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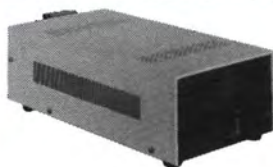
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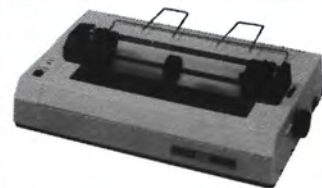
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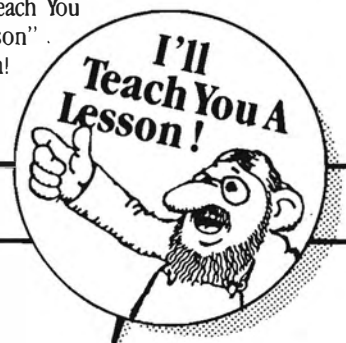
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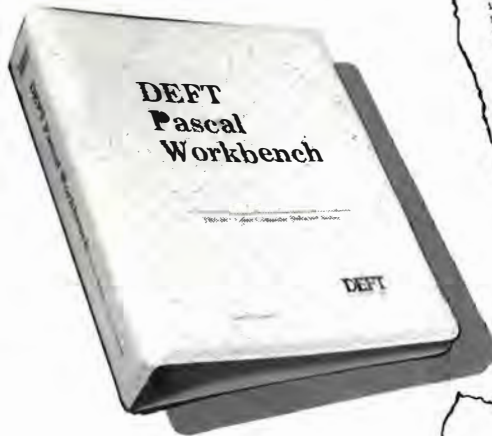
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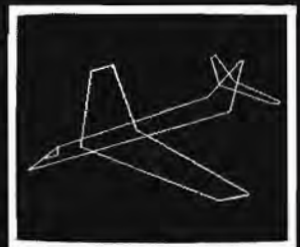
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Riding on One's Coattails

Tandy discovered a long time ago that you don't have to do a lot of promotion to sell computers—as long as the market was good and Atari and Commodore competed for sales and the public's attention. In many ways, the promotion dollars spent by companies producing the Color Computer's competition created a "coattail" effect; the consumer's enthusiasm, bought and paid for by the competition, sold CoCos as well.

But this past summer, consumers have been less than enthused about home computers. Some speculate that the announcement of Atari's 520ST and Commodore's Amiga, and the accompanying fanfare, will again whet the consumer's appetite for home computers. Let's assume that those speculators are correct and that we'll see a surge in home-computer sales by year-end. Can the Color Computer ride on the competition's coattails once again?

I don't think so. The new Atari and the Amiga might excite the public, but they also redefine the home computer in terms of performance and price. The Color Computer, as we know it, cannot match either machine's graphics capabilities or memory capacity. The CoCo will remain a good buy for what it offers, but by Christmas the message that consumers will hear is that a true state-of-the-art home computer is supposed to cost \$1,000. The CoCo stands a good chance to be labeled a toy, once again.

If Tandy is serious about continued support for the CoCo, they should launch their own mass-media campaign. The CoCo has not reached the end of its useful life. Thousands are helping to educate our children. Small businesses depend on them in day-to-day operations. Hobbyists spend hours at CoCo keyboard honing their programming skills.

It doesn't take much imagination to come up with a promotional campaign that puts the CoCo in a good light. It is one of the few truly affordable computers still sold, and it has one of the best software bases and the best support available. The Amiga and Atari 520ST might be dynamite computers, but 95 percent of the households that I know of don't need anything more than what the CoCo offers.

Our Program Listings

This month, we are placing all program listings with the accompanying article, rather than placing them in a pull-out section in the middle of the magazine. Many of you did not want to see the programs separated from the text, and those who complained the loudest were the ones who typed in the most programs. We want *HOT CoCo* to be as easy to use as possible, so you can expect all our listings to accompany the corresponding article in the future.—*Michael E. Nadeau* ■

HOT CoCo is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 57 computer publications in more than 20 major countries. Nine million people read one or more of the group's publications each month. Members of the group include: Argentina's *Computerworld/Argentina*; Asia's *The Asian Computerworld*; Australia's *Computerworld Australia*, *Australian PC World*, *Macworld* and *Directories*; Brazil's *DataNews* and *MicroMundo*; China's *China Computerworld*; Denmark's *Computerworld/Danmark*, *PC World* and *RUN* (Commodore); Finland's *Mikro*; France's *Le Monde Informatique*, *Golden (Apple)*, *OPC (IBM)* and *Distributive*; Germany's *Computerwoche*, *Microcomputerwelt*, *PC Welt*, *SoftwareMarkt*, *CW Edition/Seminar*, *Computer Business*, *RUN* and *Apple's*; Italy's *Computerworld Italia* and *PC Magazine*; Japan's *Computerworld Japan*; Mexico's *Computerworld/Mexico* and *CompuMundo*; The Netherlands' *Computerworld Benelux* and *PC World Benelux*; Norway's *Computerworld Norge*, *PC World* and *RUN* (Commodore); Saudi Arabia's *Saudi Computerworld*; Spain's *Computerworld Espana*, *Microsistemas/PC World*, *Commodore World*; Sweden's *ComputerSweden*, *Mikrodatorn* and *Svenska PC*; the UK's *Computer Management*, *Computer News*, *PC Business World* and *Computer Business Europe*; Venezuela's *Computerworld Venezuela*; the US's *Computerworld*, *Hot CoCo*, *iNcider*, *Infoworld*, *MacWorld*, *Micro Marketworld*, *PC World*, *RUN*, *73*, *80 Micro*, *Focus Publications* and *On Communications*.

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The Instant CoCo symbol appears in *HOT CoCo*'s table of contents and on the program listing for each article with a listing used on the Instant CoCo tape. As an added extra, each tape also contains a never-before-published Bonus Program, complete with instructions.

The directory below lists all programs included on this month's Instant CoCo cassette. Shown first are the name of the article with a descriptive blurb and its author, followed by the page number in this issue where the article appears. Next comes the file name of the program on cassette. Finally, there is a brief description of the Color Computer system needed to run the program.

This month's Instant CoCo cassette is available for just \$11.47, including postage and handling, from **Instant CoCo, 80 Pine St., Peterborough, NH 03458**. See our ad on p. 64 for more details.

Instant CoCo Directory October 1985

		Side A		
Article Name/Author/Description	Page #	File Name	System	
Copyright Statement	...	TITLE	16K CB	
Mindbusters/Ramella You must learn the rules before you solve this puzzle.	16	FATHOMS ALPHAZOO	16K ECB 4K CB	
CoCo Sketchpad/White Drawing with a mouse, joystick or Touch Pad was never so easy.	26	SKETCH	32K ECB or DECB	
Basic. Just a Hare FASTER/Brown A little planning makes for faster-running Basic programs.	30	BASE LOOK-UP STRING CALCS	16K ECB 16K ECB 16K ECB 16K ECB	
CoCo Study Guide/Ainscough Prepare for the big test with the help of your CoCo.	50	TERMS	32K ECB	
		Side B		
Master World Geography/Griggs Study the geography of the world in hi-res graphics.	52	WORLD	32K ECB	
For Your Eyes Only/Landwehr Encode your cassette files and keep them safe from prying eyes.	65	ENCRYPT (m)	16K CB	
ABCs/Wood Teach preschoolers the alphabet and the keyboard.	69	ABC	16K ECB	
B is for Brevity/Curtis Enter Basic keywords in a single keystroke.	70	BREVITY	16K ECB or DECB	
*** BONUS PROGRAM ***				
Color Tape Copier/Goodwin Transfer your tapes to disk.	...	CASSTCPY (m) DISKTCPY (m)	16K ECB 16k DECB	

CB = Color Basic. DECB = Disk Extended Color Basic. ECB = Extended Color Basic
(m) = machine-language program (use CLOADM)

HOT CoCo (ISSN 0740-3186) is published monthly by CW Communications, 80 Pine St., Peterborough, NH and additional mailing offices. Subscription rates in U.S. are \$24.97 for one year, \$38 for two years, and \$53 for three years. In Canada and Mexico, \$27.97—one year only, U.S. funds. Second class postage paid at Peterborough, NH and additional mailing offices. Canadian 2nd Class mail reg. #9564. 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. In South Africa contact *HOT CoCo*, P.O. Box 782815, Sandton, South Africa 2146. All subscription correspondence should be addressed to *HOT CoCo*, Subscription Department, P.O. Box 975, Farmingdale, NY 11737. Please include your address label with any correspondence. Postmaster: Send address changes to *HOT CoCo*, Subscription Services, P.O. Box 975, Farmingdale, NY 11737. Send Canadian change of address to *HOT CoCo*, P.O. Box 1051, Fort Erie, Ontario Canada, L2A5N8. Return postage guaranteed. Entire contents copyright 1985 by CW Communications/Peterborough, Inc.. For questions concerning your subscription and to place subscription orders, please call us toll free at 1-800-258-5473 between 8 a.m. and 5 p.m. EST or write to *HOT CoCo*, Subscription Department, P.O. Box 975, Farmingdale, NY 11737.

Back Issues

Yes, back issues of *HOT CoCo* are available for all months. This list shows the features in each issue:

June 1983—The CoCo word processor; a serial-to-parallel interface project; and the adventure, Cavehunt.

July 1983—Combine text and graphics; cure video RFI.

September 1983—Disk utilities; Galaxy Trek adventure.

October 1983—Animation techniques; ROM disassembly, part I.

November 1983—Nuclear submarine simulation; ROM-pack primer; banner printer.

December 1983—World capitals quiz program; talking spelling tutor; vocabulary-building program.

January 1984—Stock-market program, business graphics, mail-list program.

March 1984—How a disk stores information; create your own wordsearch puzzles; dental/medical bill balancer.

April 1984—Peripherals buyer's guide; how to shop for a disk drive; disk-fix utility; Lisp interpreter.

May 1984—OS-9 review; financial transactions tracker; homebrew spelling checker; CoCo Reversi game.

June 1984—Horse-racing and stock-market simulators.

July 1984—Do-it-yourself lowercase mod; variable cross-referencer; the game, Python.

August 1984—Basic OS-9 review; database manager program; graphics tutorials; hurricane tracker.

September 1984—Educational software buyer's guide; typing-teacher program; the CoCo as a marketing aid.

November 1984—Personal money manager program; disk-file protection utility.

December 1984—Disk-drive timer; disk drive maintenance tips; full-featured text-editing program.

January 1985—Spreadsheet program; stock-charting program; make fancy graphics with your printer.

February 1985—Drawing program; user's group list; Space Hawks game.

March 1985—Universal screen-dump program; POKE list; utilities.

April 1985—Telewriter-64 mods; modem comparison; satellite-tracking program.

May 1985—Sound digitization; blackjack program; disk-based smart terminal programs compared.

June 1985—How to install 64K in any CoCo; pie-chart program; custom fonts for Gemini printers.

August 1985—Graphics utilities; auto-line-numbering program; how to connect the CoCo to a Model 100.

You'll also find in each issue our regular features, reviews of popular software and hardware, and dozens of useful programs that are yours for the typing in.

Each back issue costs \$3.50 plus \$1 shipping and handling. On orders of 10 or more back issues, there is a flat \$10 shipping and handling fee. Quantities are limited, and we cannot guarantee that all back issues are available. Send your orders to ***HOT CoCo*, Back Issue Orders, 80 Pine St., Peterborough, NH 03458**. ■

How to Use HOT CoCo

Each month *HOT CoCo* provides a number of program listings for you to type into your Color Computer and use. If you are new to computing, read this page for advice that will help you avoid problems often encountered when entering programs manually.

Know the Basics

Before you begin, you should be familiar with the basic operation of your Color Computer. Read the manual, and make sure you understand how to enter a program line, save a program to cassette or disk, and make corrections to a program line. Verify that the program you want to enter will run on your version of the Color Computer. You need to know the memory requirements, the type of Basic used (Color, Micro Color, Extended Color, or Disk Extended Color Basic), what peripherals might be needed, and in some cases whether a particular ROM version is needed.

All this information is provided in the System Requirements box included with each article that has a program listing. This box gives the minimum requirements to use the program. If, for instance, the box reads "16K RAM, Color Basic," the program should also work on 32K or higher, Extended or Disk Extended Color Basic CoCos. Optional equipment is listed as such. Once you've established that the program will work on your CoCo, read the article thoroughly. Sometimes it will include information vital to typing in the listing.

What You See Is What You Get

We print all Basic program listings 32 characters across—just as they appear on your video screen. Type in the listing exactly as it appears in the magazine, being particularly careful with spaces and punctuation. If you do this, the 32-character format will aid in proof-reading what you have typed by letting you match beginning and ending characters on corresponding lines. If you have a line that ends on a character other than what appears in the magazine, go back and check for a typo. Also, don't mistake certain characters for others that look similar, such as a zero instead of the letter O, a comma for a semicolon, and so on.

Weird Characters

The up arrow indicates exponentiation on the Color Computer. Unfortunately, our printer prints a caret (^) instead. Be sure to type an up arrow in place of all carets in Basic program listings.

Assembly-Language Listings

HOT CoCo often publishes programs written in Assembly language rather than Basic. Assembly programs "talk" to your CoCo on a more direct level and, therefore, run faster. Unfortunately, it is much more difficult to learn Assembly-language programming than Basic programming.

But you do not need to know how to program in Assembly to use these programs. You do need, however, something called an editor/assembler. An editor/assembler allows you to manually enter an Assembly listing, and then it "assembles" it into a form that your CoCo can execute.

If you do not own an editor/assembler, it is possible to hand-assemble an Assembly listing, but this is a tedious process that is best left to someone with a little experience with Assembly programming. It also requires a short Basic routine that prepares your CoCo for hand-assembly.

We try to convert Assembly programs to Basic DATA statements. With a short Basic routine to execute the DATA statements, you have a program that you can type in just like a Basic listing, yet operates much like the one written in Assembly.

If you want one of *HOT CoCo's* Assembly listings, but it hasn't been converted to DATA statements and you do not own an editor/assem-

bler, check to see if it appears on our Instant CoCo cassette. All assembly programs on Instant CoCo are in assembled form, meaning you can load and execute them immediately.

Speaking of DATA Statements

Since DATA statements often consist of numbers only, it is easy to make a mistake typing them in. One wrong number can crash the program. When this happens, the only way to recover is often to turn off the computer for a few seconds before turning it back on. Of course, this wipes out your program in memory.

To avoid this, always save what you have typed in before running it. That way, if you did make a mistake, you can load the program from tape or disk to look for the error, rather than retyping the entire listing.

One last thing about DATA statements: Error messages that occur due to a mistyped DATA statement line will refer to the corresponding READ statement line earlier in the program. Yet it is the DATA statement that is incorrect.

If All Else Fails

If you cannot get your typed-in listing to run after checking and double-checking for typos, you can ask us for help. Send a detailed description of your problem along with any error messages given. Ideally we'd like a printout of what you typed. Send a self-addressed, stamped envelope for the fastest reply. Sorry, but we cannot help you if you have modified the original program in any way. Write to ***HOT CoCo***, attn. Technical Editor, 80 Pine St., Peterborough, NH 03458. ■

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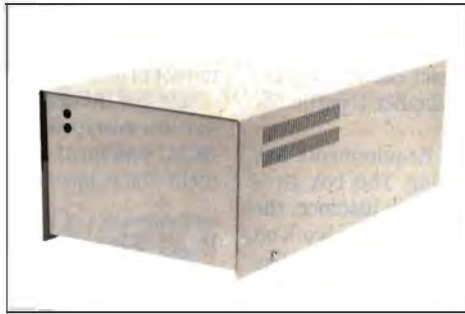
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Letters to the Editor

Service Problems

I own a 64K Color Computer in the 26-3002A series. This series has been plagued by an intermittent problem. About 10 to 20 minutes after I turn on the computer, the second and ninth columns sometimes fill with random characters and the computer freezes.

After reading that Tandy had issued a service bulletin, I called a local Tandy Computer Center, but they forgot to research the problem. When I called software support in Fort Worth, the Tandy representative with whom I spoke agreed that there was a problem and transferred me to technical support. They came close to declaring that there was no malfunction and would not discuss service bulletins. I was referred to my local service center because there were "no user-serviceable parts inside the computer."

When I protested, I was transferred to customer service and, without providing details on the fix or the bulletin, they told me that the cost would be \$30 plus parts. They expected me to pay for repairs and not ask questions.

I reported my lack of progress to my local Computer Center and talked to a technician there. He confirmed that a service bulletin and a repair kit existed. The hitch was that there were no instructions for the kit, and even if I could order a kit from Fort Worth, I could not get a service bulletin. Furthermore, he did not want to service a user-modified computer or a machine bought from a non-Radio Shack store.

I have purchased service manuals and parts from manufacturers of all kinds. At most, I have been asked to sign a nondisclosure agreement. Tandy doesn't seem to be concerned about their customers.

Robert Gault
Grosse Pointe Woods, MI

Users are free to modify their Color Computers if they wish. To that end, I have sent Mr. Gault the relevant service bulletin and kit.

I apologize for the misinformation that Mr. Gault received. Tandy does service its computers, regardless of where they are purchased. Tandy also services user-modified computers unless the modification involves non-Radio Shack parts. However, the user might void his warranty if he modifies or services certain boards or parts within the system. Warning labels upon or within the computer state this explicitly.

Our service network is aimed at in-shop work because this is what most customers want. Therefore, we design bulletins for our service centers. If a customer needs to get a

copy of a particular technical bulletin in order to service his computer, Tandy is happy to provide it.

David Krebbs
Manager

Field and Central Support Operations

Bright POKE

Could anyone tell me how to get a drink of water in The Sands of Egypt? I'd appreciate other clues and even a solution. I have solved Black Sanctum and have a map of the area around the locked door. Please write to me if you'd like clues.

Does anyone have a POKE that will brighten the CoCo's screen display?

Steve Warrick
1721 Chicago St.
Peru, IL 61354

You can get a bright orange screen from SCREENO.1 by typing POKE359,60. Are there any other suggestions?—eds.

Curses!

The Doctor ASCII column for July (HOT CoCo, July 1985, p. 15) contained a typographical error. The third bulleted item in the Doctor's response to Clarence Neece's question (second column) should read:

*PRINT HEX\$(PEEK(27)*256 + PEEK(28) - 2)*
—eds.

Smart Reviews

I would like to thank you for the two-part series, "Smart Terminals for the Disk Drive Set" (HOT CoCo, April 1985, p. 20, and May 1985, p. 30). I had been looking for a terminal program that would operate with disk systems and was compatible with JDOS. (I had the VIP Terminal ROM-pack version but was told by VIP Technologies that they do not support the disk version of the program when it is run under JDOS.)

After reading the series, I selected Autoterm because it appeared to have the features I was looking for. The review did not discuss compatibility with JDOS, so I called PXE Computing. When they assured me that Autoterm was compatible with JDOS, I ordered it.

I found the review to be accurate. The comments about VIP Terminal, with which I am familiar, were also correct. I would like to see more comparison reviews. They are helpful in selecting new hardware and software. Articles that discuss the basics are great for a neophyte like me.

Please keep up the good work. I look forward to your magazine each month. I wish that there were more of it.

Ernest L. Sample, Jr.
Beaumont, TX

I'm Sorry, the Number You Have Dialed. . .

September's "6809 On Line" (HOT CoCo, p. 73) contained a wrong number for Richard Duncan's BBS. The correct number for the COBBS board is 501-735-5614. Again, you can also reach Mr. Duncan by writing to him at 2504 North Gathings Drive, West Memphis, AR 72301, or by leaving an e-mail message on CompuServe #71515,1420.—eds.

"Missile Defense" Warning

I have received letters from three people who complained of a firing problem in "Missile Defense" (HOT CoCo, June 1985, p. 44). While the listing that appeared in my copy of the magazine is correct, apparently line 1560 in Listing 2 did not print clearly in some issues. It should read:

1560 DATA 140, 1, 129, 0, 39, 48, 37, 6, 48, 30
Jim McDowell

Calendar Change

As written, the Date Minder program (HOT CoCo, July 1985, p. 74) allows you to edit the first line of a daily entry before any data has been entered. To prevent this, change TE = 1 to TE = 0 in line 590 of the Listing.

James Huckabey

Clubhouse

Have a Color Computer Club? Let prospective members know about it through a letter to the Editor.

Rockland County, NY

The Rockland County, NY, CoCo Users' Group is now holding monthly meetings. Members from Westchester, Putnam, Orange, and Bergen counties are also welcome. Write to receive information and be placed on the mailing list.

Rockland County CoCo
P.O. Box 131
Monsey, NY 10952-0131

Adirondacks Club

The Adirondacks CoCo Club now has three chapters. In the Albany area, write to ACCC, c/o Ron Fish, Jr., Box 4214, Albany, NY 12204. In the Athens area, write c/o Pete Chast, Box 61, Athens, NY 12015. In the Glens Falls area, write c/o Richard and Dave Mitchell, 39 Center St., Fort Edward, NY 12828.

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On Line

Are you operating a BBS? Send us a note to let our readers know about your service.

CoCo Exchange

Four CoCo users would like to exchange information or start a CoCo users' group in their area:

Nita D. Grose
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AI Computing Group

The Fifth Generation Computing Group is open to computerists from all walks of life who are interested in next-generation technology. Membership ranges from knowledge engineers to systems designers and business professionals.

Meetings are held from 7 to 10 p.m. on the

Greenville, SC

The DLOAD OS-9 BBS is on line every day from 9 p.m. to 9 a.m. Offerings include e-mail, bulletins, graphics, and downloads. The BBS supports OS-9, Basic-09, Basic, and C. The phone number is 803-288-0613. Your terminal package must be able to send eight data bits and one stop bit. New users can log in at the log-in prompt by pressing the enter key.

MULTISCREEN



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Jim Taylor
Greenville, SC

Goldens Bridge, NY

The Undersea Kingdom of Goldens Bridge is a modified Colorama BBS running 24 hours a day, every day. The system supports 300 baud and can be accessed at 914-232-4582. Features include uploads, downloads, magazine, and more. For higher-level access, go to the magazine section.

Michael Sebar
Goldens Bridge, NY

Performing Arts BBS

The Electronic Call Board is on line in New York City. Features include entertainment and theater listings for major U.S. cities, free want ads, electronic mail, and general computer advice. Callers can post and read free

casting notices instantly or contribute to an on-line play.

The BBS is up 24 hours a day, every day. Users should set their terminals to 300 baud, 7 bits, and even parity and call 718-499-1633.

Bobby Ballard
Brooklyn, NY

New York

Tele-Net, a Colorama BBS, is currently operating from 6 p.m. to 7 a.m. on weekdays and 24 hours on weekends. The system offers messages, various SIGs, uploads, and downloads. Their number is 718-727-1781; Stephen Knell is the sysop.

Mike Sileo
Glendale, NY

Fort Worth

TBBS Fort Worth, which operates at 300 or 1,200 baud, is now serving the Dallas/Fort Worth area. It offers bugs and fixes for CoCo software, technical-reference files, and pub-

lic-domain software. The board is open 24 hours daily at 817-232-2087.

R. Wayne Day
Fort Worth, TX

Springfield, OH

The new Colorama BBS in the Springfield area is operating 24 hours a day. It offers uploads, downloads, want ads, and a message base. The number is 513-399-1262.

Roger Holmes
Springfield, OH

Mobile, AL

Mobile's new BBS is open 24 hours a day, 7 days a week. Although the board is open to the general public, users interested in the CoCo and amateur radio or digital communications are especially welcome. The phone number is 205-649-2894.

Terry W. Platt
Mobile, AL

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Doctor ASCII

by Richard E. Esposito and Ralph E. Ramhoff

Having technical difficulties? Consult the Doctor for an answer. Due to the volume of mail Doctor ASCII receives, we cannot guarantee that your query will be published. Please send a self-addressed, stamped envelope with all letters to Doctor ASCII, c/o HOT CoCo, 80 Pine St., Peterborough, NH 03458.

Q. Can I turn the cassette motor on and off without using the MOTOR ON and MOTOR OFF commands?—**Georg Prumper, Koin, West Germany**

A. You can turn the motor on with POKE &HFF21,PEEK (&HFF21) OR 8 and off with POKE &HFF21,PEEK (&HFF21) AND 247.

Q. Can I build the disk controller into my CoCo, or can I use a Y-cable to attach ROM packs without disconnecting my disk drive?

I have Tandy's disk drive and controller. I know that other controllers include automatic line numbering and other commands in addition to the original set. Can I use these controllers with my disk drive?—**Steve Martin, Astoria, OR**

A. You could solder wires to the end of your controller and connect them to the buss just before it goes to the expansion connector, or you could use a Y-cable. But neither will allow you to connect ROM packs to your CoCo at the same time. The ROMs in both the controller and packs start at same time. The ROMs in both the controller and packs start at address \$C000, and the CoCo gets thoroughly confused when confronted with two sets of ROM at the same address. Tandy's Multi-Pak Interface will let you do what you want. It has four slots and lets you select one of the four with either a manual switch or a POKE.

The difference in these controllers is the ROM. Tandy leaves about 2 of the 8K of memory in their Disk Basic's ROM unused. J & M Systems started from scratch and wrote their own DOS. Spectrosystems has ADOS, and Spectrum Projects has SpectrumDOS. Both of these use Tandy's original 1.0 DOS and fill in the missing 2K with enhanced features. J & M sells the ROM separately, and you can mount it on your Tandy controller.

The problem with the J & M ROM is that there is much software that is not compatible with it—most notably, Telewriter-64. ADOS and SpectrumDOS are distributed on disk with the assumption that the user will burn his own EPROM. Since they both contain the original Tandy 1.0 disk ROM, compatibility problems are eliminated.

I use ADOS because it is the only one of the three that works with PBJ's Word-Pak and its full-screen editor. For \$50, Hard Drive Specialists (16208 Hickory Knoll, Houston, TX 77059, 713-480-6000) will sell you ADOS already burned into an EPROM and set up to use all 40 tracks of your CoCo 2's drives.

Q. Is there any way to recharge the ribbons on my DMP-110 printer?—**Walter C. Adelman, Cohoes, NY**

A. Creative Computer (1236 E. Colonial Drive, Orlando, FL 32803, 800-327-9294) offers ribbon reloads (a new ribbon without the cartridge for most printers at about \$3 each). To use these, you first wind the reload into the cartridge after removing the old ribbon and then reinstall the cartridge in your printer. My 4-year-old LP-VIII is still using its original cartridge and its tenth reload.

Q. I hooked up a high-resolution monitor to my CoCo by picking off the signal before it goes to the RF modulator. I wound up with resolution no better than that of my TV. Is there a way to get better resolution using a monitor?—**Alan Craig, Brampton, Ontario**

A. For those who missed it before, a color monitor will not give a better picture than a good-quality TV set. It can display the picture no better than the signal it receives. The CoCo's display is 256 by 192 pixels no matter how good the monitor is. A monitor will reduce RFI (radio-frequency interference) in the picture, but I don't think that this improvement is worth the extra cost.

Q. Does it matter how long I leave a disk in the drive? Is there a command that will intercept the I/O error if I forget to put a disk in the drive when my program wants to read programs or data? Will leaving the CoCo on all the time hurt it?—**Mark A. Sowl, Minneapolis, MN**

A. You can leave a disk in the drive indefinitely. However, a few words of caution: Always wait until the drive motor has stopped before removing the disk. Also, if the microswitch in the drive goes bad, the write-protection for the disk could fail. This will allow the computer to write on a supposedly write-protected disk. Always keep a backup of any important program or data! Finally, the disk controller will sometimes glitch when you turn on the computer, blowing the disk. It is a good idea to open the disk-drive doors when turning the computer on.

There is no way to intercept any error message with any Tandy Basic. However, ADOS (SpectroSystems, 11111 N. Kendall Drive, Suite A108, Miami, FL 33176, 305-274-3899) has an error command that enables you to intercept any Basic error message. ADOS (\$27.95) works with the 1.0 Disk Basic ROM. However, Hard Drive Specialists sells ADOS in ROM form for the Disk Basic version 1.1. (See letter above.)

If your computer is in a cool place and doesn't have heat problems, leaving it on won't hurt it.

Q. The CSAVEM command does not work on my machine. Is there some other way to save Assembly-language programs?—**Alan Drennan, Sonora, CA**

A. I assume that you are using Extended Color Basic. Your difficulty stems from the typographical errors in Tandy's documentation regarding the CSAVEM command. The proper syntax is:

CSAVEM 'file name', start address, end address, EXEC address

where all three addresses are numbers expressed in decimal or hexadecimal. In Basic, each hexadecimal number must be preceded by &H.

Q. I purchased 64K RAMs to upgrade my D-board CoCo. After reading "64K Modification Revisited," (Esposito and Rowe, *HOT CoCo*, June 1985, p. 40) I realized that I needed a new Basic ROM (catalog no. AXX3052). I have been to four different Radio Shack stores including one Computer Center. They all looked at me as if I had just escaped from an asylum and told me that it was against company policy to sell me the part. If I can't get the ROM, the memory chips are useless to me. Does anyone else sell it?—**Tom Hoyt, Beacon, NY**

A. Funny you should mention that. I have had similar experiences with my local Radio Shack. I wanted to get the new 74LS785 SAM chip for my F-board CoCo's 256K RAM upgrade. However, they would only sell it to me installed in an A-type Korean CoCo 2. Since I don't own one, I had to go elsewhere. So can you. Computer Plus (1-800-343-8124) can supply you with the ROM you need.

Q. Is there a way I can verify a cassette save?—**Mel Waxman, Freehold, NJ**

A. First, CSAVE the program. Then type:

```
PRINT HEX$(PEEK(25)*256 + PEEK(26))
```

and note the hex value. For example, assume that the hex value returned is 2F9A. Next, type:

```
PRINT HEX$(PEEK(27)*256 + PEEK(28) - 2)
```

and note the hex value returned. Assume that this second hex number is 3A6C. Finally, POKE the second hex value into bytes 25 and 26. In this example, you would type POKE 25,&H3A and POKE 26,&H6C.

CLOAD and LIST the program. If it loads and lists, then your tape is fine. To get back to the first copy, POKE the original values for 25, 26, 27, and 28 and continue your programming or turn off the computer. If the tape fails to load, you must set 25, 26, 27, and 28 back to their original values. POKE 25,&H2F and POKE 26,&H9A from the first hex value, and POKE 27,&H3A and POKE 28,&H6C from the second hex value. One word of warning: This method works only for programs that use less than half of Basic's free memory, since both copies must fit into free memory.

Q. Tandy stresses the dangers of inserting and removing program packs while the computer is turned on. What specifically is damaged when a program pack is misused? If I use a Multi-Pak Interface, do I still need to follow the same precautions?—**Bruce E. Witzel, Westfield, NJ**

A. The danger that Tandy warns us of is very real! If you insert or remove a program pack with the power on, you could blow every chip in your machine. Such an action could cause the power-line land on the program pack to short, making the CoCo's or Multi-Pak's power supply send 12 or 5 volts to lines designed to carry considerably less voltage. Tandy program packs have shorter power-line lands to help prevent shorts, but you should still exercise the same caution. Many third-party products don't protect you. Russian Roulette, anyone?

Q. I recently purchased a 16K CoCo from my local Radio Shack store with the intention of writing a manuscript on it. I soon concluded that 16K was not enough memory, and had Radio Shack install 64K. My local store didn't tell me that I needed Extended Color Basic, a disk drive, and OS-9 to use the memory above 32K until after I had made my purchase. Is there any way to use the additional memory?

I am also having trouble understanding subroutines. Can you explain them to me? Finally, the November 1983 Doctor ASCII column, p. 137, included a program that enables 64K of memory. However, when I typed it in, ran it, and typed PRINT MEM, I received the same number as before. Is the 64K available to me or not?—**Gale Wallenberg, Marysville, KS**

A. You do not need any additional hardware to use the 64K of memory. However, you do need to have machine-language programs that are capable of using it. The CoCo's main memory can only be 64K. Therefore, in order to accommodate the three Basic ROMs (Color Basic, Extended Color Basic, and Disk Basic) you must sacrifice some of your RAM. The CoCo's design draws the line at 32K, giving the lower memory to your program and the upper memory to the Basic ROMs. If you select the all-RAM mode of operation, the ROMs are switched out of the memory space and are not accessible to the computer.

The program you refer to POKES a machine-language routine into memory and then executes it. The routine copies each of the ROMs into RAM so that the Basic interpreter won't get lost, and then it leaves the computer in the all-RAM mode. Since Basic thinks that it has only 32K to use, that's all it will try to use. The May 1983 issue of *80 Micro* contains an article called "40K Color Basic" (Esposito, Ramhoff, and Rowe, p. 212), which shows how to patch Basic to use 40K of memory if Extended Basic is not used. This article was written for the original CoCo with Color Basic version 1.1, and might not work with other ROMs without modification.

Subroutines are a mechanism for executing a segment of code from several different spots in a program. Essentially, it is a "go to X and remember where you were so that you can come back" command. The Basic command to go to a subroutine is GOSUB, and the command to go back from the subroutine is RETURN. ■

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Mindbusters

by Richard Ramella

Fathoming Fathoms

Jeffrey Plude of Moorestown, N.J., has done it. He is the winner of the Mindbusters Puzzle Contest I. He will receive a free one-year subscription or extension to *HOT CoCo*. And he has our congratulations on a puzzle well solved.

The answer to Puzzle Contest I is: AND, LIST, ELSE, RUN, and CLS. Several people found this answer, so Jeffrey Plude's name was selected from those with the right answer by a random-generation program run on the Color Computer. At this writing, the puzzle contests in later issues (some of which are more challenging) have yet to receive the large number of responses that the first contest did. If you found what you think is the correct answer to any of the puzzle contests, don't hesitate to send it in. We would like to have a winner for every contest.

Some hard-working puzzle busters have written to me with two better solutions to Bull's Eye, a puzzle presented in the June Mindbusters. The two solutions, which solve the puzzle in 17 moves (fewer than the 23 I had found), are: A.,ZZ.AA,Z.A.Z.Z, and Z.,AA.ZZ,A.Z.A.A.. Another reader noticed a problem in the listing for the Cryptonice puzzle published in the July Mindbusters. Disk Extended Color Basic users will get an SN (syntax) error for line 420 because Disk Basic does not accept the variable letters AS as a valid variable name. To fix the problem, change the variable AS to A1 in lines 420 and 430. Now on to this month's puzzles.

Fathoms

On the way back to the castle, you take a wrong turn into the dark woods. After a deep sleep, you awaken to find yourself on an apparently abandoned starliner. Suddenly you are thrown into another dimension where, using only your wits and a small vorpal blade, you must fend off 50 gnitchmonsters. These are motifs of the computer adventure, which is fashioned from randomness, danger, puzzles, and permutative events resulting from your choices. There is always an objective of some sort—treasure, knowledge, survival.

This month, Mindbusters offers a puzzle-graphics adventure called Fathoms. (See Program Listing 1.) The word fathom has two meanings. According to Webster, a fathom is a unit of length for measuring water depth,

and to fathom means to probe or penetrate and come to an understanding. This is appropriate because part of the puzzle this month is figuring out how to use Fathoms.

When you load the program it presents the specter of the dark and briny deep. Once you set the puzzle adventure in motion, you'll find that you are a scuba diver. And you are looking for an orange box that contains ancient words of wisdom. If you are successful, these words will be revealed to you. One of the obstacles facing you is a lack of knowledge concerning how to move about in your surroundings. Here is what you know. The arrow keys make the swimmer move. There are four screens. The object is to go to the box. The word fin, which means an appendage on a fish, also means *end* or *the end* in French. When you see the word *fin!* on the screen, you have made a mistake, the run is ended, and you must start over. Beware of hungry fish!

I am interested in your reactions to Fathoms, which purposely leaves out instructions. If you want full instructions on how to solve the puzzle, send a self-addressed, stamped envelope to Fathoms at the address printed following this column.

Puzzle Contest VI—Alphazoo

Now try your hand at a wordsmith contest. Alphazoo (see Program Listing 2) is a brief listing that will run on any Color Computer or the MC-10. When the program is run, it presents two alphabets strung together on two lines of the screen. The object of the puzzle is to form a second string made up of as many animal names as possible. As you type in each letter, it will disappear from the alphabet string at the top of the screen, which means that you have only two of each letter.

Animal names can be strung together, as in *cowgoat*, or combined, such as *cowl*, which yields *cow* and *owl*. Entries will be scored by multiplying the number of animal names in the string by the character length of the

string. For example, *foxen* would be worth 15 points because it contains three names (*fox*, *ox*, *oxen*) times five characters.

I will use Webster's *Third New International Dictionary, Unabridged* as my reference in judging Alphazoo. Singular and plural forms and names signifying gender (such as *sow* or *stallion*), age (such as *pup*), or description (such as *jade* or *porker*) are permissible. Not allowed are names of mythical animals, creatures of unproved existence, and animal products. Next month: out into the Wild Blue Yonder. ■

Ed. note—To enter Puzzle Contest VI, print or type your name, full address, answer string, a separate list of all the animal names in the order they appear in your answer string, and the score you claim on a piece of paper. Mail your entry to Richard Ramella, 1493 Mt. View Ave., Chico, CA 95926. Entries must be postmarked no later than October 31, 1985. The winner will be the entrant with the highest verified score. In the event of a tie, the winner will be selected by a random drawing. The winner's name and entry will be published in a future Mindbusters column. The winner will also receive a free one-year subscription to HOT CoCo.

Program Listing 1. Fathoms

```
100 REM * FATHOMS * TRS-80 EXTEN
DED COLOR BASIC 16K / BY RICHARD
RAMELLA
110 CLEAR 500: POKE 65495,0: CLS
: PMODE 4,1: PCLS: COLOR 1,0: SC
REEN 1,1: DIM Q(0,46), R(1,63),
S(1,62), P1(1,6), P2(1,6), L(1,1
0), M(0,26)
120 FIS="L8R4U12R4L8R4U8E4R4F4D4
C0D3R2C1D2C0D4C1D4G4H4F4E4F4R4U4
E4F4D4U4E4F4D4R4C0R3C1U2C0U4C1U1
5": ACS="94 10 09 08"
130 M$(1)="F3D7G3F3H3E3R3D9R2L2U
15R1F3D5U5H4L2U3R3D3": M$(2)="G3
D7F3G3E3H3L3D9L2R2U15G3D5U5E3R3U
3L3D3"
140 GOSUB 600: GOSUB 730: W=120:
GOSUB 740: DRAW "BM203,180"+V$
150 DRAW"BM151,50;U6E1R8L8U6E1R9
": DRAW"BM151,69;U15F8D8U6L8"
160 DRAW"BM155,90;U15L3G3E3R6E3"
: DRAW"BM153,111;U17D8R3E2R3U7D1
7": CIRCLE(157,125),7,.14
170 DRAW"BM153,155;U17F3D2F2E2U2
```

Listing continued

System Requirements

16K RAM cassette
32K RAM disk
Extended Color Basic

```

E3D17": DRAW"BM161,163G7F7G7"
180 S=RND(0):CIRCLE(105,124),RND
(3): IF INKEY$<>" THEN LINE(100
,30)-(165,190),PSET,BF: GOTO 1
90 ELSE FOR X=1 TO RND(15): GET(
102,33)-(100,132),Q: PUT(102,30)
-(100,127),Q: NEXT: GOTO 180
190 GET(0,115)-(97,165),R,G: FOR
L=2 TO 102 STEP 2: PUT(L,115)-(
L+97,165),R,PSET: NEXT
200 Q=97: FOR L=104 TO 150 STEP
2: GET(L-4,115)-(L-4+Q,165),S,G:
PUT(L,115)-(L+Q,165),S,PSET: Q=
Q-2: NEXT
210 GOSUB 750: DRAW "BM245,130"+
QM$: FOR X=50 TO 240 STEP 1.7: L
INE(X,100)-(X,140),PSET: NEXT
220 X=45: Y=47:GOSUB 770: DRAW"B
M50,50"+M$(1): GET(X,Y)-(X+18,Y+
24),P1,G: LINE(X,Y)-(X+18,Y+24),
PSET,BF: DRAW"BM58,50"+M$(2):
GET(X,Y)-(X+18,Y+24),P2,G: GH=1
230 GOSUB 950
240 JJ=0: GOSUB 880
250 IF X>174 AND Y<91 THEN X=X-4

260 IF X>230 THEN X20
270 IF Y>126 AND X>210 THEN GET(
193,50)-(244,60),L,G: FOR R=50 T
O 170: PUT(193,R)-(244,R+10),L,P
SET: NEXT: F$$="BM110,70": GOTO
940 ELSE 230
280 LP=1: GH=0: PCLS: GOSUB 770:
X=8: Y=84
290 XV$="A O ABEO HOG IEM REDWAE
E EYU "
300 Q=RND(X/8): IF Q=1 THEN V=RN
D(8)*28+15: V1=RND(6)*30-13: GOS
UB 960
310 GOSUB 950: IF X<8 THEN X=8 E
LSE IF Y<4 THEN Y=4 ELSE IF Y>17
0 THEN Y=170
320 IF PPOINT(X,Y)=5 OR PPOINT(X
+9,Y)=5 OR PPOINT(X+17,Y)=5 OR P
POINT(X,Y+23)=5 OR PPOINT(X+9,Y+
23)=5 OR PPOINT(X+17,Y+23)=5 THE
N 980
330 IF X>230 THEN 350
340 GOTO 300
350 GOSUB 1050: PCLS: ZQ=1: X=11
9: Y=84: FOR V=0 TO 40 STEP 2: L
INE(0+V,0+V)-(255-V,192-V),PSET,
B: NEXT
360 XV$="OLKE OREEUO H OGNTADNTU
O H OE"
370 V=0: V$=INKEY$: IF V$="" THE
N 410 ELSE V=ASC(V$)
380 IF L1=3 THEN L1=0: C1=0
390 IF V=94 THEN Y=Y-2 ELSE IF V
=10 THEN Y=Y+2 ELSE IF V=8 THEN
X=X-2 ELSE IF V=9 THEN X=X+2
400 L1=L1+1: C1=C1+V: IF L1=3 AN
D INSTR(" 196 197 112 28 26 110
29",STR$(C1))=0 THEN LINE(X,Y)-(
X+18,Y+24),PSET,BF: X=119: Y=8
4: L1=0: C1=0
410 GOSUB 950: IF X>195 OR X<41
OR Y<42 OR Y>125 THEN 420 ELSE 3
70
420 FOR V=1 TO 50: PUT(X,Y)-(X+1
8,Y+24),P1,NOT: PUT(X,Y)-(X+18,Y
+24),P1,PSET: NEXT: GOTO 430
430 PCLS: GOSUB 680: FOR L=115 T
O 0 STEP -1: PUT(0,L)-(97,L+50),
R,PSET: NEXT: X=10: Y=150
440 FOR V=42 TO 6 STEP -8: CIRCL
E(205,10),V,,.2: NEXT V
450 LINE(150,0)-(160,192),PSET,B
F: LINE(0,52)-(120,62),PSET,BF
460 FOR V=168 TO 214 STEP 2: DRA

```

```

W"BM"+STR$(V)+"",185U20E10":NEXT
470 FOR V=165 TO 185 STEP 2: DRA
W"BM217,"+STR$(V)+"E10": NEXT V
480 CB$=CB$+XV$: GOSUB 1060
490 X=8: Y=160: ZQ=0: LP=1:GH=0
500 GOSUB 950: GOSUB 880
510 IF X<3 AND Y<53 THEN FOR V=5
0 TO 80: LINE(150,V)-(160,V),PRE
SET: NEXT
520 IF Y<27 AND X<129 THEN 550
530 IF X>161 THEN LK$=LK$+"SYURM
L NTRUHLF/YFIN/HTVRB ORGA": GOTO
570
540 GOTO 500
550 FOR L=0 TO 48 STEP 2: PUT(L,
0)-(L+97,50),R,PSET: NEXT
560 DRAW "BM20,100"+FI$: GOTO 56
0
570 IF X<163 THEN X=X+3 ELSE IF
X>234 THEN X=234
580 IF X<229 AND Y>126 THEN Y=Y-
2
590 GOSUB 950: GOSUB 880
600 IF X>171 AND Y<25 THEN 1010
610 IF X>230 AND Y>157 THEN FOR
V=20 TO 200 STEP 2: CIRCLE(X+5,Y
+5),V: NEXT V: GOTO 630
620 GOTO570
630 FOR T=1 TO 1000: NEXT T: LK$
=LK$+"/EPYU Y PNTEDUHU/N O PNTHE
L."
640 GOSUB 1070: FOR A=1 TO 58: V
$=CHR$(ASC(MID$(B$,A,1))): GOSUB
1080
650 V$=CHR$(ASC(MID$(B$,A+58,1))
): GOSUB 1080: NEXT A
660 PRINT: PRINT: PRINT "THE END
"
670 EXEC 44539: END
680 CIRCLE(54,140),45,,.55,.6,.4
: DRAW"BM17,127L8H5D42E10R10": P
AINT(54,140),1,1
690 IF QZ=0 THEN COLOR 0,1: FOR
X=63 TO 165 STEP 2: CIRCLE(160,1
31),X,,1,.45,.55: NEXT: COLOR 1,
0
700 COLOR 0,1: DRAW"BM97,140L10N
E8NF8": FOR X=5 TO 2 STEP -3: CI
RCL(75,130),X: NEXT
710 FOR X=15 TO 1 STEP -1: CIRCL
E(40,145),X,,.6,.8,.4: NEXT: COL
OR 1,0: QZ=1
720 LINE(98,135)-(105,150),PRESE
T,BF: GET(0,115)-(97,165),R,G: R
ETURN
730 L=RND(10): X=X+L: CIRCLE(X,1
5),L,,1,0,.5: IF X<255 THEN 730
ELSE PAINT(0,0),1,1: COLOR 1,0:
RETURN
740 V$="U"+STR$(W)+"R4D"+STR$(W)
+"R4": V$="G8R50H8L33"+V$+V$+V$+
V$+"U"+STR$(W)+"E8L50F8R33": RET
URN
750 QM$="U1C0U2C1U4E6U6L8G2": RE
TURN
760 FOR T=1 TO 30: NEXT T: RETUR
N
770 DRAW"BM0,0R255D192L255U191R2
54D191L254U190": RETURN
780 IF ZQ=1 THEN 820 ELSE IF(PEE
K(341)AND8)=0THENPOKE341,255:Y=Y
-2: GOTO 820
790 IF(PEEK(342)AND8)=0THENPOKE3
42,255:Y=Y+2: GOTO 820
800 IF(PEEK(343)AND8)=0THENPOKE3
43,255:X=X-2: GOTO 820
810 IF(PEEK(344)AND8)=0THENPOKE3
44,255:X=X+2
820 GOSUB 760: IF X<2 THEN X=2
830 IF X>252 THEN X=252

```

```

840 IF Y<2 THEN Y=2
850 IF Y>166 THEN Y=166
860 IF GH=1 AND Y<30 THEN Y=30
870 RETURN
880 IF PPOINT(X,Y-2)<>JJ OR PPOI
NT(X+9,Y-2)<>JJ OR PPOINT(X+18,Y
-2)<>JJ THEN Y=Y+4: RETURN
890 IF PPOINT(X,Y+26)<>JJ OR PPO
INT(X+9,Y+26)<>JJ OR PPOINT(X+18
,Y+26)<>JJ THEN Y=Y-4: RETURN
900 IF LP=0 THEN RETURN
910 IF PPOINT(X-2,Y)<>JJ AND PPO
INT(X-2,Y+9)<>JJ AND PPOINT(X-2,
Y+24)<>JJ THEN X=X+4
920 IF PPOINT(X+23,Y)<>JJ AND PP
OINT(X+23,Y+9)<>JJ AND PPOINT(X+
23,Y+24)<>JJ THEN X=X-4
930 RETURN
940 DRAW F$$+FI$: GOTO 940
950 PUT(X,Y)-(X+18,Y+24),P1,PSET
: GOSUB 780: PUT(X,Y)-(X+18,Y+24
),P2,PSET: GOSUB 780: RETURN
960 CIRCLE(V,V1),13: PAINT(V,V1)
,1: DRAW"C0BM"+STR$(V-3)+"",+STR
$(V1-11)+"":R6L3D6C1D2L3C0D5U5F5U
5D6C1D2R1C0L6R3D5C1": RETURN
970 GOTO 970
980 X=X+8: Y=Y+12: FOR V=1 TO 20
0: X1=RND(254): Y1=RND(191): LIN
E(X,Y)-(X1,Y1),PSET: NEXT
990 LINE(1,1)-(60,50),PSET,BF:
DRAW"BM15,40:"+FI$
1000 GOTO 1000
1010 FOR V=12 TO 145 STEP 3: CIR
CLE(200,V),(200-V)/5,,.2,RND(0),
RND(0)
1020 IF N<1 THEN N=2: NEXT ELSE
NEXT
1030 DRAW "BM60,100:"+FI$
1040 V=RND(41)*3+12: R=RND(2)-1:
CIRCLE(200,V),(200-V)/5,R,.2,RN
D(0),RND(0): GOTO 1040
1050 CB$=XV$: XV$="": RETURN
1060 LK$=CB$: CB$="": XV$="": RE
TURN
1070 B$=LK$: LK$="": RETURN
1080 IF V$="/" THEN PRINT ELSE P
RINT V$:
1090 FOR T=1 TO 100: NEXT T: RET
URN
1100 REM * END OF LISTING

```

Program Listing 2. Puzzle Contest VI Alphazoo

```

100 REM * ALPHA ZOO * MINDBUSTER
S CONTEST * RICHARD RAMELLA
110 REM * WORKS ON ALL MODELS, I
NCLUDING MC-100
120 CLS: CLEAR 256: A$="ABCDEFGH
IJKLMNOPQRSTUVWXYZ": A$=A$+A$
130 PRINT A$
140 Z$=INKEY$: IF A$="" OR Z$=""
: THEN 210
150 IF Z$="" THEN 140
160 FOR A=1 TO 52: IF Z$=CHR$(32
) THEN 140
170 IF Z$=MID$(A$,A,1) THEN 190
180 NEXT A: GOTO 140
190 B$=B$+Z$: A$=LEFT$(A$,A-1)+C
HR$(32)+MID$(A$,A+1)
200 PRINT: PRINT B$: PRINT @ 0,A
$: GOTO 140
210 PRINT @ 256,"";
220 INPUT "TYPE NUMBER OF CLAI
M D WORDS AND PRESS ENTER";V
230 PRINT: PRINT "SCORE:"V*LEN(B
$)
240 END

```


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Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (11)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X,Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous	Yes	Yes	No
Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16,32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function Switch to & from the Standard 16 by 32 Screen for full compatibility	Yes	Yes	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program Yes	Yes	Yes	Yes
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The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes." Another user reported a program that took 1 to 1 1/2 hours to run in Basic, now runs in 5 to 6 minutes!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequential lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log." If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DAS(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX\$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DAS, you would still use DAS(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the program in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD\$(2560), and then to access string #30, you would have to multiply 30 x 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8 1/2 by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like, MID\$(RIGHT\$(DAS\$(VAL(IN\$(LEN(LE\$))),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is \$149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those today in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of \$149.00 plus \$3.00 for shipping and handling to the address to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

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Reviews

edited by J. Scot Finnie

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An MECC Education

by Dennis Peterson

Marketplace, Outdoor Biology, Earth Science, Pre-Reading, Music, and Graphing are manufactured by the Minnesota Educational Computing Consortium for Tandy Corp., 1400 One Tandy Center, Fort Worth, TX 76102. They require 32K, Extended Color Basic, and a disk drive. They sell for \$34.95 each.

