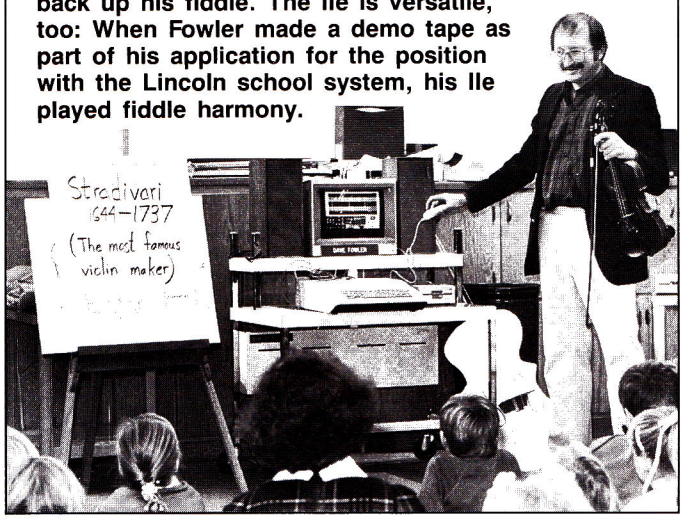
—P.S.

"The advantage of the computer is its patience and its accuracy. You can experiment with it, and it won't argue with you."

SPOTLIGHT ON. . . .

FIDDLING PARTNER

While artist-in-residence Dave Fowler demonstrates classical violin and country-style fiddling to elementary-school classes in Lincoln, Nebraska, his Apple IIe with Mockingboard music synthesizer plays a piano accompaniment. Running Music Construction Set on his IIe, Fowler shows his classes how the notes of a scale generate different pitches, and how he uses the synthesized piano to back up his fiddle. The IIe is versatile, too: When Fowler made a demo tape as part of his application for the position with the Lincoln school system, his IIe played fiddle harmony.



■Are you ready for an **AppleWorks expert system**? A **doctor on a disk** that asks you a series of questions and figures out whether you have a cold or the flu? All in an AppleWorks database file? Believe it. For more information, call **Petit Design** in Milwaukee, Wisconsin: (414) 483-9056.

■Broderbund is releasing a IIGS version of its popular **Fantavision** animation program. It not only looks like a million bucks in GS super-hi-res color, it sounds like a billion.

■Despite considerable consumer demand, Nick Romano, of Nikron Technical Products (Shirley, MA), says the company won't be publishing a GS version of his popular **Master Diagnostic** disk.

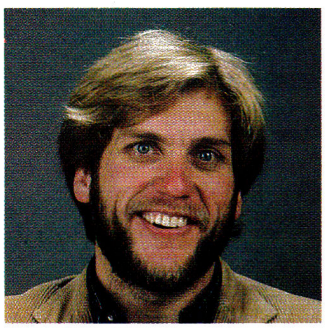
VIDEO-CHIP UPDATE

If you bought a GS before March 1987 and returned your warranty card to Apple, you should have received a postcard explaining the company's official video-graphics-chip and ROM-chip replacement program. It's designed to fix problems encountered in double-hi-res mode and provide GS owners with the most recent improvements in ROM technology.

Your dealer will provide the chip swap free of charge (whether or not you've returned your warranty card). The offer will continue until the end of the year, Apple says. **—D.deP.**

There Oughta Be a Law

by Paul Statt, Technical Editor



"It's not the first time a software ad has promised the impossible."

Laws are great. For instance, the law says I can't take $24.95 from your pocket unless you ask me to: That's theft. Another kind of law states that if I throw a six-sided die, chances are one in six that a 4 will come up: That's the law of probability. Mathematical laws such as the law of probability and civil laws that prohibit stealing don't have much more in common than a name—but you'll get caught if you try to break either kind.

You can calculate the probability of rolling a 4, winning the lottery, or marrying a millionaire in either of two ways. The first method, which appeals to mathematical types like me, is to figure the number of possible outcomes of the event, figure the number of "successful" outcomes, and divide the second number by the first. For instance, you can throw any of six different numbers when you toss a single die. So the probability of throwing any single number—say, 4—is 1/6.

Or you can try an experiment to discover a fraction representing the probability of an event: Throw that die a few hundred times and see what comes up. Count the number of 4s, divide by the number of throws, reduce the fraction, and you'll arrive at a figure around 1/6.

The probability of throwing a 4 remains as much 1/6 on the 200th toss as it did on the first. This statistical fact often escapes the gambler. He invokes a mysterious "law of averages"—after failing to roll a 4 in ten attempts. "Four's due," proclaims the gambler, kissing the die in compliance with some other mysterious law.

Four is not due. On each throw, the probability of throwing a 4 is 1/6. What happened on the last ten throws doesn't matter; the events are independent.

Evidently, a lot of *inCider* readers believe in the "gambler's fallacy." Thousands of you saw an ad for The Lotto Program in *inCider* and requested information from Soft-Byte Software of Dayton, Ohio.

The Lotto Program, like all lottery software, keeps track of the winning lottery numbers of the past several weeks. Lottery software may want to "use the power of the Apple computer to project winning numbers," but that's not the first time a software ad has promised the impossible.

The Lotto Program creates an impressive array of reports: a frequency chart, lists of numbers with two or three consecutive appearances, numbers with no shows in six, nine, or 12 weeks, and so on. In short, 28 hasn't won for 28 weeks.

Who cares? The implication is that "28's due." A real gambler knows that if 28 hasn't come up in 28 weeks, his chances of winning with 28 are still 1/36 (or worse, depending on how many numbers you pick from). Your chances of winning the lottery—picking six winning numbers—remain one in a billion, literally.

Another lottery program, from f/22 Press, offers its customers a discount if they agree to pay back 1 percent of their winnings over $100,000. Why doesn't f/22 keep the program and 100 percent of all the winnings? If I knew a magic formula for making money, I wouldn't bother converting my secret to software and selling it in *inCider*—I'd have my hands full counting my cash.

No law says f/22 and Soft-Byte can't take your money for selling software that claims to break the laws of probability—Shirley MacLaine writes books that claim she can break the law of gravity, and nobody arrests her. No law but the law of human nature forces fools to believe in miracles. Nobody can stop you from throwing away a dollar a week in the lottery, but do you want to toss another 25 bucks for worthless software after it?■

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THIS IS NOT REPEAT NOT A DRILL STOP
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BEST LUCK STOP

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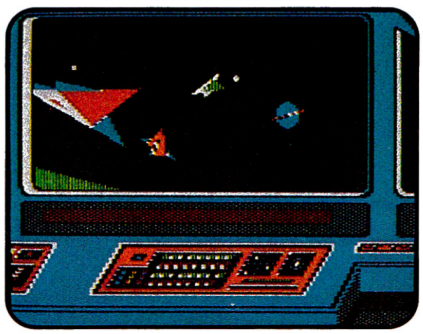
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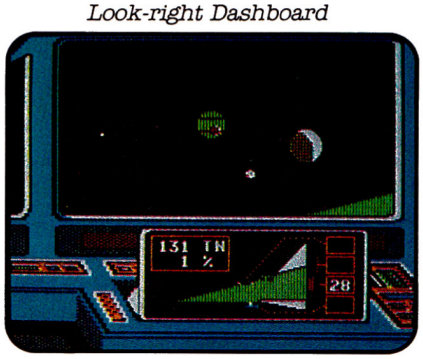
Look-left Dashboard

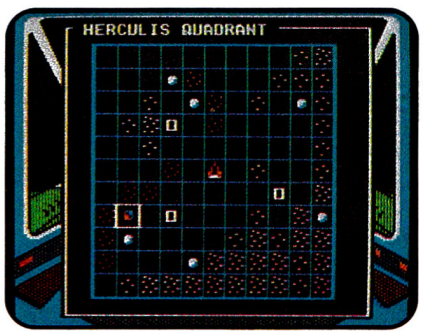


Forward Dashboard

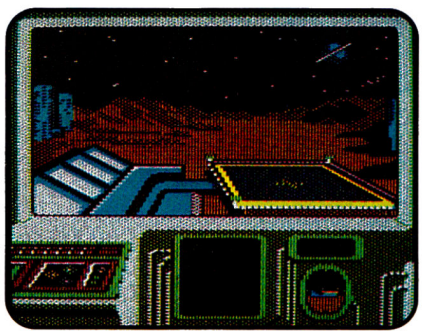


Look-right Dashboard





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APPLE CLINIC

by Paul Statt, Technical Editor

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.*

Expanding the IIc

Can you expand an Apple IIc by replacing the 64-kilobit RAMs on the motherboard with the new 256-kilobit RAMs?

Ross Fear
Baulkham Hills
New South Wales, Australia

You can remove the 64-kilobit chips and plug in 256-kilobit chips, and your IIc will run just fine—but no, its performance won't improve. The IIc's system software, like the IIe's, looks for 64K of RAM. (The eight 64-kilobit chips in your IIc add up to 64 kilobytes—64K—of RAM.) Software for 128K machines looks for two separate banks of 64K each.

Programs that use extra memory beyond 128K don't look for it on the motherboard; they try to find it in the auxiliary slot or a peripheral slot. Even if you put eight times the memory on your motherboard, your IIc won't see it. See "Go Beyond the IIc's Limits," September 1987, p. 51, for more information and suggestions on getting more power from your IIc.

Different Disks

Is there a major difference in quality among blank disks? I want to make sure my data disks are safe, yet prices for single-sided disks range from 27 cents to $2 each, and I tend to buy the less expensive. So far, I haven't noticed any difference in quality, but eventually there might be.

Eric Hollowell
San Clemente, CA

You hit the disk on the head, Eric: Someday the cheap disks will fail, probably a day or two before the high-priced disks.

For my money, the difference between a cheap disk and an expensive one is its name, but that's not what the folks at Maxell or BASF will tell you. "Testing" is the difference, they say, and they're probably right—in other words, fewer failures.

A disk should last about 1000 hours. That's several days of drive spinning; my data disks are in the archives long before they're in danger of failing.

My advice: Buy the best disks you can afford, but don't try to use the cheaper ones as long or as often as the expensive ones. And if you want your disks to last for years, take care of your drives. Have them calibrated periodically. Most "disk failures" are actually the fault of a disk drive that's slowing down with age.

Hold the RAM

I have a problem with AppleWorks and my Applied Engineering RAMWorks and RAMFactor memory-expansion boards. The AppleWorks Expansion Software that comes with both products forces a choice between an AppleWorks desktop that expands to take up all the unused RAM, or a completely unexpanded 55K desktop. The first choice means I can't use a quick RAM disk for temporary storage and rapid retrieval of data files; the second means that AppleWorks has to "go to the disk" for every little operation.

Does anyone sell an AppleWorks expansion program that lets you choose the size of the desktop?

Richard Stauts
Morgan City, LA

Applied Engineering sells the software you need, but you already have it.

The trick's in two parts: programs called Partition and ProDrive. Look for Partition and ProDrive.System on your Applied Engineering AppleWorks Expansion Software (/AE.EXP/PARTITION and /AE.EXP/PRODRIVE.SYSTEM).

You need to do two things. Both are simple tasks, but Applied doesn't explain either very simply.

The Partition program will separate the RAM available on your Apple's memory-expansion card into two parts—one for AppleWorks, another for something else.

The part of RAM that isn't AppleWorks doesn't mean anything to the disk-operating system (ProDOS). To make AppleWorks recognize your extra RAM as a RAM disk, you must format the RAM. That's what ProDrive does.

You install Partition once, on your AppleWorks disk. For some reason, Partition isn't a menu option on the Applied Engineering Expansion Software disk: You have to leave the menu for BASIC and RUN PARTITION. I don't know why Applied makes it so hard.

The Partition software itself is easy: Use the arrow keys to change the amount of memory you allocate to AppleWorks, then type in the pathname of the AppleWorks system file—usually /APPLEWORKS/APLWORKS.SYSTEM—and put that file into the drive. AppleWorks is permanently partitioned.

If that's confusing, there's another option. A program called RAMUP, from Quality Computers (1365 Berkshire Road, Grosse Pointe, MI 48230, 313-885-4270, $39.95), does all this automatically. It lets you keep more than one program in RAM at a time, but you could certainly use it to keep AppleWorks and a RAM disk.

Bold News

I had the same problem with The Newsroom that Paula Heilig (August 1987, p. 22) had—but I discovered it's not only possible to print The Newsroom in boldface, it's quite simple.

The Newsroom doesn't cancel a boldface command sent to the printer. You can either type in the command from BASIC or send it via a simple program you run before booting The Newsroom. As long as you leave the printer on, it will produce all Newsroom fonts and graphics in boldface.

William Fox
Manchester, NH

Thanks for the tip. I was assuming that The Newsroom, like many word-processing programs, sends its own printer codes to the printer when you boot it, changing or canceling any commands you might have sent that way.

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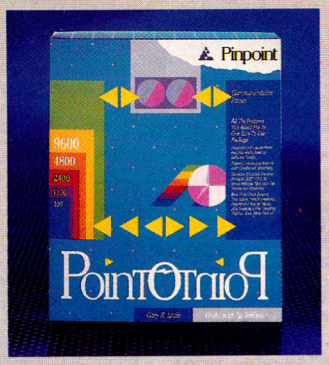
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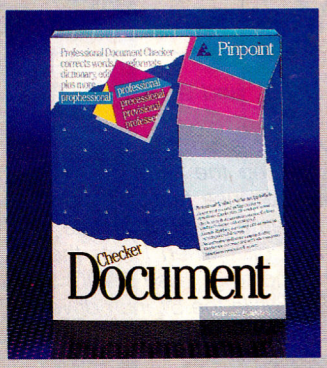
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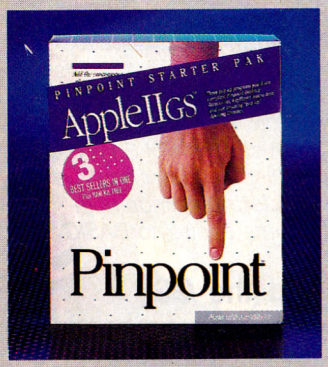
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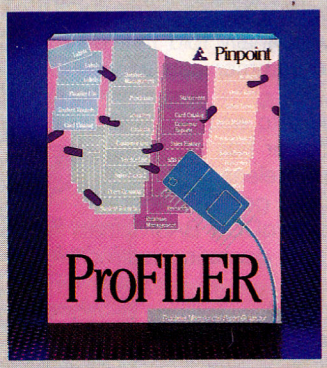


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by Paul Statt, Technical Editor

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Expanding the IIc

Can you expand an Apple IIc by replacing the 64-kilobit RAMs on the motherboard with the new 256-kilobit RAMs?

Ross Fear
Baulkham Hills
New South Wales, Australia

You can remove the 64-kilobit chips and plug in 256-kilobit chips, and your IIc will run just fine.

Boot Camp

I recently added a 3½-inch UniDisk to my Apple IIe system. I use it in slot 5 because I want to continue to boot my 5¼-inch disk drive in slot 6.

I've tried unsuccessfully to modify my AppleWorks Startup disk to look for the Program disk in slot 5 or to create a startup program that will look for both the Startup and Program disks in slot 5.

Roger Stembridge
Commerce, TX

Your Apple IIe looks for a disk drive in the slot with the highest number. It first checks slot 7, then slot 6, slot 5, and so on, counting down. The device in the highest-numbered slot is the startup device.

If you have more than one memory-storage device in your IIe, this can be a problem. I've installed a DuoDisk in slot 6—the standard place—a hard-disk drive in slot 5, and a UniDisk 3.5 in slot 5.

Most of my work is on the hard disk in slot 5; I keep the DuoDisk in the "boot slot" because that makes it easy to play a game on short notice. To boot the hard disk when I turn the power on in the morning, I use BASIC (hit Control-Reset while the 5¼-inch drive is running) and type PR#5. That boots slot 5, the hard disk.

The new GS contains a built-in program called SmartPort, which does exactly what you want—scans all the slots until it finds one with a bootable disk in it. Lacking SmartPort, try ***Listing 1****. This short program checks slot 5 for a bootable disk; if it finds another program, it runs it. If* ***Listing 1*** *finds nothing in slot 5, it returns control to BASIC.*

Listing 1. *BASIC program to check IIe's slot 5 for bootable disk.*

```
10 D$=CHR$(4)
20 ONERR GOTO 40
30 PRINT D$;"PR#5"
40 PRINT "Can't boot slot 5"
50 PRINT D$; "NEW"
```

Applesoft and the GS

For a computer-science project last semester, I wanted to use my GS' Toolbox firmware. I tried in vain to access it, and was finally told that only a licensed programmer can access it. Is that true?

I've also failed to acquire ProDOS 16, and my dealer has no knowledge of it. Has Apple released ProDOS 16 yet? Where can I get it? Is there a new version of ProDOS BASIC that supports the new operating calls of ProDOS 16?

Eric Ong
San Jose, CA

The Toolbox firmware in the Apple IIGS is available to any programmer who buys the right language; at the moment the right languages are TML Pascal (TML Systems, 4241 Baymeadows Road, Suite 23, Jacksonville, FL 32217, 904-636-8592, $125), ORCA/Pascal, and ORCA/M Assembler from ByteWorks (4700 Irving Boulevard N.W., Suite 207, Albuquerque, NM 87114, 505-898-8183, $125 and $69.95, respectively).

You can't use the Toolbox from BASIC—at least not yet. That doesn't mean you can't write BASIC pro-



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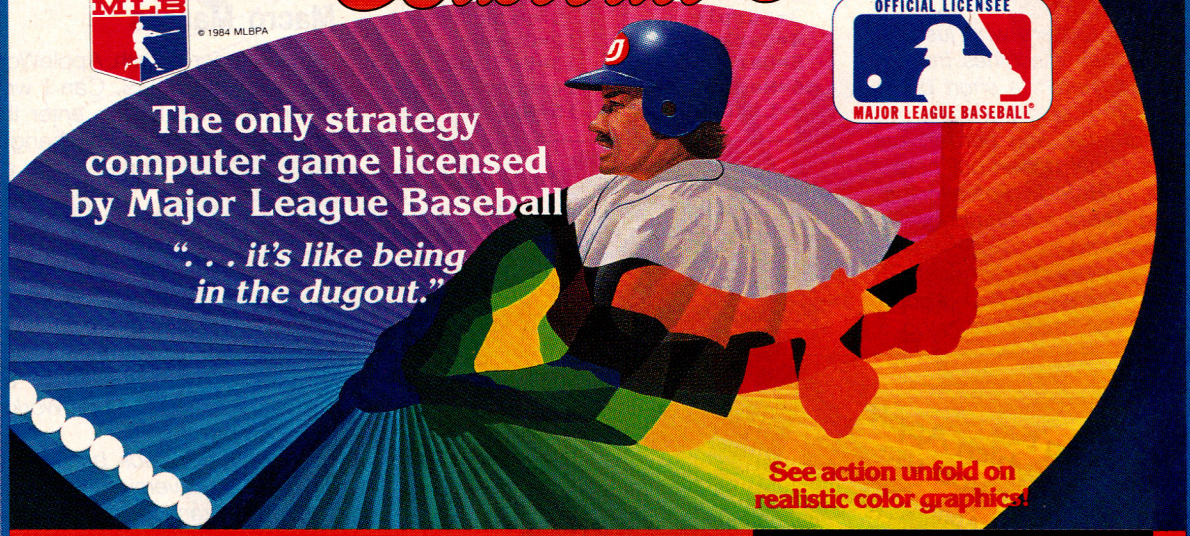
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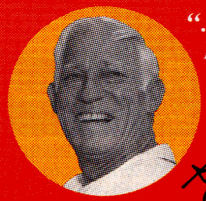
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grams for your GS: For example, see this month's free listing, BasicPaint (p. 67). But you'll need to issue a lot of PEEKs and POKEs, until Apple or some enterprising third party comes up with an extension of AppleSoft BASIC with commands such as Window, Color, and Menu.

So What Software (10221 Slater Avenue, Suite 103, Fountain Valley, CA 92708, 714-964-4298) sells a program called Iconix-GS ($29.95 plus $1.50 shipping), which adds some super-hi-res graphics to Applesoft. So What promises a companion product for sound soon.

*For hungry GS owners who just want to control their machines from BASIC somehow, here's a short program (**Listing 2**). It sets the color of the text, background, and border, just as the Control Panel does—but here you can do it in BASIC. (Refer to the accompanying **Table** for numbers of the available colors.)*

ProDOS 16 is available on most GS disks. Legally, it's stealing if you copy it for your own use; many users do, despite this restriction. Applesoft BASIC doesn't support ProDOS 16.

The Apple IIGS ProDOS 16 Reference *is now available from Addison-Wesley Publishing (6 Jacob Way, Reading, MA 01867, 617-944-3700, $29.95). It includes "ProDOS 16 Exercises," a program that lets you practice making operating-system calls without actually writing a listing.*

Listing 2. BASIC program to set text, background, and border colors

```
10 INPUT "What color text do you want? (0-15) ";X
20 INPUT "What color background? (0-15)";Y
30 INPUT "What color border? (0-15) ";Z
40 POKE 49186,X*16+Y
50 POKE 49204,Z
```

*Table. Color key for **Listing 2.***

0=Black	8=Brown
1=Red	9=Orange
2=Dark blue	10=Light gray
3=Purple	11=Pink
4=Dark green	12=Green
5=Dark gray	13=Yellow
6=Medium blue	14=Aquamarine
7=Light blue	15=White

Macro Macros

I use macros with AppleWorks all the time on my GS. Can I write a macro that will let me enter the Control Panel, make some changes, and return to AppleWorks with a single keystroke?

Paul Stewart
New York, NY

None of the current crop of AppleWorks macro programs—MacroWorks, AutoWorks, or Pinpoint KeyPlayer—offers the luxury of letting you get "outside" AppleWorks with a single keystroke.

But you're in luck because you have a GS. Diversi-Key, Bill Basham's macro program for the Apple IIGS (Diversified Software Research, 34880 Bunker Hill, Farmington, MI 48018, 313-553-9460, $45), lets you design not just AppleWorks macros, but macros for whatever program might be running on your GS.

Diversi-Key works differently from other macro programs: It uses the GS' built-in keyboard buffer to memorize a series of keystrokes. That means you can write a macro to enter the Control Panel, make some changes, and return to AppleWorks.

For that matter, if you're running a desk accessory, such as Roger Wagner Publishing's SoftSwitch (1050 Pioneer Way, Suite P, El Cajon, CA 92020, 619-442-0522, $59.95; see "Three Programs in Progress" in this issue, p. 72), there's nothing to stop you from writing a macro that flips between two 8-bit programs at a keystroke. Using Basham's Diversi-Hack (free with Diversi-Key), you could even write macros that make changes in the system monitor.■



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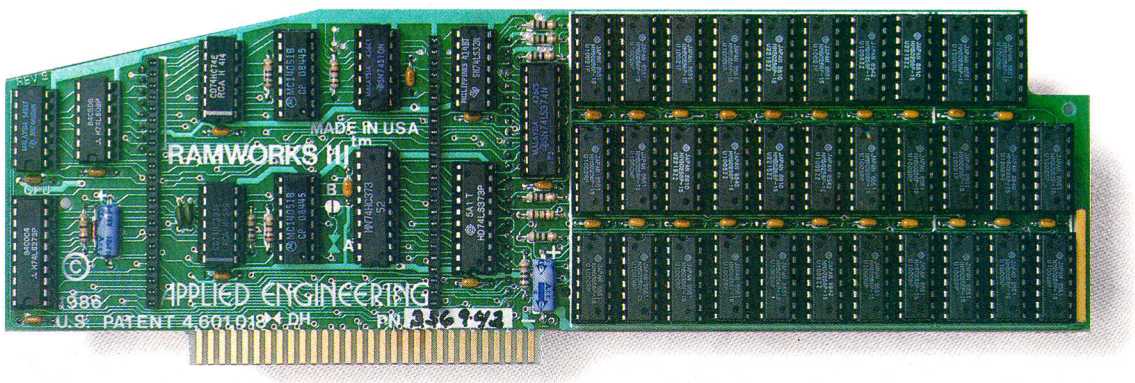
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RamWorks eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 22,000. *Only* RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 22,000. *Only* RamWorks expands the maximum clipboard limit from 250 to 2,042 lines. 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. 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 VIP Professional to name a few (and most 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 #4601018) 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, 1 MEG, or 2 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.

It Even Corrects Mistakes.

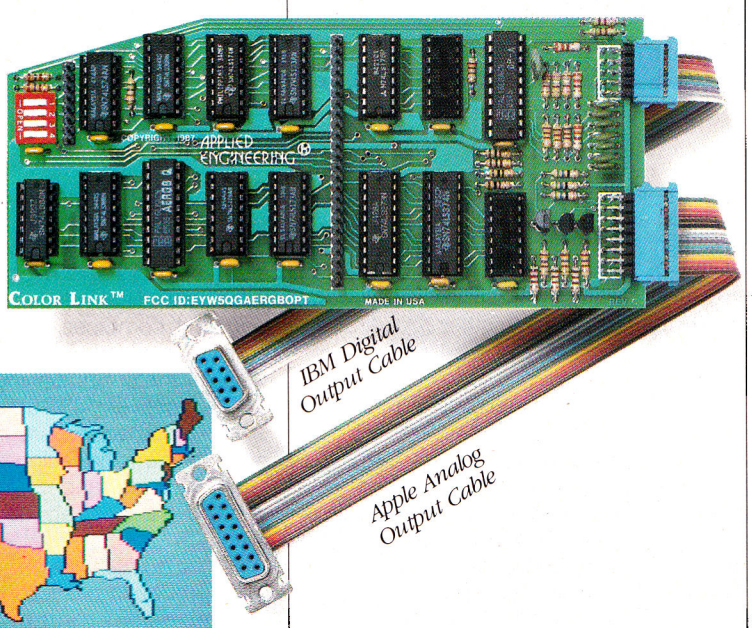
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

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 the new Apple standard analog and the IBM standard digital 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.

ColorLink™ 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 while maintaining 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' 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
- Built-in super sharp 80 column display (U.S. Patent #4601018)
- Expandable to 1 MEG on main card
- Expansion connector for possible future expansion to 16 MEG
- 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
- 100% compatible with all standard IIe software
- RamDrive™ and ProDrive™ the ultimate 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 the new Apple and standard IBM type monitors
- Self diagnostics software included
- Lowest power consumption (U.S. Patent #4601018)
- 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	**$199**
RamWorks III with 512K	**$249**
RamWorks III with 1 MEG	**$329**
RamWorks III with 1.5 MEG	**$489**
RamWorks III with 3.0 MEG	**$1099**
Ram Expander+ 1 MEG	**$499**
Ram Expander+ 2 MEG	**$799**
65C816 16 Bit Card	**$159**
ColorLink RGB Option	**$129**
Optional Software:	
Pinpoint with RAM Enhancement Software	**$79**
VIP Professional	**$219**

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MasterCard, Visa and C.O.D. welcome. Texas residents add 6¼% sales tax. Add $10.00 if outside U.S.A.

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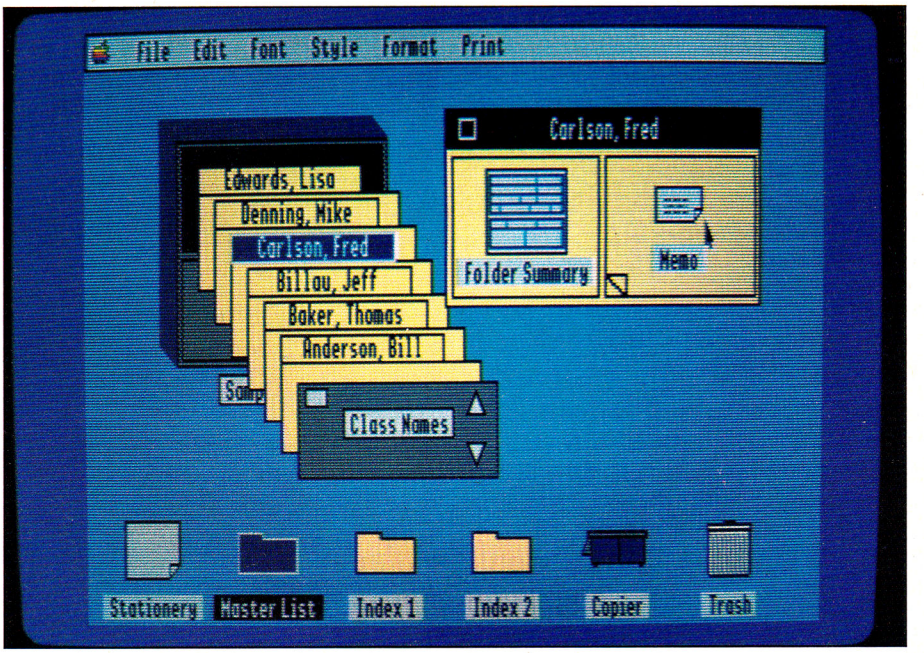
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REVIEWS

Notes 'n' Files, SoftWood GSFile; MultiRAM Plus, QCard; Understanding the U.S. Constitution; BEST Project Management; Games Editors Play



Great GS Databases

NOTES 'N' FILES

DataPak Software Inc., 14011 Ventura Boulevard #507, Sherman Oaks, CA 91423, (818) 905-6419

Database with word processing and mail merge; 512K Apple IIGS
$129.95
Rating: ■■■■

SOFTWOOD GSFILE

SoftWood Company, P.O. Box 90331, Santa Barbara, CA 93190-0331, (805) 966-4662

Database; 512K Apple IIGS
$99.95
Rating: ■■■■

For IIGS owners, it's been the best of times, it's been the worst of times. It's been a time of exciting product announcements, it's been a time of vaporware. Now, however, two brand-new GS databases have appeared. Both DataPak's Notes 'n' Files and SoftWood's GSFile serve notice that the new wave of 16-bit Apple software, complete with Macintosh-style pull-down menus, icons, and dialog boxes, has finally arrived.

While both are mouse-controlled databases, the two programs differ in appearance, capabilities, and intent. Notes 'n' Files emphasizes a graphics-oriented, intuitive method of organizing data and merging them with various types of documents, also created within the program. SoftWood GSFile, on the other hand, is a more powerful, conventional database, sacrificing graphics for extra versatility.

A GRAPHICS GEM

Let's look first at Notes 'n' Files (N&F). Its attractive opening screen displays a number of icons—a large two-drawer filing cabinet, a copier (for printing), variously labeled folders, and the inevitable trash can. Once started, the program is as easy to use as the actual objects depicted.

As you double-click on one of the cabinet's drawers, it slides open, showing a series of overlapping yellow folders with easy-to-read lettering atop each. These labels represent a name or a subject, depending on the type of file you create—something as specific as "Smith, Mary" or as loose as "Family Mail." A 3½-inch 800K disk can hold more than 2000 folders; you can move them effortlessly from one drawer to another. Loading or creating cabinets is easy.

Double-clicking on a folder removes it from the drawer and places an open-folder icon on screen. The left inside cover is labeled "Folder Summary"; clicking here zooms in on an almost-full-screen view of the database record (such as name, address, city, and so on). The right inside cover shows icons for letter-, legal-, or notecard-sized documents stored along with the record; clicking on a "dog ear" in the bottom corner thumbs through the documents, while clicking on an icon brings a document to the screen.

In short, N&F works exactly as you would in a real office: go to a cabinet drawer, open it, remove a folder, look over the contents, and select the information you want. The rest of the program is equally simple and intuitive, under either mouse or keyboard control.

Creating files and documents is a breeze. The "stationery" icon on the main screen leads to a supply room, letting you select a new folder or one of four sizes of paper for memos or letters you'll place in an existing folder.

BUILT-IN EDITING

The word processor has most of the text-editing power of DataPak's stand-alone program GraphicWriter. Although it limits documents to ten pages, it combines standard functions such as cut-and-paste editing with multiple fonts, underlining, clipboard transfer between documents, and more. Since each paragraph can have its own formatting for margins, spacing, fonts, and so forth, you can vary your pages' appearance as you like.

N&F's combination of database and word-processing functions makes label or form-letter printing or mail merge a cinch. Creating labels takes no more effort than selecting "Mailing Labels" from the print menu, accessed by double-clicking on the copier icon. A window displays numerous choices for formatting your label and selecting folders from which to extract data. Choose the number of copies you desire and N&F does the rest.

Producing form letters is as easy as typing a document, with names of

inCider's Ratings

Excellent—remarkable, a must buy	■■■■■
Very good—impressive and recommended	■■■■
Good—average, solid performance	■■■
Fair—flawed but adequate	■■
Poor—unacceptable or unusable	■

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The fastest, most powerful graphic word processor for the Apple®IIGS™ is now even more powerful – with MultiScribe GS 3.0.
Complete with the 80,000-word Merriam-Webster/Proximity spell checker and thesaurus, MultiScribe GS offers the most sophisticated spell-checking and thesaurus technology ever available on an Apple II. An on-line spell checker that not only checks your spelling, but also suggests valid alternatives to misspelled words – both typographically and phonetically. And a thesaurus that lets you find the most appropriate words for your work, by using 40,000 entry points to generate 470,000 possible synonyms!

The desktop publishing solution for the Apple IIGS.

Choose from a variety of type styles, character sizes, and fonts to fit your writing needs. MultiScribe GS includes built-in object-oriented drawing, so you can add color shapes and lines to your documents – without using a graphics program. With the exclusive MultiScribe GS Color Editor, you can choose from 4,096 colors for your text and graphics. And MultiScribe GS is compatible with all major IIGS graphics programs.

From the screen to the page – without surprises!

All character sizes, print styles, and graphics appear on-screen exactly as they will when printed. MultiScribe GS offers near letter quality color printing on an ImageWriter II™ and near typeset quality with a LaserWriter.™

Powerfully professional.

MultiScribe GS even includes power user features like direct AppleWorks™ word processing, file compatibility and keyboard commands for scrolling, selecting, and deleting text.

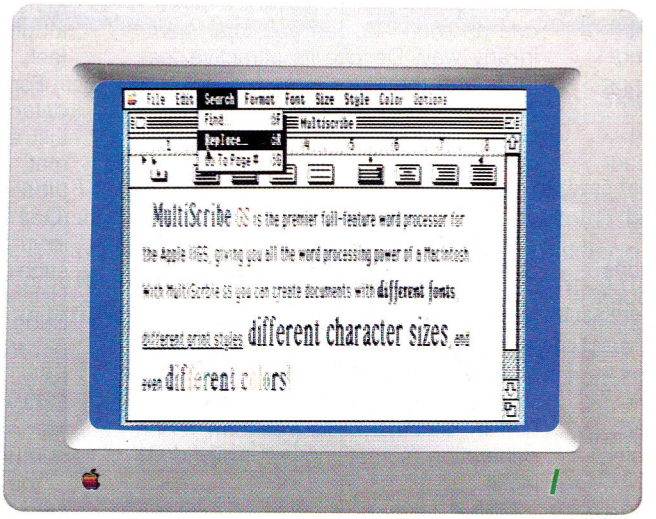


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TopDraw™

For those thoughts that just can't be put into words, StyleWare has created TopDraw. Like MultiScribe GS, TopDraw is designed to take full advantage of the capabilities of the Apple IIGS. And TopDraw does it with flying colors – 4,096 colors, to be exact!

The shape of things to come.

The first object-oriented graphics program for the IIGS, TopDraw gives you the ability to create drawings based on shapes, or objects, which can be moved, edited and duplicated – giving you virtually limitless drawing potential.

The color of creativity!

TopDraw lets you edit both colors and patterns. Draw with up to 38 color patterns at once. Use color patterns as line or fill patterns to create millions of color combinations. And because creativity isn't limited to an 8½ x 11 inch page, TopDraw lets you print your creations in any size you want – up to dozens of pages in length and width.

Get serious.

TopDraw comes complete with all the tools you need to create professional quality drawings – movable palettes and user-defined rulers, grids, colors, and patterns. Create ellipses, rectangles, polygons and freehand objects, and a wide variety of lines and arcs. Print in beautiful color on an ImageWriter II. And because TopDraw uses object-oriented graphics, its LaserWriter output is far superior to that of the bit-mapped graphics of paint programs.

Seeing is believing!

See TopDraw, MultiScribe GS, and all the other creative StyleWare products at your authorized StyleWare dealer.

StyleWare, Inc.

5250 Gulfton, Suite 2E, Houston, Texas 77081
713/668-0743 (in Texas)
800/233-4088

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fields within braces, and selecting the folders containing the information you want to include. Any folder field can appear anywhere in a document, to support sentences such as "Your account shows a balance of [Amount Owed]" as well as typical name-and-address merges. Print routines support a variety of dot-matrix and daisywheel models, plus Apple's LaserWriter. The program can flag documents automatically to show not only which were printed, but when you printed them, too.

Notes 'n' Files has a few limitations. For example, although you can import database and word-processing files from various sources, including AppleWorks, the program imposes some simple but time-consuming restrictions on such files and the way you must set them up before transfer. The program is copy-protected, though DataPak will provide owners with a free backup upon receipt of the original warranty card and purchasing information. (DataPak's instruction manual, by the way, is excellent.)

More seriously, N&F lacks one ability that's a must for many database users: calculation. Fields can't affect one another, nor can you total them in any way. Despite its attractive features and the extra dimension of storing documents along with records, N&F can't help you if you need calculated fields.

JUST THE FACTS

If N&F isn't the database for you, SoftWood GSFile probably is. Although it's a more straightforward, traditional program, GSFile should by no means be considered inferior. In fact, although I've long been a dedicated AppleWorks user, I may switch to GSFile because of its free-form report generation, something AppleWorks lacks.

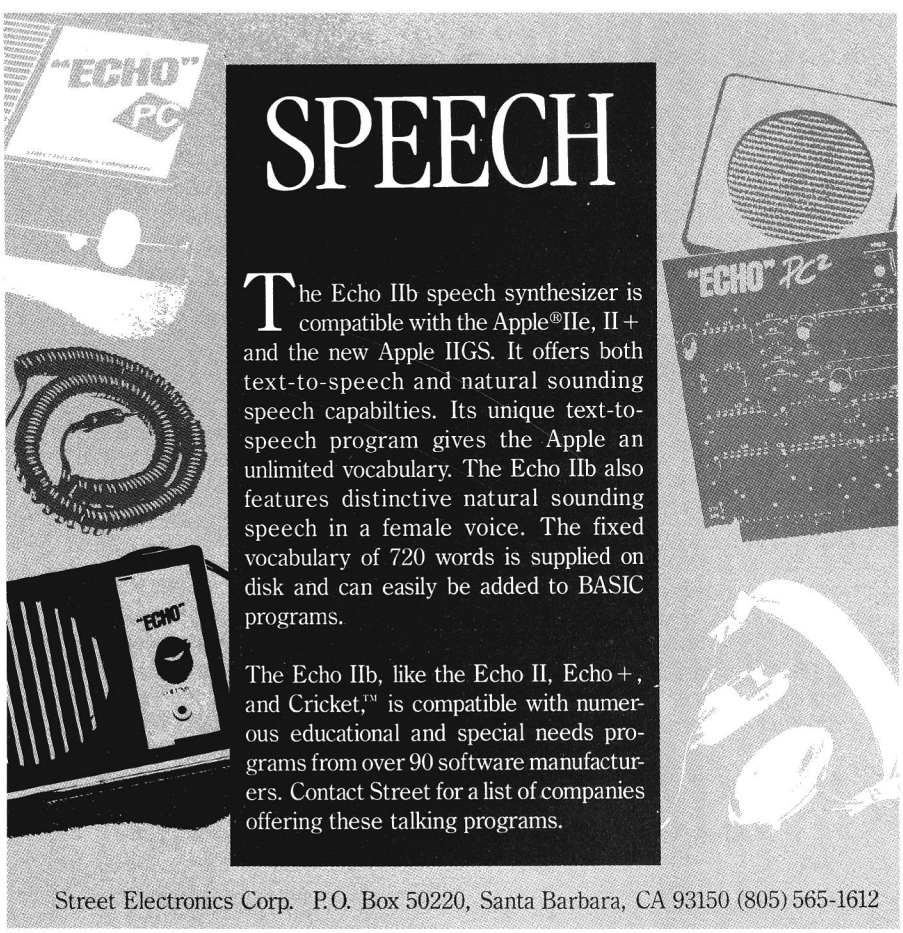
GSFile takes advantage of many GS features, including one of the most readable screen displays around. Like N&F, GSFile allows either mouse or keyboard control, with the minor annoyance that there's no keyboard equivalent to clicking on a dialog-box button to select field types. Scrolling and windowing features contribute to the program's Macintosh-like feel.

For the most part, creating a GSFile database is a snap. The program's List screen uses a spreadsheet format, giving a nice overview of the database. You can define columns (GSFile's fields) as one of eight types, including several unique selections such as Yes/No, Phone, and Time. Using the Phone, Time, and Date fields not only saves memory space, but formats those columns automatically. Also, according to the people at SoftWood, a future version of GSFile will include an auto-dialer that will call numbers from Phone fields.

You can define any column as a calculation, and GSFile constructs them in the simplest way: Just type the column names involved, as in (HOURS * RATE) for a salary field. While this is usually easier and quicker than using spreadsheet-style cell addresses, space for formulas is limited, so abbreviated column titles permit lengthier formulas. In addition, GSFile determines automatically the sum of all amount and calculated columns. This is usually convenient, though occasionally ludicrous—if you have a column of players' batting averages, GSFile will helpfully give you a total and produce a useless number.

Once you've defined columns, you enter information on the database-form screen. Here, previously defined columns appear as horizontally stacked rectangular boxes, which you can reshape or move anywhere on screen, giving you the opportunity to create whatever form you desire. This is one area where using the mouse to drag or place fields is a pleasure. Since you save each form as a unique "view," you can create any number of report forms from a single database.

Several useful features enhance the data-entry process. One switch, for example, offers automatic capitalization of the first character of each entry; another speeds entry of repetitive data, with the return key copying data from the same field in the previous record.



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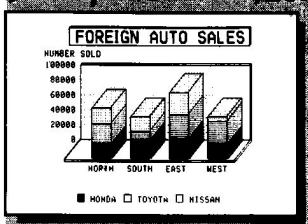
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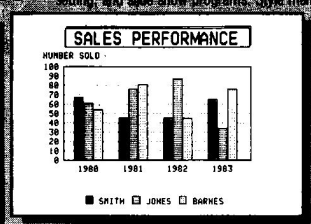
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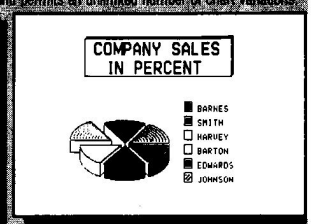
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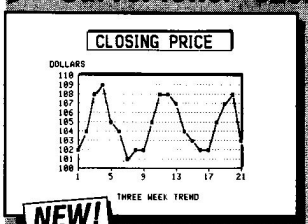


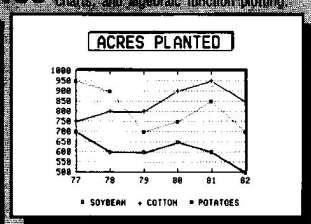


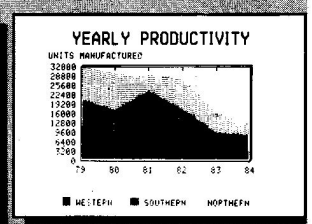


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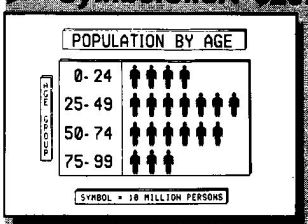


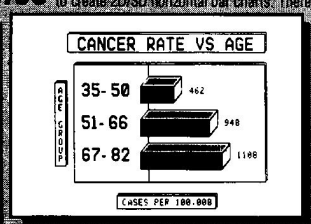


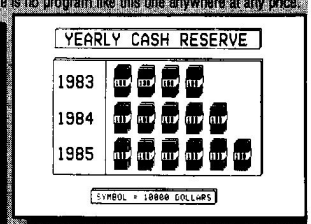
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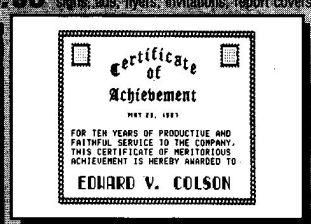




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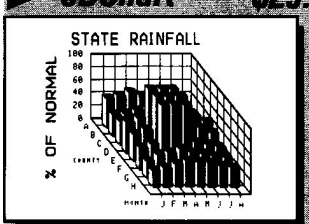


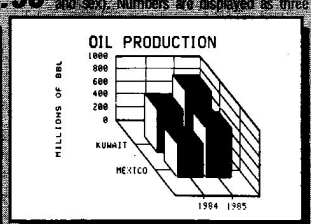


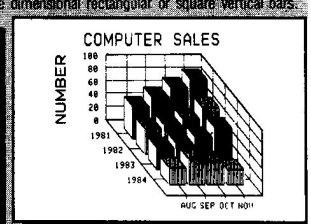


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REVIEWS

CHANGING THINGS AROUND

You edit your data in the Form screen; you must edit columns, however, from the List (spreadsheet) screen. Thanks again to the mouse, even major changes, such as altering column types, take minimal effort. You can sort material in any number of ways and filter it through numerous conditionals, similar to AppleWorks' selection format. Like Notes 'n' Files, GSFile can import AppleWorks databases, though again the process is a trifle slow.

What sets GSFile apart from other databases? For one thing, you can hide any or all fields when you call them to the screen. If you have two columns, say, one showing your cost and the other the retail price, a simple Hide command will "gray out" the first column on screen and exclude it from printed reports for your customers. Also, when printing labels, GSFile automatically compacts fields appearing on the same line, separating them by only a space. (Unfortunately, you can't preset the label run to more than a single copy of the file you want to print.)

