

**Facts and Advice
On Video Monitors**

A CWC/I PUBLICATION
SEPTEMBER 1985
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HOT CoCo®

THE MAGAZINE FOR TANDY COLOR COMPUTER® USERS.

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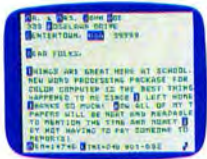
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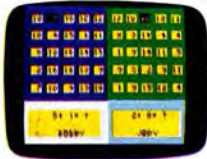
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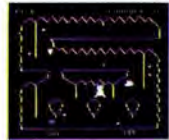
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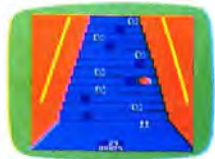
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** Cassette recorder required.
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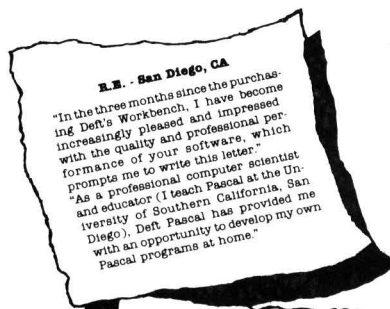
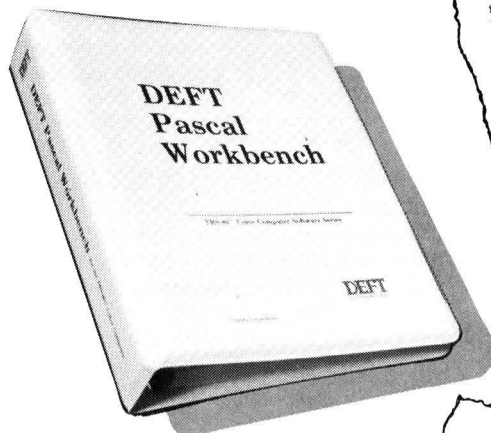
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Most of the programming features found on the mainframes and minis used in business and science are available on the Color Computer with **DEFT Pascal Workbench**.

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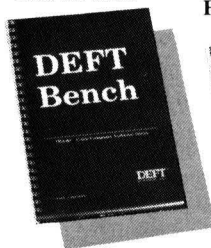
HOT CoCo Magazine - (March 1985)

"What sets the DEFT product apart is the extent of its coverage. It provides the CoCo user with a very compatible implementation of standard Pascal, along with many useful extensions for string handling, absolute memory access, and the compilation of separate program modules. That's quite a feat for a system that can run on a 32K computer. DEFT's Pascal supports real (that is, floating-point) variables. Many CoCo aftermarket languages handle only integers; this Pascal gives you full-bore computation capability."

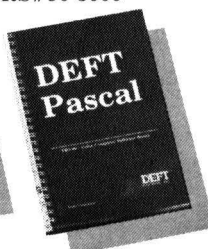
RAINBOW Magazine - (November 1984)

"The DEFT Systems people have put together a package which is a complete Pascal and/or assembly programming environment that is reasonably priced and works like a champ."
"DEFT Bench and DEFT Pascal remain an excellent example of what can be accomplished in the CoCo world. The entire package gives you all the necessary tools to learn Pascal. If you already know Pascal, then it gives you a total development environment. Nothing is missing, there is nothing else to buy."
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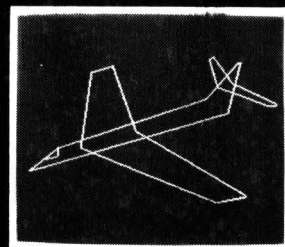
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The Home-Computer Market Slows Down

Anyone who has been following the microcomputer industry through the summer knows that sales of home computers fell drastically after last Christmas. Even the biggest sellers are doing poorly. One industry analyst said that the Commodore-64 is "suffering from arterial sclerosis," and *InfoWorld* reported that Apple II sales "dropped off a cliff" after Christmas. The word on the Color Computer is not much better.

Ed Juge, Tandy's director of market planning, stated several months ago in a conference on Compuserve that the Color Computer market was "soft"—significant when you consider that Tandy officials always discuss products and sales in the best possible light.

Radio Shack stores confirm slow CoCo sales. One salesman in Chicago claimed that he sells nearly ten Model 1000s for every CoCo sold. A franchise store owner in an urban area reported sales of only three or four CoCos a month.

But there is no need for a feeling of doom and gloom to set in yet. Christmas should bring improved sales, though I don't expect them to equal the 1983, or even 1984, buying levels. Tandy and other home-computer manufacturers are facing the same problem: How do you sell home computers to a public that is confused about and even alienated from them?

The hype that has accompanied the microcomputer phenomenon since its beginning (from Commodore TV commercials to pie-in-the-sky magazine articles) is starting to backfire. Consumers are discovering that computers won't balance their checkbooks, organize recipe files, or make geniuses out of their children. They have good reason to feel misled. A computer is not a cure-all, but a facilitator to performing specific tasks—people are still responsible for the final outcome.

The fact is that most people don't need computers, and the computer industry has failed to come up with a good reason for consumers to buy one. Home computers do a few things very well: They store and sort information, act efficiently as typewriters, entertain, and enhance a child's conventional schooling. But how many people do you know handle lists of data at home large enough to require a computer, use a typewriter on a regular basis, or understand how a computer can help their children in school? And how many are willing to invest in a computer just to play games?

Home computers do not offer enough utility for the average consumer, and the average consumer is still largely unaware of the computer's potential. Tandy should take the lead and look for ways to integrate the computer into the home environment. They must define the computer's role in the home and then bring the message to the consumer. They must find ways to convince the consumer that computers improve the quality of life, not complicate it.