Teachers might know MECC (Minnesota Educational Computer Consortium) for its line of school courseware designed for Apple computers. The company has translated several of their programs to other computers at the request of computer manufacturers, like Tandy, which now markets MECC's Marketplace, Outdoor Biology, Earth Science, Pre-Reading, Music, and Graphing for the Color Computer.

meets	maintains	documentation
objective	interest	ease of use

6			
5			
4			
3			
2			
1			
OVERALL RATING 5.50			

Marketplace

Marketplace

Marketplace is a simulation package that lets students make marketing decisions in four increasingly complex games. The first simulation, called Sell Apples, lets younger

students and beginners determine the best market price for apples. Sell Plants uses the same idea and also permits students to experiment to find the most profitable levels of advertising. Sell Lemonade lets players determine production levels and pits them against random events, such as thunderstorms, that affect sales.

Once students have become familiar with the simpler simulations, Sell Bicycles will engage them for hours. Its premise is two competing companies that produce, advertise, and sell bicycles. Play continues until one company acquires \$32,000 in assets or goes bankrupt. The only user-controlled factors that affect the bike market are advertising and price. However, the program provides random events, such as production-cost increases, strikes, wage and price freezes, and fires that add real excitement.

The reading levels of Marketplace range from third to sixth grade, and the level of the subject matter stretches from third to ninth grade. The package comes with several useful blackline duplication masters for handouts. Its manual offers excellent curriculum guidance for classroom teachers.

Students can play any of the Marketplace programs by themselves except Sell Bicycles, which requires two players. Sell Lemonade can be used by as many as six individual players. The Marketplace simulations can be enjoyed at home. Families that like board games will be intrigued with this package. Marketplace is even more effective in school, where whole classes or competing sections will be absorbed in making collective financial decisions. Marketplace offers quality learning because it is both fun and educational.

meets	maintains	documentation
objective	interest	ease of use

6			
5			
4			
3			
2			
1			
OVERALL RATING 4.50			

Outdoor Biology

Outdoor Biology

The Outdoor Biology package contains two programs: Odell Lake for third through ninth graders and Odell Woods for second through eighth graders. Odell Lake is based on data gathered from the lake of the same name in Oregon. The program offers simple but appealing monochrome graphics and a multiple-choice format. Odell Woods is similar, although it does not have graphics.

Outdoor Biology teaches ecological relationships in the food chain. Students choose animals they want to be, such as a rabbit in a woodland setting. When they encounter other animals, such as pack of hungry wolves, they must choose to chase, eat, ignore, or run away. In this instance, running is the best option. The selected animal must make it through nine options in order to survive.

Sounds simple, but it is not always so. Some of the relationships between producers (plants), primary consumers (herbivores), and secondary consumers (carnivores) are more complex than you might expect—especially in the Odell Lake food chain. And the programs do not even include all the elements of food chains. (Scavengers, parasites, and saprophytes, for example, are excluded.)

The package contains a minor glitch concerning the percentages it uses to determine the outcome of the actions of its animal and human characters. If a wolf or fox encounters a farmer and chooses to run, the farmer shoots. He misses 75 percent of the time, injures the animal 15 percent of the time, and kills it another 15 percent of the time. This means that wolves and foxes have a little extra time on their hands (paws?). In encounters with a bear, foxes escape 90 percent of the time and are injured 5 percent of the time. But what are they doing the other 5 percent of the time? None of this matters, however, because the program works fine. And more importantly, it captures the imaginations of students.

The Outdoor Biology package offers an excellent introduction to its subject. It also comes with a selection of handouts for photocopying that provides a good start. According to MECC, Odell Woods has a Spache reading level (a reading scale based on vocabulary that determines the grade level of educational reading materials) of 2.2 and Odell Lake has a

3.2 level. Although the reading level of the handouts seems to be higher, the package is designed to be useful at several grade levels. I've taught similar units to sixth through eighth graders; *Outdoor Biology* is just the right package to fill out most lesson plans.

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 5.25			
<i>Earth Science</i>			

Earth Science

MECC's Earth Science package contains programs for third- to twelfth-grade students and has second- to eighth-grade reading levels. Students can use the programs on their own, but greater learning is derived from the package's detailed guide and handout masters, which coordinate to support a complete classroom presentation.

Earthquake is a program for seventh through twelfth graders that simulates the locating of an earthquake epicenter (the point above the focus of an earthquake). Program options include a presentation of background information, a demonstration for guiding the student through the lesson, and plenty of earthquakes. There is no reason to fear that Earthquake might prompt students to hit a 10 on the Richter scale. However, you can expect to hear positive rumblings from even hard-to-interest students as they observe seismographic readings on the screen and use them to locate earthquake epicenters on a screen map of the western United States. Earthquake teaches map skills as well as vocabulary and understanding of seismology.

Minerals is an Earth Science program that teaches students to identify characteristics, such as hardness or luster, to distinguish 29 common minerals. The kit does not include lab materials; teachers should select minerals that clearly represent each type with the computer-generated questions of the program in mind. The software guide notes that Minerals focuses more on leading students through the identification process than teaching recognition of particular minerals. After working with the computer, students should be able to follow a flowchart such as the one included with the program or even other more detailed mineral guides.

Younger students will learn the names of planets, their distances from other planets, and the weight of human beings relative to the different gravities of planets with *Solar Distance*. The program outlines possible activities in its software guide and comes with

handouts. One exercise prompts kids to imagine that they could travel to a planet by a familiar mode of transportation, such as a bicycle, and tells them how long the trip would take.

The last program in the Earth Science package, *Ursa*, familiarizes students with five major constellations around the North Star. It shows the apparent rotation of the constellations by picturing them at intervals.

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 5.00			
<i>Pre-Reading</i>			

Pre-Reading

The designers of Pre-Reading intended it for preschool through second-grade learners. Teachers of older students will also find some portions useful for strengthening visual memory skills. The package begins with two commonplace but well-written missing-letter identification drills. The first adds body segments to a caterpillar as children identify a missing letter in an uppercase display of a portion of the alphabet. Train is similar to Caterpillar but adds train cars as kids provide missing letters for lowercase alphabet segments. If students miss their first try, Train displays the entire alphabet and a box for the missing letter so they can try again. The program gives the correct response after a second wrong answer.

The two programs above do not have sound, and their graphics are rudimentary. The activities they offer are similar to those found in prereading workbooks but have the advantage of introducing youngsters to computers, too. They come with exercise suggestions for pre- and post-program classroom activities that will not be new to most early-learning educators.

In *First Letter*, students match initial consonant and vowel sounds with the corresponding letter. Four letters and a picture appear on the screen. Children select the beginning letter of the word that identifies the picture. The activity continues through 26 pictures, one for each letter of the alphabet. Because this might be too long or complex for preschoolers, a well-considered program option allows parents or teachers to select the letters in advance. A chosen list can be stored on disk for later use, too. *First Letter* is not a unique idea, but it does provide a fine classroom supplement.

The last three programs in this package, *Pictures*, *Words*, and *Shapes*, use a format similar to that of the television game show, *Concentration*. Two students can compete or

one can attempt to solve the board in as few tries as possible.

The games hide pictures, words, or shapes in boxes marked by alphabetized letters. Players develop memory skills by matching two items for points. The *Words* program has a set of 10 primary-level words, but teachers or parents can substitute words of their own choice with as many as seven letters. The software guide suggests that nonsense syllables be used to challenge young memories, which lets children experiment to see whether words, pictures, shapes, or nonsense syllables are easiest to remember. Skilled teachers could gain information about students' learning styles from this exercise. Although MECC intended these programs for kids up to the second-grade level, they are fun for everyone.

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 4.75			
<i>Music</i>			

Music

The Music package contains five programs that teach music theory. The programs have sound, but it is derived of simple tones—and they are not always melodic. In fact, some note relationships, while being educational, are not intended to provide a pleasing sound.

The Music programs have fifth- through eighth-grade reading levels, activities for beginning through advanced music students, and graphics that precisely display a measure or two of music. Program users need prior knowledge of note types and should be able to read treble-clef notes.

In *Counting*, students provide the missing note to complete a measure in the time signature of their choice. For example, if a dotted-quarter note were required to complete a measure, students would type DQ from the screen menu. In *Wrong Note*, students listen to a five-note pattern and compare it to five notes on the screen. They select the incorrect note on the screen after listening to the melody as many times as they want. After the wrong note has been chosen, the computer displays the correct note phrase. *Missing Note* is a similar activity in which students must provide the name of a missing note.

Students select note intervals and the maximum number of flats and sharps in the last two programs, but if B flat is missing, the program accepts only B as the answer. The instruction guide addresses the quirk, but it is not enough to make up for this program weakness.

Remember the times when as a kid you

dutifully practiced a tough music passage only to find out days later in your Thursday afternoon music lesson that the rhythm was wrong? The Rhythm program gives students three music patterns to compare with displayed notes. The computer can repeat any of the patterns until a student figures out which one matches the notes.

Rhythm Play further develops rhythm skills by letting students tap out a displayed rhythm on the N key (other keys work, too) at the tempo of their choice. If the pattern is incorrect, the computer displays it. Students may also command the computer to play the pattern correctly. Although it is a good idea, Rhythm Play is disconcerting because after the first tap, pressing the N key breaks a steady tone generated by the computer. (The last tap turns off this sound.) The effect is similar to that of repeatedly striking a note on a piano while holding down the damper (loud) pedal. The tone should cease completely as the key is released. Nevertheless, both rhythm programs help instill a sense of rhythm in students. The highest of the three levels made my skill with syncopation look dismal.

Despite a few shortcomings, the Music package offers an important and possibly redeeming feature: Its programs correct stu-

dent errors immediately, preventing the reinforcement of unrealized mistakes. This has to be one of the most important requirements of music-theory software because it is aimed at a discipline about which students can quickly become confused.

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 5.25			

Graphing

Graphing

This package is a worksaver for math teachers. It offers programs that are useful to junior-high through college classes. The first of its five programs, Slope, graphs as many as five linear equations on one coordinate system. Polygraph is more sophisticated, allowing the plotting of most relations on the x-y plane. Polar graphs polar functions and shares the ability with Polygraph to move the screen window to different parts of the coor-

ordinate system or "zoom" in or out for additional plot exploration. The computer redraws their graphs with each move or zoom. One drawback is that moving to the right and zooming in, for example, requires two redrawings of the screen.

None of the programs in the Graphing package can be expected to replace the textbook, but they can eliminate some arduous blackboard work for the teacher and help maximize the value of lectures. Students might also benefit by seeing a mathematical equation expressed in terms that the computer understands. For example, $y = \frac{3}{x}$ is expressed $Y = 3/X$. And $r^2 = \cos 2\theta$ is expressed $R12 = \text{COS}(2*0)$. You can use scientific notation, too, but 10^6 , for example, becomes $1E + 6$. When entering an equation that uses a θ , substitute a capital O.

There are some ground rules to follow in using these programs. For instance, Slope accepts only the first-degree variables x and y in equations set up in the $y = mx + b$ format. The letters m and b represent constants in this example. Polygraph and Polar accept more complex equations and offer numerous mathematical functions. They give you the option of plotting 2 to 1,000 points, but the more points you choose, the longer the computer takes to graph the equation. However, the result is a smoother, more visually appealing line.

Snark is a game for younger students. The Snark is an imaginary creature that hides on a 10-by-10 grid. Students have 12 tries to find him by entering the radius and the x-y coordinates of a point. The computer reports whether the Snark is inside, outside, or on the circle. Players use the information to home in on the Snark's location.

Radar is a simulation game for which students enter degree headings to direct a rescue boat to a runaway ship. The two crafts appear as blips on a realistic-looking radar screen. Players must accomplish a rescue before the ship crashes into an island.

The instruction guide suggests that the last two games are designed for seventh through twelfth graders, but younger students would also benefit. Radar would also enrich a map-skills class. Snark would make an excellent reward or supplement program in any class exercise that focuses on reasoning skills.

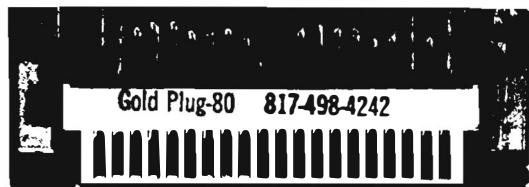
Summing Up

The MECC programs Tandy has selected are easy to use because they are consistent in the way they load and offer the option of on-screen instructions. You can exit a program whenever it calls for input by pressing the clear key twice. Pressing the break key halts the program; if you press it accidentally, you must rerun it. Although the manual warns you about this, any improvement of the series should include the disabling of the break key.

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The documentation for these packages is more than just instructions on running the programs. It includes classroom worksheets, student readings, and suggestions for activities that support the lessons. The manuals state learning objectives clearly, preview programs thoroughly, and usually provide everything most teachers like in a ready-to-

go lesson plan. It appears that nothing has been overlooked. But just in case, you'll find a help-line phone number and address in the back of the manual.

This series of programs clearly defines and meets its lesson objectives. Some of the packages are likely to cause a real spark of interest among students. However, the software

creators do not pretend that these programs could take over a classroom; a teacher must provide interest, understanding, and monitoring. The real advantage is that teachers may occasionally trust some of the teaching of a subject to one of these programs, leaving them free to interact more closely with their students. ■

Facemaker, Kindercomp, and Kids On Keys

by Dennis W. Peterson

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 5.00			
Educational Software			

Facemaker, Kindercomp, and Kids on Keys are offered by Spinnaker Software Corp. through Tandy Corp., 1400 Tandy Center, Fort Worth, TX 76102. They require 16K and sell for \$29.95 each. Kindercomp requires a joystick.

To sailors, a spinnaker is a large sail used on a boat running before the wind. To computerists, Spinnaker is a well-known software company that blew into Radio Shack stores with a shipload of some of the finest early-learning programs you are likely to find anywhere on the seven seas.

Facemaker

When kids can get this graphics program away from you, Facemaker lets them create a face from an easy-to-use menu. My 6-year-old understood the process quickly, and was soon happily creating and changing faces with choices of hair, ears, eyes, noses, and mouths. Facemaker doesn't leave you with just another pretty or not-so-pretty face, however. By pressing the proper keys, you'll cause ear wiggles, eye winks, smiles, frowns, and a protruding tongue accompanied by sound effects for emphasis. You can also make color selections. The program gives kids an experience in elementary programming by allowing them to input a sequence of facial movements. Pressing the enter key starts the action.

Another exercise teaches important memory skills. Kids watch the Facemaker face go through a series of animated expressions. Then they type the single-keystroke commands in the order they occurred. The program adds another expression when a child remembers the string of gestures correctly.

Kindercomp

Kindercomp is a package of six programs for children ages 3 to 8. Draw requires a joystick and lets kids create colorful patterns on the screen. Complex pictures demand more dexterity and patience than kids are apt to have, but the program is not intended for this kind of use. The joystick guides a small flashing cursor in forming vertical, horizontal, and 45-degree diagonal lines. Circles are difficult to achieve because of lower-level program graphics. In addition, it is hard to stop the cursor on a particular point.

Draw allows you to change cursor color to background color with the joystick's fire button and erase lines you don't want on a drawing. This is not a sophisticated graphics program, but it provides a great deal of fun for kids. Its capability for filling areas with color or changing all colors adds variety. And if a child fancies another design, the clear key wipes the slate clean.

Scribble lets you touch a key and watch a character repeat for a full line accompanied by a background sound. It teaches an appreciation



Facemaker, Kindercomp, and Kids on Keys are three of the several Spinnaker Software products marketed by Tandy.

of letters and characters. But another program in the set, Names, does this better. When kids type names or short phrases with Names, their writing is displayed on the screen in a manner that rivals the title sequences of some network-television weeknight movies. A minor problem with Scribble involves the display of additional keyboard characters. You access them by pressing the shift-O key combination. However, you must press these keys again before entering some of the other programs or they will not run. Kindercomp's documentation fails to mention this.

Sequence offers several numbers in a series and requests that children provide the next number. As proficiency grows, the numbers become higher and begin increasing by twos with double-digit numbers. Letters lets younger Kindercomp enthusiasts match letters on the screen with keyboard letters.

Match, the last program in the Kindercomp

series, displays patterns. It teaches children visual discrimination skills by offering a multiple-choice format of three possibilities for matching each pattern. While watching my son and his young friend play, I noticed that their perception skills grew quickly with these last three games. These programs are equally entertaining and educational. In addition, each correct, first-try answer produces a part of a picture reward. When the picture is completed, it becomes animated with sound.

Kids On Keys

This program fascinated the children in the neighborhood. In the first game, letters float down the screen and players try to type them before they disappear. After fifteen letters, a balloon carrying a boy and a word descends. Typing the word before the balloon

disappears gives you bonus points. At higher levels, letters fall faster, numbers are included, and bonus words are longer.

In the second game, children select pictures (by number) that match words on the screen. The third game also focuses on picture/word identification. It is aimed at older learners, who must type the word that identifies a picture moving down the screen before the picture disappears. The beginner's level of this game requires typing of the first letter of each word only. Speed increases in the higher levels. The second and third games have bonus rounds that challenge kids' visual perception. These display partial pictures that players must identify and are sometimes difficult.

Meeting Lesson Objectives

Facemaker, Kindercomp, and Kids on

Keys clearly meet many needs of 3- to 9-year-old learners. They were created by educators, and it shows. Intriguing sounds and graphics enhance activities that are an excellent balance of teaching and fun. The programs offer the convenience of cartridge loading, which is easy for youngsters. After brief instruction, all but the youngest children can use many of the programs with only limited supervision. Most kids readily understand how the software runs, which shows that Spinnaker's educators understand their audience.

The documentation that comes with these programs is attractive and clearly written. It offers a reading level low enough for some third graders to understand, which allows older children to help their younger siblings. Chances are, families that try any of these packages won't settle for one. ■

The Guide to Super Software for the TRS-80 Color Computer

by Terry Kepner

	organization thoroughness	production readability	quality
6			
5			
4			
3			
2			
1			
OVERALL RATING		5.00	
Books			

The Guide to Super Software for the TRS-80 Color Computer, by Scott L. Norman, is published by Scott, Foresman and Co., 1900 East Lake Ave., Glenview, IL 60025. The softcover book is 186 pages long and sells for \$18.95.

If you are a novice in the Color Computer world or are expanding your software horizons to include serious business uses, the *Guide to Super Software for the TRS-80 Color Computer* is for you. Author Scott Norman has been writing about the Color Computer and its software almost from the day that Tandy first released the computer. He watched the CoCo grow from a 4K Color Basic machine to its present 64K configuration with options such as OS-9. The new book

sorts out the sometimes bewildering features of various word processors, spreadsheets, and databases. The insights it imparts come from Norman's extensive experience as a product reviewer for *80 Micro*, *Color Computer Magazine*, and *HOT CoCo*.

The primary purpose of the *Guide to Super Software* is to offer a snapshot of the field of business software for the Color Computer and present a fair and balanced look at the products it contains. The book examines and compares the features, capabilities, advantages, and disadvantages of the products it covers, providing a solid basis for evaluating software that is not likely to be much eroded with time.

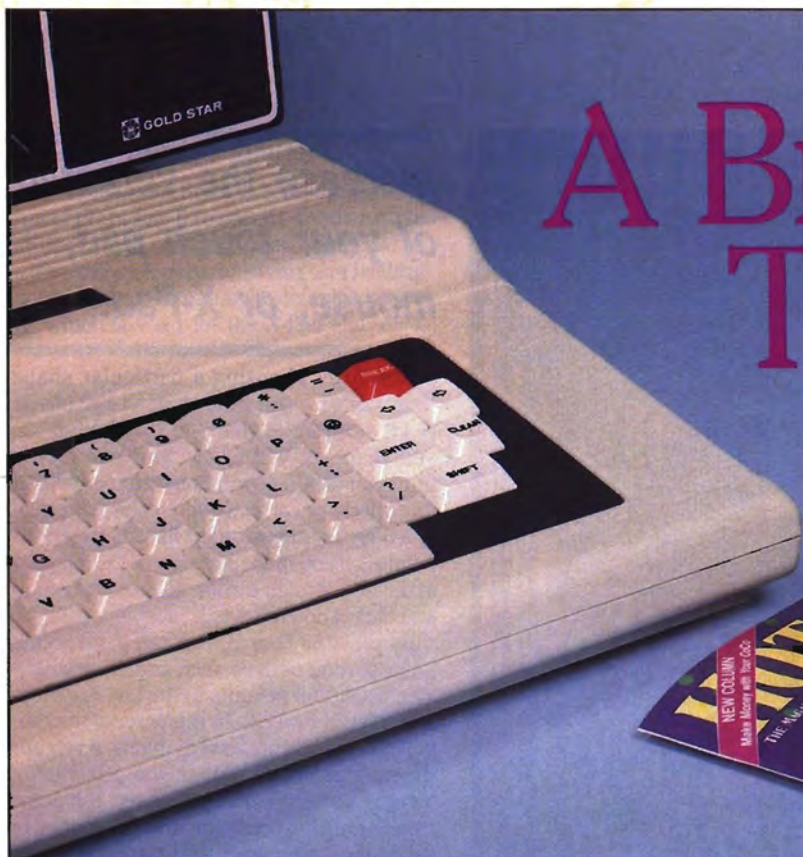
There are seven chapters, two appendices, and an index. The first chapter covers Color Computer hardware, discussing its history, memory maps, operating systems, and references. This is a goldmine of technical information written in a style that will not intimidate novices.

The second chapter examines word processors, and the third looks at their ancillary spelling-checker and file-merging programs. The fourth chapter tackles database-management programs. The fifth details electronic-spreadsheet programs. The sixth chapter covers miscellaneous business and personal-finance programs, such as Tandy's Graphics Pack and Disk Graphics, and Sugar

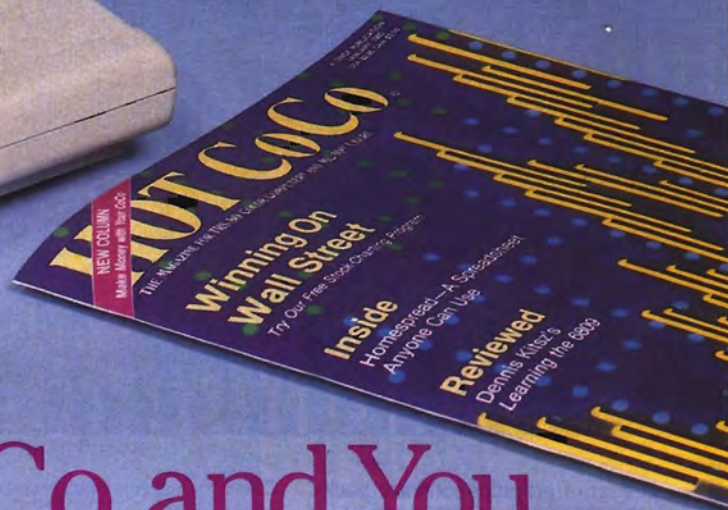
Software's Statgraf. The seventh chapter considers future possibilities, such as integrated software, icons, and hard disks. Appendix A is a list of the names and addresses of hardware companies mentioned in the book; Appendix B is a similar list of the software companies.

The chapters begin with overviews of their topics and then dig right into the programs. The discussions start with the cassette-software programs and work their way to programs that require disk drives and Flex or OS-9. In the second chapter, Norman covers C.C. Writer, Color Scripsit, Master Writer, Teletwriter-64, VIP Writer, and Stylograph (for Flex and OS-9). The last three programs he addresses are Elite-Word, Color Scribe, and DynaStar.

Overall, the *Guide to Super Software* is well written with lucid and complete explanations on how to best make use of the Color Computer as a business tool. The reviews are fair, honest, and thorough. Each chapter goes a long way in educating you about available software and what features to consider before buying. If you need help in selecting a word processor, spreadsheet, or database program, this book is a valuable reference for making the right decision. It also provides a helpful introduction to the OS-9 and Flex operating systems with software examples in each chapter. ■



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by Eric White

Artwork by Eric White



Increase the versatility of your touch pad, mouse, or X-Pad.

pears. After choosing a particular shape, "tack down" the first point of the shape. Next, stretch the shape to the desired size and shape—it will follow your pen around until you tack it down. Some shapes will not fill entirely or correctly with color patterns 0 and 5-9. To draw straight lines between two points (L), you must tack down the first point of the line, stretch the line to its end position, and tack it down there.

By pressing G or B, you can get a rectangular portion of the screen and draw with it. The resolution defaults to the low-resolution screen (128 by 192). In this screen, the color of your brush is preserved; that is, it remains the same no matter where you place it. You thereby prevent color artifacting, the sometimes annoying color-flip problem created on the hi-res screen when you place a shape on an odd-bit X-boundary. (The sequence for red in hi-res is one bit on and the next bit off. You would therefore change the color of a shape if you repositioned it by one bit.) If you do not want to preserve the color, press R after you have made your stamp. The screen toggles back to 256 by 192. Position your original stamp one bit to the right or left of its original position and tack it down.

Since the BRUSH command ANDs the brush with whatever is underneath it, the best results are achieved on a white background. If the background is black, use I to invert the screen temporarily.

With Sketchpad it is easy to copy graphics, or invert or clear a portion of the screen. To copy a section of a graphic, select G or B, and then pick up the segment that is to be copied. Load the target picture from tape or disk, tacking the segment down wherever you want it. To invert a partial screen, use G to make a stamp of the area to be inverted. Press I to invert the screen, tack the stamp down in its original location, and press I to invert the screen again. To clear an area of the screen, first select the color to which you want the screen cleared. Press S, select the Box-Fill option, and position the box over the area you wish to clear.

Saving and loading to and from disk uses pages one through four of graphic memory (addresses \$0E00 to \$25FF). Show Gallery sequentially displays the pictures on the disk with a pause for keyboard input between each picture. Sketchpad retains the directory in memory to save time when a disk is accessed repeatedly. Consequently, it is important to inform the program, by selecting Exit Disk, when you change disks.

The advent of graphics-software packages like Graphicom and CoCo Max has made it possible for CoCo owners, armed with joysticks or a mouse, to create fancy graphics. Before the current graphics-software boom began, I started to assemble my own CoCo graphics system. I had discovered that, in most cases, the digitizing tablet performed better than other graphic-input devices. Joysticks were cheaper but were cumbersome and did not afford the resolution I needed. So, I bought a Tandy X-Pad.

I quickly realized that the software Tandy supplied was inadequate for my needs. Because of this and because Tandy had decided to phase out the X-Pad, I was forced to write my own software. It wasn't until the release of Graphicom Part II (a library of machine-language graphics subroutines) and the Whitesmith art-demo disk—when I received calls and letters from X-Pad and Touch Pad enthusiasts—that I realized other CoCo users could benefit from my programs.

Tips and Techniques

To assist as large an audience as possible, I have rewritten my original program to support both disk and cassette systems. (See Listing.) The program is menu driven and includes such features as an UNDO command, a PAINT option, and a GET/PUT sequence.

The chart in Table 1 contains a comprehensive list of CoCo Sketchpad's keyboard functions. However, there are a few tricks that will make the program easier to use. The opening screen displays the main menu.

Clear the screen before you begin to create graphics by pressing C and choosing the screen color you want.

Because the paint mode uses Extended ColorBasic's PAINT command, you can only paint over white or black. Furthermore, painting stops at a border of the opposite color. For example, painting on black stops at a white border. If you encounter an OM (out-of-memory) error while you are playing, type "RUN"—nothing will be lost; you can then continue painting or make changes using UNDO.

When you press S, the shapes menu ap-



System Requirements
32K RAM
Disk Extended Color Basic
X-Pad, Color Mouse, or Touch Pad

Changing Default Values

The default disk drive is zero; change the value of PD in line 5 to specify another drive number. Line 6 uses FE\$ to establish PIC as the file extension used for saving and loading disk files. Line 7 contains the default tool setting, which is V = 1 for the X-Pad and V = 2

for a joystick. You can redefine the colored patterns corresponding to keys 0-9 by changing the array definitions in line 9.

In line 35, the high-speed POKE is treated as a remark. If your CoCo accepts this POKE, delete the apostrophe. Sketchpad temporarily slows down the computer during disk or

cassette access and then returns it to its previous speed. ■

Eric White is a partner in Whitesmith, an unincorporated partnership for computer graphics. Sketchpad is available on Instant CoCo (see ad on pp. 72 and 73), but for \$12 White will send you a disk containing the program and sample graphics. Write to him at Whitesmith, P.O. Box 609, Altamonte Springs, FL 32715-0609.

Key	Function	Notes
0-9	Change Drawing Color	Use to draw, paint, or fill color. 1 = Black 2 = Blue 3 = Red 4 = White. Keys 0 and 5-9 represent special color patterns.
	Increase Cursor Height	Cursor height ranges from 1 to 25 pixels.
	Decrease Cursor Height	
-	Increase Cursor Width	Cursor width ranges from 1 to 25 pixels.
-	Decrease Cursor Width	
Q	Quit Menu	Cold-starts Basic, or goes directly to another graphics program. Picture is usually still in memory but might not be complete.
W	Window Mode	Joystick mode only. Toggles drawing window between a large, 256 x 192 window and a 64 x 64 window.
R	Resolution Switch	Toggles between the hi-res screen (256 x 192) and the color screen (128 x 192).
U	Undo	Restores screen to condition before last graphic operation. Does not work with Get/Put, Brush, or Invert.
I	Invert Screen	Toggles bits and swaps colors. Undo by pressing I again.
P	Paint	Paints colors 0-9 on white or black.
S	Shapes Menu	Box-Frame/Box-Fill/Circle/Circle-Fill
D	Disk Menu	Save Picture/Load Picture/Show Gallery/Rename Disk
T	Tape Menu	Save Picture/Load Picture/Skip File. Will transfer picture files between cassette and disk systems.
G	Get/Put	Makes and draws with an opaque stamp.
B	Brush	Makes and draws with a clear rubber stamp.
H	Help Menu	Contains the list of commands, cursor's last X and Y position, current file name, draw mode and tool, and resolution. (Noncommand keys also bring up this menu.)
J	Joystick Tool	Selects the right joystick, color mouse, or touch pad as the input device.
X	X-Pad Tool	Selects the X-Pad as the input device.
L	Line	Selects line-drawing mode.
M	Mirror	Toggles between No Mirror/X-Mirror/XY-Mirror in the draw mode.
C	Clear Screen Menu	Clears screen with Black/Blue/Red/White.
Space-bar	Reset to Default/Escape	Resets to draw mode with a one-pixel cursor. Also used to escape from unwanted menus.