Selecting the apple symbol from the menu line atop the screen gives instant information on which database is open, the amount of memory it's using, its disk-storage requirements, and so on. The apple menu also lets you choose default formats for fields such as numeric and date entries.

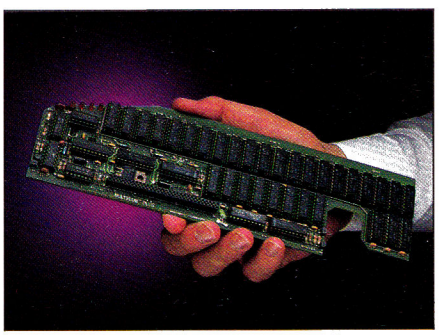
GSFile boasts other features, including a scrollable database directory, automatic cumulative totals and page headings when printing columnar reports, and conversion of databases to ASCII files for use with word processors or mail-merge programs.

Incidentally, instructions for using this merge feature are found on page 63 of the 71-page manual and consist of seven lines. Take this as a subtle slam at GSFile documentation; although the manual is generally well written and illustrated, it sometimes assumes too much knowledge on the user's part or glosses over certain techniques. Tighter organization wouldn't hurt, either.

Nevertheless, the manual's minor shortcomings don't prevent you from employing any of GSFile's features. The program is noncopy-protected; technical support and potential upgrades (for a nominal fee) are guaranteed upon receipt of warranty or registration information.

Both Notes 'n' Files and SoftWood GSFile are laudable programs. Your choice will depend on your needs; if their combined cost weren't a prohibitive $230, I'd almost suggest you buy both.■

James V. Trunzo
Leechburg, PA



RAM That Lasts

MULTIRAM PLUS

QCARD

Checkmate Technology Inc., 509 South Rockford Drive, Tempe, AZ 85281, (602) 966-5802, (800) 325-7347
QCard: Auxiliary-slot memory-expansion card; Apple IIe
$99.95 (64K), $129.95 (256K)
MultiRam Plus: Piggyback memory card (expandable to 4 MB) with power supply for QCard or MultiRam RGB
$249.95 (256K), $399.95 (1 MB), $39.95 (external power module)
Rating: ■■■■

I've never been a big fan of RAM disks; I always thought the trouble of loading them with programs and data files whenever I turned on my IIe outweighed their speed advantage over conventional disk drives. I'm singing a different tune now, since I got the latest "must buy" for AppleWorks or other power users—the MultiRam Plus card from Checkmate Technology.

Designed to piggyback on one of Checkmate's auxiliary-slot RAM cards for the IIe—the MultiRam RGB card or the new QCard (more on that later)—the MultiRam Plus is more than a memory expander. It's a solid-state disk drive that gives you the speed of a RAM disk with the stability (almost) of a physical drive.

17 Meg IIe/1 Meg IIc

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1024k MultiRam Plus	359.	*NEW*
2-17 meg MultiRam Plus	Call	*NEW*
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Checkmate Technology's MultiRam CX card easily expands your IIc to 640k and has a CX+ Piggyback to add another 512k (1152k total)! It's 100% compatible with all IIc software/hardware & upgradable with a 65C816 kit ($85) — all at about 50% less power than Z-RAM™. **SAME FREE SOFTWARE/UPDATES & 5 YR WARRANTY AS IIe CARDS.**

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SoftSwitch GS (Ultimate IIgs program switcher)	46.
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Pinpoint Program	55.
Copy II Plus 7.3 (Best Apple Utility)	29.

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COIT VALLEY COMPUTERS 14055 Waterfall Way
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A MultiRam Plus RAM disk doesn't disappear when you turn off your computer, because the card doesn't draw its power from your Apple's power supply. It comes with its own transformer that plugs into a standard electrical outlet; for the ultimate in convenience and reliability, an optional battery module preserves data for up to 20 hours if you lose your home or office power completely. Either way, when you turn on your Apple, you need only boot with a utility that "rehooks" the RAM disk to the operating system to have access to its stored programs or files, instead of filling an empty RAM disk every morning.

A GOOD MATCH

I used the MultiRam Plus with Checkmate's QCard, an economical memory expander that follows the auxiliary-slot or bank-switching standard rather than Apple's more recent peripheral-slot protocol. About the size of the 64K Apple Extended 80-Column Card it replaces, the QCard supports 80-column text, single- and double-hi-res graphics, and either 64K or 256K of bank-switched memory. While it doesn't have the RGB color-video output of Checkmate's bulkier MultiRam RGB, the 256K Qcard performed flawlessly in my tests. It's an excellent buy at $129.95.

Like other auxiliary- instead of peripheral-slot RAM cards, the QCard isn't automatically recognized as a ProDOS RAM disk or AppleWorks 2.0 expander. It offers those functions through supplied software utilities, which create RAM disks, expand AppleWorks (versions 1.2, 1.3, or 2.0) and load it into the card's memory, and test QCard or piggyback-board RAM. Checkmate also throws in the convenient Squirt program launcher or disk menu.

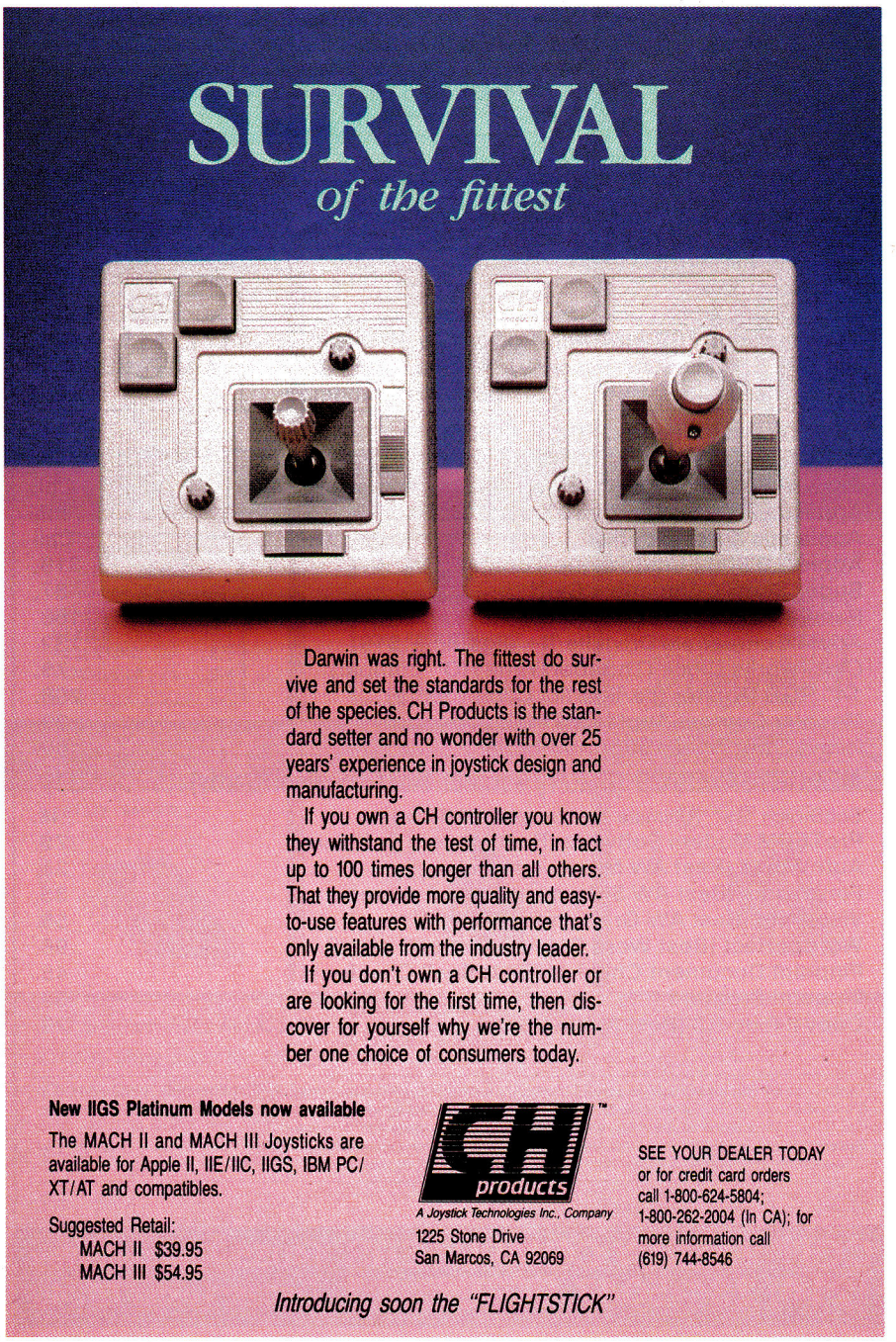
SETTING UP

To go beyond the QCard's 256K maximum, I unplugged my IIe, removed the QCard, then plugged the MultiRam Plus onto it. Before reinstalling the QCard, I attached a mounting plate on the leftmost (from the front) vertical cut-out on the Apple's back panel. The mounting plate provides a connection for the external transformer and additional radio-frequency shielding and grounding for the MultiRam Plus. It installed easily with two screws.

Next, I installed the optional battery holder (containing four "C" cells, not included) under my keyboard before plugging the QCard/MultiRam Plus combo into the auxiliary slot and connecting the Plus to the battery pack and mounting plate with the supplied cables. Finally, I plugged the transformer into the mounting plate, then into a wall outlet.

Software installation was nearly as easy; Checkmate's utilities guided me through testing the new memory, creating a RAM disk on the Plus, and making a boot disk that reactivates the RAM disk at startup. Next, I expanded AppleWorks to take advantage of the extra memory, splitting my 1-megabyte MultiRam Plus into a 768K permanent RAM disk and 256K of free memory. I used the latter and the 256K on the QCard to expand my AppleWorks desktop.

I didn't take advantage of another software patch that loads AppleWorks into RAM when starting the program. Instead, using the ProDOS Filer, I



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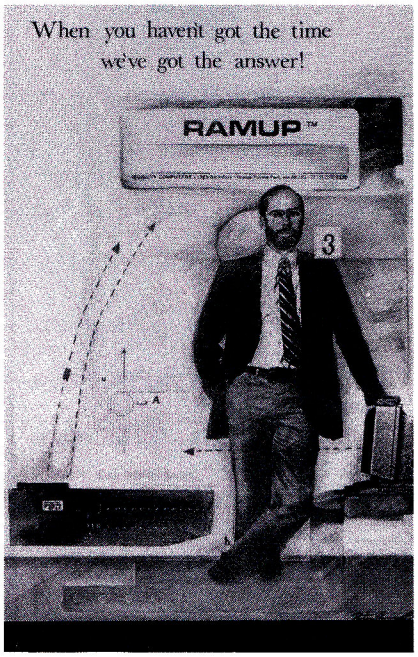
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moved the AppleWorks program files to the MultiRam Plus RAM disk—I don't need AppleWorks overlay files in system memory because the RAM disk is just as fast. I had reached AppleWorks Nirvana.

SAFE OPERATION

The permanent RAM disk is wonderful, but it requires more thought and planning than ordinary disks. You must use a customized "rehook" disk to boot your Apple every time you want to access the RAM disk after a cold start; you should also avoid programs and utilities that overwrite RAM disks indiscriminately; and, as with any disk, you should back up the contents of the MultiRam Plus at regular intervals.

You should also realize that turning off your Apple still erases system memory; only a RAM disk located entirely in MultiRam Plus memory survives a cold boot. If you have the battery-power module, of course, you should replace the batteries regularly so they'll be fresh if suddenly called into service.

For example, after running AppleWorks and other programs from the MultiRam Plus disk, turning my computer on and off many times, I gave the system the ultimate test—I walked to the back of my computer table, deftly kicked the Apple and MultiRam Plus power plugs from the wall, and went out to mow the lawn. Several hours later (it's a big lawn), I reconnected the plugs and booted the Apple. All my programs and data files were still waiting for me on the RAM disk.

THE LAST WORD

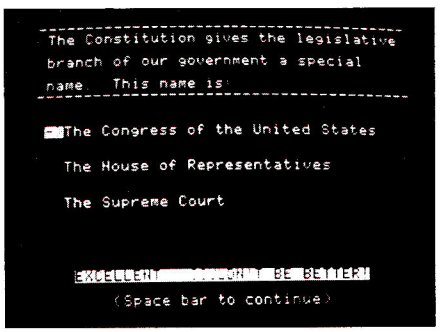
Besides offering the reassurance of constant power for its speedy RAM disk, MultiRam Plus offers the reassurance of Checkmate's five-year warranty and extensive customer service. It also offers another important benefit to sophisticated users—since the card is powered externally, it doesn't increase the drain on your Apple's power supply if you have several power-hungry expansion cards.

With proper care and feeding, the MultiRam Plus can become your most important Apple peripheral. It isn't for casual users—its auxiliary-slot software requires a bit more patching than the equivalent features of peripheral-slot cards—but if you're an AppleWorks user who wants the fastest, most powerful system possible, you need MultiRam Plus. Its ideal partner, the

QCard, is a solid, bargain-priced memory board in its own right.■

Robert M. Ryan
Hancock, NH

Editor's note: In response to our July 1987 review of Sensible Writer (p. 32), Roger Tuttleman of Sensible Software points out that the program does have keyboard commands to move vertically through a file (Open apple-up or -down and -1 through -9, as in AppleWorks). He adds that the company has been unable to duplicate the word-wrap problems our reviewer experienced with Sensible Speller on his Checkmate- and TransWarp-equipped IIe.



We the People

UNDERSTANDING THE U.S. CONSTITUTION

Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062, (800) 221-9884

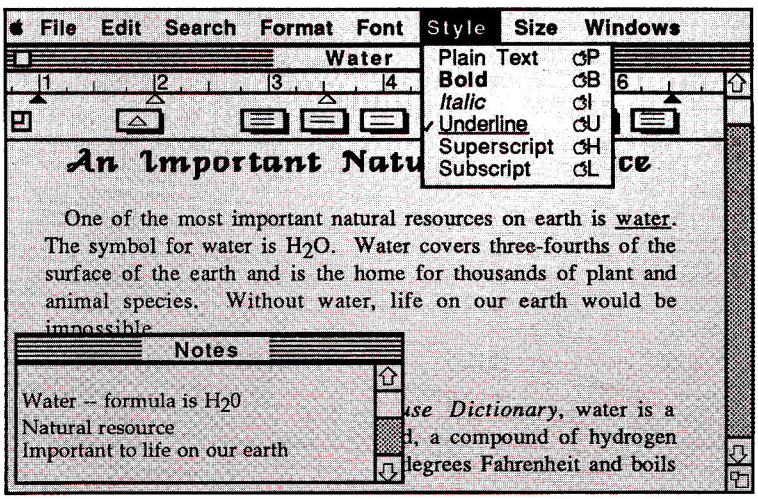
Social-studies program; 48K Apple II Plus, IIe, IIc
$49.95
Rating: ■■■

What's the difference between a veto and a pocket veto? Did you know that the President of the United States must not only be a "natural-born" citizen, but have lived in the U.S. for at least 14 years? Who is president *pro tempore* of the Senate?

Mindscape's Understanding the U.S. Constitution (UUSC) teaches students about the meaning of the Constitution, our political system, and the operation of the government established in Philadelphia 200 years ago. More than just an aid for students in grades 7–12 civics or social-studies classes, it could also be helpful for adults preparing for the citizenship examination. Even if you're in neither of

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System Requirements:
// Write runs on the Apple IIe/c (128K) and Apple IIGS. Requires only one disk drive. All functions can be used with the keyboard or with a mouse.

// Write developed by UNICOM Software Development Group.
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those categories, but think double jeopardy is part of a game show or that a capital crime is one committed in Washington, D.C., this program could be for you.

LEARNING THE LAW

UUSC is easy to use. Each of its two parts has five question sets, each containing ten multiple-choice questions about some aspect of the Constitution. Part I deals mainly with the legislative branch of government and how a bill becomes law. There are questions about the powers of Congress, Representatives' and Senators' duties and responsibilities, the role of state governors, impeachment, vetoes, elections, excise taxes, census reporting, *habeas corpus,* and more.

Part II focuses on the executive and judicial branches, as well as amendments to the Constitution. Topics include the electoral college; the duties of the President, Vice-President, federal judges, and the Supreme Court; due process; the ratification of amendments; and the issues addressed by the Bill of Rights and subsequent amendments.

In UUSC's "learning mode," the computer and the student interact, with the program commenting on each answer the student selects. Correct answers bring words of encouragement, such as "Go to the head of the class" or "Super! Can't be beat," along with a brief explanation of the answer—in many cases, nothing more than a restatement of the question.

Wrong answers bring negative comments, ranging from "Are you really trying?" or "Are you putting me on?" to "Sorry, Charlie! You missed it!" I found these quips mildly offensive at best. The program explains why the student's choice is incorrect and asks the question again, with three instead of four choices remaining. A second incorrect answer shifts the program into a "guidance phase," in which pressing the spacebar brings a hint message to the screen. Pressing the spacebar again presents the question once more, this time with only two possible answers.

On the third incorrect choice, UUSC takes "remedial action." It presents right and wrong answers and explains them, then offers a "memory aid"—a new sentence requiring the student to type in the correct answer's key words. The computer accepts no incorrect response at this point; the program won't proceed until the student enters the correct answer with appropriate spelling. Once he or she has typed in the right response, the Apple offers a musical reward (if the student has selected sound effects) and moves on to the next question.

After each set of questions, the student's scorecard appears, showing his or her name, the question set completed, the time taken, and the numerical score, along with a listing of the number of questions answered correctly on the first, second, and third tries and the number wrong on the third try. The program doesn't continue to store these scores once the student moves on to another question set, but he or she can send the scorecard to a printer connected to slot 1.

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TESTING AND TIMING

In UUSC's "testing mode," the computer draws from the same pool of questions to test the student's knowledge of the Constitution. No reinforcing comments or sounds are available, and the student must complete all ten questions in the set before viewing the scorecard, after which he or she may review any questions answered incorrectly. Depending on students' answers in the review, the computer offers positive reinforcement or remedial action.

Although UUSC includes a built-in clock showing the amount of time the student takes to answer questions, students can work through the program at their own pace. Although there are no point penalties for moving slowly, there's no way to interrupt the program and pause the clock. The timer restarts at the beginning of each new question set. Pressing C hides or displays the clock in either learning or testing mode.

UUSC comes with a teacher's manual, containing instructions, four reproducible activity sheets, and a backup disk. The software carries a 90-day warranty; for nine months thereafter, defective disks are replaced for $10. Mindscape's 1987 catalogue states that a Spanish version is on the flip side of each program disk, but there was none on my review copy; I called Mindscape's technical support to ask about the omission and was told this feature is no longer available.

Although Understanding the U.S. Constitution provides a solid introduction to the meaning and operation of the Constitution, it doesn't take full advantage of what your Apple has to offer. With neither color graphics nor animation, the program comes across simply as a competent electronic text; learning mode offers both constructive and destructive feedback, but little of the excitement we expect from computer-assisted learning. If you want to brush up for the Constitution's bicentennial, UUSC is a good choice, but if you want pictures and pizzazz, buy a book.■

Carol S. Holzberg
Shutesbury, MA

Working Overtime

BEST PROJECT MANAGEMENT

Business Electronics Software & Technology Inc., P.O. Box 230519, Tigard, OR 97223, (503) 684-6655

Project-management software; 128K Apple IIe, IIc, IIGS
$69.95
Rating: ■■■

One of the biggest problems any business has is scheduling—making sure everything gets done when it's supposed to. There's much more to it than planning, although that's vital. You must take care of engineering in advance, obtain appropriate permits, and order materials ahead of time; the right technicians must be available, the company must have the cash to pay for any expenses it incurs, and so on.

For a small business with small jobs, you can do your planning on a legal pad. If your company is a bit larger, you know how quickly you can become enmeshed in details—subcontractors who don't deliver what they promise, suppliers who can't deliver when they promise, even your own people agreeing to other work without consulting you. Proper scheduling keeps not only the customers happy, but the cash flowing. One little thing that doesn't get done can hold up an entire job and, with it, your customer's paying the bill.

BEST Project Management (named for its publisher, Business Electronics Software & Technology) lets you do project management on your 128K Apple. It's a menu-driven program concentrating on dates; you enter the starting date and how long each activity takes, along with which activities depend on others and which don't. The program provides scheduling information about your project.

The program is noncopy-protected and includes a good (although unindexed) 87-page manual, beginning with a history of project planning and definition of terms. I usually like to start with a tutorial to get into a program quickly, but BEST's approach makes sense because many small-business owners are unfamiliar with project-planning concepts.

BEST SPECS

BEST helps you break down a project into a series of activities. For ex-

Continued on p. 121

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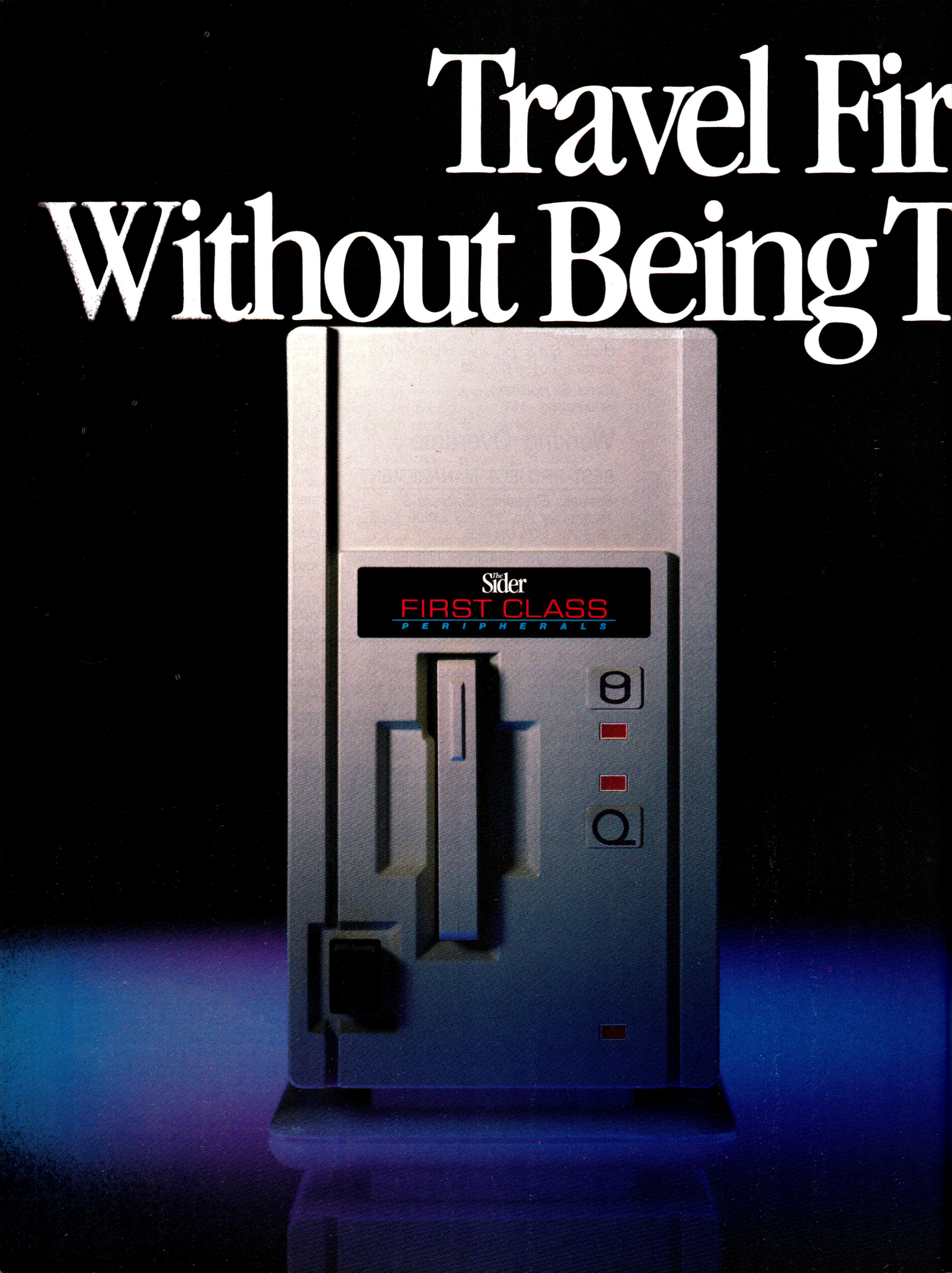
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First, The Problem. No matter whether you are working with the Apple II computer series or the powerful new Macintoshes, and no matter whether your applications are educational or corporate, the ability to get down to business these days often has as much to do with the peripherals you attach as it does to the computer itself.

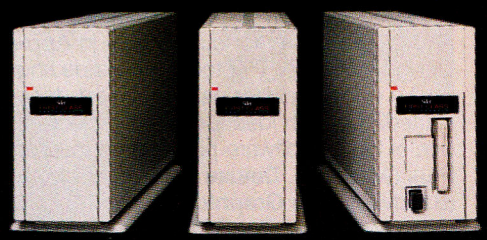
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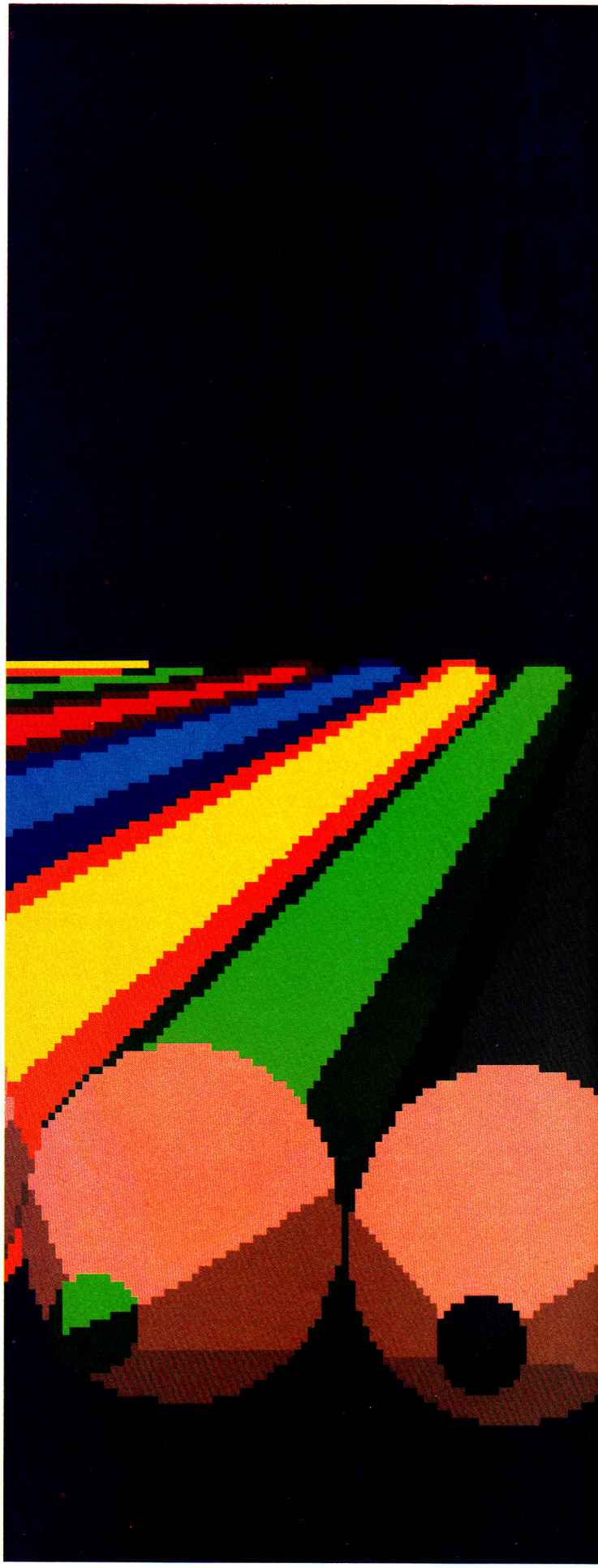
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"G" Stands for GRAPHICS

Release your creative potential—for art projects of all kinds, Apple IIGS graphics offers a dazzling spectrum of possibilities.

by Cynthia E. Field



That *G* in your Apple IIGS lets you plot more dots than ever before and choose from 4096 colors—but what in creation can you do with super-high-resolution graphics and more hues than you can name?

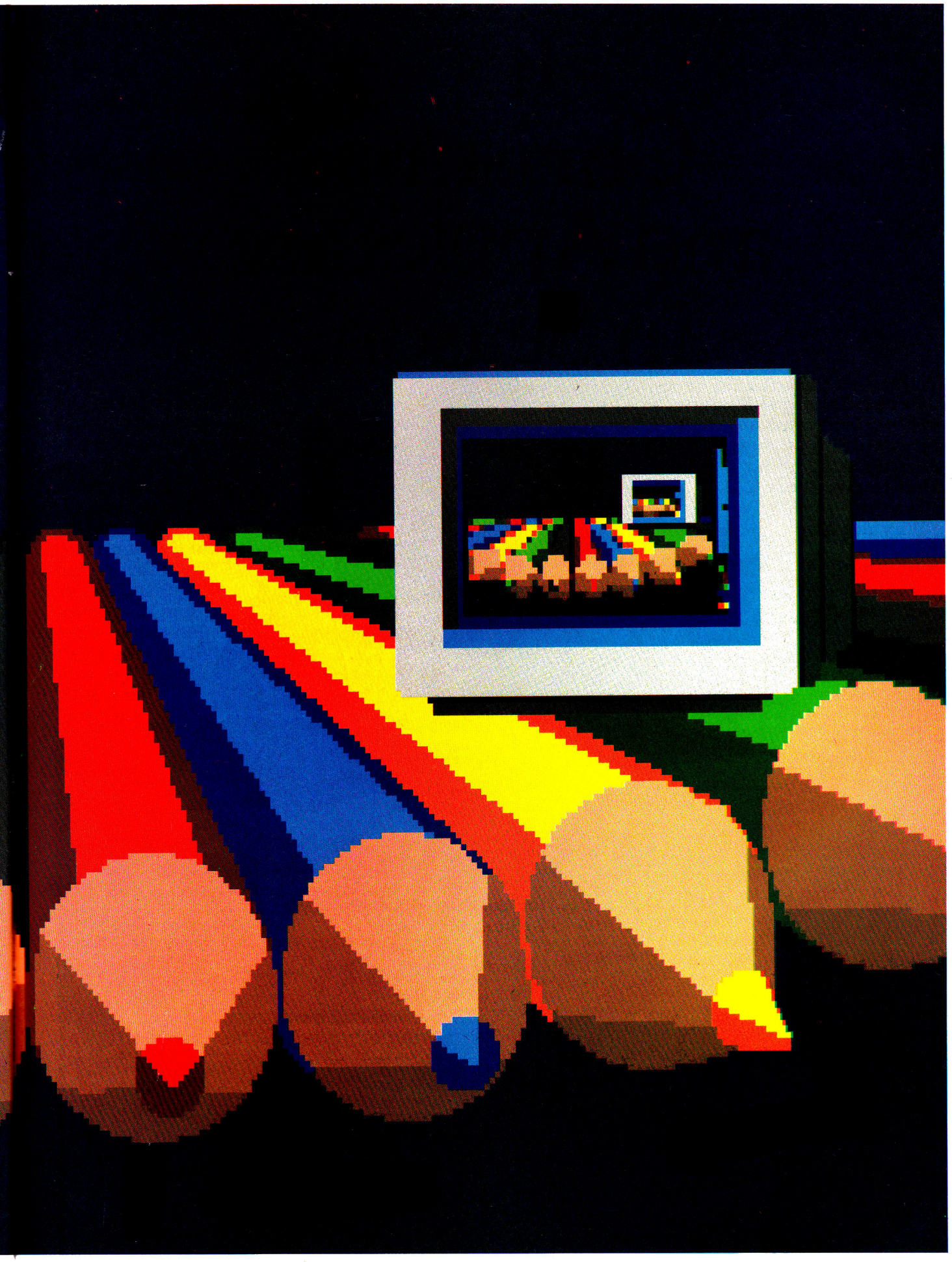
From astronomy to zoology, GS graphics lets you create artwork to enhance any subject. (See "BasicPaint," p. 67 in this issue, for more information on GS graphics technology and programming for super-hi-res in Applesoft.) Illustrate text. Design stationery. Put together a slide show. Create your own jigsaw or needlework patterns. What does it take to get started? Only an idea for an art project—and an assist from one of the six software packages discussed here: **PaintWorks Plus** (Activision), **Deluxe Paint II** (Electronic Arts), **816/Paint** (Baudville), **The Graphics Studio** (Accolade), **Draw Plus** (Activision), and **TopDraw** (StyleWare).

TOOLS OF THE TRADE

These six GS graphics programs (see the Product Information box for prices and manufacturers' addresses) meet on common ground when it comes to the user interface. All support the mouse as a selector of menus, color and patterns, or tools, and as a freehand-drawing device.

Overall screen appearance in all six graphics programs is remarkably similar. Each sports a bar with a half-dozen or so pull-down menus—with names like "Goodies," "Options," "Font," and "Text"—listing major program functions, such as File, Edit, and Color. Interfaces mimic the work world. Instead of a desktop, which is appropriate for the business office, graphics programs offer on-screen working environments consistent with the art studio: PaintWorks Plus has "The Easel"; Deluxe Paint II, "The Painting Screen"; and Draw Plus, "The Drawing Board."

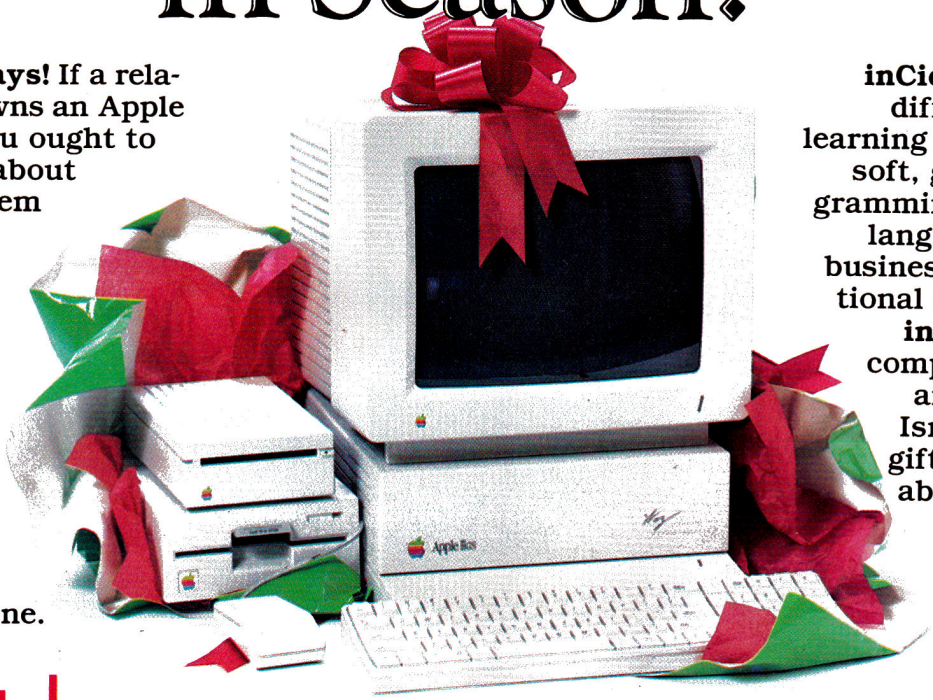
GS graphics programs recognize each artist's need for the tools of his or her trade, as well. (See "Presenting Business Graphics," March 1987, p. 42, and the accompanying sidebar, "Drawing vs. Painting: What's the Difference?" for more information on graphics-software techniques.) The painter requires different accoutrements from the draftsman; the four "paint" programs (PaintWorks Plus, Deluxe Paint II, 816/Paint and The Graphics Studio) accommodate this need. Each paint program provides you



It's Christmas and Apples are in Season.

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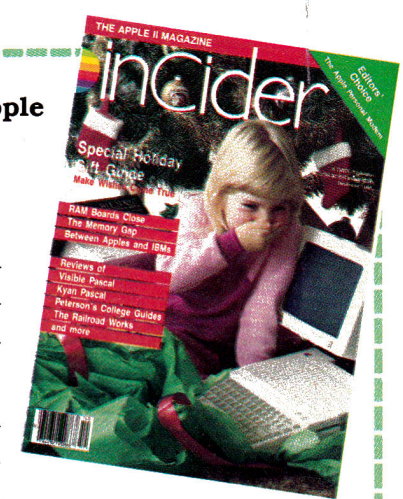
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with an assortment of brushes, a collection of shape tools (for drawing lines, rectangles, circles, and polygons), and an array of enhancements (a spray-paint tool, color and pattern filling, a zoom feature) for making your work picture-perfect.

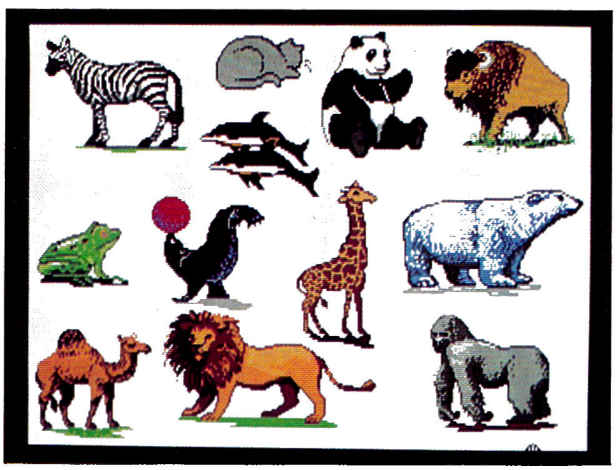
A drawing program, on the other hand, recognizes that people who create charts and other precise illustrations require a somewhat different toolbox, as well as a different working environment. Draw Plus and TopDraw offer screens that look like sheets of graph paper instead of canvases. You wouldn't expect a drawing program to include an airbrush tool or a blending function, but you would expect vertical and horizontal rulers and built-in shapes for easy manipulation. Draw Plus and TopDraw offer those features and more, along with different line widths, text fonts, and color-palette mixing similar to the paint programs'. They're less suited to freehand artistry, but excel at manipulating objects or placing them precisely in drawings.

THE ELECTRONIC EASEL

All six graphics programs reviewed here can mix and display the GS' 4096 separate colors. Whether you're a painter, a designer, or an illustrator, you can use each program's built-in paint mixers to adjust a color's level of red, green, and blue, as well as its brightness and intensity.

Once you find a pleasing hue, you can substitute it in the software's painting or drawing palette. Although the GS can technically display 4096 colors, it can't show all of them at the same time: It limits you to 16 colors when creating your artwork.

In fact, you can use or modify any of these programs' built-in color palettes (Draw Plus offers 128), or you can start from scratch and design your own. Each program lets you save your customized palettes on disk. Deluxe Paint II even lets you print your palette in color on an Apple ImageWriter II.



PaintWorks Plus' Clip Art Gallery offers more than 600 prepared images.

DELUXE PAINT II: BEYOND THE BASICS

As perhaps the most sophisticated of all GS graphics programs, Deluxe Paint II offers a number of advanced features not found in other painting software: For instance, you can blend, smear, and smooth transitions between images and background. Blending and smearing are like dragging a brush across a wet oil painting, while smoothing involves a technique called *anti-aliasing*.

As Steve Gibson explains (*InfoWorld*, June 22, 1987), anti-aliasing eliminates jagged edges by fading picture elements (pixels, the individual dots on your screen) selectively to trick the eye into seeing a smoother image.

Other Deluxe Paint II features include the ability to make a two-dimensional object appear 3-D by controlling its rotation on x, y, and z axes. According to Andy Gavin, a program developer from McLean, Virginia, "You can draw a brick wall and twist it so that it recedes in the distance."

In Gavin's assessment, Deluxe Paint II has "everything you could possibly want," but admits, "It gets overwhelming." Consider, too, that Deluxe Paint II requires an absolute minimum of 768K of RAM and needs 1 megabyte if you want to access all features. Special functions, such as "saving an extra page" (a second drawing screen), swallow up memory.

In general, other GS graphics programs require 512K. For Deluxe Paint II, though, you tack on another $60–$180 for memory-expansion chips. Still, if your GS already has 1 megabyte, or if you need the advanced painting features this program offers, Deluxe Paint II is clearly the program of choice.

Meg Manhart, of Pingree, Idaho, is one commercial artist who needs sophisticated graphics functions; she's a recent convert to Deluxe Paint II. She's designing a logo for a food co-op and was disappointed in PaintWorks Plus because she couldn't "bend fonts and contort them into dif-

Drawing vs. Painting: What's the Difference?

Painting and drawing packages let you sketch on screen and manipulate your pictures much as word processors let you enter and edit text. With a graphics-input device, such as a mouse, KoalaPad, or your Apple's cursor keys, you can draw an image freehand or choose basic shapes, such as circles and lines. Special software functions then scale an image up or down, rotate or invert it, combine it with geometric shapes, color and texturize it, animate it, or zoom in for a close-up.

A painting program differs from drawing software in the way it stores images. A "painted" image looks more realistic because it's composed of a grid of dots, like a newspaper photo, rather than a compilation of shapes.

One advantage of painting programs is that they're compatible with digitized images obtained through "scanning" (converting photos to dot patterns with a device attached to your printer) or "frame grabbing" (using a video camera and special interface board); you can then edit and alter images as you choose. The drawbacks are less flexibility in editing original images and a print resolution limited to your screen resolution.

Images designed with drawing software are composed of layers of basic shapes. The major advantage is that hardcopy output is sharper than your screen image. Painting software simply dumps your screen's dot patterns to the printer, and enlarges images by doubling or quadrupling every dot, resulting in jagged edges. Drawing programs, on the other hand, adapt mathematically to the output device you're using: They give your Apple (and through your computer, your printer) only beginning and ending coordinates—not the rest of the points in between—and tell it to draw a line.□

ferent shapes." She took advantage of Electronic Arts' trade-in offer: She sent in the PaintWorks Plus manual cover and $50 and received Deluxe Paint II, which ordinarily sells for $99.95, in exchange.

Dennis Snow of Medford, Oregon, another Deluxe Paint II owner, says he's using the program's animation features, along with a video camera and AST's **VisionPlus** card to create training videotapes for his local fire department. His project last summer was to "digitize [an image of] the heart, then import it into Deluxe Paint II, color it, and animate it to show the venous and arterial flow." (For more on video digitization, see "Digitize to the Max," July 1987, p. 40.)

Snow says he misses the "lasso," a tool offered in both PaintWorks Plus and 816/Paint. With the lasso, you can capture an image, copy it to the clipboard, then paste it wherever you want. But two other Deluxe Paint II features that are lacking in PaintWorks Plus—the curve tool and the stencil option—have convinced Snow that Deluxe Paint II gives him "better drawing control." (See the accompanying sidebar, "GS Graphics: Out of This World," for an account of how one amateur astronomer hopes to use PaintWorks Plus to prepare slide shows.)

GS ANIMATION

Deluxe Paint II, 816/Paint, and The Graphics Studio offer a nontraditional method of animation called *color cycling*. Instead of drawing individual pictures representing various stages of an object in motion (called *cell animation*, as PaintWorks Plus offers), you draw an object once, then direct your paint program to simulate motion by "switching palettes at regular intervals," as the *816/Paint Instruction Manual* explains. With color cycling, you can make snakes slither, neon signs flash, or blood flow—as Dennis Snow intends to simulate in his fire-department training film.



Deluxe Paint II, the most sophisticated GS graphics program, includes several advanced features, such as blending, smearing, smoothing, and 3-D.

FOR ARTISTS AND AMATEURS ALIKE

What if you don't want to spend your time drawing, erasing, and redrawing images? Is there a "quick and dirty" way to create artwork? There is—it's called *clip art*.

Activision (PaintWorks Plus) and Electronic Arts (Deluxe Paint II) currently offer clip-art libraries ($29.95 each); Baudville (816/Paint) and Accolade (The Graphics Studio) are expected to release similar collections soon.

The PaintWorks Plus **Clip Art Gallery** consists of more than 600 color and black-and-white images in 24 categories, including academics, food, plants, business, and symbols. With PaintWorks Plus' lasso tool, it's a snap to select an image and copy it to your artwork, change it as you like, and print it.

GS Graphics: Out of This World

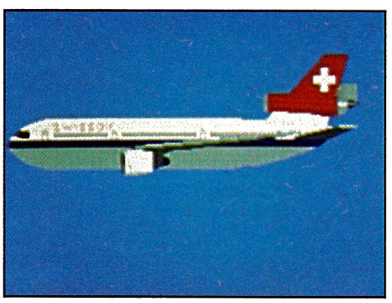
"I found the fulfillment of entering a totally new area—mixing paints, creating images, developing my own artistic potential," claims Clark Andrews, an amateur astronomer and avid Apple IIGS user from Shamokin Dam, Pennsylvania.

Andrews praises Activision's PaintWorks Plus and says he sees no reason to switch to another program: "Even though I've seen Deluxe Paint II and read about 816/Paint, my enthusiasm for PaintWorks Plus is undiminished. It's stimulating—and fun."

Since May 1973, Andrews has presented more than 345 astronomy slide shows to clubs and civic organizations, from the Rotary Club to the Daughters of the American Revolution. He's now working on adding slide screen shots of his drawings—which he keeps track of, by the way, with the AppleWorks database.

Andrews also uses **GraphicWriter**, a graphics-oriented word processor published by DataPak, of Sherman Oaks, California. He can import his PaintWorks Plus images into GraphicWriter to integrate text and pictures in the same document. (See Editors' Choice, March 1987, p. 128.)