It really is no wonder that the home-computer market is dead in the water. The industry has failed to find an approach that would give computers the mass appeal of, say, stereos or VCRs. Without some creative rethinking on the industry's part, the days of the home computer might be numbered.—Michael E. Nadeau ■

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80 Pine Street
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1-800-441-4403 or
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- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

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.

64K COMPATIBLE

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 (LPV7/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.

*...truly a state of the art word processor...
outstanding in every respect.*

— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs \$49.95 on cassette, \$59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

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Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Add \$2.00 for shipping & handling. CA residents add 6% state tax.

**Now available at
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Instant CoCo is a cassette tape containing the major programs from this issue of *HOT CoCo*. Its purpose is to save you the time and effort of typing long program listings into your Color Computer. You simply load the programs from the Instant CoCo tape using your cassette recorder. The instructions for operating each program are found in the corresponding *HOT CoCo* article. Both Basic and Assembly-language programs are included on the tape.

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 September 1985

Side A			
Article Name/Author/Description	Page #	File Name	System
Copyright Statement	---	TITLE	16K CB
Mindbusters/Ramella	18	STAMPEDE	16K ECB
Round up the loose ponies and put them where they belong.			
Me and My CGP-115/Shaw	25	COLORDMP	16K ECB
Produce color screen dumps with Tandy's popular little printer.			
The Fat CoCo/Esposito and Jackson	28	BANKTEST	64K ECB
Test your 256K of RAM.		BANKBACK	64K ECB
Matrix Maneuvers/Benson	40	MATRIX	4K CB

Side B			
Disk Data Recovery/Meredith	55	DISKFIX	32K DECB
Restore data lost due to crashed disks.			
The John-B System, Part III/Barbarelo	60	JBROBOT	16K ECB
Use this program to drive your personal assistance/home-control system.			
Radio-Systems Calculations/Epp	70	RADIO	16K ECB
Get a fix on communication satellites.			

*** BONUS PROGRAM ***

3-D Orange Trap/Wood	---	ORANGE	16K CB
How many moves will you last in this revision of an old favorite?			

CB = Color Basic, DECB = Disk Extended Color Basic, ECB = Extended Color Basic

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.

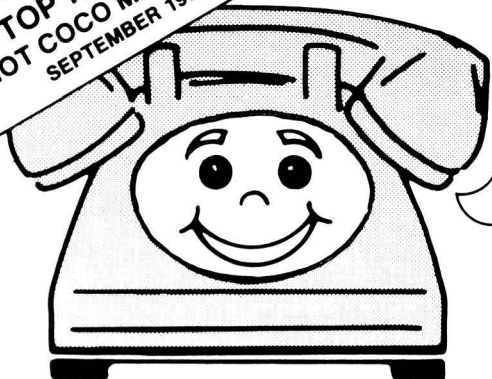
June 1985—How to install 64K in any CoCo; pie-chart program; custom fonts for Gemini printers.

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**. ■

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984



YOU COULD FALL IN LOVE WITH **AUTOTERM!**

IT TURNS YOUR COLOR COMPUTER INTO THE

WORLD'S SMARTEST TERMINAL

AND
MOST
LOVABLE

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 46,600 characters (34,900 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

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WHAT THE REVIEWERS SAY

"AUTOTERM is the Best of Class."

Graham, *RAINBOW*, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."

Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."

Ellers, *RAINBOW*, 11/84

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Please hire the mentally retarded. They are sincere, hard working and appreciative. *Thanks! Phyllis.*

Each month *HOT CoCo* provides 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. The Color Computer manuals are well written, and you will enjoy your CoCo much more if you've read them.

Check the Requirements

The first thing you should do is make sure 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. (See below for an explanation of the different ROMs.)

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.

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 listings 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 proofreading what you have typed in 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.

Common Errors

Some characters are easier to confuse than others when you are typing in program listings. And since your Color Computer interprets everything literally, the smallest error can crash a program. Below is a list of characters commonly confused with one another:

zero and the letter O
colon and semicolon

lowercase l and the numeral one
uppercase B and the numeral eight

Weird Characters

The up arrow indicates exponentiation on the Color Computer. Unfortunately, most printers do not have an up arrow. 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 listings "talk" to your computer on a much more direct level; Basic requires some translation before your CoCo can execute it. Therefore, Assembly works much faster than Basic. Unfortunately, it is 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. Since editor/assemblers can cost as much as \$80, you probably don't need one unless you want to learn Assembly-language programming.

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 convert some Assembly programs to Basic DATA statements and include a short Basic routine to load and execute the DATA statements. This gives you a program that you can type in just like a Basic listing, yet it operates much like one written in Assembly.

If you want to run one of *HOT CoCo's* Assembly listings, but it hasn't been converted to DATA statements and you do not own an editor/assembler, check to see if the program is included 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 or lock up your machine. When this happens, the only way to recover is often to turn off the computer for a few seconds and then turn 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.

Different ROMS

Radio Shack has updated the Basic ROMs in the Color Computer several times since it was introduced. Below is a list of the ROMs and the problems and benefits you might encounter with each one:

- Color Basic 1.0—Cannot fully use the 64K upgrade and has only a 7-bit serial printer routine, which inhibits sending graphics data to a printer.

- Color Basic 1.1—Fully supports 64K and has an 8-bit serial printer routine for graphics.