Table 1. Program Functions

Program Listing, Sketchpad

```

1 CLEAR1000:PMODE4:PCLEAR8:DIM T
(65),R(65),SS(15),M(1000),PS(72)
,AS(1),SP(24):C=1:U=1:P=4:C=3
2 VS(1)="X-PAD":VS(2)="JOYSTK":
NS="UNTITLED":BS=CHR$(128)
3 IS="SDLCRGBU"+CHR$(94)+CHR$(100
)+CHR$(8)+CHR$(9)+"M PXJQTWI1234
56789"
4 '
5 PD=0:PICTURE DISK DRIVE NO.
6 FE$="PIC":DISK FILE EXTENTION
7 V=2:1=X-PAD 2=JOYSTICK
8 '
9 P(0)=20:P(1)=0:P(2)=1:P(3)=2:P
(4)=3:P(5)=30:P(6)=43:P(7)=50:P(
8)=121:P(9)=116
10 DES="/"+FE$+": "+RIGHT$(STR$(P
D),1):SH=1
11 F$="DRAW BOX FRBOX FLSCIRC
LESCIR FLGETPUTGBRUSH BLINE LP
AINT PDISK DMIRROR"
12 GOTO107
13 IF MR=2 THEN16
14 PUT(255-X-H,Y-W1)-(255-X+H,Y+
W1),R,NOT
15 PUT(255-X-H,Y-W1)-(255-X+H,Y+
W1),R,NOT:RETURN
16 PUT(255-X-H,191-Y-W1)-(255-X+
H,191-Y+W1),R,NOT
17 PUT(255-X-H,191-Y-W1)-(255-X+
H,191-Y+W1),R,NOT:RETURN
18 PUT(X-H,Y-W1)-(X+H,Y+W1),T,NO
T:IF MR>0 THENGOSUB13
19 PUT(X-H,Y-W1)-(X+H,Y+W1),T,NO
T:RETURN
20 LINE(X1,Y1)-(X,Y),PSET,B:IF S
=3 THENSH=2:S=0:GOTO34ELSEGOTO44
21 IF GT=2 THEN23ELSEIF S=3 THEN
GET(X1,Y1)-(X,Y),M,G:SH=11:GT=2:
GOTO34ELSE34
22 IF GT=2 THEN23ELSEGET(X1,Y1)-
(X,Y),M,G:PUT(X1,Y1)-(X,Y),M,NOT
:IF S=3 THENS=0:SH=11:GT=2:G1=AB
S((X1-X)/2):G2=ABS((Y1-Y)/2)
23 IF B=1 THEN24ELSEPUT(X-G1,Y-G
2)-(X+G1,Y+G2),M,PSET:IF S=3 THE
NSH=10:S=0:GOTO46ELSEGOTO44
24 PUT(X-G1,Y-G2)-(X+G1,Y+G2),M,
AND:IF S=3 THENSH=12:S=0:GOTO46E
LSEGOTO44
25 X=PEEK(65376):Y=PEEK(65377):S
=PEEK(65378)
26 IF X-G1-H<0 THENX=G1+H ELSE I
F X+G1+H>255 THENX=255-G1-H
27 IF Y-G2-W1<0 THENY=G2+W1 ELSE
IF Y+G2+W1>191 THENY=191-G2-W1
28 IF GT=2 THENRETURN
29 IF S=3 AND SH>1 THEN SOUND255,
1

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30 RETURN
31 S=PEEK(65280):X=JOYSTK(0):Y=J
OYSTK(1):IF W THENX=X+WX:Y=Y+WY
ELSE X=X*4:Y=Y*3
32 IF (S AND 3)<3 THEN S=3 ELSE
S=0
33 GOTO26
34 PMODE4:SCREEN1,1:PMODEP:POKE1
78,C:IF SH>1 THEN MR=0:W1=0:H=0
35 'POKE65495,0
36 ON V GOSUB25,31:A$=INKEY$:IF
A$="" THEN 37 ELSE55
37 IF GT=2 THEN38ELSEGOSUB18
38 ON SH GOTO 40,45,20,45,48,45,
49,45,49,45,22,45,22,45,47,52
39 GOTO 36
40 IF S=3 THENLINE(X-H,Y-W1)-(X+
H,Y+W1),PSET,BF ELSE36
41 IF MR=1 THENLINE(254-X-H,Y-W1
)-(254-X+H,Y+W1),PSET,BF
42 IF MR=2 THENLINE(255-X-H,191-
Y-W1)-(255-X+H,191-Y+W1),PSET,BF

43 GOTO36
44 FORI=1 TO 4:PCOPY I+4 TO I:NE
XT:GOTO34
45 IF S<>3 THEN 34
46 X1=X:Y1=Y:FORI=1TO4:PCOPY I T
O I+4:NEXT:SH=SH+1:GOTO34
47 LINE(X1,Y1)-(X,Y),PSET:IF S=3
THEN SH=SH-1:SOUND255,1:X1=X:Y1
=Y:S=0:GT=0:GOTO34ELSEGT=2:GOTO4
4
48 GT=2:LINE(X1,Y1)-(X,Y),PSET,B
F:IF S=3 THENSH=4:S=0:GT=1:SOUND
255,1:GOTO34ELSEGOTO44
49 POKE179,C:CIRCLE(X1,Y1),ABS(X
-X1),,ABS((Y-Y1)/20):IF S=3 THEN
IF SH=9 THEN50ELSESH=6:S=0:GOTO3
4ELSE44
50 PAINT(X1,Y1):SH=8:S=0:GOTO34
51 IF GT=2 THEN SOUND1,5:RETURNE
LSEPMODE3:SCREEN1,1:GET(0,0)-(25
5,49),M,G:PCOPY5TO1:FORI=2TO4:PC
OPY I TO 5:PCOPY I+4 TO I:PCOPY
5 TO I+4:NEXT:PMODE3,5:PUT(0,0)-
(255,49),M,PSET:PMODE4:SCREEN1,1
:U=1:RETURN
52 IF S<>3 THENGOTO34ELSEPMODE4:
PP=PPOINT(X,Y)
53 IF PP THEN PS=0 ELSE PS=1
54 GOSUB86:POKE178,C:PAINT(X,Y),
,PS:GOTO34 ELSE GOTO34
55 KB=INSTR(I$,A$):IF KB THEN SO
UND200,1 ELSE 107
56 ON KB GOTO87,179,68,78,62,67,
69,70,71,72,73,74,60,66,91,58,59
,93,114,64,77
57 C=P(VAL(A$)):POKE178,C:GOTO 3
4
58 V=1:GOTO34
59 V=2:GOTO34
60 SH=1:MR=MR+1:IF MR>2 THEN MR=
0
61 GOTO75
62 IF P=3 THEN P=4 ELSE P=3
63 GOTO34
64 IF W THEN W=0 ELSE WX=X-32:WY
=Y-32:W=1
65 GOTO 34
66 P=4:W=0:W1=0:H=0:MR=0:G1=0:G2
=0:GT=0:SH=1:S$="":P$="":GOTO34
67 P=3:G1=0:G2=0:GT=1:SH=10:B=0:
GOTO34
68 P=3:H=0:W1=0:GT=0:SH=14:S=0:G
OTO34
69 P=3:G1=0:G2=0:GT=1:SH=12:B=1:
GOTO34

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70 GOSUB51:GOTO34
71 W1=W1+1:GOTO75
72 W1=W1-1:GOTO75
73 H=H-1:GOTO75
74 H=H+1
75 IF W1>25 THEN W1=25 ELSEIF W1
<0 THENW1=0 ELSEIF H>25 THENH=25
ELSEIF H<0 THENH=0
76 GOTO 34
77 FORY=0TO191STEP48:PUT(0,Y)-(2
55,Y+47),M,NOT:NEXT:GOSUB86:GOTO
34
78 Y$="CLEAR DRAWING SCREEN":GOS
UB113:PRINT:PRINT" ARE YOU SURE
YOU WANT TO CLEAR THE SCREE
N (Y/N)"
79 GOSUB84
80 IF A$="Y" THEN81ELSE34
81 PRINT@128," ":PRINTTAB(11)"1)
BLACK",TAB(11)"2) BLUE",TAB(11)
"3) RED",TAB(11)"4) WHITE":MI=4:
GOSUB175:IF A=0 THEN 34
82 BC=A:PMODE3:PCLS BC:PMODEP:IF
GT=2 THEN GOSUB86
83 GOTO34
84 A$=INKEY$:IF A$="" THEN 84
85 SOUND200,1:RETURN
86 FORI=1TO4:PCOPY I TO I+4:NEXT
:RETURN
87 Y$="SHAPES MENU":GOSUB113
88 PRINTTAB(9)"1) BOX FRAME",TAB
(9)"2) BOX FILL",TAB(9)"3) CIRCL
E",TAB(9)"4) CIRCLE FILL"
89 MI=4:GOSUB175:SH=A*2:IF A THE
N P=3
90 GOTO34
91 GOSUB86
92 P=3:PC=A:SH=16:GOTO34
93 MI=4:Y$="QUIT MENU":GOSUB113:
PRINT@128," "
94 PRINTTAB(4)"1) GOTO GRAPHICOM
"
95 PRINTTAB(4)"2) GOTO GRAPHICOM
PART II"
96 PRINT TAB(4)"3) GOTO HARDCOPY
"
97 PRINTTAB(4)"4) GOTO BASIC"
98 GOSUB175:IF A=0 THEN 66
99 IF A=4 THEN 102 ELSE PRINT:PR
INTTAB(6)"INSERT PROGRAM DISK"
100 A$=INKEY$:IF A$="" THEN 100
101 IF A$<>CHR$(13) THEN PRINTTA
B(12)"ABORTED":SOUND1,5:GOTO 66
102 ON A GOTO 103,104,105,106
103 RUN"BOOT:0"
104 RUN"BOOT:0"
105 RUN"BOOT:0"
106 POKE113,0:EXEC40999
107 Y$="SKETCH PAD V:1.0 HELP M
ENU":GOSUB113:PRINT@96," ";
108 A$=" ":PRINT " CHR$(34)"
"CHR$(34)"= DRAW",A$"B = BRUSH"
,A$"P = PAINT",A$"G = GETPUT",A$
"L = LINE", " D/T=DISK/TAPE"
109 PRINTA$"M = MIRROR",A$"C = C
LEAR",A$"X = X-PAD",A$"R = RES",
A$"I = INVERSE",A$"J = JOYSTK",A
$"^ = CURSIZ", " 0-9= COLORS",A$
"S = SHAPES",A$"U = UNDO",A$"Q =
QUIT",A$"W = WINDOW"
110 A$=INKEY$:IF A$<>" " THEN111E
LSE110
111 IF A$=" " THEN 34
112 GOTO 55
113 CLS:GOSUB198:PRINTSTRING$(32
,140)TAB((32-LEN(Y$))/2)Y$:PRINT
STRING$(32,131):PRINT:RETURN
114 POKE65494,0:Y$="TAPE MENU":G

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OSUB113
115 PRINTTAB(8)"1) SAVE PICTURE"
,TAB(8)"2) LOAD PICTURE",TAB(8)"
3) SKIP FILE":MI=3:GOSUB175:ON A
GOTO117,122,129
116 GOTO34
117 GOSUB130
118 IF Y$="" THENGOTO34ELSEY$=LEF
T$(Y$,8)
119 LINEINPUT" PRESS PLAY & REC
ORD/'ENTER'";A$:PRINT:PRINTTAB(8
)"SAVING:Y$
120 IF PEEK(188)=6 THEN :CSAVEM
Y$,&H600,&H1DF,0 ELSE :CSAVEM Y
$,&HE00,&H25FF,0
121 A$=INKEY$:N$=LEFT$(Y$+STRING
$(8,32),8):GOTO34
122 GOSUB130:PMODE4,3:PCLS1:SCRE
EN1,1
123 CLOADM Y$,3072
124 Y=PEEK(487)*256+PEEK(488):X=
PEEK(188)
125 IF Y=&HE00 AND X=6 THENPMODE
4:SCREEN1,1:FORI=0TO6143:POKE153
6+I,PEEK(6656+I):NEXT:GOTO128
126 IF Y=&H600 AND X=14 THENPMOD
E4:SCREEN1,1:FORI=0TO6143:POKE35
84+I,PEEK(4608+I):NEXT:GOTO128
127 FORI=1TO4:PCOPYI+2TO I:NEXT
128 GOSUB86:GOTO121
129 SKIPF:GOTO114
130 PRINT@128," ":PRINTTAB(6)"ENT
ER NAME OF PICTURE":PRINT:PRINT:
PRINT@233," ":INPUTY$:RETURN
131 CLS
132 A$=INKEY$:GOTO34
133 GOTO179
134 VERIFY ON
135 IF DT THEN139
136 FORX=1TO12:SP(X)=(X-1)*32+1:
SP(X+12)=SP(X)+16:NEXT:Z$="LOAD>
":EX$="ZZ"+CHR$(8)+CHR$(8)+"exit
disk"
137 NN=0:FORX=1TO72:P$(X)="" :NEX
T
138 DSKI$ PD,17,18,A$(0),A$(1):D
N$=MID$(A$(1),113,8):DT$=MID$(A$
(1),121,8):FR=FREE(PD):PN=1
139 GOSUB196
140 IF DT THEN143
141 IF VAL(DT$)=0 THEN 171
142 PRINT@66,"WHEN DIR. IS PRINT
ED,USE THE ARROW KEYS TO SCROLL
THOUGH THE LIST OF PROGRAMS O
N THE DISK.":GOSUB162:S=1
143 S=1:GOSUB160
144 FORT=0TOLL:Y$=INKEY$:PRINTTA
B(7);P$(S+T);TAB(23);P$(S+T+12):
NEXTT:PP=1:LD=0
145 PRINT@SP(PP),Z$,:P1=PP
146 IF PEEK(342)=247 THENPOKE342
,255:PP=PP+1:IF PP>NN THENPP=NN
147 IF PEEK(341)=247 THENPOKE341
,255:PP=PP-1:IF PP<1 THENPP=1
148 IF PEEK(343)=247 THENPOKE344
,255:PP=PP-12:IF PP<1 THENPP=1
149 IF PEEK(344)=247 THENPOKE343
,255:PP=PP+12:IF PP>NN THENPP=NN
150 IF PEEK(345)=247 THENPOKE345
,255:LD=1:P1=0
151 IF PP=P1 THEN145
152 PRINT@SP(P1)," ";:IF LD=
0 THEN145ELSEGOTO168
153 IF PP<1THENPP=1
154 NV=INT((S-1)/24):IFPP>(NN-24
*NV)THENPP=(NN-24*NV)
155 IFPP>24THENPP=24

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156 IFIN=9THEN159ELSE IFIN<>8THE
N152 ELSEIFPS-24<1THEN152
157 IFIN<>8THEN152
158 PP=1:S=S-24:GOTO143
159 IF S+24>49 OR S+24>NN THEN15
2ELSEPP=1:S=S+24:GOTO143
160 PRINT@480,USING"### PICTURE";
NN-1;:IF NN>2 THENPRINT"S";
161 PRINT@0,"";:RETURN
162 PRINT@232,"READING DIRECTORY
"
163 NN=0:FORZ=3TO11
164 DSKI$ PD,17,Z,AS(0),AS(1):FO
RQ=0TO1:FORW=0TO3:P$=MIDS(AS(Q),
W*32+1,32):P1$=LEFT$(P$,1):P1=AS
C(P1$):IFP1=0THEN165ELSEIF P1=25
5THENGOTO166ELSE IF MIDS(P$,9,3)
=FE$ THEN NN=NN+1:P$(NN)=LEFT$(P
$,8)
165 NEXTW,Q,Z
166 POKE&HFF40,0:NN=NN+1:P$(NN)=
EX$
167 RETURN
168 IF P$(PP)=EX$ THENDT=0:GOTO1
31ELSEDT=1:LD=0:PRINT@492,"LOADI
NG:"P$(PP);:PCL$1:SCREEN1,1:LOAD
M P$(PP)+DE$:N$=P$(PP):IF GT=2 T
HENGOSUB86
169 GOTO131
170 CLS:PRINT@64,"DO YOU WANT TO
RENAME THE DISK (Y/N)?:INPUTY
$:IF Y$="Y" THENCLS:GOTO172ELSE1
79
171 CLS:PRINT@66,"HEY! THIS DIS
K HAS NO NAME!"
172 PRINT@96," WHAT DO YOU WANT
TO NAME IT?:PRINT@269,".....
":PRINT@266,"";:INPUTDNS$:IF DNS=
"OR LEN(DNS)>8GOTO172
173 PRINT@321,"ENTER TODAY'S DAT
E FOLLOWED BY":PRINT@355,"YOUR I
DENTIFICATION LETTER":PRINT@395,
"YMM.DDI":PRINT@392,"";:INPUTDT
$:IF DT$="" OR LEN(DT$)<>8THEN17
3
174 DSKI$ PD,17,18,AS(0),AS(1):M
ID$(AS(1),113,16)=STRING$(16,32)
:MID$(AS(1),113,8)=DNS:MID$(AS(1
),121,8)=DT$:DSKO$ PD,17,18,AS(0
),AS(1):DT=0:GOTO179
175 Y$=INKEY$
176 IF Y$=" " THENA=0:RETURN
177 A=VAL(Y$)
178 IF A>MI OR A<1 THEN175ELSESO
UND200,1:RETURN
179 POKE65494,0:CLS:Y$="DISK MEN
U":GOSUB113:PRINTTAB(9)"1) SAVE
PICTURE",TAB(9)"2) LOAD PICTURE"
,TAB(9)"3) SHOW GALLERY",TAB(9)"
4) RENAME DISK":MI=4:GOSUB175:ON
A GOTO185,181,192,170
180 GOTO131
181 IF DT>0 GOTO135 ELSE PRINT@1
28,"":PRINT" ENTER THE NAME OF
THE PICTURE TO BE LOADED FR
OM DISK?":PRINT" (PRESS 'ENTER'
FOR DIRECTORY.)":PRINT:PRINTTAB(
9);:INPUTYS$:SOUND200,1
182 IF Y$=""THEN134ELSEY$=LEFT$(
Y$,8):PMODE4:PCL$1:SCREEN1,1:LOA
DM Y$+DE$
183 IF GT=2 THEN GOSUB86
184 GOTO121
185 PRINT@128,"":FORA=1TO4:PRINT
" ":NEXT:PRINT@128,"";
186 IF N$="" THEN INPUT"NAME OF
PICTURE TO BE SAVED";N$ ELSE PRI
NT"IS THE NAME OF THE PICTURE TO

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BESAVED CALLED "":N$(Y/N)":;
GOSUB84:IF A$="Y" THEN Y$=N$:GOT
O187 ELSE GOSUB130
187 PRINT:PRINT:IF Y$="" THENPRI
NTTAB(5)"ABORT ILLEGAL FILE NAME
!":SOUND5,10:GOTO131 ELSE PRINT
AB(4)"READY DISK DRIVE/'ENTER'":
GOSUB84:IF A$<>CHR$(13) THEN PRI
NT:PRINT"ABORTED!":SOUND5,10:GOT
O131
188 FR=FREE(PD):IF FR<3 THEN PRI
NTTAB(9)"NO ROOM ON DISK":SOUND1
,1:EXEC44539:GOTO132
189 IF A$<>"Y" THEN DT=0
190 Y$=LEFT$(Y$,8):SAVEM Y$+DE$,
&HE0,0,&H25FF,&HE0
191 GOTO121
192 A$=INKEY$:PRINT:PRINTTAB(8)"
READING DIRECTORY":GOSUB163:IF I
NKEY$<>" " THENPRINTTAB(12)"ABORT
ED":SOUND1,5:GOTO44
193 PMODE4:GOSUB86:PCL$1:SCREEN1
,1:FORZ=1TO NN-1

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```

194 LOADM P$(Z)+DE$
195 GOSUB84:NEXTZ:GOTO44
196 CLS:PRINT@384,STRING$(32,131
)DN$ "RIGHT$(DE$,2)TAB(11)B$DT$
B$;:PRINTUSING"### GRANULE";FR;:I
F FD<2 THEN PRINT"S"
197 PRINT@395,B$;:PRINT@404,B$;:
GOTO200
198 PRINT@384,STRING$(32,131)"MO
DE:"MID$(F$,INT(SH/2)*7+1,6)B$;"
RES:";:IF PEEK(&HB6)=3 THENPRINT
"LOW "; ELSE PRINT"HI ";
199 PRINTB$;:PRINTUSING"X=###";X
;:PRINTB$;:PRINTUSING"Y=###";Y:P
RINT@395,B$;:PRINT@404,B$;:PRINT
@410,B$;
200 PRINT@448,STRING$(32,131)"TO
OL:"V$(V)B$"PICNAME:"N$:LEFT$(DE
$,3);:POKE1535,ASC(RIGHT$(F$,1)
):PRINT@459,B$;:IF MR>0 THEN PRI
NT@421,"MIRROR";
201 PRINT@0,"";:RETURN

```

END

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BASIC:

IT'S JUST A HARE FASTER

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You can make Basic programs run faster.

Most beginning and intermediate home programmers quickly learn that Basic can be frustratingly slow in executing programs. The cleverest game idea or the most artistic graphics program often loses its appeal when fast action is slowed by the tortoise that is Basic.

Most of us like using Basic—an acronym for beginner's all-purpose symbolic instruction code—because it's easy to learn and use. What's more, Basic has become the common tongue of the home computer. And it's beginning to creep into business—long the bastion of Cobol and Fortran—as microcomputers appear in offices.

Basic has its virtues. It is, for example, a flexible language to structure; by using this inherent flexibility, a programmer can squeeze as much of the hare from Basic as possible.

Varying Program Structures

While struggling with calculations for a graphing program, I was struck by the slow speed with which my graphics were being drawn on the screen. An earlier version of the same program, in which I had done the calculations and the drawing in different locations within the program, seemed to plot the results more quickly.

I began to play with portions of the program to see if I could speed execution. To perform a baseline test for speed, I wrote Program Listing 1. It contains some relatively complex calculations, string manipulation, graphics instructions, and a short FOR...NEXT loop to add sufficient execution time to give me a basis for comparison.

The program is structured from the top down; it contains no variable lookup tables

and only one string assignment for the DRAW statements. The program performs a calculation to determine one of the X, Y coordinates for a drawing. The program then calls up the graphics screen, clears it, and draws the figures.

Using the Color Computer's internal timer, I ran the test 10 times and computed the average to determine the relative speed differential of execution. The particular time value is unimportant; only the differential matters. The base time for Listing 1 was 651 time units. (If you are uncomfortable with that, figure that the CoCo's internal clock times in intervals that are $\frac{1}{60}$ of a second.)

I then experimented with five variations on the original program, using different structures to change the execution location for each segment of the program. While I'm not sure that it is important for this test, I was careful to restrict each of the programs to 361 bytes of memory—the size of the original program.

I inserted a lookup table in the first variation (Listing 2) and converted the integer to a string inside the graphics loop. (The CoCo's DRAW command requires that all commands be strings.) Listing 2 executed in 552 time units—a 15-percent improvement in speed. I knew I was on the right track.

Putting the string assignment outside the drawing loop (Listing 3) did not have any effect; the program ran in 552 time units. But I still wanted to see whether I could make it run faster. I decided to perform the calculations before entering the graphics loop (List-

ing 4). When I used the same lookup table for variables and a string assignment for the DRAW commands, the program executed in 445 time units—an improvement of nearly 20 percent over my second attempt and 31.6 percent better than my original test. Interestingly, further modification—such as eliminating the variable lookup table and plugging variables directly into the calculations—did not reduce execution time significantly.

These minor speed triumphs encouraged me to look at my graphing program differently. I changed the arrangement of the calculation and graphics; this speeded execution. Then I examined my subroutines. They were tucked away at the end of the program, but Basic reads from the top down. I reasoned that placing GOSUBs at the end of the program would slow execution. To test this, I wrote a 240-byte program, placed the subroutines at the bottom of the listing, and ran my timer tests. When I moved the subroutines to the top of the program, I reduced processing time by 4 percent. Longer programs would have correspondingly faster execution times if the subroutines were placed in the first few lines of the program.

I tried another trick—one that did not alter the program structure but that did save time. By POKEing memory address &HFFD7 (65945) with a zero, I forced the SAM (synchronous-address multiplexer) chip to run at double speed and execute calculations and graphics faster. Many Extended Color Basic games use this POKE to speed up lasers and missiles by 60 to 65 percent. When I incorporated this technique into Listing 4, the program ran in 303 time units—a net improvement of 53 percent. (Unfortunately, the high-speed POKE does not work on all models of the CoCo.) Ex-

System Requirements

16K RAM

Extended Color Basic

tended use of this POKE can also increase "wear" on your CoCo's components by causing a greater heat buildup.

Summary

As the test results show, doing calculations outside of repetitive graphics and screen-output loops saves time. Furthermore, it is clear that plugging variables into the calculations does not make Basic programs run faster. Consequently, you can still take advantage of the convenience of using variables in

lookup tables without sacrificing speed. But it is wise to place lookup tables, variable assignments, and subroutines near the front of the program.

Basic does have its shortcomings, but by following logical program structures, programmers can turn Basic into—if not a hare—at least a hot-rod turtle. ■

Address correspondence to Steve Brown, 717 West Scottwood Drive, Peoria, IL 61615

Program Listing 1. Base Program

```

1Ø REM LISTING 1
2Ø REM CALCULATIONS DONE AFTER
3Ø REM ENTERING DRAWING LOOP
4Ø TIMER=Ø
5Ø C$="D4R4U4L4"
6Ø FOR LOOP=1TO5Ø
7Ø PMODE4,1:SCREEN1,1:PCLS
8Ø R=1ØØ:X1=25:X2=33:MV=2:B=3.5
9Ø A=(R-INT((X1/MV)*B)):A$=STR$(A)
1ØØ DRAW"BM5Ø","A$:DRAWCS
11Ø B=(R-INT((X2/MV)*B)):B$=STR$(B)
12Ø DRAW"BM2Ø","B$:DRAWCS
13Ø NEXT LOOP
14Ø PRINT TIMER
15Ø END
16Ø REM TIMER TO END =651
17Ø REM MEM=361 BYTES USED

```

Program Listing 2. Look-Up Table and Conversion Within the Graphics Loop

```

1Ø REM LISTING 2
2Ø REM CALCULATIONS DONE WHILE
3Ø REM ACTUALLY INSIDE OF
4Ø REM THE DRAWING LOOP
5Ø REM *****
6Ø TIMER=Ø
7Ø R=1ØØ:X1=25:X2=33:MV=2:B=3.5
8Ø FOR LOOP=1TO5Ø
9Ø PMODE4,1:SCREEN1,1:PCLS
1ØØ DRAW"BM5Ø","+STR$(R-INT((X1/MV)*B))+";D4R4U4L4"
11Ø DRAW"BM2Ø","+STR$(R-INT((X2/MV)*B))+";D4R4U4L4"
12Ø NEXT LOOP
13Ø PRINT TIMER
14Ø END
15Ø REM TIMER TO END=552
16Ø REM MEM=361 BYTES USED

```

Program Listing 3. String Assignment Outside Loop

```

1Ø REM LISTING 3
2Ø REM CALCULATIONS DONE WHILE
25 REM ACTUALLY INSIDE OF
3Ø REM THE DRAWING LOOP
35 REM *****
4Ø TIMER=Ø
5Ø R=1ØØ:X1=25:X2=33:MV=2:B=3.5
6Ø C$="D4R4U4L4"
7Ø FOR LOOP=1TO5Ø
8Ø PMODE4,1:SCREEN1,1:PCLS
9Ø DRAW"BM5Ø","+STR$(R-INT((X1/MV)*B)):DRAWCS
1ØØ DRAW"BM2Ø","+STR$(R-INT((X2/MV)*B)):DRAWCS
11Ø NEXT LOOP
12Ø PRINT TIMER
13Ø END
14Ø REM TIMER TO END =552
15Ø REM MEM=361 BYTES USED

```

Program Listing 4. Calculations Before Graphics Loop

```

1Ø REM LISTING 4
2Ø REM CALCULATIONS DONE BEFORE
3Ø REM ENTERING DRAWING LOOP
4Ø TIMER=Ø
5Ø R=1ØØ:X1=25:X2=33:MV=2:B=3.5
6Ø C$="D4R4U4L4"
7Ø A=(R-INT((X1/MV)*B)):A$=STR$(A)
8Ø B=(R-INT((X2/MV)*B)):B$=STR$(B)
9Ø FOR LOOP=1TO5Ø
1ØØ PMODE4,1:SCREEN1,1:PCLS
11Ø DRAW"BM5Ø","A$:DRAWCS
12Ø DRAW"BM2Ø","B$:DRAWCS
13Ø NEXT LOOP
14Ø PRINT TIMER
15Ø END
16Ø REM TIMER TO END =445
17Ø REM MEM=361 BYTES USED

```

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen.

— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

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Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

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— The RAINBOW, Jan. 1982

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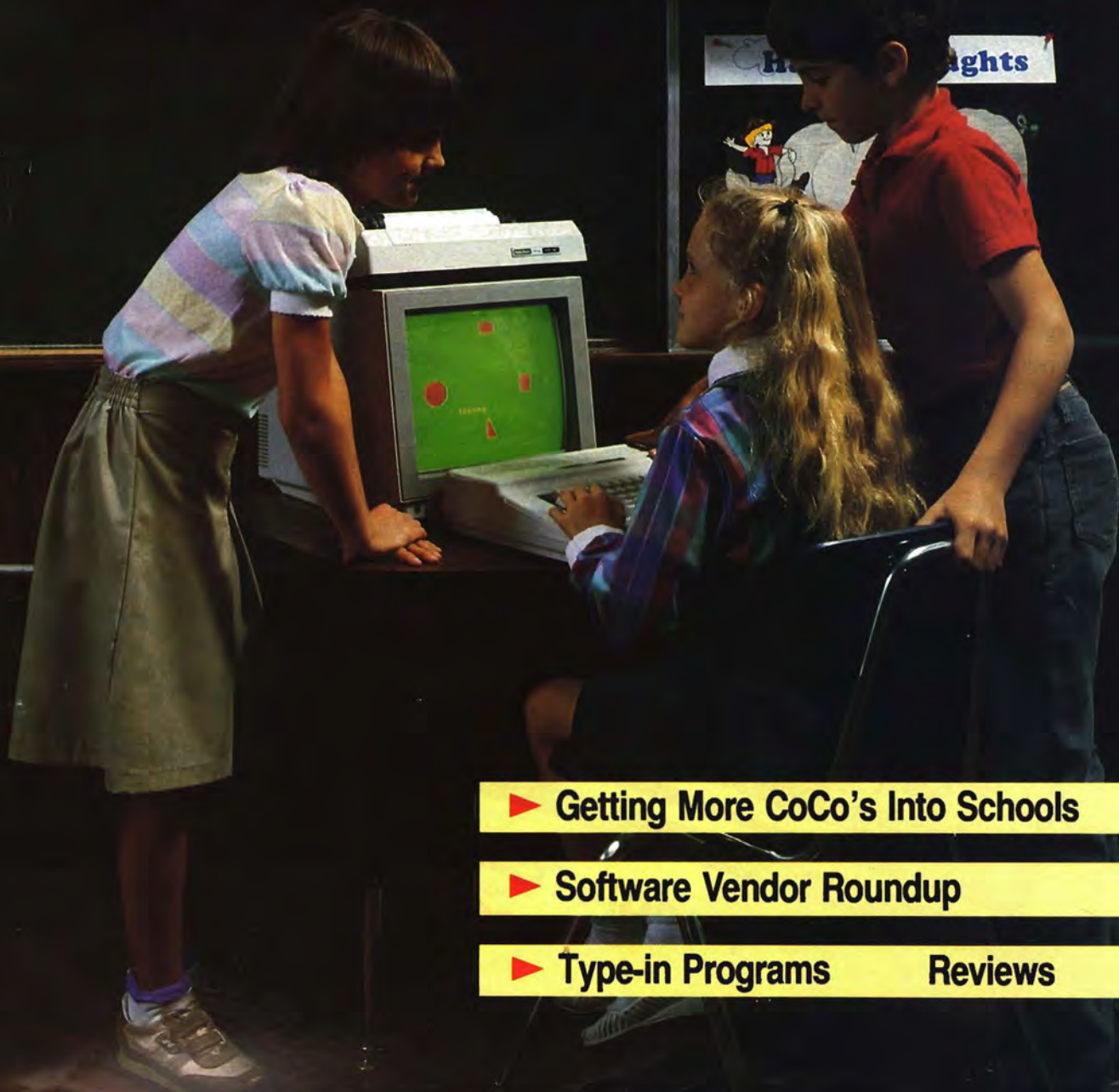
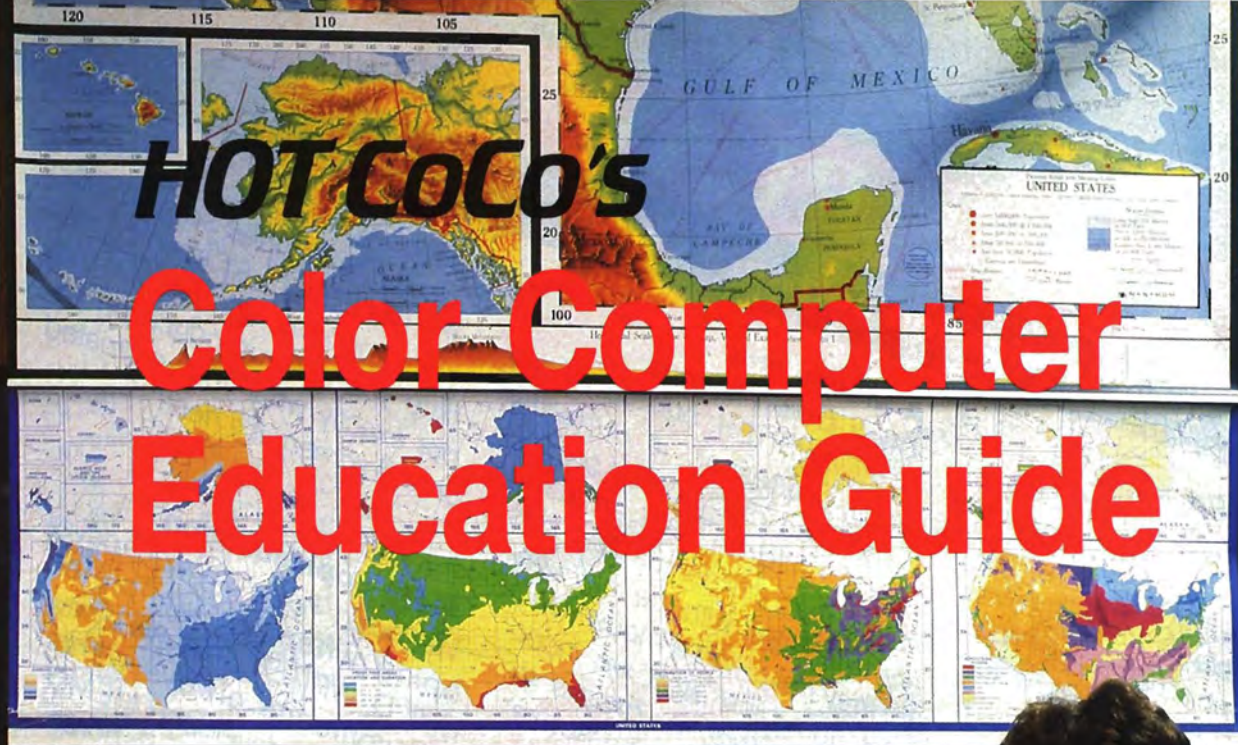
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HOT CoCo's

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HOT CoCo's

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What are the parents' responsibilities to their children's education?

A Welcome to Educators

Traditionally, *HOT CoCo* has devoted an issue to education each autumn. This year we have become more intent on furthering education with the Color Computer, which appeals to the education market because it offers a lot of computing power for the price. It is also supported by some of the most innovative third-party software developers anywhere. And Tandy has made a strong commitment to the education market. *HOT CoCo* will cover education more often and more closely in the months to come.

The business mission of Tandy's Education Division, headed by Bill Gattis, seems clear: Equip as many school districts as possible with Tandy computer systems. The Color Computer is the system that many have selected. However, the reliable Model 4 and hot selling Tandy 1000 are welcome allies in the field of educational computing, as well.

Tandy knows that its high-quality hardware must be accompanied by the same caliber of software and support. It recruited some of the leading names in educational software to support their products, including such well-known companies as Spinnaker, Walt Disney, Sunburst, Children's Computer Workshop, and possibly World Book in the near future. Other companies, such as TCE, Dorsett, Deft, B-5, and Colorware, to mention a few, have been supporting the Color Computer for years. They have some of the most exciting educational products on the market today.

Congratulations to everyone involved with the Color Computer and education, both in the classroom and at home. You are part of a large family of educators and software developers striving to make the best use of the Color Computer's adaptable features in a growing and exciting area. It is *HOT CoCo's* intention to keep you informed of the latest on education and the Color Computer. ■

The Home School Interface

by Paul Kimmelman

Involvement in educational computer activities benefits children and parents.

Family computing can be fun. What is more, it can extend your children's schooling and encourage parent-child interaction. Educators agree that working together on worthwhile projects benefits parents and children.

But computers are important outside the home, too. As a parent, you probably need to know what computer activities your children's school offers and how best to assist its computer-education program.

Parent Groups

Not long ago, parent-teacher associations were primarily concerned about raising funds for playground equipment and spent little time discussing curricula. Not anymore. Since publication of the national report, "A Nation At Risk," educational excellence has been on every parent's mind.

Now parents are challenging school officials to defend their programs. They want to know whether their children are learning and expect assistance programs for children who fall behind. This is where computers can help. Parent groups realize that computers are effective tutors, so they are helping schools obtain more computer equipment and software.

In offering assistance, your parent group should avoid unnecessary confrontations. Educators are professionals; imposing a brand of equipment or software on teachers is counterproductive. Such materials are likely to gather dust. Instead, work with teacher committees and offer advice before decisions are made, and be supportive if your decision loses. Equipment is not the most important aspect of a computer-education program—more important are curriculum, available software, and program implementation.

Your parent group can help by donating funds earmarked for the computer program.

No matter what the level of federal funding is, few schools have the money to purchase everything needed for a quality program. Donations will help teachers obtain more equipment and software and enable them to make classroom decisions outside the bureaucracy of school-system purchasing.

Other financial donations might be earmarked for a teacher-scholarship fund. While Radio Shack sponsors free classes for teachers, these classes don't always meet teachers' needs. Most teachers need classes that demonstrate computer operation and software use. Knowing how to write a simple program won't help if you don't know a disk from a tape.

What Can You as An Educator Do?

Getting computers into the schools can be difficult, especially when there isn't money available to purchase them. One alternative is to enter into a partnership with the school's Parent-Teacher Association (PTA). While the PTA isn't the sole solution to developing a complete computer curriculum, it is an influential and helpful supplement to the often costly acquisition process.

Grill School in the Norton, OH, School District discovered that its PTA was a treasure pot at the end of the rainbow. Dick Nettles, Grill's principal, found that the PTA was willing to purchase computers, televisions, disk drives, cassette recorders, software, and yes, even extra cables. The PTA also provided volunteers to help staff the computer lab.

How can you get started? What cautions should school officials be alert to when working with a PTA? Are there problems when you involve parents?

There are answers for all these questions, but remember that every school district is

different. Teachers and principals must know their parent groups and tailor the program to meet their needs.

The best way to get started is for teachers and the principal to sit down and explain the computer program to the PTA executive board. Describe the plans carefully and point out what will be needed to make the program operational. Don't forget to emphasize what financial support you'll need. Provide a list of equipment and costs at the meeting.

There is no substitute for preparation. Be ready to answer questions and explain why you selected the Color Computer over other brands. Don't hesitate to explain the advantages and disadvantages of computers in the curriculum. Make parents aware that computers can enhance their children's education.

Should the PTA agree to fund the program, discuss how the money will be raised. Some school districts have policies prohibiting fund raisers. In some instances, fund-raising companies don't provide a quality product to be sold and charge excessive prices. Look for companies that have good track records. Be sure to get a written contract that specifies what you will receive, cost, returns, damaged goods, deadlines on delivery, training, and how problems will be handled.

Another delicate decision is who makes the final decision on purchasing the computer equipment. The PTA is working as a support group. The decision on what to purchase belongs to the professional staff. Establish this position at the beginning of the planning. If there is a change of the PTA leadership, the computer plan can move forward with no changes.

Finally, once you get the equipment, have an open house. Let parents see their children demonstrating the new equipment. The public-relations value is unbeatable. Better yet your PTA will want to help you get more equipment.

For more information, contact the National Parent-Teacher Association:

National PTA Headquarters
700 N. Rush St.
Chicago, IL 60611
312-787-0977

There are other means of obtaining computer equipment. First, screen a list of private grantors. Every state has foundations that often help schools with innovative educational programs. Contact your state's department of education for a list of foundations.

Your state's department of education can also provide you with other sources of money. Ask about special-category grants for the purchase of computer equipment and supplies. Ohio, for example, gave schools an outright grant out of its Excess Lottery Fund that could be used for this purpose.

Federal funds are also available. Such federal programs include Chapters I and II, for example. Be careful; each of these programs requires that your application be approved. Your federal funds for handicapped and disadvantaged children might also be used for computer purchases.

Volunteers

Schools don't always need money. Parent volunteers are often an important resource. The teacher with a class of 30 children and one computer might find it difficult to help the students working at the computer while trying to teach the remainder of the class. Consider donating scheduled time to help the students working at the computer. Not only will the teacher be happy, but you will experience the fulfillment of helping children.

There are pitfalls to volunteering, however. First, don't volunteer in your child's classroom. It can place stress on your child and be distracting. You will feel more comfortable working with children you don't know.

Second, be dependable. Don't volunteer if you can't maintain the commitment. While emergencies are unavoidable, bear in mind that the teacher depends on you. When you miss a volunteer day, the teacher and students will be disappointed.

Volunteering can further your own education. Your work with the school might train you to use the computer and better prepare you to work with your children at home. Family computing can be important, especially if your child can't get enough computer time at school. Working with other children will also tell you how your child compares to others and whether your child needs assistance.

Family Computing

Home and school are interrelated. If it is important for schools to have computers, they must be important in the home, as well. Education should not stop when school lets out at 3 p.m. Using a computer at home for

applications, computer-assisted instruction, and programming is equivalent to doing homework for other subjects.

Approach family computing cautiously. Don't zealously push a child who shows no interest—you wouldn't force children to practice reading and writing. Your child will probably show an interest at some point, especially if computer education is a part of the school program.

Family computing for educational purposes can be expensive. Your selection of a computer and software go hand in hand. Look for software that meets your needs and then find a computer that is compatible with the software. The CoCo remains a good choice for educational computing.

After you bring the computer home, sit down with your child and review the manual to become familiar with the equipment. When you feel comfortable with it, start looking at software, but beware. Software is expensive; never purchase a program without seeing it first. Let your child work with the software and ask yourself whether it is interesting and motivating. Evaluate the program's menu items. Many packages provide only a few lessons: once your child memorizes the answer, there is nothing left to learn.

Look for an option that allows you to write your own lesson. Putting in your child's spelling words each week and practicing together beats using flash cards.

The Impact of Computers

Family computing has the potential to change traditional school curriculum. What happens, for example, when a third-grade child masters fifth-grade concepts at home on the computer? Can the third-grade teacher meet this child's advanced needs?

Some talk/tutor software for the CoCo can also advance a student's education. The implication of advancing a child's education is serious if the student's curiosity and enthusiasm are stifled at school because coursework is repeated. Consider, too, the difficulty a teacher faces when introducing a new lesson that is repetitive for some students. Perhaps the computer will break down grade levels or force teachers to develop more individualized instruction.

Whatever happens, the process will be slow and difficult. The computer's ability to handle massive amounts of information is changing the educational process. The support of many outstanding parent organizations is propelling the schools into the technological age. Family computing is advancing the curriculum for many students, old and young alike. Wherever this leads us, education will never be the same. ■

Paul Kimmelman is a public-school administrator and holds an Ed.D. in education. Address correspondence to him c/o HOT CoCo, 80 Pine St., Peterborough, NH 03458.

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SIMPLY MA

Child Writer is an educational tool, a word processor, and the first in a promising series from TCE.

Child Writer is manufactured by TCE Programs, P.O. Box 2477, Gaithersburg, MD 20879, 800-482-4823. It requires 32K, Extended Color Basic, a disk drive, and a mouse or joystick. It sells for \$54.95. The Network 2 version of Child Writer was scheduled to be released as this review went to print. It costs \$99.95. Memo Writer, TCE's intermediate-level word processor, was expected to be released shortly thereafter and sell for \$64.95. Tandy has entered Child Writer and Child Writer for the Network 2 into its Express Order Software (EOS) program. The EOS numbers for the programs are 90-5032 and 90-5100, respectively. Child Writer is the first in a series of easy-to-use applications programs called Child's Play.

You'll have to excuse me if this review is enthusiastic. TCE Program's Child Writer is the first mouse-operated word processor for the Color Computer. And saying that it is user friendly is an understatement. It is extremely easy to use and opens up many possi-

bilities for activities and uses in school or at home. Child Writer offers the kind of on-screen instructions and thoughtful features that let students and people of all ages concentrate on learning and writing without worrying about the mechanics of word processing.

Getting Started

When you load the Child Writer disk, the main menu (see Photo 1) gives you four options. You can load an existing memo (or file), create a new file, delete an existing memo, or change the setup (print- and screen-format) specifications. You make selections by highlighting one of four blocks that represent these actions with a click of the mouse. Joystick users press the fire button. A blinking arrow shows the position of the mouse on screen, and selected options are highlighted in reverse video.

Once you load or choose to create a memo, the screen divides into blocks. At the top of the screen are four areas clearly marked: edit, format, option, and end. Each represents a menu of commands, called a "click-down" menu, that drops down onto the screen when the mouse arrow is positioned on it and clicked down. Click-down menus overlay the text of your files, much like the pull-down menus of Apple's Macintosh. Pull-down menus, however, are operated by positioning the mouse arrow, depressing the mouse button, and "dragging" the menu down like a window shade. Child Writer's click-down menus pop down at a click of the mouse button, a method that is probably easier for kids to master.



Photo 1. Selecting files is fast and easy on Child Writer's mouse-driven main-menu directory.

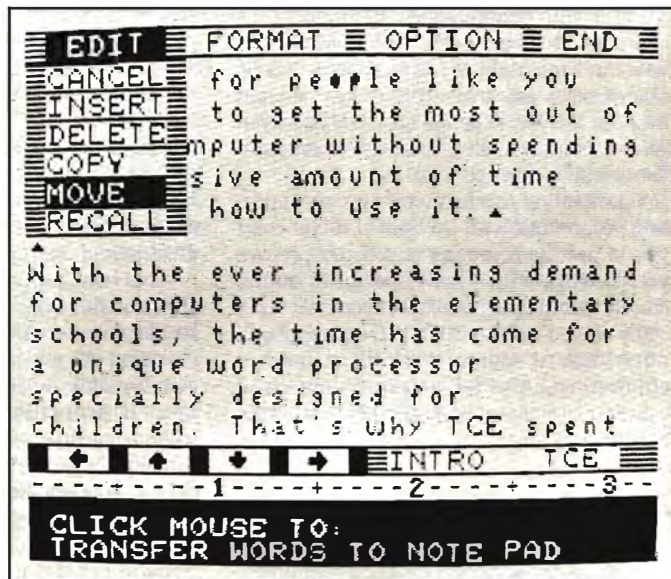


Photo 2. In this shot, Child Writer's edit menu overlays one of the program's introductory screens.

ARRIVELOUS

by Nancy Kipperman
HOT CoCo staff

Most of the Child Writer screen is open for creating or displaying your text files. A blinking, reverse-video cursor shows where you are on screen. An arrow menu near the bottom of the screen consists of four arrow-direction squares. Whenever you position the mouse arrow on one of these four squares, the latter lights up in reverse video. Depressing the mouse button in one of these four positions moves the cursor in the direction of the menu arrow. The movement repeats if you hold the mouse button down. You can also use the CoCo's four arrow keys, which are key-repeat enabled in Child Writer, to move around the screen. Next to the arrow menu is the mode or file-name display.

Below these two screen areas is the on-screen instruction box, part of what makes the program so easy to use. The instruction box and mouse-oriented structure of the program give kids and first-time users an advance description of each option or command before the mouse button is pressed down. When the mouse button is depressed, instructions for the command appear. As a result, clear command instructions are always on screen so that users are never in doubt about what to do at a given point or how to exit an option. This takes a great deal of the potential for frustration out of learning to use the word processor.

The Edit Menu

Suppose you have just written a letter and want to make a few insertions or deletions. All you do is move the mouse arrow to the edit-menu area at the top of the screen and click down the mouse button.

When the edit menu pops down over the text area (see Photo 2), you can select cancel, insert, delete, copy, move, and recall (for retrieving text from the note pad—more on this later). Selections are made by moving the mouse so that the arrow points to the desired part of the menu. The menu bar of each command is highlighted when the mouse arrow is in its vicinity.

When you depress the mouse button for insert, the menu disappears and the word "insert" appears in the mode or file-name area above the instruction box. This is a full-screen insert mode, which means that you can move anywhere on the screen and insert characters without canceling or having to reselect the option. In the delete mode, the on-screen instructions tell you to highlight the area to be removed by finding its beginning and pressing the enter key and then finding its end and pressing the enter key. See what I mean about being simple? You can also enter the insert mode by pressing the @ key. And you can press the clear key for a character-by-character delete that repeats if you hold it down.

The copy and move functions transfer text from a file into the note pad. When the copy command is used, the copied text is removed from its original location. With the move command, the text is removed from its original location. To retrieve text stored in this manner, you select the recall command. The instruction box tells you to move the cursor to the position where you want to insert copied or moved text and press the enter key. Child Writer's note pad can hold only one copied or moved block of text at a time. Each time you write a block to the note pad, it erases the one that was there previously.

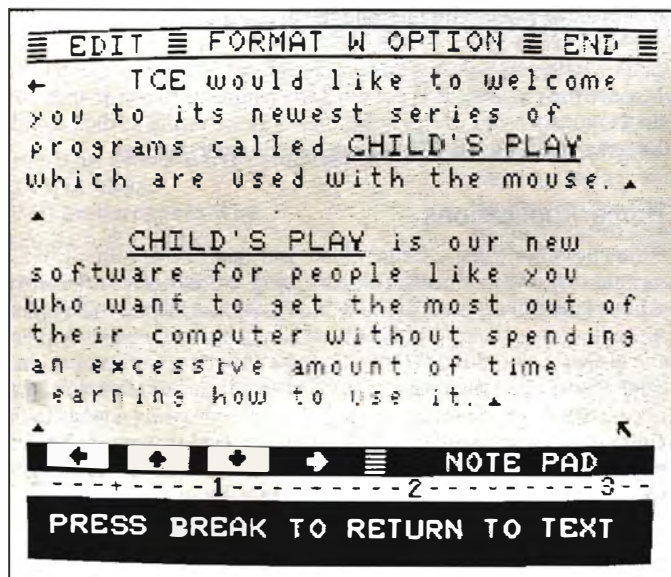


Photo 3. Data in the note pad is transferable to other as yet unreleased programs in the Child's Play series.

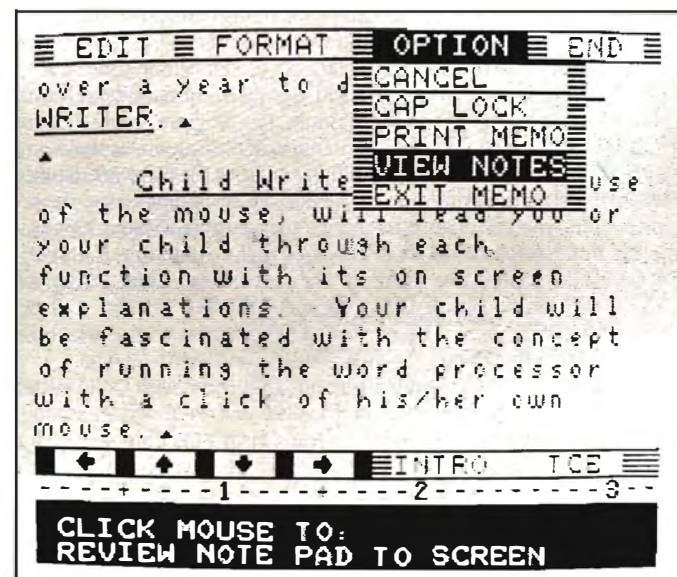


Photo 4. You can access but not edit the note pad with the view notes command.

Large blocks, however, will fit into the note pad. Although you cannot edit the note pad, the "view notes" selection on the option menu allows you to look at the text it contains. (See Photo 3.)

Other Menus and Documentation

The second click-down menu is called format. Child Writer's unique on-screen underlining feature is accessed from this menu. An underline can be drawn under a single letter, a whole sentence, or more. You also choose the format menu to left, right, or center justify text on a line-by-line basis (the program defaults to left justification). Any changes that you make with these commands are displayed on screen the way that they will be printed.