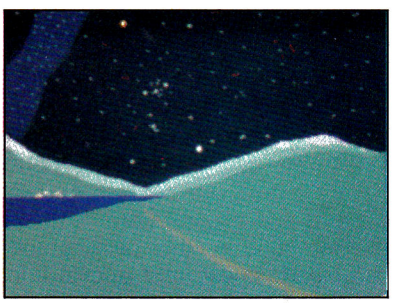
In PaintWorks Plus and his GS, Clark Andrews has discovered a new way to express his love of astronomy—and has happened upon a new means of personal enrichment.□ **—C.F.**



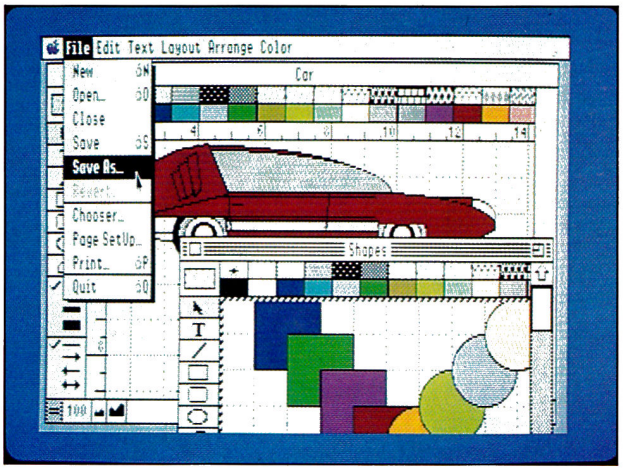
PaintWorks Plus rendition of a DC-10, using the program's color palette and FatBits.



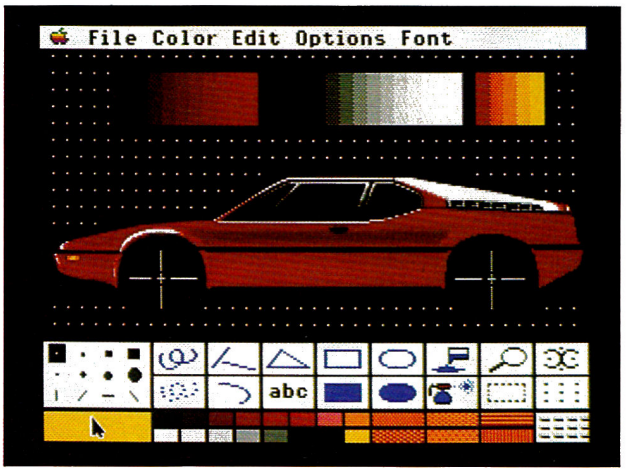
Midnight on the moon beneath a full Earth.



Portrait of Orion on the horizon, as seen from a location in northern Canada.



Draw Plus, a dedicated GS drawing program, provides a "graph paper" screen, rulers, and other tools for precise design.



Baudville's 816/Paint offers intermediate-level features, plus compatibility with PaintWorks Plus and Deluxe Paint II files.

Deluxe Paint II clip art comes in three separate packages: **Art Parts Volumes 1** and **2** and **Seasons & Holidays**. Volume 1 includes African images, maps of the U.S. and the world, pictures of dinosaurs, and a collection of faces, noses, eyes, and other physical features. The latter is like a super-hi-res, adult version of **Facemaker**, Spinnaker's logic and computer-literacy game for children.

Although Baudville doesn't offer clip-art disks yet, 816/Paint can import files from either PaintWorks Plus or Deluxe Paint II. In addition, PaintWorks Plus claims to be compatible with Deluxe Paint II pictures, and it is—sort of. But most of the images in the Electronic Arts clip-art libraries are saved in proprietary Deluxe Paint II form as "brushes," which don't seem to load properly into PaintWorks Plus—but do load easily into 816/Paint.

Baudville's program might be considered intermediate in terms of features and performance when compared with PaintWorks Plus and Deluxe Paint II. When it comes to file compatibility, though, 816/Paint seems to be the most flexible—an advantage users will appreciate increasingly as they contribute artwork created on all three programs to the public domain.

SHARING YOUR CREATIONS

So, you've mixed custom palettes and created a painting, a logo, a greeting card, or some other artwork. You want to brag a little, right?

Well, to distort an old saying, "Every silver lining has a cloud." For now at least, and probably for some time into the future, what you see on paper doesn't come close to what you see on screen.

For one thing, while all GS graphics programs support the ImageWriter II, only 816/Paint supports other Apple-compatible color printers, including the **Okimate 20**, a thermal-transfer model, and the discontinued Epson JX-80, an impact dot-matrix printer. Baudville's program also supports the now-unavailable Apple Scribe. Brother International has announced the **M-4018**, an Epson JX-80 compatible, but it's priced at $1695—the cost of about four ImageWriter IIs. Like it or not, for color printing, the ImageWriter II seems to be almost the only game in town.

To make matters worse, although the quality of black-and-white printouts is acceptable, color printouts are disappointing. Using a better grade of paper sometimes yields better results.

But printing directly onto acetate sheets, in an attempt to create colorful overhead transparencies for my botany classes at the University of Rhode Island, was a dismal failure. The colors were faint and smeared, and the printhead left scratch marks on the acetate. Each ImageWriter II color ribbon costs about $14, too. (For an inexpensive way to refresh them, see the accompanying sidebar, "Recycling Your Color Ribbons.")

As Dennis Snow points out, sometimes the muted appearance of color printouts—especially text on parchment—can be desirable. And, depending on your subject, black-and-white or single-color printouts may be more appealing, as in "pen and ink" or "charcoal" sketches.

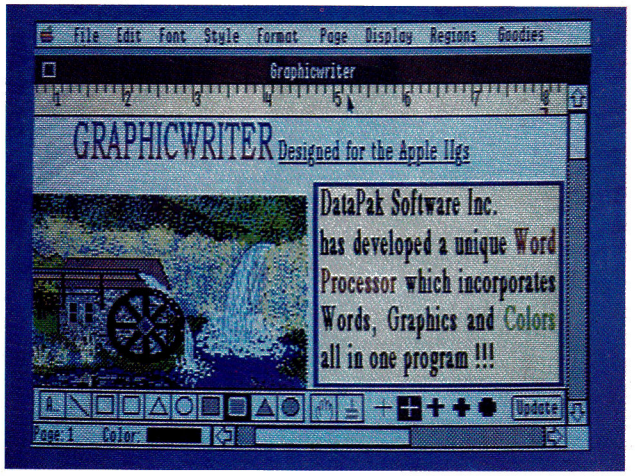


Recycling Your Color Ribbons

Looking for a way to economize on color ribbons? Computer Friends, of Portland, Oregon, sells re-inking units designed specifically for ImageWriter II color ribbons. The product uses special ink and a unique device that applies ink evenly to the four color bands.

Is it messy? If you can pour ink into a hole, you can use this unit. These hints, however, will help you use it neatly and efficiently: 1) Shake the plastic ink bottle well before you begin. 2) To get the ink flowing, push the plunger down once or twice. 3) When finished, insert the plunger into the ink well, while the unit continues to run, to remove excess ink from the well.

At $80 for the unit, $6 for the multicolor-ink kit, and $3 for shipping, you should break even after about six re-inkings. You should get at least five to ten re-inkings from each bottle. After that, each re-inking should cost about a dollar. A good-quality ribbon can hold up even after 60–100 re-inkings.□ **—C.F.**



GraphicWriter, a word processor from DataPak, lets you integrate text and PaintWorks Plus images in one document.

That brings us to another possibility. Computer Friends, the company highlighted in "Recycling Your Color Ribbons," sells ImageWriter II single-color ribbons with a specially formulated ink for making iron-on transfers.

According to Jonathan Cook of Computer Friends, all you need to do is create a mirror-image printout of your artwork. (Use the "flip horizontal" option in the GS paint programs featured here.) Regular paper works fine, but check around for special paper designed for iron-ons.

Because color printouts don't do justice to your artwork, try bypassing the printer altogether—make a videotape of your work. It's easier than you think: Check out "The Apple/VCR Connection," Hints/Techniques, February 1987, p. 117, and "Video Magic," March 1987, p. 51, for instructions. (See "Make the Videodisc Connection," April 1987, p. 59, for a more sophisticated technique.)

Here's another method, suggested by Paul Larkin of West Kingston, Rhode Island. Use an RCA-type cable to connect the composite video-out port (the one that looks like a TV screen) on the back of your GS to the video-in port on the back of your VCR. Leave your RGB monitor plugged into its proper port on the GS. (Unless you have a second, composite monitor hooked up to your GS, the video-out port should be free.) Turn on your VCR, boot up your paint program, and load your masterpiece.

Press the "record" button on your VCR when your artwork appears; turn that function off after your painting, illustration, or animated scene has been displayed for the desired length of time.

If you want to get fancy, use the "pause" function on your VCR between slides or animated movies. Add some text slides, dub in some music. The possibilities are endless, and you can share your enthusiasm about computer art with anyone who owns a VCR of the same format. Best of all, the colors remain true.

SETTLING ON A PROGRAM

The six GS graphics programs described here have a similar "look and feel." What's best for you depends on your computing budget and your artistic needs.

If your artwork leans more toward precision drawings, bar graphs, flowcharts, and the like, Draw Plus or TopDraw is your best bet in a GS graphics program.

It's too soon to tell about Accolade's Graphics Studio (I saw only a prerelease demo disk), but this paint program should be a strong contender in its price range.

For now, the professional artist will probably prefer Deluxe Paint II because of its many high-performance features. The amateur who wants a traditional paint and animation program—and compatability with Draw Plus and **Writer's Choice Elite** (a "graphics" word processor)—will be happy with PaintWorks Plus and its Clip Art Gallery. Baudville's 816/Paint appeals most to those who want flexibility in features, choice of printer, and file compatability.

What can you do with the *G* in your GS? Publish a newsletter. Re-create the Sistine Chapel—or Warhol's soup can. Digitize your dog. In short, there are probably as many reasons to own a GS graphics program as there are reasons to own a GS.■

Product Information

Brother M-4018
Brother International
8 Corporate Place
Piscataway, NJ 08854
(201) 981-0300
(800) 446-6282
$1695
Reader Service Number 301

Art Parts Volume I, $29.95
Art Parts Volume II, $29.95
Deluxe Paint II 2.0, $99.95
Seasons & Holidays, $29.95
Electronic Arts
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San Mateo, CA 94404
(415) 571-7171
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Clip Art Gallery, $29.95
Draw Plus, $79.95
PaintWorks Plus 1.01, $79.95
Writer's Choice Elite, $79.95
Activision Inc.
P.O. Box 7286
Mountain View, CA 94039
(415) 940-6044
(800) 227-9759
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Grand Rapids, MI 49506
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$75
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Spinnaker Software
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Cambridge, MA 02139
(617) 494-1220
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Accolade
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Cupertino, CA 95014
(408) 446-5757
$69.95
Reader Service Number 306

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14011 Ventura Boulevard
Sherman Oaks, CA 91453
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$149.95
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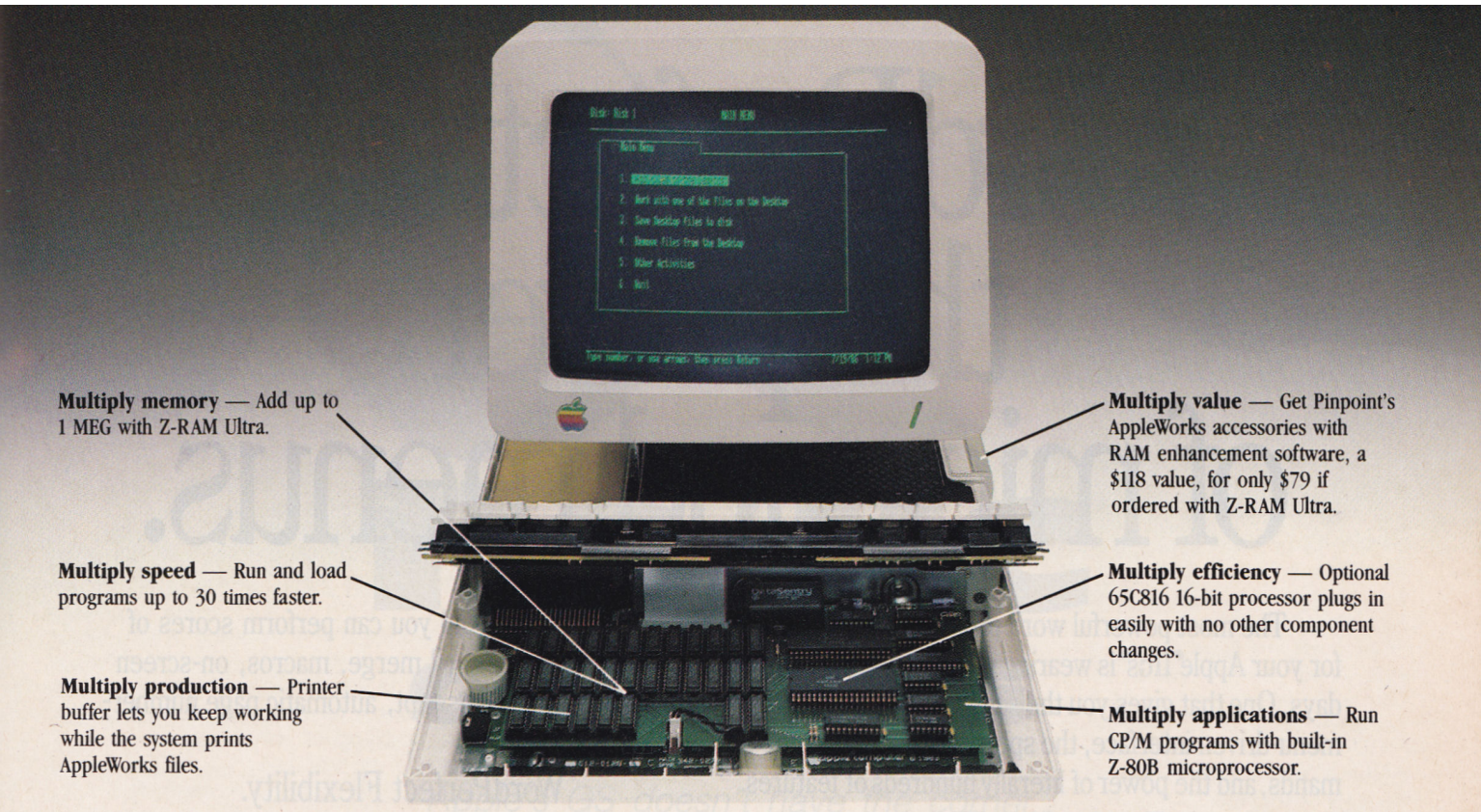
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Heat-Transfer Inker, $70
Heat-Transfer Ribbons, $8
MacInker Solid-Color Inker, $42, $3 shipping
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Portland, OR 97229
(503) 626-2291
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Mount Laurel, NJ 08054
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StyleWave
5250 Gulfton
Houston, TX 77081
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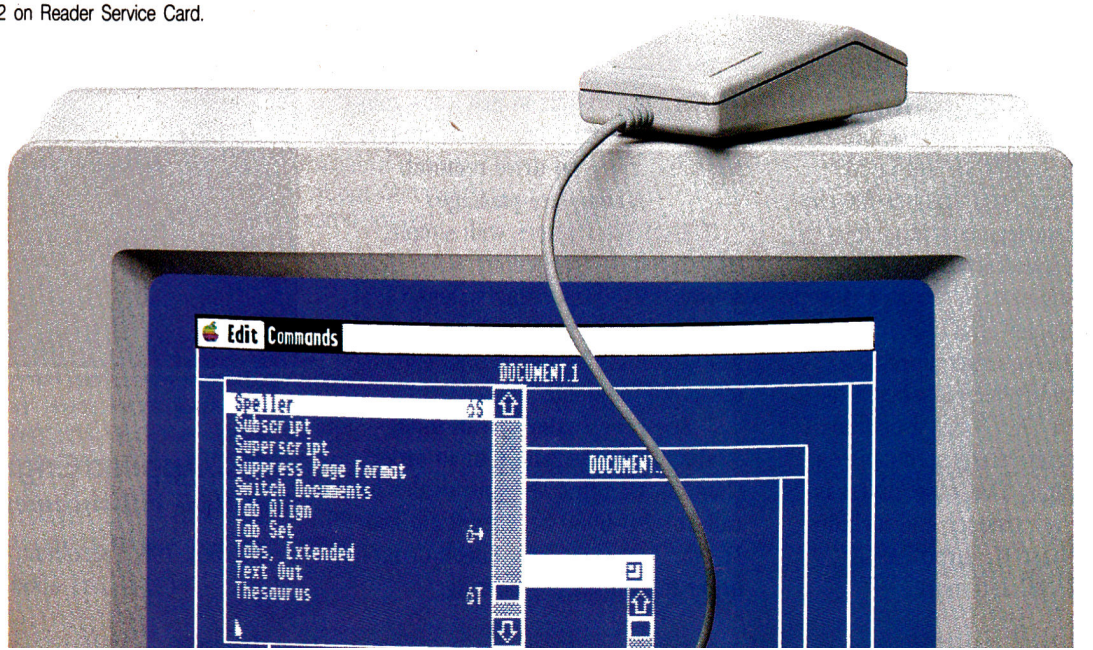
In addition to running on the IIGS, WordPerfect is available for the IIe/IIc.* And files from both versions can be interchanged with WordPerfect files generated on other machines, including IBM®-PC compatibles and some minicomputers.

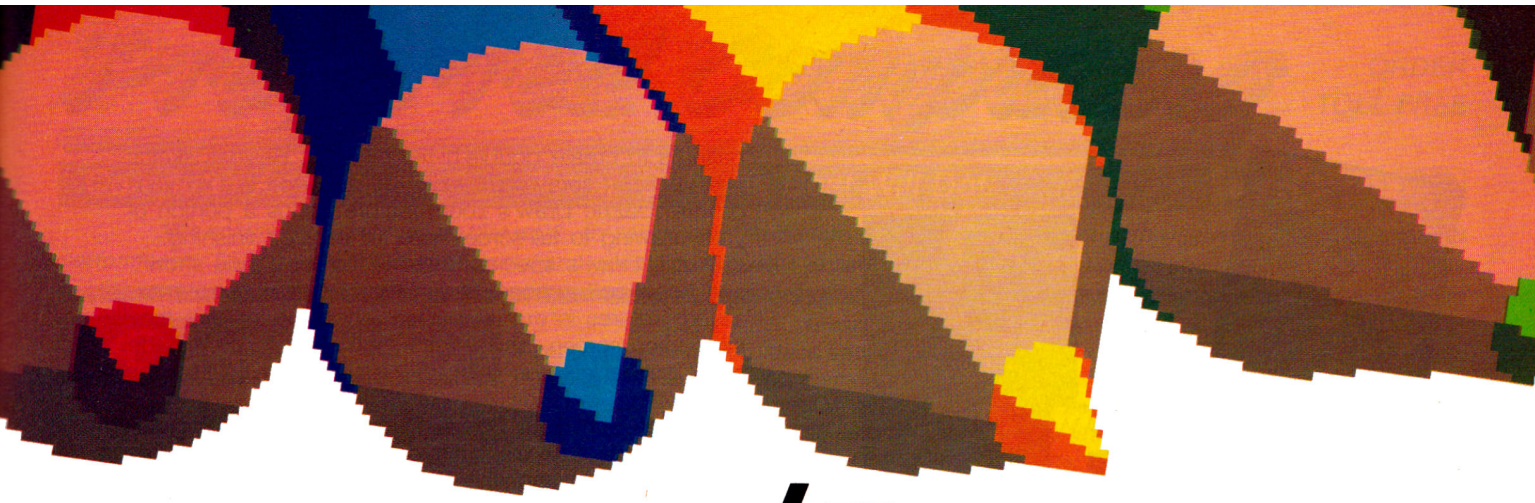
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IIe/IIc GRAPHICS

Apple's GS doesn't have the corner on beautiful color graphics. Get creative—let Apple IIe and IIc drawing and painting programs bring out the artist in you.

by Lafe Low, Assistant Editor

Your Apple IIe or IIc doesn't have the GS' sharp graphics and 4096 colors—but that doesn't mean you can't use it to create lively, appealing pictures.

Painting and drawing programs for the Apple II were around long before the GS entered the picture. With the right package, you can create anything from simple line drawings to complex art.

BEHIND THE SCREENS

Just how does your Apple IIe or IIc draw graphics?

Think of your Apple II as a lit-up scoreboard at a baseball game. When you draw on your computer screen, you're actually turning the "lights" on your screen (called *picture elements*, or *pixels*) on and off—and changing their color.

A *high-resolution*, or hi-res, screen is a matrix 280 pixels wide and 192 pixels high. *Double-hi-res* is just that—twice the number of pixels on the screen—560 by 192, making screen resolution clearer. Every Apple IIe or IIc has a standard-hi-res and a double-hi-res graphics mode. The GS takes that a step further and offers two super-hi-res modes: 320 by 200 and 640 by 200. (See "The 'G' Stands for Graphics," p. 46 in this issue, for more information on GS graphics.)

When coloring pixels separately, only four pure hues, in two primary groups, are available: purple and green, and orange and blue. According to a screen-pixel numbering convention, odd-numbered pixels can be green or orange, and even-numbered pixels purple or blue.

Putting a color from one of the two primary groups next to a color from the other may appear to change the colors of neighboring pixels; this is called *clashing*. You can adjust the colors of individual pixels to obtain the shade you want: Just add pixels of other hues. For example, if you've colored an area blue, but want it darker, adding rows of black pixels will do the trick.

TOOLS OF THE TRADE

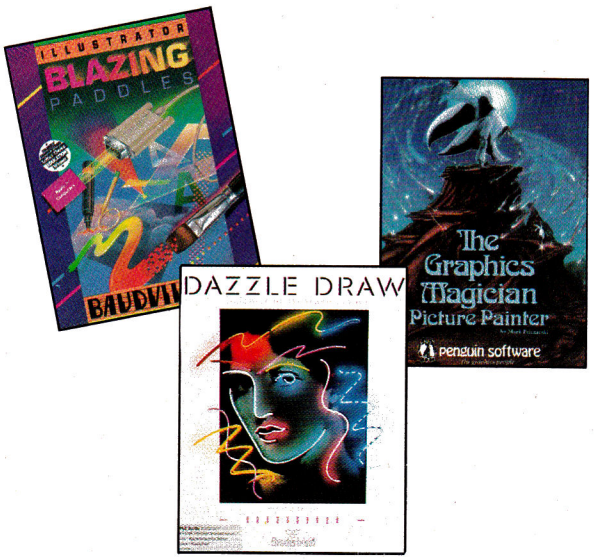
While each Apple II graphics program offers it own unique features, some functions are common to all painting and drawing packages.

First, you can choose from several *brushes* in a number of sizes and shapes. Much like paintbrushes, electronic brushes let you draw lines of varying thickness.

Next, you can fill in outlined areas with color. Drawing and painting programs feature color *palettes*, from which you choose solid colors or mix colors to create other shades. Make sure you've closed your boundaries completely before you color, as color will spill over outside the shape you've drawn until it finds the nearest closed boundary.

Some programs include predrawn shapes or pictures (called *clip art*) you can add to your drawing. You may also want to add a caption or other text; most drawing programs allow text entry in a number of fonts.

After you've made a rough drawing, call on your pro-



gram's *zoom*, or close-up, feature, which allows detailed work on your picture. Especially handy when you're working on a complicated section, such as a human face, "zooming" lets you change your picture pixel by pixel. You can turn ragged edges into smooth curves or add detailed shading.

Drawing and painting programs allow for a number of input devices. The most common are the joystick or mouse, though you might also use a touch tablet or graphics tablet with light pen. Your input device lets you move the cursor to select options, choose brushes and colors, and do the actual drawing. Using a graphics tablet and light pen is probably most similar to paper-and-pencil drawing, but the mouse allows greater precision.

SHOPPING FOR SOFTWARE

When you're ready to choose a drawing or painting program for your IIe or IIc, you should first decide on features that are important to you. As noted above, most programs offer similar functions, but some are more powerful, include more colors, or offer specialty touches.

Dazzle Draw, from Broderbund Software, is one of the most popular paint programs. It offers six shapes of paint brushes (each in four sizes) and works in 16 colors and patterns to create double-hi-res pictures. Besides sketching, you can spray-paint, color-fill, and add text to your picture. Dazzle Draw's zoom feature brings a portion of your drawing to full-screen size for detailed finishing.

Dazzle Draw's special functions include "slide show" and "capture" options. Slide Show lets you show your saved pictures in any sequence, choose how long they'll appear on screen, and whether they'll scroll off or fade out. Capture lets you copy part of your picture and repeat it elsewhere.

You can print your Dazzle Draw pictures in color on an Apple Scribe (now discontinued), ImageWriter II, or Epson JX-80. For black-and-white printing, it supports the NEC 8023A, C-Itoh 8510, Star Micronics 10X and 15X, and Epson's line of Apple-compatible printers.

Baudville produces two drawing and painting programs—**Blazing Paddles** and **Pixit**. Of the two programs, Blazing Paddles is a little easier to operate; Pixit, however, offers more powerful features.

Blazing Paddles' nicely laid-out menu makes it simple to use, especially for first-time computer artists. You can draw with a joystick, mouse, touch tablet, or graphics tablet with light pen. It offers seven brushes, for freehand sketching or drawing dots, lines, and outlined or solid ovals or boxes. You can also fill, spray, or add text.

Blazing Paddles' documentation says the program lets you choose from eight primary colors; actually, you can select from only the four primary colors mentioned above (green, purple, orange, and blue). The other four consist of two whites and two blacks.

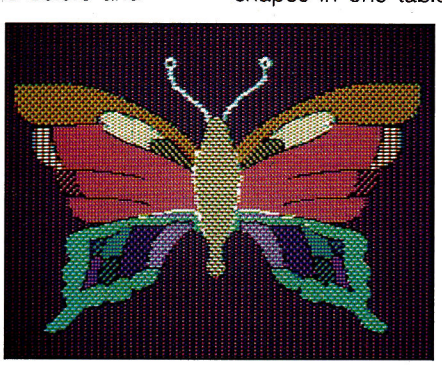
You can mix any colors to create a selection of six textured hues. For example, mixing white and green would yield six various patterns of green and white. You can change your screen's background color to any of the primary colors after you clear a picture from your current screen. Blazing Paddles also offers a window option (cut and paste), zoom, and a *shape table* (a series of binary numbers representing a shape) with about 15 predefined pictures.

Unlike Blazing Paddles, Pixit operates with keyboard commands. Pixit also features sophisticated picture and shape-table editors. The picture editor includes standard functions such as color fill, circles, lines, shapes, text, and various colors. You can also move, scale, and rotate shapes within a picture.

Pixit's shape-table editor lets you combine up to 128 shapes in one table. You can add or delete shapes any-

Dazzle Draw (below) gives you 24 brushes and 16 vivid colors.





Easy-to-use Blazing Paddles (above) offers textured color, windows, and prepared shape tables.

Pixit (below) includes keyboard control and sophisticated picture and shape-table editors.



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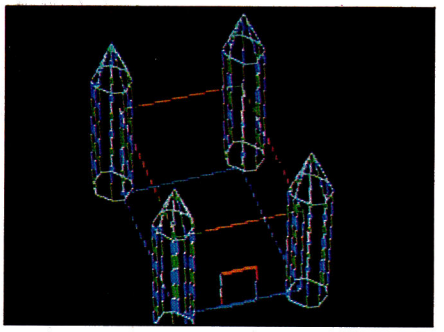
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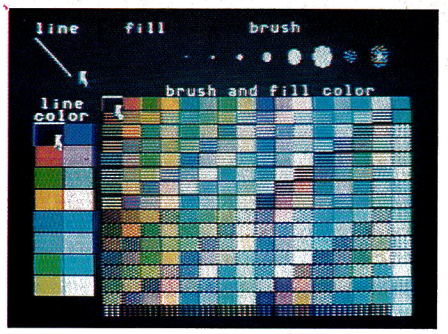
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The Complete Graphics System (below) gives you a 3-D option and fast access to your pictures.





The Graphics Magician (above) lets you save hundreds of pictures per disk and supports keyboard, joystick, mouse, and tablet input.

Animate (below) gives you sophisticated animation tools for computer movies with sound and up to 16 characters per scene.



where within a table, and splice several shape tables into one large table. This module also includes a Create-a-Shape program for designing your own shapes or altering existing ones.

Pixit and Blazing Paddles support the same printers, for the most part, including the Epson JX-80, IDS Prism, Okimate 20, ImageWriter II, and Scribe.

Polarware offers three drawing and painting programs—**The Graphics Magician**, **The Graphics Magician Junior**, and **The Complete Graphics System**. The color palettes in these three programs are impressively large, blending the Apple II's four primary colors into 16 different shades and hues.

The Graphics Magician supports keyboard control as well as other input devices (joystick, mouse, and graphics tablets), and features many of the same standard options as other paint programs.

The Complete Graphics System (CGS) is different from the two Graphics Magician programs in two ways. First, CGS lets you create "three-dimensional" pictures. Second, CGS stores pictures as *bit maps*, letting you save only about 30 pictures per disk. In contrast, Graphics Magician stores its pictures as assembly-language programs, letting you save hundreds of pictures.

What's the difference? Think of it as the difference between drawing a map of Boston and giving someone directions to Boston Garden. Specific instructions don't take up as much room on paper as a complete map. The advantage of assembly-language graphics instructions that reproduce the process of creating those images is that you can keep more images on disk. Accessing them is slow, however, because your monitor has to re-create the picture pixel by pixel. Bit-mapped images take much less time to get from your disk to the screen, because the program saves the complete picture as one shape, reproducing it pixel by pixel, each corresponding to its own memory location.

AT THE MOVIES

If still pictures aren't enough, you can buy software that lets you create animation or "computer movies." Programs in this category include **Fantavision** and **Animate** from Broderbund, and **Take 1** from Baudville.

How can you animate still pictures on an Apple II? Fantavision uses a process called *tweening*: You draw the first and last pictures in your series; Fantavision fills in all the screens in between—up to 64 of them. You don't need to know how to create animation, because the program does it for you.

Although not as easy to use as Fantavision, Animate is more detailed—and represents more traditional animation. Using the program's special tools, you create sophisticated movies and animation, with up to 16 characters per scene. Animate also accepts pictures created with Dazzle Draw. You can even add sound.

Baudville's **Take 1** isn't a graphics generator (you can't create original pictures), but it can load pictures you've created with other programs.

SHOWING THE RESULTS

To get the most out of computer art, get yourself a color monitor. You have two options: color composite and the more expensive, more sophisticated RGB (red-green-blue). Unless you're a serious artist, a color composite will probably serve your needs. (For more information on color monitors, see "The Cadillac of Monitors," p. 63 in this issue.)

If you want hardcopy results, you'll need a color printer, too. (See "Add a Splash of Color," December 1986, p. 66.) Nevertheless, whether you opt for a dot-matrix model, such as the ImageWriter II, or a thermal printer, such as the Okimate 20, the quality of the printed picture won't do justice to its on-screen image.

GET CREATIVE

With your graphics software up and running, it's time to let your imagination run wild. And you don't even have to worry about cleaning up spilled paint or eraser shavings. If you're a serious artist, you'll find that computer art adds a new dimension to your creativity. But even if you're not an artist, Apple II drawing and painting software will make you feel like one.■

Product Information

Animate, $69.95
Dazzle Draw, $59.95
Fantavision, $49.95
Broderbund Software
17 Paul Drive
San Rafael, CA 94903-2101
(415) 492-3200

Reader Service Number 327

Blazing Paddles, $34.95
Pixit, $49.95
Take 1, $59.95
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The Complete Graphics System, $39.95
The Graphics Magician, $39.95
The Graphics Magician Junior, $19.95
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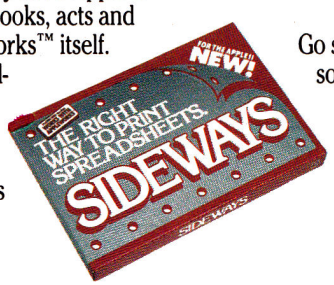
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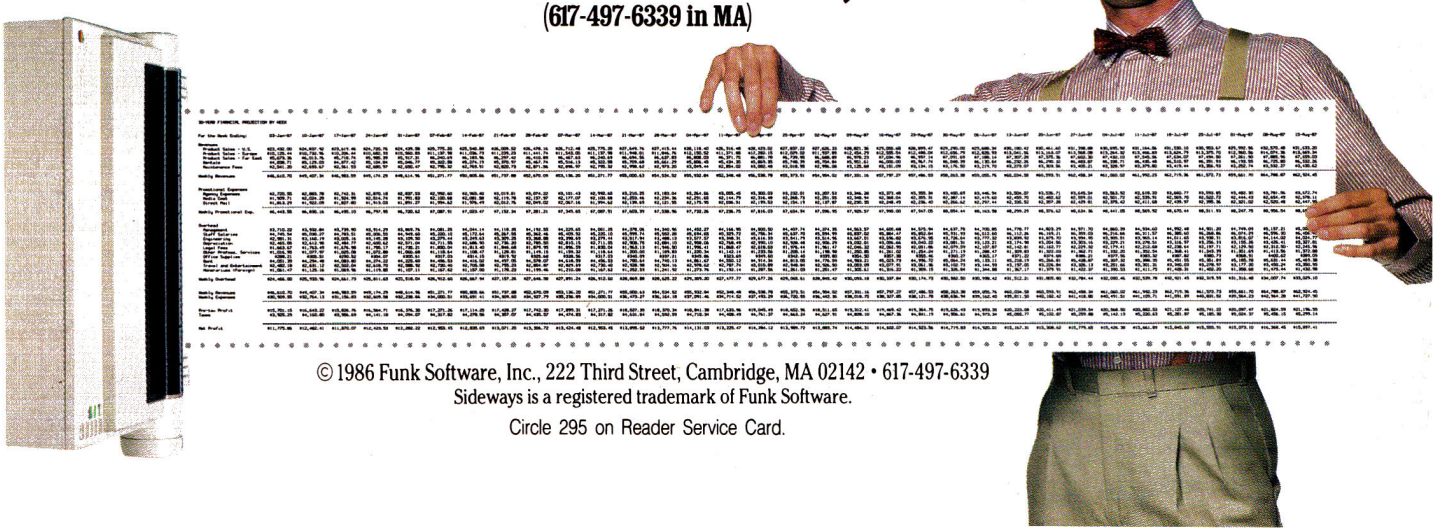
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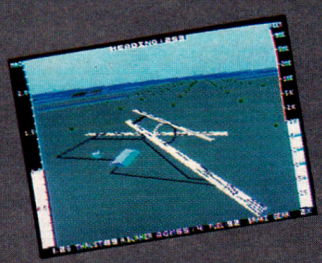


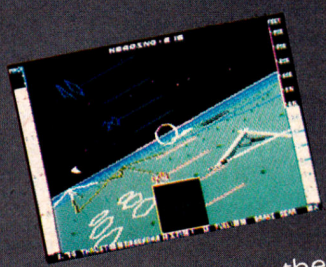


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The Cadillac of MONITORS

Shopping for a color monitor? For 80-column text, brilliant hues, and superior graphics resolution, RGB's an option you'll want to consider.

by Paul Statt, Technical Editor

Who needs RGB? An RGB (red-green-blue) monitor is a necessity for some Apple II users, but to most it's an expensive toy. It costs less than an Apple IIgs ($999), which displays 4096 colors, but more than the ImageWriter II, which can print color graphics. (See the Product Information box.)

Not everyone needs an RGB monitor. In fact, RGB isn't as desirable an option today as it was two years ago. Apple's new, technologically advanced composite monitors can display words and pictures—in color—at a competitive price. If you're serious about computer art, you need RGB. Otherwise, color composite will probably suffice.

GETTING THE SIGNALS STRAIGHT

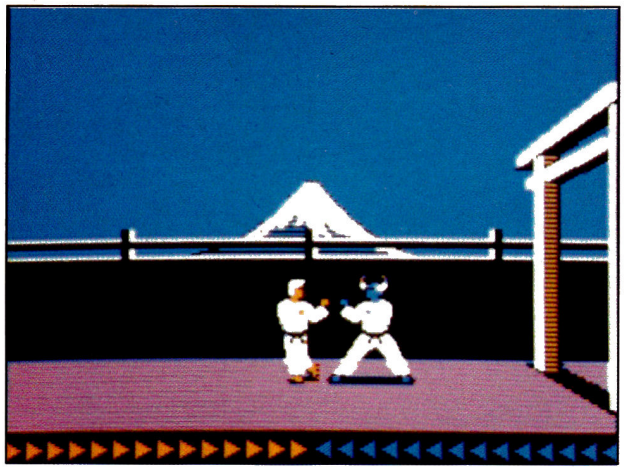
Before you decide whether you need RGB, you need to know how it's different from other types of video displays: You need to know why it looks better and costs more.

Computer monitors work like televisions, with a couple of differences. One difference is that what appears on your monitor has an *intelligent* source—your Apple II, with its random-access memory and its ability to respond to your commands—which your TV lacks. A more important difference, though, is that the computer monitor gets its video signal through a wire, not through thin air like the television—and that makes it much easier to understand how your monitor works.

The video signal is simple. It's an electrical current that flows through the wire connecting your Apple to your monitor. The monitor converts the video signal to a beam of electrons that races across the front of the picture tube, from top to bottom and left to right, filling the screen with words or pictures in less than a second.

Pixels (*picture elements*, or dots on the screen) are composed of phosphorescent material that glows when stimulated by electrical current. Each pixel is either on or





Scene from Karateka as displayed on Apple's Color RGB Monitor for the IIGS.

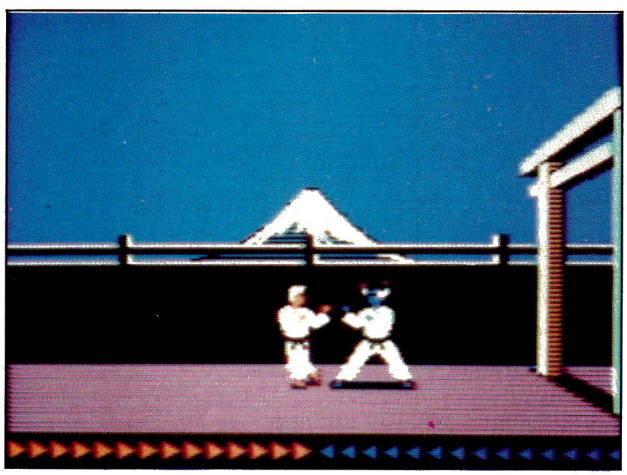
off; the stream of bits and bytes coming from your Apple tells your monitor which pixels to light. You can see an infinite number of different images and intensities on screen—Vanna White, Stickybear, the AppleWorks main menu, or the Applesoft BASIC prompt—because the video signal, hence the beam of electrons that tickles the phosphorescent screen, hence the glow on the screen itself, lights up different patterns of pixels.

That's black-and-white, mind you. When the monitor receives one video signal, it can control only one color—usually black. On a TV, the absence of black is white; on a computer monitor, it's sometimes yellow—an amber monitor—or green.

To see color, you need more signals. Color pixels are larger than monochrome pixels because they're composed of three elements each: a red filter, a green filter, and a blue filter. Different combinations of colors within each pixel and across neighboring pixels create optical illusions—let us perceive many shades and hues on a color monitor.

Your Apple combines, or *composes*, signals for lighting various patterns of the three primary-color filters—red, green, and blue—into a single signal, called the *composite signal*. A color composite monitor (or color TV) *decomposes* this signal into its red, green, and blue components. Color composite monitors and color TVs use one video signal with three parts.

RGB, on the other hand, comes in threes: a red, a green, and a blue signal. The three signals are sent to your monitor simultaneously. RGB is to composite video what parallel data transmission is to serial: It's faster, sending more information in less time.



Same scene shown on Apple's Color Composite Monitor for the IIc.

Product Information

Apple Color Composite Monitor for IIc, $379
Apple Color Composite Monitor for IIe, $379
Apple Color RGB Monitor for GS, $499
Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010
$379

Reader Service Number 311

Color 6005
Amdek
1901 Zanker Road
San Jose, CA 95112
(408) 436-8570
$550
requires IBM digital RGB board

Reader Service Number 312

HX-9, $650
HX-12, $695
Princeton Graphics Systems
601 Ewing Street
Building A
Princeton, NJ 08540
(609) 683-1660
require IBM digital RGB board

Reader Service Number 313

MultiRAM RGB
Checkmate Technology
509 South Rockford Drive
Tempe, AZ 85281
(602) 966-5802
$189.95–$339.95

Reader Service Number 314

RAMWorks III ColorLink RGB,
$129, plus card,
$179–$1099
RAMWorks III RGB Option,
$129, plus card,
$179–$1099
IIc RGB Adapter
Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

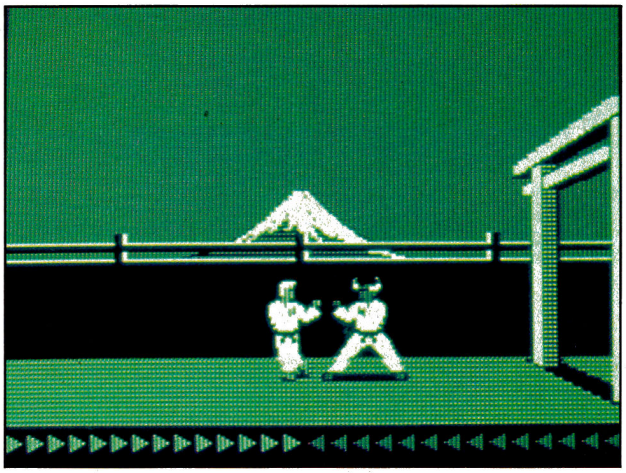
Reader Service Number 315

Taxan 720
Taxan
18005 Cortney Court
City of Industry, CA 91748
(818) 810-1291
$595

Reader Service Number 316

ZVM-135
Zenith Data Systems
1000 Milwaukee Avenue
Glenview, IL 60025
(312) 699-4800
$599
requires IBM digital RGB board

Reader Service Number 317



Apple IIe monochrome display.

The problem is that your Apple II produces a composite signal, as noted above—it comes out through the port on the back of the machine, which takes a standard RCA-type video plug. It's pretty obvious: There's a single hole for a single signal. If you want RGB color on an Apple II, you need to convert that signal to a three-part RGB signal.

Converters on the Apple IIc attach to the auxiliary-video outlet; on the IIe you'll need an interface card. Some makers of RGB monitors supply the card with the monitor; others require that you purchase it separately from another company, such as Applied Engineering or Checkmate Technology, either alone or in combination with a memory-expansion board (such as Applied's **RAMWorks III RGB** option or Checkmate's **MultiRAM RGB**). Video-7, of Milpitas, California, made the RGB converter famous with its Mappler; it no longer produces the Mappler, but you may still be able to find one in a computer store. At press time, an **RGB adapter for the IIc** from Applied Engineering was in the works.

If you own a GS, you have an RGB interface built in. If you want composite video, there's a separate plug for that, too.

BIGGER BANDWIDTH, BETTER COLOR

However you achieve it, the result is that images look sharper on RGB than on composite monitors. You see more colors, especially around the edges of the spectrum, on an RGB monitor because the electronic difference between colors can be greater: On an RGB monitor, the signal that carries information about the color red, for example, carries as much information as the composite signal controlling red, green, and blue. The technical term for the amount of information a monitor can handle (that is, the number of colors it can display and how different they'll appear) is *bandwidth*. The bigger the bandwidth, the better.

A color composite monitor has a bandwidth, or frequency range, of about 5 megahertz (MHz)—good enough for 40 columns of text. Monochrome monitors have a bandwidth of around 9 MHz—good for 80 columns of text in a single color. (TVs have the lowest resolution of all.)

The bandwidth of an RGB monitor is at least 15 MHz—for 80 columns of text and superior graphics resolution. But the GS *analog* RGB monitor transmits 23 MHz, even more information than the older *digital* variety. If you follow the consumer-electronics industry—tapes, compact discs, TVs, and the rest—the news that analog RGB is better than digital probably surprises you.

While digital audio produces clearer sound than analog records and tapes, there's a problem with digital color. A good digital RGB monitor for a computer—such as the GS, which can display 4096 different *pure* colors, not just mixtures of the three primary colors—would theoretically require 4096 lines, or one for each color. It wouldn't be a red-green-blue monitor, but a scarlet-orange-sienna (and so on through African violet) monitor. That's because each line would carry information about one pure color.

But only three color lines—one for shades of red, one for shades of green, and one for shades of blue—control an analog monitor, such as Apple's IIGS monitor. How then can we get 4096 pure colors? Analog monitors contain digital-to-analog converters that change that stream of bits and bytes to a flow of electricity. Instead of simply being on or off, each color pixel varies proportionally in shade as the electrical current varies in intensity.

Your IIe can now have analog RGB color, too. Applied Engineering's new RAMWorks III memory-expansion card with **ColorLink** option promises two types of output—IBM digital and Apple analog.

WHAT TO BUY?