- Color Basic 1.2—Executes code faster than previous versions, but changed the way the ROM reads the keyboard. This makes some software written for the older ROMs incompatible with the 1.2 ROM. There is a simple fix, which *HOT CoCo* incorporates into every program in which this problem is encountered.

If you don't know what Color Basic ROM version you have, type EXEC 41175 after you first turn on your computer. The ROM version will be printed on the screen.

- Extended Basic 1.0—Has bugs in the PCLEAR, PRINT USING, and DLOAD statements.

- Extended Basic 1.1—Fixes the above-mentioned bugs.

- Disk Basic 1.0—This is in the disk controller cartridge used with the grey CoCos and grey disk drives. The 1.0 Disk ROM is incompatible with CoCo 2's.

- Disk Basic 1.1—Works faster than 1.0, but you can use the 1.1 Disk Basic controller with the older, grey CoCos. Also, many routines have been moved, making some programs written using the 1.0 Disk ROM incompatible with the 1.1 ROM. (See "A Quick Fix for Your Disk ROM," by Mike Meehan, *HOT CoCo*, February 1985, p. 44, for a utility that overcomes this incompatibility in most cases.)■



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Letters to the Editor

Readers Respond

Ed. Note: The following letters are in response to our call for comments on HOT CoCo's redesign, beginning with the May issue.

I am a new computer user and have learned most of what I know from your magazine. I read Letters to the Editor, Doctor ASCII, and Reader's Forum every month.

Your new format is backwards. You should put Reviews in the pull-out section and keep the listings with the articles.

Keep up the good work. I'm reading almost every issue now.

R. Hunter
Cerritos, CA

I have just received my May issue of *HOT CoCo*. Although the overall look of the magazine is excellent, I would prefer that the listings accompany the articles. I'm sure that many other readers clip articles and file them under appropriate headings.

Christian Bergerson
Williamsville, NY

I am dismayed at the current stark appearance of *HOT CoCo*. The most distressing change is the pull-out program listings. The listing is of little value without the accompanying article. In addition, the type is too small. Instant *CoCo* is not the answer for everyone; many readers type the listings in order to become familiar with the principles of programming.

Furthermore, a theme for each issue would give the magazine a more polished air. Most important, don't let the two Richards, Ramella and Esposito, slip through your fingers. They are among *HOT CoCo*'s most valuable assets.

You've taken on a Herculean task. As an indication of the faith I have in *HOT CoCo*'s enduring quality, I have renewed my subscription for three years.

Dorothy N. Welch
Madison, MS

Many of our issues do have themes—e.g., last month was our graphics issue. Thanks for the support and encouragement.—eds.

I would like to hear more about what is happening in the marketplace with respect to

CoCos. Discussion of promising developments for competing computers and the prospect of these features becoming available for the *CoCo* are of interest to me. Many computer magazines are bad at explaining how programs work. *HOT CoCo* is average at best.

I am eagerly following the Perottis' Assembly-language column. So far it is good, but I am reserving comment. Letters to the Editor and Doctor ASCII are interesting. The reviews are vital, and an annual index of articles would be helpful. Pull-out program listings are a pain. They guarantee that the program and the article will never be together.

Chris Klemmer
Granby, CT

Industry news has always rated low in our surveys of readers' interests. Most, it seems, want to learn how to use what they have, rather than know what might be coming down the road.—eds.

Sometimes the product reviews you print are confusing. In the May issue, for example, Jeff Parker praised Cer-Comp's error trapping in Data Pack II (*HOT CoCo*, May 1985, p. 30) but the rating box gave error trapping a 4. Why the discrepancy?

You should provide more basic information for first-time users. Explain terms such as "hidden RAM," "buffer," and "DOS."

The new format and typestyle look fine. But print the program listings in larger type and stop making a separate pull-out section for them.

I like *HOT CoCo*. I need hints, hardware reviews, and clear instructions.

Ted Paul
Fredonia, NY

If you type BA to return to Basic while running Data Pack II, you lose the contents of the buffer. Our reviewer, Jeff Parker, mentioned this and suggested that Cer-Comp add an error-handling routine to guard against accidental data loss.—eds.

I don't think there is any advantage in separating the text from the program listings. After typing in a program, I usually go back and read how to use it. At least give the page number and the title of the article with the listing to make it easier to find the article

again. If your magazine were thick, the pull-out section would make sense.

John Jenkins
Worth, IL

Your new format should set an example for professional computer magazines. I can only add my best wishes for your effort to be the first to publish an error-free publication.

Your articles are interesting; I especially enjoy Doctor ASCII and Reader's Forum. The pull-out listings are another good idea.

Michael L. Millard
Douglas City, CA

I like the high-tech look you have adopted—it makes the magazine easier to read. I like the separation of the Table of Contents into articles and departments because I can find what I am looking for more easily.

You should keep the reviews in one place. Don't start them and then jump the rest of that section to another page.

Readers who type in all the programs welcome the pull-out listings. It is also useful if you want to quickly see what programs are in a particular issue. Other readers might prefer to have the listing at the end of the article. I am easy to please; either way is fine.

I've been wondering why *HOT CoCo* is getting smaller. Your first issue had 146 pages; the May issue had only 96. Why is that?

On a different subject, I'd like to say that I am pleased with HJL. I found out about their keyboard in your magazine—the reader's service card was a real blessing. Getting the keyboard was even better. If it weren't for *HOT CoCo*, I don't know what I would have done.

Wayne C. Finlay
Scarborough, Ontario

Magazine size is determined by the number of advertising pages. The more we sell, the bigger we can be. In the past year, there has been a decline in both the number of advertisers and advertising pages in the Color Computer market. This trend is a sign of maturation in the CoCo marketplace—strong companies with good products survive. We do see good growth potential in the near future; maybe then we can put on some more weight.—eds.