The option menu offers "cap lock," "print memo," "view notes," and "exit memo." The cap-lock selection lets you lock the text into upper- or lowercase. Print memo gives you the chance to correct the default-margin and page-width settings before it prints your file. View notes allows access to the note pad, as described above (see Photo 4). By choosing the exit-memo command, you bypass Child Writer's automatic-save feature. The last menu along the top of the screen is labeled "end." When you select the end square with the mouse, the program exits and saves your file to disk automatically. In order to avoid saving an unwanted file, you select exit memo on the option menu. The end-command concept is another feature of the program that children and computer novices grasp quickly.

Child Writer makes print and screen formatting an easy task. The setup menu is accessible from the main menu and offers changeable default values for various parameters, including text width, left margin, bottom margin, page length, baud rate, and others. Child Writer displays 32 columns of large characters on screen at one time, but the screen and print margins are adjustable to 80 columns. When the text-width setting is larger than 32 columns, the program scrolls horizontally to follow the cursor. Child Writer also allows you to display text in a 32-column format (to avoid scrolling) and print the file in 80 columns; when you click the print-memo selection on the option menu, the program gives you the chance to change the margins without having to return to the setup menu. One drawback to the program is that it does not permit double-space printing. For this review, Child Writer was tested with Radio Shack DMP-105 and DWP-210 printers and performed well with them. TCE has tested the program with several other printers, including Epson, Gemini, Okidata, and Smith-Corona.

Along with the on-screen instructions that come with Child Writer, there are two introductory files on the disk, and a red, white, and blue spiral-bound manual. The latter contains clear directions with examples, diagrams, and screen representations. It is a well-organized manual that most readers will have no trouble understanding.

Myriad Applications

Now that you've had an introduction to the workings of Child Writer, let's take a look at how you can use the program. It has potential to offer myriad practical applications, especially in the classroom.

This is because Child Writer also comes in a Network 2 version. Teachers can download directions or assignments with Child Writer that each student can complete individually. The use of the word processor in school allows students to edit work on screen and, depending on their grade level, make use of recently learned rules for punctuation, verb tenses, agreement, capitalization, and other language conventions.

A good example of potential uses in the classroom setting is the traditional English composition. The frustration of copying over work is eliminated if the first draft is on computer. Several lessons might elapse before students review their first draft and make editing corrections during which teachers can address specific writing problems in preparation for editing. And editing is simple. Child Writer is easy enough for youngsters to use that it allows them to focus their attention on the concepts and rules of writing instead of the drudgery of its physical mechanics.

I envision a strong combination of oral teaching and visual reinforcement that uses the child's own work as a grounding point. Child Writer's easy scrolling permits careful proofreading while creativity is still in flux and not committed in ink—a condition for which the only method of revision is laborious recopying.

There are also many applications for word processing in subjects other than English. Science and history classes often require reports or outlines that could be created by students on the Color Computer with Child Writer. TCE plans to offer curriculum guides with overhead transparencies for three grade levels next year.

In addition to helping students learn to write, Child Writer teaches children about the computer and the application of word processing. Teachers will need to familiarize students, especially in the lower grades, with vocabulary words, such as insert, delete, and enter. But because the program does not have any complicated commands, students quickly establish the meanings of these terms in their minds. Experience with the program brings swift understanding.

Home Applications

Among other things, Child Writer will take the argument out of writing thank-you notes and the drudgery out of homework assignments. It also offers an intriguing and easy route to children inspired to try their imaginations at creative writing. Moms and dads will find themselves using Child Writer, too. It provides a quick and accurate method of formalizing notes for the local women's or men's club, writing a letter of complaint to a corporation, or composing a letter to the editor of a magazine such as *HOT CoCo*. However you, your children, or your class use it, Child Writer is a big step forward as an easy-to-use, yet sophisticated, applications program. ■

Nancy Kipperman is HOT CoCo's Education Editor and an English teacher at Conant High School in Jaffrey, NH. Write to her c/o HOT CoCo, 80 Pine St., Peterborough, NH 03458.

With the beginning of a new academic year, the thoughts of parents, educators, and students are again focused on classroom activity. Pencils are sharpened, books are open, and computers are turned on. Over the years, the Color Computer has steadily gained a reputation as an inexpensive and reliable computer for schools. As the educational software market for the CoCo has matured, many more programs, covering a broader range of subject matter, have become available.

To help you find the right software for your students or children, *HOT CoCo* has again compiled a list of manufacturers and their products. There is, it seems, something for everyone. Courseware targets groups from preschool through college and teaches subjects as varied as the alphabet and higher mathematics. You will find programs to help you supplement classroom material, tutor and test students' knowledge, stimulate creative and logical thinking, and reduce your record-keeping workload.

"The *HOT CoCo* 1985 Guide to Educational Software" is organized according to manufacturer. It provides information on the number of programs offered by each company, range of topics covered, level at which the software is aimed, and pricing. Also included are summaries of manufacturers' educational objectives and lists of their popular titles. Although we have endeavored to make the guide complete, some manufacturers might have been omitted. If you know of companies not listed here, please let us know so that we can include them in a future survey. ■

American Educational Computer Inc.
P.O. Box 50930
2450 Embarcadero Way
Palo Alto, CA 94303

American Educational Computer has 11 programs on reading (for grades K-8); Spanish (for high-school students); and geography, grammar, and vocabulary (for fourth through sixth grades). Their products sell for \$19.95 each.

The company feels that educational software must follow the curriculum of the classroom and should be effective in improving students' grades. Graphics are important in educational programs but should not be used at the expense of subject content. Their packaging clearly identifies the product, shows what it does, and tells the grade levels for which it is designed.

Popular programs include:

- Reading Comprehension III,
- Spanish
- U.S. Geography,
- World Geography, and
- Grammar.

Ankia Research
901-19 Indiantown Road
Suite R
Jupiter, FL 33458

Ankia Research's three educational programs on mathematics, investment, and politics are aimed at ages 12 to adult. Programs cost from \$16.95 to \$44. Site licensing fees are about \$15 for single copies. No fee is required when schools purchase multiple copies of programs. All programs are copyrighted but not copy protected.

Ankia Research feels that educational software should allow students to use the computer as a tool in learning a concept, practicing a methodology, or simulating a decision-making process. They focus on making reasonably priced software that has multiple levels of difficulty and is fun to use.

Popular programs include:

- Math Package,
- Strategy Investing, and
- Strategy Politics.

Aquarius People Materials Inc.
P.O. Box 128
Indian Rocks Beach, FL 33535

Aquarius offers 36 programs aimed at children aged 4 to 11. Their software covers such areas as math, typing, and readiness skills. Programs are available on disk and cassette; prices start at \$29.95.

The company feels that classroom computer materials should be educationally sound yet easy to run and fun to use. All programs are based on curricula and are accompanied by extensive teacher's guides. Information on site licensing for schools is available upon request.

Popular programs and sets include:

- Junior Typer,
- Math for All Ages,
- Counting Skills,
- Language Arts, and
- Ordering/Sequencing.

B & B Software
P.O. Box 210
Jenkintown, PA 19046

B & B Software sells six packages on such topics as speed reading and Color Logo. The

programs, which are priced from \$13.95 to \$17.95, are aimed at first-grade to adult levels.

B & B Software tries to create useful programs that offer unique features. To serve as many CoCo users as possible, all programs are furnished on cassette and require 16K RAM.

Popular programs include:

- Logo Starter,
- Speed Reading,
- Quiz Kids,
- Logo Stars, and
- Logo Shapes.

B5 Software Co.
1024 Bainbridge Place
Columbus, OH 43228
614-276-2752

B5's 34 packages for the Color Computer, which cost from \$9.95 to \$49.95, target students from kindergarten through college. The programs explore math, language arts, problem solving, government, music, and keyboard use. In addition, B5 has a record-keeping program for teachers.

According to B5, educational software should help students learn and enjoy learning. They stress lessons that are organized around a clear objective and sound educational practices. Their programs have several skill levels and allow the user to input information to be mastered. In this way, software can be tailored to meet individual needs. Rewards; positive feedback; and color, graphics, and sound that enhance learning are central to B5's programs.

Popular programs, which are sold through software dealers and Radio Shack's Express Order Software, include:

- Clock,
- Mathfacts,
- Keyboard,
- Money, and
- Spell.

Cognitive Development
Suite 141
12345 Lake City Way NE
Seattle, WA 98125

Cognitive Development's two educational programs, which teach math and computer familiarity, are aimed at eight- to fifteen-year-olds. Prices vary from \$24 to \$30.

In creating software, Cognitive Development stresses the importance of sound educational techniques, ease of use, visual appeal, and maintaining the child's interest. Because they feel that the student should

control the computer and the software, they emphasize programs that are flexible enough to adapt to the needs and interest of the individual.

Popular programs include:

- Heroes & Trolls and
- The Designer.

Color Connection Software
1060 Buddlea Drive
Sandy, UT 84070
801-571-5023

Color Connection sells 13 packages ranging in price from \$15.95 to \$29.95. They have programs that assist students with math and spelling as well as puzzle, quiz, and flash-card programs that teachers can adapt for any subject.

Color Connection tries to create software that is flexible, powerful, and easy to use. They focus on programs that assist teachers in their role as educators. However, they recognize that the computer's advantage as a patient tutor that can make learning fun should not be overlooked. Effective games must be educational; e.g., require strategy or help develop logical thinking.

Popular programs include:

- Puzzler,
- Quiz All,
- Tic-Tac-Toe Math,
- Mathwar, and
- Match and Spell.

Compugram
P.O. Box 26663
Richmond, VA 23261

Compugram markets two educational programs for CoCo users aged 8 to 15. They offer a mathematics drill program (\$10) and software that introduces students to computers (\$27.95). The user can duplicate programs and accompanying materials for multiple use at one site.

Compugram stresses interactive software that is easy to use and understand. They feel that quizzes are essential to any educational program and should provide feedback and encouragement. Pace is especially important when the subject matter is repetitive.

Popular programs include:

- Mathfun and
- Compusys.

Computer Island
227 Hampton Green
Staten Island, NY 10312
718-948-2748

Computer Island markets 92 educational programs for preschool through high school. They offer software geared toward specific subjects (math, language arts, science, social studies, and foreign language) as well as ma-

terials on classroom management, study aids, and critical thinking. Programs are priced from \$11.95 to \$49.95. Contact them for information on which programs can be networked.

Computer Island emphasizes that educational software should be educationally sound and easy for students, teachers, and parents to use. They strive to make their documentation clear, concise, and free of computer jargon.

Popular programs include:

- Beyond Words,
- Dollars and Sense,
- McCoCo's Menu,
- Long Division Tutor, and
- Vocabulary Builders.

Creative Technical Consultants
P.O. Box 652
Cedar Crest, NM 87008

Creative Technical Consultants markets 18 educational packages aimed at students in grades K-12. Their programs, which encompass mathematics, language arts, and classroom utilities for teachers, sell for \$17.95 on cassette and \$19.95 on disk. Prices include shipping. Write them for a free catalog.

Creative Technical Consultants creates easy-to-use software by designing programs with on-screen prompts and operating instructions. To ensure that students do not get bored, the company stresses software that is entertaining and that contains multiple levels of difficulty.

Popular software includes:

- Alphabet Soup,
- Fraction Math Quiz,
- Super-Speller,
- Math Word Problems, and
- Custom Flashcards.

Custom Software Engineering
807 Minuteman Causeway
CoCoa Beach, FL 32931
305-783-1083

Custom Software Engineering offers five educational programs for kindergarten through adult levels. Their courseware for basic math skills, spelling, accounting, and interest computation is priced from \$13.95 to \$45.95.

Custom Software Engineering emphasizes programs that are easy to use and that hold students' attention. They feel that meeting the stated educational objective of a program involves rewarding successes and demonstrating corrections when errors are made.

Popular programs include:

- Math Tutor and
- Spelling Teacher.

Cy-Burnet-Ics
5705 Chesswood Drive
Knoxville, TN 37912
615-688-4865

Cy-Burnet-Ics focuses on software that teaches number, math, and alphabet skills to kindergarten through sixth-grade students. A VCR tape, which provides highlights of their 12 programs (including talking and networking versions), is available on loan to schools. Programs cost from \$18.95 to \$32.95. Write for more information, program descriptions, and a free catalog.

Cy-Burnet-Ics designs their software to be easy to use. They test all programs in two primary schools and encourage parent, teacher, and student recommendations. Their programmers are elementary-school principals and are dedicated to quality and customer satisfaction.

Popular programs include:

- Clock,
- Money,
- Alphabet,
- Multiplication/Beat Computer, and
- Subtraction.

D & D Software
Rte. 2, Box 47
West, MS 39192

D & D Software offers two educational programs for students and teachers. Prices range from \$14.95 to \$29.95.

Popular programs include:

- Flashcard Review and
- Multiple-Choice Test.

Dorsett Educational Systems Inc.
Goldsby Airport
Box 1226
Norman, OK 73070
405-288-2300

Dorsett sells an array of software designed for preschool through adult levels. They offer 528 individual programs on cassette and 20 disk programs. Topics covered include language arts, math, science, and social studies. Cassettes (with two programs) are \$8.80; a 16-program series is \$59.90. Disk programs are \$14.95, \$28.95, and \$48.95 for one, two, and four disks, respectively. Prices do not include shipping and handling.

All Dorsett programs for the Color Computer use a tutorial format that incorporates high-resolution graphics, color, and easy-to-read upper- and lowercase letters. Courseware is based on a philosophy of positive reinforcement and prompted response. Lesson programs do not test the student; they teach and encourage the student. However, a scoreboard appears at the end of every lesson. Because the lessons are individually paced, they do not network.

Popular program series include:

- Basic Algebra,
- Number Operations,
- Children's Tales,
- Spelling, and
- Reading Comprehension.

Educational Micro Inc.
1926 Hollywood Blvd.
Suite A620
Hollywood, FL 33020-4524

Educational Micro's eight packages for the Color Computer are designed for use in first through twelfth grades. They market a voice synthesizer, spelling and grammar programs, as well as adventure games that teach reading comprehension and logical thinking. Their products range in price from \$22.95 to \$49.95. Contact them for information on site licensing.

A team of educational specialists is responsible for designing software for Educational Micro. They feel that learning should be fun and games, so they focus on software that teaches and entertains.

Popular programs include:

- Speak Up 3.3,
- Dr. Stan,
- Dr. Adlib,
- Harold's Castle, and
- Dr. Words.

MatheGraphics Software
61 Cedar Road
East Northport, NY 11731

MatheGraphics' mathematics software is designed for junior-high through college students. They have 16 programs covering prealgebra, algebra, trigonometry, precalculus, calculus, probability, and differential equations. Single programs are priced at \$20; packages of seven programs are \$100.

MatheGraphics stresses the importance of integrating math and graphics to stimulate students and increase their understanding by helping them to visualize mathematical concepts. The company feels that, because computers have unlimited patience and time, they provide students with individual attention that no teacher could possibly give in a classroom setting.

Popular programs include:

- Algebra Drill and Practice,
- Coordinate Defense,
- Polynomial Graphs,
- Trig Pack, and
- Pre-Algebra Drill and Practice.

Timothy J. McIlwee
RR 2, Box 462A
Dundee, IL 60118

Mr. McIlwee designs mathematics programs for students aged 10 to 17 and also

offers a classroom-management program. Prices vary from \$5 to \$10. Schools may make copies of a program for use within a school building, provided they purchase at least two copies of each program. Group discounts are available in the event students wish to have copies for home use.

According to McIlwee, educational software should cover subjects that are difficult for students to learn so that educators will use computers in areas where they will be most beneficial. He views the computer as a patient and supportive tutor and feels that it is essential for educational programs to point out students' mistakes in order to avoid frustration and promote a sense of accomplishment.

Programs include:

- Addition and Subtraction of Fractions and Mixed Numbers,
- Fast, Tape-Based Gradebook, and
- Story-Problem Tutors (under development).

Middletown Educational Software Association
Middletown High School
Valley Road
Middletown, RI 02840

MESA's educational software is geared toward the elementary level. They have 12 packages covering math, language arts, music, and keyboard skills. Prices vary from \$8 to \$32. For an additional charge of \$5 to \$10, schools can purchase a license that permits them to use a piece of software in a network. And for an additional \$2 to \$5, they can purchase a copy license allowing them to make as many copies as necessary within a school building.

MESA feels that teachers need educational software that can be molded to accommodate classroom study. Creativity is important but not when it is emphasized at the expense of ease of use. Their documentation includes explicit operating instructions as well as activities for using the program effectively. They feel that a good program holds students' interest while providing instructions, feedback, and review for judging their own progress.

Popular programs include:

- Young Writer Notepad,
- The Wizard's Math Board,
- Fast Food Math,
- Missile Math, and
- Letter Invaders.

Petrocci Freelance Associates
651 N. Houghton Road
Tucson, AZ 85748
602-296-1041

Petrocci Freelance Associates sells more

than 25 programs covering science and health, preschool materials, and educational games. The programs, for ages six to adult, vary in price from \$24.95 to \$34.95.

The company designs their educational software so that students can use it without much supervision. They focus on effective teaching techniques, rather than on dazzling graphics that are impressive but which don't prompt learning.

Popular programs include:

- Heart, Lung, Circulatory/Medical Terminology,
- Weather Pro/Weather Watch,
- Dunk a Duck,
- Stagecoach, and
- Inspector Clueseau.

Prickly-Pear Software
2640 N. Conestoga
Tucson, AZ 85749

Prickly-Pear offers a variety of educational software, most of it aimed at children in grades K-3. Programs teach phonics, music, math, counting, and the alphabet. Their trivia programs test memory skills. For the additional price of the program (prices start at \$24.95), schools may purchase the right to make as many copies of that program as they need for their school building.

A first-grade teacher writes Prickly-Pear's educational programs, and since their courseware targets young learners, they use voice prompts and simple screens to avoid confusing students. The company feels that learners should be allowed two or three attempts to answer correctly before the answer is given.

Popular programs include:

- MathPacl,
- Music Reader,
- Phonics I and II,
- Talking Alphabet, and
- Children's Trivia.

Saguaro Software
P.O. Box 1864
Telluride, CO 81435
303-728-4937

Saguaro Software offers three educational programs for the Color Computer on tape (\$19.95) and disk (\$24.95). The programs are aimed at students from 8 to 12 years of age and cover general history, U.S. history, and biology.

Popular programs include:

- Stars of America,
- Digestive System/Circulatory System, and
- History—1607 to 1976.

Speech Systems
38 W. 255 Deerpath Road
Batavia, IL 60510
312-879-6880

Speech Systems sells a variety of educational software aimed at all age groups. They emphasize talking software designed to run with Super Voice (\$77.95), a speech synthesizer. Software prices range from \$9.95 to \$24.95.

In order to challenge students to learn, Speech Systems creates materials that have various skill levels. Their educational software emphasizes the computer's role as an interactive tutoring device and uses speech synthesis as a means of keeping students' attention. This approach, they feel, is especially effective with young children.

Popular programs include:

- Animated Sentences,
- King Arthur's Tales,
- Talking Alphabet,
- Talking Clock, and
- Presidents.

Sugar Software
1710 N. 50th Ave.
Hollywood, FL 33021
614-861-0565

Sugar Software sells educational programs that cover math, social studies, and language arts. Prices range from \$17.95 to \$24.95.

Popular programs include:

- Galactic Hangman,
- PreReader,
- Silly Syntax,
- The Great U.S.A., and
- The Presidents of the United States.

Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570
800-431-1934

Sunburst's nine educational programs for preschool through adult students encompass problem solving, mathematics, and language arts. Packages cost \$59, and although they do not allow site licensing, Sunburst offers networking disks, computer lab packs, backup disks, and a lifetime warranty for programs. Details are provided in their software catalog.

Sunburst designs "long-playing" programs that put the computer to good use. They concentrate on creating thought-provoking software with multiple levels of difficulty that challenge students.

Popular programs include:

- The Factory,
- The Incredible Laboratory,
- The Pond,

- Hot Dog Stand, and
- Puzzle Tanks.

TCE
P.O. Box 2477
Gaithersburg, MD 20879
800-482-4823

TCE's over 75 packages for preschool through adult learners vary in price from \$10.95 to \$129.95. The programs assist students and teachers in the areas of early-learning skills, math, geography, applications, administration, and computer literacy.

Courseware from TCE uses educational techniques proven effective in classroom teaching. Programs target a specific area of learning yet offer versatility. The company strives to make their programs easy to use so that learners spend their time mastering the subject matter rather than program operation.

Popular programs include:

- Child Writer,
- ABCs in Color,
- United States,
- Fractions, and
- English Pack.

Tandy Corp.
1400 One Tandy Center
Fort Worth, TX 76102

As the manufacturer of the Color Computer, Tandy offers a wide variety of CoCo educational software for preschool through adult levels. Language arts, preschool skills, mathematics, music, and computer use are a few of the areas that Tandy's software covers. In addition to selling software from the Children's Computer Workshop, Walt Disney, and Spinner, Tandy has begun making other third-party software available through its Express Order Software service. Check your local Radio Shack store if there is a particular program you would like to obtain.

Popular Tandy programs include:

- Professor Pressnote's Music Machine (uses *Electronic Book*),
 - Solar Explorer (*Electronic Book*),
 - Assembly Language Tutor,
 - Color Math, and
 - Fun with Reading.
- Popular Children's Computer Workshop programs include:
- Flip Side,
 - Star Trap,
 - Taxi,
 - Grover's Number Rover, and
 - Cookie Monster's Letter Crunch.

Popular Spinner programs include:

- Facemaker,
- Kids on Keys,
- Kindercomp,
- Fraction Fever, and
- Alphabet Zoo.

Popular Walt Disney programs include:

- Telling Time with Donald,
- Mickey's World of Writing,
- Mickey's Alpine Adventure,
- Space Probe: Math, and
- Goofey Covers Government.

Tom Mix Software
4285 Bradford N.E.
Grand Rapids, MI 49506
616-957-0444

Tom Mix Software's 10 educational programs cover math, spelling, vocabulary, classroom management, and algebra and range in price from \$24.95 to \$39.95.

Popular programs include:

- Vocabulary Management System,
- Fractions,
- Teacher's Database,
- Math Duel, and
- Estimate.

Tothian Software
Box 663
Rimersburg, PA 16248

Tothian Software writes science programs for high-school students as well as programs for teachers at all levels. Individual programs are priced from \$9.95 to \$19.95; program packages are available for up to \$47.95.

Tothian Software doesn't feel that all concepts can be effectively taught using a computer, so they don't create software to teach something that can be better taught in other ways. They feel that ease of use is of prime importance in educational programs.

Popular programs include:

- Teacher Pak,
- CoCo Testem,
- Teacher Pak Plus,
- Graphic Physics, and
- Lissajous Art.

Triad Pictures Corp.
P.O. Box 1299
Sequim, WA 98382
206-883-6459

Triad Pictures offers nine programs aimed at preschool through fourth-grade students. Subject matter includes animation, graphics, drills, programming, and preschool skills; prices vary from \$11.95 to \$18.95.

Triad intends their courseware to be used with children on a daily basis. They emphasize accuracy, simplicity, and attractive design in creating their programs.

Popular programs include:

- Centipede ABCs and 123s,
- Etch•A•Dot,
- Robot Basic,
- Superflash, and
- Alphabet Stew.

Creative Educational Computing Ideas

by Dennis W. Peterson

Not for teachers only—tips on computers in education

It's strange how time changes things. Only a few years ago, the choice for classroom computers was limited to the Apple II, Commodore PET, and TRS-80 Model I. A school where I taught settled for the PET because the manufacturer offered a promotional discount. Today, if you mention PET, you get a quizzical look. Of course, the Apple and the TRS-80 have undergone numerous changes since they were introduced.

The second computer wave produced a flood of home computers: the TI 99/4 from Texas Instruments, the VIC-20 and C-64 from Commodore, the Timex Sinclair, numerous Ataris, and Tandy's Color Computer. At first, the Color Computer was billed as a machine for home use, but as it became bigger and more powerful, teachers began to take it to school.

Today, many of the early computers are gathering dust in classroom corners or school storerooms—victims of a lack of continued software support or obsolescence. By the end of 1984, however, the Color Computer had edged into first place as the best educational computer system for under \$1,000, according to a poll of computer-magazine editors conducted by *Creative Computing* magazine. Tandy continues to support the CoCo in its teaching role, and a smorgasbord of educational courseware is available from software suppliers.

In short, the CoCo is an excellent educational tool. I've found it a valuable resource in the classroom and would like to pass along tricks and information that might help educators and parents put the CoCo to good educational use.

Cutting Costs Without Sacrificing Quality

When an inexpensive computer is as effective in the classroom as a more expensive machine, the choice is obvious. Now that a 64K CoCo with Extended Color Basic costs less than \$170, the price is right. The addition of a Network 2 Controller eliminates the need for cassette recorders or disk drives at students' stations because you can download software from the teacher's station. With a school discount, educators can reduce even further the cost of this reasonably priced piece of equipment. The network controller can be a time saver, too. By loading up to 16 computers at once, you can put a class to work fast.

Unlocking Secrets

If you're a teacher who uses networked CoCos, you'll find 500 POKEs, PEEKs 'n EXECs for the Color Computer by Kishore M. Santwani, a valuable aid. It tells you how to transfer most ROM packs to tape. With the network-controller switch set in the multi-plex position, download the programs to student stations by typing:

```
CSAVEM"Program" 49152, 57344, 49152
```

Before transferring to either tape or student stations, however, set the 64K all-RAM mode (as described in the book) in all machines that will receive the program. Since a little typing is involved, you'll probably want to save this procedure as a short program. By studying Santwani's book and the manual for Network 2 Controller, you might even find a way to circumvent the tape transfer and download the cartridge directly to the student stations.

Before implementing the procedure, be sure that the manufacturer of the courseware permits downloading. If not, find a product that does. After all, why teach computer ethics if the biggest software pirate in the classroom is the teacher?

If you're teaching computer literacy, you'll find that book full of tips will help you get the most from your computer. You can order it from Microcom Software, P.O. Box 214, Fairport, NY 14450 (716-425-1824). Call for the current price.

Computers May Be Hazardous To Your Mental Health

According to an article in the June 1985 issue of Minneapolis' *Computer User* newspaper, research by MECC (Minnesota Educational Computing Consortium) showed that students blamed themselves for computer trouble even when the machine was at fault. Researchers deliberately caused a breakdown in some computers as secondary-school students worked on a science unit. When they asked the students what caused the breakdown, almost 57 percent attributed at least part of the blame to themselves. Six months later, these students were more inclined to anticipate computer problems than students who had not experienced the initial failure.

Another study undertaken at Pittsburg's

Carnegie-Mellon University, which requires coursework in programming, found that "most liberal-arts students held a negative view of their required encounter with computer programming..." The study stated that students in programming classes became angry more often than students in other classes.

Painless Learning

Video arcades and computer shoot-'em-up games will always be with us, but enough game parlors are closing to indicate that either kids have run out of quarters or have lost interest. Interactive adventure games, however, offer kids a chance to improve thinking, memory, and typing skills while capturing their attention for hours.

I've used Raaka-Tu as a reward game for sixth through eighth-grade students who became so involved that they sought after-school opportunities to play. More recent adventure games are even more captivating because many offer impressive graphics displays to accompany the text.

A word of caution, though. Don't tell them that adventure games are good for them. They might go back to the arcade.

Cloak-and-Dagger CoCo

If your local school district doesn't offer as much computing as you'd like, you can complain to the school board or form a neighborhood kids' computing club. If you choose a computing club, keep programming activities short. Choose interesting exercises that teach the kids to create simple programs relating to their world of play.

For example, do you remember secret decoder rings? How about helping the kids write a secret-message program in which one letter represents another. It would print a coded version of any message they type in. By typing in the code, they could produce the original message for the intended receiver. The kids would learn about variables, simple statements, and elementary program loops.

Got the idea? Good. But don't just sit there—go get the kids! ■

Address correspondence to Dennis W. Peterson, 4290 Quaker Trail N.E., Prior Lake, MN 55372.

CoCo Max

This is one of those rare programs that will captivate everyone in your family.... No one can see CoCo Max and not want to try it!



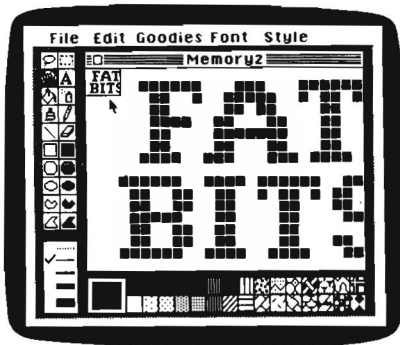
We are all witnessing an exciting revolution in microcomputers: a radically new kind of computer and software that opens a whole new world of creative power to computer users.

It was inevitable that this exciting approach would be brought to the CoCo. With this in mind, Colorware chose to go all out and maximize this new concept for the color computer. That meant designing not just software but hardware too. It meant thousands of hours of pure machine language programming. Rarely has this much effort been applied to one product for the Color Computer.



UNMATCHED CAPABILITY...

Because we took the maximum approach, highly optimized machine code combined with hardware, CoCo Max truly stands above the rest as the ultimate creative tool for the Color Computer. It's unrivaled performance lets you create with more brilliance and more speed than any similar system — much more than you ever imagined possible. And, you can do it in black & white or color.



All the sophisticated power of the bigger systems is there: *Icons*, *Pull-Down Menus*, full *Graphic Editing*, *Font Styles*, and all kinds of handy tools and shortcuts.

Plug your joystick, mouse or touch pad into CoCo Max's Hi-Res Input Unit. Then use a delightfully simple *Point-and-Click* method to get any of CoCo Max's powerful graphic tools. It has them all:

You can *Brush*, *Spray* or *Fill* with any *Color*, *Shading* or *Pattern*. Use *Rubber Band Lines* and *Shapes* (square, rectangle, circle, ellipse, etc.) to create perfect illustrations with speed and ease. There's a *Pencil*, an *Eraser* and even a selection of *Calligraphy Brushes*. And, as you can see, CoCo Max can do a lot with text. All of the newest special effects are there: *Trace Edges*, *Flip*, *Invert*, *Brush Mirrors*, etc. And all of the very latest super-capabilities like: *Undo*, which automatically reverses your mistakes, and *Fat Bits* which zooms you way in on any part of your subject to allow dot-for-dot precision.



THE BIG PICTURE

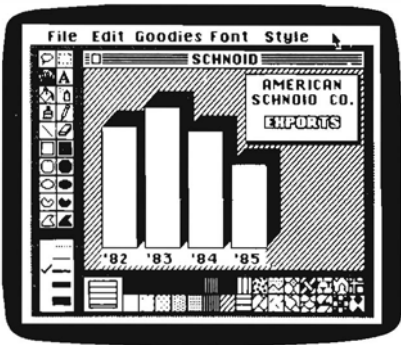
The large image box in the middle of the CoCo Max screen is actually only a window on an even larger image. Use the Point-and-Click "Hand" to effortlessly move your window over any portion of the larger image. You have a working area of up to 3-1/2 times the area of the window itself.

FLEXIBLE PRINTING...

CoCo Max gives you many ways to print. Fill a whole page with your image or condense two full CoCo screens to less than 1/4 page for a finely detailed copy. "Dump" your CoCo Max screen full size or shrink it to 1/8 page size.

FREEDOM TO CREATE...

Anyone who wants to create anything at all on their CoCo screen or printer will certainly be very glad to meet CoCo Max. CoCo Max's friendly yet sophisticated graphic and text capabilities let you almost instantly produce illustrations, diagrams, charts,



graphs, and computer art – for serious use or just for creative fun.



tion by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer – a precision one with a 49,152 point resolution to match the CoCo screen exactly.

Plug your same joystick, mouse or touch

You may then use CoCo Max's graphic magic on it. The DS-69 is available as an option from Colorware from \$149.95 complete with its own software on disk or tape. Using the DS-69 with a disk requires an RS multi-pak adaptor.



COCO MAX REQUIREMENTS

The CoCo Max System includes the Hi-Res Input Unit, software on disk or cassette (please specify) and user manual. It will work on any 64K Extended or non-

THE COCO MAX SYSTEM

AN ABSOLUTE GUARANTEE

CoCo Max is a hardware/software system that no software-only system can match. Get CoCo Max and see your CoCo perform as it never could before. If you don't agree that CoCo Max is the ultimate creative tool for the Color Computer, simply return it within 20 days for a full, courteous refund from Colorware.

THE HARDWARE...

This is the key to CoCo Max's unmatched performance. Did you know the normal joystick input built into the Color Computer only allows access to 4,096 (64 x 64) points on the CoCo screen? Yet, the Color Computer's high resolution screen



has 49,152 (256 x 192) pixels. This means that a joystick, mouse or even a touch pad can, at best, only access about one tenth of the pixels on the CoCo screen.

Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limita-

tion by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer – a precision one with a 49,152 point resolution to match the CoCo screen exactly.



A DIGITIZER OPTION...

We studied all the video digitizers available and picked the best of them to link with CoCo Max. The DS-69 from Micro Works was our choice. This optional device lets you capture the image from any video source (video recorder, camera, etc.) on your Color Computer.



extended Color Computer. You'll need a Radio Shack or equivalent joystick, mouse or touch pad. Disk systems require a Multi-Slot Interface or Y-Branching Cable.

THE COMPLETE COCO MAX SYSTEM, with software on **DISK** \$69.95

with software on **CASSETTE** (Available Mar '85). \$69.95

Y-BRANCHING CABLE—If you have a disk system but do not have a Multi-Slot Interface, use this economical 40-pin, 1 male, 2 female cable to connect the CoCo Max Hi-Res input unit and your disk controller to your CoCo. \$27.95

(Sorry, not compatible with JDOS)



Colorware Inc.
78-03G Jamaica Ave.
Woodhaven, NY 11421
(718) 647-864



ORDERING INFORMATION

ADD \$3.00 PER ORDER FOR SHIPPING AND HANDLING.
C.O.D.'S ADD \$3.00 EXTRA.
SHIPPING AND HANDLING FOR CANADA IS \$5.00
WE ACCEPT VISA, MASTER CARD, M.O.'S, CHECKS.
N.Y. RESIDENTS MUST ADD SALES TAX.

CoCo Study Guide

by Rob Ainscough

Create quizzes tailored to your needs.

Knowing what to study is often not enough; the hard part is learning important information. With Study Guide, the CoCo becomes the friend, parent, or teacher helping a student successfully prepare for an exam or quiz. You supply the terms and definitions; Study Guide tests students' knowledge by letting them choose the correct definition among four possible answers.

You can create individualized tests on a myriad of topics. Use it to review English or foreign-language vocabulary, math facts, significant historical dates, or even chemical formulas. Possible applications are limited only by your imagination. You can save your tests on disk and load them back in later; an optional print routine provides printouts of study material.

Program Use

Type in the Listing and then run the program. Remember to turn up the volume—the program uses sound. After the title screen, three important notices appear. The messages tell you not to use periods or commas when submitting terms or definitions; to press XXX to terminate data entry; and to limit terms and definitions to one line and three and one-half lines, respectively. Disregarding these warnings might cause data errors and frustration.

The next screen displays a menu with seven choices:

- 1 Load Old Terms
- 2 Save Current Terms
- 3 Input New Terms
- 4 Test Terms
- 5 Print Out Terms
- 6 Change Terms
- 7 End Program

Load Old Terms allows you to load data files you have saved to disk. Press Y and the enter key after the index prompt to see a di-

rectory of stored files. The next prompt asks whether you would like to erase a file. I recommend that you do this only when necessary. Once you have supplied the preliminary information, load the file by typing in its file name. The program tells you how many terms it has loaded.

Save Current Terms follows the same procedure as loading files. After the index and erase-file prompts, you specify a file name and it is saved to disk. Whenever you make changes to a file—by using the Change Terms or Input Terms option—be sure to save the file again.

Input New Terms lets you enter terms and definitions to be tested later or add data to an existing list. The maximum number of entries allowed is 50. Test Terms quizzes users on terms. The terms appear in the order in which they were submitted; you must choose the correct definition from four choices. If the answer is incorrect, you hear a low tone and see the correct response. When you have completed the test, the program displays the number of correct responses and a percentage score.

Print Out Terms allows users with printers to obtain a printout of the file name, the terms, and their definitions. Change Terms, the correction mode, lets you change terms or definitions. The terms are displayed in groups of 12. After each set, the program asks whether you wish to continue (C) to the next set or enter (E) a change. To make a change, press E and then type the number corresponding to the entry to be altered. Press T (term) or D (definition) and then change your entry; you return to the opening

menu. End program exits you from the program. If you have not saved your data, it is lost.

20	String Allocation/Array Dimensions
30-80	Introduction
90-210	Menu
220-300	File-Index and Erase Sub-routines
310-460	Load File
470-580	Save File
590-650	Input New Terms
660-840	Test
850-930	Print
940-1010	Display Sets for Change
1020-1030	End
1040-1110	Incorrect Response
1120-1210	Change

Table 1. Program Structure

Program Structure

Study Guide uses approximately 8,600 bytes. I deliberately avoided compacting the program so that it would be easier for others to expand. Refer to Table 1 for an outline of program structure.

If you have a 16K CoCo and get an OM (out-of-memory) error, change line 20 to:

```
20 CLEAR 4000:DIM T$(40),D$(40),C$(4)
```

The program will then accommodate a maximum of 40 terms and their definitions. If you have a 32K or 64K machine, you can experiment with increasing the values of the CLEAR command, T\$, and D\$. Do not change the value of C\$. ■

System Requirements

32K RAM
Extended Color Basic
Disk Drive
Printer Optional

Address correspondence to Rob Ainscough, 708 Cheyenne Drive, Walnut Creek, CA 94598.

Program Listing. Study Guide

```

1Ø CLS
2Ø CLEAR 5ØØØ: DIM T$(5Ø), D$(5Ø),
C$(4)
3Ø PRINT@234, "STUDY GUIDE": PRINT
@452, "PRESS ANY KEY TO CONTINUE"

4Ø A$=INKEY$: IF A$="" THEN KL=RN
D(4): GOTO 4Ø
5Ø CLS: PRINT: PRINT "WARNING: WHE
N INPUTING DATA do not USE COMMA
S (,) OR COLONS (:).": PRINT: PRIN
T "WHEN YOU ARE DONE WITH ENTERIN
G THE DATA, INPUT XXX UNDER TERM
"
6Ø PRINT: PRINT "KEEP TERMS TO ONE
LINE AND DEFINITIONS TO UNDER 3
1/2 LINES"
7Ø PRINT @452, "PRESS ANY KEY TO
CONTINUE"
8Ø A$=INKEY$: IF A$="" THEN 8Ø
9Ø CLS
1ØØ PRINT@45, "menu"
11Ø PRINT@99, "1. LOAD OLD TERMS
"
12Ø PRINT@131, "2. SAVE CURRENT T
ERMS"
13Ø PRINT@163, "3. INPUT NEW TERM
S"
14Ø PRINT@195, "4. TEST TERMS"
15Ø PRINT@227, "5. PRINT OUT TERM
S"
16Ø PRINT@259, "6. CHANGE TERMS"
17Ø PRINT@291, "7. END PROGRAM"
18Ø PRINT@355, "ENTER CHOICE": IN
PUT CH
19Ø IF CH<1 OR CH>7 THEN 18Ø
2ØØ ON CH GOSUB 22Ø, 47Ø, 59Ø, 66Ø,
85Ø, 94Ø, 1Ø2Ø
21Ø GOTO 9Ø
22Ø GOSUB 23Ø: GOTO 31Ø REM LOAD
OLD TERMS
23Ø CLS: PRINT@234, "INDEX (Y/N)":
: INPUT AN$
24Ø IF AN$<>"Y" THEN CLS: GOTO 26
Ø
25Ø CLS: DIR
26Ø PRINT: PRINT "ERASE A FILE (Y/
N)": : INPUT AN$
27Ø IF AN$<>"Y" THEN RETURN
28Ø PRINT: INPUT "FILE NAME TO BE
ERASED": F$
29Ø KILL F$+ "/DAT": CLS: DIR
3ØØ GOTO 26Ø
31Ø PRINT "TO LOAD": A=Ø
32Ø PRINT "ENTER FILENAME": : INPUT
F$
33Ø CLS
34Ø PRINT@234, "LOADING"
35Ø OPEN "I", #1, F$+ "/DAT"
36Ø IF EOF(1)=-1 THEN 42Ø

```

```

37Ø A=A+1
38Ø INPUT #1, T$(A)
39Ø IF EOF(1)=-1 THEN 42Ø
4ØØ INPUT #1, D$(A)
41Ø GOTO 36Ø
42Ø CLOSE #1
43Ø CLS: PRINT@232, "LOADED" A "TERM
S"
44Ø PRINT @452, "PRESS ANY KEY TO
CONTINUE"
45Ø A$=INKEY$: IF A$="" THEN KL=RN
D(4): KL=RND(A): GOTO 45Ø
46Ø RETURN
47Ø REM SAVE CURRENT TERMS
48Ø GOSUB 23Ø
49Ø CLS: PRINT "TO SAVE": PRINT "ENT
ER FILENAME": : INPUT F$
5ØØ CLS
51Ø PRINT@234, "SAVING"
52Ø OPEN "O", #1, F$+ "/DAT"
53Ø B=B+1
54Ø WRITE #1, T$(B), D$(B)
55Ø IF B=A THEN 57Ø
56Ø GOTO 53Ø
57Ø CLOSE #1
58Ø B=Ø: RETURN
59Ø REM INPUT NEW TERMS
6ØØ CLS
61Ø A=A+1: PRINT
62Ø INPUT "ENTER TERM>>>": T$(A):
PRINT
63Ø IF T$(A)="XXX" THEN A=A-1: RE
TURN
64Ø INPUT "ENTER DEFINITION>>>":
D$(A)
65Ø GOTO 6ØØ
66Ø REM TEST TERMS & DEFINITION
67Ø CLS: CR=Ø
68Ø FOR C=1 TO A
69Ø CLS: PRINT T$(C): PRINT
7ØØ F=RND(4): C$(F)=D$(C)
71Ø G=RND(A): H=RND(4): IF H=F OR
G=C THEN 71Ø
72Ø C$(H)=D$(G)
73Ø I=RND(A): J=RND(4): IF J=H OR
J=F OR I=C OR I=G THEN 73Ø
74Ø C$(J)=D$(I)
75Ø K=RND(A): L=RND(4): IF L=H OR
L=F OR L=J OR K=I OR K=G OR K=C
THEN 75Ø
76Ø C$(L)=D$(K)
77Ø FOR P=1 TO 4: PRINT P: : PRINT
C$(P): NEXT P
78Ø INPUT "ENTER CHOICE": HC
79Ø IF C$(HC)<>D$(C) THEN GOSUB
1Ø4Ø: GOTO 81Ø
8ØØ CLS: CR=CR+1: PRINT @234, "CORR
ECT": SOUND 1ØØ, 8
81Ø NEXT C
82Ø CLS: PRINT: PRINT: PRINT: PRINT:
PRINT: PRINT "INCORRECT ANSWERS" A-
CR: PRINT "CORRECT ANSWERS" CR: PRIN
T "PERCENTAGE" INT((CR/A)*1ØØ): PR

```

```

INT: PRINT "PRESS ANY KEY TO CONTI
NUE"
83Ø A$=INKEY$: IF A$="" THEN 83Ø
84Ø RETURN
85Ø REM PRINTOUT TO THE PRINTER
86Ø CLS: PRINT @232, "PREPARE PAPE
R": PRINT: PRINT "PRESS ANY KEY
TO CONTINUE"
87Ø A$=INKEY$: IF A$="" THEN KL=RN
D(4): KL=RND(A): GOTO 87Ø
88Ø CLS: PRINT@234, "PRINTING"
89Ø PRINT#-2, CHR$(31): PRINT#-2,
F$: PRINT#-2, CHR$(3Ø): PRINT#-2, ""
9ØØ FOR P=1 TO A
91Ø PRINT#-2, "*** T$(P) ***": PRI
NT#-2, D$(P): PRINT # -2
92Ø NEXT P
93Ø RETURN
94Ø REM CHANGING DATA
95Ø CLS
96Ø FOR P=1 TO A
97Ø PRINT P: : PRINT T$(P)
98Ø IF P/12=INT(P/12) THEN GOSUB
112Ø
99Ø NEXT P
1ØØØ GOSUB 112Ø
1Ø1Ø RETURN
1Ø2Ø REM END
1Ø3Ø CLS: PRINT "bye": END
1Ø4Ø REM INCORRECT
1Ø5Ø CLS
1Ø6Ø PRINT @ 234, "INCORRECT": SOU
ND 1, 1Ø
1Ø7Ø CLS: PRINT "correct answer:
"
1Ø8Ø PRINT: PRINT T$(C): PRINT: PRI
NT D$(C)
1Ø9Ø PRINT@452, "PRESS ANY KEY TO
CONTINUE"
11ØØ A$=INKEY$: IF A$="" THEN 11Ø
Ø
111Ø RETURN
112Ø REM TO CHANGE OR NOT TO CHA
NGE
113Ø PRINT@448, "": INPUT "c-CONTI
NUE, e-ENTER CHOICE": KL$
114Ø IF KL$="E" THEN 116Ø
115Ø CLS: RETURN
116Ø PRINT@416, "
": PRINT@416, "": : INP
UT "ENTER CHOICE": KL
117Ø CLS: PRINT: PRINT T$(KL): PRIN
T: PRINT D$(KL): PRINT: INPUT "TERM
(T) OR DEFINITION (D)": KL$
118Ø IF KL$="T" THEN 12ØØ
119Ø CLS: PRINT D$(KL): PRINT: INPU
T "ENTER CORRECTION": D$(KL): GOTO
121Ø
12ØØ CLS: PRINT T$(KL): PRINT: INPU
T "ENTER CORRECTION": T$(KL)
121Ø CLS: RETURN

```


Master World Geography

by John Griggs

Want to bone up on the nations of the world and their capitals? Do you need to motivate your children or students in social studies? World Geography's high-resolution maps are an excellent way to teach and test geographical knowledge. (See Listing.) Instruction covers the six inhabited continents; their countries and capitals; the major oceans, seas, and mountain peaks; and a state-by-state analysis of the United States.