Faced with a choice among today's high-quality color composite monitors, plus digital and analog RGB monitors, what should you buy? The distinctions are subtle. If you need to show many colors on screen, and also need to capture all the fine differences in shade among them, an RGB monitor is a necessity. Unless you're an artist or a designer, you probably don't *need* an RGB. Of course, once you see those vibrant colors and sharp text, that doesn't mean you won't want one.■

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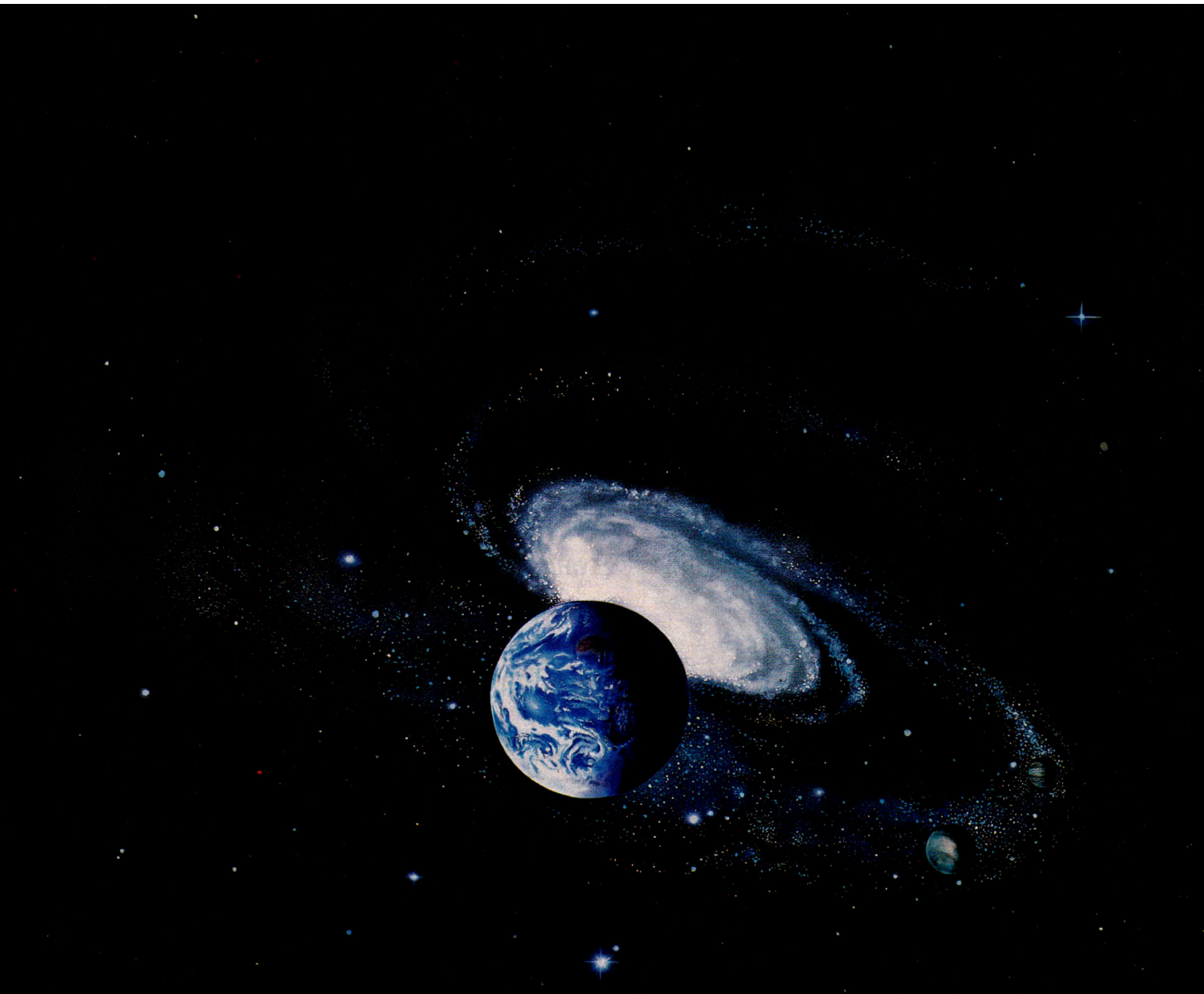
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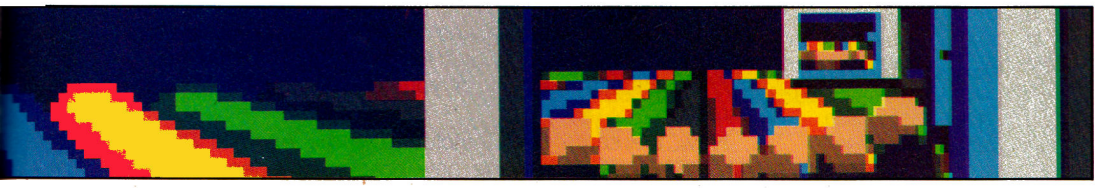
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BASIC PAINT



Get into GS graphics with BasicPaint, an Applesoft program that lets you create dazzling 16-color effects as you dabble in super-hi-res.

by Scott R. Bowers

When Apple introduced the IIGS, I thought it was actually two computers in one: a IIc plus a new computer with great graphics (and sound, too). I also believed it was impossible to access the new world from the old.

After I bought my own GS, however, I discovered you can access the GS' graphics capabilities directly from Applesoft—BasicPaint (see the accompanying **Program listing** and the data strip on p. 124) will show you how. With BasicPaint, you can paint or modify a super-hi-res picture, then save your work to disk.

To use BasicPaint, just follow the prompts to load a picture, then use your mouse to move the pointer and press the mouse button to draw. To change colors, hit the spacebar; to see the menu, hit Escape. You'll draw one pixel at a time and scroll through the 16 available colors. To erase, paint in black. (This is awkward because you can't see the cursor.) Make sure your mouse isn't set to sensitive mode. (Go to the GS Control Panel, select "options," and set "high-speed mouse" to no.)

A QUICK LESSON IN GS GRAPHICS

Before you begin, here's a little background on how the GS creates graphics images and saves them to disk.

A super-hi-res picture takes up 32K of GS memory and has three parts:

1) the *bit map*, which represents your image and uses 32,000 bytes of memory;

2) one or more *palettes* (512 bytes), to determine which 16 of the possible 4096 GS colors to use;

3) 200 *scan control bytes* (SCBs), which control certain details of organization, such as whether to display 320 or 640 pixels per line, whether or not to use the fill mode, and which of the 16 palettes to use. Apple designated 256 bytes for SCBs; the other 56 remain unused.

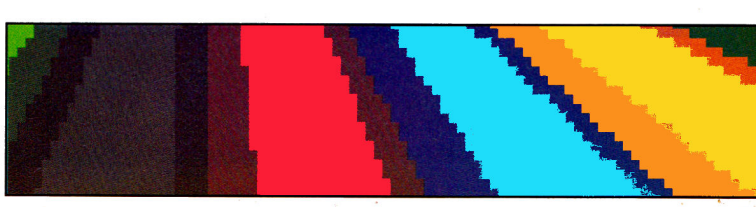
To save a super-hi-res picture to disk, programmers save the bit map, followed by the SCBs, and finally the palettes, under filetype $C1.

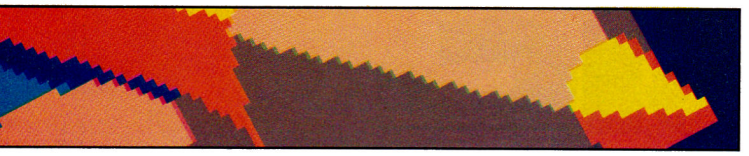
A QUICK TOUR

Because of Applesoft's memory limitations, it can work with only half your picture at a time, but four machine-language routines let you draw on the entire page.

One of the GS' most useful quirks—one it uses in emulation mode to run old IIe and IIc programs—is *memory shadowing*. Shadowing copies the auxiliary bank (GS bank 01) into bank E1—and that just happens to be the place where GS pictures are stored.

So to use Applesoft BASIC to create a GS picture, all you have to do is put it into the proper locations in the auxiliary bank (01). The machine then moves the picture automatically to the graphics-storage area in bank E1. BasicPaint uses five machine-language routines—labeled C1, C2, C3, C4, and C5 in the **Program listing**—to copy data to and from the main-memory bank (00) and the auxiliary bank (01). The subroutines in lines 1000–1150 load these machine-language routines.





GETTING INTO A ROUTINE

Machine-language routine C3 sets up the palettes and SCBs you'll use. BasicPaint calls it near the beginning of the program when it loads the palette and SCBs. C1 and C2 use mouse input to control the bit map.

Even moving the cursor to the bottom half of your picture after working on the top entails a number of intricate, behind-the-scenes programming steps. The routines switch the bit-mapped halves to and from main memory so that Applesoft can access them whether the cursor is on the top or bottom; this maneuver lets you draw on both halves of the screen.

THE HEART OF THE MATTER

BasicPaint's central operation lies in a set of formulae that plot regular X-Y coordinates on the super-hi-res screen. To find the right byte, the program uses the following equation:

```
MEM = 8192 + (Y - 100 * (Y>99)) * 160 + X/2
```

Next, the following formula changes only the correct half of the byte to color C:

```
POKE MEM, (INT(X/2) <> X/2) * (C + INT(PEEK(MEM) / 16 *
16)) + ( INT(X/2) = X/2) * (C * 16 + PEEK(MEM) -
( INT( PEEK(MEM)/16) ) * 16)
```

Finally, the formula to call the routine to transfer the right half to the auxiliary page is this:

```
CALL 768 + 29 * ( Y > 99)
```

When plotting points in which Y is less than 100, BasicPaint calls C4 to load the first half of your picture into RAM at address 8192. When Y is more than 99, the second half loads at address 8192 by calling C5.

DABBLING IN GS GRAPHICS

BasicPaint lets you experiment with the GS' super-hi-res screen in ways conventional paint programs don't permit.



The screen shown above was created a few pixels at a time, scrolling through 16 colors, with the Applesoft program BasicPaint. It's slow, but it lets you experiment in unusual ways with the GS' super-hi-res graphics—you can even create your own palettes.

For instance, you can create your own palettes with the INIT SCREEN subroutine (line 4000) by POKEing 32 new values into memory locations starting at 24864.

Change line 4030 to set any lines you want to any of the palettes you've created. Memory locations 24576–24775 represent SCB lines 0–199. If you POKE zero into one of those locations, BasicPaint uses the first palette; if you POKE 1, it uses the second, and so on up to 16 palettes. You can also use "fill mode" for any GS scan line by adding 32 to the value POKEd into the corresponding SCB. When you set fill mode for a line, all pixels of value zero become the color of the first nonzero pixel on the left—that makes for some interesting special effects when drawing. Don't forget to call C3 after you switch palettes or SCBs, or your changes won't appear on screen.

Now, the same BASIC included in the Apple II Plus before 1980 can control the new graphics modes of Apple's latest II. With BasicPaint's routines, you're free to program anything on the super-hi-res screen—and to do it in the language Apple enthusiasts are most familiar with: limitless Applesoft BASIC.■

Scott Bowers is a computer-science major at Texas A&M University. Write to him at Route 5, Box 1338, College Station, TX 77840.

Program listing. *BasicPaint lets you dabble in GS graphics.*

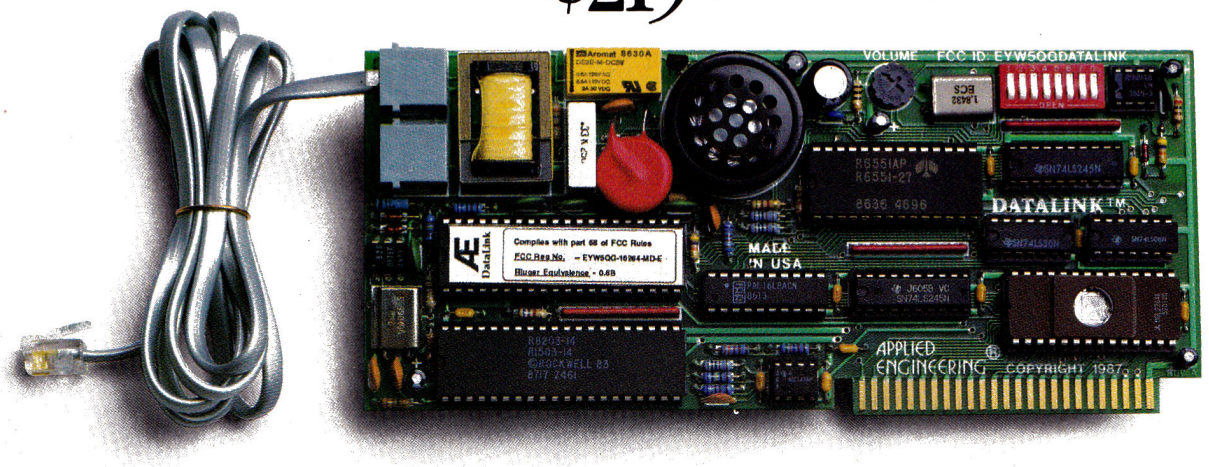
```
10  ONERR  GOTO 8000
20  HOME :D$ =  CHR$ (4): POKE 49205,0:H = 0:VT = 1:HT = 1:C =
    1
30  PRINT "Load picture? (Y/N) ";: GET P$: IF P$ = "y" THEN P
    $ = "Y"
40  GOSUB 1000: REM  LOAD IN ROUTINES
50  IF P$ = "Y" THEN  GOSUB 2000: REM  LOAD PICTURE
60  IF P$ <  > "Y" THEN  GOSUB 4000: REM  BLANK PICTURE, SET
    PALETTE, SET LINES TO PALETTES
70  GOSUB 5000: REM  INIT MOUSE
100  REM  - - - - - - - CHECK KEYBOARD - - - - - - -
110  IF  PEEK ( - 16384) = 155 THEN  GOSUB 6000: POKE 49193,1
    : GOSUB 7000: POKE  - 16368,0: POKE 49193,163: GOSUB 500
    0
120  IF  PEEK ( - 16384) = 160 THEN C = C + 1: IF C = 16 THEN
    C = 0: POKE  - 16368,0: REM  CHANGE COLOR
130  POKE  - 16368,0
140  REM  - - - - - - GET X,Y FROM MOUSE - - - - - -
150  INPUT "";X,Y,S: VTAB 1
160  IF X > 319 THEN X = 319
170  IF Y > 199 THEN Y = 199
180  REM  - - - - SWITCH WORK SCREEN IF NEEDED - - - -
190  IF H = 0 AND Y > 99 THEN H = 1: CALL C5
200  IF H = 1 AND Y < 100 THEN H = 0: CALL C4
210  REM  - - - DRAW COLOR C AT X,Y OR MOVE CURSOR - - -
220 MEM = 8192 + (Y - 100 * (Y > 99)) * 160 + X / 2
230  IF S = 1 OR S = 2 THEN CH = 1: POKE MEM,( INT (X / 2) <
     > X / 2) * (C +  INT ( PEEK (MEM) / 16) * 16) + ( INT (
    X / 2) = X / 2) * (C * 16 +  PEEK (MEM) - ( INT ( PEEK (
    MEM) / 16)) * 16): CALL C1 + 29 * (Y > 99): GOTO 120
240 MV =  PEEK (MEM)
250  POKE MEM,( INT (X / 2) <  > X / 2) * (C +  INT ( PEEK (M
    EM) / 16) * 16) + ( INT (X / 2) = X / 2) * (C * 16 +  PEEK
    (MEM) - ( INT ( PEEK (MEM) / 16)) * 16): CALL C1 + 29 *
    (Y > 99): POKE MEM,MV: CALL C1 + 29
260  GOTO 110
270  GOSUB 6000: POKE 49193,1: END
997  REM  - - - - - - - - - - - - - - - - - - - - - -
998  REM            CREATE SUPER RES ROUTINES
999  REM  - - - - - - - - - - - - - - - - - - - - - -
1000  FOR I = 25344 TO 25488: READ T: POKE I,T: NEXT I:C1 = 2
    5344:C2 = 25373:C3 = 25402:C4 = 25431:C5 = 25460: RETURN

1010  DATA  169,0,133,60,169,32,133,61,169,127
1020  DATA  133,62,169,94,133,63,169,0,133,66
1030  DATA  169,32,133,67,56,32,17,195,96,169
1040  DATA  0,133,60,169,32,133,61,169,127,133
1050  DATA  62,169,94,133,63,169,128,133,66,169
1060  DATA  94,133,67,56,32,17,195,96,169,0
1070  DATA  133,60,169,96,133,61,169,0,133,62
1080  DATA  169,99,133,63,169,0,133,66,169,157
1090  DATA  133,67,56,32,17,195,96,169,0,133
1100  DATA  60,169,32,133,61,169,127,133,62,169
1110  DATA  94,133,63,169,0,133,66,169,32,133
1120  DATA  67,24,32,17,195,96,169,128,133,60
1130  DATA  169,94,133,61,169,255,133,62,169,156
1140  DATA  133,63,169,0,133,66,169,32,133,67
1150  DATA  24,32,17,195,96
```

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Fits any slot (even with fan)	YES	NO

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Listing continued.

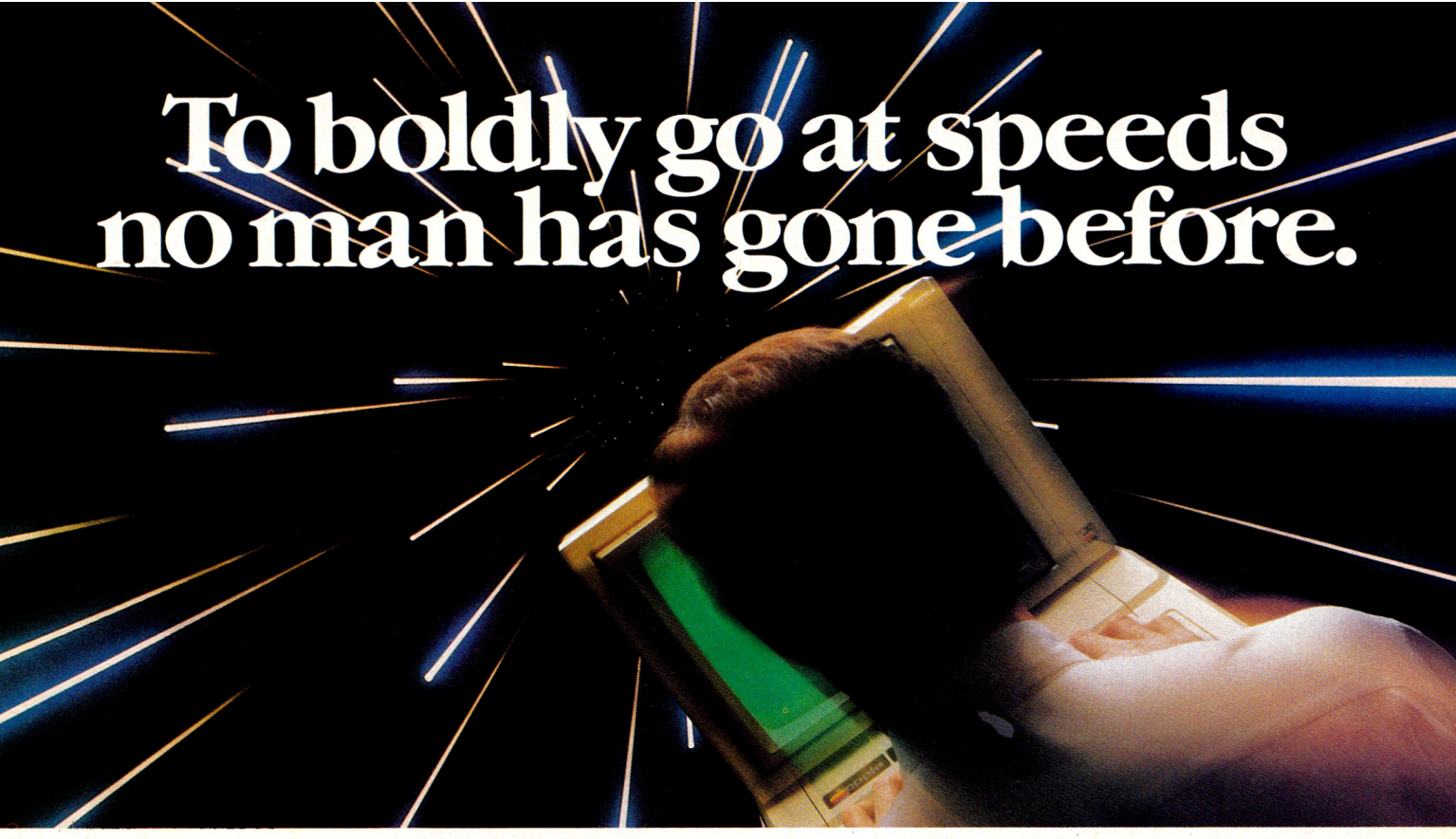
```
1997  REM  - - - - - - - - - - - - - - - - - - - - - - -
1998  REM                  LOAD PICTURE
1999  REM  - - - - - - - - - - - - - - - - - - - - - - -
2000  POKE  - 16368,0: POKE 49193,1:P$ = "Y": HTAB HT: VTAB V
     T: CALL  - 868: INPUT "Enter picture to load: ";PIC$: IF
     PIC$ = "" THEN  PRINT D$"CAT":HT = 1:VT = 24: GOTO 2000
2010  POKE 49193,163:CH = 0:F1 = 0:F2 = 0:F3 = 0:F4 = 0:F5 =
     0
2020  PRINT D$"BLOAD"PIC$",A24576,L768,B32000,T$C1": CALL C3
2030  PRINT D$"BLOAD"PIC$",A8192,L16000,T$C1": CALL C1
2040  PRINT D$"BLOAD"PIC$",A8192,B16000,L16000,T$C1": CALL C2

2050  CALL C4
2060  RETURN
2997  REM  - - - - - - - - - - - - - - - - - - - - - - -
2998  REM                  SAVE PICTURE
2999  REM  - - - - - - - - - - - - - - - - - - - - - - -
3000 F1 = 0:F2 = 0:F3 = 0:F4 = 0:F5 = 0
3010  CALL C4: PRINT D$"BSAVE"PIC$",A8192,L16000,T$C1"
3020  CALL C5: PRINT D$"BSAVE"PIC$",A8192,L16000,B16000,T$C1"

3030  PRINT D$"BSAVE"PIC$",A24576,L768,B32000,T$C1"
3040  CALL C4: POKE 49193,163:CH = 0:P$ = "Y"
3050  RETURN
3997  REM  - - - - - - - - - - - - - - - - - - - - - - -
3998  REM                  INIT SCREEN
3999  REM  - - - - - - - - - - - - - - - - - - - - - - -
4000  POKE 49193,163: POKE 230,32: CALL  - 3086: POKE 230,64:
     CALL  - 3086: REM  BLANK SCREEN
4030  FOR I = 0 TO 199: POKE 24576 + I,0: NEXT : REM  SET SCB
     S
4040  FOR I = 0 TO 31: READ T: POKE 24832 + I,T: NEXT : REM
     SET PALETTE #0
4050  DATA  0,0,119,7,65,8,44,7,15,0,128,0,112
4060  DATA  15,0,13,169,15,240,15,224,0
4070  DATA  223,4,175,13,143,7,204,12,255,15
4900  CALL C1: CALL C2: CALL C3: RETURN
4997  REM  - - - - - - - - - - - - - - - - - - - - - - -
4998  REM                  INIT MOUSE
4999  REM  - - - - - - - - - - - - - - - - - - - - - - -
5000  PRINT D$"PR#4": PRINT  CHR$ (1)
5010  PRINT D$"PR#0"
5020  PRINT D$"IN#4"
5030  RETURN
5997  REM  - - - - - - - - - - - - - - - - - - - - - - -
5998  REM                TURN OFF MOUSE
5999  REM  - - - - - - - - - - - - - - - - - - - - - - -
6000  PRINT D$"IN#0": PRINT D$"PR#4": PRINT  CHR$ (0): PRINT
     D$"PR#0": RETURN
6997  REM  - - - - - - - - - - - - - - - - - - - - - - -
6998  REM                  PRODOS MENU
6999  REM  - - - - - - - - - - - - - - - - - - - - - - -
7000  HOME : VTAB 8: HTAB 11: PRINT "1) Load picture": VTAB 1
     0: HTAB 11: PRINT "2) Save picture": VTAB 12: HTAB 11: PRINT
     "3) Save picture as...": VTAB 14: HTAB 11: PRINT "4) Go
     back to picture": VTAB 16: HTAB 11: PRINT "5) Quit": POKE
     49193,1
7010 VT = 19:HT = 6
7030  POKE  - 16368,0
7040 A =  PEEK ( - 16384): POKE  - 16368,0: IF A <  > 177 AND
     A <  > 178 AND A <  > 179 AND A <  > 180 AND A <  > 181 THEN
     7040
7045  POKE  - 16368,0
7050  IF A = 177 OR A = 181 THEN F1 = 1
7060  IF F1 = 1 AND CH = 0 AND A = 177 THEN  CALL  - 868: GOSUB
     2000: RETURN
7070  IF F1 = 1 AND CH = 0 AND A = 181 THEN  POKE  - 16368,0:
     HOME : END
7080  IF F1 = 1 AND CH = 1 THEN F2 = 1
7090  IF F2 = 1 THEN  VTAB 19: HTAB 6: CALL  - 868: PRINT "Sa
     ve picture? (Y/N)";
7100  IF F2 = 1 THEN P =  PEEK ( - 16384): IF P <  > 217 AND
     P <  > 249 AND P <  > 206 AND P <  > 238 THEN 7100
7105  POKE  - 16368,0
7110  IF F2 = 1 AND (P = 206 OR P = 238) AND A = 177 THEN  CALL
      - 868: GOSUB 2000: RETURN
7120  IF F2 = 1 AND (P = 206 OR P = 238) AND A = 181 THEN  POKE
      - 16368,0: HOME : END
7130  IF (F2 = 1 AND (P = 217 OR P = 249)) OR A = 178 THEN F3
     = 1
7140  IF F3 = 1 AND P$ = "Y" THEN  GOSUB 3000
7170  IF F3 = 1 AND P$ <  > "Y" THEN F4 = 1: POKE  - 16368,0
7180  IF F4 = 1 OR A = 179 THEN  VTAB 19: HTAB 6: CALL  - 868
     : INPUT "Type name of picture: ";PIC$: IF PIC$ <  > "" THEN
     P$ = "Y": PRINT D$"CREATE"PIC$",T$C1"
7200  IF ((F4 = 1 OR A = 178 OR A = 179) AND PIC$ <  > "") AND
     P$ = "Y" THEN  GOSUB 3000
7230  IF A = 180 THEN  RETURN
7240  IF A = 177 THEN  GOSUB 2000: RETURN
7250  IF F4 = 1 OR ((A = 179 OR A = 178) AND PIC$ <  > "") THEN
      RETURN
7260  IF A = 181 THEN  POKE  - 16368,0: HOME : END
7997  REM  - - - - - - - - - - - - - - - - - - - - - - -
7998  REM                ERROR TRAPPER
7999  REM  - - - - - - - - - - - - - - - - - - - - - - -
8000 E =  PEEK (222): POKE  - 16368,0: POKE 49193,1
8010  IF E = 19 THEN  VTAB 22: HTAB 4: PRINT "File exists.  O
     verwrite? (Y/N)"
8020 P =  PEEK ( - 16384): IF P <  > 217 AND P <  > 206 AND P
      <  > 249 AND P <  > 238 THEN 8020
8030  IF E = 19 AND (P = 217 OR P = 249) THEN  GOSUB 3000: POKE
     49193,163: GOTO 70
8040  IF E = 19 AND (P = 206 OR P = 238) THEN  POKE 49193,163
     : GOTO 70
8050  IF E = 6 THEN  PRINT D$;"CREATE"PIC$",T$C1": GOSUB 3000
     : POKE 49193,163: GOTO 70
```

End of Listing.

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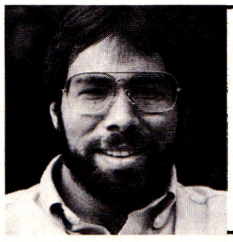


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3 PROGRAMS IN PROGRESS

Three times II equals SoftSwitch: This new desk accessory lets you load three programs into one Apple, to get the most from 8-bit software.

by Eric Grevstad, Review Editor

While more ProDOS 16 programs appear every week, most Apple IIGS owners spend a lot of time running 8-bit Apple II software—and wishing their investment in a GS with memory card yielded something more than extra speed that trails that of a IIe with accelerator card. Now, given the investment of another $59.95, it does.

Roger Wagner Publishing's SoftSwitch, a program users have been waiting for since Apple announced the GS, is a solid, if less elegant, implementation of the idea behind the popular Macintosh Switcher. If you have a 512K or larger RAM card, SoftSwitch lets you load three 8-bit programs into your GS, flip among them in seconds, and paste images from one into another. Instead of using the GS as a 128K Apple IIe, SoftSwitch lets you use it as three of them.

SoftSwitch won't turn separate programs into integrated software (no cutting rows from a spreadsheet and pasting them into a word processor), and holding multiple programs in memory isn't real multitasking in the sense of having a program running, not just suspended, behind another. Memory-partition programs are nothing new, anyway; Beagle Bros' two-year-old Extra K turns a 128K Apple into two 64K machines, and a number of 8-bit RAM cards come with software that lets you load several programs or operating systems.

Still, SoftSwitch is irresistible. Installed on a ProDOS 16 system disk (a supplied disk conveniently skips the Program Launcher to boot directly into the Desktop or BASIC), Ken Kashmarek's utility appears on the desk-accessories menu when you press Control-Open apple-Escape.

Its display shows four miniature black-and-white screens—the current workspace or program as you just left it, and up to three saved workspaces. Each represents a particular program captured at a particular point (the date and time indicated below the miniature screen, and the program's status at that instant): a database in midsort, a graphics program halfway through coloring a rectangle, an adventure game before you open the dungeon door. You can run programs from different floppy disks, though naturally each will expect to find the proper disk in the drive when you return to work.

Saving a program in progress, clearing a partition, or switching a workspace to the active window is as easy as pressing the apple and number keys. An "auto-save" option is even easier, updating a program's workspace each time you enter SoftSwitch. Keepsake, a supplied ProDOS 16 utility, saves a workspace to a 133K disk file so that you can reload it days later and pick up where you left off.

GAMES AND GRAPHICS

It takes a few keystrokes—the escape sequence, up or down arrows in the accessories menu, Return, a number key, Y to confirm a change, and two Returns—but swapping programs with SoftSwitch beats rebooting and reloading. Among other things, it makes the Macintosh-style ProDOS 8 Desktop truly usable. Stored as a workspace, the Desktop no longer takes a tiresome half-minute to reload after you leave a program, and its "Startup: Slot 6" function lets you boot DOS 3.3 or protected applications or games without losing your other work.

The real value of SoftSwitch, however, goes beyond simply switching among your spreadsheet, communications program, and F-15 Strike Eagle or whatever. Besides storing different programs, SoftSwitch lets you store different



Top, SoftSwitch display shows Blazing Paddles running (top center), with the GS Desktop, Stickybear Spellgrabber, and AppleWorks stored.

moments within the same program, helpful when debugging a listing, comparing versions of a word-processing document, or practicing part of an arcade game without being sent all the way back to the beginning if you lose.

And SoftSwitch gives new life to most graphics programs. For graphics screens (or text screens to be printed as documentation), an open apple-E command lets you examine the current workspace's graphics pages (text, hi-res, or double-hi-res) and copy any of them to a clipboard. You can then bring a graphics program to the active window and paste in the first image—moving images between different operating systems or protected disks, or putting your favorite arcade or educational screen into a drawing program. The SoftSwitch disk includes a couple of sample BASIC programs and a handy Screen Manager that saves and loads images to and from disk.

EIGHT BITS, WELL BEHAVED

Is SoftSwitch too good to be true? Not quite. Limited to 128K Apple II applications, it can't save or switch bulky ProDOS 16 programs (though you can launch one from the Desktop, capture a screen, then exit the program).

It won't work with ProDOS 1.1.1 software or some games, Broderbund graphics packages, and other programs that disable the Control-Open apple-Escape sequence or reboot the system instead of giving a proper quit command. You have to remember some rules, too: AppleWorks 2.0, for instance, eats all the memory it can find and should be loaded last. Also, you can't save a 2.0 workspace, return to AppleWorks, shut it down with the "quit" command, then try to jump back into the workspace. AppleWorks crashes emphatically.

SoftSwitch's copy-protected installation disk lets you put the accessory on any number of ProDOS 16 system disks. Our prerelease version produced disks that worked fine in the computer with which we created them, but trying to use one in a different IIgs rendered that machine unable to boot any other ProDOS 16 disks. They hung up with an "Unable to load TOOL.SETUP file" message, until we changed Control Panel RAM-disk sizes and finally removed and replaced the RAM card.

This puzzled Roger Wagner, who told us that the production version lets you boot your disk on a friend's machine for a temporary demonstration, but not install SoftSwitch a second time. According to the manual, your registration card entitles you to a second copy of the installation program if you have a second machine.

Most users, of course, have just one GS. SoftSwitch is a boon not only for them, but for office or classroom settings, as well, where two or three users might have to share a single system or interrupt each other's work for access to a printer. For these situations or just for playing around, SoftSwitch is the best GS boost $60 can buy. It's a simple, neat trick that works with tons of popular programs, and the most compelling reason yet for existing software users to get a GS. We expect this program to be very popular.■

Product Information

SoftSwitch
Roger Wagner Publishing
1050 Pioneer Way
Suite P
El Cajon, CA 92020
(619) 442-0522
$59.95

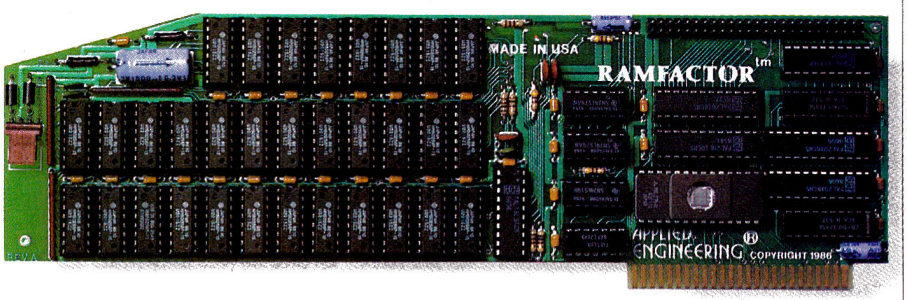
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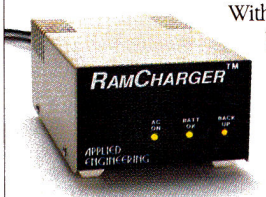
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AppleWorks Power

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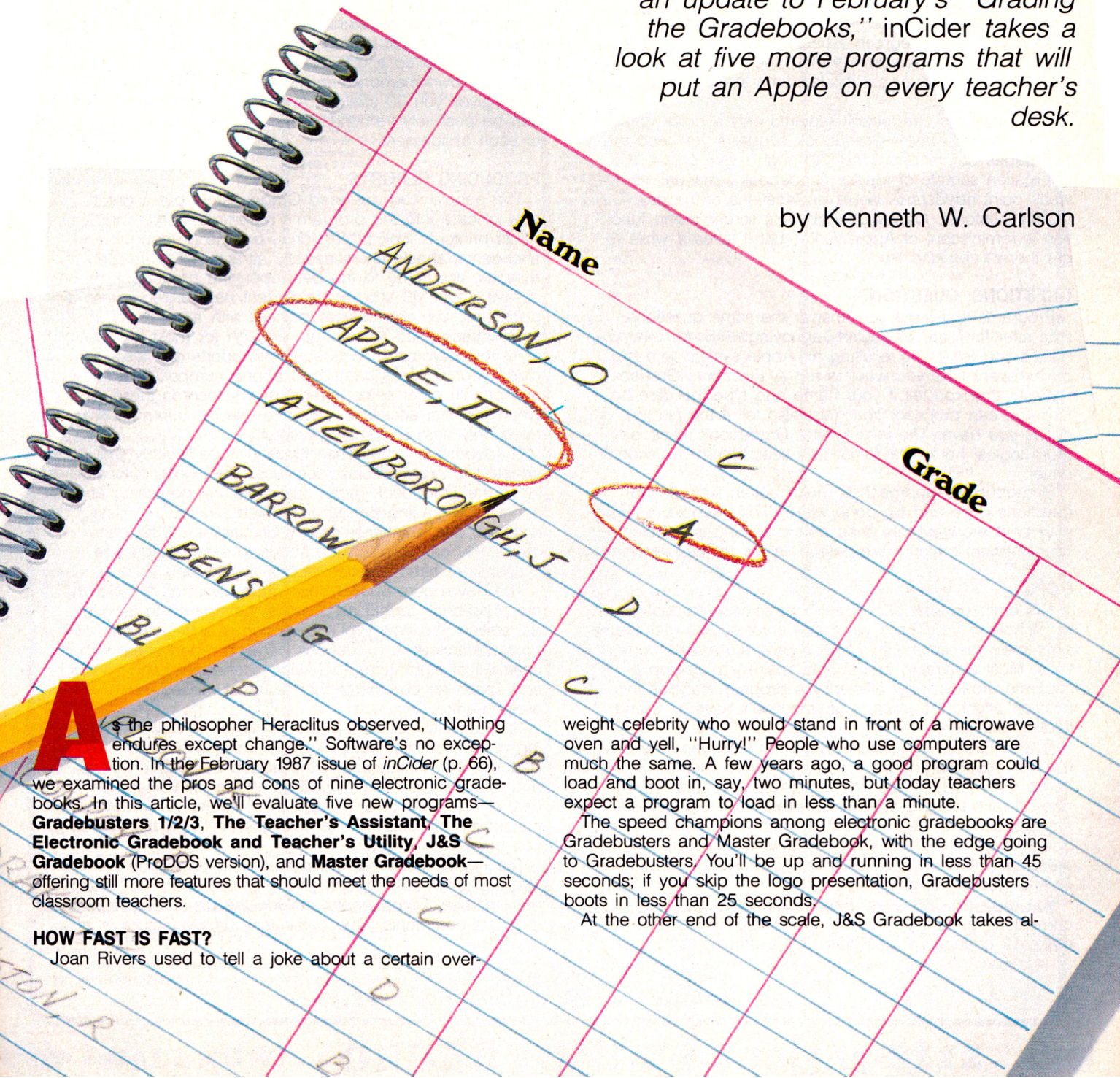
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GRADEBOOKS REVISITED

Busy educators need all the recordkeeping help they can get. In an update to February's "Grading the Gradebooks," inCider *takes a look at five more programs that will put an Apple on every teacher's desk.*

by Kenneth W. Carlson



As the philosopher Heraclitus observed, "Nothing endures except change." Software's no exception. In the February 1987 issue of *inCider* (p. 66), we examined the pros and cons of nine electronic gradebooks. In this article, we'll evaluate five new programs—**Gradebusters 1/2/3**, **The Teacher's Assistant**, **The Electronic Gradebook and Teacher's Utility**, **J&S Gradebook** (ProDOS version), and **Master Gradebook**—offering still more features that should meet the needs of most classroom teachers.

HOW FAST IS FAST?

Joan Rivers used to tell a joke about a certain overweight celebrity who would stand in front of a microwave oven and yell, "Hurry!" People who use computers are much the same. A few years ago, a good program could load and boot in, say, two minutes, but today teachers expect a program to load in less than a minute.

The speed champions among electronic gradebooks are Gradebusters and Master Gradebook, with the edge going to Gradebusters. You'll be up and running in less than 45 seconds; if you skip the logo presentation, Gradebusters boots in less than 25 seconds.

At the other end of the scale, J&S Gradebook takes al-

most three minutes to load weighted data. Unweighted grades load faster, but you must then call up another module to weight them.

MANUAL? WHAT MANUAL?

One way to test a gradebook's ease of use is to see how far you can get without looking at the manual. Teachers aren't likely to spend hours learning a program—they just don't have time.

Gradebusters shines in simplicity of operation. Except for a few fine points, you can go through Gradebusters without touching the manual. All its functions are menu driven and easy to understand. If you're careful about reading documentation, though, Gradebusters comes with complete instructions.

Running the other four programs is more difficult, though in varying degrees. I had trouble getting to first base in Teacher's Assistant without the manual. It's complete and informative, but it takes time to master the information.

The Electronic Gradebook requires only a quick glance at the manual; Master Gradebook suggests you read several pages before beginning. Although I saw only a prepublication sample of Master Gradebook's manual, its weak point appears to be its explanations of the program's printouts. Master Gradebook's screen-dump function is reminiscent of AppleWorks', but it takes a while to get there.

QUESTIONS, QUESTIONS!

Programs that insist you answer the same questions time after time are particularly annoying. J&S, for example, makes you tell it you're using an Apple system with two drives every time you want to run it. Electronic Gradebook requires that you tell it your name and type the date before you can proceed. You must also tell it the number of drives you have. The tack Master Gradebook takes is more logical here: It automatically searches for a second drive.

Gradebusters' approach is much better: Answer the questions once and be done with it. For example, entering your print requirements once before starting is sufficient. Your answers become the default values for that session.

OOPS

The ominous look of a junior-high science student burning a hole in your back while you enter scores makes you appreciate the ease with which a program makes corrections. Most electronic gradebooks make you call up a separate module; how efficiently a program handles this function affects the amount of time you'll have to spend fiddling with it.

Master Gradebook requires that you load separate modules for changes in names and corrections in grades. Because it's written in machine language, this function doesn't take long. Gradebusters presents a slightly different approach: Once you load its change module (it takes about 15 seconds), you can edit anything on screen—name, assignment, date, or grade, for instance. You save all changes at the same time.

You must tell J&S every time you want to make a correction—even if you've just made one. If you have to make 12 changes in one class, for example, you'll have to answer the same question 12 times. It's annoying and time-consuming. In Electronic Gradebook you must repeatedly type in the number of the student whose grade you want to change. With Teacher's Assistant, you can change as many names or grades as you need to, but you'll have to call up separate modules.

BREAKING YOUR CODES

Your class has just finished dissecting earthworms. It's March 23, 1987. How do you enter your students' grades for this session?

J&S gives you ten spaces in which to describe this exercise and note the date. Electronic Gradebook is worse—only nine spaces. Teacher's Assistant gives you only two rows of four spaces each.

Master Gradebook and Gradebusters are the most considerate. Instead of forcing you to develop abbreviations that would trip up a U.S. Navy codebreaker (not to mention your own memory one month later), Master Gradebook gives you 30 spaces. And with Gradebusters, you can be positively verbose: 39 spaces for the title and date of each assignment.

PRODUCING REPORTS

The people who designed Gradebusters put a great deal of care into the program's report-generation module. All its printouts look professional, but the gradebook and attendance sheets are especially attractive. For aesthetic reasons, according to the developer, the gradebook report always leaves 40 spaces for student names, regardless of class size. You can customize them with a comment in up to 70 spaces, too—more than enough for most purposes.

At your command, Gradebusters reports can also include your school's name and phone number, the date, and certain other items. Gradebusters records these data when you first access the disk; to use the information, you need only answer some questions.

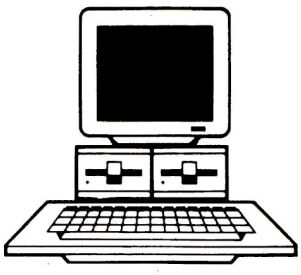
Gradebusters' attendance function is particularly well adapted to practical classroom use. This sheet looks similar to the gradebook page. Just enter the beginning and end of the grading period along with any institute days, holidays, and any other days your classes will be canceled. You can also include codes to indicate absence, suspension, band practice, sports events, and so on.

The developers of J&S have gone about as far with the old gradebook format as possible. Compared to its original edition, the new ProDOS version is quite efficient. J&S' printouts include a gradebook page, a report sheet with a checklist of eight items (behavior, attendance, and so on) and space for comments, and a list of missed assignments.

You can also tell J&S to print a list of all students receiving grades of, say, below 70. Electronic Gradebook also performs this function, with the added advantage that at one keystroke it can produce reports for all classes on disk or for a particular student in all subjects. Gradebusters prints individual reports, too—just highlight the names you want.

Teacher's Assistant prints nice-looking pages, as well. The big drawback, though, is the limited space for assignment names. Other reports include the usual records, with room for comments. One particularly handy feature is its

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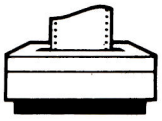


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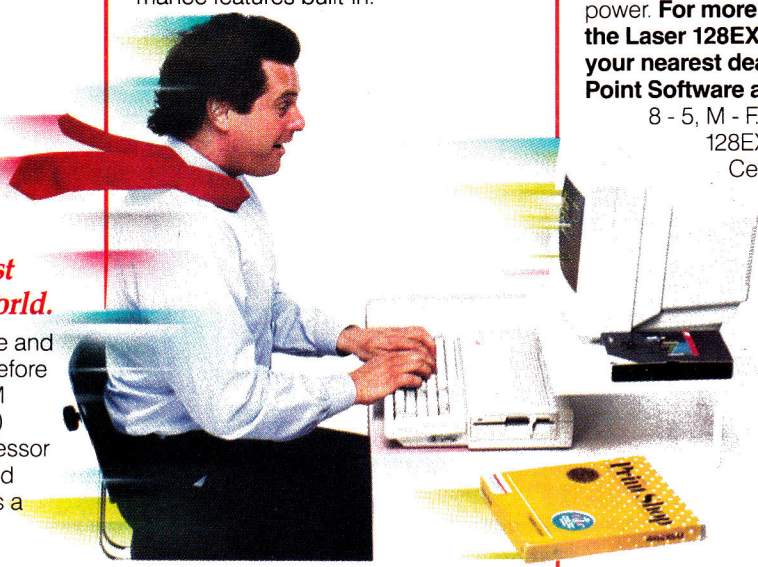
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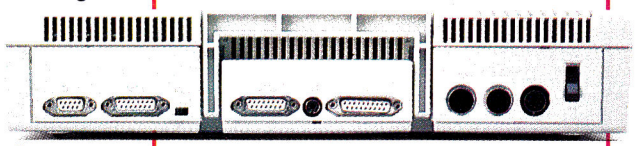
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seating-chart function. You can enter student names yourself, or tell the program to assign seats randomly. (The advantage of that, of course, is that when students complain about their seats, you can just tell them it's the computer's fault.)

IT'S ALL IN THE NUMBERS

Nowadays, a program is useless if it can't do statistics. Four of the five gradebooks reviewed here can perform at least basic statistical calculations.

The champ is Teacher's Assistant. It handles the usual computations—mean, median, and mode—but also draws equal- and variable-interval histograms. Additional functions include correlation coefficient and standard deviation.