I think your magazine's new format is great. I especially like the new pull-out sec-

tion for program listings. The magazine lies flat while I type in the listings. I also like the smaller print you are using because it means you can fit more good articles into the same number of pages.

I enjoy the variety of articles I find in *HOT CoCo*. For me, Reviews, Product News, and the program listings are the most important.

Jill Mead
Pinconning, MI

I think your magazine's new look is good, but I will have to get used to it. I would like to see you print the line numbers for program listings in bold type so that users can distinguish between lines. After typing for a while, the lines seem to run together.

John W. Barbera
Elmwood Park, IL

We print out program listings on a letter-quality printer from the author's disk or tape. This makes it impossible for us to darken the line numbers as you suggest. Perhaps we could improve readability in other ways. Anyone have other suggestions?—eds.

Until a few months ago, I planned not to renew my subscription to *HOT CoCo*. The articles and reviews did not seem aimed at me. "Improve Your Telewriter-64" (*HOT CoCo*, April 1985, p. 40) by Mike McGuire started to change my mind. The new format in the May issue further convinced me that you are trying to show *CoCo* users how to fully use a fine machine.

Keep up the good work and *HOT CoCo* will grow. Readers need a practical magazine.

Leon G. Wigrizer
Jenkintown, PA

Your magazine, like many others I've read, is geared to the reader who is computer wise. You seem to forget that lots of us are new owners who need information and a little instruction. I enjoyed James Wood's articles in "Basic Beat" because he wrote so that a novice could understand how programs work.

You should publish the tables of contents for your back issues. I purchased your June 1983 and December 1984 issues to get a word-processing program. I'm sure there are other issues that might interest me if I knew what was in them.

Overall I am pleased with your magazine. In fact, I just renewed it for two more years.

Vernon Lundeen
Fredericksburg, TX

I will not renew my subscription because of your new format. I do not like the pull-out program listings. When you read an article, you then have to find the listings. To return to the article, you have to look at the index because the page number of the article is not given with the listing.

Homer E. Brooks
Zephyrhills, FL

Article page numbers are now with the listings.—eds.

MusiWriter Useful

I cannot believe Eric Grammer is a musician after reading his review of MusiWriter (*HOT CoCo*, May 1985, p. 76). I am a professional musician and have used MusiWriter nearly every day since I purchased it last November.

It is not true that MusiWriter works only with the Tandy DMP-110 and DMP-120 printers. It also works with the DMP-200, Epson, Gemini, and Smith-Corona printers. The print routine also includes a double-strike option, which greatly enhances the appearance of printed music.

I write mostly instrumental music with MusiWriter, and, unlike Mr. Grammer, I am not frustrated with the software. You can add any sharp or flat in its proper position, so you accommodate a mixture of key signatures following a set key signature with the fewest sharps and flats. Triplets, 32nd, and 64th notes are possible if you handwrite the beams and additional editing marks after printing.

Mr. Grammer was dissatisfied because he had to check both cursors to be sure the note and position along the bar were correct. Writing music is an exacting process; MusiWriter eliminates the tedious process of handwriting music.

He also complained that the 60 positions MusiWriter allots to each staff are insufficient for four measures written in 4/4 time. Readable music has space. I use 8½-inch paper and it is filled with the 60 positions.

I use my Telewriter-64 to title my compositions and then follow it with the printed

score, using my favorite computer program—MusiWriter.

Michael Stokes
Nashville, GA

Technically speaking, MusiWriter does not work with any printer. A printer driver permits you to obtain printouts from a program. The version of MusiWriter that *HOT CoCo* received for review included printer drivers for Tandy's DMP-110 and 120 printers only.

My frustration with MusiWriter results from the program's requirement that you specify the exact position of musical symbols. When writing by hand, it is easy to put a sharp, flat, natural, or other musical symbol where you want it. Using the arrow keys to accomplish this is tedious. If the program used game paddles instead, I would have no reason for complaint.

MusiWriter offers well-formed musical notation at a price; its musical symbols are limited and it requires you to specify placement with the arrow keys. If you want to put beams on eighth notes, you must remember to program them as quarter notes (because quarter notes do not have flags) and connect the stems by hand later. As you mention, written music is an exact process. What would you think of a word processor that is incapable of punctuating sentences, leaving you to insert periods and commas by hand?

With MusiWriter, key signatures containing more than three sharps or flats protrude into its limited number of positions (60). This is mentioned in the review because the sharps and flats from key signatures are often erased during editing. This is an annoying but minor drawback.

Furthermore, while the resolution of handwritten music is more than 1,000 positions, MusiWriter offers only 60 positions—enough for four measures of tightly packed eighth notes. It is not possible to get 16th notes to line up. The program is good for simple music. But serious composers and musicians want their printed music to contain plenty of space to make it easy to read.

Any decision concerning whether it is easier to write music by hand or with MusiWriter is ultimately a subjective one. People with particularly poor handwriting might be better off with MusiWriter. But most musicians will find it easier to control the legibility of music they write by hand. The music-processor concept is a good one, and Tesseract has made a significant first step in that area. I'm glad to see that someone finds it useful, but I can't recommend it for most musicians.

Eric Grammer

Bad Combination

I recently bought a Juki Model 2200 combination printer/typewriter. I ordered a parallel port because I own a Botek serial/parallel interface and have had good results using it with my DMP-110 dot-matrix printer. The printer produces gibberish; I cannot get it to interface. Can you help? Is it possible to interface my CoCo 2 and the printer? I have one disk drive and am using VIP Writer.