I think you will find the program useful on its own—my children had fun with it—or as a supplement to classroom study. Because it is menu driven, World Geography is easy enough for grade-school children to follow. And, although there are minor inaccuracies in mapping due to the limitations of space and graphing, the shapes and locations of countries should make them recognizable.

Using the Program

The program's opening screen displays a world map and a main menu offering seven options:

- 1 Africa
- 2 Europe
- 3 Asia
- 4 The United States
- 5 South America
- 6 Other
- 7 Quit Program

The boundaries of Africa, Europe, and Asia correspond to the standard continental land masses depicted in any world atlas. South America includes the countries of Central America. The U.S. map shows all 50 states, and Australia is treated as a country under the Other option.

When you select options 1 to 5 from the main menu, the program displays a map of the appropriate region and offers you five choices:

- 1 Teaching
- 2 Name Country (or State for the U.S.)
- 3 Name Capital
- 4 Paint Country (or State for the U.S.)
- 5 Quit

The teaching mode paints a region and prints the name of the country/state and its capital city at the bottom of the screen. Small countries are highlighted within a painted circle. The display does not change until you press any key to continue, so you control how quickly you progress.

The structure of options 2 and 3, which test your knowledge of geography, is similar. The program randomly paints a region. You must identify the country/state (option 2) or capital city (option 3) from the list of three possibilities shown at the bottom of the screen. Press the number corresponding to your answer.

The program provides positive reinforcement by telling you whether you are right or wrong and stating the correct response. After you have answered 10 questions, you learn how many correct answers you got and are returned to the continent/state menu in which you are working.

Option 4 also tests your geographical knowledge. The program names a country/state at random and then paints another country/state. Use the left- and right-arrow keys to move to the correct area, painting intervening countries as you go. When you reach the object

country, press the enter key to make your choice. You learn whether you are right or wrong and see the correct response. After you answer 10 questions, you return to the continent/state menu.

To exit the teaching mode, press Q; to exit Name Country, Name

205	Get Data for Text and Numbers
230	Text on Graphics
710	Mainline
1010	Africa Strings
1060	Europe Strings
1100	Asia Strings
1160	Australasia Strings
1190	N. America Strings
1240	Arctic Strings
1260	S. America Strings
1310	Draw World
1440	Draw Africa
1500	Draw Europe
1560	Draw Asia
1680	Draw N. America
1780	Draw S. America
1850	Initial Menu
1950	Continent Menu
2900	Read Country Data into Tables
3020	Country Data
4000	Teaching
4200	Name Country/Capital
4400	Paint Country
5000	Get Random Selections
5200	Test Option Display
5300	Reinitialize Selection Tables
5400	Check RND Is Unique
5500	Correct Answer Display
5600	Wrong Answer Display
5800	Score for Option
5900	Score for Continent
6000	Total Score

Table 1. Program Structure

Capital, or Paint, press the four key. The program prints your score for the round. If you select option 5 to leave the continent/state menu, the program prints your total score for that option before returning you to the main menu.

Option 6 in the main menu presents countries not covered under the other options (e.g., Canada, Australia, New Zealand, and so on); oceans and seas; and the world's highest peaks. The Other menu has three choices:

- 1 Teaching
- 2 Name Other
- 5 Quit

The teaching mode presents the items on which you will be tested in the naming mode. An asterisk marks an ocean or sea; a painted tri-

System Requirements

32K RAM
Extended Color Basic

Learn world geography at your own pace.



Illustration by Alfonso Gobea

angle marks a mountain peak. Name Other works like Name Country.

To exit the game press option 7 from the main menu. Your total score for all continents is displayed and the game ends.

Program Design

Except for the memory-saving measures described in the next section, the program structure is straightforward. I used strings (M\$) attached to DRAW instructions to outline the world map. The continental maps use the same outlines, but a scale parameter added to the DRAW statement sizes the maps appropriately. For large land masses, this created no problems, but Europe, which explodes from

small to large, is broad and lacks detail.

The country boundaries are strings (N\$) scaled and drawn within the continental outlines. The data for countries is stored in DATA statements in the format: country, capital, x-coordinate, y-coordinate. The data is loaded into C1\$, P1\$, X1, and Y1, respectively.

The country borders must form enclosures for the PAINT sequence to work. To ensure that the program runs properly, be certain to enter the coordinates correctly when typing the program.

Memory-Saving Techniques

To conserve memory, I omitted all REM statements. Instead I have

outlined the program's main routines in Table 1. To further reduce memory requirements, I used READ statements to limit the amount of information stored at one time. Although the program contains over 200 sets of data, only the sets for the continent being tested are in memory. This technique reduces the maximum number of sets stored to 50.

Lines 2900-2990 contain a program loop that drives the READ command and decrements the table index. So, the program might access DATA sets 131 to 157 and store them in table entries 1 to 27.

Reading DATA statements is time consuming, but it allowed me to reduce the dimensioning by tables of over 150 entries. To offset the slowdown, I used a high-speed POKE (POKE 65495,0) in lines 2900 and 2995. Delete it if your CoCo does not accept this POKE.

I saved additional memory by using only seven graphics pages. With eight pages I could have PCOPYed P1 to P5, P2 to P6, P3 to P7, and P4 to P8 (and vice-versa). Instead I PCOPYed P1 to P5, P2 to P6, and P3 to P7; or P2 to P5, P3 to P6, and P4 to P7—depending on the x and y coordinates of the last area painted. (If you ever use this technique, be careful. You lose your program if you try to PCOPY from P8.)

By employing the above techniques, I was able to reduce memory requirements by over 5K. Unfortunately, the program still consumes too much memory to allow it to run on disk systems. ■

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Program Listing. World Geography

```

2 PCLEAR7
5 PMODE4,1:SCREEN1,1:PCLS:CLEAR5
ØØ: DIMAZ$(28),NO$(1Ø),C1$(51),P1
$(51),X1(51),Y1(6Ø),N$(12),II(12
)
5Ø C$(1)="AFRICA":C$(2)="EUROPE"
:C$(3)="ASIA":C$(4)="UNITEDSTAT
ES":C$(5)="SOUTHAMERICA":C$(6)="
"OTHER"
2Ø5 FORT=ØTO27:READAZ$(T):NEXTT
21Ø FORT=ØTO9:READNO$(T):NEXTT
212 IFRS=1 THENRS=Ø:RETURN
215 GOTO71Ø
23Ø DATABU4ER3FDGLD2BR2
24Ø DATABR4
25Ø DATA5R4D3N3L3D2
26Ø DATAR4U3L4ND3U2R3D2BD3BR
27Ø DATABRNR3HU3ER2FBD3GBR
28Ø DATANR3U5R3FD3GBR
29Ø DATANR4U3NR4U2R4BD5
3ØØ DATA3NR3U2R4BD5
31Ø DATABRNR3HU3ER2FBD3LR2LGBR
32Ø DATA3NR3U2BR4D5
33Ø DATABR2U5BD5BR2
34Ø DATABRNR2EU4NL2R2BD5
35Ø DATANU5U3R2NE2F3
36Ø DATANU5R4
37Ø DATA5R3ND3R3D5
38Ø DATAU5F4DNØ5
39Ø DATABRNR3HU3ER3FD3GBR
4ØØ DATAU2NR4U3R4D3BD2BR
41Ø DATABRHU3ER2FD2G2BU2F2R
42Ø DATA5R3FDGNL2F2
43Ø DATAR4U3L4U2R4BD5
44Ø DATABR3U5NL2R2BD5
45Ø DATABRNR3HU4BR5D4GBR
46Ø DATABR2NE2H2U3BR4D3BD2
47Ø DATANU5R3NU5
48Ø DATAUE2NH2E2G2F2D
49Ø DATABR2U3NH2E2BD5
5ØØ DATANR5E5L5BF5
51Ø DATAAZ$(16);
52Ø DATAAZ$(1Ø);
53Ø DATARNR3ER2U3HL2GBD4BR4
54Ø DATABU5R4D2NL4D3NL4
55Ø DATABU2NR4E3RD5BR
56Ø DATABUF2EUHL3U2R4BD5
57Ø DATAU4ER2BD2NL3FDGL3BR3
58Ø DATABU5R4DGD3BR2
59Ø DATA3NR4U2R4D5NL4
6ØØ DATABU3NR4U2R4D5NL4
62Ø COLOR1,1:FORT=1TØLEN(A$):DRA
WAZ$(ASC(MID$(A$,T,1))-63)+"BR5"
:NEXTT:A$="" :T=Ø:RETURN
63Ø IFNO<1Ø THENN$=STR$(NO):DRAW
NO$(VAL(N$)):RETURN
633 N$=MID$(STR$(NO),2)
636 FORJ=1TO LEN(N$):DRAWNOS(VAL
(MID$(N$,J,1))+"BR3":NEXTJ:RETR
RN
64Ø SY=158:GOTO67Ø
65Ø SY=14Ø:GOTO67Ø
66Ø SY=13Ø:GOTO67Ø
665 SY=184
67Ø COLOR4,Ø:LINE(Ø,SY)-(255,191
),PSET,BF:RETURN
71Ø GOSUB1Ø1Ø
715 IFQ=5THENCOLOR1,Ø:GOSUB131Ø:
GOSUB18Ø:GOTO725
72Ø GOSUB185Ø
725 IFC=7THENGOSUB6ØØØ:GOTO8ØØ
728 A=Ø
73Ø ON C GOSUB144Ø,15ØØ,156Ø,168
Ø,178Ø,2ØØØ
74Ø GOSUB29ØØ
745 GOSUB195Ø
75Ø IFQ=5THENGOSUB59ØØ:PCLSØ:GOT
O715
755 IFQ=1THENGOSUB4ØØØ ELSEIFQ=2
ORQ=3 THENGOSUB42ØØ ELSEIFQ=4TH
ENGOSUB44ØØ
76Ø GOTO745
8ØØ END
1Ø1Ø M$(1)="L3DL3GL2GLGG4DGD8F2D
F2DF2R4E2RFR2F2D3F2D9DF2DFDFD3FD
2F2R2ER2E3URU4EU3E3UEU7RE3RUEUE
EU3L4HU2HU2HU2HU2L3DL5H3L3DL4
HL2UH2BD35BR29DGD2DFGDFREU2EUE
UH2
1Ø2Ø M$(1)="D2GDF2NE3D3F2R2FR2F2
ER2NU9R9E2BL21BUG4H8E3RU2BD5BL4D
2L2D2L2HLBR22BD3D3G2DF2DR2E2BG2B
L2GFD2NR3D2L5BDRUBR2D3LGBU5BL2EU
EREUEUEL6D2ND3HGND3LND3L2DND3L3D
2L3NGFDLDBR2UDG2BR1ØBU2ULHLHLBL
D7BL2NHFD2RDFU2HUNR4UHLBD7NE2GL2
GL2HNL8U3R2U2BD6DF2RE2UHBD3BLDFN
DLGFRUR2"
1Ø4Ø N$(3)="LGLGLHU2RU4BD4BLBD2D
2GL3BR8GFEH"
1Ø6Ø M$(2)="H4L3HL4G4LG3D2G2D4FR
UF2RE2U3E3R2GD2FR2FL2GDGL2GL5GL
HEULGD3L2GDGBL2L2GL2E2L2EURU2LU3
R2GRDFDLDLDBR2DGLB6U3GL2EU2RERD2GBR
8BD3GLGL2DLDFDFD2L4DL4RFR2E2UERU
ER2BDDHRRBD2DLURBØ3EF3RFDL2FRUB
RE2H3UER2F3DFRFL2FR2U2E2R2U2E2F2
E2DF2DL3HL2GLBLD2F2R4D2G"
1Ø7Ø M$(4)="GULG2LHDFD2FD2BR3BD4
EUEUHU2HU3BL5GDLGD3L3D3GDBG4R2
BFDPLGFRFR2FR2ER2UEU4L2UBD6BRL2H
L3HNU3G2BFG2L2NDLULHUEUBD4LUHLBGF
R2BFBRG2ND3R2ER2FNDR3EUBDBGFR2E3
UNLR2EF2D2BG2NRL2NH3DR2FBHBL2LGL
2NGULGBL13BDLHLHL3BD2NL2D4BU17H
UBR34BD18R5U3HL"
1Ø8Ø N$(4)=N$(4)+"E14H14L3"
11ØØ M$(3)="D4R2F2DF2DF2DFDR2E5U
2HL3UH2BU8R2U2HUHURUHL2DGF2D3FBD
8R2F2R4DR5F4D3F2D2FD2FDRBR3D2REH
2BL3BDE2U5R3UE2R2E2RF2D3F2D23F
D2F2D2F2DREH2U2H2U2E2RDF2DFRDE3U
3H3U2R4DDBDGFEBURUE2RBR5RU2LD2BL
5ERUEUEU2UH2U3L2U2EF2RUR2FD2FDR2
U2HU2ER2E3U3H2U2HL3"
111Ø REM**TOP ASIA**
112Ø M$(4)="L3DF2R2U2RD2E2R4E2R3
FDR3U7R2D2FDR2U3E2RFRU3E4RFE2F2
R2FDL2D2R5UR2DR2UR3D2R3ER2DR2FR4
F2R4DR3E2R3FR4FR3D2R5FR4FR3D2FR3
DL7D2L3D2L4D3GD3G2D2H2U3U3L3D2L
6G3DBD5BR9ND4F2RDLDL2BGD3G4D2RU2
RE2R2EHU3L2"
113Ø N$(5)="F2NR2DFNL4DFGF2DL2DN
R2L2ULHLHNGDHLHLEUNLNR2ULND3U2R2E
R2D2G2BD13BR7R2NGE2NFEU2NUL2NUHU
EBR6UR2UHUHU2GLHL2LGLBR7BD2R2UER3
ERDR2DL2DL2G2L2GBD5BR4ER2UHU2R2
E3HR2UL2HLBR3BFRFGFRFR2FR4ER2EFR
DL2GD2LBRULUHL2UL2DFD2BU5BL2NUL
2HL2UBR8REU"
114Ø N$(6)="BR3BD2RFD2GRFDRFDG2F
D5GBD3BR2REBD5EUB6BR2UER2D2LDBU3
BRUHØ3UE2F3BL5L2HLDFDR2FRDFBR1
7BU2GLBU3BE2RERNF2U3LH3L2L3D
2GL5GL4H2L3UHL3D2GL3H2L2G3LG2DG2
L2DG2L2DLBR13BU1ØF2DF2R3FR4FR6ER
E2RELHUBL5BD5L3HL2GL3DF2R2EFRDB
U4BL6H9E15"
116Ø M$(5)="GLG2D2R2F2E2U2E3HLBR
4RU2GDBH3U4LD4RBD4BL18DF4RF2EUH3
L2H2LBD9BR9DR2FR2UHL4BR12BUØ3RFD
GLBR1ØR2DF2RER2FR2R3H3LH2L2HL4D2B
D5L2G2L2U2L2G2L2D3L2G2D2FGD5R2UR4
2R4F3RD2RFRFRERERUEUE2U2HU2H2U2H2
U2LD4LH3UL2BD2ØBR6L2D2REULBR16BDR
G4U2E2UDRBRBU2LU4BD2R2EBGD2GD
117Ø N$(7)="RERERER2ØBDØD3
119Ø M$(6)="R2URER2FRER4F2R2F2U2
R3E2RD2R2FR2F2ER3E2R3FR2ER4U3RDR
D2R2DR2RED3LFL2DL2GL2GD3FRDF3D2
R2U2RU2RU4R2FRD2R2U2R2F2D2F2R2G3B
R4BU2DG2DR4U2L2EULBL4BD2L4DG3RE2
R2DR2EFG3LE2LG3D3L2DGD3LG3D3FD3L
HU2HU4DL2FL3HLG2L3GD3BL43DFUH"
12ØØ M$(7)="HU4H2LH3D2FD2F2LHU2HU
3H2UHUØ6H3BR27BD2E2RFR2FLHFDG
BRDE2RGL2GRBLUHUHDLGD2LU2ER3HLHG
LGBL25H2RF2UH3LU2H2LHUHL4UL2G2L
2G2L3E2BE2UE3ULHU3EL3UER3H3"
121Ø N$(8)="D9RFDDEF2GDBD7BR4EU
R2ØFR3BR1ØBD2E2R2UE2F2BD19BL23L4

```

HUH2LGH3L2HL2BR2U2H3U2NL3R3ND6R2
NU3DR2ND8R3NU7R2D3NR6LNL8DNR3D3L
4BU6BR5R5FD2NR4ND2BL4DFR3FND3R3F
RDR2UNU3RUR2R2FUH2NL5ERFBL4ND2L5
DGLBU2BR2NHU2NRL1HUHL4NDUHNNU4NL6
U3NU2L6D2L5HUHUL3ND3L2H"
122Ø N\$(9) = "NF2GL2GDNL4FND2ER3NR
3D3GDLR2EREU3R3BRNR2D2G2HLRFRGRG
2FBU3RE2NL2FRBLU2NL2FHU2FRU2NRND2
FHLUNU2RNU2RUH"
124Ø M\$(8) = "R2E3FG3DL3U2BR8BD2U2
RDRU2FR3FR2ED3L3P2L3HL4EHUBR23RD
RURD2R2E2F2R2FRD3F2G2H2D2G2H3R2U
2HUHL4H2U3BR2BU4R3FR3DL2GLHL2U2B
R14BU4D2LD2RDE2F4DR3D1ØF2DFR2U3E
2R2E3R4E3L5E2U2R2U2EUHU2EU2BD18B
R4E2D4L3GLU2LHURDR3BR25BU18F2DG3
H2LE3"
126Ø M\$(9) = "DRE2R2GDGDR2D4FERFE4
R2FR4F2R2R2F2R2D2R3FR3FR3FD3GD3G
D2GD3G3L2GDGD2G2DG2L3FRD2GL2GDGD
GD3GDGDGF2BR2RDRDL3EUBR4BU5FGUHR
BD5BL7LH2U2HUEHU5EU17H2L2H3U2H4U
E2UE2U2H2GLH2UH3U4L4H2BR14BU3R2F
R2FL3HL2EBD2BR6R3FL3HBLBDLFRHBR6
RFLH"
127Ø N\$(11) = "D2BR5BU5GDFRFD3REUR
E2U2D2FD3R2NU4R2NU3R2EBL1L2D4L2
HL3BR3DG2DL2HBR8BU2DGLDGF2R2DR2
FD5GEU5HRE2RD2FRFRD2R2DRD3HL2D2L
3GLUHULBD2BR6F2R2FDR2EU2L2LHUBR
3BD5RD2G3RF2H2LGD2BL6BU1ØGD2GD6F
D5GD1ØF"
128Ø N\$(12) = "GNDGLD2FE2GFNE2GFR2
D3BR11BU9EBL17BDH3U4BL9F7"
131Ø DRAW"BM121,5Ø"+M\$(1)
132Ø DRAW"BM145,17"+M\$(2)
133Ø DRAWMS(3)
134Ø DRAW"BM146,17"+M\$(4)
135Ø DRAW"BM211,79"+M\$(5)
136Ø DRAW"BM5,15"+M\$(6)
137Ø DRAW"BM43,63"+M\$(7)
138Ø DRAW"BM28,8"+M\$(8)
139Ø DRAW"BM49,63"+M\$(9)
1395 RETURN
144Ø COLOR1,Ø:PCLS: DRAW"BM8Ø,1Ø;
S1Ø"+M\$(1):DRAW"BM8Ø,1Ø;S1Ø"+N\$(
1):DRAW"BM1Ø5,42;S1Ø"+N\$(2):DRAW
"BM12Ø,12Ø;S1Ø"+N\$(3):S1=1:F1=47
:RETURN
15ØØ COLOR1,Ø:PCLS: DRAW"BM17Ø,2Ø
;S1Ø"+M\$(2):DRAW"BM144,5;S1Ø"+N\$(
4):S1=48:F1=74:RETURN
156Ø COLOR1,Ø:PCLS: DRAW"BM48,31;
S8"+M\$(4):DRAW"BM4Ø,98;S8"+M\$(3):
DRAW"BM5Ø,83;S8"+M\$(5):DRAWN\$(6
):S1=75:F1=1Ø8:RETURN
168Ø COLOR1,Ø:PCLS: DRAW"BM1Ø,8;S
13"+M\$(6):DRAW"BM122,15Ø;S13"+M\$(
7):DRAW"BM56,8;S13"+N\$(8):DRAW
"BM164,78;S13"+N\$(9):S1=1Ø9:F1=15
8:RETURN
178Ø COLOR1,Ø:PCLS: DRAW"BM11Ø,1Ø
;S8"+M\$(9):DRAW"BM127,25;S8"+N\$(
11):DRAW"BM117,1Ø;S8"+N\$(12):S1=
159:F1=185:RETURN
185Ø A\$="WORLD":DRAW"BM75,15Ø
":GOSUB62Ø:A\$="GEOGRAPHY":DRAW"BM
M4Ø,17Ø":GOSUB62Ø:PORT=1TØ5ØØ:NE
XTT:GOSUB65Ø:A\$="BY":DRAW"BM12Ø,
15Ø":GOSUB62Ø:A\$="JOHN@GRIGGS":D
RAW"BM3Ø,17Ø":GOSUB62Ø:PORT=1TØ5
ØØ:NEXTT
1875 GOSUB65Ø
188Ø A\$="SELECT@YOUR@OPTION":DRA
W"S4;BM35,14Ø":GOSUB62Ø
189Ø NO=1: DRAW" S4;BM5,152":GOSUB
63Ø:A\$=C\$(1):DRAW"BM2Ø,152":GOSU
B62Ø:NO=2: DRAW"BM5,162":GOSUB63Ø
:A\$=C\$(2):DRAW"BM2Ø,162":GOSUB62

Ø:NO=3: DRAW"BM5,172":GOSUB63Ø:A\$
=C\$(3):DRAW"BM2Ø,172":GOSUB62Ø
19ØØ NO=4: DRAW"BM12Ø,152":GOSUB6
3Ø:A\$=C\$(4):DRAW"BM136,152":GOSU
B62Ø:NO=5: DRAW"BM12Ø,162":GOSUB6
3Ø:A\$=C\$(5):DRAW"BM136,162":GOSU
B62Ø:NO=6: DRAW"BM12Ø,172":GOSUB6
3Ø:A\$=C\$(6):DRAW"BM136,172":GOSU
B62Ø
19Ø5 NO=7: DRAW"BM12Ø,182":GOSUB6
3Ø:A\$="QUIT":DRAW"BM136,182":GOS
UB62Ø
191Ø A\$=INKEY\$:IFA\$="" THEN191Ø
192Ø C=VAL(A\$):IFC<1 ORC>7 THEN
191Ø
1925 RETURN
195Ø GOSUB64Ø:A\$="SELECT@YOUR@OP
TION":DRAW" S4;BM35,164":GOSUB62Ø
196Ø NO=1: DRAW"BM5,174":GOSUB63Ø
:A\$="TEACHING":DRAW"BM2Ø,174":GO
SUB62Ø:NO=2: DRAW"BM5,182":GOSUB6
3Ø:IFC=4 THENA\$="NAME@STATE":B\$="P
AINT@STATE" ELSEIFC=6 THENA\$="NAM
E@OTHER" ELSE A\$="NAME@COUNTRY":B
\$="PAINT@COUNTRY"
1965 DRAW"BM2Ø,182":GOSUB62Ø
197Ø IFC=6 THEN1975 ELSENO=3: DRAW"
BM5,19Ø":GOSUB63Ø:A\$="NAME@CAPIT
AL":DRAW"BM2Ø,19Ø":GOSUB62Ø:NO=4
:DRAW"BM12Ø,174":GOSUB63Ø:A\$=B\$
:DRAW"BM136,174":GOSUB62Ø
1975 NO=5: DRAW"BM14Ø,19Ø":GOSUB6
3Ø:A\$="QUIT":DRAW"BM155,19Ø":GOS
UB62Ø
198Ø A\$=INKEY\$:IFA\$="" THEN 198Ø
199Ø Q=VAL(A\$):IFC=6AND(Q=3ORQ=4
ORQ>5) THEN198Ø ELSEIFQ<1 OR Q>5 T
HEN198Ø
1995 GOSUB64Ø:RETURN
2ØØØ S1=186:F1=221:GOSUB66Ø:RETU
RN
29ØØ POKE65495,Ø:RESTORE:S=S1:F=
F1
29Ø5 A\$="LOADING@DATA":DRAW"BM8Ø
,19Ø;S4":GOSUB62Ø
291Ø RS=1:GOSUB2Ø5
2915 IFS=1 THEN298Ø
292Ø IFS<5Ø THENS3=1:F3=S-1:GOTO
296Ø
2925 FORJ=1TØ5Ø:READC1\$(J):READP
1\$(J):READX1(J):READY1(J):NEXTJ
293Ø IFS<1ØØ THENS3=51:F3=S-1:GO
TO296Ø
2935 FORJ=51TØ1ØØ:READC1\$(J-5Ø):
READP1\$(J-5Ø):READX1(J-5Ø):READY
1(J-5Ø):NEXTJ
294Ø IFS<15Ø THENS3=1Ø1:F3=S-1:G
OTO296Ø
2945 FORJ=1Ø1TØ15Ø:READC1\$(J-1ØØ
):READP1\$(J-1ØØ):READX1(J-1ØØ):R
EADY1(J-1ØØ):NEXTJ
295Ø IFS<2ØØ THENS3=151:F3=S-1
296Ø FORJ=S3 TOF3:READC1\$(J-S3):
READP1\$(J-S3):READX1(J-S3):READY
1(J-S3):NEXTJ
297Ø FORJ=S TOF1+1:READC1\$(J-S+1
):READP1\$(J-S+1):READX1(J-S+1):R
EADY1(J-S+1):NEXTJ:J=J-S
2975 GOTO299Ø
298Ø FORJ=1TØF1:READC1\$(J):READP
1\$(J):READX1(J):READY1(J):NEXTJ
299Ø FORJJ=J TO51:CI\$(JJ)="" :P1\$(
JJ)="" :X1(JJ)=Ø:Y1(JJ)=Ø:NEXTJJ
2995 POKE65494,Ø:GOSUB665:RETURN
3Ø1Ø RETURN
3Ø2Ø DATAMOROCCO,RABAT,5Ø,33,ALG
ERIA,ALGIERS,76,33,TUNISIA,TUNIS
,84,22,LIBYA,TRIPOLI,96,33,EGYPT
,CAIRO,122,3Ø,MAURITANIA,NOUAKCH
OTT,54,33,MALI,BAMOKO,63,51,NIGE

R, NIAMEY, 76, 53, CHAD, NDJAMENA, 96,
53, SUDAN, KHARTOUM, 125, 6Ø, ETHIOPI
A, ADDISABABA, 14Ø, 6Ø
3Ø3Ø DATADJIBOUTI, DJIBOUTI, 142, 5
5, SOMALIA, MOGADISHU, 15Ø, 6Ø, SENEG
AL, DAKAR, 47, 54, THE@GAMBIA, BANJUL
, 43, 51, GUINEA@BISSAU, BISSAU, 47, 5
9, GUINEA, CONAKRY, 6Ø, 65, SIERRA@LE
ONE, FREETOWN, 54, 65, LIBERIA, MONRO
VIA, 56, 65, IVORY@COAST, ABIDJAN, 67
, 65, GHANA, ACCRA, 73, 62
3Ø4Ø DATAUPPER@VOLTA, OUAGADOUGOU
, 73, 53, TOGO, LOME, 75, 62, BENIN, POR
TO@NOVO, 79, 6Ø, NIGERIA, LAGOS, 9Ø, 6
Ø, CAMEROON, YAOUNDE, 92, 7Ø, CENTRAL
@AFRICA, BANGUI, 1Ø5, 6Ø, EQUIT@GUIN
EA, MALABO, 86, 75, GABON. LIBREVILLE
, 9Ø, 75, CONGO, BRAZZAVILLE, 95, 75, Z
AIRE, KINSHASA, 112, 8Ø
3Ø5Ø DATAUGANDA, KAMPALA, 12Ø, 7Ø, R
WANDA, KIBALI, 12Ø, 76, BURUNDI, BUJU
MBURA, 121, 8Ø, KENYA, NAIROBI, 138, 7
Ø, TANZANIA, DAR@ES@SALAAM, 129, 83,
ANGOLA, LUANDA, 96, 95, ZAMBIA, LUSAK
A, 12Ø, 1ØØ, MALAWI, LILONGWE, 129, 93
, NAMIBIA, WINDHOEK, 96, 1Ø5, BOTSWAN
A, GABORONE, 116, 115
3Ø6Ø DATAZIMBABWE, HERARE, 12Ø, 1Ø9
, MOZAMBIQUE, MAPUTO, 13Ø, 1Ø5, SOUTH
@AFRICA, PRETORIA, 116, 125, LESOTHO
MASERU, 119, 131, SWAZILAND, MBABAN
E, 123, 118, MADAGASCAR, TANANARIVE,
151, 1Ø5
3Ø8Ø DATANORWAY, OSLO, 87, 52, SWEDE
N, STOCKHOLM, 1Ø3, 52, FINLAND, HELSI
NKI, 132, 32, RUSSIA, MOSCOW, 16Ø, 8Ø,
EIRE, DUBLIN, 26, 83, UNITED@KINGDOM
, LONDON, 47, 89, BELGIUM, BRUSSELS, 6
7, 97, NETHERLANDS, THE@HAGUE, 7Ø, 88
3Ø9Ø DATALUXEMBOURG, LUXEMBOURG, 7
3, 1ØØ, WEST@GERMANY, BONN, 8Ø, 92, D
ENMARK, COPENHAGEN, 82, 72, EAST@GERM
ANY, BERLIN, 95, 82, CZECHOSLOVAKIA,
PRAGUE, 115, 99, POLAND, WARSAW, 115,
82, PORTUGAL, LISBON, 28, 14Ø, SPAIN,
MADRID, 38, 14Ø, FRANCE, PARIS, 67, 1Ø
7, SWITZERLAND, BERNE, 8Ø, 11Ø
31ØØ DATAITALY, ROME, 85, 127, AUSTRI
A, VIENNA, 1ØØ, 11Ø, HUNGARY, BUDAPE
ST, 12Ø, 11Ø, YUGOSLAVIA, BELGRADE, 1
22, 123, RUMANIA, BUCHAREST, 14Ø, 11Ø
, BULGARIA, SOFIA, 14Ø, 123, ALBANIA,
TIRANA, 118, 127, GREECE, ATHENS, 125
, 133, TURKEY, ISTANBUL, 155, 136
312Ø DATARUSSIA, MOSCOW, 16Ø, 5Ø, TU
RKEY, ISTANBUL, 4Ø, 86, SYRIA, DAMASC
US, 43, 98, LEBANON, BEIRUT, 39, 98, IS
RAEL, TEL@AVIV, 39, 1ØØ, JORDAN, AMMA
N, 43, 1Ø3, IRAQ, BAGHDAD, 53, 98, SAUD
I@ARABIA, RIYADH, 53, 11Ø, YEMEN, SAN
A, 59, 126, SOUTH@YEMEN, ADEN, 63, 125
, OMAN, MUSCAT, 7Ø, 117
313Ø DATA@ARAB@EMIRATES, ABU@DHA
BI, 66, 113, QATAR, DOHA, 63, 113, IRAN
, TEHRAN, 63, 1Ø3, AFGHANISTAN, KABUL
, 82, 1ØØ, PAKISTAN, ISLAMABAD, 87, 1Ø
8, INDIA, DELHI, 1Ø7, 11Ø, SRI@LANKA,
COLOMBO, 111, 146, NEPAL, KATMANDU, 1
14, 1Ø4, BHUTAN, THIMBU, 13Ø, 1Ø4, BAN
GLADESH, DACCA, 127, 111
314Ø DATABURMA, RANGOON, 138, 111, T
HAILAND, BANGKOK, 151, 13Ø, W@MALAYS
IA, KUALA@LUMPUR, 15Ø, 149, SINGAPOR
E, SINGAPORE, 154, 152, LAOS, VIENTIA
NE, 154, 125, CAMBODIA, PHNOM@PENH, 1
61, 138, VIETNAM, HANOI, 159, 121, CHI
NA, PEKING, 169, 96, MONGOLIA, ULAN@B
ATOR, 15Ø, 76
315Ø DATATAIWAN, TAIPEI, 189, 116, N

Listing continued

@KOREA, PYONGYANG, 195, 86, S@KOREA, SEUL, 196, 96, JAPAN, TOKYO, 213, 89
 318# DATAALASKA, JUNEAU, 4# 2#, WAS HINGTON, OLYMPIA, 9#, 8#, OREGON, SAL EM, 9#, 85, IDAHO, BOISE, 1# 8#, 85, MONT ANA, HELENA, 1# 8, 8#, WYOMING, CHEYEN NE, 11#, 9#, NORTH@DAKOTA, BISMAR, 1 27, 77, SOUTH@DAKOTA, PIERRE, 127, 87 , MINNESOTA, ST@PAUL, 143, 82, WISCON SIN, MADISON, 16#, 83
 319# DATAMICHIGAN, LANSING, 175, 83 , CALIFORNIA, SACRAMENTO, 88, 98, NEV ADA, CARSON@CITY, 95, 98, UTAH, SALT@ LAKE@CITY, 1# 5, 1# 8#, ARIZONA, PHOENI X, 1# 5, 11#, COLORADO, DENVER, 115, 1# #, NEW@MEXICO, SANTA@FE, 115, 11#, NE BRASKA, LINCOLN, 132, 95, KANSAS, TOP EKA, 132, 1# 2
 32# DATAOKLAHOMA, OKLAHOMA@CITY, 137, 11#, TEXAS, AUSTIN, 137, 125, IOW A, DES@MOINES, 146, 9#, MISSOURI, JEF F@PERSON@CITY, 15#, 1# 2, ARKANSAS, LIT TLE@ROCK, 15#, 11#, LOUISIANA, BATON @ROUGE, 15#, 119, ILLINOIS, SPRINGFI EL, 162, 95, INDIANA, INDIANAPOLIS, 17#, 95
 321# DATAOHIO, COLUMBUS, 18#, 92, KE NTUCKY, FRANKFORT, 173, 1# 2, WEST@VI RGINIA, CHARLESTON, 185, 1# 8#, VIRGIN IA, RICHMOND, 19#, 1# 8#, TENNESSEE, NA SHVILLE, 175, 1# 6, NORTH@CAROLINA, R ALEIGH, 185, 1# 6, SOUTH@CAROLINA, CO LUMBIA, 185, 11#, MISSISSIPPI, JACKS ON, 162, 118
 322# DATAALABAMA, MONTGOMERY, 172, 115, GEORGIA, ATLANTA, 18#, 115, FLOR IDA, TALLAHASSEE, 184, 122, MARYLAND , ANNAPOLIS, 192, 96, DELAWARE, DOVER , 195, 97, PENNSYLVANIA, HARRISBURG, 192, 9#, NEW@JERSEY, TRENTON, 197, 92 , NEW@YORK, ALBANY, 197, 83, CONNECTI CUT, HARTFORD, 2# 2, 88
 323# DATARHODE@ISLAND, PROVIDENCE , 2# 4, 88, MASSACHUSETTS, BOSTON, 2# 4 , 84, VERMONT, MONTEPELIER, 2# 2, 8#, NE WE@HAMPSHIRE, CONCORD, 2# 4, 8#, MAINE , AUGUSTA, 2# 9, 76, HAWAII, HONOLULU , 3, 152
 325# DATAMEXICO, MEXICO@CITY, 1# 5, 12, GUATEMALA, GUATEMALA, 113, 16, BE LIZE, BELMOPAN, 116, 12, EL@SALVADOR , SAN@SALVADOR, 115, 2#, HONDURAS, TE GUCIGALPA, 118, 17, NICARAGUA, MANAG UA, 118, 21, COSTA@RICA, SAN@JOSE, 11 8, 25, PANAMA, PANAMA@CITY, 124, 27, C UBA, HAVANA, 134, 9
 326# DATAJAMAICA, KINGSTON, 138, 13 , HAITI, PORT@AU@PRINCE, 142, 11, DOM INICAN@REP, SANTO@DOMINGO, 145, 11, PUERTO@RICO, SAN@JUAN, 152, 13, COLO MBIA, BOGOTA, 132, 29, VENEZUELA, CAR ACAS, 145, 25, GUYANA, GEORGETOWN, 15 5, 28, SURINAM, PARAMARIBO, 159, 3#, F R@GUIANA, CAYENNE, 163, 3#
 327# DATAECUADOR, QUITO, 127, 39, PE RU, LIMA, 13#, 55, BOLIVIA, LA@PAZ, 14 8, 62, BRAZIL, BRASILIA, 16#, 52, PARA GUAY, ASUNCION, 16#, 74, URUGUAY, MON TEVIDEO, 165, 94, CHILE, SANTIAGO, 14 5, 76, ARGENTINA, BUENOS@AIRES, 155, 94, FALKLAND@IS, STANLEY, 162, 126
 33# DATACANADA, OTTAWA, 45, 3#, GRE ENLAND, @, 93, 7, ICELAND, REYKJAVIK, 1# 7, 19, INDONESIA, DJAKARTA, 21#, 85 , PHILIPPINES, MANILA, 211, 72, PAPUA @NEW@GUINEA, PORT@MORESBY, 235, 88, AUSTRALIA, CANBERRA, 244, 1# 8#, NEW@Z EALAND, WELLINGTON, 228, 111
 33# DATAARCTIC@OCEAN, @, 141, 5, PA CIFIC@OCEAN, @, 25, 75, N@ATLANTIC@O

CEAN, @, 9#, 43, S@ATLANTIC@OCEAN, @, 1# 5, 95, INDIAN@OCEAN, @, 175, 9#
 331# DATABASE@FORT@SEA, @, 2# 7, 7, BAF FINE@BAY, 1#, 1#, NORWEGIAN@SEA, @, 125, 15, BARENTS@SEA, @, 15#, 12, OKHO TSK@SEA, @, 228, 35, BERING@SEA, @, 24 8, 3#, CARIBBEAN@SEA, @, 6#, 65, SARGA SSO@SEA, @, 72, 52, NORTH@SEA, @, 118, 3#, MEDITERRANEAN@SEA, @, 13#, 47, BL ACK@SEA, @, 143, 43
 3315 DATACASPIAN@SEA, @, 153, 43, RE D@SEA, @, 148, 62, ARABIAN@SEA, @, 164 , 7#, SOUTH@CHINA@SEA, @, 2# 7, 75, COR AL@SEA, @, 24#, 95, TASMAN@SEA, @, 242 , 11#, MT@MCKINLEY, @, 15, 21, MT@ANCO HUMA, @, 69, 88, MT@BLANC, @, 122, 38, M T@EVEREST, @, 183, 49
 332# DATAMTEKILIMANJARO, @, 144, 75 , MT@COOK, @, 246, 113, , , #, #
 4# F1=F1-S1+1
 4# I=#:GOTO4#25
 4#1# GOSUB45#8:GOSUB64#:IFA=6THE NRETURN
 4#25 I=I+1:IFI>F1 THEN4#85 ELSEY 4=Y1(I):GOSUB457#:COLOR1,1:IFC<> 6 OR(C=6ANDI>8)THEN4#35
 4#31 IFI<3 ORI=7 THENGOSUB41#8:G OTO4#45
 4#32 IFI=4 THENR=2#:HW=.3# ELSE R =6:HW=1
 4#33 CIRCLE(X1(I),Y1(I)),R,HW:C IRCLE(X1(I),Y1(I)),R+1,HW:GOTO4 #45
 4#35 IFC=6 THENGOSUB41#8:GOTO4#4 5
 4#4# GOSUB51#8:PAINT(X1(I),Y1(I)),1:GOSUB48#8
 4#45 IFC=4 THENA\$="STATE" ELSEIF C<>6 ORC=6 ANDI<9 THENA\$="COUNTR Y" ELSEA\$="THIS@IS"
 4#5# DRAW"S4;BM2#,164":GOSUB62#: A\$=C1\$(I):DRAW"S4;BM1#8#,164":GOS UB62#
 4#6# IFC<>6 ORC=6 ANDI<9 THENA\$=" CAPITAL":DRAW"S4;BM2#,174":GOSU B62#:A\$=P1\$(I):DRAW"S4;BM1#8#,174 ":GOSUB62#
 4#65 A\$="Q@QUIT@#@#@#@ANY@KEY@CONTI NUE":DRAW"BM5,19#":GOSUB62#
 4#7# A\$=INKEY\$:IFA\$="M"THEN4#7#
 4#75 IFA\$="Q" THEN F1=F1+S1-1:A= 6
 4#8# GOTO4#1#
 41#8# COLOR1,1:IFI>3# THEN41#85ELS ECIRCLE(X1(I),Y1(I)),4:PAINT(X1(I),Y1(I)),1:LINE(X1(I)-6,Y1(I))- (X1(I)+6,Y1(I)),PSET:LINE(X1(I), Y1(I)-5)-(X1(I),Y1(I)+5),PSET:GO TO414#
 41#5 LINE(X1(I)-4,Y1(I)+4)-(X1(I) ,Y1(I)),PSET:LINE-(X1(I)+4,Y1(I))+4),PSET:LINE-(X1(I)-4,Y1(I)+4) ,PSET:PAINT(X1(I),Y1(I)+2),1
 414# RETURN
 42#8# GOTO4222
 421# GOSUB45#8:IFA=4THENRETURN
 4222 GOSUB5#8:GOSUB51#8:GOSUB64 #:Y4=Y1(I):GOSUB457#
 4224 GOSUB64#
 4228 IFC=6THENGOSUB41#8:GOTO424#
 423# PAINT(X1(I),Y1(I)),1:GOSUB4 8#8#
 424# IFQ<>2 THEN425#
 4245 A\$="SELECT":DRAW"BM35,164": GOSUB62#
 425# IFQ<>3 THEN426#
 4255 A\$="CAPITAL@OF":DRAW"BM5,16 6":GOSUB62#:A\$=C1\$(I):DRAW"BM12# ,166":GOSUB62#:DRAW"BM+5,+#":A\$= "?:GOSUB62#