The exception here is Electronic Gradebook: It doesn't do statistics at all, except for calculation of averages.

CHOICES, CHOICES

So—which one's for you?

All five programs reviewed here contain enough space for grades and student names to satisfy most teachers' needs. Electronic Gradebook has the fewest, with 34 grades per student; Master Gradebook allows 55, Gradebusters 40, and J&S 50. Teacher's Assistant is essentially unlimited.

In terms of features, ease of use, and speed, however, the clear winner is Gradebusters. Even a teacher who has never used an electronic gradebook will have this program up and running in less than five minutes.

Several unique functions set Gradebusters apart from the others. When you enter grades, for example, Gradebusters shows students' cumulative scores so far, along with corresponding letter grades, and changes them immediately as you add to or edit your data. You don't have to load a separate module to see averages, then another for letter grades. The quality of Gradebusters' printed gradebook pages and attendance reports also puts this program into a separate class.

In terms of ease of use, your second choice is Electronic Gradebook. A lack of statistical functions is a drawback, however.

Master Gradebook and Teacher's Assistant are harder to use at first because of their control codes. Once you master them, though, you'll find them adequate. If price is your main consideration, Teacher's Assistant has a clear advantage—and you get outstanding statistical functions, to boot.

J&S is the slowest to load and use, but its print functions, especially the report feature, are attractive. J&S is also the only gradebook among those reviewed here that weights grades by category instead of individually: You can choose up to five categories of scores and assign a particular percentage to each.

What's the role of the Apple II in schools? As the five gradebook programs reviewed here demonstrate, educational software for students isn't the only game in town. Efficient classroom management also enhances the quality of children's learning, and Apple II software can fulfill teachers' requirements as effectively as it does their students'.■

Kenneth Carlson is a junior-high-school science teacher in the Chicago area. Write to him at 1407 Middletree Road, Joliet, IL 60433.

Product Information

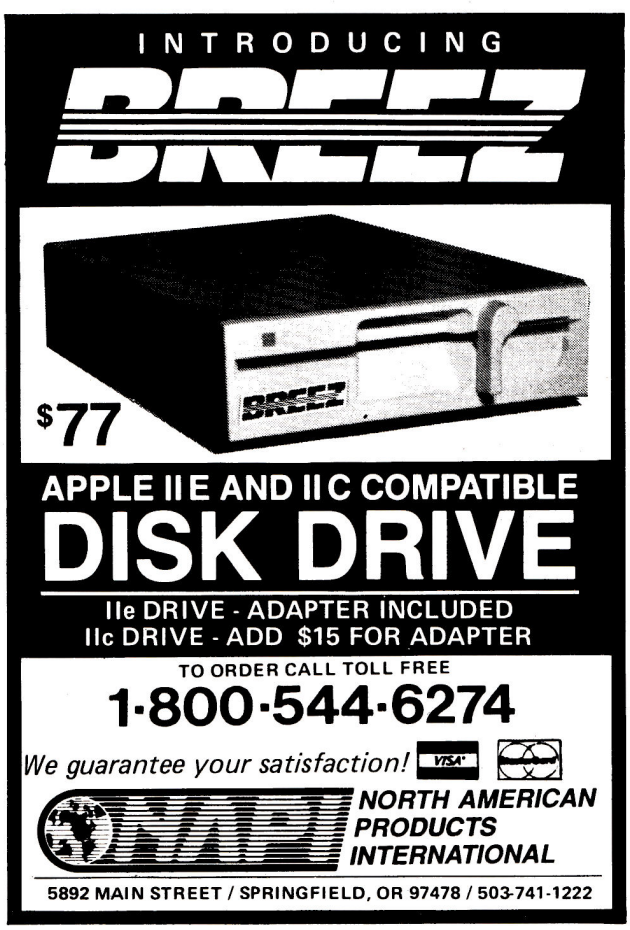
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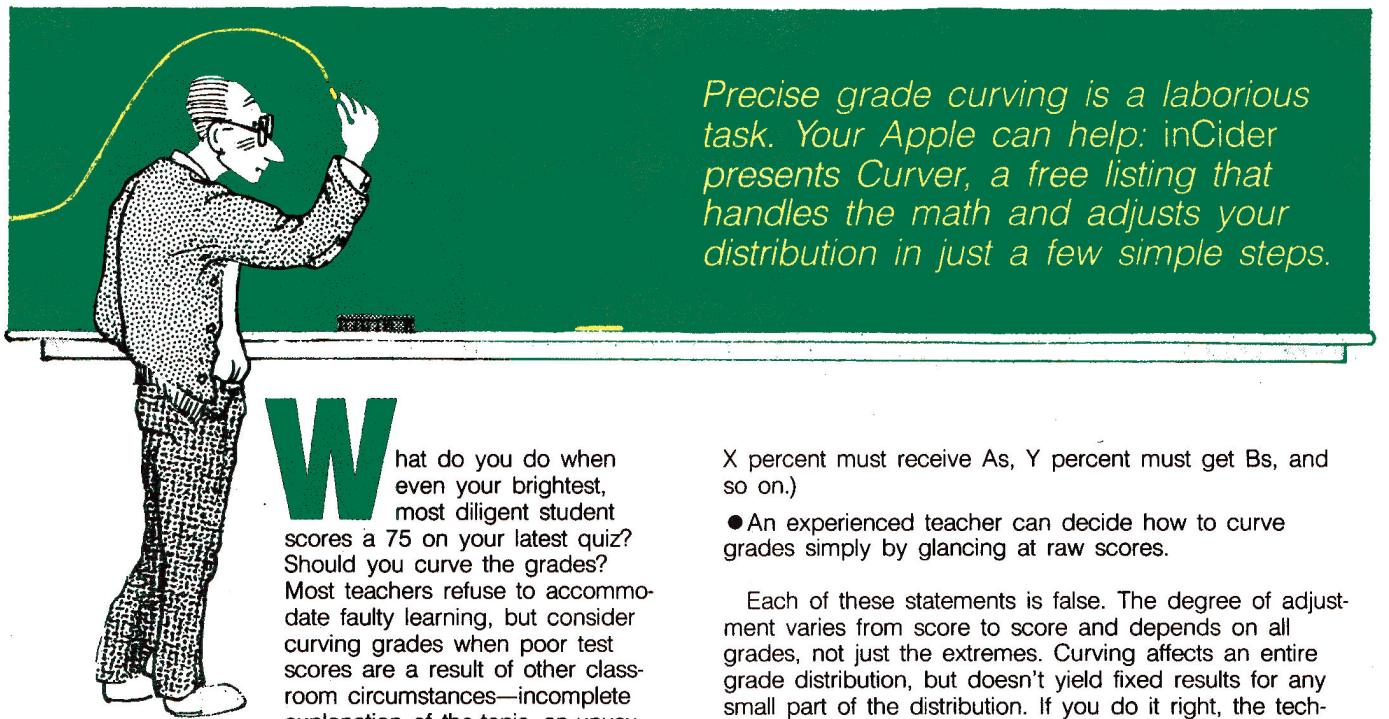
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Grading on the Curve

by Charles R. Wall



Precise grade curving is a laborious task. Your Apple can help: inCider *presents Curver, a free listing that handles the math and adjusts your distribution in just a few simple steps.*

What do you do when even your brightest, most diligent student scores a 75 on your latest quiz? Should you curve the grades? Most teachers refuse to accommodate faulty learning, but consider curving grades when poor test scores are a result of other classroom circumstances—incomplete explanation of the topic, an unusually difficult or confusing exam, and so on.

Very few people, however—even the teachers who use curving—understand the math involved. Many teachers curve grades incorrectly, and the rest go through tedious calculations. The accompanying **Program listing**, Curver, scales grades precisely and easily. (For those with the appropriate hardware, a data-strip version of this listing appears on p. 125.)

Among the myths surrounding grade curving are the following beliefs:

- Each student's raw score increases by the same amount (as in, "There was a seven-point curve").
- If anyone makes a very high raw score, you can't curve the grades.
- Curving grades produces a fixed-percentage grade distribution automatically, forcing someone to fail. (That is, a fixed proportion of your students will receive each grade—X percent must receive As, Y percent must get Bs, and so on.)
- An experienced teacher can decide how to curve grades simply by glancing at raw scores.

Each of these statements is false. The degree of adjustment varies from score to score and depends on all grades, not just the extremes. Curving affects an entire grade distribution, but doesn't yield fixed results for any small part of the distribution. If you do it right, the technique involves detailed calculations that are laborious to perform by hand for a classroom full of scores—but Curver makes it simple.

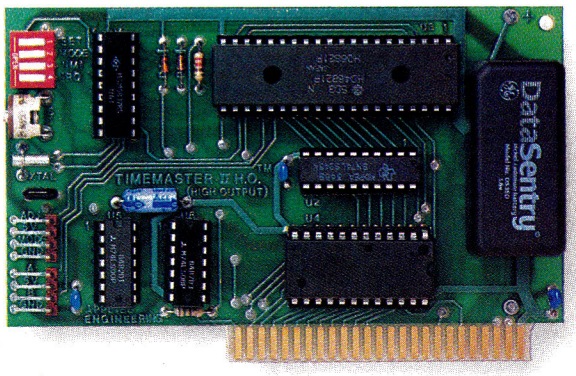
A STATISTICS PRIMER

A *histogram*, such as **Figure 1**, shows the relative frequency with which various categories of data occur in a collection. You'll probably want to set up the vertical scale so that the total area of the graph is one unit (100 percent).

As sample size and number of categories increase, many collections of data, such as a large group of student scores, produce histograms that approach the bell-shaped *normal-distribution curve* shown in **Figure 2**.

A normal curve extends indefinitely both left and right, but you can summarize it with two measurements: the *mean*, the center of the curve, and the *standard deviation*,

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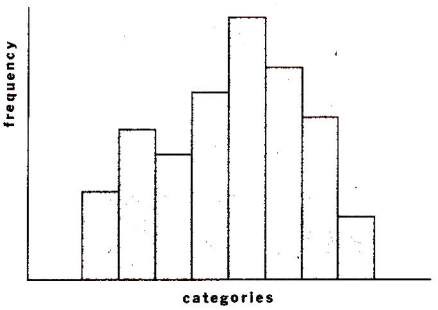
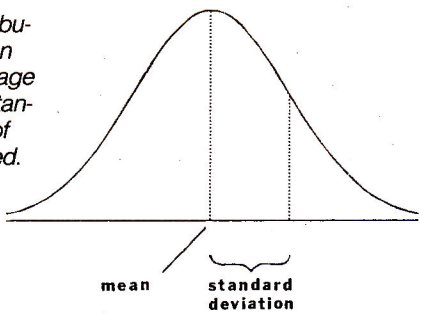


Figure 1. Histogram, or bar graph, depicting varying frequencies of different categories of data (such as ranges of test scores).

Figure 2. A normal-distribution bell curve, with mean (center of curve, or average of individual data) and standard deviation (degree of horizontal spread) marked.



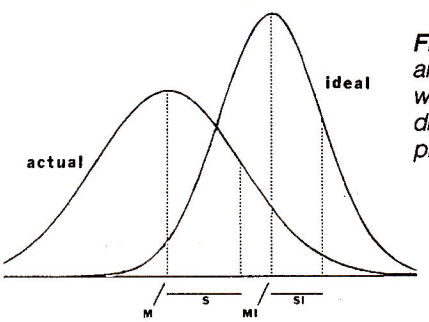


Figure 3. Actual scores are lower and fall into a wider range than normal-distribution curve would predict.

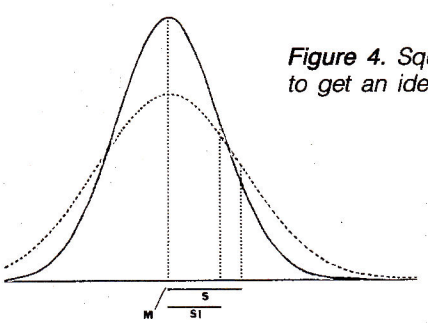


Figure 4. Squeezing the distribution to get an ideal standard deviation.

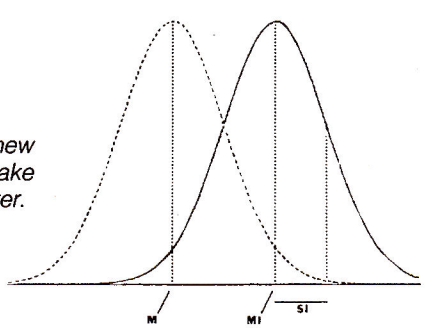


Figure 5. Shifting the new curve far enough to make the ideal mean its center.

the degree of horizontal spread. (In a normal distribution, about two-thirds of the data fall within one standard deviation above the mean and one standard deviation below it.) In our examples, the total area is 1; therefore, the larger the standard deviation, the lower the maximum height.

Any collection of data, whether it fits the normal-distribution ideal or not, yields these two measurements. To figure the mean, simply compute the average of the scores: Add them and divide by the number of scores. The standard deviation is the square root of the difference between the average of the squares of the data numbers and the square of the mean. (See line 120 in the **Program listing**.)

In plainer English, follow these steps to calculate the standard deviation for your collection of test scores:

1) Square each score.

2) Average the squared scores.

3) Average the actual scores, then square that number.

4) Subtract the squared mean (step 3) from the average of the squared scores (step 2).

5) Take the square root of that difference. That figure is "one standard deviation" from the mean.

RESTRUCTURING THE CURVE

Figure 3 illustrates a typical situation in which you might decide to curve grades: The mean is too low, and the standard deviation is too large. (That is, the grades are too low and too spread out.)

When you curve grades, you adjust them consistently so that the actual mean, M, and standard deviation, S, become prespecified values—an ideal mean, MI, and an ideal standard deviation, SI. Ordinarily, MI is a grade of C and SI is the length of a typical grade interval (number of points to the next grade). In the common scheme in which 90s are As, 80s are Bs, and so forth, you might make MI equal to 75 and SI equal to 10. (In more advanced courses, MI might be a higher grade.)

If GC is the curved grade corresponding to raw score RW, you'd figure each new score according to the following formula (see line 20 of the **Program listing**):

GC = MI + ((RW − M) * SI / S)

Step by step, you'd follow the formula this way for each student's score:

1) Subtract the group's actual mean from the raw score.

2) Multiply the difference by your ideal standard deviation.

3) Divide that product by the group's actual standard deviation.

4) Add that quotient to your ideal mean to get the curved grade.

It's a two-step process: First you squeeze the distribution (or stretch it, if the raw scores are bunched too tightly, but that's rare) to get a normal spread (standard deviation), as shown in **Figure 4**; then you shift this curve, the modified distribution, to a normal location (mean) along the graph, as shown in **Figure 5**.

Typically, when M is too small and S is too large, you increase a raw score below the mean twice—once because of the squeeze, and again because of the shift. You decrease a raw score above the mean because of the squeeze, but increase it during the shift. If the decrease overpowers the increase, you may lower the top few scores by curving. Some teachers follow the results of curving strictly, while others say curving shouldn't lower anyone's grade (thus letting students "beat the curve").

SETTING THE GROUND RULES

The program presented here assumes that both raw scores and curved grades lie between zero and 100 (although raw scores with a smaller maximum present no problem). Screen prompts ask for your desired (ideal) mean and standard deviation, and whether you'll let the resulting curve lower any top scores.

Once you establish the ground rules, Curver asks for the number of raw scores, then prompts you to enter them individually. When you're finished, Curver displays the actual mean and standard deviation. Pressing any key then produces a table showing curved grades corresponding to raw scores between zero and 100. You can go on to curve another set of scores according to the same set of ground rules. (To change them, just run Curver again.) Curver takes the pain out of long calculations—and gives each student as fair a grade as possible in the process.■

Program listing. Curver computes the actual mean and standard deviation for your collection of test scores, then figures the curved grade corresponding to each raw score.

```
10  HOME : PRINT  TAB( 17);: INVERSE : PRINT "CURVER": NORMAL
     : PRINT : PRINT  TAB( 8)"BY CHARLES R. WALL 1986": PRINT
     : PRINT : PRINT "FOR GRADES BETWEEN Ø AND 100...": PRINT

20  DEF  FN F(X) = X * (X >  = Ø AND X <  = 100) + 100 * (X >
     100): DEF  FN G(X) =  INT (MI + .5 + (X - M) * SI / S): INPUT
     "WHAT IS THE DESIRED MEAN? ";MI: PRINT
30  INPUT "IDEAL STANDARD DEVIATION? ";SI: PRINT : IF SI > Ø THEN
     50
40  PRINT "MUST HAVE POSITIVE STD. DEV.": PRINT : GOTO 30
50  PRINT "CAN THE CURVE LOWER A GRADE? (Y/N) ";: GET A$: PRINT
     A$: IF A$ <  > "Y" AND A$ <  > "N" THEN 50
60  PRINT :BD = Ø: IF A$ = "N" THEN 80
70 BD = 1
80 SM = Ø:SQ = Ø: PRINT
90  PRINT "COUNTING DUPLICATED SCORES,": INPUT "HOW MANY RAW
     SCORES? ";N: IF N > Ø AND N =  INT (N) THEN 110
100  PRINT : PRINT "POSITIVE INTEGER, PLEASE": PRINT : GOTO 9
     Ø
110  PRINT : PRINT "NOW ENTER THE RAW SCORES...": PRINT : FOR
     Q = 1 TO N: PRINT "RAW SCORE #";Q;" ";: INPUT D:SM = SM +
     D:SQ = SQ + D * D: PRINT : NEXT Q
120 M = SM / N:S =  SQR (SQ / N - M * M)
130  PRINT : PRINT "  SAMPLE OF ";N: PRINT "      MEAN = ";M: PRINT
     "STD.DEV. = ";S: IF S > Ø THEN 150
140  PRINT : PRINT "NO VARIANCE MAKES IT IMPOSSIBLE TO": PRINT
     "CURVE GRADES.": PRINT : GOTO 270
150  PRINT : PRINT "PRESS ANY KEY TO OBTAIN CHART": PRINT "SH
     OWING RAW AND CURVED GRADES": GET A$: HOME : GOTO 190
160 GC = GC - 100 *  INT (GC / 100): IF GC > 9 THEN 180
170  PRINT " ";
180  PRINT GC;" ";: RETURN
190  PRINT  TAB( 12);: INVERSE : PRINT "CONVERSION CHART": NORMAL
     : PRINT : PRINT "READ TENS DIGIT OF RAW SCORE AT LEFT,":
      PRINT "UNITS DIGIT AT THE TOP.  LAST TWO": PRINT "DIGIT
     S OF CURVED SCORE SHOW IN TABLE.": PRINT
200  PRINT "  ";: FOR J = Ø TO 9: INVERSE : PRINT " ";J;: NORMAL
     : PRINT " ";: NEXT J: PRINT
210  FOR I = Ø TO 9: INVERSE : PRINT I;: NORMAL : PRINT " ";
220  FOR J = Ø TO 9:RW = 10 * I + J:G =  FN G(RW):GC =  FN F(
     G): IF GC > RW OR BD = 1 THEN 240
230 GC = RW
240  GOSUB 160: NEXT J: PRINT
250  NEXT I
260 G =  FN G(100):Y =  FN F(G):GC = 100 * (BD = Ø) + Y * (BD
     = 1): PRINT "...AND 100 CURVES TO ";GC: PRINT
270  PRINT "CURVE ANOTHER SET OF GRADES? (Y/N) ";: GET A$: PRINT
     A$: IF A$ <  > "Y" AND A$ <  > "N" THEN 270
280  IF A$ = "N" THEN 300
290  HOME : GOTO 80
300  END                                              End of listing.
```

Charles Wall is the author of a number of math-journal papers and college-level texts, including Basic Technical Mathematics *(Harcourt Brace Jovanovich, 1986). Write to him at Trident Technical College, P.O. Box 10367, Charleston, SC 29411.*

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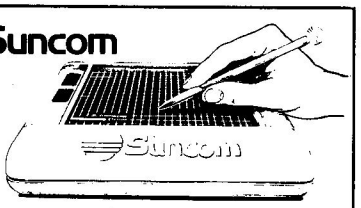
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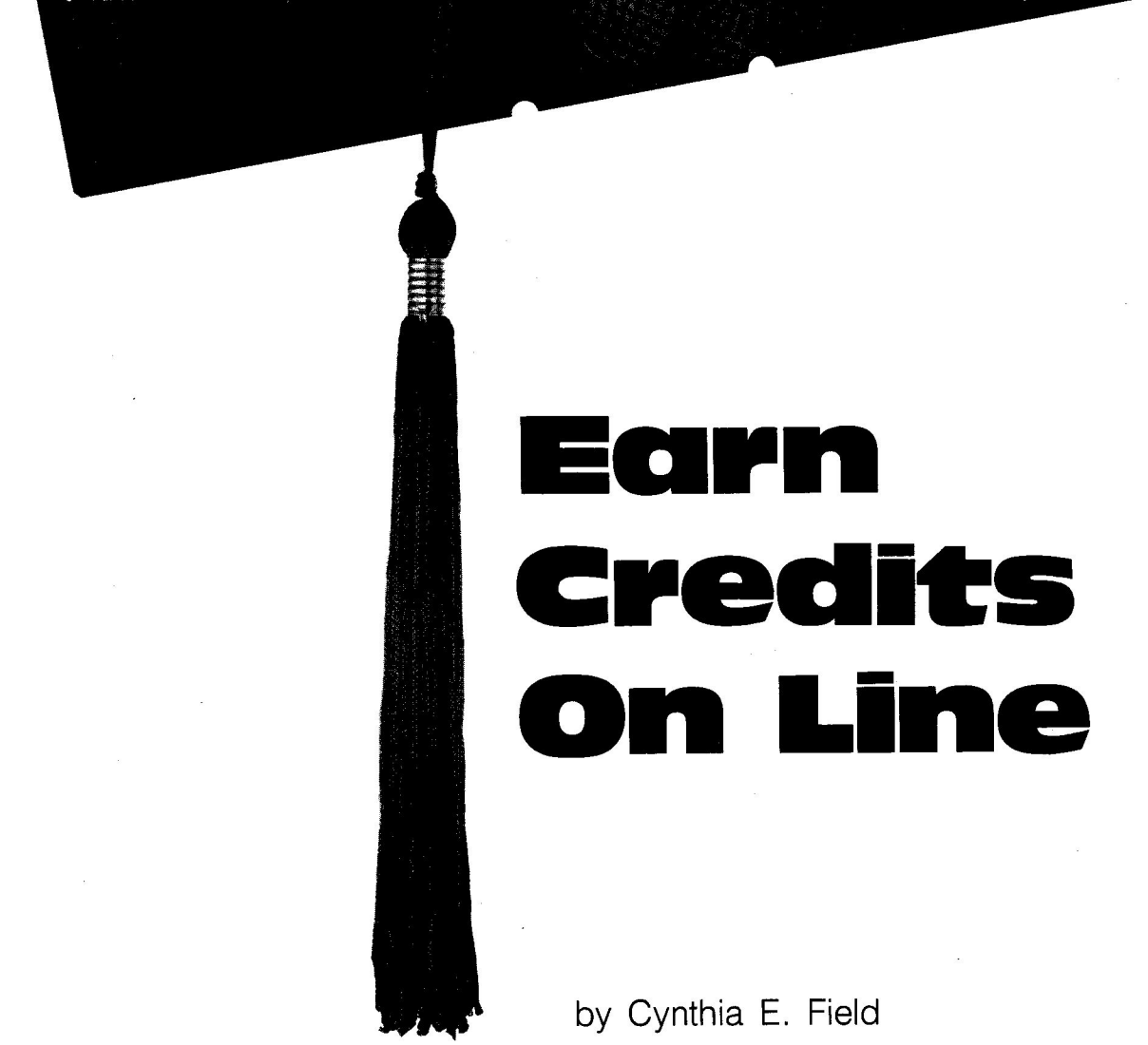
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Earn Credits On Line

by Cynthia E. Field

Many colleges and universities let you use your Apple to complete your education. Log on to the Electronic University Network, a unique service that gives you access to a wide variety of courses and certificate programs.

How can you simultaneously take a course offered by the University of Iowa, another from Washington State University, and yet another from Boston University—without spending one red cent on airfare or rushing like mad to get to class on time?

You might be surprised to learn that you already have the only vehicle you need—your Apple II—to take a course or complete a degree through the Electronic University Network (Telelearning Systems Inc., 505 Beach Street, San Francisco, CA 94133, 800-22-LEARN, 800-44-LEARN in California).

You can study traditional academic subjects such as accounting, English literature, sociology, and computing, or enroll in diverse nontraditional courses such as "Moonlight with Your Microcomputer," "Spreadsheet Software," "Memory-Training Techniques," and "The Art of California Cuisine."

According to Network enrollment counselor Charles Jackson, the Electronic University Network (EUN) serves approximately 17,000 students. Among these enrollees, ten to 15 percent log on (take their classes) with Apple II computers. The Network, your Apple system, and a telephone are the only prerequisites for bringing home these educational opportunities.

LINKING PEOPLE TO A WORLD OF EDUCATION

EUN isn't a college or university *per se*. Rather, it's a liaison between computer users who want to further their formal education and universities that have realized that your busy lifestyle often prevents you from studying subjects that interest you, or from finishing a degree that can enhance your career. Institutions such as Thomas A. Edison College in New Jersey and John F. Kennedy University in California seem committed to offering traditional courses in this nontraditional way.

As you would with any college you're thinking of attending, you can first send for the EUN course catalogue ($5). Like traditional college catalogues, it highlights EUN course offerings, degree requirements, and tuition and other costs.

Enrolling in EUN is as hassle-free as can be. Instead of waiting in long lines on campus to register for courses, you make a toll-free phone call. An enrollment representative helps you plan your curriculum and determine whether the courses you want are available. Most popular courses are open at all times. Special offerings aren't always available, though, and schools may limit the number

of students who can enroll in these courses. You can start a course anytime during a semester and finish it at your own pace.

EUN's one-time enrollment fee of $195 gives you and others in your household a lifetime membership. You can pay this initiation fee, as well as your tuition ($60–$80 per undergraduate credit, $100–$130 per graduate credit) with any of the more popular charge cards. When you sign up for a course, you can order your textbook at the same time from EUN's electronic college bookstore.

A BROAD-BASED CURRICULUM

Universities and colleges participating in EUN are fully accredited and offer a wide variety of credit, noncredit, undergraduate, and graduate courses. You can complete associate's and bachelor's degrees in liberal arts and business through Thomas A. Edison College, or earn the master of business administration (MBA) degree from John F. Kennedy University. For those seeking to advance their knowledge and abilities in narrower subject areas, both of these institutions offer certificate programs in accounting, finance, information management, and other specialties.

Part-time students can access a wide spectrum of courses offered by these institutions and others throughout the country. Statistics, history, natural science, psychology, and computer applications (such as BASIC and fundamentals of word processing) are a few examples.

Special-credit courses are also given through EUN from time to time. For example, Bank Street College of Education offers "Methods for Computer Applications in the Classroom" (three graduate credits, $390), and Eastern Michigan University teaches "Marketing Educational Products" (two graduate credits, $146). Noncredit courses, such as "Starting and Managing Your Own Business" and "Principles of Accounting for Small Business," are also offered through the network.

THE ELECTRONIC CAMPUS

When you enroll in a course through EUN, you receive course materials by mail, including the communications software your Apple (equipped with a 300- or 1200-baud modem) needs to "talk" to EUN's computer over the phone lines.

Besides the communications program, you receive course disks containing the electronic equivalent of a syllabus and lessons. Each lesson usually includes a reading assignment, instruction in the subject, and reinforcing exercises and activities.

EUN enrollees have access to a number of on-line databases, such as the National Newspaper Index, Sociological Abstracts, and the Sports Database. Using these electronic libraries costs extra—14 cents to 72 cents per minute, plus telephone costs. Used prudently and efficiently, these databases can save you time in researching information for papers and reports.

When you complete each lesson, you send it and any questions you have to your instructor by electronic mail. E-mail, as the process is sometimes known, involves using the communications software EUN provides to send your "homework" to the EUN computer. A special file called a "mailbox" is set aside for your instructor; another one is assigned to you.

As in a traditional correspondence course, you send completed lessons to your teacher, while he or she sends comments, corrections, and suggested activities to you. Response time in electronic courses, though, is much faster. Usually your instructor assesses your work and responds within 48 hours.

Unlike the traditional classroom, you don't have face-to-face contact with your instructor when you take classes through EUN. Neither do you have to compete with other students for the teacher's attention during class. When your instructor reads your work, presumably he or she gives full attention to your educational progress—without regard to classroom distractions or classroom politics.

Depending on the course and the particular institution, your final exam may be a standardized test such as that prepared by CLEP (College Level Examination Program) or ACT/PEP (American College Testing/Proficiency Examination Program). If so, you're required to take your final exam at one of the 1000 or so testing centers located throughout the country.

Some courses offer traditional (not standardized) final examinations. According to Charles Jackson, colleges and universities across the country have *reciprocal proctoring agreements*: In certain courses, you may be required to take your final exam at a local college or university.

FLEX-LEARNING

Think of the flexibility EUN offers. When does class begin? Whenever you'd like it to. You no longer have to worry about parking problems or being late for class.

You can take courses at home or at the office. A number of companies, including Bank of America and AT&T, have tuition-reimbursement programs for employees who link up with EUN. Enhancing your business acumen is about as painless as possible, thanks to EUN's wide variety of business subjects. You can work toward an associate's, bachelor's, or master's degree in business—or just take a marketing course to improve your prospects for promotion.

Do you find it impossible to take traditional university classes because you have small children at home? You can still work toward and complete a degree at EUN by taking your class during your children's naptime or after they've gone to bed.

Do you live in a remote location, far from campus? You needn't miss out on an important educational experience. According to Charles Jackson, high schoolers in northern California, though physically distanced from the university experience, take college-level math classes through EUN.

Do you expect your summer job to take up much of your day and early evening? With prior approval from the local college or university you now attend, you could take an elective course this summer through EUN and be that much closer to your degree.

EUN removes just about all the barriers to disabled adults who want to further their education. Now, people who are immobile or otherwise handicapped needn't be as concerned about transportation and physical accommodations.

Are you on the road a lot? Jackson stresses the convenience of EUN courses for business travelers. He notes that a sales representative might be "in Des Moines one night and somewhere else the next, and can still take lessons" if he or she has a portable computer and access to a telephone.

NO MORE EXCUSES

Commuting hassles and rigid schedules are things of the past for Apple II users who log on to the Electronic University Network. EUN gives you access to a wide variety of courses and programs at a cost that's comparable to that of traditional education. EUN can help you sidestep many of the stumbling blocks that may have forced you to put your educational goals on the back burner. And the only thing you'll miss is the weekly fraternity party.■

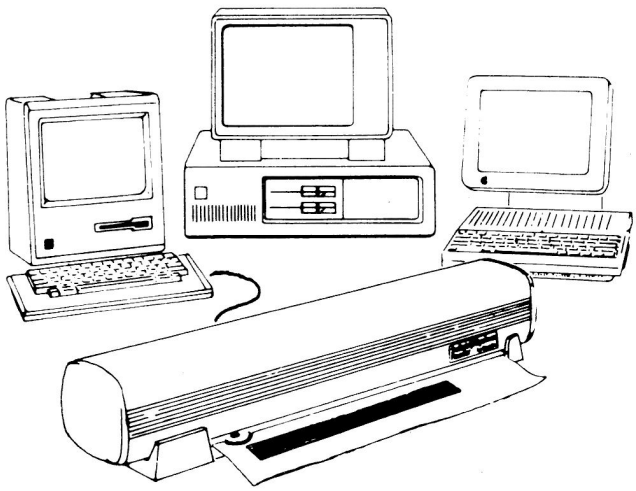
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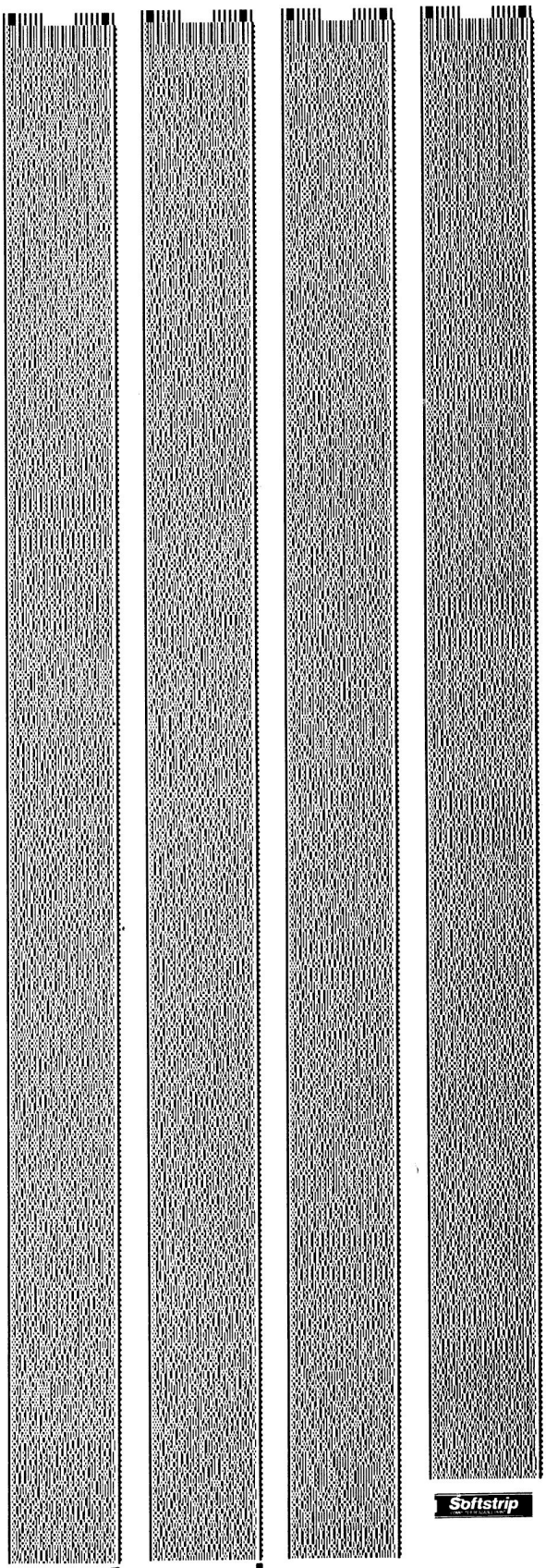
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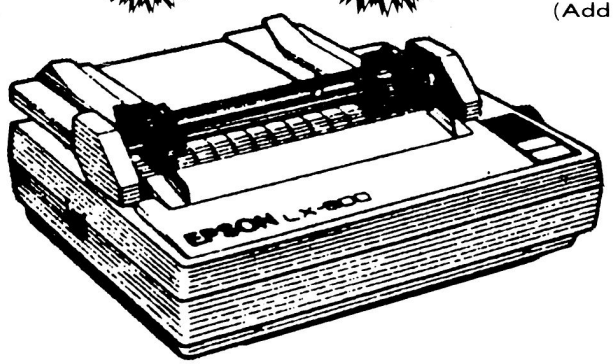
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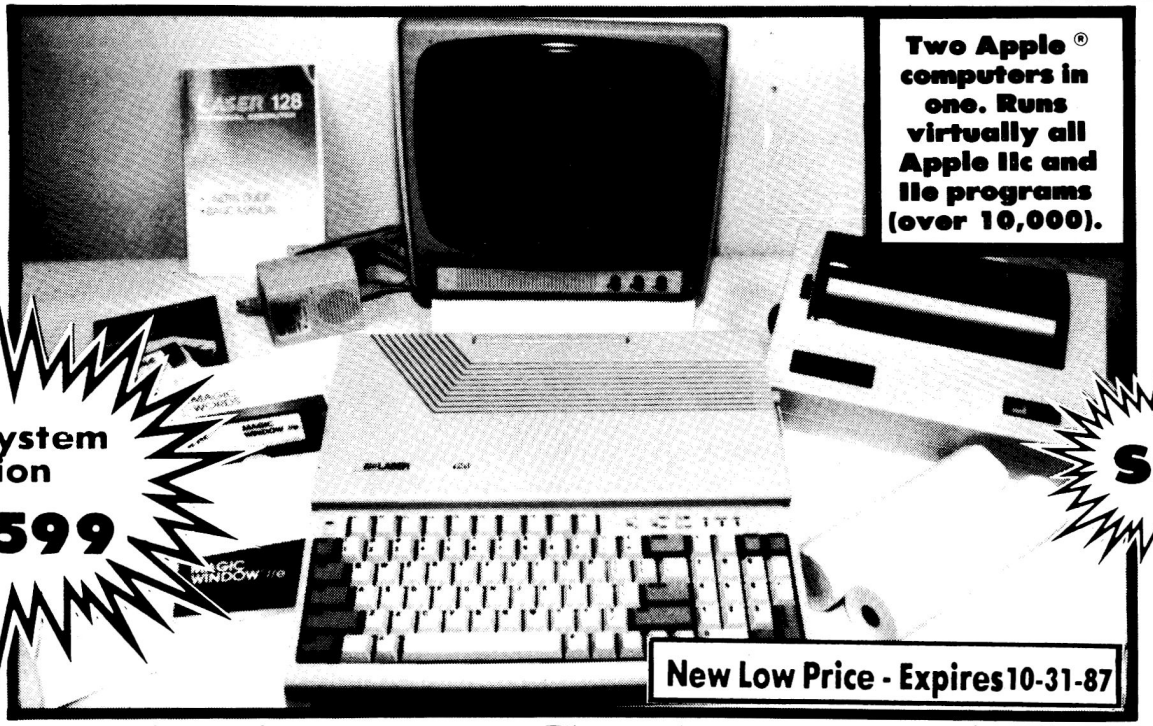
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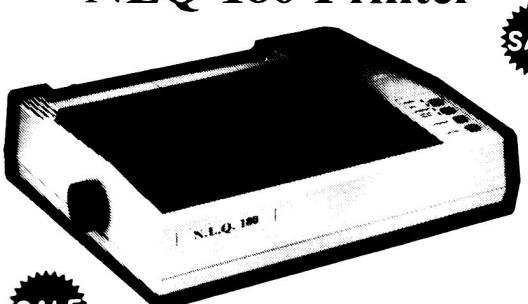
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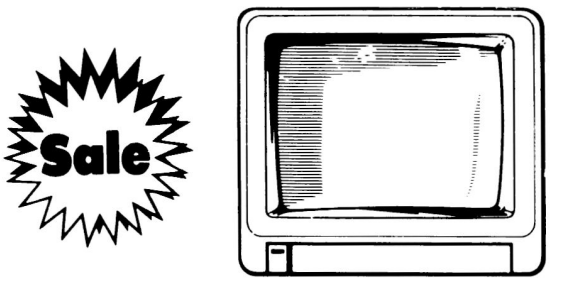


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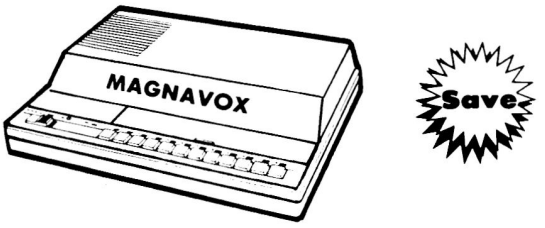


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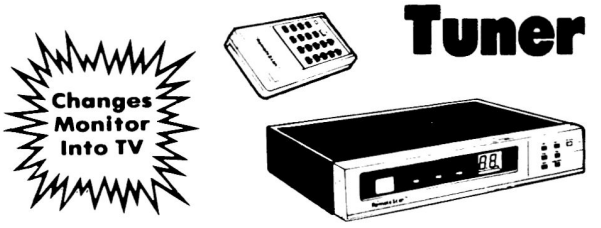


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The Numbers Game

Set up an AppleWorks database to keep track of important dates and other numbers.



by Ruth K. Witkin

I'm impressed—I mean really impressed—by people who can remember the phone numbers of all their friends, rattle off their license-plate numbers without having to think twice about it, and recite a safe-deposit-box number before the bank clerk looks it up. Some people have that kind of awesome memory. For the rest of us, there are databases.

Much of what you do is associated with numbers that distinguish you from everyone else. For starters, you're likely to have a library card, school ID card, credit card, driver's license, car registration, passport, and Social Security card. If you lose any of these items, you lose the number, which can be a bother to trace and replace.

Then there are the special numbers you want to keep track of, such as the addresses, phone numbers, and birthdays of important people in your life. With a numbers database, you can keep all these numbers and more in one safe, secure place.

This month, you'll create a database containing the numbers accumulated by Dick and Annie Smith. **Figure 1** shows one of their reports. The WHAT category contains a keyword that identifies the item; the WHOSE category names the person to whom the item belongs; WHERE lists the organization involved or the location of the item; NUMBER is simply that—a way to describe the item if you lose it; and NOTES holds important jottings.

In this session, you'll create categories, insert records, customize the multiple-record screen, ditto entries, create report formats, select records, and produce the table and label reports shown in **Figures 2** through **4**.

When you see such key combinations as OA-Y, hold down the open-apple key and type Y. With repeated combinations, such as OA-left arrow five times, hold down the open-apple key and press the left-arrow key five times. If you make a typo, hit the delete key to back up the cursor and erase.

A DATABASE FROM SCRATCH

Use the AppleWorks Startup and Program disks to bring up a new database screen. Name this file *NUMBERS*. And here's the Change Name/Category screen. Your cursor is on the C in *Category 1*. Press OA-Y to delete these words. Now type the following category names and press the return key after each name: **WHAT**, **WHOSE**, **WHERE**, **NUMBER**, **NOTES**. (To keep things simple, this database lacks the spare categories I usually recommend you include at the beginning, so that you'll have a place to enter any information you might think of later.)

Press OA-S to store the categories on disk. Press the spacebar to enter Insert New Records mode. An empty Record 1 appears and awaits your entries.

In this database, working in multiple-record layout can save you keystrokes, because you can "ditto" previous entries. The key to this technique is to first activate the number of records you'll need. Refer again to **Figure 1**. You fill out only the first eight records (addresses, autos, and birthdays). To activate eight records, press OA-down arrow eight times. You should now see an empty Record 9 of 9 on screen. Press OA-Z to zoom in to multiple-record layout, which now shows eight records filled with dashes and the cursor on the first record in the WHAT category.

CUSTOMIZING THE MULTIPLE-RECORD SCREEN

As you can see in **Figure 1**, some entries need more room than others. To accommodate them, press OA-L to bring up the Change Record Layout screen. Now press OA-left arrow five times to reduce the WHAT column by five characters.

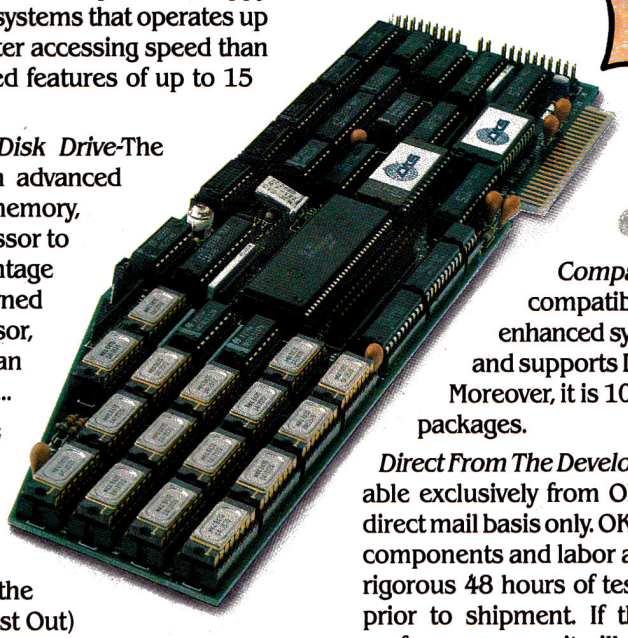
Press the tab key to move to the WHOSE column. Press OA-left arrow seven times to reduce its width by seven characters. Hit the tab key again. Increase the WHERE column one character by pressing OA-right arrow once. Hit the tab key again. Increase the width of the NUMBER column 11 characters by pressing OA-right arrow 11 times. The NOTES column is fine, so press Escape twice to return to the multiple-record screen.

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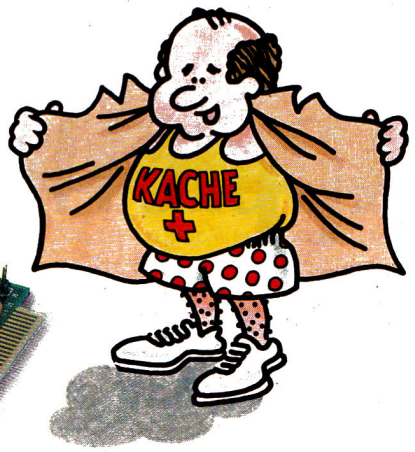
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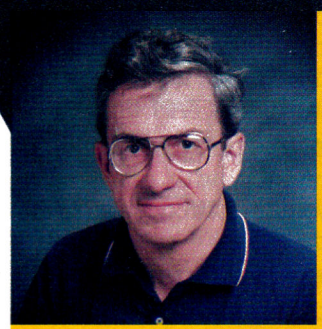
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Figure 1. Sample printout containing the records in a Numbers database.