David M. Thomas
345 Second St.
Atlantic Beach, FL 32233

We cannot offer any advice but perhaps our readers can.—eds.

Bull's Eye!

Three readers have found ways to complete the Bull's Eye puzzle ("Mindbusters," HOT CoCo, June 1985, p. 22) in 17 moves. Joe Daniel solved the puzzle using A,,Z,Z.Z.A.Z,Z,.

Ruthe Hamilton and A.N.L. Fladung came up with Z,,AA.ZZ.A.Z.A.A.,. Congratulations! Can anyone improve on this?—eds.

SAT Tutorial

I am interested in purchasing PSAT, SAT, and Achievement Test tutorial software that will run on my 64K, disk-based CoCo 2. Can anyone help?

W.K. Whitman
101 Van Norden Road
Reading, MA 01867

me out in the cold. I hope that you will convert the listings for EDTASM +.

Jay C. Thomas
Great Falls, MT

Although the Perottis have expressed a preference for the Macro 80-C, the Assembly-language series also provides instructions for using two other popular editor/assemblers: EDTASM + and SDS80-C.—eds.

Test Pilots

I would like to have several people test a printer-utility program. If you are interested, please write to me, giving the brand and model of your printer. Only the first several respondents for each different printer will be answered. No phone calls, please.

John M. Gregg
Try-O-Byte
1008 Alton Circle
Florence, SC 29501

Assembly 101

I was disappointed that you chose to use the Macro 80-C assembler in your Assembly-language series (HOT CoCo, May 1985, p. 68). Like most people, I own the Radio Shack editor/assembler EDTASM +, and that leaves

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(OS-9) *X-Word wordprocessor	\$ 79.95
(OS-9) *X-Merge mail merge for X-Word	\$ 29.95
(OS-9) *X-Term terminal package	\$ 59.95
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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. I am having problems with disk Telewriter-64 and the Disk Basic ROM, version 1.2. When I type double letters, the second letter doesn't print approximately half the time. I often must press the key four or five times before it registers. The cursor movement and break key are also stubborn. Is there a fix?—**Rev. Ted Power, Assiniboia, Saskatchewan**

A. When Telewriter-64 was first written, the later Basic ROM versions did not exist, and the program's author did not follow Tandy's advice to use only documented routines. In particular, the program should use the keyboard-polling (POLCAT) routine at address \$A000, calling it with a JSR [\$A000] from an Assembly-language program. The more recent releases of Telewriter-64 incorporate this technique.

For your original disk version, add the following lines 501–508 to the program U/BAS and replace its line 200 with the line below. Line 507 makes your program compatible with both Disk Basic 1.0 and 1.1.

```
200 LOADM"TW64",OF:GOSUB 500:POK
E386,57:IF(SW) GOSUB 330
500 P1=PEEK(&HA000):P2=PEEK(&HA0
01)
501 POKEOF+7931,P1: POKEOF+7932,
P2
502 POKEOF+8210,P1: POKEOF+8211,
P2
503 POKEOF+9845,P1: POKEOF+9846,
P2
504 POKEOF+13783,P1: POKEOF+1378
4,P2
505 POKEOF+14774,P1: POKEOF+1477
5,P2
506 POKEOF+15241,P1: POKEOF+1524
2,P2
507 IF PEEK(&HC004)=215 THEN POK
EOF+8929,202:POKE8930,103
508 RETURN
```

This patch makes disk Telewriter-64 compatible with both the 1.1 and 1.2 Basic ROMs. It is especially useful if you do not always use the same machine, as in a classroom situation. We came up with this patch by searching through Telewriter-64 for the byte sequence 189,

161, 193 and replacing each occurrence with 189, PEEK(&HA00), PEEK(&HA001). What caused the problem was that the POLCAT routine was moved 10 bytes higher in the 1.2 Disk Basic ROM. You can construct similar patches for other programs.

Q. I need a disk drive. Should I get the J & M disk controller with a Teac drive or an RS-DOS system? I am worried about compatibility. Will all RS-DOS programs work with J & M's DOS?—**E. Coons, Myrtle Creek, OR**

A. Get a J & M controller, but with RS-DOS installed instead of JDOS. While JDOS has a number of enhancements over the standard RS-DOS, you lose compatibility with many popular programs—e.g., Telewriter-64. I strongly recommend that you get double-sided drives. The small additional price that you pay would be well worth it should you ever decide to use Flex or OS-9.

Q. I have a CoCo 2 with two 80-track, double-sided drives. With Flex and a patched OS-9, I can use all tracks on both sides of a disk. With Tandy's Disk Color Basic 1.1, I have only 35 tracks and one side. Can I patch Disk Color Basic so it can access all tracks on both sides of a disk, too?—**M. Friedman, Brooklyn, NY**

A. With your CoCo in memory map 1 (you can use the 64K Enable program that appeared in the June 1985 HOT CoCo, p. 45) the following Basic program will patch your version of Disk Color Basic for 80-track operation with drive 2 being the back side of drive 0 and drive 3 being the back side of drive 1. If you copy your Disk Basic 1.1 ROM to a 68766 EPROM, you can make these patches permanent.