426# GOSUB52#8
 427# A\$=INKEY\$:IFA\$=" " THEN427#
 428# A=VAL(A\$):IFA=# THEN427# EL SEIFA=4 THENGOSUB58#8:GOTO421# E LSEIFA=X THENGOSUB55#8 ELSEGOSUB 56#8
 429# CT=CT+1:IFCT<1# THEN421# EL SEGOSUB58#8:A=4:GOTO421#
 44#8# GOSUB5#8:FT=#:GOTO443#
 44#5 GOSUB5#8#
 4425 IFFT=1 THENGOTO448#
 443# IFC=4 THENA\$="WHICH@STATE@I S" ELSEA\$="WHICH@COUNTRY@IS"
 444# DRAW"BM35,166":GOSUB62#
 445# A\$=C1\$(I):DRAW"BM5,174":GOS UB62#:A\$="OR@Q@QUIT":DRAW"BM17#, 174":GOSUB62#
 446# A\$="USE@RIGHT@AND@LEFT@ARRO WS":DRAW"BM5,182":GOSUB62#:A\$="P RESS@ENTER@WHEN@SURE":DRAW"BM5,1 9#":GOSUB62#
 447# I2=RND(2#):I2=I2-1#:IFI2=#T HEN447#ELSEI1=I+I2:IFI1<#THENI1= F1-IELSEIFI1>F1THENI1=S1+I1
 4475 Y4=Y1(I1)
 448# IFI1<1 THENI1=F1+1-S1 ELSE IFI1>F1+1-S1 THENI1=1
 4492 IFFT=# THEN45#5
 4495 GOSUB45#8
 45#5 Y4=Y1(I1)
 451# GOSUB457#
 4512 PAINT(X1(I1),Y1(I1)),1:GOSU B51#8:GOSUB48#8
 4513 A\$=C1\$(I):DRAW"BM5,174":GOS UB62#
 4515 FT=1
 4518 A\$=INKEY\$:IFA\$=" " THEN4518
 4519 IFA\$="Q" THENGOSUB58#8:GOSU B45#8:RETURN
 452# IFA\$=CHR\$(8) THENI1=I1-1:GO TO448# ELSE IFA\$=CHR\$(9) THENI1= I1+1:GOTO448#
 453# IFA\$<>CHR\$(13) THEN448#
 4535 IFPOINT(X1(I),Y1(I))=5 THE NGOSUB55#8:GOSUB45#8 ELSEGOSUB45 8#:ER=1:GOSUB56#8
 454# GOSUB64#:FT=#:CT=CT+1:IFCT< 1# THEN44#5 ELSEGOSUB58#8
 456# RETURN
 457# IFY4<97 THENPCOPY1TO5:PCOPY 2TO6:PCOPY3TO7 ELSEPCOPY2TO5:PCO PY3TO6:PCOPY4TO7
 4575 RETURN
 458# IFY4<97 THENPCOPY5TO1:PCOPY 6TO2:PCOPY7TO3 ELSEPCOPY5TO2:PCO PY6TO3:PCOPY7TO4
 4585 RETURN
 48#8# COLOR1,1:IFX2<># THENPAINT(X2,Y2),1 ELSE IFY2=99 THEN FOR= 6TO7:CIRCLE(X1(IX),Y1(IX)),R:NEX TR
 481# RETURN
 5#8# NU=#:I=RND(F1-(S1-1)):GOSUB 54#8:IFNU=1 THEN5#8#
 5#1# I1=RND(F1-(S1-1))
 5#15 IFI1=I THEN5#1#
 5#2# I2=RND(F1-(S1-1))
 5#25 IFI2=I OR I2=I1 THEN5#2#
 5#4# IFI<I1 THENT1=I:T2=I1 ELSE T 1=I:T2=I
 5#45 IFI2<T1 THENT3=T2:T2=T1:T1= I2:GOTO5#7#
 5#5# IFI2<T2 THENT3=T2:T2=I2 ELS ET3=I2
 5#7# IFT1=I THENX=1 ELSE IFT2=I THENX=2 ELSE IFT3=I THENX=3
 51#8# X2=#:Y2=#:IFQ<>4 ORQ=4 ANDE R=1THENR=#:IX=I ELSEIX=I1
 51#3 IFC<>1THEN511#
 51#5 IFIX=12 ORIX=15 ORIX=28 THE

```

NY2=99
5106 GOTO5150
5110 IFC<>2THEN5115
5112 IFIX=6THENX2=32:Y2=78:GOTO5
150
5113 IFIX=9THENY2=99
5115 IFC<>3 THEN5130
5120 IFIX=4 ORIX=5 ORIX=9 ORIX=1
3 ORIX=20 ORIX=25 ORIX=31 THENY2
=99
5125 IFIX=19 THENX2=118:Y2=106 E
LSEIFIX=34 THENX2=216:Y2=80
5128 GOTO5150
5130 IFC<>4 THEN5140
5135 IFIX=11 THENX2=170:Y2=78 EL
SEIFIX=50 THENY2=99
5137 GOTO5150
5140 IFC<>5 THEN5150
5142 IFIX=3 ORIX=4 OR(IX>9 ANDIX
<14) ORIX=27 THENY2=99:GOTO5150
5145 IFIX=9 THENX2=129:Y2=7
5150 RETURN
5200 IFQ=2 THENA=C1$(T1) ELSEA=
P1$(T1)
5205 NO=1:DRAW"BM5,174":GOSUB630
:DRAW"BM20,174":GOSUB620
5210 IFQ=2 THENA=C1$(T2) ELSEA=
P1$(T2)
5215 NO=2:DRAW"BM5,182":GOSUB630
:DRAW"BM20,182":GOSUB620
5220 IFQ=2 THENA=C1$(T3) ELSEA=
P1$(T3)
5225 NO=3:DRAW"BM5,190":GOSUB630
:DRAW"BM20,190":GOSUB620
5230 NO=4:DRAW"BM180,174":GOSUB6

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```

30:A$="QUIT":DRAW"BM195,174":GOS
UB620
5240 RETURN
5300 FORJ=1TOTI:II(J)=0:NEXTJ
5310 RETURN
5400 FORJ=0TOTI
5410 IFI=II(J) THENNU=1:GOTO5440
5420 NEXTJ
5430 TI=TI+1:II(TI)=I
5440 RETURN
5500 GOSUB640
5510 CR=CR+1
5520 A$="CORRECT":DRAW"BM70,166"
:GOSUB620
5530 A$="IT@IS":DRAW"BM5,182":GO
SUB620:IFQ=2 ORQ=4 THENA=C1$(I)
ELSE A=P1$(I)
5540 DRAW"BM60,182":GOSUB620
5550 FORT=1TO1000:NEXTT
5560 RETURN
5600 GOSUB640
5620 A$="SORRY@YOU@ARE@WRONG":D
RAW"BM20,164":GOSUB620
5630 IFQ<4 THENGOSUB5530:GOTO56
70
5640 A$="THIS@IS":DRAW"BM5,172":
GOSUB620:A=C1$(I):DRAW"BM75,172"
:GOSUB620
5645 Y4=Y1(I):GOSUB4570
5650 GOSUB5100:PAINT(X1(I),Y1(I)
),1:GOSUB4800
5660 FORT=1TO2000:NEXTT
5665 GOSUB4580
5670 RETURN

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```

5800 GOSUB640:A$="YOUR@SCORE@ON@
THIS@OPTION":DRAW"BM5,166":GOSUB
620:NO=CR:DRAW"BM40,182":GOSUB63
0:A$="OUT@OF":DRAW"BM66,182":GOS
UB620:NO=CT:DRAW"BM138,182":GOSU
B630
5810 FORT=1TO1000:NEXTT:QR=QR+CR
:CR=0:QT=QT+CT:CT=0
5820 FORT=0TOTI:II(TI)=0:NEXTT:T
I=0
5825 GOSUB5300:GOSUB640
5830 RETURN
5900 IFQT=0 THEN5940 ELSEGOSUB64
0:A$="TOTAL@FOR":DRAW"BM5,166":G
OSUB620:A=C1$(C):DRAW"BM120,166"
:GOSUB620
5920 NO=QR:DRAW"BM40,182":GOSUB6
30:A$="OUT@OF":DRAW"BM66,182":GO
SUB620:NO=QT:DRAW"BM138,182":GOS
UB630
5930 FORT=1TO2000:NEXTT:TR=TR+QR
:QR=0:TT=TT+QT:QT=0
5940 RETURN
6000 GOSUB660:A$="YOUR@TOTAL@ESCO
RE":DRAW"BM40,152":GOSUB620
6040 NO=TR:DRAW"BM40,182":GOSUB6
30:A$="OUT@OF":DRAW"BM64,182":GO
SUB620:NO=TT:DRAW"BM146,182":GOS
UB630
6050 FORT=1TO2000:NEXTT:GOSUB650
:A$="HOPE@YOU@ENJOYED@IT":DRAW"B
M30,152":GOSUB620:A$="AND@LEARN@
D@A@LITTLE":DRAW"BM30,172":GOSUB
620:FORT=1TO2000:NEXTT:CLS:END

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Tandy's SUPER^{dupe}LOGO

by David Meredith

Super Logo is published by Tandy Corp., 1400 One Tandy Center, Fort Worth, TX 76102. The "classroom" version (catalog no. 26-2716), which is reviewed here, comes on disk, requires 32K, and sells for \$99.95. The "home" version (catalog no. 26-2717) comes on ROM pack, requires 16K, and sells for \$49.95. The Network 2 version (catalog no. 26-2738) requires 32K host and student computers and a Network 2 Controller. It sells for \$299.

Radio Shack has released a new and improved version of Logo for the Color Computer called Super Logo. It is an upgrade of the original Color Logo and was written by the same authors, Larry Kheriaty and George Gerhold. The program retains the best features of its precursor, including a convenient editor for writing programs, the doodle mode for young children, and multiple turtles for advanced users. In addition, it incorporates an improved turtle display, floating-point arithmetic, and list processing. There are also numerous minor improvements, including the new PRINTSCREEN command that copies a graphics screen to a Tandy dot-matrix or ink-jet printer.

Super Logo is available on disk or ROM pack, and there is also a Network 2 version. The disk version can save Logo procedures you write to disk or cassette. The ROM-pack version saves to cassette only. Procedures saved on cassette should be compatible with both versions. (Super Logo loaded tapes made with my Color Logo ROM-pack cartridge.)

Included with the Super Logo package is an expanded version of the original Color Logo manual. It explains all the Super Logo functions and provides many example programs. The Tandy manual has always been one of my favorite introductions to Logo, and the new version has more and better examples than the old one.

Along with the Super Logo disk, the prerelease package used for this review contained a disk of demonstration programs. The short, clever graphics and list-processing routines illustrate advanced Logo programming techniques better even than the manual, and you don't have to type them in. Tandy should include these demonstration programs on the program disk.

Super Logo is impressive. Apart from one isolated but serious bug—the division algorithm is incorrect—I would give the program the highest of ratings because it functions superbly in every other respect. It is crashproof, forgiving of errors, convenient, and fun. It presents Logo as it should be, a programming language that is simple enough for beginners and powerful enough for experts.

Turtle Graphics

One area of improvement in Super Logo is turtle movements. Color Logo's turtle does not turn and move as accurately as does the turtle from the newer program. It can only point in directions that are multiples of 45 degrees. For example, the command RIGHTTURN 15 in Color Logo usually produces no visible effect on the turtle because the

change in direction does not take in 45 degrees. But even though you can't see it, the direction of the Color Logo turtle is changed by that command. If you execute a FORWARD 10 command, the turtle will move diagonally 15 degrees away from the direction in which it was previously pointing. My Logo students are often confused by this. Super Logo's turtle points in the exact direction that it will move. And because of this, my own children, who used Color Logo extensively, now use only Super Logo.

Another difference is that whereas Color Logo's turtle ends every move in the center of a screen pixel, the Super Logo turtle can differentiate fractions of pixels. In Color Logo, executing a FORWARD 1 command with a heading of 30 degrees has the same effect as executing FORWARD 1 with a 45-degree heading. Repeating the command on a 30-degree heading produces a 45-degree line. In Super Logo, a FORWARD command on a 30-degree heading produces some 45-degree movements and some zero-degree movements that combine to form a line inclined at 30 degrees. As a result, the classic Logo circle algorithm,

```
REPEAT 360
(FD 1 RT 1),
```

which made an octagon in Color Logo, creates a circle in Super Logo.

Structured Programming

An important aspect of Logo is that it is a structured language. It uses WHILE, REPEAT, and IF...ELSE commands rather than GOTOS to control program logic. Programs written in Logo are actually a collection of short procedures. Each procedure does a single job, often calling another procedure into play. Logo programmers commonly reuse procedures that they mix and match to create different programs.

Super Logo makes it easy to reuse procedures with a MERGE command and a selective SAVE command. They allow you to combine procedures from different programs to form new programs. To illustrate the advantage of these commands, you might ask each student in a class to write a procedure to make the turtle write a particular letter of the alphabet. With the new commands, students could save the letter routines in different files and you could combine them into an interesting printing program. And Super Logo, unlike some other Logos, also allows multiple-line WHILE, REPEAT, and IF...ELSE clauses so you don't need to reduce each clause to a one-line subroutine call.

Super Logo also provides two new commands for communication between procedures. They are a send-receive pair that allows one procedure to request and receive a value from another. When the second procedure executes the command OUTPUT value, it stops just as though it had encountered END and returns control to the procedure that invoked it. It also sends the specified value to a buffer where it can be retrieved by the first procedure. Then the calling procedure executes RESULT to find the value of the OUTPUT.

Super Logo goes beyond Color Logo with list processing, floating-point arithmetic, and a new turtle display.

What Is List Processing?

Super Logo is similar to Basic in its accessibility and related to Pascal in its structured-programming capabilities. But otherwise, it is not anything like either of these languages. It is closely related to Lisp (for list processing), the artificial-intelligence language used for advanced computer research. It is list variables that distinguish Lisp-style or -functional languages, such as Logo, from procedural languages, such as Basic, Pascal, and Fortran. A list is a sequence of character strings, called words, that are separated by blanks. For example, CAT DOG MOUSX7&T is a list containing three words. In Super Logo, lists are denoted by surrounding brackets: [CAT DOG MOUSX7&T]. The brackets are not part of the list, but are delimiters like the quotation marks around a Basic string.

Empty lists are denoted by empty brackets, [], which are analogous to "", the null-string symbol in Basic. Lists can be stored in a variable, as in this statement: MAKE :L [CAT DOG MOUSX7&T]. Lists can be manipulated by adding or deleting entries or by combining them with other lists. For example, MAKE :M BUTLAST :L, makes :M contain [CAT DOG]. Table 1 is a glossary of Super Logo's list operations.

In the same way that a list is a list of words, a word is a list of characters. Words are denoted by beginning quotation marks and trailing blanks. Most list operations operate on words. For example, MAKE :W BUTLAST "DOG makes :W contain the word DO. Or you might add a word to a list; FPUT "COW [DOG CAT] would result in the list [COW DOG CAT]. You can also extract a word from a list. FIRST [COW DOG CAT] is the word cow.

Lists can be input with the REQUEST command and printed on the screen with the PRINT command. A program line such as MAKE :L REQUEST pauses the program until you type a list of words that becomes the contents of :L. PRINT :L prints the list on the screen at the turtle's location.

Both words and lists can be compared for equality and lexicographic order. The following comparisons, for example, are in such order:

```
CAT < DOG
[CAT COW] < [DOG COW]
[COW CAT] < [COW DOG]
[CAT DOG] < [CATS] < [COW DOG].
```

You can write text-manipulation programs with comparisons.

Lists form a recursive data structure that complements recursive programming in Super Logo. If you remove the first or last element from a list or insert a new element, what remains is still a list.

Although lists, like arrays, are sequences of data, they differ from arrays in that position is entirely relative. When you remove the first element from a list, you do not have an empty space as you would in an array. Instead, the second word now becomes the first word.

Lists do not have to be dimensioned as arrays must be. A list is as long as you have to make it and no longer. I made a Super Logo list of 351 three-letter words before I ran out of memory.

Computer researchers sometimes use list-based languages derived from Lisp because programs written this way are easy to verify. Consider the problem of computing the length of a list. There are two possible approaches. The counting method matches the entries of a list against sequence 1, 2, 3, and so on. The length of the list is the last number matched. The recursive method defines the length of an empty list to be zero and the length of any other list as one more than the length of the list with the first entry removed.

The counting method is more convenient for humans, but it is easier to write a correct computer program using the recursive approach. The procedures LengthC and LengthR in Listing 1 compute the length of a list. The counting method, LengthC, works correctly but is difficult to check. Its program lines could conceal an off-by-one error that would return a value too large or too small by one. The recursive

Command	Function
FIRST list	Returns the first word of the list
LAST list	Returns the last word of the list
BUTFIRST list	Returns a list containing all the words of the argument list but the first
BUTLAST list	Returns a list containing all the words of the argument list but the last
LIST word word	Returns a list consisting of the two arguments
FPUT word list	Returns a list containing a word followed by the words in a list
LPUT word list	Returns a list of words in a list followed by the argument word
REQUEST	Returns a list of words input from the keyboard
SENTENCE list list list # list	Either of these operations returns a concatenation of the argument lists.

Table 1. List Operations

procedure, LengthR, mimics exactly the recursive definition of length; therefore, it must be correct.

Another aspect of list processing is merge sorting (see Listing 2), which works by dividing the entries of a list into two sublists, sorting them recursively, and merging them into a sorted copy of the original list. The Super Logo implementation of merge sorting uses two recursive procedures, SORT and MERGE. SORT sorts a given list in conjunction with MERGE, which combines the two sorted lists into one.

Purists might find Super Logo to be careless in some borderline areas of list processing. In general, no distinction is made between a word and one-word list. Asking for the first word in an empty list returns the null word (empty string), not an error message. It is possible to remove the first word from an empty list; the result is an empty list. The procedure Sort in Listing 2 takes advantage of these ambiguities. When words are taken in pairs from the front of :LIST and put into :PART1 and :PART2, it is not important that :LIST might contain an odd number of entries.

Another limitation of Super Logo's list-processing abilities is that its lists cannot be elements of other lists, which limits the degree to which Super Logo can imitate Lisp. In addition, its lists cannot be executed as programs. Logo programs are lists of words; other versions of the language allow you to execute a list if it happens to be a syntactically correct program. Super Logo does not offer this feature.

Floating-Point Arithmetic

Super Logo displays numeric values with two decimal places and stores numbers with a somewhat greater accuracy. Although the result of 1 divided by 64 prints as 0.01 (the correct answer is .016), 1/64 > 0.01 tests as true. Addition, subtraction, and multiplication work correctly, but there is a serious error in the floating-point division algorithm. A bad design decision was made concerning this aspect of the program. The result of 3.24 divided by 2.89 is 1.5 in Super Logo. (The correct answer is 1.12.) The program removes fractional parts from an equation before division is performed even though the quotient is correct to two decimal places.

The reason for this is not apparent. You can get around it by multiplying your dividend and divisor by 100 before dividing. For example, instead of dividing 3.24 by 2.89, divide 324 by 289. The answer will be correct to two decimal places. However, this correction does not work in every case. The division routine sometimes returns wrong answers for numbers in the hundreds. If you divide 300 by 500 in

MAKE :A :B (Color Logo)
 MAKE "A :B (Apple Logo)

:X + :Y (Color Logo)
 SUM :X :Y (Apple Logo)

IF :X = :Y (Color Logo)
 [multiline routine goes here]
 TEST :X = :Y (Apple Logo)
 IFTRUE [one line goes here]

NOWRAP (Color Logo)
 FENCE (Apple Logo)

REQUEST (new feature found in Super Logo)
 READLIST (Apple Logo)

Table 2. A Sample of Alternate Forms That Make Super Logo Partially Compatible with Apple Logo

turtle prints anything but 0.6 or 0.59, you've encountered the bug, too.

In addition to floating-point arithmetic, Super Logo provides sine and cosine functions for angles in degrees. However, it does not offer arctangent, logarithmic, or exponential functions, and does not perform square roots.

Other Features

Many teachers who use Logo in their classrooms have been trained on Apple Computers. To ease the transition to the CoCo, Super Logo has some redundant commands (see Table 2) to make it partially compatible with Apple Logo without losing compatibility with Color Logo. Actually, the transition from Apple Logo to CoCo Logo is child's play. I showed Super Logo to a fourth grader trained in Apple Logo; in five minutes he was writing programs without assistance.

Table 3 lists the commands in Super Logo that will be new to Color Logo users, including several that control the screen. The turtle does not normally appear in the three-line text window at the bottom of the screen. The command TEXT prints a message in this window, and PRINT prints at the turtle's location. The text window can be eliminated so you can use the entire screen for graphics with the commands DRAW and FULLSCREEN. For nongraphics programs, the entire screen can be turned into a text window with FULLTEXT. This is useful for list-processing experiments.

New graphics commands in Super Logo include DOT, which sets a dot at the turtle's location, and CLEAN, which erases the screen without altering the turtle. There's also a new command, PAT (pattern), for giving the turtle any shape that can be drawn in a 16- by 16-pixel box. Despite what the manual claims, this feature does not work for an 8- by 32-pixel box.

Another new aspect of the program is that you can copy the entire screen to a Tandy printer with the PRINTSCREEN command. Super Logo's manual says that PRINTSCREEN will work with a DMP-110 dot-matrix printer or a "Radio Shack Color Printer." I tried the CGP-220 ink-jet printer at my local Radio Shack store and my own DMP-120 dot-matrix printer. The ink-jet printer produced colorful results but required 20 minutes for printing. My DMP-120 worked fine with Super Logo and took only three minutes to print a picture.

Error Handling

When the Super Logo interpreter encounters a command it cannot parse, it prints the offending line in the text window together with one of nine spelled-out error messages. And if you do not understand an error, the program offers a new command called TRACE that prints each line of text in the text window before it is executed. I rate Super Logo's error handling as excellent.

Summary

Except for its division bug, Super Logo is a good implementation of Logo, especially for beginners. Its commands are powerful, and its syntax is uncomplicated. The editor makes it easy to enter procedures. Doodle mode, which allows you to move the turtle with one-key commands, is a good introduction to the turtle's moves. But advanced users will not soon outdistance the potential of Super Logo. Multiple turtles and list processing will give them plenty to think about. If and when Tandy fixes the division bug, I'll recommend Super Logo unreservedly. ■

David Meredith is a professor of mathematics at San Francisco State University. Address correspondence to him at San Francisco State University, Department of Mathematics, 1600 Holloway Ave., San Francisco, CA 94132.

Command	Function
OUTPUT value	Terminates procedure and returns value to calling routine
RESULT	Returns result of last OUTPUT
TEXT expression	Prints the value of the expression in the text window
CLEAN	Erases screen without moving turtle
CLEARTEXT	Erases text window
FULLSCREEN	Allows turtle to move into textscreen
FULLTEXT	Uses entire screen as text window
PAT	Assigns the turtle a user-designed 16- by 16-pixel pattern
PENERASE	Sets pen color to background color (The suggested abbreviation for this command, PE, does not work.)
DOT	Draws a dot at the turtle's location
ECHO, NOECHO	Sends or stops sending TEXT, PRINT, and REQUEST values to the printer
ASCII word	Returns the ASCII value of the first character of a word
BUTTON O/I	Returns 1 if selected joystick button is depressed, otherwise returns 0 (Argument 0 equals the right joystick.)
SIN degrees	} Trig Functions
COS degrees	
ROUND value	Returns the nearest integer value
TRACE, NOTRACE	Turns on or off TRACE, which displays each command before executing it.

Table 3. New Super Logo Commands Other Than List Commands

Super Logo, it will give you the answer .17. (The correct answer is .6 or .59.)

I called Tandy's Education Division to ask about Super Logo's division routine. The company assured me that the bug would be investigated. To test the program, type PRINT 300/500 in the run mode. If the

Listing 1. Alternate Procedures for Finding the Length of a List—Run TestL

** LENGTHC IS A COUNTING ALGORITHM FOR FINDING THE LENGTH OF A LIST. :COUNT IS A LOCAL VARIABLE. **

```
TO LENGTHC :LIST :COUNT
  MAKE :COUNT 0
  WHILE :LIST<>[]
    ( MAKE :COUNT :COUNT+1
      MAKE :LIST BUTFIRST :LIST
    )
  OUTPUT :COUNT
END
```

** LENGTHR IS A RECURSIVE ALGORITHM FOR FINDING THE LENGTH OF A LIST. **

```
TO LENGTHR :LIST
  IF :LIST=[]
    ( OUTPUT 0 )
  ELSE
    ( LENGTHR BUTFIRST :LIST
      OUTPUT RESULT+1
    )
  END
```

** TESTL IS A ROUTINE FOR TESTING THE LENGTH FUNCTIONS. FIRST IT INPUTS A LIST, THEN MEASURES AND PRINTS ITS LENGTH TWICE. IT RUNS UNTIL <BREAK>. :LIST IS A LOCAL VARIABLE. **

```
TO TESTL :LIST
  FULLTEXT
  WHILE 1
    ( MAKE :LIST REQUEST
      LENGTHC :LIST
      PRINT RESULT
      LENGTHR :LIST
      PRINT RESULT
    )
  END
```

Listing 2. Merge-Sort Procedures—Run Testsort

** TESTSORT EXERCISES THE SORTING ROUTINE. IT RUNS UNTIL YOU PUSH <BREAK>. :LIST IS A LOCAL VARIABLE, NOT A PARAMETER THAT NEED BE SPECIFIED WHEN CALLING TESTSORT. **

```
TO TESTSORT :LIST
```

```
FULLTEXT
WHILE 1
  ( MAKE :LIST REQUEST
    SORT :LIST
    PRINT RESULT
  )
END
```

** SORT RETURNS THE ENTRIES OF :LIST IN SORTED ORDER. IT DOES NOTHING IF :LIST HAS NO MORE THAN 1 ENTRY, OTHERWISE PUTS ENTRIES OF :LIST ALTERNATELY INTO :PART1 AND :PART2, SORTS THE PARTS, AND MERGES THEM. :PART1 AND :PART2 ARE LOCAL VARIABLES. **

```
TO SORT :LIST :PART1 :PART2
  IF BUTFIRST :LIST = []
    ( OUTPUT :LIST )
  MAKE :PART1 []
  MAKE :PART2 []
  WHILE :LIST <> []
    ( MAKE :PART1
      LPUT FIRST :LIST :PART1
      MAKE :PART2
      LPUT FIRST BUTFIRST :LIST
        :PART2
      MAKE :LIST
      BUTFIRST BUTFIRST :LIST
    )
  SORT :PART1
  MAKE :PART1 RESULT
  SORT :PART2
  MAKE :PART2 RESULT
  MERGE :PART1 :PART2
  OUTPUT RESULT
END
```

** MERGE ASSUMES :LIST1 AND LIST2 ARE SORTED, AND OUTPUTS THE RESULT OF MERGING THEM. THE MERGE IS ACCOMPLISHED RECURSIVELY BY FINDING WHICH LIST HAS THE SMALLEST FIRST ELEMENT, REMOVING IT, MERGING THE RESULT WITH THE UNAFFECTED LIST AND PUTTING THE SMALLEST ELEMENT AT THE FRONT OF THE RESULT. **

```
TO MERGE :LIST1 :LIST2
  IF :LIST1 = []
    ( OUTPUT :LIST2 )
  IF :LIST2 = []
    ( OUTPUT :LIST1 )
  IF FIRST :LIST1 < FIRST :LIST2
    ( MERGE BUTFIRST :LIST1 :LIST2
      OUTPUT FPUT FIRST :LIST1
        RESULT
    )
  ELSE
    ( MERGE :LIST1 BUTFIRST :LIST2
      OUTPUT FPUT FIRST :LIST2
        RESULT
    )
  END
```

Educational Programs



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The Learning Page

by Nancy Kipperman

Help Wanted: Computer Education

Why do you send your children to school? You do so because it's required by law, because education is important to success as an adult, and because you want to provide your child with the best environment in which to develop his or her unique qualities.

Whether you choose public, private, or parochial education, your expectations are the same. You want your child to be challenged, supported, and taught the facts and skills that will enable him or her to develop into an independent contributing member of society.

Too often, parents assume that education is something that happens automatically once a child enters a school building. I'm reminded of the story about the young parents who brought their son to kindergarten on the first day of school. When the teacher asked if Johnny had any special accomplishments or talents acquired in his previous five years of life, the parents replied, "We haven't taught him anything. We've been saving him for you."

Educational Partnership

The point is that a huge responsibility for your child's development rests with the schools—the teachers and administrators to whom you entrust him or her. But education is a partnership between parents and educators striving to provide the best learning situation for each child. Certainly that shared responsibility is the basis for parent-teacher associations.

Traditionally, such organizations have offered support in a variety of ways. Parent-volunteer programs within the schools, new playground equipment, audio-visual materials, curtains for the auditorium stage, school-assembly monies, expanded sports programs—these and many other contributions are often the result of partnerships between schools and parents.

How does this tie in with computers? As parents and educators acclimate themselves to this new technology, the question of how to effectively use computers within schools and at home finds new answers. Debates abound over what computer literacy is, how computers should be used in classrooms,

how to provide equal computer access for all students, and where to find funding for hardware and software.

Involvement Opportunity

I see in this controversy an ideal opportunity for increased involvement between schools and parents. Many school administrators are still writing computer-education curriculum that will determine the way in which computers are used by your child. Advice from the business community on what skills students should acquire is certainly valuable. Many of you might share your expertise with your school personnel.

Purchasing computer hardware is costly. One of the reasons the Color Computer is a wise choice for schools is its modest price. However, for educational computer use to be effective, there must be more than one computer per classroom. Software must also be purchased, not just on a startup basis, but continuously, as new and improved programs become available. Monies raised by parents and children could be earmarked for specific or general purchases.

All of the tried and true methods of fund-raising will work. Candy and bake sales, school fairs, jewelry sales, and t-shirt sales are generally successful. How about charging admission at a computer fair in the school gymnasium, where students already familiar with computers could demonstrate a machine's capabilities? Computer owners or local computer dealers might lend equipment for the day. Perhaps attendees could purchase 10 minutes at a computer and use software under helpful supervision. An important message to the tax-paying community would be the joint involvement of teachers, parents, and students in the quest for school computers.

Chris Malaska, educational sales representative for TCE Software in Maryland, says she receives calls about three times a year from small, private schools ordering software with funds raised by parents and students. Usually these funds are turned over to a specific teacher or administrator for expenditure. However, a goal for specific software or hardware could be set in advance.

Community Involvement

If your district or school already has enough computers, other areas for participation might be found. Perhaps parent volunteers could work with students to set up databases containing information or sources relevant to areas of curricula being studied. How about developing a local speakers' bureau—a bank of community expertise that could be used for arranging classroom guest speakers, student interviews of people in particular occupations, or career-shadow days in which students spend a day in the workplace learning about a specific job or profession. The database could include information on unusual hobbies or collections of local residents.

Parent volunteers might establish a software library within the school that includes donations of home-education software or original programs that have outlived their usefulness to the owner. As schools move toward emphasizing real-life computer applications, particularly at the high-school level, area professionals who use spreadsheets and databases might visit the classroom to explain how computers are actually used in business.

Careful Approach

For a community member interested in getting involved, the first step is to speak to the administrator or teacher in charge. Or, perhaps the first step is for the teacher or administrator to approach parents or for the student to initiate a dialogue. Most important is recognizing that computers are here to stay; we must learn to use their capabilities to our advantage. You can't save your children for their school experience with blank minds; nor can you relegate your responsibility for their education completely to the teachers they meet there. You can and should be informed and be willing to contribute your time and talent if it is needed. At the rate knowledge is increasing, none of us can afford to delay involvement in preparing today's children to be tomorrow's citizens. ■

Nancy Kipperman is HOT CoCo's Education Editor and an English teacher at Conant High School in Jaffrey, NH. Write her c/o HOT CoCo, 80 Pine St., Peterborough, NH 03458.

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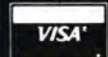
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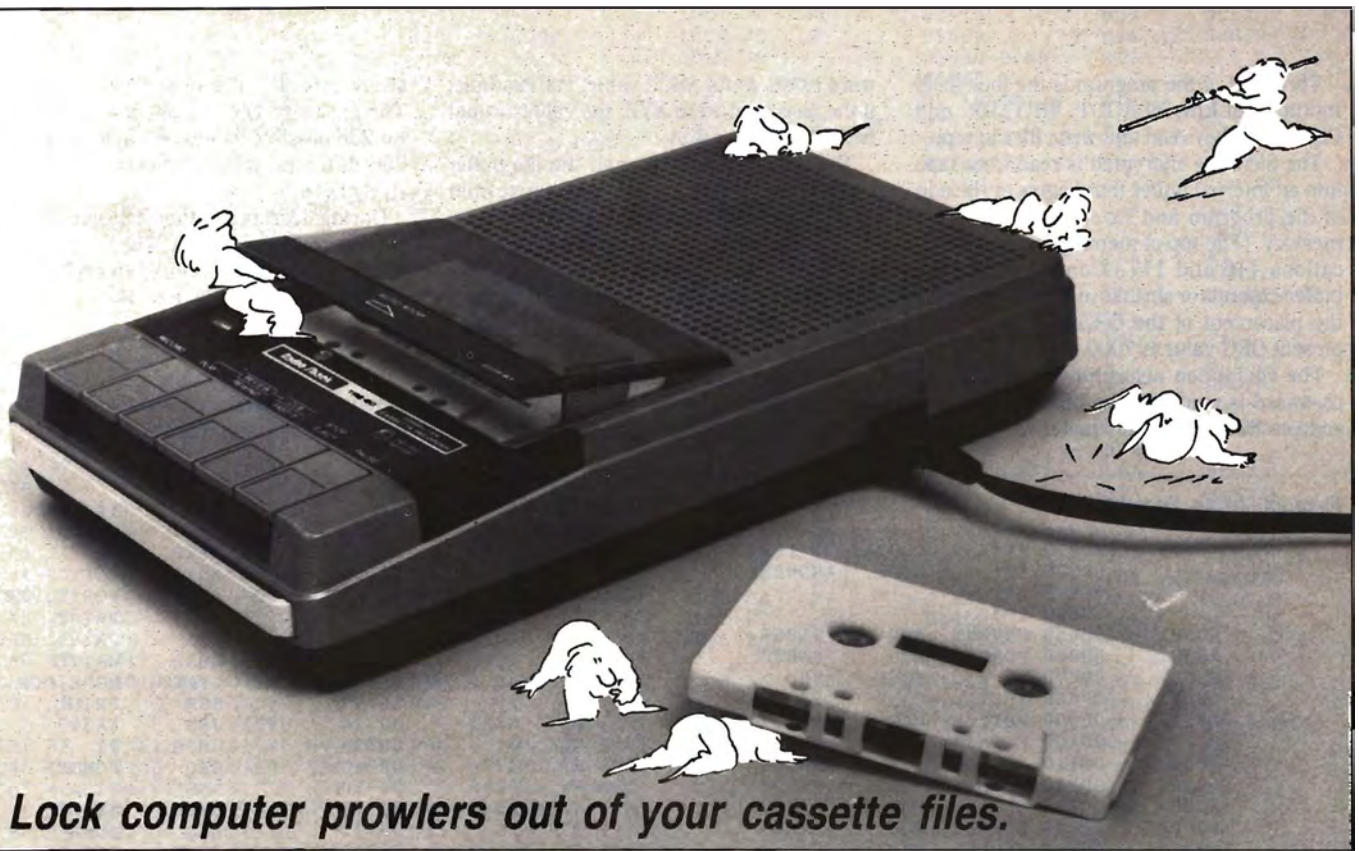
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UTILITY

by Larry Landwehr

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Using the Program

The program encrypts only files written in ASCII format. Radio Shack's EDTASM+ and most word processors save files in ASCII; to save a Basic program in ASCII, type `CSAVE "File name".A`.

After typing in the Listing, CLOADM and EXEC the program. The opening display prompts you for the name of the file to be encoded. Set up the tape recorder and position the tape near the beginning of the file you want to encrypt. Type the file name and press the enter key. If you press the enter key without naming a file, the program accepts the next file on the tape.

Messages regarding searching, reading, and loading of the file keep you informed of the progress of the program. After the file is loaded in to an internal buffer, a prompt requests a password. Enter a word of more than one character. Make it easy to remember but hard for someone else to guess. Almost immediately after you press the enter key, a message announces that the file in the buffer is encoded.

At the next prompt, type in a name for the output file and press the enter key. If you press the enter key without entering a file name, the program assigns a file name consisting of eight blanks.

You are instructed to press the enter key again after positioning the tape to record the encoded file. The program asks whether you wish to save another encrypted copy of the file. A Y response brings up the tape-positioning prompt and you repeat the procedure outlined above. If you press any other key,

the program announces that it is done and asks you if you need to encode another file. Responding with a Y returns you to the beginning of the program; any other response exits you to the Basic interpreter.

The decryption process operates similarly. Position the tape at the beginning of a previously encoded file. Run the encryption program again; at the password prompt, type in the password you used during encryption. (If you use a different password, garbage results. You can, however, use two passwords deliberately as a double encryption.) At the end of the decryption procedure, you will have a restored copy of the original file on tape.

How the Program Operates

The program reads input from the keyboard using an undocumented ROM (read-only memory) routine located at memory address \$A393. The routine accepts a string of characters that is terminated by pressing the enter or break key. The string is stored in a 250-byte buffer starting at address \$2DD. The X register holds the value \$2DC on returning; the B register holds the length of the string plus 1.

System Requirements

16K RAM
Color Basic
Editor/Assembler

The heart of the program is the four ROM routines, BLKIN, BLKOUT, WRTLDR, and CHROUT. They read and write files to tape.

The file to be encrypted is read from tape into an internal buffer that begins at the end of the program and extends to the top of memory. (The top-of-memory value is in locations 116 and 117.) Consequently, the buffer expands or shrinks in accordance with the placement of the ORG statement. The present ORG value is 7000.

The encryption algorithm is simple. The password is read into the buffer starting at address \$2DD. Each character of the pass-

word exists as its ASCII value. For example, if the password were XYZ, the values would be \$58, \$59, and \$5A.

The program goes through the file buffer exclusively ORing each byte with a byte from the password. When the program has gone through each byte of the password it returns to the first byte, cycling through the password as many times as necessary. This process produces a buffer of bytes that appear to be random.

An exclusive OR of two bits is true if the bits are different and false if they are the same. The EORA or EORB instruction exclu-

sively ORs all 8 bits of the A or B registers. The exclusive OR is a one-to-one mapping: All 256 possible values of a byte translate to 256 different values after they are exclusively ORed.

During decryption, the exclusive OR operation is performed again. The file is restored to its original state because an exclusive OR operation is its own inverse. ■

Address correspondence to Larry Landwehr, P.O. Box 27545, Minneapolis, MN 55427.

Program Listing. Encryption

	0000	***	THE CODER	1BCA	A6	A0	00620	COPY	LDA	,Y+
	00010	***	COPYRIGHT 1984	1BCC	A7	80	00630		STA	,X+
	00020	***	BY L. LANDWEHR	1BCE	5A		00640		DECB	
	00030	***		1BCF	26	F9	00650		BNE	COPY
	00040	***		1BD1	30	8D 0199	00660	DUMP	LEAX	POSIT,PCR
	A002	00050	CHROUT EQU \$A002	1BD5	8D	31	00670		BSR	PRINT
	A000	00060	POLCAT EQU \$A000	1BD7	BD	A393	00680		JSR	\$A393
	000D	00070	CR EQU \$0D	1BDA	17	00EF	00690		LBSR	WRITE
	0059	00080	YLET EQU \$59	1BDD	30	8D 0178	00700		LEAX	MORE,PCR
	FF21	00090	MOTCTL EQU \$FF21	1BE1	8D	25	00710		BSR	PRINT
	00F7	00100	MOTMSK EQU \$F7	1BE3	BD	A393	00720		JSR	\$A393
	A004	00110	CSRDON EQU \$A004	1BE6	C1	01	00730		CMPB	#1
	A006	00120	BLKIN EQU \$A006	1BE8	27	07	00740		BEQ	NOMORE
	A00C	00130	WRTLDR EQU \$A00C	1BEA	F6	02DD	00750		LDB	\$2DD
	A008	00140	BLKOUT EQU \$A008	1BED	C1	59	00760		CMPB	#YLET
	007E	00150	CBUFAD EQU \$7E	1BEF	27	E0	00770		BEQ	DUMP
	007C	00160	BLKTYP EQU \$7C	1BF1	30	8D 01F4	00780	NOMORE	LEAX	FIN,PCR
	007D	00170	BLKLEN EQU \$7D	1BF5	8D	11	00790		BSR	PRINT
	00FF	00180	EOF EQU \$0FF	1BF7	BD	A393	00800		JSR	\$A393
	02E5	00190	NAMEND EQU \$2DD+8	1BFA	C1	01	00810		CMPB	#1
		00200		1BFC	27	09	00820		BEQ	NO
		00210	ORG 7000	1BFE	F6	02DD	00830		LDB	\$2DD
1B58		00220	START JSR \$A928	1C01	C1	59	00840		CMPB	#YLET
1B58	BD	A928		1C03	1027	FF51	00850		LBEQ	START
1B5B	0F	6F	00230 CLR \$6F	1C07	39		00860	NO	RTS	
1B5D	30	8D 01BE	00240 LEAX HEAD,PCR				00870			
1B61	17	00A4	00250 LBSR PRINT	1C08	34	12	00880	PRINT	PSHS	A,X
1B64	7F	1E4D	00260 LOOP1 CLR NONAM	1C0A	A6	80	00890	PRINT2	LDA	,X+
1B67	DC	74	00270 LDD 116	1C0C	27	06	00900		BEQ	PRDONE
1B69	83	0104	00280 SUBD #260	1C0E	AD	9F A002	00910		JSR	[CHROUT]
1B6C	ED	8D 02DE	00290 STD BUFND,PCR	1C12	20	F6	00920		BRA	PRINT2
1B70	1F	03	00300 TFR D,U	1C14	35	92	00930	PRDONE	PULS	A,X,PC
1B72	30	8D 01D4	00310 LEAX FILEQ,PCR				00940			
1B76	17	008F	00320 LBSR PRINT	1C16	34	32	00950	COMP	PSHS	A,X,Y
1B79	BD	A393	00330 JSR \$A393	1C18	A6	80	00960	PMTCH	LDA	,X+
1B7C	C1	01	00340 CMPB #1	1C1A	A1	A0	00970		CMPA	,Y+
1B7E	26	04	00350 BNE NAME	1C1C	26	05	00980		BNE	NOMCH
1B80	E7	8D 02C9	00360 STB NONAM,PCR	1C1E	5A		00990		DECB	
1B84	17	018A	00370 NAME LBSR PAD	1C1F	26	F7	01000		BNE	PMTCH
1B87	30	8D 0216	00380 LEAX SRCH,PCR	1C21	35	B2	01010		PULS	A,X,Y,PC
1B8B	8D	7B	00390 BSR PRINT	1C23	C6	FF	01020	NOMCH	LDB	#\$FF
1B8D	17	0097	00400 LBSR FFILE	1C25	35	B2	01030		PULS	A,X,Y,PC
1B90	81	00	00410 CMPA #0				01040			
1B92	26	D0	00420 BNE LOOP1	1C27	30	8D 0227	01050	FFILE	LEAX	BUFV,PCR
1B94	30	8D 0288	00430 LEAX LOAD,PCR	1C2B	9F	7E	01060	LOOP	STX	CBUFAD
1B98	8D	6E	00440 BSR PRINT	1C2D	AD	9F A004	01070		JSR	[CSRDON]
1B9A	30	8D 0277	00450 GETPS LEAX PASS,PCR	1C31	AD	9F A006	01080		JSR	[BLKIN]
1B9E	8D	68	00460 BSR PRINT	1C35	81	00	01090		CMPA	#0
1BA0	BD	A393	00470 JSR \$A393	1C37	27	0F	01100		BEQ	CHECK
1BA3	C1	01	00480 CMPB #1	1C39	F6	FF21	01110		LDB	MOTCTL
1BA5	27	F3	00490 BEQ GETPS	1C3C	C4	F7	01120		ANDB	#MOTMSK
1BA7	17	0108	00500 LBSR ENCODE	1C3E	F7	FF21	01130		STB	MOTCTL
1BAA	30	8D 021B	00510 LEAX CODED,PCR	1C41	30	8D 01E8	01140	ERR	LEAX	RDERR,PCR
1BAE	8D	58	00520 BSR PRINT	1C45	8D	C1	01150		BSR	PRINT
1BB0	30	8D 0225	00530 OUT LEAX OUTQ,PCR	1C47	39		01160		RTS	
1BB4	8D	52	00540 BSR PRINT	1C48	D6	7C	01170	CHECK	LDB	BLKTYP
1BB6	BD	A393	00550 JSR \$A393	1C4A	26	DB	01180		BNE	FFILE
1BB9	C1	01	00560 CMPB #1	1C4C	F6	FF21	01190		LDB	MOTCTL
1BBB	27	F3	00570 BEQ OUT	1C4F	C4	F7	01200		ANDB	#MOTMSK
1BBD	17	0151	00580 LBSR PAD	1C51	F7	FF21	01210		STB	MOTCTL
1BC0	30	8D 028E	00590 LEAX BUFV,PCR	1C54	E6	8D 01F5	01220		LDB	NONAM,PCR
1BC4	108E	02DD	00600 LDY #\$2DD	1C58	26	13	01230		BNE	FOUND
1BC8	C6	08	00610 LDB #8	1C5A	AF	E3	01235		STX	--S

1C5C 8E 02DD 01240	LDX #S2DD	1CC3 A7 80 01650	STA ,X+
1C5F 31 8D 01EF 01250	LEAX BUFF,PCR	1CC5 A6 A4 01660	LDA ,Y
1C63 C6 08 01260	LDB #8	1CC7 26 F0 01670	BNE NEXT
1C65 8D AF 01270	BSR COMP	1CC9 20 EA 01680	BRA BEGIN
1C67 C1 00 01280	CMPB #0	1CCB 39 01690	DONE RTS
1C69 26 BC 01290	BNE FFILE	1CCC 0F 7C 01710	WRITE CLR BLKTYP
1C6B AE E1 01295	LDX ,S++	1CCE 30 8D 0180 01720	LEAX LEAX BUFF,PCR
1C6D AF E3 01300	FOUND STX ,--S	1CD2 9F 7E 01730	STX STX CBUFAD
1C6F 30 8D 0145 01310	LEAX READ,PCR	1CD4 86 0F 01740	LDA LDA \$SOF
1C73 8D 93 01320	BSR PRINT	1CD6 97 7D 01750	STA STA BLKLEN
1C75 AE F1 01330	LIX ,S++	1CD8 AD 9F A00C 01760	JSR JSR [WRTLDR]
1C77 9F 7E 01340	IN STX CBUFAD	1CDC AD 9F A008 01770	JSR JSR [BLKOUT]
1C79 AD 9F A004 01350	JSR [CSRDN]	1CE0 86 01 01780	LDA LDA #1
1C7D AD 9F A006 01360	JSR [BLKIN]	1CE2 97 7C 01790	STA STA BLKTYP
1C81 F6 FF21 01370	LDB MOTCTL	1CE4 EE 8D 0166 01800	LDU LDU BUFND,PCR
1C84 C4 F7 01380	ANDB #MOTMSK	1CE8 A6 C0 01810	L1 L1A ,U+
1C86 F7 FF21 01390	STB MOTCTL	1CEA 27 0E 01820	BEQ BEQ EXIT
1C89 81 00 01400	CMPA #0	1CEC 97 7D 01830	STA STA BLKLEN
1C8B 26 B4 01410	BNE ERR	1CEE 9F 7E 01840	STX STX CBUFAD
1C8D AC 8D 01BD 01420	CMPX BUFND,PCR	1CF0 AD 9F A00C 01850	JSR JSR [WRTLDR]
1C91 25 08 01430	BLO OK2	1CF4 AD 9F A008 01860	JSR JSR [BLKOUT]
1C93 30 8D 01A3 01440	OVF LEAX OVFLO,PCR	1CF8 20 EE 01870	BRA LDA L1
1C97 17 FF6E 01450	LBSR PRINT	1CFA 86 FF 01880	EXIT LDA #EOF
1C9A 39 01460	RTS	1CFC 97 7C 01890	STA STA BLKTYP
1C9B D6 7D 01470	OK2 LDB BLKLEN	1CFE 0F 7D 01900	CLR CLR BLKLEN
1C9D E7 C0 01480	STB ,U+	1D00 AD 9F A00C 01910	JSR JSR [WRTLDR]
1C9F 1193 74 01490	CMPU 116	1D04 AD 9F A008 01920	JSR JSR [BLKOUT]
1CA2 27 EF 01500	BEQ OVF	1D08 F6 FF21 01930	LDB LDB MOTCTL
1CA4 D6 7C 01510	LDB BLKTYP	1DOB C4 F7 01940	ANDB ANDB #MOTMSK
1CA6 C1 FF 01520	CMPB #EOF	1D0D F7 FF21 01950	STB STB MOTCTL
1CA8 26 CD 01530	BNE IN	1D10 39 01960	RTS
1CAA 5F 01540	CLRB	1D11 86 20 01980	PAD LDA #S20
1CAB E7 C4 01550	STB ,U	1D13 30 85 01990	LEAX LEAX B,X
1CAD AF 8D 019F 01560	STX EOB,PCR	1D15 8C 02E5 02000	DO DO #NAMEND
1CB1 39 01570	RTS	1D18 24 04 02010	BHS BHS OK
1CB2 8E 1E61 01590	ENCODE LDX #BUFF+15	1D1A A7 80 02020	STA STA ,X+
1CB5 108E 02DD 01600	BEGIN LDY #S2DD	1D1C 20 F7 02030	BRA BRA DO
1CB9 AC 8D 0193 01610	NEXT CMPX EOB,PCR	1D1E 39 02040	OK RTS
1CBD 27 0C 01620	BEQ DONE	1D1F 02050	HEAD
1CBF A6 84 01630	LDA ,X		
1CC1 A8 A0 01640	EORA ,Y+		

Listing continued

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ON..GO	RETURN	STOP	SUBROUTINE		
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STR\$	STRING\$				
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1D1F	54	02070	FCC /THE CODER/	1DD9		02480	
1D28	0D	02080	FCB CR	1DD9	46	02490	OUTQ
1D29	43	02090	FCC /COPYRIGHT 1984/	1DE8	00	02500	FCC /FILE TO WRITE? /
1D37	0D	02100	FCB CR			02510	FCB 0
1D38	42	02110	FCC /BY L. LANDWEHR /	1DE9		02520	
1D47	0D	02120	FCB CR	1DE9	0D	02530	FIN
1D48	0D	02130	FCB CR	1DEA	50	02540	FCB CR
1D49	00	02140	FCB 0	1DFA	0D	02550	FCC /PROGRAM FINISHED/
		02150		1DFB	43	02560	FCB CR
1D4A		02160	FILEQ	1E0D	28	02570	FCC /CODE ANOTHER FILE /
1D4A	46	02170	FCC /FILE TO CODE? /	1E14	00	02580	FCC *(Y/N)? *
1D58	00	02180	FCB 0			02590	FCB 0
		02190				02600	
1D59		02200	MORE	1E15		02610	PASS
1D59	57	02210	FCC /WRITE ANOTHER /	1E15	50	02620	FCC /PASSWORD? /
1D67	43	02220	FCC /COPY? /	1E1F	00	02630	FCB 0
1D6D	00	02230	FCB 0			02640	
		02240		1E20		02650	LOAD
1D6E		02250	POSIT	1E20	46	02660	FCC /FILE LOADED/
1D6E	50	02260	FCC /PREPARE CASSETTE /	1E2B	0D	02670	FCB CR
1D7F	54	02270	FCC /TO RECORD/	1E2C	00	02680	FCB 0
1D88	0D	02280	FCB CR			02690	
1D89	50	02290	FCC /PRESS ENTER WHEN /	1E2D		02700	RDERR
1D9A	52	02300	FCC /READY /	1E2D	0D	02710	FCB CR
1DA0	00	02310	FCB 0	1E2E	49	02720	FCC *I/O ERROR*
		02320		1E37	0D	02730	FCB CR
1DA1		02330	SRCH	1E38	0D	02740	FCB CR
1DA1	53	02340	FCC /SEARCHING FOR FILE/	1E39	00	02750	FCB 0
1DB3	2E	02350	FCC /.../			02760	
1DB6	0D	02360	FCB CR	1E3A		02770	OVFLO
1DB7	00	02370	FCB 0	1E3A	0D	02780	FCB CR
		02380		1E3B	42	02790	FCC /BUFFER OVERFLOW/
1DB8		02390	READ	1E4A	0D	02800	FCB CR
1DB8	52	02400	FCC /READING FILE.../	1E4B	0D	02810	FCB CR
1DC7	0D	02410	FCB CR	1E4C	00	02820	FCB 0
1DC8	00	02420	FCB 0			02830	
		02430		1E4D		02840	NONAM RMB 1
1DC9		02440	CODED	1E4E		02850	BUFND RMB 2
1DC9	42	02450	FCC /BUFFER ENCODED/	1E50		02860	EOB RMB 2
1DD7	0D	02460	FCB CR	1E52		02870	BUFF RMB 1
1DD8	00	02470	FCB 0			02880	
						02890	END START

00000 TOTAL ERRORS

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typing in Basic programs.*

Brevity might be the soul of wit, but it is much more important as a utility for your CoCo. With Brevity you can abbreviate any Basic keyword in the CoCo's vocabulary with a single letter or @. If you have a Tandy disk system, you can abbreviate any Disk Extended Color Basic keyword.

Brevity lets you assign and reassign any set of 27 Basic keywords to @ and the 26 letter keys. You need no keyboard overlays or decals because a table of key-to-Basic word assignments automatically appears on the screen for handy reference. The number keys 1-9 are permanently assigned to I/O commands and the assignments are displayed on demand. The zero key can be assigned to any line of Basic programming and used to type that line every time it occurs in a program.

Brevity uses only 505 of the bytes usually available for Basic programming and is memory protected in the highest 505 RAM addresses, whether you have 16 or 32K RAM.

Using Brevity

Every Color Computer statement, command, or function is represented by a Basic keyword. This utility eases the tedium of keying in Basic programs. Typing a letter key (or @) with the down arrow depressed causes the associated Basic word to be typed.

To assign @ or a letter key to a Basic word, press the right-arrow key for the Key? prompt. In response, press the desired key and enter. Next you see the Word? prompt. Answer it by typing the desired word and pressing enter. You will see a table of the current key-to-Basic word assignments.

You must spell the Basic words exactly as they appear in Table 1 or 2, or you will again get the Word? prompt. For Extended Color

Basic without a Tandy disk system, refer to Table 1; otherwise use Table 2. For now, ignore the entries made under the headings labeled # in both tables.

Keys 1-9 are permanently assigned to I/O commands and the assignment appears as an extension of the assignment table. Call the extended table by pressing the right arrow and answering the prompt by pressing the slash key followed by enter. Press the down arrow and the assigned number key to type an I/O command shown in the extended table.

To assign zero press the right arrow. Answer the Key? prompt by typing the zero key. Then you will see the prompt, Line?. Respond to this prompt by typing the number of the Basic programming line that you want to assign to zero. Before you use the assigned line, you must edit it by inserting an apostrophe at the very beginning of the line. Whenever you depress the down arrow and type zero, the assigned line is typed without the apostrophe. The special key also lets you

System Requirements

16K RAM

Extended Color Basic or
Disk Extended Color Basic

WORD	#	WORD	#	WORD	#	WORD	#
ABS	51	EXP	66	OFF	2B	RUN	F
AND	31	FIX	67	ON	9	SCREEN	40
ASC	59	FN	4D	OPEN	1A	SET	1D
ATN	63	FOR	1	OR	32	SGN	4F
AUDIO	22	GET	45	PAINT	44	SIN	54
CHR\$	5A	GO	2	PCLEAR	41	SKIPF	24
CIRCLE	43	HEX\$	6B	PCLS	3D	SOUND	21
CLEAR	16	IF	6	PCOPY	48	SQR	6A
CLOAD	18	INKEY\$	61	PEEK	55	STEP	2A
CLOSE	1B	INPUT	A	PLAY	4A	STOP	12
CLS	1F	INSTR	6D	PMODE	49	STR\$	57
COLOR	42	INT	50	POINT	60	STRING\$	70
CONT	14	JOYSTK	5C	POKE	13	SUB	27
COS	64	LEFT\$	5D	POS	69	TAB{	25
CSAVE	19	LEN	56	PPOINT	6F	TAN	65
DATA	7	LET	3B	PRESET	3F	THEN	28
DEF	3A	LINE	3C	PSET	3E	TIMER	6E
DEL	36	LIST	15	PUT	46	TO	26
DIM	D	LLIST	1C	READ	E	TROFF	39
DLOAD	4B	LOG	68	REM	3	TRON	38
DRAW	47	MEM	62	RENUM	4C	USING	4E
EDIT	37	MID\$	5F	RESET	1E	USR	52
ELSE	5	MOTOR	20	RESTORE	10	VAL	58
END	B	NEW	17	RETURN	11	VARPTR	6C
EOF	5B	NEXT	C	RIGHT\$	5E		
EXEC	23	NOT	29	RND	53		

Table 1. Keyword Assignments, Extended Color Basic

WORD	#	WORD	#	WORD	#	WORD	#
ABS	64	EOF	6E	MID\$	72	RND	66
AND	31	EXEC	23	MKN\$	88	RSET	58
ASC	6C	EXP	79	MOTOR	20	RUN	F
ATN	76	FIELD	51	NEW	17	SAVE	59
AUDIO	22	FILES	52	NEXT	C	SCREEN	40
BACKUP	5E	FIX	7A	NOT	29	SET	1D
CHR\$	6D	FN	4D	OFF	2B	SGN	62
CIRCLE	43	FOR	1	ON	9	SIN	67
CLEAR	16	FREE	85	OPEN	1A	SKIPF	24
CLOAD	18	GET	45	OR	32	SOUND	21
CLOSE	1B	GO	2	PAINT	44	SQR	7D
CLS	1F	HEX\$	7E	PCLEAR	41	STEP	2A
COLOR	42	IF	6	PCLS	3D	STOP	12
CONT	14	INKEY\$	74	PCOPY	48	STR\$	6A
COPY	5F	INPUT	A	PEEK	68	STRING\$	83
COS	77	INSTR	80	PLAY	4A	SUB	27
CSAVE	19	INT	63	PMODE	49	TAB{	25
CVN	84	JOYSTK	6F	POINT	73	TAN	78
DATA	7	KILL	53	POKE	13	THEN	28
DEF	3A	LEFT\$	70	POS	7C	TIMER	81
DEL	36	LEN	69	PPOINT	82	TO	26
DIM	D	LET	3B	PRESET	3F	TROFF	39
DIR	4F	LINE	3C	PSET	3E	TRON	38
DLOAD	4B	LIST	15	PUT	46	UNLOAD	5C
DRAW	47	LLIST	1C	READ	E	USING	4E
DRIVE	50	LOAD	54	REM	3	USR	65
DSKINI	5D	LOC	86	RENAME	57	VAL	6B
DSKI\$	60	LOF	87	RENUM	4C	VARPTR	7F
DSKO\$	61	LOG	7B	RESET	1E	VERIFY	5B
EDIT	37	LSET	55	RESTORE	10	WRITE	5A
ELSE	5	MEM	75	RETURN	11		
END	B	MERGE	56	RIGHT\$	71		

Table 2. Keyword Assignments, Disk Extended Color Basic

move a line from one place in your program to another.

Usually, the assignment table automatically appears at the top of the screen for handy reference. However, the table is inhibited when you RUN, LIST, or LLIST a Basic program. Pressing enter twice after running makes the table reappear. After LISTing or LLISTing, you enable the table by calling the extended table—that is, by pressing the right arrow, slash, and enter in that order.

Brevity does not function during editing, but the use of Brevity reduces the need for editing.

Program Description

Program Listing 1 shows Brevity. The DATA statements of lines 40–170 contain the machine-language routine that carries out the assignment of keys to words. The machine-language routine that types Basic words when assigned keys are pressed is contained in the DATA statement lines 200–340. The remaining DATA statements, lines 370–390, contain a machine-language routine that initializes Brevity and effectively makes it an extension of the Basic ROM.

Lines 140 and 150 contain the extended assignment table. The first nine values in line 140 are the hexadecimal codes for the permanently assigned I/O commands. The remaining values in lines 140 and 150 are for @ and the 26 letters.

Lines 140 and 150, as they appear in Listing 1, pertain to a Color Computer with Extended Color Basic without a Tandy disk system. If you have a disk system, use lines 140, 150, 180, 350, and 400 as shown in Listing 2 instead of those same numbered lines in Listing 1.

To aid you in correctly typing the DATA statements in Brevity, a checksum is calculated for each of three sets of DATA statement lines (40–170, 200–340, and 370–390). Do not type line 410 until you have run Brevity without any checksum errors. Then key in line 410 and (before rerunning Brevity) save Brevity on tape or disk.

There is one distinct difference between the operation of the cassette and disk versions of Brevity. When you load Brevity from tape and run it, the assignment table automatically appears on the screen. After loading Brevity from a disk and running it, you must press the right-arrow key and then the slash key to cause the initial appearance of the assignment table.

After saving Brevity, familiarize yourself with it by keying in a Basic program. When you have used it a few times, you might find that you prefer some other permanent assignments of the keys 1–9. You might also prefer another initial assignment of @ and the letter keys.

You can readily make the permanent and initial assignments of your preference by changing lines 140 and 150 appropriately. Tables 1 and 2 show the hexadecimal codes

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Coming Next Month

Good software is versatile; you can adapt it for use in several different applications. Telewriter-64 is a good example of such software, and in November, *HOT CoCo* will show you one reason why. Next month, author J.D. German describes how to patch Telewriter to handle mailing lists.

Winter's coming, and many of you in the snow belt heat your homes with wood. But have you ever wondered what kind of wood was your best buy for the heat produced? November's *HOT CoCo* includes a program that calculates the best wood buys in your area. Now you can use your CoCo to keep warm this winter.

Not satisfied with the CoCo's disk directory? William Bonnell has written a clever utility that places all the information you need about your disk files on one screen.

Scott Norman returns in November with The Computer Room after a one-month hiatus. Next month he talks about "appropriate technologies" in personal software. Appropriate technology refers to using just the right software for the right task.

See you in November. ■



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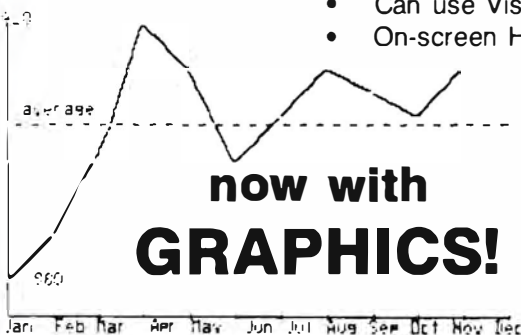
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(under the heading labeled #) used by Brevity to represent the Basic words for Extended Color Basic and Disk Extended Color Basic, respectively. For instance, suppose you want to have the five key assigned to SOUND instead of EXEC. Change the value 23 in line 140 to 21. (Caution: Changing a value will cause a checksum failure in lines 180, 350, and 400.) After making a value change, delete lines 180, 350, and 400 and save the revised Brevity.

The generation and initialization of the machine-language routines of Brevity might seem slow to you. If that is the case, you might want to have a totally machine-language version of Brevity. To produce this, load Brevity, delete line 410, and then run the program. Ready a tape or disk for recording, and if you have a 16K-cassette-based system, type

CSAVEM "BREVITY", &H3DBD, &H3FFF, &H3DBD

and press enter. If you have a 16K disk system, type SAVEM instead of CSAVEM. If you have a 32K system, replace the threes in the addresses with sevens.

Every time you want to use the machine-language version of Brevity you must first type CLEAR200,&H3DBC (16K) or CLEAR200,&H7DBC (32K) and press enter. Then, to load, use CLOADM or LOADM "BREVITY". Finally, to start Brevity type EXEC and press enter.

There are two final notes for those with Tandy disk systems. Use of the DIR command does not inhibit the assignment table. For a directory of over four or five programs you will want to inhibit the assignment table. To do so, LIST any Basic program line that is

presently in RAM. If there is no Basic program in RAM, type 1' and press enter; then LIST to disable the assignment table.

The disk version of Brevity was written for disk 1.0 ROM; nevertheless, you can make a few conversions to run the program on 1.1 ROM disk systems. In Table 2, add one to every number greater than 61, and add one to each of the eight values greater than 61 in lines 140 and 150 of Partial Listing 2. Increase each of the three checksums in lines 180, 350, and 400 by eight. If the I/O (input/output) assignments for the 3 and 4 keys are not SAVE and LOAD, you will have to add one to the values 59 and 54 in line 140 and make appropriate changes in the checksums of lines 180, 350, and 400. ■

Address correspondence to H. Allen Curtis, 172 Dennis Drive, Williamsburg, VA 23185.

Program Listing 1. Brevity