File: NUMBERS Page 1
Report: LOTSA NUMBERS 10-3-87

WHAT	WHOSE	WHERE	NUMBER	NOTES
Address	Dick	Office	345 Fifth Ave, NYC 10027	-
Address	Annie	Office	89 Main St, Redford 11749	-
Auto	D&A	National Insur	5046-B24	Inspect July
Auto	D&A	Vehicle ID	42L39R374	Expires Mar 89
Auto	D&A	License Plate	101-SSS	-
Auto	D&A	Auto Club	597-6-114	Renew August
Birthday	Dick	-	August 22, 1958	-
Birthday	Annie	-	June 21, 1961	-
Cemetery	D&A	Lindenwood	Lot 72, Plots 16-17	-
Checking	D&A	Shoreline Trust	789012	-
Credit	Annie	Essoil	317-762 380 2	Expires Jul 88
Credit	Annie	Dandy Jeans	876908	Expires Apr 88
Credit	Dick	Woodruff Stores	195 56 438X	No Expiration
Credit	D&A	VistaCard	4240 760 002 86	Expires Sep 89
Credit	D&A	Banyon Oil	765A-678 53	Expires Jun 88
Credit U	Dick	Commuter Lodge	1234-F	-
Donor	Annie	Abner Blood Grp	A-5608	Type A+
Driver	Dick	NY State	S0865 345678-39	Expires Aug 88
Driver	Annie	NY State	S9836 115425-42	Expires June 89
Elections	Annie	Abner HS	B-87319	-
Elections	Dick	Abner HS	B-87310	-
Insurance	Dick	Equity Life	345-12342	Life Term
Insurance	Annie	Equity Life	176-9753B	Life Term
Insurance	Dick	Fidelity Mutual	89C-43-32	Disability
Insurance	D&A	HOMY	455 987-4321	Homeowners
IRA	Annie	Shoreline Trust	079543.2	-
Keogh	Dick	Shoreline Trust	079543.2	-
Library	Dick	Abner Public	467 11 240	-
Library	Annie	Abner Public	467 11 239	-
Medical	D&A	Blue Star	34X678-PRW	-
Money Mkt	D&A	XYZ Money Fund	074678539-8	-
Mortgage	D&A	Nickel Savings	R54-B57-K22D20	Fixed 11.5%
Passport	Dick	-	T987654	-
Passport	Annie	-	B123456	-
Phone	Dick	Office	212-555-6588	-
Phone	Annie	Office	516-555-1100	-
Savings	D&A	Shoreline Trust	1234-56X	-
Soc Sec	Dick	-	156-67-7108	-
Soc Sec	Annie	-	111-22-3344	-

Figure 2. Report 1: The first eight records in the database.

File: NUMBERS Page 1
Report: LOTSA NUMBERS 10-3-87

WHAT	WHOSE	WHERE	NUMBER	NOTES
Address	Dick	Office	345 Fifth Ave, NYC 10027	-
Address	Annie	Office	89 Main St, Redford 11749	-
Auto	D&A	National Insur	5046-B24	Inspect July
Auto	D&A	Vehicle ID	42L39R374	Expires Mar 89
Auto	D&A	License Plate	101-SSS	-
Auto	D&A	Auto Club	597-6-114	Renew August
Birthday	Dick	-	August 22, 1958	-
Birthday	Annie	-	June 21, 1961	-

Figure 3. Report 2: Records selected on the basis of information shared by Dick and Annie Smith.

File: NUMBERS Page 1
Report: LOTSA NUMBERS 10-3-87
Selection: WHOSE equals D&A

WHAT	WHOSE	WHERE	NUMBER	NOTES
Auto	D&A	National Insur	5046-B24	Inspect July
Auto	D&A	Vehicle ID	42L39R374	Expires Mar 89
Auto	D&A	License Plate	101-SSS	-
Auto	D&A	Auto Club	597-6-114	Renew August

ENTERING THE RECORDS

Figure 1 shows entries that appear more than once: two *Address*, four *Auto*, two *Birthday*, four *D&A* (joint ownership by Dick and Annie), and two *Office* entries. The neat trick in working with multiple records is that you can "ditto" as many times as you like any entry you've already typed.

Try it now. Your cursor is in the WHAT column. Type **Address** and press the return key. The cursor is now in the second record. Press the OA-" keys. (Don't press the shift key.)

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The cursor is now in the third record.

Now type **Auto** and press the return key. Press OA-'' three times to ditto *Auto* into the three records below. To complete the entries in the WHAT category, type **Birthday**, press the return key, then press OA-''. Press OA-1 to jump the cursor to the first record.

Press the tab key to move to the WHOSE category. Follow the same process—typing an entry and ''ditto-ing'' where possible—to fill in all the entries in the WHOSE category. Now fill in the entries in the WHERE, NUMBER, and NOTES categories. Be sure to press Return after each entry. To skip past the empty entries (shown by the dash), press the return key or the down arrow. After you type in the last entry (Renew August), press OA-S to store the database on disk.

CREATING A TABLE REPORT FORMAT

The first report lists the records in table format. To create it, press OA-P to bring up the Report Menu. Press the return key to confirm *Create a new tables format.* Now type **LOTSA NUMBERS** (the name of this report) and hit the return key again.

You now see the Report Format screen describing the keystrokes that start a command and move the cursor, and the entries in the first three records. The *Len* indicator shows a print width of 65 characters. This count is important because it helps you determine the character size to use in your printed report. At ten characters per inch, you can print about 80 characters per line, not nearly enough for all the information. At 12 characters per inch, you can print 97 characters per line, which is about right.

Just as you did in the multiple-record screen, you need to adjust the widths of the columns to show the entries properly when you print the report. Your cursor is in column A (WHAT). Press OA-right arrow once to increase column A by one character.

Now press Tab to move to column B (WHOSE) and press OA-left arrow twice. Press Tab to move to column C (WHERE) and hit OA-right arrow eight times. Hit Tab again to move to column D (NUMBER); press OA-right arrow 17 times. Hit Tab again to move to column E (NOTES); press OA-right arrow eight times. Press the tab key to jump to the *Len* indicator, which should now read *Len97*—on the button.

When you create your own report formats, you'll find that getting the proper column widths is often a matter of trial and error. Establishing the character size first gives you a goal (the number of characters that can fit across a page) to shoot for.

PRINTING THE REPORTS

You're still in the Report Format screen. Before printing, set the character size: Press OA-O to bring up the Printer Options screen. Type **CI** and press the return key. Type **12** and hit Return again. Now tell AppleWorks to print a dash whenever an entry is blank: Type **PD** and hit Return. Press the escape key to exit the Printer Options screen.

REPORT 1: ALL RECORDS

Figure 2 shows a report containing every record you've entered. Turn on your printer. Press OA-P to bring up the Print the Report screen. Press the return key to confirm the printer. (Or type a printer number, then press Return.) Type today's date and press Return twice. (The second time confirms *one copy.*) The printer whirs, and here's a report showing all eight records in the database. Press OA-S to store it on disk and bring up multiple-record layout in the Review/Add/Change screen.

REPORT 2: SELECTED RECORDS

Figure 3 shows another report, this one containing only those records of the accounts or numbers Dick and Annie share. This kind of report is handy to keep in your wallet. First, press OA-P to bring up the Report Menu. Now press the return key twice, once to confirm *Get a report format* and the other to bring up LOTSA NUMBERS.

Now tell AppleWorks to select the records: Press OA-R to bring up the Select Records screen. Type **2** to select *WHOSE* and press the return key. Press Return again to confirm *equals.* Now enter the comparison information: Type **D&A** and press Return. The third line from the top of the screen displays the comparison criteria: *Selection: WHOSE equals D&A.* There are no other comparisons, so press the escape key to exit the Select Records screen.

Your printer should still be on. Press OA-P and press the return key three times (to confirm the printer, date, and *one copy*). And here's a list of the four joint records for Dick and Annie. To return the selection to *All records*, press OA-R and type **Y**.

REPORT 3: ALL RECORDS IN LABEL FORMAT

Figure 4 shows the same records in label format. Here, records are printed one after another. To create this format, press the escape key to bring up the Report Menu. Type **3** and hit Return to select *Create a new labels format.* Type **LABELS STYLE** and hit Return again.

In this type of listing, you can tell AppleWorks to print a category name before each entry, which helps identify a potentially confusing piece of information (for example, whether a phone number represents home or office). Your cursor is in the WHAT category. To see how it works, press OA-V, and *Address* (the first entry in the WHAT category) appears. Press Return. Press OA-V again—and *Dick* (the first entry in the WHOSE category) appears.

Continue to press Return and OA-V to display the first entry in each of the other categories. Your cursor should now be in the NOTES category, which shows only a colon beside it because the notes entry in the first record is empty. Now press Return to insert a blank line to separate the records. The screen should now display the following message: *Each record will print 6 lines.*

Next, set up your printer. Press OA-O to bring up the Printer Options screen. Set wide left and right margins for this report: Type **LM** and press the return key. Type **2** and hit Return again. Type **RM** and press Return. Type **2** and hit Return again.

And finally, tell AppleWorks to print a dash whenever an entry is blank: Type **PD** and press Return. That does it. Press the escape key to return to the Report Format screen.

Be sure your printer is on. Type OA-P and press the return key three times. Your report should now look like the one in **Figure 4**. These reports are only a few of the many you can produce with a numbers database.

C. ITOH PROWRITER CODES

A lot of my mail deals with printer incompatibility and printer-control codes. Incompatibility is something I can't help you solve; there are simply

Figure 4. Report 3: Records in label format showing category names.

```
File:   NUMBERS                    Page 1
Report: LABELS STYLE               10-3-87

WHAT: Address
WHOSE: Dick
WHERE: Office
NUMBER: 345 Fifth Ave, NYC 10027
NOTES: -

WHAT: Address
WHOSE: Annie
WHERE: Office
NUMBER: 89 Main St, Redford 11749
NOTES: -

WHAT: Auto
WHOSE: D&A
WHERE: National Insur
NUMBER: 5046-B24
NOTES: Inspect July

WHAT: Auto
WHOSE: D&A
WHERE: Vehicle ID
NUMBER: 42L39R374
NOTES: Expires Mar 89

WHAT: Auto
WHOSE: D&A
WHERE: License Plate
NUMBER: 101-SSS
NOTES: -

WHAT: Auto
WHOSE: D&A
WHERE: Auto Club
NUMBER: 597-6-114
NOTES: Renew August

WHAT: Birthday
WHOSE: Dick
WHERE: -
NUMBER: August 22, 1958
NOTES: -

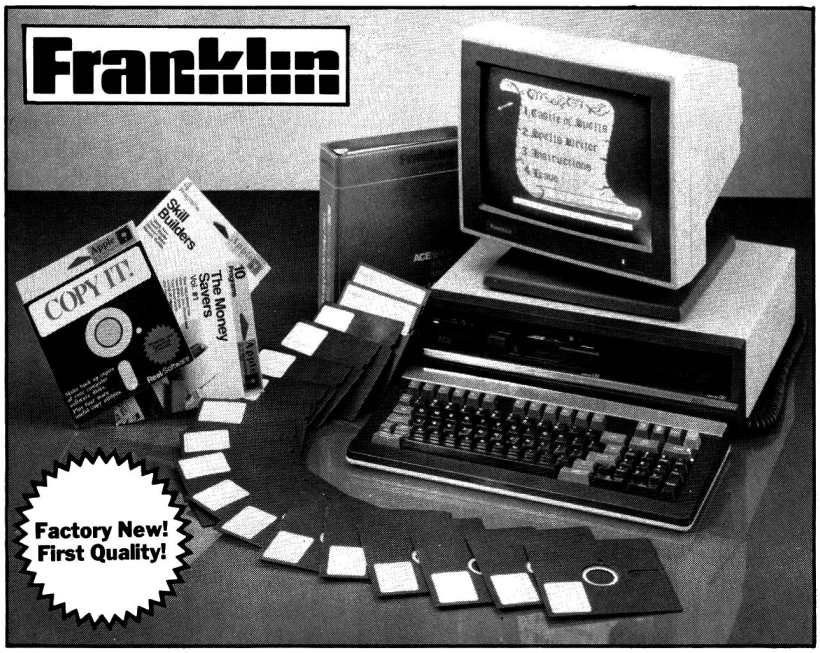
WHAT: Birthday
WHOSE: Annie
WHERE: -
NUMBER: June 21, 1961
NOTES: -
```

too many printers and too many hardware/AppleWorks variables. We can, however, help each other with control codes.

In my May 1987 column ("Creating Return-Address Labels," p. 70), I listed the ImageWriter control codes that produce various typestyles on mailing labels. Reader Stan Francis of Gilroy, California, compiled and sent me a list of control codes for the C. Itoh ProWriter. These codes, which you enter as Special Codes in the Printer Options screen, govern character size and style, boldfacing, underlining, and so on. I'll be glad to share them with you if you enclose a self-addressed, stamped envelope with your request. If you've compiled (and checked thoroughly) the control codes for another printer, you're invited to send them along to me.■

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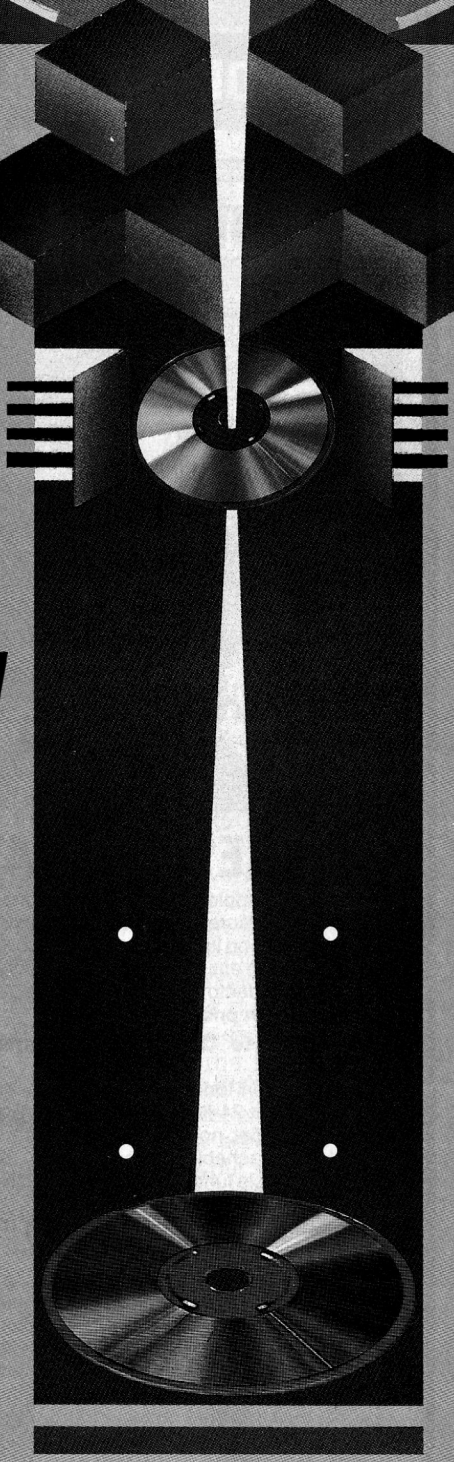
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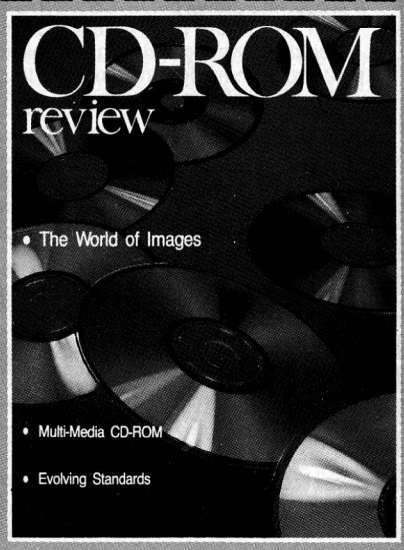
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Disk-File Input/Output

The basics of database programming: Create an external disk data file to increase Calorie Burner's efficiency.



by Dan Bishop

Several of the programs that have appeared in this column use READ/DATA statements to load "database" information into arrays—probably the simplest way to handle data. You have to modify the program itself, though, to add, edit, or delete information, a cumbersome procedure as the size of your database grows.

The solution, of course, is to maintain data in a disk file, separate from the program file, so that the program reads the data it needs from the disk file. You alter the data interactively through either the application program or a separate file-maintenance program, the way commercial applications handle data.

This month I'll show you how to create and use external data files for your programs in Applesoft BASIC. Activities, the sample file-maintenance program in **Listing 1**, (see also the accompanying data strip on p. 124), lets you build a disk-file database for Calorie Burner, the program that appeared in last month's Applesoft Adviser (September 1987, p. 99). You'll have to alter the original program, too: **Listing 2** contains the changes you'll need to make.

The Activities program lets you store all the data for a particular application in one *file* on your disk. This collection of data has a name, such as Burner Data, which appears on your directory listing each time you catalog that disk.

The program stores information within the file as subgroups of related pieces of data. For Calorie Burner, each subgroup (called a *record*) consists of the name of an activity, a brief description, and the number of calories a 100-pound person burns per minute while pursuing that activity. For example,

```
SKIING DOWNHILL 6.3
```

is the record for "downhill skiing." Similar records represent each activity in the file. The data file, then, is a collection of records.

In a record, each space containing an individual item of information is called a *field*. The example above is a record with three fields: activity, activity type, and number of calories burned. All records in a random-access file must contain the same number and types of fields. The size of each field, indicated in bytes, is called the *field length*. Throughout all records in a file, a particular field always has the same length.

This constant field length forces you to make some compromises. Defining a field length large enough to accommodate all possible situations often wastes disk storage space, since most entries won't come close to using the full field length. On the other hand, if your field length is too short, your program might chop the ends off too many data entries.

Another useful tip for working with disk files is to define record lengths in exact factors of 256. For Burner Data, 32 (one-eighth of 256) is an appropriate record length, allowing 5 bytes for the numbers of calories burned (4 bytes for the number plus 1 byte for the return character), 14 bytes for the activity name and return character, and 13 bytes for the activity descriptor and its return character. This means that the actual numbers of characters allowed for the activity name and descriptor are 13 and 12, respectively.

Your file-maintenance program must ensure that you don't exceed these field lengths. Lines 620, 625, and 630 in the Activities program use BASIC's LEFT$ function to handle this task. At the same time, the program pads entries that are smaller than the specified field lengths with blank spaces.

Note that in designating the number of bytes for each field, you must include 1 extra byte for the return character. When you use PRINT to write an item into a disk file, the program sends the return character to the disk along with the rest of the characters for that item. When an INPUT statement reads the item from the data file, the return character is the marker that tells your Apple to stop reading characters for this item.

The field lengths you choose for strings can be any appropriate number. Applesoft stores numeric data in either 2-byte (for integers) or 4-byte (for real numbers having decimal fractions) chunks. The field in Activities containing the number of calories is assigned 5 bytes (4 plus 1).

Listing 1. Activities, a file-maintenance program for Burner Data.

```
1  REM       ACTIVITIES
2  REM   EXTERNAL FILE HANDLING
3  REM   PROGRAM FOR CAL. BURNER
4  REM
5  REM     **********************
6  REM      BY DAN BISHOP
7  REM      APPLESOFT ADVISOR
8  REM     INCIDER MAGAZINE 10/87
9  REM     **********************
10 NA = 100:NB = 8: DIM AC$(NA),TP$(NA),CB(NA),JX(NA)
15  FOR I = 1 TO NA:JX(I) = I: NEXT I
20 L$ = "----------":D$ =  CHR$ (4):TB$ = "CALORIE BURNER"
30 L$ = "---" + L$ + L$ + L$ + L$
35 BL$ = "                                   ": REM  30 BLANK SPAC
    ES
40  GOSUB 200: REM  READ DATA
60  GOSUB 700: REM  DISPLAY MENU
70  ON M GOSUB 300,800,1100,1200,9050,90
80  GOTO 60
90  PRINT "SAVING DATA TO DISK."
95  GOSUB 600: HOME : END
96  REM  **********************
97  REM  COMMONLY USED ROUTINES
98  REM  **********************
99  REM
100  INPUT "PRESS <RETURN> TO CONTINUE...";X$
110  HOME : RETURN
120  GOSUB 190
130  PRINT "ACTIVITY.....................CAL/MIN"
140  PRINT L$: PRINT : RETURN
150  GOSUB 500: PRINT PL$
160  PRINT L$
170  IF P$ = "Y" THEN  GOSUB 1500
180 P$ = "N": RETURN
190  HOME : PRINT TB$: RETURN
194  REM
195  REM
196  REM  **********************
197  REM  ROUTINE TO READ DATA
198  REM  **********************
199  REM
200  PRINT D$;"OPEN BURNER DATA,L32"
210  FOR J = 1 TO NA
220  PRINT D$;"READ BURNER DATA, R";J
225  INPUT R$
230  IF  LEFT$ (R$,11) = "END OF FILE" THEN  GOTO 255
235 AC$(JX(J)) = R$
240  INPUT TP$(JX(J))
245  INPUT CB(JX(J))
250  GOTO 270
255 I = J - 1
260 J = NA
270  NEXT J
280  PRINT D$;"CLOSE BURNER DATA"
285 NA = I
290  RETURN
294  REM
295  REM
296  REM   **********************
297  REM  ROUTINE TO DISPLAY
298  REM  NR RECORDS AT A TIME
299  REM  ************************
300  HOME :NU = 0:P$ = "N"
305  IF NA = 0 THEN  PRINT "THERE ARE NO ACTIVITIES LISTED.":
     GOSUB 100: GOTO 390
310  INPUT "DO YOU WANT RECORDS PRINTED ON PRINTER?   (Y/N):
    ";P$
320  IF P$ = "Y" THEN  GOTO 400
```

Listing continued.

USING RANDOM-ACCESS FILES

The Applesoft BASIC commands you use for random-access disk files include OPEN, READ, WRITE, and CLOSE. A PRINT CHR$(4); . . . statement invokes each of these commands from your program. CHR$(4) is a special character that tells your Apple that the following command is disk-related. Applesoft programmers traditionally define a constant, D$, at the beginning of a program (D$ = CHR$(4)), then substitute the D$ into the PRINT command.

To open a random-access file, you need the name of the file and the length of each record in the file. In **Listing 1**, the filename is BURNER DATA and the record length is 32. Lines 200 and 600 show the correct syntax for opening a random-access file:

```
PRINT D$;"OPEN BURNER DATA,L32"
```

Note that the letter L precedes the record length and that a comma separates the filename from the record length.

Use the OPEN command only once when you access data from your disk file. You shouldn't leave a file open any longer than necessary, however. The Activities program opens a file and reads all data immediately into arrays. Line 280 then closes the disk file:

```
PRINT D$;"CLOSE BURNER DATA"
```

Some programmers open data files at the beginning of a program and leave them open throughout program operation. Should a power failure occur while the program runs, though, any open files will be damaged. That's why Activities contains two OPEN commands. The first sequence (lines 200–280) reads data from the disk file into arrays the program can use, then closes the file. The second sequence (lines 600–655) writes the updated array data back into the disk file just before the program ends. The disk file remains closed during the rest of the program, while you add new activities and edit or delete old ones.

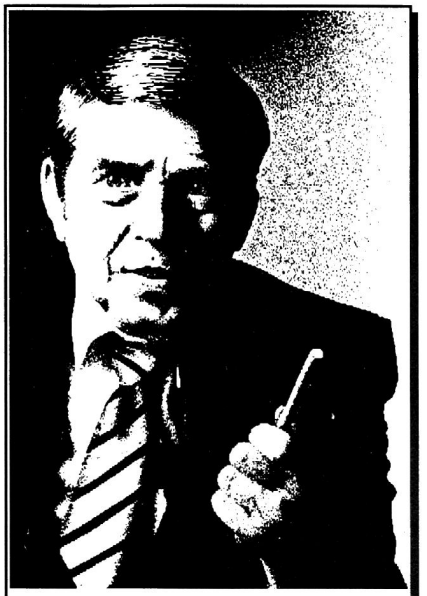
DATA INPUT FROM DISK FILES

The Activities program uses the INPUT command to read data from a random-access disk file. You need another command, though, to tell your Apple that input data are coming from a disk file instead of your keyboard. Applesoft handles this "redirection" process with the READ command. READ requires the name of the disk file from which it reads

Listing continued.

```
330  GOSUB 120: FOR J = 1 TO NB:NU = NU + 1
340  GOSUB 150: REM  DISPLAY RECORD JX(NU)
350  IF NU = NAX THEN J = NB
351  REM  NAX AND NA ARE THE SAME
360  NEXT J
370  GOSUB 100: IF NU = NAX THEN 390
380  GOTO 330
390 P$ = "N": RETURN
393  REM
394  REM
395  REM  ******************
396  REM  PRINT ROUTINE FOR
397  REM  ENTIRE LIST
398  REM  ******************
399  REM
400  HOME
410  PRINT D$;"PR#1"
420  GOSUB 120
430  FOR J = 1 TO NA
440 NU = J
450  GOSUB 500
460  PRINT PL$: PRINT L$
470  NEXT J
480 P$ = "N": PRINT D$;"PR#0"
490  RETURN
494  REM
495  REM
496  REM  ******************
497  REM  DISPLAY FORMATTER
498  REM  ******************
499  REM
500 PL = 30 -  LEN (AC$(JX(NU)))
510 PL$ = AC$(JX(NU)) + " " +  LEFT$ (TP$(JX(NU)),PL)
520 PL$ =  LEFT$ (PL$ + BL$,30)
530 PL$ = PL$ +  RIGHT$ ("       " +  STR$ (CB(JX(NU))),7): REM
     7 BLANK SPACES
540  RETURN
594  REM
595  REM  ********************
596  REM   SAVE DATA TO DISK
597  REM  ********************
598  REM
599  REM
600  PRINT D$;"OPEN BURNER DATA,L32"
605  IF NA = 0 THEN J = 1: GOTO 640
610  FOR J = 1 TO NA
615  PRINT D$;"WRITE BURNER DATA,R";J
620  PRINT  LEFT$ (AC$(JX(J)) + BL$,13)
625  PRINT  LEFT$ (TP$(JX(J)) + BL$,12)
630  PRINT CB(JX(J))
640  NEXT J
650  PRINT D$;"WRITE BURNER DATA,R";J
655  PRINT "END OF FILE"
660  PRINT D$;"CLOSE BURNER DATA"
665  RETURN
694  REM
695  REM
696  REM    ********************
697  REM  ROUTINE TO DISPLAY MENU
698  REM   ********************
699  REM
700  GOSUB 190
710  PRINT "ENTER THE NUMBER OF YOUR SELECTION...": PRINT
720  PRINT "     1. LIST ALL ACTIVITIES."
730  PRINT "     2. SEARCH FOR AN ACTIVITY TO EDIT"
735  PRINT "        OR DELETE."
740  PRINT "     3. SORT ACTIVITIES IN THE LIST."
745  PRINT "     4. ADD A NEW ACTIVITY TO THE LIST."
750  PRINT "     5. INITIALIZE DATA FILE FOR A NEW "
755  PRINT "        LIST. (OLD LIST WILL BE ERASED.)"
```

Listing continued.



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Listing continued.

```
760  PRINT "      6. END THE PROGRAM."
770  PRINT : INPUT "  CHOICE ====> ";M$
780 M =  VAL (M$): IF M < 1 OR M > 6 THEN  PRINT "**** INVALI
     D CHOICE ****": PRINT : GOTO 720
790  RETURN
794  REM
795  REM
796  REM  ********************
797  REM  ARRAY SEARCH ROUTINE
798  REM  ********************
799  REM
800  GOSUB 190
810  PRINT : PRINT "YOUR ACTIVITY LIST WILL BE SEARCHED"
820  PRINT "FOR ANY PARTIAL MATCH ON ACTIVITY NAME.": PRINT
830  PRINT "ENTER THE CHARACTER STRING TO BE USED"
840  PRINT "FOR THE SEARCH (OR PRESS RETURN):"
850  PRINT : INPUT "====>  ";S$
860  IF S$ = "" THEN  RETURN
870 S =  LEN (S$):NU = 0
880  GOSUB 1000
890  IF F = 0 THEN  GOTO 980
900  GOSUB 120: GOSUB 150
910  PRINT
920  PRINT "PRESS <N> FOR NEXT MATCH;"
921  PRINT "       <E> TO EDIT THIS ENTRY."
922  PRINT "       <D> TO DELETE THIS ENTRY."
923  PRINT "       <P> FOR PRINTED COPY;"
924  PRINT "    <Q> TO QUIT & RETURN TO MENU ===>";
930  GET X$
940  IF X$ <  > "N" AND X$ <  > "E" AND X$ <  > "D" AND X$ <
      > "P" AND X$ <  > "Q" THEN 930
950  PRINT X$: IF X$ = "P" THEN  GOSUB 1500: GOTO 900
955  IF X$ = "Q" THEN  GOTO 995
960  IF X$ = "E" THEN  GOSUB 1400: GOTO 900
965  IF X$ = "D" THEN  GOSUB 1600: GOTO 900
970  IF NU < NAX THEN  GOTO 880
980  PRINT : PRINT "NO FURTHER MATCHES FOUND."
990  GOSUB 100
995  RETURN
996  REM   ********************
997  REM    SEQUENTIAL ARRAY
998  REM    SEARCH ROUTINE
999  REM   ********************
1000 F = 0:NU = NU + 1
1005  HOME : PRINT "SEARCHING INDEX ENTRY "NU"..."
1010 L =  LEN (AC$(JX(NU)))
1020  IF S > L THEN 1090
1030 D = L - S + 1
1040  FOR J = 1 TO D
1050 D$ =  MID$ (AC$(JX(NU)),J,S)
1060  IF D$ = S$ THEN J = D + 10:F = 1
1070  NEXT J
1080  IF J >  = D + 10 THEN  GOTO 1095
1090  IF NU < NAX THEN  GOTO 1000
1095  RETURN
1096  REM  ******************
1097  REM   SORT INDEX BY
1098  REM    ACTIVITY NAME
1099  REM  ******************
1100  IF NA = 1 GOTO 1160
1105  GOSUB 1300
1110  FOR J = 1 TO NU
1120  IF AC$(JX(J)) > AC$(JX(NXT)) THEN K = J:J = NU + 10
1130  NEXT J
1140  GOSUB 1330
1150  IF NXT <  = NAX THEN  GOTO 1110
1160  RETURN
1195  REM  **********************
1196  REM     NEW ITEM ENTRY
1197  REM  **********************
```

Listing continued.

data and the number of the record containing the data. The following example shows the syntax:

```
PRINT D$;"READ BURNER DATA,R1"
```

This command instructs your Apple to read the first record in Burner Data or to read the J'th record:

```
PRINT D$;"READ BURNER DATA,R";J
```

The programming for reading (and writing) records is usually included in a FOR/NEXT loop. A loop counter (such as J) indicates the record your Apple is reading. In this case, the second example above shows the most common format. It's important to note that a READ command with the appropriate value for R must precede each set of data (each record) your Apple will read from the file.

Now that you've told your Apple to perform a READ operation and that you want to read the J'th record, use INPUT to retrieve the data from the specified record. The INPUT command takes the usual form:

```
INPUT X$, Y$, Z
```

This command tells your Apple to read two strings and a number from the data file. You could use three separate INPUT statements for this example, as well.

If you instruct your Apple to read a record that doesn't contain the expected data fields or one that doesn't exist in your file, you'll get an END OF DATA error. One solution is to place an END OF FILE marker after the last legitimate record in your file. You can then instruct your Apple to keep scanning records until it reads the marker. When the program encounters END OF FILE, it closes the file and begins executing its other functions.

Lines 9000–9040 place the END OF FILE marker into the Burner Data file as record 1 when the program initializes the file. When you run the program the first time, type RUN 9000 (instead of just RUN) to initialize the Burner Data file. If the file already exists on your disk, the old file is effectively erased and Burner Data starts again fresh.

From this point on, every time you end Activities, the program writes the array data into Burner Data and adds an END OF FILE marker after writing the last record (lines 600–655).

With the END OF FILE marker in place, the READ sequence always reads the first field in the designated record and tests whether it's the END

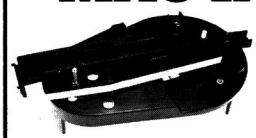
Listing continued.

```
1198  REM
1200  HOME : IF NA = 100 THEN  PRINT "SORRY, DATA ARRAYS ARE
      FULL.": GOSUB 100: GOTO 1290
1205  PRINT "ENTER SHORT NAME FOR THIS ACTIVITY:"
1210  INPUT AC$
1215  PRINT "ENTER SHORT ADDITIONAL DESCRIPTOR:"
1220  INPUT TP$
1225  PRINT "ENTER THE CALORIES/MINUTE A 100 POUND"
1230  PRINT "PERSON WOULD BURN DOING THIS ACTIVITY:"
1235  INPUT CB
1240  PRINT "ENTER <YES> IF YOU WISH TO ADD THIS"
1250  PRINT "DATA TO YOUR FILE...";
1260  INPUT X$
1270  IF X$ <  > "YES" THEN  GOTO 1285
1275 NA = NA + 1:AC$(JX(NA)) = AC$
1280 TP$(JX(NA)) = TP$:CB(JX(NA)) = CB: GOTO 1290
1285  PRINT "NO ENTRY HAS BEEN MADE.": GOSUB 100
1290  RETURN
1296  REM   ********************
1297  REM    GENERAL ROUTINES
1298  REM    USED BY SORT
1299  REM   ********************
1300  HOME : PRINT "SORTING RECORDS."
1310  PRINT "  PLEASE WAIT..."
1320 NU = 1:NXT = 2: RETURN
1330  IF J < NU + 10 THEN  GOTO 1390
1340 XX = JX(NXT)
1350  FOR J = NXT TO K + 1 STEP  - 1
1360 JX(J) = JX(J - 1)
1370  NEXT J
1380 JX(K) = XX
1390 NU = NU + 1:NXT = NXT + 1
1395  RETURN
1396  REM  ********************
1397  REM  ITEM EDIT ROUTINE
1398  REM  ********************
1399  REM
1400 AC$ = AC$(JX(NU))
1405 AC$ = "":TP$ = "":CB$ = ""
1410  PRINT "JUST PRESS <RETURN> FOR FIELDS THAT YOU"
1415  PRINT "DO NOT WISH TO CHANGE."
1420  PRINT : PRINT "ENTER REVISED ACTIVITY NAME:"
1425  INPUT AC$: IF AC$ <  > "" THEN AC$(JX(NU)) = AC$
1430  PRINT "ENTER REVISED DESCRIPTOR:"
1435  INPUT TP$: IF TP$ <  > "" THEN TP$(JX(NU)) = TP$
1440  PRINT "ENTER REVISED CALORIE AMOUNT:"
1445  INPUT CB$: IF CB$ <  > "" THEN CB(JX(NU)) =  VAL (CB$)
1450  RETURN
1494  REM
1495  REM
1496  REM  ********************
1497  REM  PRINT-OUT ROUTINE
1498  REM  ********************
1499  REM
1500  PRINT  CHR$ (4);"PR#1"
1510  GOSUB 120
1520  GOSUB 500: PRINT PL$
1550  PRINT L$
1560  PRINT
1570  PRINT  CHR$ (4);"PR#0"
1580  RETURN
1595  REM  ************************
1596  REM   ITEM DELETE ROUTINE
1597  REM  ************************
1598  REM
1600  PRINT : PRINT "IF YOU WANT TO DELETE THIS ACTIVITY,"
1610  PRINT "ENTER <YES>.  ELSE JUST PRESS <RETURN>."
1620  INPUT X$: IF X$ <  > "YES" THEN 1690
1630  FOR I = NU TO NA
1640 AC$(JX(I)) = AC$(JX(I + 1))
1650 TP$(JX(I)) = TP$(JX(I + 1))
```

Listing continued.

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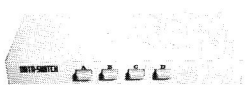
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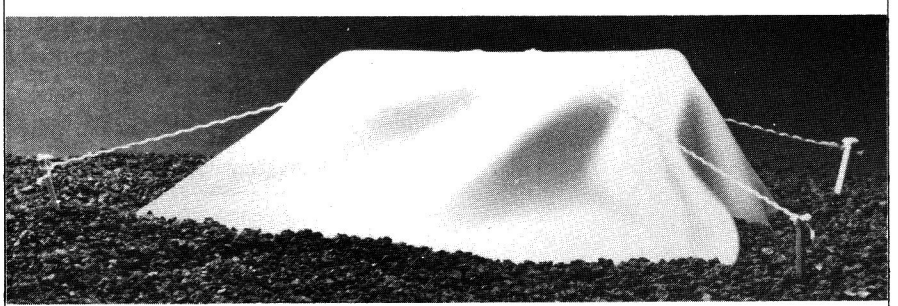
Listing continued.

```
1660 CB(JX(I)) = CB(JX(I + 1))
1670  NEXT I
1680 NA = NA - 1
1690  RETURN
8995  REM  ************************
8996  REM  DATA FILE INITIAL-
8997  REM  IZATION ROUTINE
8998  REM  ************************
8999  REM
9000  PRINT  CHR$ (4)"OPEN BURNER DATA,L32"
9010  PRINT  CHR$ (4)"WRITE BURNER DATA,R1"
9020  PRINT "END OF FILE"
9030  PRINT  CHR$ (4)"CLOSE BURNER DATA"
9040  GOTO 10
9050  HOME
9060  PRINT "THE ACTION YOU HAVE SELECTED WILL"
9065  PRINT "TOTALLY DESTROY ALL INFORMATION IN YOUR"
9070  PRINT "ACTIVITY FILE.  A NEW FILE WILL BE "
9075  PRINT "STARTED, ERASING ALL OLD ACTIVITIES."
9080  PRINT
9085  PRINT "IF YOU STILL WANT TO DO THIS, SELECT"
9090  PRINT "OPTION 6 (END THE PROGRAM). THEN ENTER:"
9095  PRINT "       RUN 9000"
9100  PRINT "TO RESTART THE PROGRAM."
9105  PRINT
9110  GOSUB 100
9115  RETURN
```

End of listing.

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OF FILE marker. If it isn't, the program assigns the item read to an activity name and uses INPUT commands to read the next two fields directly. If the program reaches END OF FILE, it ends the data-input process. The program assigns the actual number of records read (J – 1) to I and the value in NA (the loop terminator) to J so that the loop ends, then closes the file and gives NA the value I. From this point, NA's value corresponds to the actual number of activities in the program rather than some predesignated value.

WRITING DATA TO DISK FILES

Like the READ process, WRITE begins by opening the appropriate disk data file:

```
PRINT D$;"OPEN BURNER DATA,L32"
```

You then tell your Apple that you intend to send data to the disk file with the line:

```
PRINT D$;"WRITE BURNER DATA,R";J
```

This command tells your Apple that the following PRINT commands send data to the J'th record in the disk data file, rather than to the screen. As with the READ command, a statement must accompany each new set of data to be output as a record, to tell your Apple where to write the data.

Simple print statements, such as PRINT X$, Y$, Z, now transfer data to the file. Data types (string, integer, or real) must be the same for print statements used here and input statements used with the READ command. You could use three separate print statements for this example, as well.

One problem is hidden in the simple print statement in the example above. Recall that random-access files require a predefined length for specific fields and that each record must have a set length (32 bytes in Burner Data). If X$ is 20 bytes long and Y$ is 20 bytes long, the PRINT command above will send 47 bytes to the disk file instead of 32. (Don't forget to add in the three return characters.) You won't be aware of this problem until the next time you try to read data from the file—you'll find that some of your data have turned to garbage!

The simple way to avoid this problem is to make sure each data item you write to the file meets field-length requirements exactly. If X$ is to contain 13 bytes plus a return character, use the following command instead of PRINT X$:

PRINT LEFT$(X$ + BL$, 13)

where BL$ is a string constant containing at least 13 blank spaces. This command adds a string of blanks to the end of X$ and instructs your Apple to print only the 13 leftmost characters. If X$ is too long, the command sends only the first 13 characters to the disk file, ensuring a perfect match of field lengths and the size of each item sent to the data file.

When your Apple has written all records to the file (when the FOR J = 1 TO NA loop is finished), the value of J becomes NA + 1. At this point you write the END OF FILE marker (lines 640–645) in the data file, and the program closes it:

PRINT D$;"CLOSE BURNER DATA"

USING THE PROGRAM

Activities is a disk data-file maintenance program that lets you add, edit, or delete activities in the Burner Data file. The Calorie Burner program (presented in last month's Applesoft Adviser), modified with the changes shown in **Listing 2**, accesses Burner Data and lets you calculate basal metabolic rate (BMR) and accumulate calories expended, based on selected activities.

To convert Calorie Burner for disk-based data files, replace lines 10, 20, and 200–290 in that program with the program lines in **Listing 2**, and delete the rest of the program beginning with line 1990.

Several functions in the Activities and Calorie Burner programs are similar. In fact, you can save time by copying Calorie Burner (name the new copy *Activities*), then carefully adding, editing, or deleting lines in this copy to match **Listing 1**. Load Calorie Burner, make the changes, and use the name Activities to save the revised program. You'll now have both Calorie Burner and Activities saved on your disk.

When you use the Activities program the first time, start the program with the command RUN 9000 instead of just RUN. This initializes the Burner Data file and places an END OF FILE marker in record 1 so that the program will work properly. Use RUN 9000 whenever you want to erase your entire data file and start over.

The program then presents the master menu, shown in **Figure 1**. Options 1 and 3 are identical to those in Calorie Burner. When you select option 1, you can display the listing

Listing 2. Changes for Calorie Burner program.

```
10 NA = 100:NB = 8: DIM AC$(NA),TP$(NA),T(NA),CB(NA),QB(NA),J
   X(NA)
20 L$ = "----------":D$ =  CHR$ (4):TB$ = "CALORIE BURNER"
194  REM
195  REM
196  REM  ********************
197  REM  ROUTINE TO READ DATA
198  REM  ********************
199  REM
200  PRINT D$;"OPEN BURNER DATA,L32"
210  FOR J = 1 TO NA
215 JX(J) = J
220  PRINT D$;"READ BURNER DATA, R";J
225  INPUT R$
230  IF  LEFT$ (R$,11) = "END OF FILE" THEN I = J - 1:J = NA:
     GOTO 250
235 AC$(JX(J)) = R$
240  INPUT TP$(JX(J))
245  INPUT CB(JX(J))
250  NEXT J
260  PRINT D$;"CLOSE BURNER DATA"
270 TB = BR:TM = 0
275  FOR J = 1 TO NA
280 QB(J) = 0:T(J) = 0
285  NEXT J
290 NA = I: RETURN
```

Listing continued.

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Listing continued.

```
501  REM  FOR LINES 500 TO 550
502  REM  IN CALORIE BURNER,
503  REM  CHANGE ALL OCCURRENCES
504  REM  OF 20 TO 24 AN ALL
505  REM  OCCURRENCES OF 7 TO 5.
506  REM  THIS WILL FORMAT THE
507  REM  SCREEN TO BETTER MATCH
508  REM  THE DATA.
```

End of listing.

Figure 1. *Activities program master menu.*

```
ENTER THE NUMBER OF YOUR SELECTION...

     1. LIST ALL ACTIVITIES.
     2. SEARCH FOR AN ACTIVITY TO EDIT
        OR DELETE.
     3. SORT ACTIVITIES IN THE LIST.
     4. ADD A NEW ACTIVITY TO THE LIST.
     5. INITIALIZE DATA FILE FOR A NEW
        LIST. (OLD LIST WILL BE ERASED.)
     6. END THE PROGRAM.

   CHOICE ====>
```

on screen or print it. Option 3 simply sorts the activities into alphabetical order, then redisplays the master menu.

Figure 2. *Search/Edit menu.*

```
PRESS <N> FOR NEXT MATCH.
      <E> TO EDIT THIS ENTRY.
      <D> TO DELETE THIS ENTRY.
      <P> FOR PRINTED COPY.
      <Q> TO QUIT & RETURN TO MENU.===>
```

Option 1 will now show the sorted list of activities.

Select option 4 to add a new activity to the list. The subroutine in lines 1200–1290 handles this function; it prompts you to enter a name for the activity (such as JOGGING), a short descriptor (such as 8 MIN. MILE), and the number of calories per minute a 100-pound person burns while performing this activity.

When you've entered the data, the program asks you to enter the word YES if you want to add them to your file. Any other response aborts the process with an appropriate message. In either case, the master menu reappears.

To edit or delete an item already in the list, select option 2 to search for it. Enter all or part of an activity name. Your Apple displays the first list item containing a character string matching the string you entered, then displays the Search/Edit menu shown in **Figure 2**.

If the displayed item isn't the one you want to edit, press N; your Apple displays the next activity containing a matching character string. Press E to edit the displayed entry. The program then asks you to enter the revised data for each of the three fields. If the current data in any of the fields are OK, just press Return rather than retype them for that field. When

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Open-Apple is Tom Weishaar's monthly newsletter for knowledgeable Apple II users. It's thin but packed tight with Apple II lore, humor, letters, tips, advice, and solutions to *your* problems. Compared to other Apple II publications, ***Open-Apple*** has the highest new-idea-per-issue ratio, the clearest writing, the funniest cartoons, the longest index, the *only* warranty (all your money back if you're not satisfied), and it takes up the least shelf space. The only thing it doesn't have is the most subscribers. Yet.

IIc cue #16

A small shield is missing inside some Apple IIc internal disk drives that causes trouble with booting and other disk operations, especially for users of color monitors. Stray magnetic energy from the monitor can overwhelm the read-write head inside the drive when the shield is missing. If your IIc sometimes refuses to boot, move the monitor farther away from the computer or take it to your dealer for a check-up. For more information, see "IIc color monitor interference," "More disk interference," and "The system works" in our February, April, and July 1986 issues, pages 2.8, 2.23, and 2.44.

From our fan mail:

The more I read the personal computer literature, the more I am convinced that you, Bert Kersey, and maybe a couple of others are the only sane people involved. Also, after fighting Big Blue and "professional" programmers for nearly thirty years, I doubt that very many Apple users realize just how lucky they are.

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you're finished, the program displays the revised record along with the Search/Edit menu.

To delete the displayed item, press D. To print the record, press P. To quit the Search/Edit process and return to the master menu, press Q.

When you're finished working with Activities, be sure to select option 6 from the master menu to end the program. This option opens the disk data file and writes the array data to the Burner Data disk file before ending the program.