You cannot make Basic use both sides of a disk as one drive since Microsoft did not allow enough space for an allocation table of that size. You still get 158 granules on each side of a double-sided, 80-track floppy disk for a total of 316 granules—significantly better than the standard 68.

```
10 POKE&HC735,158:' 80 TRACK POK
ES
20 POKE&HC75A,1
30 POKE&HC7BB,158
40 POKE&HC7D0,158
50 POKE&HC7EF,158
60 POKE&HCD26,158
70 POKE&HCEB5,158
80 POKE&HD29D,80
90 POKE&HD44D,158
100 POKE&HD534,79
110 POKE&HD65F,80
120 POKE&HD682,80
130 POKE&HD89F,65:' MAKE 2 BACK
OF 0
140 POKE&HD8A0,66:' MAKE 3 BACK
OF 1
```


Q. The 64K Enable program ("64K Modification Revisited," *HOT CoCo*, June 1985, p. 45) stirred my imagination. To truly put the additional memory to work, however, I need help understanding how the CoCo stores variables. After running the following program:

```
1Ø CLS:A=1Ø:S$="NAME":VA=VARPTR(
A):VS=VARPTR(S$)
2Ø PRINT"FOR A"
3Ø FORN=-2TO4:PRINTPEEK(VA+N);:N
EXT
4Ø PRINT:PRINT"FOR S$"
5Ø FORN=-2TO4:PRINT PEEK(VS+N);:
NEXT
```

I get:

```
FOR A
65 0 130 32 0 0 0
FOR B
83 128 4 0 38 16 0
```

The only value I can make sense out of is 4 for the length of S\$.—**T. Moore, Indianapolis, IN**

A. The VARPTR function tells you where the third byte of a variable resides in memory. The first 2 bytes contain the ASCII codes of the first two characters in the variable name. In the case of a character variable, 128 is added to the second byte's ASCII code. For a floating-point variable, byte 3 represents the exponent and bytes 4-7 represent the mantissa.

For your variable A, that leaves a mantissa of 132 0 0 0. This is the floating-point representation of 10. If you convert the number 10 to binary and expand it to fill 4 bytes, you get 1010.0000 00000000 00000000 00000000. Converting to scientific notation and normalizing so that the binary point is to the left, you get 10100000 00000000 00000000 00000000 $\times 2^4$. The resulting 4 bytes without the power of two are known as the mantissa.

The CoCo changes the leftmost bit of the mantissa to zero to indicate a positive value. (For negatives, it is left unchanged.) The power of two is added to 128, and this value is stored preceding the mantissa. The number (both exponent and mantissa) as stored in the computer would be 10000100 00100000 00000000 00000000 00000000, which is in agreement with the output of FOR A.

For your variable S\$, the third byte (as you correctly concluded) contains the string length. Bytes 5 and 6 are a pointer to the byte sequence that contains the string. In this case, the actual string would start at address $38 \times 256 + 16$, or 9744. The other bytes are not used.

Q. On my CoCo, statements PRINT 3/5*10 and PRINT 10*3/5 both return an answer of six. But if I have the CoCo test to see if they are equal, it indicates that they are not! Is this a bug?—**John J. Cimino, Whitesboro, NY**

A. It is not a bug, but a result of rounding off in binary floating point. If you look at the two results in memory with the aid of VARPTR (see previous letter), the results are:

131 64 0 0 0 and 131 64 0 0 1

which the CoCo sees as a difference of $1.86264515E-9$. The solution is to test for equality using a scheme such as:

IF ABS(X - Y) < $1E-8$ THEN...

If the idea of binary rounding is not good for your application, use a business language such as Cobol, which stores numbers in binary coded decimal (BCD). The lowest-cost CoCo Cobol runs under Flex. It is Crunch Cobol, and is sold by Frank Hogg Labs, 770 James St., Syracuse, NY 13203, for \$99. The only features it lacks that a main-frame Cobol programmer would miss are ISAM files and the COMPUTE statement.

Q. My birthday is coming up, and I have been given the choice of a 64K upgrade, a CGP-115 printer, or a TP-10 printer. Which is the best to get?—**Warren Colvett, Redding, CA**

A. You have a split decision, so you'll have to make your own choice. Here are our opinions:

Ralph: I would go for the printer before the memory. However, I would look at some of the non-Tandy printers, such as the Star Micronics (Gemini) SG-10. For more specific printer information, refer to "Printer Answers," *HOT CoCo*, March 1985, p. 24.

Richard: I recommend getting 64K, a printer, and then a disk drive in that order. You would soon be unhappy with the choice of either of the printers you mentioned. My advice is to go with the memory upgrade and save up for a good dot-matrix printer. (These are currently selling in the \$300 range.)

Q. I am looking for a high-level, well-structured programming language that runs at speeds comparable to Assembly. I am considering C and Forth. Do you know of any others for the CoCo?—**Steve Olson, Gaithersburg, MD**

A. Unless you are a devotee of reverse Polish notation (RPN), I would rule out Forth. Tandy markets a very good C compiler for OS-9, and they also have an OS-9 Pascal compiler. If you are willing to sacrifice some speed, Basic-09 is a structured programming language that is a cross between Basic and Pascal.

continued

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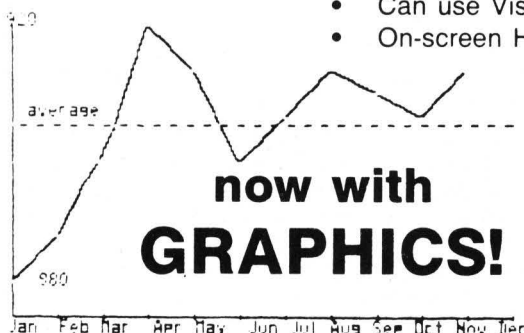
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Q. I have a problem running machine-language programs that work on my old grey CoCo on my new CoCo 2. They just hang up. Is there a fix?—**Al Givens**