```
1Ø CLEAR2ØØ,256*PEEK(116)-25Ø
2Ø X=256*PEEK(116)-249
3Ø FORI=X TOX+234:READA$:A=VAL("&H"+A$):POKEI,A:B=B+A:NEXT
4Ø DATA 7F,1,DA,39,81,9,27,15,3
9,1,2,BD,B9,9C,BD,BØ,2F
5Ø DATA3Ø,1,39,4B,45,59,Ø,57,4F,
52,44,Ø,8D,E1,BD,A9,28,3Ø,8C,EE
6Ø DATA 8D,E4,A6,84,81,2F,27,5D,
81,3Ø,26,14,3Ø,8C,B,8D
7Ø DATA D5,9F,A6,BD,B7,3D,BF,1,D
B,2Ø,63,4C,49,4E,45,Ø,84,5F,81
8Ø DATA 4Ø,25,D4,81,5A,22,DØ,34,
2,BD,A9,28,3Ø,8C,CØ,8D,B2,34,1Ø
9Ø DATAF,43,F,44,CE,1,16,33,4A,A
6,C4,27,24,1Ø,AE,41,AE,E4,E6,8Ø
1ØØ DATA C1,4Ø,25,2,C4,5F,EØ,AØ,
27,F4,C1,8Ø,27,1A,C,44,4A,27,EØ
11Ø DATA 31,3F,E6,AØ,2A,FC,2Ø,E1
,2Ø,43,CE,1,1B,3,43,26,CF,35,1Ø
12Ø DATA 2Ø,BA,32,62,D6,44,5C,35
,2,33,8C,D3,E7,C6,7A,1,DA,32,68
13Ø DATA 7E,AC,73
14Ø DATA 2Ø,24,19,18,23,1A,1B,5C
```

```
,1C,F,25,15,1F,47,37,1,45,46,A
15Ø DATA 61,43,3C,3E,C,4A,55,13,
11,2A,28,4E,58,5D,5F,5E,7Ø
16Ø DATA 1Ø,8E,5,41,86,31,C6,3,3
3,8C,AØ,8D,74,8B,3,5A,26,F6,8Ø
17Ø DATA 8,31,3F,81,34,26,EC,2Ø,
B8
18Ø IFB<>21983THENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 4Ø - 17Ø.":END
19Ø X=I:FORI=X TOX+269:READA$:A=
VAL("&H"+A$):POKEI,A:B=B+A:NEXT
2ØØ DATA 34,1Ø,9E,A6,9C,19,35,1Ø
,25,3,39,1,2,34,4,F6,1,56,C1
21Ø DATA FF,27,11,C4,F,C1,7,22,B
,F6,1,58,C1,F7,35,4,26,7C,2Ø,E3
22Ø DATA35,4,81,D,26,72,7D,1,DA,
27,D8,34,7F,8D,1E,86,4Ø,C6,3,33
23Ø DATA8D,FF,4B,8D,25,8B,9,5A,2
6,F5,8Ø,1A,31,3F,81,49,26,EB,8E
24Ø DATA 5,FF,9F,88,35,FF,86,CF,
8E,4,2Ø,A7,8Ø,1F,12,A7,8Ø,8C,5
25Ø DATA 4Ø,26,F9,39,1F,21,A7,81
,34,6,8D,1Ø,A6,CØ,2B,4,A7,8Ø,2Ø
26Ø DATAF8,8Ø,8Ø,A7,8Ø,31,2B,35,
86,E6,C6,CE,1,16,33,4A,A6,C4,27
27Ø DATA12,EØ,C4,22,F6,EB,C4,EE,
```

```
41,5A,27,6,A6,CØ,2A,FC,2Ø,F7,39
28Ø DATA CE,1,1B,2Ø,E3,2Ø,4B,81,
3Ø,25,FA,81,39,22,5B,8B,6,5A,3Ø
29Ø DATA 1F,81,36,26,1A,1F,12,9E
,19,FE,1,DB,3Ø,2,11,A3,84
3ØØ DATA 27,6,AE,83,26,F5,4F,39,
33,4,1F,21,2Ø,A,34,4,33,8D,FE
31Ø DATA B7,8D,A9,35,4,A6,CØ,8D,
B,BD,A2,85,A6,CØ,27,B,2A,F5,8Ø
32Ø DATA8Ø,C1,FA,24,18,A7,8Ø,5C,
34,6,DC,88,83,5,FF,26,A,F6,2,DC
33Ø DATA C1,86,27,3,17,FF,2E,35,8
6,7E,A3,9A,81,5A,22,E4,81,4Ø,25
34Ø DATA EØ,2Ø,9D
35Ø IFB<>49484THENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 2ØØ - 34Ø.":END
36Ø X=X-3Ø9:FORI=X TOX+41:READA$:
A=VAL("&H"+A$):POKEI,A:B=B+A:NE
XT
37Ø DATA 8E,1,67,33,8D,1,38,C6,3
,BD,A5,9A,33,53,FF,1,68
38Ø DATA 33,C9,FF,1D,C6,3,BD,A5,
9A,33,59,FF,1,6B
39Ø DATA 33,5C,FF,1,A7,C6,7E,F7,
1,A6,39
4ØØ IFB<>54291THENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 36Ø - 39Ø.":END
41Ø EXEC X:NEW
```

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Partial Listing 2. Replacement Lines for Disk Users

```
14Ø DATA 2Ø,24,59,54,23,1A,1B,6F
,1C,F,25,15,1F,47,37,1,45,46,A
15Ø DATA 74,43,3C,3E,C,4A,68,13,
11,2A,28,4E,6B,7Ø,72,71,83
18Ø IFB<>22259THENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 4Ø - 17Ø.":END
35Ø IFB<>4976ØTHENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 2ØØ - 34Ø.":END
4ØØ IFB<>54567THENCLS:PRINT" YOU
MADE AN ERROR SOMEWHERE IN LIN
ES 36Ø - 39Ø.":END
```

Testing Testmaker

by Michael F. Garozzo

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Testmaker is produced by Saguaro Software, P.O. Box 1864, Telluride, CO 81435, 303-728-4937. It requires 16K, Extended Color Basic, a disk drive, and a printer to print tests on paper. It sells for \$29.95 plus \$1 for shipping.

There are numerous programs available to educators for preparing multiple-choice and true/false exams. Although they all generally perform the same task, their program authors have developed specialties. As a result, there are test generators out there that might be better suited to your specific needs than others.

Testmaker from Saguaro Software comes with two double-sided pages of concise instructions. The booklet suggests that you read it thoroughly before attempting to run the program. This is a good suggestion because you probably won't understand some of the program's idiosyncracies otherwise. Testmaker creates multiple-choice and true/false tests. It lets you write these two kinds of questions in separate sets, edit them, combine them on screen or paper, and save them to disk. Its ability to combine multiple-choice and true/false questions in one test is an ad-

vantage. Test questions may be as long as five lines and have as many as four lines for answers.

The program begins with a main menu that allows you to set the number (from one to five) of disk drives you plan to use. Once the program is initialized, it is not necessary to reset it unless you change your drive configuration. You are better off using two drives because the file programs are resident. One-disk-drive systems support Testmaker but require swaps between the program disk and the file disk.

It is not possible to network Testmaker on Radio Shack's Network 2 system; if you want to test an entire class at one time, you must have a disk drive for each Color Computer. If you use single-drive systems at each computer, it will be necessary to run Testmaker and use the file disk. With a large class, this would be time consuming. However, the pro-

SUPPORT

(sə-pôrt) v.t. **1.** To bear the weight of, especially from underneath; uphold in position; keep from failing, etc. **2.** To bear or sustain (weight; etc.) **3.** To keep from failing; strengthen: *PBJ, Inc. supports their product line with technical personnel that are always there to help you.* **4.** To serve, to uphold or corroborate (a statement, theory, etc.) substantiate; verify: *PBJ, Inc. receives testimonials on a daily basis that support their product line.* **5.** To provide (a person, institution) with maintenance; provide for: *PBJ, Inc. supports the CoCo user by consistently creating new advancements in their field.*

Synonym: **PBJ, Inc.**

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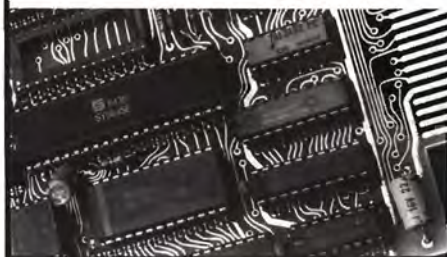


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gram can automatically grade each test by displaying the total number of questions, correct and incorrect answers, and percentages. This is a time-saving feature that teachers looking for efficiency will appreciate. The program also prohibits cheating by randomizing multiple-choice answers so that students cannot reveal the order of the questions and their answers to other students.

The Creation Mode

There is no cursor in Testmaker; it is possible to type beyond the number of characters allotted each line of a question. To avoid this, the program sounds three warning beeps. The first warns that there are 11 characters left on the line, the second that there are six, and the third sounds at zero. If you type beyond this last beep, the line on which you are typing will not be formatted properly in printing. When you are ready to begin typing, a graphic cursor flashes on the screen for about three seconds. You cannot type while this remains on screen but must wait until it changes to a greater-than sign. Even though this is a relatively short period of time to wait, it is a drawback. The program also does not have an automatic word-wrap feature.

“Testmaker has some helpful and unique features, such as automatic grading for on-screen tests and the option to merge files of different kinds of questions. But there are some nuts and bolts problems that need to be corrected.”

When entering questions in the creation mode, the down arrow is used to enter a line feed, even within a question. Pressing the enter key completes a question and prepares the program to accept answers. Once a question or answer is typed in, you cannot edit it until the test is completed and you use Testmaker's edit feature. You can, however, edit lines of questions or answers as you type them.

When you complete each question and its answers, the program repeats what you have typed. It would be better if it displayed questions and answers on the screen at the same time, but they are shown separately. Questions are recorded sequentially in Testmaker; you have to keep track of the number you are working on because the program does not automatically number the questions. However, when the program displays or prints a test, it does number the answers. This is a quirk not mentioned in the instruction booklet.

Editing

In the edit mode, Testmaker shows you each of the questions in the file in turn and asks if you want to edit it. If you have written a 50-question test, you must mark each



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question with either "YES" or "NO." Once you have done that, the program displays the questions after which you typed an affirmative answer and allows you to edit them.

When you have completed a test, it is not possible to add or delete questions. The edit mode only lets you correct your questions. To add or delete questions, you must make a new file. I tried deleting a question by typing blank spaces over the words in the edit mode, but it caused confusion in the print formatting. I also found that if you accidentally backspace more characters than you have typed, the program crashes.

Test Usage

When you use a program you have created, Testmaker prompts you for the file name and tells you to insert your file disk. Although you can run multiple-choice and true/false questions in one test, they are separated and the multiple-choice questions come first. On-screen tests display scores when they are completed.

The system Testmaker uses to display test questions is impractical. It shows questions for about six seconds, clears the screen, and

shows the answers. Students cannot reread the questions nor adjust the length of time available to read questions. To answer multiple-choice questions, students must use the numbers 1, 2, 3, and 4 to refer to the answers. The program does not accept other numbers. However, the use of letters other than T and F in response to true/false questions scores as an incorrect answer. This aspect of the program is unacceptable; it is too likely that students might accidentally hit a wrong key and have it count against them.

It is easy to print tests by making a selection from the main menu. Your questions are printed following a heading that includes name, date, class, and test file. The program is set for a standard baud rate of 600 and does not allow you to change to a higher speed. If your printer is set at a different rate, you must remember to POKE the computer before running Testmaker.

You are given the choice of producing either a master or a student copy before printing. Choosing the master prints the test with the correct answer marked with asterisks. My copy of the test had the commands for printing a separate true/false test reversed. Choosing the student version of the printout elicited a copy with the answers. There are

some problems with the print format. There is no line space between questions and no line space between a question and its first answer. And a line space is skipped in printing wherever you were forced to use a down arrow on a line.

Summing Up

A utility program should work quickly, logically, and simply; it should get the job done. If extras are added, they should not obscure the basic functions of the program. Testmaker has some helpful and unique features, such as automatic grading for on-screen tests and the option to merge files of different kinds of questions. But there are some nuts and bolts problems that need to be corrected. Andy Irvin, owner of Saguaro Software, was very cooperative on the telephone and concerned about trying to make Testmaker as good as it should be. He and I agreed that the program has some good features. He also stated that he and the program author would make every effort to clear up some problems in the program. Be prepared for some frustration, but don't count this one out if you want some of the interesting features it has to offer. ■

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Circle Reader Service card #75

A Full Deck with Full Character Set

by James J. Barbarello

	construction quality	documentation	set up	performance	ease of use
6					
5					
4					
3					
2					
1					
OVERALL RATING					4.50
Hardware					

Full Character Set is manufactured by CoCo Devices, Box 677, Seabrook, TX 77586, 713-474-3232. It works with all models of the Color Computer and sells for \$38.

A minor but sometimes annoying shortcoming of the Color Computer is its lack of true lowercase characters. This is especially apparent when using communications software that uses the CoCo character set. A number of products have been developed to correct this. Some are software based. They use some of your memory and in fast screenwriting applications can produce an irritating lag. Others, such as Full Character Set (FCS), are completely hardware based and do not use memory. In effect, they modify the CoCo's character generator to produce a new, true upper- and lowercase character set.

FCS provides all 96 standard ASCII characters. It displays both upper- and lowercase characters on the screen at the same time. (The CoCo's reverse characters are replaced by true lowercase characters.) Its lowercase character set has true lowercase descenders in the letters g, j, p, q, and y. It has the capability to display reverse video, which makes the background dark and the letters light. FCS also produces a slashed zero to distinguish the numeral zero from the letter O. An optional switch allows you to disable FCS at any time.

Construction Quality

I tested the "CoCo 1" version of FCS on an old E-board CoCo. FCS is a double-sided, glass-epoxy PC (printed-circuit) board about 3¼ by 2¼ inches. It contains a ROM chip, four TTL (transistor-transistor logic) chips, some resistors, and a 40-pin socket that accepts the 6847 IC (integrated circuit) chip

from your CoCo. The underside of the board contains two rows of 20 pins spaced 0.6 of an inch apart. These pins mate with the 6847 IC socket in your CoCo.

The quality of the product's PC board is good. I did discern some traces of residue from the flux-cleaning process that the untrained eye might miss. A common practice I've noticed in products for the CoCo is the use of very small PC pads where they are not needed. Larger pads can provide more mechanical integrity and decrease the possibility of damage when users need to modify the board in some way, such as soldering switch wires to it. Barring these minor shortcomings, the construction quality of FCS is well suited to its use.

Documentation and Installation

FCS comes with a four-page instruction guide. Two of the pages are little more than advertisement for FCS. But that is acceptable because very little information is needed to

**"Full Character Set is
hardware based.
It modifies the CoCo's
character generator
to produce
a new, true
upper- and lowercase
character set."**

use this device. The last page contains the installation instructions. It tells you to unpack and check the FCS board for any bent pins. If you have to straighten any out, be careful. Use minimal pressure and needle-nose pliers as instructed. Excess pressure or carelessness can damage the electrical contact between the pins and the board.

After you disassemble the CoCo and remove the RF (radio frequency) shield that might be covering the 6847 IC, you remove the 6847 from its socket. With an "antique"

E-board CoCo like mine, you could run into a problem. Corrosion between the pins of the IC and its socket could make the chip hard to remove. Be patient, it is better to work slowly and carefully than to damage the IC.

Once the 6847 is removed, you place it on the FCS socket. A problem with the instructions becomes evident at this point. The IC has a small dot on its upper-left side to indicate pin 1. But pin 1 of the socket on the FCS board is not clearly marked. After investigation, I found a small chamfer on one corner of the socket that identifies it as pin 1. On the version I tested, pin 1 points toward the on-board ICs. The manufacturer should add a clear marking on pin 1 of the socket or a drawing showing the proper installation orientation. This is important because 6847 chips are expensive and can be damaged if installed incorrectly.

Once you have mounted your 6847 chip on the FCS board, you align the 40 pins on the bottom of the board with the socket in the CoCo. Pin 1 of the 6847 chip should be oriented in the same way over its old socket as it was before you removed it. Because the FCS board will fit only one way, this is a good check of whether you have properly inserted the 6847 in the new socket. FCS also comes with instructions for adding two optional switches, one that allows you to dynamically disable the board and another that permits you to mechanically switch the reverse-video screen on and off. A note to E-board CoCo owners: After installing FCS, I could not completely replace the RF shield. The FCS board sits too high and interferes with the shield closure at the rear. Although this is annoying, I did not notice an increase in interference.

Performance

Once installed, there is nothing more to do than turn on your CoCo. If you want to add the optional switches for disabling FCS or enabling its reverse-video screen, you should do it before installation. FCS was not meant to be plugged in and pulled out. Each time you install or remove it, you increase the chance of bent or damaged pins.

When you turn on your modified CoCo after installing FCS you might think the new component is not working. The difference in the appearance of the sign-on message is subtle. Press the shift-O key combination and begin typing. You'll see crisp, clear lowercase characters with true descenders. The zero is slashed and the letter O is better formed (not

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like the original rectangle-shaped O). The characters are finer and more pleasing. The instructions contain a five-line program to display the new character set. You can get the reverse-video screen without the optional switch by POKEing screen memory.

An initial concern of mine was the characters FCS produced with the POKE command. If you POKE 64 through 127, you get the same characters with or without FCS (except for 95, which produces a left arrow normally and an underline with FCS). But from zero to 63, the characters FCS creates are different, which could be an unwelcome condition when used with programs that rely on the original character ROM. However, the solu-

tion is easy; switch to the disable mode. For this reason, I recommend installing the optional switches.

It is important to realize that FCS does not provide enhancement with many commercial programs such as Telewriter-64 from Cognitec and the VIP series. This is because they use their own software-generated characters. But for programs that do not generate their own character sets, FCS is a welcome addition. The reverse-video lowercase characters you put up with otherwise can drive you a little crazy; they remind me of looking at a patchwork quilt. The added intelligibility you'll gain from FCS with communications

programs alone is well worth the price of the product.

Summing Up

FCS provides an enhanced character set for the CoCo in normal operation. Although it does not offer a significant advantage to computerists who use Telewriter or the VIP series heavily, it is a welcome addition to the rest of the CoCo community. And its price tag is reasonable. Cautious workers will find the installation to be quick and easy. If FCS is representative of CoCo Devices products yet to come, I look forward to seeing more of their line. ■

Take Control with the Hi-Res II Screen Commander

by Jeffrey S. Parker

	ease of use	documentation
	performance	error handling
6		
5		
4		
3		
2		
1		
OVERALL RATING		4.50
Application Software		

Hi-Res II Screen Commander version 2.2 is manufactured by Cer Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, 702-452-0632. It sells for \$24.95 on cassette or \$29.95 on disk plus \$2.50 for shipping. It requires a minimum of 16K.

Hi-Res II Screen Commander is a screen utility from Cer Comp that offers a great deal of versatility for choosing how to use a computer monitor. It allows you to select settings between 28 and 255 characters per line of upper- and lowercase letters and numbers. There are nine different line lengths to choose from in this range, and the settings between 28 and 85 are all legible.

Hi-Res II offers more than just line lengths, though. It seems to have been designed to

emulate a more sophisticated terminal, something along the lines of the Digital Equipment Corp. VT-100. This might be surprising, but with so many display options at your fingertips, controlled with either the keyboard or simple CHR\$(n) strings sent to the screen, you have a far more powerful video display than you had a right to expect when you bought your CoCo.

Along with two choices of character sets, Hi-Res II gives you character highlighting, which is the reverse of whatever screen colors you might be using. (For example, black on white instead of white on black.) On-screen underlining and double-size characters are also available. From one to 23 lines of screen display can be protected, which allows you to keep an eye on notes, formulas, and instructions without fear of erasure—especially when mixing text and graphics in PMODE 4. Hi-Res II is a powerful display-enhancement package.

Another nice feature of Hi-Res II is its ability to provide an adjustable automatic key-repeat function, which allows the user to define how long an alphanumeric key must be depressed before it will repeat. This feature can also be disabled.

In addition to all the support features and functions of Hi-Res II, there are a couple of other aspects of the program that make it stand out. It uses only 2K of RAM in addition to 6K of graphics RAM, which means that it packs quite a programming wallop for a small package. And more importantly, the

program offers a great deal of compatibility. It can be located in any area of RAM and it interfaces with the Basic ROM in the CoCo. That means that Hi-Res II is compatible with a very large number of Color Computer programs. However, don't expect it to work with other sophisticated programs that have their own graphics routines for character display, such as some spreadsheets or word processors. But if you are using such a program, you can toggle in and out of Hi-Res II's display to get back to the usual CoCo screen.

The manual that comes with Hi-Res II is easy to follow and very thorough. However, it has a couple of shortcomings. The loading and executing instructions are not given until page 10, the next to last page of the booklet. And loading instructions for disk are omitted altogether. (To load Hi-Res II on disk, type LOADM "PROGRAM" and follow with EXECUTE.) Despite this drawback, the manual does provide clear instructions for implementing Hi-Res II's commands and features. It offers examples of control keys and a listing for a demo file designed to show off the program's features.

Hi-Res II might be the finest screen utility available for the Color Computer because of its versatility, ease of use, advanced features, and high level of compatibility. Its sophistication puts it on a par with more expensive programs that often perform far less effectively. If you want the excitement of high resolution without the frustration of high price, I recommend Hi-Res II without hesitation. ■

Praise for Kidwriter

by Richard Ramella

	graphics	sound	documentation	playability
6				
5				
4				
3				
2				
1				
OVERALL RATING 5.50				

Games

Kidwriter is produced by Spinnaker Software Corp., One Kendall Square, Cambridge, MA 02139 and marketed by Tandy Corp., (catalog no. 26-3249), 1400 One Tandy Center, Fort Worth, TX 76102. It requires 32K and a disk drive. It sells for \$29.95.

Kidwriter is superb software. It is a story-writing package that combines scene-making and writing to let children create and save their own stories. It is one of the few programs that truly taps the creativity of children because the resulting stories spring directly from their imaginations.

When Kidwriter arrived at my home, I gathered my gang of testers and gave them the disk. The program is unmatched by any children's program I've tested for ease of use. They read the simple 10-page instructions far enough to discover that by typing RUN"SPIN" they could get the program started. Thereafter, they discarded the booklet and went to the heart of the discovery process. Within 10 minutes, they had performed all the possible moves of the program. They

never bothered to read the manual because the rest of Kidwriter's documentation is excellent.

The program starts with a demonstration that shows scenes, plays snippets of songs, and explains its own use. Pressing any key ends the demonstration. Next, the program displays a menu with four choices: make a new picture story, load an old story, view a directory of stories, and quit. The directory selection offers three options: see the directory, erase a story, and return to the story-making part of the program. To get into the heart of the program, you choose the make-a-new-story option from the main menu. The program provides simple on-screen directions at every step.

Children can select the color scheme and background color from the story-making

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Tell them "I saw it in HOT CoCo."

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menu. Characters, objects, shapes, letters, and numbers appear in turn when either the F key for forward or the B key for backward is pressed. Among these images are animals, humans, buildings, vehicles, furniture, and enough space creatures and craft to write a science-fiction book. When a player presses P for pick, a new menu appears. The arrow keys are used to move a selected picture element into place in the scene, where color and size may be adjusted. Once an image is in place, players return to the main menu to select other picture elements.

When the scene is complete, the program allows kids to write as many as 160 characters of story for that page. Simple word-processing features help to hone the writing. My play panel blundered into the right key selections for deletion, insertion, and movement of the cursor. When picture selection and story writing for a page are complete, the page can be

saved on the disk. Several pages can be saved in turn under the story's file name. And the entire story can be run later.

I think Spinnaker underestimated Kidwriter when it evaluated the program's interest level as ranging from ages 6 through 10. I've seen a sophisticated 12-year-old absorbed in the program for two hours at a time. The program's more than 100 picture elements coming in different colors, sizes, and backgrounds make it possible to create complex scenes. And the text can be as prim or as wild as a child's imagination.

The music in Kidwriter is the source of one gripe. All five players on my panel agreed that the music plays too long during each scene.

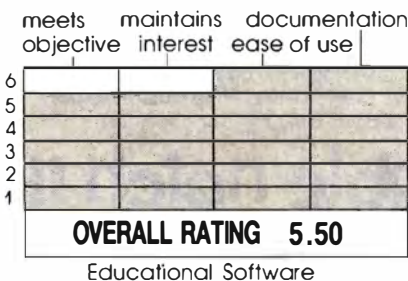
I tried unsuccessfully to crash Kidwriter. It is a well-conceived and well-written program. However, I could not make a backup of the program. And now the disk is almost

completely filled with stories that my wife and I don't want to lose. They are gems we'll hold on to the same way we treasure films of our children as toddlers. Kidwriter should offer a way to either save stories on a separate disk or back up the program disk.

The following anecdote hints at Kidwriter's potential. Two of my family are at an age when bickering is more fun than getting along. But they sat down to work on Kidwriter, one engrossed by the artistic choices and the other absorbed in telling the story. The result was a 10-page saga about Dad, who is captured by robots and taken away. Two little dogs go to his rescue and bring him back. In the final scene, he is reunited with his family under a cheerful sun. I got the gist of the story—it had to do with my spending too much time with computers and not enough with my children. We turned off the computer and went out to play in the yard. ■

Once Upon Children's Tales

by Richard Ramella



Children's Tales is manufactured by Dorsett Educational Systems, P.O. Box 1226, Norman, OK 73070, 405-288-2301. It requires 16K, comes on cassette, and sells for \$59.90.

The Children's Tales package from Dorsett Educational Systems comprises 16 interactive, illustrated, and engaging children's stories. The package aims to increase reading- and verbal-comprehension skills with painless tests of short-term memory sprinkled through the texts. Each story takes

about half an hour to complete and is similar to a chapter in a book.

Dorsett knows its way around this kind of program. The company has been in the interactive audio-visual learning business since 1957. It currently offers more than 1,000 computer-aided instruction programs. Its program's usually mix taped narration with machine-language text and pictures.

The Children's Tales illustrations are well made, even though they are small and are sometimes repeated too often in a story. Many are of such good quality that I suspect a digital reader was used to transfer the original art to the computer. There are some brief animations, but the purpose of the graphics is to reinforce the action through static scenes and characters.

The 16 tales are *Mother Goose*, *More Mother Goose*, *The Three Little Kittens*, *The Three Bears*, *A Child's Garden of Verses*, *Aesop's Fables*, *Cinderella*, *Alice in Wonderland*, *The Emperor's New Clothes*, *The Ugly Duckling*, *The Frog Prince*, *Sleeping Beauty*, *Scheherazade and the Arabian Nights*, *Aladdin and the Magic Lamp*, *The Great Pyramids*, and *The Story of Atlantis*. I was surprised and dismayed to find that the story of *Alice in Wonderland* is modernized in this program. *Wonderland* is represented as a shopping

mall, and *Alice* is shrunk by a TV camera—that isn't *Alice in Wonderland*.

I had some helpers try these programs, and I gained a lot of insight by watching them. A 4-year-old enjoyed the *Mother Goose* tapes and managed to answer most of the number-tap questions. A 9-year-old liked *The Story of Atlantis* but needed to be told that this was a mythical tale and not history. In a home setting, one run of each story seemed sufficient to the children who tried them. I bet that in a school setting, students would vie to get first crack at these stories.

Children's Tales comes in a 7- by 9-inch book-size imitation-leather container. If \$60 seems steep, divide the package's 16 programs into the purchase price. *Children's Tales* is a bargain; it offers 16 half-hour interactive tales for only \$3.75 each. And I estimate that stories from the package will interest children from preschool to about sixth-grade levels.

An added value of this package is that its tales might prompt children to seek out the full original works where such exist. Lewis Carroll, Hans Christian Anderson, the Brothers Grimm, and Robert Lewis Stevenson are available in the library in their full-original form to children whose interest has been aroused. ■

Omega-File

by John Ogasapian

	ease of use	documentation	performance	error handling
6				
5				
4				
3				
2				
1				
OVERALL RATING 4.50				
Application Software				

Omega-File is produced by The Other Guy's Software, P.O. Box H, Logan UT 84321, 801-753-7620. It requires 32K and a disk drive. It sells for \$14.95 (reduced from \$69.95) plus \$2.50 for shipping.

Omega-File is a disk-management system that can handle as many as 16 fields per record, 255 characters per field, with a file size that is limited only by the capacity of the data disk. It will sort on any field; change, add, and delete records; let you see them in sequence on the screen; and allow you to print them in horizontal report format or vertical "mailing list" style. You can print data from all fields or select particular fields you want to print and the order in which you want to print them. Omega File is menu driven. It has prompts at every step and is virtually error proof. Its documentation is clear and concise, but it is unlikely that you will need the manual beyond the first run-through because the program is very easy to use.

Omega-File loads, autoexecutes, and prompts for the optional insertion of a separate data disk. (A future upgrade should cor-

rect a misspelling in this prompt.) Once that is accomplished, the main menu offers options for creating a file or accessing a previously created file. You can also bring up a directory of the data on the disk in the drive and—because the "end" procedures in the program loop back to this main menu screen—exit the program to a cold start.

Selecting the create option causes the program to prompt for field names and numbers of characters typed as a file abc/xxx on the disk. Then the form is displayed with spaces to be filled in reverse color along with a menu of the various editing functions along the bottom. Long records are split into separate screens. As each record receives data, it is entered on the disk in a file abc/dat. Then the program offers you the choice of ending (closing the file and returning to the main menu) or adding another record. Selecting "use" from the main menu skips over the field setup and data-entry routines and goes directly to the record format previously typed with the display menu at the bottom of the screen.

Other options available from the display menu let you change or delete records, view records in sequence, print them, and sort them by a field. Sort creates a third file on the disk, abc/srt, that is essentially an index file of the record numbers. Omega-File's sort routine is at least as fast as any disk sort I have seen, and faster than most.

The print command brings up a full set of formatting prompts. You make choices about how you want to format your data. Should files be printed as entered or as sorted? Do you want headings? Do you want 80 or 132 characters per line (for printers capable of condensed format)? Which fields do you want to print and in what order? Do you want

to print all the records in the file, a single file or group of consecutively numbered records, or a subset from the file containing a specific string of characters?

Because Omega-File packs a lot of features for \$14.95, you might wonder what the catch is. What Omega-File does, it does well. But there are some things it doesn't do at all. For instance, you can print a report heading for a file, but you can't print individual column headings or labels for each field. You can sort by a single field, but not by a combination. You can search from the screen-routine prompt "match only print" at the point of printing all or part of a file, but not from the main menu or screen options. Multilevel searches and Boolean AND/OR search parameters are not possible. And because the program is written in machine code and copy protected, it is not easy to modify. What you see in the easy-to-understand manual is what you get.

Although Omega-File is copy protected, it does have a backup procedure. The program will only run from the main disk. But if there is a problem on the original, the backup disk can restore the original disk.

If you are looking for a disk-file manager that is easy to use, reliable, virtually fool-proof, and capable of maintaining records with user-definable fields and making prints with a variety of options, Omega-File is the right choice. But you must also be willing to forego such amenities as simultaneous sorts and individual column labeling. These limitations could pose a problem in some applications, but for many others they will be inconsequential. Omega-File is a well-written program. If used with the right application, it would be a bargain at twice the price. ■

Goofy Covers Government

by Richard Ramella

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 4.75			
Educational Software			

Goofy Covers Government is produced by Walt Disney Software and marketed by Tandy Corp. (catalog no. 26-2533), 1400 One Tandy Center, Fort Worth, TX 76102. It requires 16K, comes on cassette, and sells for \$34.95.

What happens if the President of the United States breaks the law?
1. The Vice President goes to jail

2. A new election is held immediately
3. The president can be impeached and possibly removed from office

This is my favorite multiple-choice question in Goofy Covers Government, a Walt Disney program package starring the dim-witted but lovable Goofy. If you do not know the answer, go to the nearest Radio Shack store and buy this program immediately.

Goofy Covers Government is a two-story

lesson, one on the powers, limitations, and responsibilities of the President of the United States, and the other on the role of Congress. It pitches well to its target audience of 10- to 14-year-olds. In fact, this simple explanation of the executive and legislative branches of federal government might be useful for refreshing the memories of many adults.

The programming technique used in this software is worthy of note. Though you might have only a Color Basic machine, you will still get high-resolution, color, movement, and sound. The scenes are well drawn in the classic Disney style—right down to the three-fingered characters. The animation, though quite limited, does have its moments. When an old jalopy began suddenly to hop up and down, I got a real sense of movement reminiscent of a cartoon.

Although there is little plot in the two tales of the package, there is a great deal of information and humor. The words of the stories appear on the screen with the scene. Then they play through the TV speaker as output from audio portions on the program tape. This read-first, hear-second style slows the story quite a bit, but it has a purpose. First the student reads out of curiosity and then

“The scenes are well drawn in the classic Disney style. When an old jalopy began to hop up and down, I got a real sense of movement reminiscent of a cartoon.”

listens as the information is aurally reinforced.

In both stories, Goofy is a cub reporter assigned to the Washington, D.C. beat. In the first tale on presidential matters, a veteran reporter named Martha and a photographer named Len Scap take Goofy to a presidential

news conference. Goofy is a perfect foil for the information provided by the lesson. He asks all sorts of naive questions, which Martha, Len, and a story narrator answer patiently.

In the second tale, Goofy is even more feeble-minded. Assigned to cover Congress, he picks up all his facts about the House and Senate from a well-informed Capitol guide and is upstaged in the question department by a small girl.

My cassette tape of the House-Senate story produced some strange effects. There were some bugs on the second side; the same text appeared in two consecutive scenes while the recorded voice went on to new material. There were also some garbled scenes on this side. I ran the 18-minute story twice to be sure of the bugs. The first story ran perfectly.

Despite the bugs I found, I liked Goofy Covers Government. One of my program testers, a 12-year-old girl who considers Disney cartoons passe and the workings of the U.S. government hardly as important as the leather-and-lace-clad rock idols of the moment, agreed to try the program in return for 50 cents. “I get to quit when I want,” she bargained. But she watched it all. ■

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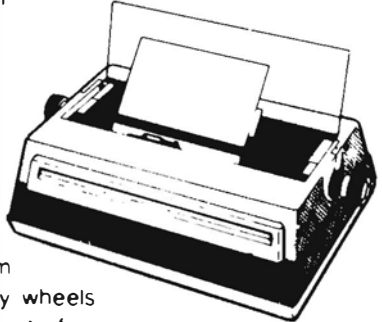
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6809 on Line

by Bobby Ballard

The Knowledge Index

With school back in session, it's time to put the CoCo to work doing research. Even if you're not a student, I'll show you how to stay on top of current affairs; research the latest medical, agricultural, or electronic developments; and tap databases covering business, engineering, mathematics, law, psychology, and education.

Visiting The Knowledge Index is an electronic walk through the reference section of your local library. Haven't you often wished you could find the information needed to begin work immediately and avoid the dreaded trip to the library? The Knowledge Index can put you in touch with your material faster.

The Knowledge Index is operated by Dialog Inc., a large professional-research database owned and compiled by Lockheed Corporation. Dialog contains millions of citations in hundreds of databases that require some training to operate fully. Through The Knowledge Index, Dialog has made portions of these databases available—to certain hours and reduced rates—to less experienced users.

The Search

The Knowledge Index is command driven; there are no menus from which to make selections. Before you sign on, you must plan the search you will conduct and know the database commands. If you haven't used a service like this, don't hesitate to jump in. The Knowledge Index is a good place to learn command-driven searching. It's faster than menu-driven services, and you'll soon find it easy to operate.

Online-research techniques are thoroughly covered in the loose-leaf manual that members receive along with two free hours of connect time. I recommend that you read the manual carefully and keep the command index at hand while you are on line. It contains three sections that cover the details of electronic research, including methods for planning professional-research strategy, appendices of definitions, subjects, telephone numbers, and protocols.

After reading the manual, use the connect time to practice a few searches—the manual's on-line exercises will help you learn your way around. There are sign-on procedures for Uninet, Tymnet, and Telenet in the command index. A few of the prompts are not documented in the manual, but this should not prevent you from signing on. It merely

means you must press the enter key a few extra times.

Planning your strategy in advance involves selecting key words or concepts that accurately represent your research topic. A thesaurus is helpful at this stage. For example, if you were searching for television-news citations, your key words might include "ethics," "law," "legal," "policy," and "practices."

Once you identify your key words, you can use the logical operators, OR, AND, and NOT, to direct your search. If you searched for "television" OR "ethics," you'd receive a list of citations containing references to either topic. If you used AND, the search would return only citations relevant to both subjects.

The search commands are easy to remember: FIND, DISPLAY, BEGIN, EXPAND, and PAGE, for example. In most cases, you can shorten commands to one letter. However, you cannot abbreviate COST, LOGOFF, SET or HELP.

The Information

You must know the names of the databases you wish to search. Each database title is listed in the manual and the command index. The user's manual contains a description of each database; a newsletter keeps members informed of additions and changes in the services.

There are currently more than 25 databases available on a wide range of subjects. EDUC1, for example, is a database compiled by ERIC (the Educational Resources Information Center) of the National Institute of Education—part of the U.S. Department of Education. In 1982, ERIC contained nearly half a million citations from over 700 periodicals, including descriptive abstracts of course plans, research reports, surveys, and curriculum and teaching guides. Each citation contains a descriptive abstract; all types of papers are cited, even unpublished works.

There are four databases on computers and electronics. IDS (International Software Database) contains over 6,500 software listings, with releases dating back to 1973. You search by eight major subtopics, such as education, industrial, systems, scientific, and personal.

Once you have found the citations you need, you may request printed copies of the article or head to the local library, armed with a complete reading list. If you elect to order documents on line, the cost is charged

to your account. The manual details methods for ordering information.

DialMail

DialMail, an electronic-mail service with some unique features, is now available to Knowledge Index users. This is a menu-driven service that lets you send U.S. or electronic mail to other Knowledge Index and Dialog members. DialMail also provides a mail-list feature that allows you to maintain a file of frequently used names and addresses.

You can set up folders and make them public by specifying which members should receive each folder. Public folders are called bulletin boards, and you become their sysop (system operator). Other members can leave files for you to post on the board. Public folders can also become conferences to which all users can read and write. You can create as many bulletin boards or conferences as you can afford to support.

The Cost

To sign up for The Knowledge Index, you will need a credit-card account to handle payment. The initiation fee is \$35. Dialog connect fees can be as high as \$100 an hour or more; The Knowledge Index fees are a flat rate of \$24 an hour for searching and \$18 an hour for DialMail. There are additional fees for electronic storage, public folders, and copies of documents. At this writing, articles and documents cost \$7.25 plus the price of the document or 25 cents per photocopied page. There is a \$6 surcharge for rush orders.

The Knowledge Index is available only during Dialog's off hours—6 p.m. to 5 a.m. (local time) Monday through Thursday (until midnight on Friday). On Saturday, you can call between 8 a.m. and midnight; on Sunday, between 3 p.m. and 5 a.m.

Write to The Knowledge Index, care of Dialog Information Services, 3460 Hillview Ave., Palo Alto, CA 94304, or call them at 415-852-3901. The Knowledge Index can save you hours of research and perhaps supply information that is not available locally. ■

Address correspondence to Bobby Ballard, 1207 Eighth Ave., 4R, Brooklyn, NY 11215. You may also reach him on line through Compu-Serve (#72746,2373 or #73135,255), The Source (#BCT173), and MCI Mail (#172-3476). Bobby's BBS number is 718-499-1633.

Assembly 101

by Victor and James Perotti

Controlling the Cursor

To follow this column, you will need an editor/assembler. The authors use Micro Works' Macro-80C disk assembler, and changes are given for Radio Shack's EDTASM+. Other editor/assemblers will work, but the programs may require some additional modification. The documentation that comes with your software should provide the commands you need.

Last month's program, Display, will never make it as a word processor. The only editing capability it has is the backspace/erase, and you had that in the first program: It's part of POLCAT. You need the ability to move the cursor around and a more sophisticated way to insert and delete text. We'll show you how to program some of these functions, beginning with arrow-key control of the cursor.

The Program Listing, Destructive Cursor, is fairly long—at least for this column. However, it uses simple commands and a few subroutines. When you run the program, you'll see what's going on. (EDTASM+ users should delete line 0007 and the START command from line 0050. Assemble the program and execute it from Basic by typing EXEC &HOE00.) If you need more clarification, use a debugger to display the contents of registers X (screen address) and A (the ASCII character). Here's an overview of the program:

- Lines 1-6 use Equates to set up labels.
- Lines 7-10 perform initialization, just in case.
- In line 11, GO starts the main program.
- In lines 12-21, GO compares A to the break key and each of the four arrow keys.
- Lines 22-25 print the character pressed and return for another, if the key pressed was not the break or arrow keys.
- In lines 26-37, subroutines for the arrow keys update the cursor address.
- In lines 38-48, CHECK keeps the cursor on the screen, stores the new cursor address, and then returns for another key.
- In lines 49-50, DONE returns you to Basic when you press the break key.

So how do the arrow keys work? The computer translates each keypress into the appropriate ASCII code; therefore, each arrow key sends a number that POLCAT picks up and places in register A. When the GO routine compares A to the arrow key's numeric code, it finds them equal, and the program branches to the subroutine for that arrow.

Key	ASCII Code	Sub-routine Called	Effect on Cursor
Left Arrow	08	LEFT	Subtract 1
Right Arrow	09	RIGHT	Add 1
Up Arrow	94	UP	Subtract 32
Down Arrow	10	DOWN	Add 32
Break	03	DONE	

Table 1. Arrow Keys and Cursor Control

Although the screen appears as a matrix of rows and columns, it is represented in memory as a linear sequence from \$400 to \$600. You can then manipulate the cursor by adding or subtracting 1 or 32 to or from the current cursor address. Therefore, if the cursor is at the left side of the third line (address \$440) and you press the down arrow, 32 characters (\$20) are added to \$440, and the cursor moves down one line, to the left side of the fourth line (\$460).

Although you could add and subtract to or from the cursor storage location, we'll use register X. The 6809 has a nice command, LEAX, that means "load the effective (relative) address into X" of some label or register (e.g., LEAX - 32, CURSOR). Each of the arrow-key subroutines has a LEAX command. Table 1 shows you what you must do to X to move the cursor: LEAX - 1, X moves the cursor one space to the left; LEAX 1, X moves it one space to the right; LEAX - 32, X moves it one line above the present cursor position; and LEAX 32, X moves it one line below the present cursor position. STX CURSOR in the CHECKING subroutine then reloads the new effective address for the cursor into the cursor's storage location.

Additional Commands

Assembly language uses many load and store commands to move things into (STORE) and out of (LOAD) memory locations. The LEAX, LEAY, LEAU, and LEAS commands are easy ways to load addresses into 16-bit registers. Commands such as LDX, LDY, LDA, and LDB offer less flexibility in fetching addresses or values, but we've used them in the program, too. In the START initialization subroutine, LDX #VIDRAM loads \$400 into X (again, the # indicates the VIDRAM number, and not the contents of its address). That number is then stored (STX) in CURSOR just to make sure that the cursor starts at the upper left corner of the screen.

In the OFFBOT (off the bottom of the screen) subroutine, X is loaded with the #\$5FF number, which resets the cursor to the bottom right corner of the screen when you try to use the down or right arrows to move the cursor off the bottom of the screen.

The CHECK subroutine employs some new branch commands following comparisons. CMPX #VIDRAM, BLO OFFTOP instructs the computer to compare X to \$400 to see if the cursor is lower than screen memory, branch to OFFTOP if it is lower (BLO means "branch if lower than"), and compare X to the last screen address to see if the cursor will go off the bottom of the screen. CMPX #5FF, BHS OFFBOT instructs the computer to branch to OFFBOT if X is higher than or the same as (BHS means "branch if higher than or the same as") \$5FF. The GO routine compares A to the arrow-key codes and branches if A is equal to one of the codes (BEQ means "branch if equal").

BRA GO (BRA means "branch always") returns the program to the main GO subroutine—the statement goes back to the keyboard to wait for you to press another key. If you press an arrow key, you will move the cursor; if you press any other key, that character will be printed on the screen.

Jump commands are similar to branches. Branches follow comparisons or tests and perform one of two actions as a result. For example, BEQ actually means "branch if equal, but ignore the branch if not." Jumps are unconditional: JMP means always jump. The jump commands in Destructive Cursor force you to distinguish between subroutines. JMP tells the program to move to a subroutine and go on from there. JSR causes the program to process the subroutine and return to the point from which it came.

The final subroutine, DONE, includes a statement to instruct the computer to jump to Basic (JMP BASIC). Once that's done, the program is over—you don't come back. The JSR CLS, JSR POLCAT, and JSR PRINT commands work because Basic's ROM subroutines end with an RTS (return to sender) instruction. You don't see these subroutines, so the ending RTS isn't apparent. Be careful that your program doesn't inadvertently fall into subroutines. BRA offers no chance of moving to the next subroutine, but a series of BEQs might present an opportunity to move on to the next program module. ■

Write to Victor and James Perotti at 163-D Pine Grove Heights, Athens, OH 45701.

Program Listing. Destructive Cursor