Now that you've created Burner Data and written it to disk, you can run Calorie Burner. If you've made the changes shown in **Listing 2**, Calorie Burner should now read data from the disk file, rather than from data statements in the program itself.

ENLARGING THE DATA FILE

As written for this column, Activities and Calorie Burner can handle 100 activities. To expand your data file, simply change line 10 in the Calorie Burner program to assign NA a value large enough to accommodate your data. (For example, NA = 250.) Change line 10 in Activities to assign the same number to NA there. Finally, change line 1200 in Activities (IF NA = 100. . .) to contain the value you assigned to NA in line 10.

Because Calorie Burner is similar to the Calorie Counter program in my February 1987 column (p. 89), you can use the programs and modifications presented here as a guide to modifying Calorie Counter for disk-data-file access also. Create a file-maintenance program called FOODS for a disk data file named FOODS DATA. Then modify Calorie Counter to access the FOODS DATA file the same way Calorie Burner accesses the Burner Data file.

A HOME-GROWN DATABASE

Random-access file handling expands your programming capabilities into the arena of database applications. If you're new to disk-file I/O, you should work carefully through this month's examples until you understand how to manipulate data in external files—then practice on Calorie Counter or some other application.

The size of your Apple's working memory limits the examples presented here, because the program transfers your entire database into arrays. That's fine for small databases, but it's just the beginning.

For larger database files, only a small block of records (perhaps just one) is resident in memory at any given moment. Database programs handle sorting, searching, and editing directly from disk. The algorithms this approach requires are more complicated, but the potential size of your database expands considerably—to the limit of your disk's storage capacity. With a hard disk, that's several megabytes!■

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GS Desk Accessories: Part 1

They're always there when you need them—get organized with an assortment of handy pop-up utilities.



by Tom Swan

Your Apple IIGS offers two kinds of desk accessories: classic desk accessories (CDA) and new desk accessories (NDA). Operating independently of other software, both varieties pop up on command in the middle of your spreadsheet, word processor, or latest space-zap craze to let you jot down a note, display a reference chart, change display colors, and do other miscellaneous jobs. Because desk accessories are available while other programs run, they're your constant companions, always around when you need them.

Despite their similarity in purpose, though, CDAs and NDAs are as different as IBMs and Apples. CDAs are nearly always ready to go to work, whether you're running 8-bit programs like Applesoft BASIC and AppleWorks, or 16-bit applications such as PaintWorks and The Music Studio. NDAs (which we'll examine more closely next month) are available only when you run desktop applications with pull-down menus. (A third kind of desk accessory appears in the Desktop program's Apple menu on GS system disks 1.0 and 1.1. Presumably, the next version of the Desktop software will use NDAs instead, perhaps by the time you read this.)

This month I'll explain how to install and use CDAs, then describe their internal structure for readers who want to write their own accessories. To give you a place to start, the **Program listing** is a complete CDA in 65816 assembly language. The program displays an ASCII-character table similar to those in many book appendices. The table is more convenient as a CDA displayed on my computer screen than as a chart printed on paper, which I never seem able to find when I need it. In addition to its usefulness as a utility, the program shows the internal form all CDAs follow.

USING CDAS

CDAs are machine-language programs that hide in RAM or ROM, waiting for you to activate them. Anytime after booting with a copy of your GS System disk, press Open apple-Control-Escape to use a CDA. This suspends the current program temporarily and displays the GS desk-accessory menu. Using the up- and down-arrow keys, select the CDA you want by moving the highlighting bar to one of the listed names. Then press Return to *open* the CDA, which displays its own screens, prompts you for various information, reads and writes disk files, and so on.

Most CDAs let you press Escape (or Escape and Return) to go back to the GS desk-accessory menu. Press Escape and Return to select Quit from the menu and resume the suspended program. You can then continue where you left off—the GS toolbox completely restores the display whether you're running a BASIC program, typing a database record, or drawing a picture. If you get stuck or confused (who doesn't?), remember that combinations of Escape and Return usually rescue you from a CDA's clutches.

Two CDAs are installed permanently in ROM, available every time you switch on your GS. The *control panel* is a multiscreen accessory that sets the clock, changes display colors, configures peripheral-card slots, prepares a RAM disk, and selects other GS features. *Alternate-display mode* is a simple accessory for programs that require two low-resolution-graphics pages, usually for animation. Unlike other Apple IIs, the GS can't normally display the second lo-res-graphics or text page. If you run into a program that has trouble displaying lo-res graphics, toggle the alternate-display mode on. With the switch on, the GS periodically copies information from lo-res page 2 to memory bank $E0 for display. With the switch off, copying doesn't occur and page 2 is invisible.

The two permanent CDAs are inside ROM—you don't have to install them. Other RAM-based CDAs are disk files of type $B9, which contain the accessory's 65816 machine-language programming. You can find many such files on bulletin boards and in user-group libraries.

When booting, the GS loads automatically all CDA files it finds in its SYSTEM/DESK.ACCS folder and installs their names in the desk-accessory menu. Therefore, to add a

Program listing. A CDA that displays an ASCII-character table.

```
;-------------------------------------------------------------------
;
; PURPOSE:     -- Display ASCII character table (CDA)
;
; SYSTEM:      -- Apple IIGS / ORCA/M 65816 Assembler 1.0
;
; AUTHOR:      -- by Tom Swan / Please give this program to a friend!
;
;-------------------------------------------------------------------

         KEEP    AsciiTab                ; Disk file name

         65816   on                      ; Runs in 65816 native mode
         ABSADDR on                      ; Run-time address unknown

         MCOPY   AsciiTab.Mac            ; Use this macro library

CDAHead  START

         DW      'Ascii Table'           ; Desk accessory name
         dc      i4'Main'                ; Main program entry point
         dc      i4'ShutDown'            ; DeskShutDown entry point

         END     ; of CDAHead


Main     START                           ; Main program code

         phb                             ; Save data bank register
         phk                             ; Push program bank register
         plb                             ; Data bank = program bank

         ph2   #$11                      ; Select 40-column display
         _WRITECHAR

         ph2   #$0C                      ; Clear screen & home cursor
         _WRITECHAR


;------- Display ASCII Table

         PUTS  #'ASCII CHARACTER TABLE',#31,CR=T
         PUTS  #'by Tom Swan',#26,CR=T
         jsr   NewLine

         PUTS  #'   00   10   20   30   40   50   60   70'
         PUTS  #'  ----------------------------------------'
         PUTS  #'0| nul  dle       0    @    P    `    p '
         PUTS  #'1| soh  dc1  !    1    A    Q    a    q '

         PUTS  #'2| stx  dc2  '                    ; Display first half of line

         PUTC  #'"'                               ; ASCII double quote
         PUTS  #'    2    B    R    b    r '     ; Do rest of line

         PUTS  #'3| etx  dc3  #    3    C    S    c    s '
         PUTS  #'4| eot  dc4  $    4    D    T    d    t '
         PUTS  #'5| enq  nak  %    5    E    U    e    u '
         PUTS  #'6| ack  syn  &    6    F    V    f    v '
         PUTS  #'7| bel  etb  ''''   7    G    W    g    w '
         PUTS  #'8| bs   can  (    8    H    X    h    x '
         PUTS  #'9| ht   em   )    9    I    Y    i    y '
         PUTS  #'A| lf   sub  *    :    J    Z    j    z '
         PUTS  #'B| vt   esc  +    ;    K    [    k    { '
         PUTS  #'C| ff   fs   ,    <    L    \    l    | '
         PUTS  #'D| cr   gs   -    =    M    ]    m    } '
         PUTS  #'E| so   rs   .    >    N    ^    n    ~ '
         PUTS  #'F| si   us   /    ?    O    _    o  del '


;------- Display message and wait for keypress

         jsr   NewLine
         jsr   NewLine
         PUTS  #'   Press esc (or another key) to quit'
```

Listing continued.

new CDA to any system disk, just copy its file to this folder and reboot. You can then select and run it. In addition to the two permanent CDAs, you can install up to 11 RAM-based accessories before the menu fills.

PROGRAMMING CDAS

CDAs and NDAs run under control of the routines in the GS Desk Manager toolset. When programming CDAs, though, you can ignore this fact and concentrate simply on writing your program—it's unlikely you'll need to call the Desk Manager, because the system has already loaded and installed the desk accessory for you.

CDA disk files must be in the correct form. Besides having the type $B9, they must be relocatable *load files*, containing various details that let ProDOS 16 run programs anywhere in memory. Load files differ from older Apple II machine-language programs, which often run at fixed memory locations. Because the GS can have up to 8 megabytes of RAM, it's important that programs be able to run at different locations. Fortunately, you don't have to know the exact structure of load files—the linker creates them automatically, unless you tell it to do otherwise.

Every CDA begins with a three-item header that identifies the accessory. The Desk Manager toolset uses the header to add the CDA's name to the desk-accessory menu and activate it on your command. In the ORCA/M development system (ByteWorks, 4700 Irving Boulevard N.W., Suite 207, Albuquerque, NM 87114, 505-898-8183), a typical CDA begins like this:

```
CDAHead  START
         DW      'Name'
         dc      i4'Main'
         dc      i4'ShutDown'
         END     ; of CDAHead
```

Beginning the CDA is the name as you want it to appear in the menu. DW (define word) is a macro, which ORCA/M translates or expands into instructions for storing strings in a program. (Why they didn't call it "define string" is beyond me.) The string begins physically with a byte representing its length, followed by the characters inside single quotes. You could create the string in this form manually, but using the DW macro is easier and lets the assembler take care of the actual storage details. By the way, I could find no

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Listing continued.

```
            jsr   GetChar                   ; Wait for keypress
            END   ; of main program -- continue to exit

;------- Return to desk accessory menu

Exit        START                           ; Exit routine normal entry
            plb                             ; Restore data bank register
ShutDown    ENTRY                           ; DeskShutDown entry point
            rtl                             ; Return to DA menu
            END   ; of exit routine

;------- Subroutine: Read keyboard returning character in register A.

GetChar     START
            pha                             ; 1 word for result
            ph2   #0                        ; Select no echo mode
            _READCHAR                       ; Get keypress
            pla                             ; Remove character from stack
            rts                             ; Return to caller
            END   ; GetChar

;------- Subroutine: Start a new display line

NewLine     START
            ph2   #$0D                      ; ASCII carriage return
            _WRITECHAR                      ; Send char to display
            rts                             ; Return to caller
NewLine     END   ; NewLine
```

End of listing.

specific restriction on the length of the CDA name, but judging from the width of the desk-accessory-menu display, I assume it should be less than 30 characters.

Two 4-byte integer pointers follow the name. The first pointer is the address at which the CDA programming begins. When you select the accessory from the menu and press Return, the Desk Manager calls this address via a JSL instruction (jump to subroutine long).

The second pointer is the address of a shut-down entry point, which usually points to a single RTL (return from subroutine long). Even though you must include it, this entry point is mostly for advanced CDAs that run or generate other tasks (programs). If those tasks call the DeskShutDown routine, which they must if they use the Desk Manager toolset, the toolbox also calls your shut-down entry point to let the main program stop the task and do other cleanup chores.

Designing such programs is beyond what I can cover here, but that's the basic idea.

The actual program follows the CDA header and always runs in native 16-bit mode. Referring to data in the same segment that contains CDA machine language requires setting the 65816 data-bank register equal to the program bank. (If these terms are foreign to you, consult a reference such as the excellent *Programming the 65816* by David Eyes and Ron Lichty, Brady, 1986.) With both registers equal, the program can use simple addressing to locate data. To do this, start the main program this way:

```
Main    START
            phb     ; Push data bank
                    register
            phk     ; Push program bank
                    register
            plb     ; Data bank =
                    program bank
```

These instructions leave the original data-bank register on the stack while

changing it to the same address as the program bank. Insert your CDA programming after these three instructions, then write an exit routine such as the following:

```
Exit        START
            plb       ; Restore data bank
                        register
ShutDown    ENTRY     ; DeskShutDown
                        entry point
            rtl       ; Return to DA
                        menu
```

Notice how the ShutDown entry point avoids restoring the data-bank register from the stack. The program does this only when finally ending—not when shutting down other tasks running on top of the CDA. (Alternatively, you could have separate shut-down and exit routines.) Always end the CDA with an RTL instruction—never with an RTS (return from subroutine).

AN EXAMPLE CDA

The **Program listing** is a complete CDA in 65816 assembly language. Type it in with the ORCA/M text editor and save it with the name ASCIITAB.ASM. From this point, I'll assume you're running the ORCA/M development system, version 1.0. You can also use APW (Apple Programmer's Workshop, Apple Programmer Developers Association, 290 S.W. 43rd Street, Renton, WA 98055, 206-251-6548), although some of the macro names and other commands might be different.

Assembling the program requires several steps. First, build a custom macro file. This cuts down assembly time by copying the required macros into a separate file, which the assembler can load more quickly than it can scan the entire macro library. To build the custom macro file, type:

```
MACGEN ASCIITAB.ASM ASCIITAB.MAC /ORCA/MACROS/=
```

This assumes your system disk is named /ORCA. The MACGEN command reads the assembly-language source file and creates ASCIITAB.MAC, copying macro definitions from the library files in the MACROS folder. After a minute or so, when this step is finished, type the following commands to assemble the final code file:

```
ASML ASCIITAB.ASM
FILETYPE ASCIITAB $B9
```

The first line assembles and links the program. If you receive errors in this step, check your typing and try again. The second line changes the file type to $B9, identifying the final product as a CDA. Lastly, copy ASCIITAB into your boot disk's SYSTEM/DESK.ACCS folder and reboot. Call up the desk-accessory menu and select ASCII Table to run your new CDA.

Most programmers insert these commands into an EXEC file instead of typing them over and over. To do this, type EXEC and press Return, selecting EXEC as the current language. Then type EDIT MAKE and enter the three previous commands. Save this text to disk and type MAKE to assemble and link ASCIITAB. To save a

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little more time, use two EXEC files. I put the MACGEN command into a file named BUILD and the two other commands into MAKE. I then type BUILD to regenerate the macro-library file and MAKE to assemble the program. Use whatever approach works best for you.

CONTROLLING THE DISPLAY

ASCIITAB shows how to use the ORCA/M WRITECHAR macro to control the display. The leading underline character in this macro name tells you this is a toolbox call, usually requiring various parameters on the stack. Notice that early in the main program, two such calls select a 40-column display, clear the screen, and home the cursor. The **Table** lists other control codes you can use. To give the video firmware a command, push the appropriate control character onto the stack with the ph2 (push 2 bytes) directive and execute WRITECHAR. The following example switches to inverse video:

```
ph2 #$0F
WRITECHAR
```

Under the comment "Display ASCII Table" in the **Program listing**, you'll find several examples of another useful macro, PUTS (put string), which resembles BASIC's PRINT command, Pascal's Write and Writeln, and C's printf( ) function. PUTS greatly simplifies string display in assembly language and takes the following general form:

```
<label> PUTS s[,len][,CR=T][,ERROUT]
```

The <label>, which can be any name you want, lets other parts of the program jump to this location or call it as a subroutine. PUTS is the macro name and must be followed by a string (s), which can be the label of a string variable or, with a hatch mark (#), a literal string as in the ASCIITAB listing. The other PUTS elements are optional, indicated by square brackets. Adding a length value (len) displays the string in that many columns, adding spaces to the left if necessary. For example, this program line centers a 10-byte string in a 40-column display:

```
PUTS #'ABCDEFGHIJ',#25
```

Adding CR=T (carriage return equals true) starts a new display line after writing the string to the screen, similar to omitting a semicolon in BASIC or to a Pascal Writeln statement. Without CR=T, the cursor position remains at the end of the line, after the last character. The final PUTS option is ERROUT, which sends characters to the error-output file (the printer or a text file on disk, for example) without disturbing text on screen.

You should be able to understand a few other features and notes in the **Program listing** on your own by reading the comments. To use the program as a starting place for new CDAs, delete all lines from the comment "Display ASCII Table" down to "Display message..." The result is an empty shell, ready for your own custom programming.

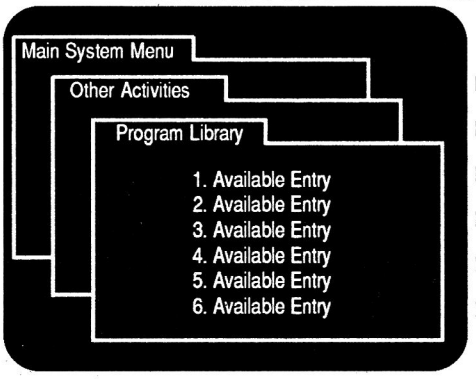
As ASCIITAB demonstrates, classic desk accessories aren't difficult to write. Although they may not match the power of full-blown application programs, these constant companions stand ready to do their part in making your GS do more for you.■

Table. Hexadecimal display-control codes.

Hex Value	Purpose
07	rings the bell
08	moves cursor left
0A	moves cursor down
0B	clears from cursor to end of screen
0C	moves cursor to upper-left corner and clears the screen
0D	starts new display line
0E	displays normal text
0F	displays inverse-video text
11	changes to 40-column display
12	changes to 80-column display
16	scrolls display down one line
17	scrolls display up one line
19	moves cursor to upper-left corner
1A	clears entire line at cursor
1C	moves cursor right
1D	clears from cursor to end of line
1E	GotoXY: follows with two characters equal to the X,Y coordinate of the location plus 32 to reposition the cursor

Write to Tom Swan at P.O. Box 206, Lititz, PA 17543.

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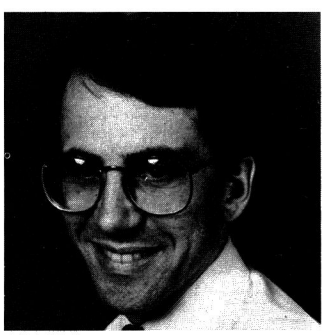
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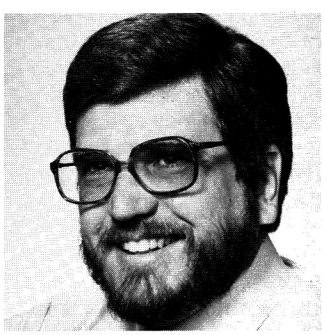
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AppleWorks Gets the Vote Out

Create a spreadsheet template to simplify school elections.



by David Goodrum



and Joel Robbins

One of the annual chores teachers like least is conducting school elections. And because 1988 is an election year, many junior- and senior-high curricula will include mock local or national elections. Turning elections into tasks for your Apple II and AppleWorks should enhance student interest and save teachers many hours of printing, distributing, collecting, sorting, counting, and recounting ballots. The computer makes it easier to type final tallies for posting.

The Voting Machine database template (see **Figure 1**) lets you type in candidate names, election categories, and directions. Students cast their votes on the Apple, and AppleWorks prints formatted totals and other information.

You may want to use the computer lab for large elections. A few students (student-council or computer-club members) and teachers can monitor the computer area during the election.

CREATING THE TEMPLATE

Boot AppleWorks and choose to add a database file to the desktop from scratch. Name it VOTING MACHINE. You should now be in the Change Name/Category screen. Use OA-Y to erase the words "Category 1," then type DIRECTIONS as the name of your first category and press Return. Now type a dash (-) and press Return for the next five categories.

Of course, you have different election categories and candidates, but for clarity's sake while you set up this template, use the names or dashes shown in **Figure 2** for the rest of the categories.

When you're finished typing the category names and dashes, press Escape, Return, and Escape to go to the Review/Add/Change screen. Next press OA-L (layout) and use the open-apple and arrow keys to move the category names to the positions shown in **Figure 1**. Remember to place the cursor on the first letter of a category name before moving it.

You can move MARK: and the three blank (-:) categories out of the way to the bottom-right corner. Move the second column of candidates into place as shown in **Figure 1**. Use the extra categories for more candidate names.

Move the sixth category (-:) to the top of the second column as a space. You may have to move some category names to the middle to get other categories into the correct spot. When a voter uses the template, the cursor follows the categories in the sequence in which you typed them, so don't change the order when moving them.

When your layout looks like the one in **Figure 1** (excluding directions), exit to the Review/Add/Change screen by pressing the escape key and choosing *order in which you defined categories* from the cursor-direction prompts. AppleWorks tells you there's no information in the file yet, so press the spacebar and Escape.

To make the directions appear on every screen ballot, press OA-V (*standard values*) and type the directions into the appropriate places. Press Escape to end this procedure, then press OA-down arrow and answer Yes to the prompt. Continue pressing OA-down arrow to create several blank records. The notation near the top of the screen (Record 2 of 4, for example) indicates the current record and the total number of records. Press OA-Z (zoom) to bring up the multiple-record screen, then OA-1 to move your cursor to the first record. Press OA-D and Return to delete this record, which doesn't contain your new standard values. The directions are now a standard value in all records.

CREATING PRINT FORMATS

To obtain election results, we'll create print formats with totaled categories. Press OA-P and choose to create a new table format. Name it VALIDATE and press Return. Now use OA-left arrow to reduce the width of the candidate-name categories to the length of each name and abbreviate the office names to three or four characters. Press OA-D to delete all categories that aren't related to offices and candidates.

In each candidate-name category, press OA-T (totals), then choose zero decimals and one blank space. To fit all votes and totals on a single sheet,

Figure 1. AppleWorks Voting Machine template.

```
File:  Voting Machine          REVIEW/ADD/CHANGE          Escape: Main Menu

Selection:  All Records


Record 2 of 150
================================================================================
DIRECTIONS: Use ones (1) to vote for the candidates of your choice.  Use the
-: RETURN key to move. You CANNOT move back up, so make your decisions before
-: moving down to vote.
-:  << START HERE!!                    -: -
-: -
PRESIDENT: -                           SECRETARY: -
  Jones: -                               Smith: -
  Walker: -                              Johnson: -
  Cowden: -                              Bailey: -
VICE PRESIDENT: -                      TREASURER: -
  Schwartz: -                            Mason: -
  Hobach: -                              Sadgebury: -
  Buckingham: -                          Kneiss: -          MARK: -      -: -
-: -                                   -: -                              -: -
TO QUIT: Touch RETURN until the cursor comes to the next _<< START HERE! -: -
--------------------------------------------------------------------------------
Type entry or use @ or  cmds                                    @-? for Help
```

Figure 2. Voting Machine categories.

DIRECTIONS	SECRETARY
–	Smith
–	Johnson
–	Bailey
–	TREASURER
–	Mason
PRESIDENT	Sadgebury
Jones	Kneiss
Walker	–
Cowden	–
VICE PRESIDENT	–
Schwartz	MARK
Hobach	–
Buckingham	TO QUIT
–	

Your vote may be invalidated if you don't follow the directions carefully.

use the print options to produce compressed type (17 characters per inch): Press OA-O (options), then type CI, Return, 17, Return, and Escape.

To make the second format, choose to duplicate an existing format and choose *validate*. Rename this format TALLY. For a hardcopy of totals only, place the cursor in the PRESIDENT category, press OA-G (group totals), and answer Yes to the prompt.

MAKING THE KEYBOARD COVER

To protect the election, you can make a keyboard cover to restrict students to the keys they need for voting. Cut a piece of file-folder material large enough to cover all the keys, leaving one-inch tabs on the top and bottom and on the left side. Use a paper punch to make a hole over the spot where the 1 key is, then cut a notch to expose part of the return key.

Bend the tabs downward and place the cover over the keyboard, making sure it doesn't touch any of the keys, especially the escape key, while voting is taking place—you don't want students to be able to back up and ruin a previous ballot. One-inch strips of file-folder material placed between rows of keys will keep the cover from touching the keys. Tie a length of ¼-inch dowel rod to each computer as a voting tool.

RUNNING THE ELECTION

To start the election, load Voting Machine into each computer. Press OA-Z to display the single-record screen, then press OA-C and type the number of records needed for voting.

Label each computer with a different letter of the alphabet. Write the same letters at the top of a blank sheet of paper divided into eight vertical columns. For control, each student should sign his or her name and list class and student numbers, or show a student ID before voting. Then give him or her a receipt with voting directions such as those shown in **Figures 3** and **4**.

Each student first writes on a receipt the letter of his or her computer and the ballot number (record 15 of

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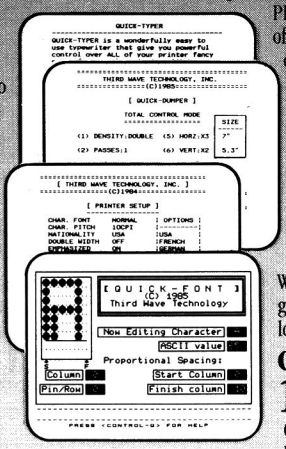
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Figure 3. Voting directions.

1) If you make an error, write on your voting receipt the letter of your computer and the screen number (Record 2 of 500, for example) representing your ballot.

2) You can move down through the ballot only once, so choose your candidates before using the Return key. Don't hold the dowel rod on the Return key—*tap* it lightly.

3) When your cursor is next to the names of the candidates of your choice, *tap* the 1 key with the dowel rod to place a 1 next to each name and press Return. Vote for only one candidate for each office.

4) To end, *tap* the Return key until you get to the << START HERE prompt.

5) Using your computer letter and voting number as a reference, report any voting problems immediately to the official on duty. If you have no problem, take your voting receipt with you to assure confidentiality.

Figure 4. Voting receipt.

```
                Voting Receipt for Central High
                      Student Election

DATE_____________________________________________

Computer letter _____________

Ballot number ___________________________________

Official on duty ________________________________
                          signature

Note problem ____________________________________

              ____________________________________
```

500, for example). To vote, the student presses the return key to move the cursor to the names of his or her chosen candidates, then pushes the dowel through the hole over the 1 key and presses Return to lock in his or her vote. After voting, the student presses the Return key again to move to the next record, and leaves the cursor on the line marked << START HERE.

Students or teachers monitoring the computers record each voter's computer letter and ballot number. If an incorrect sequence of record numbers shows up for any computer, the monitor immediately notes it on his or her report and informs the supervising teachers. (That's basically what precinct workers do on a regular election day.)

If you know these numbers, you can decide later whether a student skipped a record because he or she pressed Return too many times or because he or she tried to vote twice. When voting is finished, go into the record in question and type a one in the MARK category. Don't delete these records, though—deleting them changes the record numbers, and you won't be able to make further accurate corrections.

When a voter holds the return key down too long, passing his or her candidate, and wants to void the ballot, he or she should stop immediately and ask a teacher to place a one in the MARK category. The monitor notes the error on the student's voting receipt, signs it, and gives him or her another receipt. The student then votes carefully in another record screen and tells the monitor the numbers of the valid and invalid records. Two unsuccessful attempts should disqualify a voter.

VALIDATING THE BALLOTS

To check for double voting (voting for two candidates under the same office), press OA-P, choose *validate*, and press OA-P again to make a hardcopy. A quick glance shows whether anyone voted two or more times for the same office. If you find such a ballot, bring up that record (using OA-1 through OA-9), then place a one in the MARK category.

After checking the votes for cheating, press OA-A and choose 0–9 to sort on the MARK category, then press OA-D and the down arrow to delete all invalid ballots grouped by sorting: Valid votes show a dash, while a one indicates invalid ballots. To tally the votes, simply press OA-P and choose the TALLY print format, then press OA-P again for a hardcopy.

To add more candidates, press OA-N to enter a candidate's name in a blank category. Press OA-L and the open-apple and arrow keys to position the new category. If you test the program, remember to vote in each record. If you don't, the screen won't go to the next record when you press Solid apple-Comma. That feature also means you won't have any blank ballots when voting is completed.

For your own peace of mind, try Voting Machine in a small group election before you take on a school election. You might want to change other aspects to make the election simpler or more realistic. For example, you might not want to give a voter another chance if he or she makes a mistake—nobody gets a second chance in a real election.

In the next Teachers' Choice we'll show you how to use statistics to create a fairer grading system.■

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

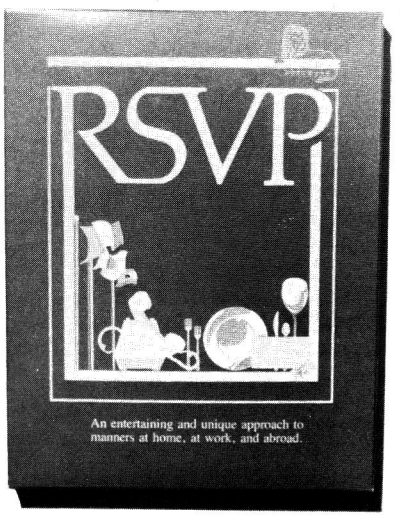
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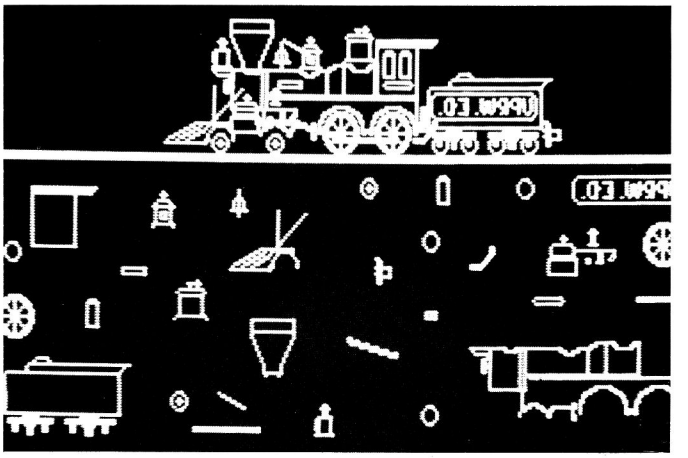
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LIFE AND LIMB

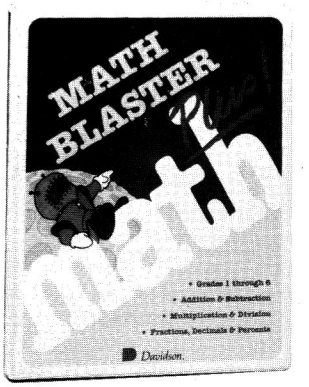
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The ZipFiles package sells for $24.95 plus $2 shipping and handling from Petit Design and Engineering, 2650 South Shore Drive, Milwaukee, WI 53207, (414) 483-9056. For more information, circle Reader Service number 352.

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WALL TO WALL

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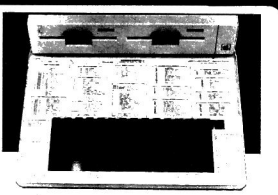
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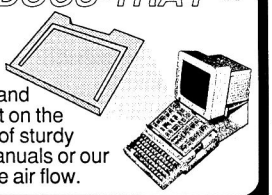
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NEW PRODUCTS

Product Updates

● **The Source** now offers on-line information on mutual funds. The database from CDA Investment Technologies, a financial-services company, lists a directory of mutual funds with ten-year histories and hypothetical analyses. For more information, contact Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102, (800) 336-3366.

● Manzanita has packaged five of its **BusinessWorks** modules at a 40-percent savings. The $995 bundle includes General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, and the System Manager, which would cost $1675 if purchased separately. (The Payroll module, not included in the bundle, retains its $395 price tag.) Contact Manzanita Software Systems at One SierraGate Plaza, Suite 200-A, Roseville, CA 95678, (916) 781-3880.

● Good news for UniDisk users: **Davidson & Associates** (3135 Kashiwa Street, Torrance, CA 90505, 213-534-4070) now produces its educational titles in both 5¼- and 3½-inch disk formats. Each program will now be available in two separate packages.

● U.S. educators can win an Apple IIc and copies of Abracadata's **Welcome!** software program by entering the firm's "Computer Solutions in Education" contest. Contestants must explain, in 500 words or less, how they've used their computers to solve organizational and communication problems within their school systems. Send your entries, typed and double-spaced on 8½-by-11-inch paper, before December 31, 1987, to Abracadata Ltd., "Computer Solutions in Education Contest," P.O. Box 2440, Eugene, OR 97402. For more information, call Abracadata at (503) 342-3030.

● Owners of Demco Electronics' ultra-hi-res **Graphics Tool Kit** can now use Macintosh clip art. A new program, included with the $395 graphics card and accompanying software, reads MacPaint pictures directly from 3½-inch Mac disks. The program is free upon request to registered Tool Kit owners. Contact Demco Electronics at 10516 Grevillea Avenue, Inglewood, CA 90304, (213) 677-0801.

● Computer artists can now get more from their Apple IIGS systems. Activision (2350 Bayshore Parkway, Mountain View, CA 94043, 415-960-0410) has released Version 1.01 of **PaintWorks Plus**, with additional features and functions and an updated manual. It's $79.95 for new buyers, but free to current owners in exchange for the front cover of the Version 1.0 manual. The upgrade also entitles owners to technical support and information on other products and revisions.

● Meanwhile, Broderbund Software has redesigned two popular programs for the IIGS. **The Print Shop** ($59.95) creates cards, banners, and signs in up to eight colors, with a wide variety of fonts, borders, graphics, and backgrounds. **Fantavision** ($59.95) combines GS sounds and super-hi-res color with easy drawing and animation. See your dealer or contact Broderbund at 17 Paul Drive, San Rafael, CA 94903-2101, (415) 479-1700.

Continued from p. 43

ample, if we were to install an air-conditioning system in someone's home, one activity would be measuring the house for the required ductwork; another would be fabricating the materials; a third would be cutting holes for the ductwork; and so on. Each activity takes a specific amount of time—six hours for one person to do the measuring, 20 hours each for two workers to install the system.

BEST Project Management can handle 99 activities per project and allows up to 999 days for each activity. Each activity can have up to five "successor" or "predecessor" activities; for example, cutting holes for ductwork precedes installation.

Let's say you plan to start cutting holes on the 15th of the month, start installing ductwork on the 19th, and put on the finishing touches and complete the project on the 29th. Sounds good on paper. Then your foreman gets sick, so the holes don't get cut until the 19th, which in turn makes the rest of the project later than you expected. BEST takes all this into account, and lets you know how late each activity can be without causing a problem. If you find that part of a project is running behind schedule, the program uses either a five- or a seven-day work week to calculate the impact of the delay on the rest of the job.

The program uses the *precedence-diagramming method* (PDM) to calculate schedules. The better-known *critical-path method* (CPM) is more graphic, but requires the use of dummy activities, while PDM doesn't.

The first thing you do is write your outline on paper. You can't just sit down and enter data, or you'll end in a tangle. Once each activity is connected logically to all the others, the program calculates whether any can start late without bumping into another, or how late you can let one or more activities slide without affecting your overall finish time.

The manual goes into detail, with several helpful diagrams, on types of problems you may encounter and how to correct them. There's a sample project on disk you can use for practice in conjunction with the tutorial part of the manual.

You can print two types of reports. One is a planning schedule, showing the dates you expect projects to start and when they're supposed to be completed. The other is a Gantt chart

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showing the same information graphically and marking activity spans "critical," "early," or "late." A "total float" column shows the number of days you can delay an activity without throwing the entire project off schedule.

A second section of the package lets you create reports based on how well your projects are staying on track. Here you enter actual starting and completion data, which the program tracks and uses to compute how well you're maintaining your projected schedule.

WISHES AND CRITICISMS

If BEST could track and control a number of projects at one time, it would be much easier to determine the severity of the problems you'd run into by moving manpower or equipment from one job to another. Working in hours or partial days, rather than forcing each activity to take a whole day, would also be helpful, as would upper- and lowercase operation instead of all capitals.

The system could also use some programming help. Once you select a section of the program—project planning, report generation, or the sample project—you must reboot your Apple to get back to the main menu. If your filenames are as long as the program allows, it doesn't track the whole name, but gives you an EXTRA



GAMES EDITORS PLAY

Our bimonthly entertainment survey reveals different interests. Some editors are historically minded, simulating Presidential campaigns or World War II sea battles. One prefers healthy sports, swinging away at a golf game that's replaced Shanghai as the current office craze. Another . . . well, it takes a real couch potato to sit at a computer playing Family Feud.



Ellen Otis plays . . .

President Elect *(1988 Edition), Strategic Simulations Inc., 1046 North Rengstorff Avenue, Mountain View, CA 94043, (415) 964-1353. $24.95.*

With nine weeks to Election Day, you're the campaign manager for a Presidential candidate in any year from 1960 to 1988. Worried about the issues, the political climate, the press? When playing President Elect, it's all inconsequential.

This simulation is a game of numbers, not history or politics. Each week, you spend Political Action Points (PAPs) to allocate time and money to national, regional, and state campaigning. (Better not make a mistake—you can't correct it.) The format stays the same for all nine weeks, with constant pauses for 30 seconds' staring at a blank screen while the computer weighs data. By the third week, I was ready to have an anarchist overthrow the government.

While it's intriguing to run Dole against Dukakis or JFK against Reagan, the chosen year doesn't seem to matter much—whether it's 1968 or 1980, foreign-news reports are mostly favorable. What about Vietnam or the Ayatollah? And, although you'll have an opportunity to debate (if the opposing candidate agrees), you don't discuss any historical issues. Debates consist of typing in a percentage of time you'll spend answering questions, dodging the issue, or attacking the opponent. There are no graphics except for a map of the U.S. shaded for Democratic, Republican, and uncommitted states.

President Elect lets you pick from an impressive list of politicians (or create your own), but gets boring fast. For fun that's less detailed, but less mathematical and more political, my vote goes to Focus Media's "And If Re-elected" (June 1987, p. 90).



Paul Statt plays . . .

World Class Leader Board, *Access Software Inc., 2561 South 1560 West, Woods Cross, UT 84047, (801) 298-9077. $39.95.*

Golf is a humbling game. Like real golf, World Class Leader Board takes ample time to play and provides endless opportunities for friendly discussion or debate: "I'm 140 yards from the rough? That's a six-iron at least." Unlike real golf, my Leader Board game reached par after only 72 holes at St. Andrews (one of four courses on the World Class disk, including Cypress Creek and Doral Country Club).

That's because you have to make only three decisions in Leader Board: which club and how much power to use and when to time the snap that leads to a hook or slice. (Switching from Amateur to Professional level adds wind effects and removes some distance gauges.) Playing real golf, you face more decisions, but enjoy less control over the results.

It never rains on Leader Board, but the courses have water, sand, and plenty of trees to distract you. The trees march into view for each shot like Birnham Wood to Dunsinane, thanks to the Apple's sluggish drawing of greens, fairways, traps, and your jaunty cap and checkered golf pants. The graphics screens are great, displaying either your view of the course or an overhead perspective.

The women I know don't care for Leader Board. My boss didn't

IGNORED? message instead, when you load the file from disk.

When you ask for a disk catalog, you see the entire catalog, not just the project-management files (which receive a special filename extension automatically). You must type in the name of your current project when you save it; the program should enter it as a default. There are also a lot of annoying exclamation points to tell you to CORRECT! this or do that.

Probably BEST's biggest problem is that it doesn't recognize holidays—if you tell it to work on Christmas or New Year's Day or Thanksgiving, it does so happily, with no warning that these days might find you without any employees, or at best with workers demanding overtime.

THE RESULT

If your business handles complex projects in which one or more activities must be completed before others can begin, and if you generally work on one project at a time (or unrelated projects), BEST Project Management is a good value at $69.95. It can't do everything, such as manage your finances as they affect your work, but it goes a long way toward structuring the jobs you take on.■

Gregory R. Glau
Prescott, AZ

appreciate the hours of research I needed for this review, while my lunch date expected a restaurant instead of a computer fairway. Leader Board widows—real golf is like that, too.



Lafe Low plays...

Destroyer, *Epyx, 600 Galveston Drive, Redwood City, CA 94063, (415) 366-0606. $39.95.*

Epyx's latest simulation gives you a pretty good taste of what it must have been like at the helm of a Fletcher-class destroyer in the Pacific of World War II. Whether hunting for planes or subs, escorting a convoy, or scouting a passageway, you'll have to run around your ship the way O.J. Simpson runs around airports. You command the bridge, navigation, radar, sonar, fore and aft guns, port and starboard anti-aircraft guns and torpedoes, depth-charge racks, and damage-control parties (though you can put some stations on automatic and hang out on the observation deck).

Besides excellent graphics (on the enhanced IIe and IIGS—an unenhanced IIe I tried didn't work), Destroyer offers realistic details of naval operations. Your ship weighs 3000 tons and measures 376 feet; changing course and speed takes some time. When a station is damaged in combat, it takes a while for the damage-control parties to get it operational again.

I should know. After completing the sub-hunting and convoy-escort missions, I received congratulatory messages from COMDESPAC (Commander of Destroyers, Pacific Ocean). When I picked a more complicated assignment and had ships, planes, subs, and island gun emplacements thrown at me all at once, I got blown out of the water. If I'd been a real destroyer captain, we'd be speaking Japanese right now.



Eric Grevstad plays...

Jeopardy and **Family Feud**, *ShareData Inc., 7400 West Detroit Street, Chandler, AZ 85226, (602) 961-7519. $9.95 each.*

As programs go, ShareData's remakes of TV game shows are closer to BASIC blackjack games than sophisticated entertainment software. The keyboard controls are a little awkward; you can't turn off the sound effects; and Jeopardy, while usually pretty good at judging partial or close answers (it accepted "Christian" for "Mr. Fletcher Christian" and "eating" for "chewing"), robbed me of big points by refusing "John McEnroe," saying I should have typed "John Mc Enroe."

But for ten bucks apiece, Jeopardy and Family Feud are economical fun. Family Feud is a faster and more frustrating guessing game compared to the challenging trivia of Jeopardy, but both games have cute graphics—assorted homely contestants, gloating over right answers and gnashing their teeth at wrong ones. ShareData is even teaming up with Grolier for classroom versions. The games aren't fancy, but they're easy to learn and faithful to their TV originals—even if you do have to hum the Final Jeopardy music yourself.

Computer Mad Libs, *Electronic Arts, P.O. Box 7530, San Mateo, CA 94403, (800) 245-4525. $19.95.*

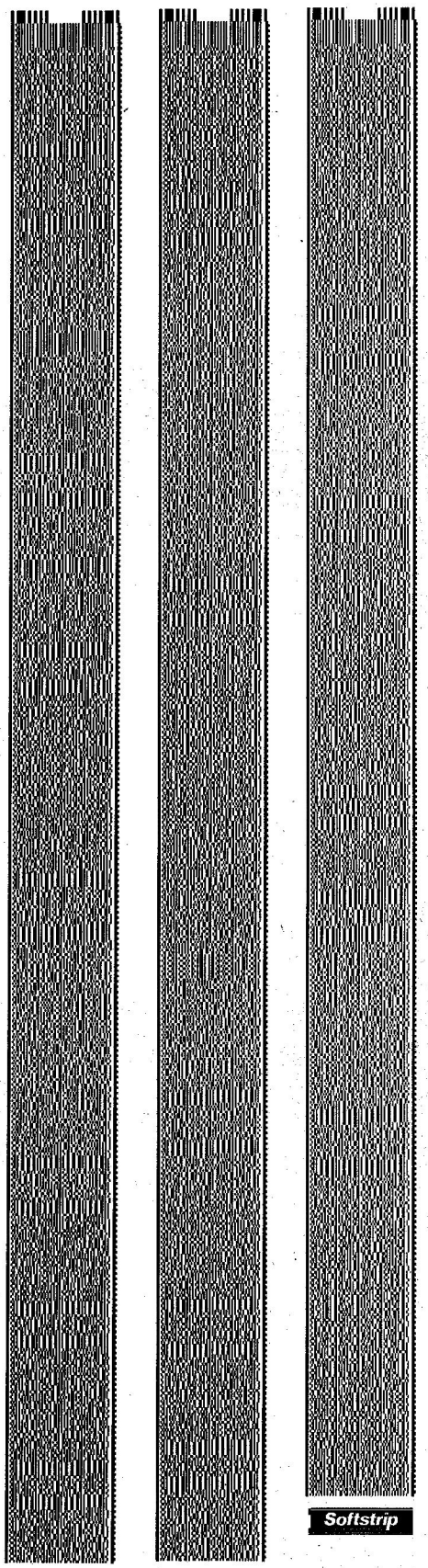
Several programs justify the purchase of a GS memory-expansion card. Computer Mad Libs (for the 768K GS) isn't one, but it's an affordable way to amuse the kids for an afternoon if you've already upgraded your system for Deluxe Paint II.

Price/Stern/Sloane's classic party game, programmed by First Byte and distributed by Electronic Arts, offers eight stories, ranging from "Little Red Riding Hood" to biographies of Napoleon and Alexander the Great. Kids type in requested words—a noun, an adjective, a place—and the program reads the story aloud, accompanying goofy cartoons with silly sentences.