A. See "A Quick Fix for Your ROM," by Mike Meehan, *HOT CoCo*, February 1985, p. 44.

```
160 C(I)=C(R)
170 C(R)=C
180 NEXT I
190 FOR I=1 TO N
200 PRINT C$(I),C(I)
210 NEXT I
```

Q. Where can I purchase *Basic Microprocessors and the 6800*, by Ron Bishop?—**Chris Cloutier, Pleasant Hope, MD**

A. I assume you are asking due to the reference on page 267 of *Getting Started with Color Basic*. At the time that the manual was written, there were no books on the 6809 being sold in Radio Shack stores. Since the 6800 is somewhat similar to the 6809 and Bishop's book was available at the time, it was referenced. Radio Shack has since commissioned William Barden, Jr., to write *TRS-80 Color Computer Assembly Language Programming*. This is the book that should be referenced on that page, and it is available at all Radio Shack stores (catalog no. 62-2077, \$6.95).

While on the subject of assemblers, Tandy's Disk EDTASM + works with PBJ's Word-Pak I if you first type RUN"DOS", and then when the drive stops press the 2 key and then press enter. (The 2 will not appear on the screen.) Finally, type EDTASM when the drive stops again and press enter. Again, no text will appear on the screen. EDTASM + will now work as usual, but in an 80-column format.

Q. I am a part-time teacher at a community college. I need a program that will divide my class into teams so that the same students aren't always on the same teams.—**J.R. Lavalley, Carrollton, TX**

A. The program below should suit your needs. It will work for a class of up to 30 students.

```
10 DIM C$(30), C(30)
20 INPUT "NO. OF STUDENTS";N
30 FOR I=1 TO N
40 PRINT "NAME ("I"):";
50 INPUT C$(I)
60 NEXT I
70 X=RND(-TIMER)
80 INPUT "NO. OF TEAMS";T
90 FOR I=1 TO N STEP T
100 FOR J=0 TO T-1
110 IF I+J<=N THEN C(I+J)=J+1
120 NEXT J,I
130 FOR I=1 TO N
140 R=RND(N-I)+I
150 C=C(I)
```

Q. I own a 16K Extended Basic CoCo. When I type PRINT MEM, I get 8487. Is this right? Is there any way to get the Basic PLAY and SOUND commands to do more than one note at a time without additional hardware or software? In the *Going Ahead with Extended Color Basic* manual, FN is listed as a reserved word (p. 203). What does FN do?—**William Cantrell, Manchester, TN**

A. The 8487 is correct. Your machine has 16,384 characters of memory. Basic takes 1,041 for its pointers, allocates 6,144 for the high-resolution graphics pages, allocates 512 for the low-resolution screen, and allocates 200 for string space, leaving you with 8,487.

The Basic PLAY and SOUND commands do not allow fast enough access to the digital-to-analog converter to produce multiple notes. These can be played using Assembly-language programs, but this is not a trivial task. FN is used with the Basic DEF FN command (p. 112 of the Extended Basic manual) to allow the user to define one-line functions that would then be referenced just like any other Basic function (ABS, RND, and so on).

Q. How can I convert a machine-language program to Basic statements? How do I use machine language?—**James Morsch, Albuquerque, NM**

A. Machine language cannot be translated directly to Basic. However, you can write a Basic program that will POKE the machine language into memory and then execute it. A utility program that builds POKE routines appeared in the July 1984 Doctor ASCII column, p. 94. Before you try to use machine language, read a good 6809 Assembly book. I recommend Bill Barden's, mentioned in a response above. Five 6809 Assembly books were reviewed in the March 1984 *HOT CoCo*, p. 38.

Q. Is there any way to do inverse trig functions on a CoCo? I can do sine, cosine, and tangent fine.—**Charles Craft, Pearl, MS**

A. I assume from your success with the trig functions that you are running Extended Basic. Page 189 of *Going Ahead with Extended Color Basic* gives equations for all the inverse, hyperbolic, and inverse hyperbolic functions. The only inverse function that is built into Extended Basic is the arctangent (ATN). ■

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Mindbusters

by Richard Ramella



Stampede

In the corral there are 24 horses with space for 25. There are 12 green mounts in the northeast corner and 12 orange ones in the southwest corner. The empty space is in the center of the corral. The ranch foreman says that you have to exchange the two sets of horses as efficiently as possible. You can't open the corral because they would break for it. There is also a hitch here. The horses are apparently infatuated with the game of chess. They resist all attempts to move unless directed in the peculiar L-shaped gait of the chess knight.

This month's puzzle, Stampede, is not so much an exercise in cowboying as it is a test of your ability to think ahead, manipulate patterns, and grasp the elusive. It is a chance to prove that your IQ is four times your waist size, 14 times the length in inches of your foot, eight times the joints on your left hand, or whichever comes first.

When you run Stampede, you'll see a 5-by-5 grid with green and orange horses. Beyond the southwest corner there is a green circle to remind you that the green pieces should finish in that corner of the board. Beyond the northwest corner there is an orange circle.

In chess, knights move two squares in any direction and then one square to either side. You might also perceive this as moving one square in any direction and two squares to either side. To move the horses in Stampede, press A for north, Z for south, comma for west, and period for east. It takes a three-key combination to make a horse move. Moves must always end up on the empty space. Because there is only one square into which you can move, there is no need to tell the computer which piece you are playing. Fix on the horse you want to move and press the sequence of keys that will take it to the empty

square. If you hear a low tone, you have tried an illegal move, such as three squares in the same direction. It will probably take no more than a minute to master the system.