```

0001 0400      VIDRAM EQU $400      TOP OF SCREEN
0002 A1B1      POLCAT EQU $A1B1    GET CHARACTER
0003 A30A      PRINT EQU $A30A     PRNT TO SCREEN
0004 0088      CURSOR EQU $088        ADDR FOR CURSOR
0005 A928      CLS EQU $A928     CLEAR SCREEN
0006 A027      BASIC EQU $A027  ADDR FOR BASIC
0007 0B2C      START  NAM CURSOR
0008 0B2C      BDA928      JSR CLS          CLEAR SCREEN
0009 0B2F      8E0400      LDX #VIDRAM     START AT TOP
0010 0B32      9F88        STX CURSOR      CRSR ON SCREEN
0011 0B34      BDA1B1      GO JSR POLCAT     CHECK KEYBOARD
0012 0B37      8103        CMPA #03        BREAK KEY?
0013 0B39      274D        BEQ DONE       RETURN TO BASIC
0014 0B3B      8109        CMPA #09        RIGHT ARROW?
0015 0B3D      2729        BEQ RIGHT      LEFT ARROW?
0016 0B3F      8108        CMPA #08
0017 0B41      271F        BEQ LEFT
0018 0B43      810A        CMPA #10        DOWN ARROW?
0019 0B45      2714        BEQ DOWN
0020 0B47      815E        CMPA #94
0021 0B49      2709        BEQ UP
0022 0B4B      BDA30A      *NOT ARROW;PRINT CHARACTER
0023 0B4E      3001      CHROUT JSR PRINT DISP CHAR
0024 0B50      9F88        LEAX 1,X       INCREMENT CURSOR
0025 0B52      20E0        STX CURSOR
0025 0B52      20E0        BRA GO
**PROCESS CURSOR MOVES

```

```

0026 0B54 3088E0      UP      LEAX -32,X      MOVE UP A LINE
0027 0B57 9F88        STX CURSOR      PUT CRSR THERE
0028 0B59 2013        BRA CHECK
0029 0B5B 308820      DOWN    LEAX 32,X         PUT CRSR THERE
0030 0B5E 9F88        STX CURSOR      STILL ON SCRN?
0031 0B60 200C        BRA CHECK       MOVE 1 TO LEFT
0032 0B62 301F      LEFT    LEAX -1,X         PUT CRSR THERE
0033 0B64 9F88        STX CURSOR      STILL ON SCRN?
0034 0B66 2006        BRA CHECK       MOVE 1 TO RIGHT
0035 0B68 3001      RIGHT  LEAX 1,X         PUT CRSR THERE
0036 0B6A 9F88        STX CURSOR      STILL ON SCRN?
0037 0B6C 2000        BRA CHECK       OFF THE TOP?
0038 0B6E 8C0400     CHECK  CMPX #VIDRAM  GOTO FIX ROUTN
0039 0B71 2507        BLO OFFTOP     OFF BOTTOM?
0040 0B73 8C05FF     CMPX #55FF    GOTO FIX ROUTN
0041 0B76 2409        BHS OFFBOT    GET ANOTHER CHRCTR
0042 0B78 20BA        BRA GO        PUT CURSOR AT
0043 0B7A 8E0400     OFFTOP LDX #5400   TOP LEFT CORNR
0044 0B7D 9F88        STX CURSOR    GET ANOTHER CHRCTR
0045 0B7F 20B3        BRA GO        PUT CURSOR AT
0046 0B81 8E05FF     OFFBOT LDX #55FF  BOTTOM RIGHT
0047 0B84 9F88        STX CURSOR    GET ANOTHER CHRCTR
0048 0B86 20AC        BRA GO
0049 0B88 7EA027     *ALL DONE, RETURN TO BASIC
0050 0B8B            DONE JMP BASIC      DONE,GOTO BASIC
0050 0B8B            END START

```

```

BASIC A027 CHECK 0B6E CHROUT 0B4B CLS A928
CURSOR 0088 DONE 0B88 DOWN 0B5B GO 0B34
LEFT 0B62 OFFBOT 0B81 OFFTOP 0B7A POLCAT A1B1
PRINT A30A RIGHT 0B68 START 0B2C UP 0B54
VIDRAM 0400

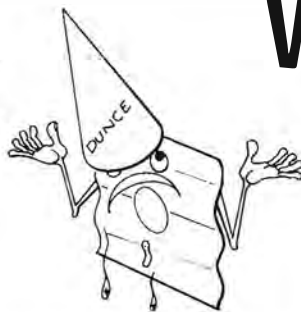
```

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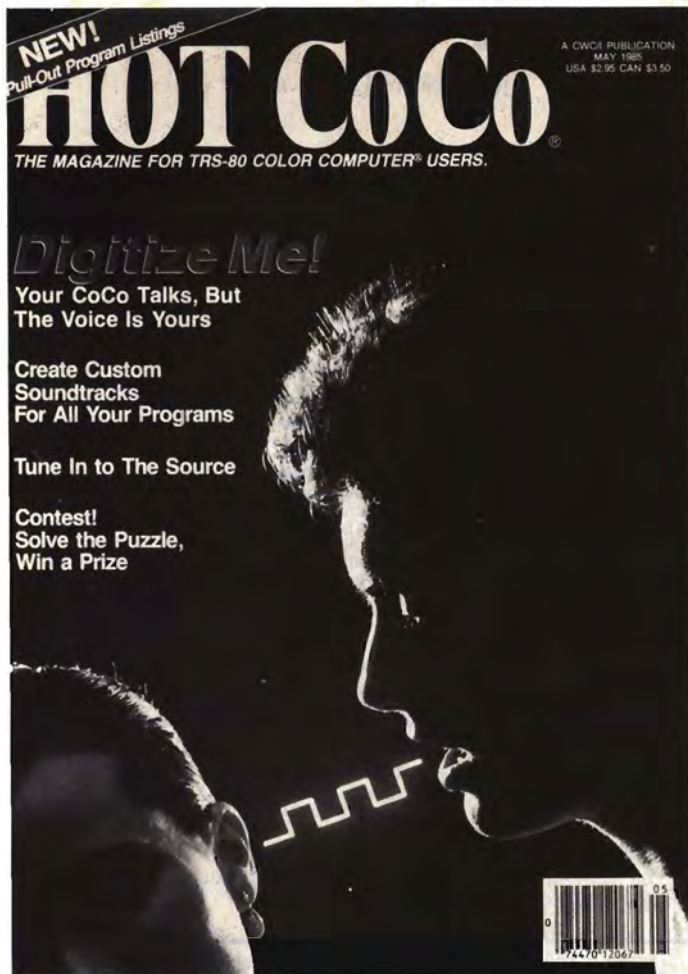
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Reader's Forum

Changing Print Styles With Color Disk Scripsit

Color Disk Scripsit offers no easy way to select different print styles or to match baud rates with your printer. I have a Tandy DMP-110 printer with switch-selectable baud rates of 600 or 1,200. However, if I return to Basic and try to list a program, I can't do so without either POKEing the value for the 1,200-baud rate into the computer or changing the printer switch back to 600 baud.

Listing 1, Printer Set, solves both problems. Line 50 sets the computer's baud rate to 1,200, and line 60 puts the printer in the word-processing mode. You can change the values to accommodate different printers.

Run this program before Scripsit and select the print style you desire. Running it before a programming session lets you print out listings in interesting print styles. The program's main value, though, is in saving you the trouble of having to look up a lot of different control codes and to POKE values to change printer modes. You could easily expand it to select various spacing and carriage-return modes, as well.

D.A. Dolbey
Fairfield, TX

Printer Formatter

What is more frustrating than typing in long Basic listings, then making a trial LLIST to check for typing errors only to have an 80-character-per-line printout while the magazine follows the screen's 32-character format?

I tried POKEing the line-width location (\$9B) with a value less than the 132-character default with no success on my Radio Shack LP VII. Checking the printer driver in ROM (\$A2BF), I found that the software tries to force a carriage return by doing a carriage-return delay when the line exceeds the width setting of \$9B. That has no effect on my LP VII; it keeps plodding across the line until it bumps the 80-character limit and forces itself to drop a line. I developed Printer Formatter (Listing 2) that allows as many characters per line as you want, starts the line indented to any margin you set, and pauses at the bottom of each page to let you insert a new sheet or skip the perforations.

Program Listing 1. Printer Set

```
10 REM PRINTER SET PROGRAM
20 REM "GO"
40 CLS
50 POKE150,41 '1200 BAUD RATE
60 PRINT#-2,CHR$(20) "WORD PROC
SSING MODE SET
70 PRINT TAB(6)"SELECT CHARACTER
SET"
80 PRINT"-----"
-----"
90 PRINT:PRINT
100 PRINTTAB(3)"1. STANDARD"
110 PRINTTAB(3)"2. CORRESPONDENC
E QUALITY"
120 PRINTTAB(3)"3. PROPORTIONALL
Y SPACED"
130 PRINTTAB(3)"4. ITALIC CURSIV
E"
140 PRINTTAB(3)"5. CONDENSED"
150 PRINT:PRINT
160 PRINTTAB(3)"YOUR SELECTION?"
170 A$=INKEY$
180 IF A$<>" " THEN200
190 GOTO170
200 IF A$="1" THEN270
210 IF A$="2" THEN440
220 IF A$="3" THEN620
230 IF A$="4" THEN640
240 IF A$="5" THEN660
250 GOTO170
260 GOTO40
270 CLS
280 PRINTTAB(6)"STANDARD PRINT S
TYLE"
290 PRINT:PRINT
300 PRINTTAB(6)"1. NORMAL SPACIN
G"
310 PRINTTAB(6)"2. ELITE SPACING
"
320 PRINT:PRINT
330 PRINTTAB(6)"YOUR SELECTION?"
340 A$=INKEY$
350 IF A$<>" " THEN370
360 GOTO340
```

To implement an interactive LLIST formatter, I first tried saving my program to tape in an ASCII format (CSAVE"File name",A). I thought I could read each record (line) of Basic in and print it. Not that easy. INPUT# - 1,A\$(or LINEINPUT# - 1) would not include the carriage returns (ASCII 13) that end each line in the input string. It looked like I would have to read in each block of tape and then decode the cassette buffer. Since I used a ROM call to read blocks, it makes a simple Basic-only program.

To use it, CSAVE the program you want to LLIST as an ASCII copy. Now load in the formatter and run it. It will ask for characters per line, lines per page, and the left margin tab. After this, prepare your printer and load your tape. The LLIST to your specifications is made as the tape is progressively read, so leave the cassette player on until the entire listing is printed. When the bottom of your page setting is reached, you will be prompted to change paper. You can advance continuous sheets manually, or insert another single sheet. Press the enter key and the printout continues.

Robert K. Fink
Dayton, OH

Undocumented Use of RND

It isn't in my CoCo manual, but you can use the RND function in the following manner:

```
10 FOR I = 1 TO 10
20 A = RND(0)
30 PRINT A
40 NEXT I
```

This gives results in a range of zero to one. If you want random numbers between A and B, replace lines 20 and 30 from the program above with:

```
20 C = INT((B - A)*RND(0)) + A
30 PRINT C
```

Ragib Karamehmedovic
Sarajevo, Yugoslavia

NEW!



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By Steve Hartford

Sitting on the back porch one afternoon, you see a strange, flashing UFO descend from the clouds & land out in the corn field. Being the curious type, you run out to investigate and find a spaceship with it's hatch open...as you step inside, the hatch closes and the ship takes off! You must find a way to get back home. A great graphics adventure! 32K & one disk drive required.

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```
37Ø IF A$="1" THEN 4ØØ
38Ø IF A$="2" THEN 42Ø
39Ø GOTO 34Ø
40Ø PRINT#-2,CHR$(27);CHR$(19)
41Ø GOTO 68Ø
42Ø PRINT#-2,CHR$(27);CHR$(23)
43Ø GOTO 68Ø
44Ø CLS
45Ø PRINTTAB(6)"CORRESPONDENCE Q
UALITY"
46Ø PRINT:PRINT
47Ø PRINTTAB(6)"1. NORMAL SPACIN
G"
48Ø PRINTTAB(6)"2. ELITE SPACING
"
49Ø PRINT:PRINT
50Ø PRINTTAB(6)"YOUR SELECTION?"
```

```
51Ø A$=INKEY$
52Ø IF A$=<>" " THEN 54Ø
53Ø GOTO 51Ø
54Ø IF A$="1" THEN 58Ø
55Ø IF A$="2" THEN 6ØØ
56Ø IF T=2 THEN 6ØØ
57Ø GOTO 51Ø
58Ø PRINT#-2,CHR$(27);CHR$(18)
59Ø GOTO 68Ø
60Ø PRINT#-2,CHR$(27);CHR$(29)
61Ø GOTO 68Ø
62Ø PRINT#-2,CHR$(27);CHR$(17)
63Ø GOTO 68Ø
64Ø PRINT#-2,CHR$(27);CHR$(66)
65Ø GOTO 68Ø
66Ø PRINT#-2,CHR$(27);CHR$(2Ø)
67Ø GOTO 68Ø
68Ø RUN"DOS" 'RUNS SCRIPSIT
69Ø END
```

Program Listing 2. Printer Formatter

```
1Ø CLS: CLEAR 3ØØ
2Ø INPUT"FILENAME TO PRINT";F$
3Ø PRINT:INPUT"CHAR./LINE";W
4Ø PRINT:INPUT"LINE/PAGE";L
5Ø CLS:PRINT"READY CASSETTE"
6Ø PRINT:INPUT"HIT <ENTER>";B$
8Ø TL=Ø:CLS
9Ø PRINT#-2,STRING$(TB,32);
1ØØ OPEN"I",-1,F$:GOTO 12Ø
11Ø EXEC &HA7Ø1
12Ø IF PEEK(&H7C)=255 THEN CLOSE
(-1):END
14Ø FOR I=&HØ1DA TO &HØ1DA+PEEK(
&H7D)-1
15Ø J=J+1:CH=PEEK(I)
16Ø IF CH=13 THEN GOSUB 2ØØ:GOTO 1
9Ø
17Ø IF J>W THEN GOSUB 2ØØ
18Ø PRINT#-2,CHR$(CH);
19Ø NEXT I:GOTO 11Ø
2ØØ J=Ø:PRINT#-2,CHR$(13);
21Ø PRINT#-2,STRING$(TB,32);
22Ø TL=TL+1
23Ø IF TL>L THEN TL=Ø:CLS:INPUT"
CHANGE PAPER";B$
24Ø CLS:RETURN
```



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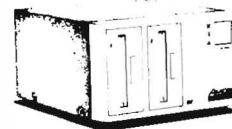


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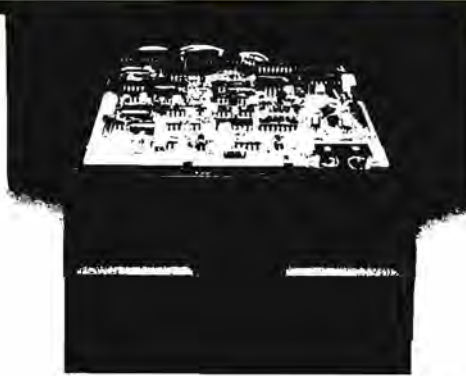
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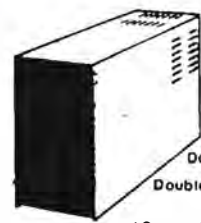
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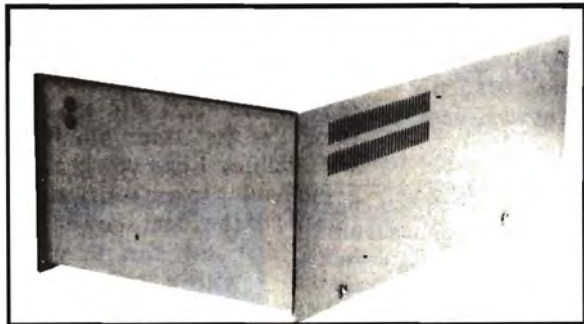
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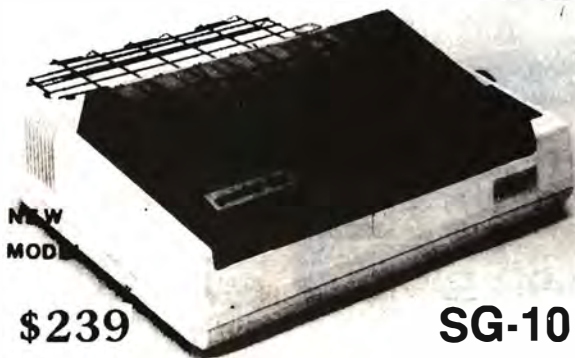
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Product News

by J. Scot Finnie

Owl-Ware, Epson, Okidata, Apropos, DiskPorter, Marooned, Cer-Comp's Starship Falcon, The Other Guy's Software, and More

Information related in the Product News section is supplied by manufacturers. HOT CoCo has not tested or reviewed the products discussed here and cannot guarantee manufacturers' claims.

It is easy to overlook the extras until some need or application comes along that demands a disk drive, a particular type of printer, or even a printer stand. Having the right peripherals and an organized work environment can really help you get the most out of computing. Sometimes one gadget or piece of equipment can make all the difference in what you and your CoCo can turn out. Recent price wars in the CoCo marketplace and general computer marketplaces make it a good time to buy a disk drive or printer. Here are some of the products we've heard about this month.

Peripherals

One of the major sources of CoCo disk drives is **Owl-Ware**. They now offer a disk-drive tutorial program with 10 lessons to help customers who are new to disk drives. The disk will also contain games and utilities. It requires 32K and sells separately for \$24.95, but the company is offering it at \$2.95 with the purchase of an Owl-Ware disk drive.

There are several new printers on the market this month, and prices are coming down all over. Our reader surveys indicate that in addition to Tandy models, Color Computer owners favor Star Micronics, Epson, and Okidata printers. Last month HOT CoCo reviewed the Star Micronics SG-10, the newest dot-matrix Star product on the market. But Epson has also released a new in-

expensive dot-matrix printer, the **Spectrum LX-80**. It sells for \$299. The 80-column printer runs at 100 cps (characters per second) in its draft mode and 16 cps in its near-letter-quality mode. The LX-80 also has a built-in parallel interface, friction feed, an expandable 1K buffer, and optional tractor and cut-sheet feeders.

Epson has also just released a new \$299 daisy-wheel printer called the **DX-10**. The new 82-column letter-quality printer works at 10 cps and uses Diablo print wheels. It offers pica and elite character sets, international character sets, and a bidirectional, logic-seeking print head.

Okidata's new dot-matrix

printer's memory until you change them, even if the printer is turned off. The Microline 192 also offers a "correspondence quality" mode and bit-image graphics. It has a list price of \$499.

Apropos Technology offers a low-cost daisy-wheel printer that should turn some heads at its price. The **Aprotek Daisy 1120** is a 20-cps, Diablo 630-compatible daisy-wheel printer. It has front-panel pitch selections, automatic paper load, switch-selectable page length, and a 2K buffer. The 1120 also has a standard Centronics parallel interface. It lists at \$364 and its optional tractor-feed attachment sells for \$82. The 1120 comes



The Aprotek 1120 from Apropos Technology is a daisy-wheel printer that deserves consideration.

ers—color TVs that also function as composite monitors. One such company is **Sylvania**, which offers a 14-inch monitor receiver (RGE150SL) with a comb filter, a flat square black-matrix picture tube, a five-button digital tuning system, bidirectional program scan, and 142-channel capability. Its random-access infrared remote control has quick view, mute and RF (radio frequency) switching. It also has a sleep timer. The new Sylvania set sells for \$469.

Computing Aids

The Read/Right division of the Texwipe company has released a product for cleaning and maintaining computers. The **Read/Right Microcomputer Cleaning Kit** is designed to remove contaminants from disk-drive heads, video screens, and computer housings. The kit also contains static-control products. It sells for \$34.95.

DiskPorter from Potomac Industries is a versatile, portable disk organizer that doubles as a copy stand, hangs on the wall, slips into a drawer, or stores on a shelf. It displays the tops of the 20 disks it stores, making them easily accessible. It sells for \$29.95.

Printer stands seem to be an area of innovation. Every month brings something new. The **Howard Printer Stand** from Howard Medical Computers is a plexiglass bridge with a foam top and



The sleek new Microline 192 from Okidata is packed with features.

printer, the **Microline 192**, comes with a reinking cartridge ribbon and an 8K buffer. It allows you to select characters per inch, print mode, and page length at the touch of a button, so you don't have to program or open the printer to make changes. Selections are stored in the print-

er with a one-year warranty on parts and labor. The company welcomes dealer inquiries.

Why buy a new color TV and pass up the sharpness of a color monitor for your CoCo? Several companies, including General Electric, Mitsubishi, Panasonic, and Sears offer monitor receiv-

cork-tipped feet that is designed to reduce noise and vibration. It allows 2½ inches of clearance beneath the printer for storing paper. It sells for \$39.50. Inland Corp. makes the **Inland Universal Printer Stand** that is designed to fit any printer. The two-piece stand comes with sound-absorbing pads, cable routers to prevent printer cables from interfering with paper feed, and a slight forward tilt to make it easier to read from the printer. The company claims that the cost of these stands will be about half the price of a conventional stand, but the actual selling price was unavailable at press time.

Games And Miscellaneous

What do you do if a UFO lands outside your house? Why, check it out, of course. And when you step inside, the door closes and off you go into the stars. This is the premise of **Marooned**, a new two-part graphics adventure authored by Steve Hartford and available from Saguaro Software. The adventure offers more than 100 rooms and outdoor locations and also has a game-save feature. It requires 32K and a disk drive. **Marooned** sells for \$29.95. Saguaro Software also recently moved north to Colorado. The company's new address is P.O. Box 1864, Telluride, CO 81435. Their new phone number is 303-728-4937.

Spectral Associates has repackaged several of its game and education programs. **Space Pac** contains 10 of the company's popular space-arcade games that normally cost from \$14.95 to \$24.95 each; it sells for \$49.95. **Education Pac** costs \$29.95 and offers six Spectral Associates education programs that regularly sell for \$14.95 to \$19.95. **Space Pac** requires 16K and a joystick; **Education Pac** requires 32K.

Cer-Comp, a company well known for its fine applications and utilities, has released a new graphics-adventure game called **Starship Falcon**, in which interstellar terrorists have threatened the planet Earth with world-wide starvation. They possess a biological weapon that can destroy



The Inland Universal Printer Stands from Inland Corp. will fit any printer.

all edible plant species throughout the galaxy. However, it is said that on the distant planet Zephyr there is an edible plant that is not affected by the herbicide. Can you obtain seeds to this plant and return to ensure the Earth's survival? **Starship Falcon** requires 32K and a disk drive. It sells for \$21.95.

Cer-Comp has released several new products this year, and **Product News** will continue to let you know about them. Look for an informative in-depth review of the company's CBasic compiler in an upcoming issue of **HOT CoCo**.

Joe Nielson is the other guy from **The Other Guy's Software**. The company offers Bob's Magic Graphic Machine (see the review in last month's issue of **HOT CoCo**), Omega-File (see the review this month), and Keep-Trak, among other programs. It has recently released Accounts Payable and Accounts Receivable and is working in a programmable-function calculator similar to the popular Sidekick software marketed for the IBM by Borland International. Nielson maintains that The Other Guy's Software intends to sell "good products at reasonable prices."

Long Division is a new drill-and-practice educational program from B5 software. It offers a tutorial, workspace for multiplication, error information, scoring analysis, and multiple levels. It also lets you enter your own problems. It requires 32K and comes on cassette for \$19.95 and disk for \$21.95.

Try-O-Print is a printer utility with routines for printing mailing labels, cassette labels, disk directories, invoices, purchase orders, and statements. The program is written in Basic to provide easy customization. It

requires 16K and comes on cassette or disk for \$19.95 plus \$2 for shipping from Try-O-Byte.

D & A Research produces a complete line of bus-related I/O (input/output) equipment for TRS-80 computers. The company has recently released the **J110K Bus Adaptor Kit** for the Color Computer, which converts the Color Computer bus to a TRS-80

Model I look-alike for I/O-driven devices. The adapter fits into the ROM port of the CoCo and allows you to hack in almost any electronic device for interfacing. The J110K sells for \$15 unassembled. You can also buy an assembled version of the board (J110A) for \$20. The assembly manual is \$5. Contact the company for more detailed information. ■

List of Vendors

Apropos Technology
1071-A Avenida Acaso
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805-482-3604
Reader Service ✓ 550

B5 Software Co.
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The Corner Office

by Jeff DeTray, Publisher

Education Extravaganza

If you've ventured this far into your copy of *HOT CoCo*, then you probably perused the "Color Computer Education Guide" in the middle of the magazine. You may even have noticed that it had its own special "cover" and table of contents. What gives?

The story began last spring, when it came time to plan our fall issues. Traditionally, education is an appropriate topic for the autumn season, and so we selected October as Color Computer Education Month at *HOT CoCo*. The timing is just right, since the October issue arrives at newsstands and in mailboxes by early September. (Remind me to explain sometime just why *HOT CoCo* comes out so early.)

Timing is one thing, but content is another. What can you say about computers and education that hasn't been said before, both here and in other publications? Our discussions of this weighty matter led to a couple of important conclusions. First, the Guide should contain material of interest to parents as well as to students and educators. Education, like charity, begins at home, and parents are they key. Well-informed parents can and should have a strong voice on if, when, and how computers are introduced into their child's classroom.

Our second major conclusion was that information on computers in education, and particularly on Color Computers in education, should be presented to an audience outside the normal *HOT CoCo* readership. After all, *HOT CoCo* regulars (you!) already know a great deal about what computers can and can't do.

To help spread the word to others, we have printed 30,000 extra copies of the 32-page Guide for distribution to schools that use Color Computers in the classroom. The schools have agreed to distribute the Guide to their CoCo-using students and encourage them to take the Guide home to their parents. In this way, we hope to bring important information about computers in education to parents who may not have given the subject much thought before. If informed parents conclude that classroom computers are a good idea, perhaps they'll push for Color Computers. We hope so.

Education—Big Business

No matter how many times I see the figures, the sheer size of the American educational system is staggering. There are now more than 17,000 school districts with more than 100,000 schools! Now that Ma Bell has been dismembered, only the public utilities can match the school system in its presence in nearly every community. By the way, Texas has the most school districts with 1,123, but California has more schools—10,193.

What's really amazing is that the vast majority of school districts in the United States—more than 15,000—own at least one personal computer. From the numbers I've seen, my estimate is between 500,000 and 600,000 personal computers currently in use in the nation's schools. Well, perhaps not actually "in use," but at least available. Even in schools, computers sometimes sit on the closet shelf.

Which computer companies lead the pack of manufacturers hungry for a share of this market? Apple is the best seller, with Tandy and Commodore vying for second place. IBM, a late starter, is making up for lost time. In software, many of the traditional textbook publishers are now in the educational computer program business. They're banking that years of experience in education will overcome their inexperience with computers. I tend to think it will. It seems to me that, for creating good, sound educational software, knowing how to teach is far more important than knowing how to program. What do you think?

Sounding Like a Broken Record

Keep those cards and letters rolling in, folks. Mail call is still the highlight of the day, except when newly printed issues of *HOT CoCo* arrive at the office. So send your comments, ideas, and criticisms to:

Jeff DeTray
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Thanks. ■

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