Unfortunately, the program is painfully slow, with a monotonous, mumbling voice compared to the admittedly simpler speech of The Learning Company's GS Reader Rabbit; editing and correcting words and pronunciations grow tiresome. Still, while the software's no match for the paper version, the Mad Libs concept is as funny as ever, and I found myself laughing at a few nonsense phrases.□

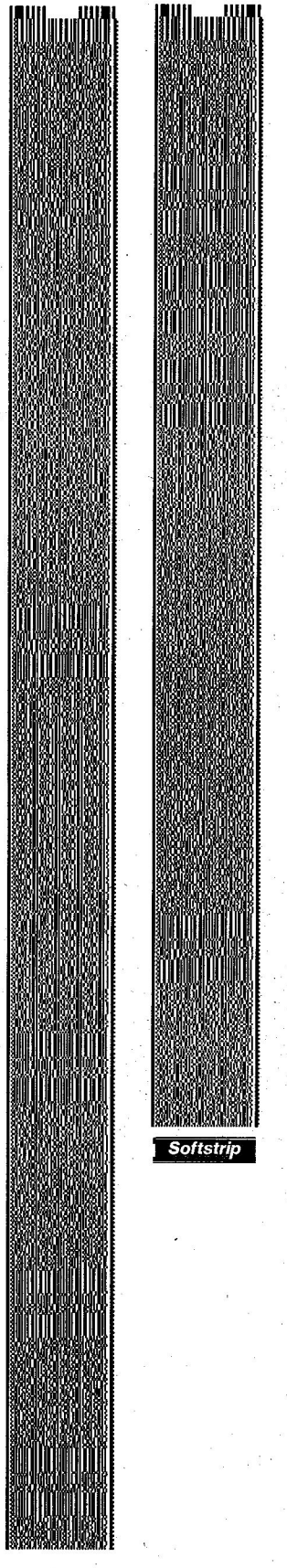
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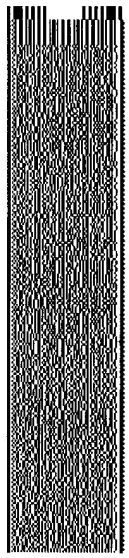
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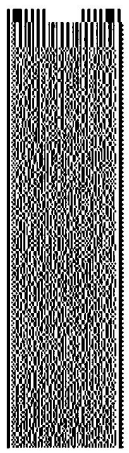
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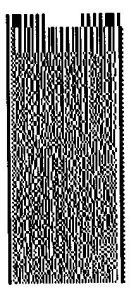
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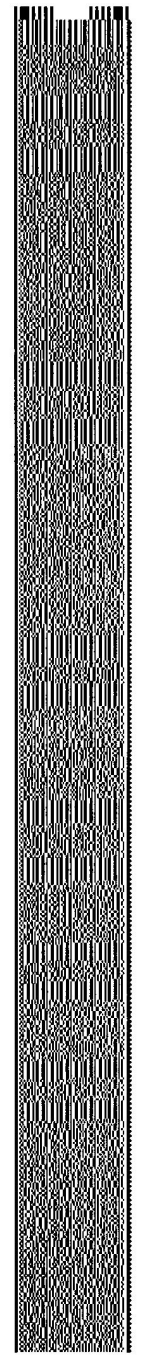
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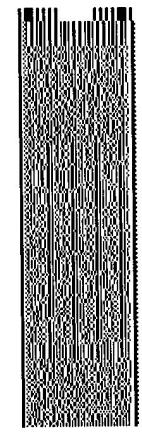
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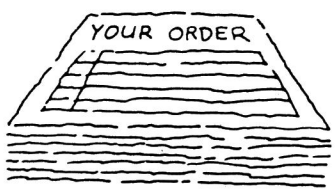
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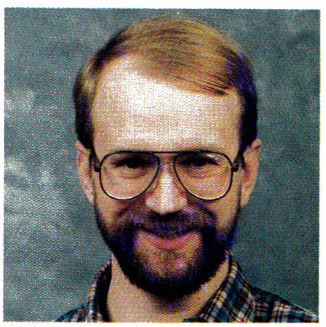
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Documentation Blues



"Publishers claim that putting documentation on the game disk encourages software piracy."

by Scott Mace

How big was the instruction booklet for the home version of Pong? Does anyone remember whether the home version of PacMan had a manual at all?

What a difference a few years make. Today many computer-game packages include several disks, a thick manual, a thinner manual (for quick reference or for experts who don't need the thick manual), a prologue, and specific instructions for booting the game on your Apple II.

ON-LINE ASSISTANCE

It's true that games are getting more complex. For example, SubLogic's **Flight Simulator** (713 Edgebrook Drive, Champaign, IL 61820, 217-359-8482, $49.95 plus $2 shipping) isn't really a game per se; it's a re-creation of the interior of a Cessna aircraft, right down to the gauges on the dashboard. You can't just boot the disk and expect to get off the ground—so you need a thick manual.

Why couldn't SubLogic have incorporated the manual into the program? Integrated documentation is called "on-line help"; any decent business program, including AppleWorks, uses help screens. They're often "context sensitive": When you ask for help, the screens know where you are in the program. If you're about to print, for instance, they won't offer you help saving your data to disk unless you ask for it.

Computer games, however, provide very little in the area of on-line help. We're just starting to see it in some Macintosh-style games that programmers are porting over to the Apple II. They sport pull-down menus that at least let you see basic commands—but they aren't context sensitive.

NO ROOM

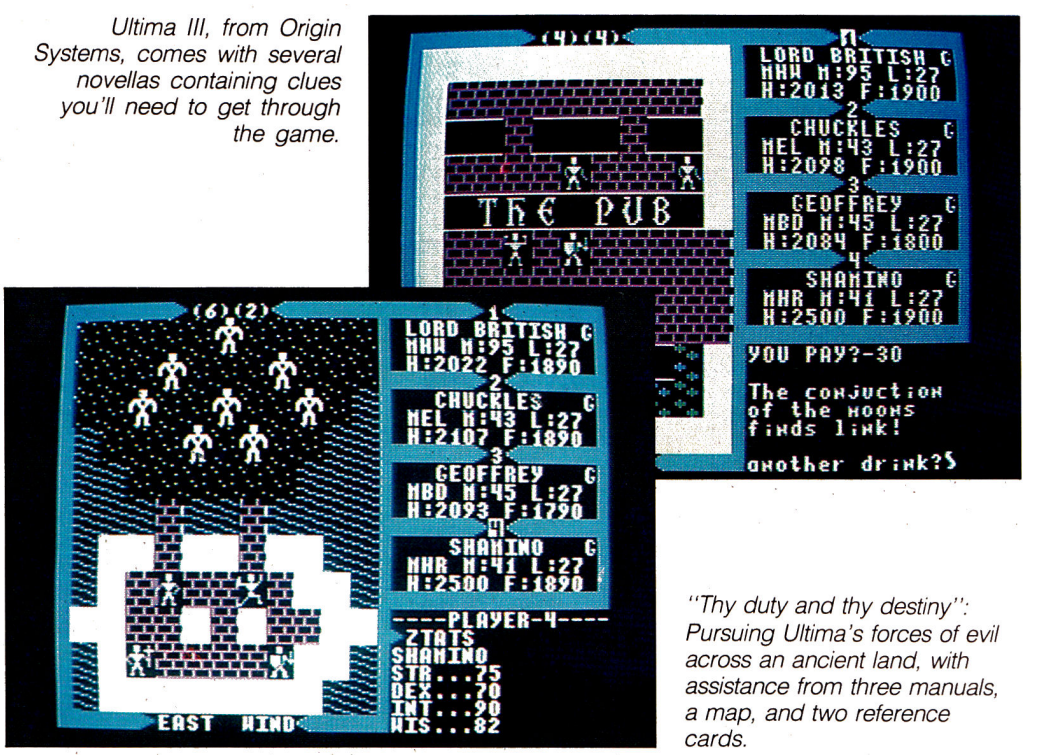
There are two reasons why context-sensitive help is missing from Apple II games; the second reason makes more sense than the first.

The first reason is that publishers want you to feel good about spending $40 for a computer game, so they try to pack as much fun into it as possible. That means 450 rooms to explore instead of 250, and so on. They also use those extras as a competitive edge. Each company wants to be able to list more features on the back of the box than its competitors.

But packing all that fun onto a disk leaves little room for on-line help—they throw a large manual at you instead. I've seen games with more than 40 commands to memorize.

I'm not saying that 75 percent of the disk should be help oriented. But keep one thing in mind: Twice as many rooms, monsters, or airstrips doesn't mean twice the fun.

Ultima III, from Origin Systems, comes with several novellas containing clues you'll need to get through the game.



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GAME PIRACY

The epidemic of illegally copied software is the second reason you'll find thick game manuals and scant on-line help.

Publishers claim that putting all the documentation you'd ever need on the game disk encourages software piracy. They believe that if you need a lengthy manual to play a game, you're less likely to make an illegal copy for a friend, because you'd also have to photocopy the manual or your friend would have to do without.

The trouble with this philosophy is that each time you play a game, you're paying for the cheating of a few computer owners. Every time I fumble through a manual while deadly beasts are firing torpedoes at me, every time I lose my place in the game and don't know how to navigate to the next level, every time I lose one of those vital little sheets of paper that fall out of the game box, I curse the need for copy protection.

Some game developers expend their creativity cooking up lots of hard-to-reproduce documentation. Some games make you read a novella before you can play, making you look for clues hidden in the story. Origin Systems' **Ultima III** (136 Harvey Road, Londonderry, NH 03053, 603-644-3360, $60), for example, divides what could make up a simple manual into several books with authentic-sounding names, such as *The Book of Amber Runes* and *The Ancient Liturgy of Truth.*

Some people may enjoy a little extra reading, but if I want to read a novel, I trot down to my corner bookstore and buy one. These lengthy documents don't always improve your game-playing skills, either. In fact, they often slow you down as you fumble through pages for what you could have at the touch of a key—if it were on screen.

WHAT'S THE SOLUTION?

There must be a way out of this mess. If you think computer games should be as popular as movies or books because they can be twice the fun, you need to think about this problem. There's no way you're going to convince your computerphobic friends of the wonders of Apple II games by asking them to sit down with a cozy 100-page manual.

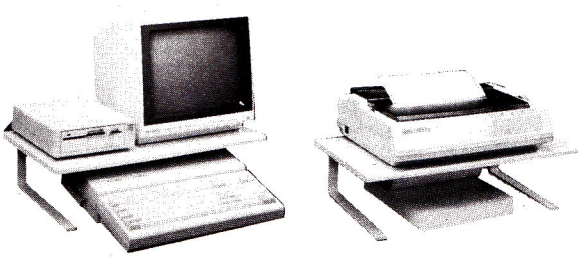
Some publishers are now experimenting with small decoder wheels resembling an engineer's vernier. At various points in the game, the software prompts you to rotate the wheel, read the value on an attached scale, and enter that into the computer to continue.

Such systems are less intrusive than volumes of material, and may lead to less copy protection for games in general. If we use software responsibly, without copying it illegally, maybe publishers will put all the information we need to enjoy their games where it belongs—on disk. ■

Scott Mace is editor and publisher of Microcosm, *a monthly newsletter on computer games. You can write him at 6510 Copper Ridge Drive #T-1, Baltimore, MD 21209.*

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Apple users know that there's always an easier way to get the job done. That's what Hints/Techniques is all about. It's an information swap for readers who want to share their programming pointers, hardware secrets, AppleWorks applications, and all those other insights that make you go "Aha!" in the night. So read on and see if you don't find just the solution you've been looking for. See p. 125 for accompanying data strips.

Hi-Res Animator

by R.C. Owen

Ever try animating your sketches on an Apple II? You can use any one of a number of techniques. Methods that alter the screen image smoothly generally involve binary or hex routines that perform clever screen-bit manipulations. If you're not a machine-language programmer, one alternative is to buy special animation software. Commercial programs may stretch your purse strings a bit, though.

If you don't mind a little stiffness, all you need is 128K of RAM, ProDOS, and any hi-res-graphics drawing software, such as Mouse Paint, Dazzle Draw, or Blazing Paddles.

IMPROVING ON THE PAST

Probably the oldest method of animation is to draw a series of pictures on a group of cards, each image altered slightly, then fan the cards one after another in sequence.

In essence, that's what Hi-Res Animator, the program in **Listing 1**, does. Your Apple II is equipped with two hi-res pages. You'll watch one of them on screen while the program loads the other. Once it loads the second page, Animator uses hi-res soft switches to display it. Now the third screen loads into the first hi-res page. This "page flipping" continues until all screens in your cartoon have been displayed.

Disk drives load screen images into hi-res RAM too slowly for effective animation, however. That's where ProDOS' RAM-disk utility comes in. Animator loads images from your disk drive into the RAM disk. The RAM

Listing 1. Hi-Res Animator.

```
10 D$ =  CHR$ (4)
15  ONERR  GOTO 300
20  GOSUB 500
25  TEXT : NORMAL : HOME : END
100  REM    ----------------------------------------
101  REM    LOAD /RAM WITH HI-RES PICTURES
102  REM    ----------------------------------------
110  VTAB 20: HTAB 5: INPUT " ENTER PATHNAME OF PICTURE SERIE
     S...";P$
115  IF P$ = "" THEN 195
116  VTAB 21: HTAB 5: INPUT "ENTER THE INDEX RANGE FOR LOADIN
     G SCREENS (FIRST,LAST)-->";FIRST,LAST
120  INVERSE
125  VTAB 23: HTAB 20: PRINT " NOW LOADING SCREENS INTO /RAM
     ";
130  NORMAL
165  FOR I = FIRST TO LAST
170  PRINT D$;"BLOAD"P$;".";I;",A$2000"
175  PRINT D$;"BSAVE /RAM/PIC"I",A$2000,L$2000"
180  NEXT
195  RETURN
200  REM   ----------------------------------------
201  REM   SHOW HI-RES SCREENS ONE AFTER THE OTHER
202  REM   ----------------------------------------
210  POKE 49239,0: POKE 49232,0: REM   SHOW HI-RES SCREEN
220  POKE 49234,0: REM       SHOW FULL MODE GRAPHICS
240  FOR I = FIRST TO LAST
245  PRINT D$;"BLOAD /RAM/PIC"I",A$2000"
250  POKE 49236,0: REM   SHOW PAGE 1
252  IF I >  = LAST THEN 265
255  PRINT D$;"BLOAD /RAM/PIC"I + 1",A$4000"
260  POKE 49237,0: REM   SHOW PAGE 2
265  NEXT I
270  GET B$: REM    HOLD THE LAST PICTURE UNTIL A KEYPRESS
280  TEXT : SPEED= 255: RETURN
300  REM   ----------------------------------------
301  REM     I/O ERROR HANDLING ROUTINE
302  REM   ----------------------------------------
310 X =  PEEK (222)
315  POKE  - 16368,0: POKE 222,0
325  PRINT  CHR$ (7); CHR$ (7); CHR$ (7)
330  HOME : VTAB 10: HTAB 20: PRINT "UNABLE TO FIND "P$
380  VTAB 20: HTAB 20: PRINT ">> HIT ANY KEY TO CONTINUE <<"
385  CALL  - 756
390  GOTO 20
400  REM    ----------------------------------------
401  REM        SET OVERALL RANGE OF INDEXING VALUES
402  REM    ----------------------------------------
410  VTAB 20: HTAB 3
415  INPUT "ENTER THE INDEX RANGE FOR FIRST TO LAST SCREEN (F
     IRST,LAST)-->";FIRST,LAST
420  RETURN
450  REM    ------------------------------
451  REM       SET FRAME SPEED
452  REM    ------------------------------
460  VTAB 20: HTAB 15:
465  INPUT "ANIMATION SPEED(100-255)...";SP
470  IF (SP < 100) OR (SP > 255) THEN 460
480  SPEED= SP
495  GOSUB 200: RETURN
```

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Listing continued.

```
500  REM      ------------------------------
501  REM       HI-RES ANIMATOR MENU
502  REM      ------------------------------
510  HGR : HGR2 : TEXT : REM       CLEAR OUT BOTH HI-RES PAGE
     S
512  HOME
515  PRINT  TAB( 23): PRINT ">> HI-RES ANIMATOR <<"
520  VTAB 6: HTAB 20
530  PRINT "[1].........LOAD PICTURE SERIES"
532  VTAB 8: HTAB 20
535  PRINT "[2].........RUN  PICTURE SERIES"
537  VTAB 10: HTAB 20
545  PRINT "[3].........SET INDEX LIMITS"
550  VTAB 12: HTAB 20
555  PRINT "[4].........QUIT"
575  VTAB 16: HTAB 20: INPUT "    SELECTION --> ";ANS
580  ON ANS GOSUB 100,450,400,600
585  VTAB 16: HTAB 36: CALL  - 958: REM   CLEAR BOTTOM OF SCR
     EEN
590  GOTO 510
600  POP : RETURN
```

End of listing.

disk then loads your screens into hi-res many times faster than a mechanical disk drive can, to produce smoother animation.

THE APPLE CARTOONIST

Type in and save Hi-Res Animator. Draw two or more hi-res screens with your graphics software. Use the same name for each picture in the series, followed by a period and an index number—for example, PICTURE.2, PICTURE.3, and so on. Pictures should look about the same, with only slight changes in successive screens.

Once your sketches are ready, run Hi-Res Animator and select option 1 from the menu. The program asks the name of the screen series; type in the complete pathname. For instance, if the PICTURE series in the above example were on a disk whose volume name is /VIDEO, you'd type /VIDEO/PICTURE. You don't have to type the period after the picture name—Hi-Res Animator does it for you.

The program then asks for your range of index values, referring to six or fewer screens. If you have a third-party memory-expansion card, chances are a RAM-disk routine came with it. By running that program before Animator, you might be able to load several dozen screens at once, depending on the amount of memory available in your RAM disk.

With all screens loaded into the RAM disk, choose option 2, select an animation speed in the range 100–255, and play out your cartoon. If you decide to leave certain scenes out of the series, use option 3 to specify a different range of index values. To display only one screen, simply enter the same value for the first and last indices.

After your cartoon runs, the last picture remains on screen until you press a key. The program then returns you to the menu; you can load another group of screens or play the same series again.■

Write to R.C. Owen at Box 2773, APO NY 09132.

Load Runner

by Merle C. Harton, Jr., Ph.D.

Cataloging a disk, then typing RUN and your program name, is pretty simple, but the utility presented here, Load Runner, makes it even easier—especially when your disk is full. Load Runner gives you several branched options on startup and lets you run one of your programs or see which ones are on disk without having to type CATALOG.

Type in and save **Listing 2**. The first option lets you select a 40- or 80-column display. It uses CHR$(4) (or Control-D) to force DOS to recognize the shift to 80 columns with PR#3, and uses the less familiar CHR$(21) (or Escape-4) to switch an 80-column display to 40 columns.

Next, you can run the program you want or look at the catalog display. If the catalog begins to scroll off screen, press Control-S to pause it. If your programs are already set for a particular column display or your Apple doesn't have that option, delete lines 15–60.

Listing 2. Load Runner.

```
5    REM Load Runner Startup Program
10   ONERR GOTO 260
15   REM  Pick 40- or 80-column display
20   HOME: PRINT "ARE YOU USING 40 <A> OR 80 <B> COLUMNS? ";C$
30   GET C$
40   IF C$ = "A" THEN PRINT CHR$(21)
50   IF C$ = "B" THEN PRINT CHR$(4);"PR#3"
60   IF C$ < > "A" AND C$ < > "B" THEN GOTO 20
65   REM  Run your program or view the catalog
70   HOME: PRINT: PRINT "Do you know the name of your program?"
80   PRINT: PRINT "Type <Y> to continue"
90   PRINT "or any key for catalog";N$
100  GET N$
110  IF N$ = "Y" OR N$ = "y" THEN GOTO 130
120  IF N$ < > "Y" AND N$ < > "y" THEN GOTO 170
125  REM  Set-up for a program in binary format
130  PRINT: INPUT "A MACHINE LANGUAGE PROGRAM <Y><N>? ";S$
140  IF S$ = "Y" OR S$ = "y" THEN GOTO 210
150  IF S$ = "N" OR S$ = "n" THEN GOTO 240
160  END
170  HOME: PRINT: PRINT CHR$(4);"CAT"
180  PRINT: INPUT "A MACHINE LANGUAGE PROGRAM <Y><N>? ";S$
```

Listing continued.

Listing continued.

```
190  IF S$ = "Y" OR S$ = "y" THEN GOTO 210
200  IF S$ = "N" OR S$ = "n" THEN GOTO 240
205  REM  Select and run a program
210  PRINT: INPUT "THE FILE NAME IS: ";A$
220  PRINT CHR$(4);"BRUN "A$""
230  END
240  PRINT: INPUT "THE FILE NAME IS: ";A$
250  PRINT CHR$(4);"RUN "A$""
260  HOME: PRINT "Bye": END
```

End of listing.

DOS 3.3 users should change CAT to CATALOG in line 170.

Use Load Runner as a startup or HELLO routine on a disk containing several programs. Since this utility gives you an option to select binary programs, it works whether the programs are written in BASIC or machine language.■

Write to Dr. Merle Harton at 1525 St. Ann Place, Slidell, LA 70460.

An Extravagant Etch-a-Sketch

by Susan W. Rollinson

The next time someone asks what you do with your Apple, you can introduce him or her to the world's most expensive Etch-a-Sketch. The programs in **Listings 3** and **4** work on any Apple II under DOS 3.3 or ProDOS.

Hi-Res Sketch (**Listing 3**) is a high-resolution version of the famous toy. Use the arrow keys to sketch; the program works best on a monochrome monitor. (You may see strange hues on a color system.) Pressing the escape key erases the screen so that you can start over. Press Control-E, Control-C, or Q to quit the program. To save your creation for printing or slide-show presentation, quit the program and type BSAVE SKETCH.1,A$4000,L$2000. You can change SKETCH.1 to any legal filename.

When you tire of the hi-res version, try something the original Etch-a-Sketch can't do—draw in color! Color Sketch (**Listing 4**) is an improved version for lo-res graphics. Use the A–H and 0–7 keys to change colors. The accompanying **Table** lists the keys and their associated colors.

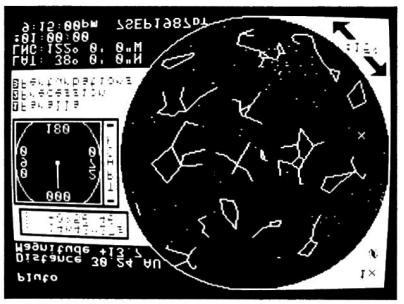
Mapping the colors to keys resulted from writing a program for the "color" keys on the Muppet Learning Keys keyboard (Sunburst Communications, 39

Listing 3. Hi-Res Sketch.

```
100  REM  WORLD'S MOST EXPENSIVE ETCH-A-SKETCH
110  REM  HI-RES VERSION
120  REM  COPYRIGHT 1987 BY S.W.ROLLINSON
130  HGR2 : HCOLOR= 3
140 B$ =  CHR$ (7)
150 X = 0:Y = 0
160  HPLOT X,Y
170  GET X$
180  IF X$ =  CHR$ (8) THEN X = X - 1: IF X < 0 THEN  PRINT B
     $:X = 0
190  IF X$ =  CHR$ (21) THEN X = X + 1: IF X > 279 THEN  PRINT
     B$:X = 279
200  IF X$ =  CHR$ (10) THEN Y = Y + 1: IF Y > 191 THEN  PRINT
     B$:Y = 191
210  IF X$ =  CHR$ (11) THEN Y = Y - 1: IF Y < 0 THEN  PRINT
     B$:Y = 0
220  IF X$ =  CHR$ (5) OR X$ =  CHR$ (3) OR X$ = "Q" OR X$ =
     "q" THEN  TEXT : END
230  IF X$ =  CHR$ (27) THEN  GOTO 130
240  GOTO 160
```

End of listing.

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Listing 4. Color Sketch.

```
100  REM  WORLD'S MOST EXPENSIVE ETCH-A-SKETCH
110  REM  LO-RES VERSION
120  REM  COPYRIGHT 1987 BY S.W.ROLLINSON
130  GR : COLOR= 15
140 B$ =  CHR$ (7)
150 X = 0:Y = 0
160  PLOT X,Y
170  GET X$
180  IF X$ =  CHR$ (8) THEN X = X - 1: IF X < 0 THEN  PRINT B
     $:X = 0
190  IF X$ =  CHR$ (21) THEN X = X + 1: IF X > 39 THEN  PRINT
     B$:X = 39
200  IF X$ =  CHR$ (10) THEN Y = Y + 1: IF Y > 39 THEN  PRINT
     B$:Y = 39
210  IF X$ =  CHR$ (11) THEN Y = Y - 1: IF Y < 0 THEN  PRINT
     B$:Y = 0
220  IF X$ =  CHR$ (5) OR X$ =  CHR$ (3) OR X$ = "Q" OR X$ =
     "q" THEN  TEXT : END
230  IF X$ =  CHR$ (27) THEN  GOTO 130
240  IF X$ = "a" OR X$ = "A" THEN  COLOR= 0
250  IF X$ = "b" OR X$ = "B" THEN  COLOR= 15
260  IF X$ = "c" OR X$ = "C" THEN  COLOR= 1
270  IF X$ = "d" OR X$ = "D" THEN  COLOR= 9
280  IF X$ = "e" OR X$ = "E" THEN  COLOR= 13
290  IF X$ = "f" OR X$ = "F" THEN  COLOR= 12
300  IF X$ = "g" OR X$ = "G" THEN  COLOR= 2
310  IF X$ = "h" OR X$ = "H" THEN  COLOR= 3
320  IF X$ = "0" THEN  COLOR= 10
330  IF X$ = "1" THEN  COLOR= 5
340  IF X$ = "2" THEN  COLOR= 11
350  IF X$ = "3" THEN  COLOR= 8
360  IF X$ = "4" THEN  COLOR= 14
370  IF X$ = "5" THEN  COLOR= 4
380  IF X$ = "6" THEN  COLOR= 7
390  IF X$ = "7" THEN  COLOR= 6
400  GOTO 160
```

End of listing.

Listing 5. Program modifications for Muppet Learning Keys.

```
125  GOSUB 1010
170  GOSUB 2010
1000  REM  INITIALIZE MLK ARRAY
1010  DIM K%(12,9)
1020  FOR YK = 0 TO 9
1030  FOR XK = 0 TO 12
1040  READ K%(XK,YK)
1050  NEXT XK,YK
1060  RETURN
1100  DATA 48,49,50,51,52,53,54,55,56,57,0,5,0
1110  DATA 97,98,99,100,101,102,103,104,0,0,27,27,0
1120  DATA 0,0,0,0,0,0,0,0,0,11,0,0,0
1130  DATA 65,66,67,68,69,70,0,0,8,0,21,0,0
1140  DATA 71,72,73,74,75,76,0,0,0,10,0,0,0
1150  DATA 77,78,79,80,81,32,0,0,0,0,3,3,0
1160  DATA 83,84,85,86,87,88,0,0,0,0,3,3,0
1170  DATA 89,90,33,63,44,46,0,63,63,0,13,13,0
1180  DATA 95,95,43,45,42,47,61,63,63,0,13,13,0
1190  DATA 0,0,0,0,0,0,0,0,0,0,0,0,0
2000  REM  READ MLK
2010 XK =  INT ( PDL (0) / 13)
2020  IF XK > 12 THEN XK = 12
2030 YK =  INT (( PDL (1) + 5) / 20)
2040  IF YK > 9 THEN YK = 9
2050 X$ =  CHR$ (K%(XK,YK))
2060  RETURN
```

End of listing.

Listing 6. Cursor-key modifications for Apple II Plus.

```
200  IF X$ = ' / ' THEN Y = Y + 1: IF Y > 191 THEN  PRINT B$:
     Y = 191
210  IF X$ = ';' THEN Y = Y - 1: IF Y < Ø THEN  PRINT B$:Y =
     Ø
```

End of listing.

Listing 7. Color Sketch modifications for Apple II Plus.

```
240  IF X$ =  CHR$ (97) OR X$ = "A" THEN  COLOR= Ø
250  IF X$ =  CHR$ (98) OR X$ = "B" THEN  COLOR= 15
260  IF X$ =  CHR$ (99) OR X$ = "C" THEN  COLOR= 1
270  IF X$ =  CHR$ (1ØØ) OR X$ = "D" THEN  COLOR= 9
28Ø  IF X$ =  CHR$ (1Ø1) OR X$ = "E" THEN  COLOR= 13
29Ø  IF X$ =  CHR$ (1Ø2) OR X$ = "F" THEN  COLOR= 12
3ØØ  IF X$ =  CHR$ (1Ø3) OR X$ = "G" THEN  COLOR= 2
31Ø  IF X$ =  CHR$ (1Ø4) OR X$ = "H" THEN  COLOR= 3
```

End of listing.

Washington Avenue, Pleasantville, NY 10570, 914-769-5030, 800-431-1934, $79.95). Modify lines 240–390 if you prefer to map the keys differently. If you don't have a color monitor, you can omit these lines.

MUPPET LEARNING KEYS INPUT

Young children can use Muppet Learning Keys as an alternative input device: Add the program lines in **Listing 5** to modify either program. The MLK arrow keys work like the Apple's cursor keys. The Eraser generates the escape character; Zap yields Control-E; Stop produces Control-C. Only the colors corresponding to the A–H keys in the **Table** are available for use with Muppet Learning Keys. Advanced BASIC and assembly-language programmers might also be interested in the Muppet Learning Keys Toolkit ($35 from Sunburst).

CHANGES FOR THE APPLE II PLUS

Apple II Plus users can press Control-K to move the cursor up and Control-J to move it down without modifying the program. A better solution is to change lines 200 and 210 to let the semicolon key (;) move the cursor up and the slash key (/) move it down.

If your II Plus doesn't have an 80-column card or a lowercase adapter, omit the lowercase letters or use the equivalent CHR$( ) function to use Muppet Learning Keys. Program modifications for the II Plus are shown in **Listings 6** and **7**.■

Table. Color map.

Key	Color Number	Color
A	0	black
B	15	white
C	1	magenta
D	9	orange
E	13	yellow
F	12	light green
G	2	dark blue
H	3	purple
0	10	gray 2
1	5	gray 1
2	11	pink
3	8	brown
4	14	aquamarine
5	4	dark green
6	7	light blue
7	6	medium blue

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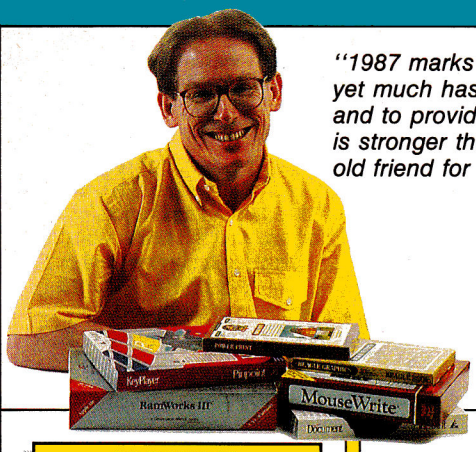
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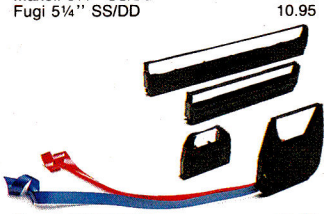
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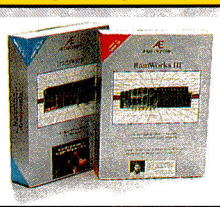
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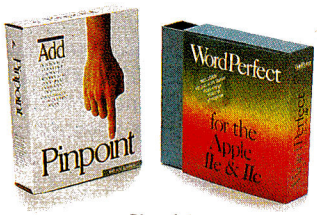
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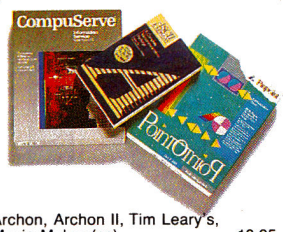
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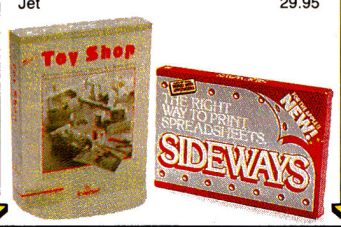
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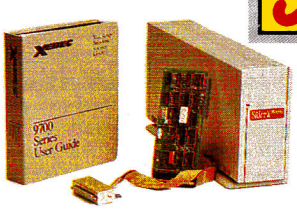


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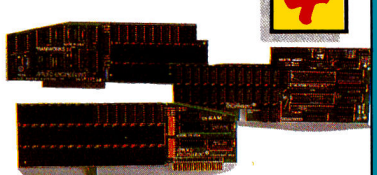


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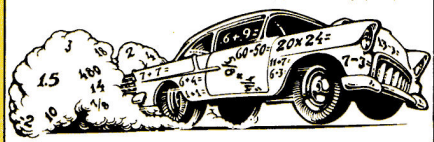
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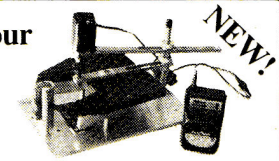
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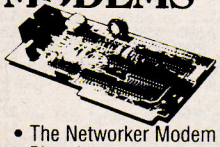
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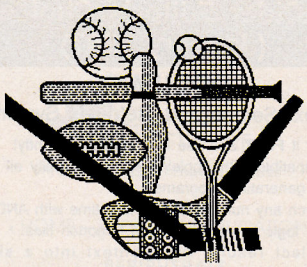
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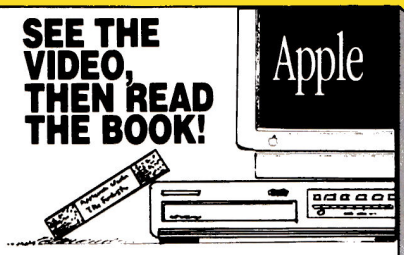
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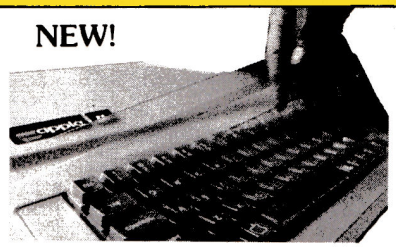
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Instant Music: Be-Bop-a-Lula

Most music programs for the IIGS are too good for most of the people who use them. Electronic Arts' Music Construction Set and Activision's The Music Studio let you transcribe songs and compose chords, but use the staffs and clefs of real music notation; they're capable educational tools, but a little complex for just playing around.

Well, Electronic Arts has fixed that. **Instant Music** lives up to its name: it lets a young child or tone-deaf grownup play along with a pop or jazz theme or compose a decent-sounding song in minutes. We still spend hours with Shanghai (it's quieter), but Instant Music is the most fun you can have with a GS.

Instead of traditional notation, the program uses colorful bars and lines to track its four instruments or voices. Each instrument appears in a different color, with multiple bars showing single notes or two- or three-note chords; higher and lower notes are represented simply by their relative positions on screen. By clicking on icons, you can transpose each instrument's pitch up or down an octave or set its volume independently of the others.

One of the pull-down menus lets you change the piano to an accordion, drum, or electric guitar, though not all of Instant Music's dozen-plus digitized instruments will fit into memory or the menu at once. Songs can be as long as 64 measures or as short as a two-measure vamp or progression; you can zoom in on individual measures for careful editing.

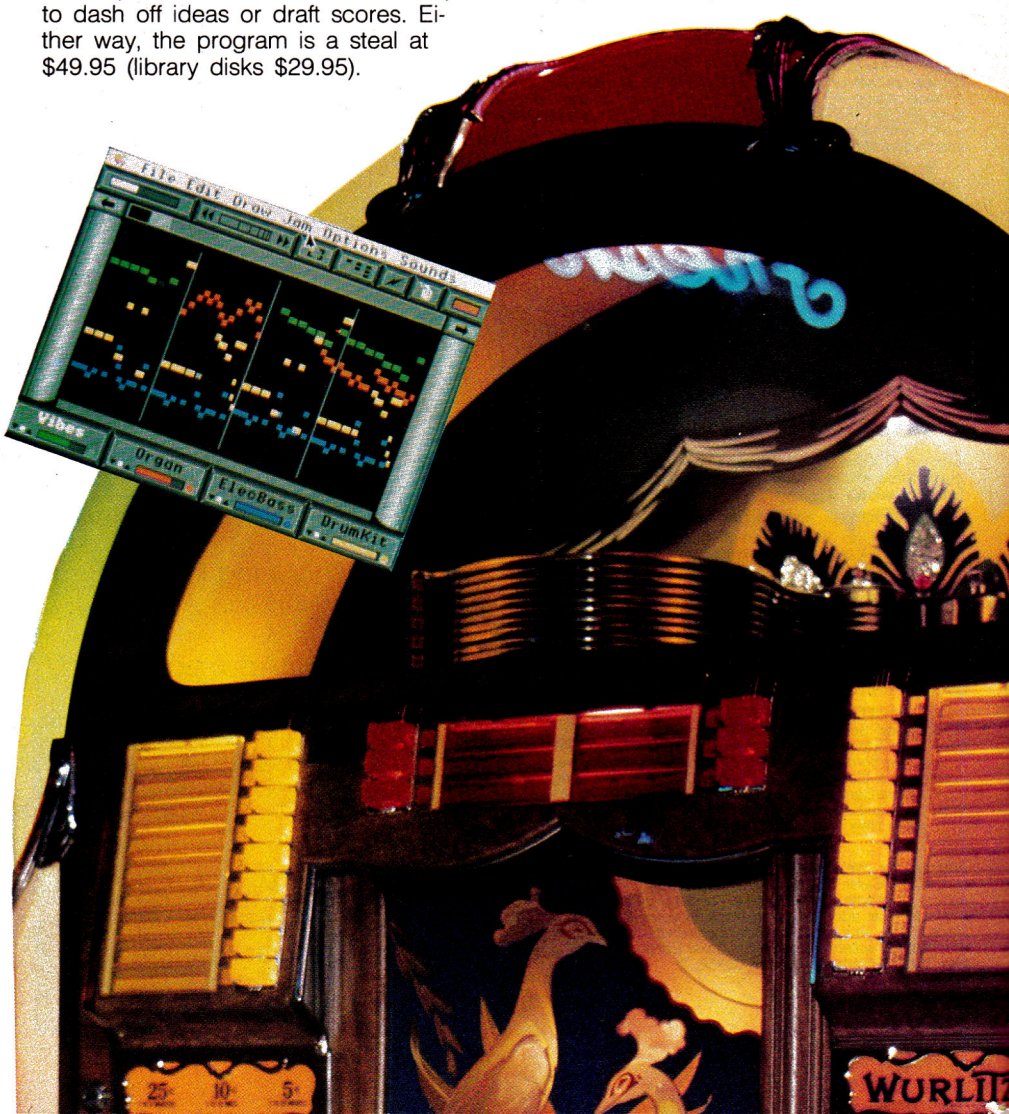
What do you do with Instant Music? Go wild. You can compose music by picking an instrument and clicking within a measure to place notes, or turn on the "QuickDraw" function to write a rising or falling musical line with a sweep of the mouse. Turn on "Mousejam," and play solos with your favorite instrument by moving the mouse around and pressing the button. Unless you turn off its guidance options, Instant Music automatically translates your mouse maneuvers—"Play higher! Lower! Doo-be-doo-be-doo!"—into the right key and rhythm.

The mouse isn't quite quick enough to play individual notes instead of solo riffs, but it sounds terrific (even though the program doesn't support the SuperSonic stereo card). Given Instant Music and a bass line, our editors turned into hard-rocking guitar stars, church organists, and piano soloists, tapping their feet and making unnecessary physical gyrations to reach the high notes. Others composed tracks that, if not symphonies, might be adequate TV-show themes.

If a musical moron can have a ball with Instant Music's 40 stored songs (extra rock and jazz disks are on the way), a real musician might use its cut-and-paste editing and "scale ruler" (which shows real note values) to dash off ideas or draft scores. Either way, the program is a steal at $49.95 (library disks $29.95).

Technical Editor Paul Statt, one of *inCider*'s musical morons, says, "Instant Music gives me a fighting chance. I'll bang on anything that makes notes—a guitar, a portable keyboard, a piano—but Instant Music is the first instrument I ever played that sounded at all like music." Adds Editor in Chief Debbie de Peyster, "I'm not sure what Statt did could be called music, but I do agree that Instant Music is neat. In fact, it's more than that. It teaches simple principles of music while you have a great time."

Instant Music requires a 512K Apple IIGS with mouse and 3½-inch drive. It's from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. ■

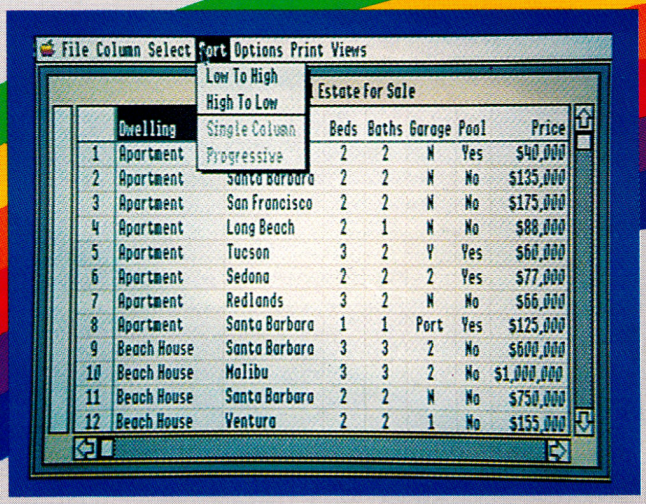


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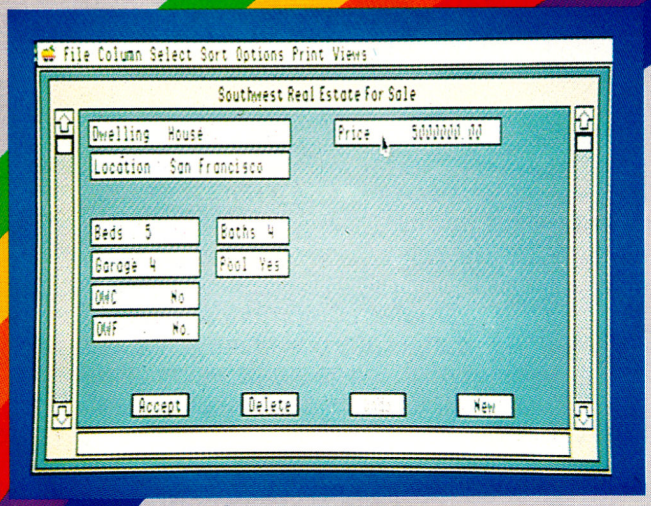
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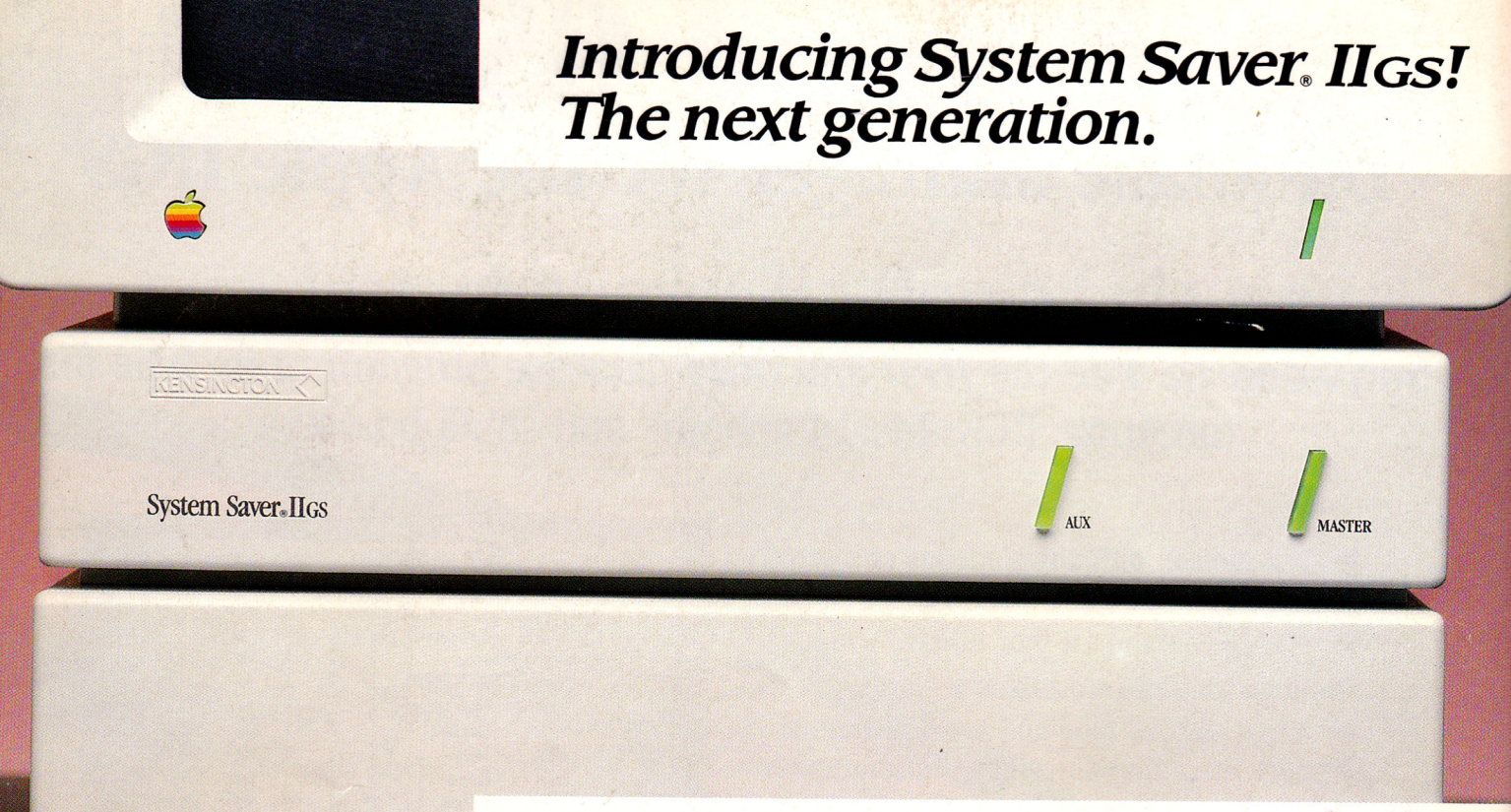
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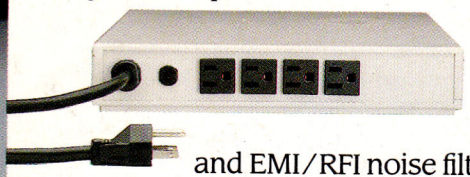


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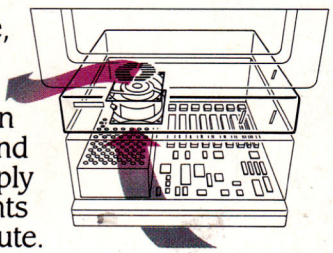
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