Before you begin, take a look at the starting positions. The green horses occupy five spaces in the top row, four in the second row, two in the third row, and one space in the fourth row. The orange horses occupy one space in the second row, two spaces in the third row, four in the fourth row, and five in the bottom row. When you make the switch, be sure that the colored horses trade positions exactly.

The program recognizes a winning position by sounding 50 random tones. If you make as many as 100 moves without finding the solution, the program emits a repeated high-to-low sound, which you turn off by pressing the break key.

Puzzle Contest V

Watch for future puzzle contests to be more challenging. Many of you sent the correct answer for Puzzle Contest I, the winner and answer of which will be printed in next month's column. As a result, I plan to make it a little more difficult for you brain strainers. It seems that a great many Color Computer owners are sophisticated puzzle solvers.

Stampede also serves as this month's contest, Puzzle Contest V. The object is to switch

the positions of the horses in as few moves as possible. Press any key after you solve the puzzle. The computer displays your move string and the number of moves you took. To win the contest, send me the move string of your attempt with the fewest moves. If you have a printer, you can print the move string. To do this, turn on your printer before you play the game. When you have a move string and score you want to print, press the break key. Then type:

FOR X=0 TO H: PRINT # - 2, ST\$(H): NEXT

and press the enter key. If you don't have a printer, copy your best move string and score onto a piece of paper.

If you want to try a noncontest version of Stampede, one that does not impose a 100-move limit, change line 440 to 440 GOTO 430 and line 480 to 480 REM. Then delete lines 380, 450, and 460. In this version, a winning position causes random tones to sound until you press the break key. But it does not generate move strings. To see your score, press the break key after you have solved the puzzle and type PRINT B. ■

See program listing on page 44

Eds. note—To enter Puzzle Contest V, send your name, address, and a printout or copy of your move string and score to Richard Ramella, 1493 Mt. View Ave., Chico, CA 95926. Entries must be postmarked on or before September 30, 1985. The winner will be the entrant who submits the answer string with the fewest moves. Ties will be broken by a random drawing. The winner's name and answer will be printed in a future Mindbusters column. The winner will receive a free, one-year subscription to HOT CoCo.

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The Computer Room

by Scott L. Norman

A Data Manager for OS-9 Without Tears

I seem to be caught in a minor-league time warp. Shortly after the first edition of *The Computer Room* hit the streets (*HOT CoCo* June 1985, p. 24), I had to start preparing this month's column. I find myself writing about data-management programs again. I have recently seen Computerware's Databank Manager, which is noteworthy for being one of the first applications programs to come with its own copy of the OS-9 operating system right on the disk. I also have some material from correspondents: thoughts about simplifying life with Pro-Color-File, and a lead on another data manager from a proven software author.

Databank for OS-9

The arrival of a box bearing the Computerware logo is usually a sign of good things. The most recent shipment included Databank Manager, which turned out to be a serious contender for repairing the lack of a mid-size data manager for OS-9.

Good, simple OS-9 applications software is still hard to find. There are some decent word processors around, and there's DynaCalc, but the pickings get slim. People with data to manage have had a particularly tough time of it. To my knowledge, all the early OS-9 data managers were ungainly brutes, designed to be installed by systems integration professionals. Databank is more like the majority of programs already running under R/S DOS: a self-contained package that can satisfy the needs of the individual or small organization. It still wouldn't be my recommendation for someone's first data manager, but then the complete novice is unlikely to be tangled up with OS-9.

Computerware's disks and manuals fit into envelopes about 5½ by 8½ inches in size for ease of display, and, presumably, for brand recognition as well. This might help keep the price down, but it also leads to some terse documentation. Databank uses a certain amount of unique terminology, and there aren't a lot of examples in the 29-page instruction booklet. Not that the product is riddled with bugs; it's just easier to use if you have had experience with another data manager.

Aside from that, Databank makes it very easy to get started with OS-9. You don't even have to own a separate copy of the operating system; Computerware has capitalized on Tandy's long-rumored offer of low-cost licen-

ses and has included OS-9 version 01.01.00 on the Databank disk. While experts can copy program files to their favorite system disks, people who have never dealt with OS-9 before can be off and running without concerning themselves with operating-system issues at all. Databank includes a System Interface option that lets you jump out to the OS-9 shell to change screen color, baud rate, and so on, and spells out the necessary commands.

The use of such "invisible" copies of OS-9 is reported to be one of the officially-sanctioned waves of the future for CoCo software. I therefore used the program much as a beginner might, working straight from the manual without referring to any of my other OS-9 references or utilities. For data files, I used two of my everyday applications: my manuscript-tracking system and the list of business expenses I keep for the IRS.

The unprotected program disk has enough free space left for a modest data file or two. Not surprisingly, the program can handle the CoCo's full complement of four disk drives, although it doesn't allow for large files that span more than one drive.

Databank loads with all the drive clatter typical of OS-9 software and comes up with a white 51-by-24 screen in about a minute. You can change the display format. If you use a TV set, you can call for a conventional 32-by-16 readout, but if you own the PBJ Word-Pak, you can arrange to have Databank send its output through its 80-column screen driver.

Setting up a new Databank file involves the usual tasks. You must name the data fields in which information will be stored and specify a length and type for each. Then you can design both the video screens onto which your data will be entered and as many as nine different report formats for retrieving and summarizing the information.

Databank records can consist of up to 35 fields. Each field can be up to 64 characters in length, but a record cannot exceed 512 characters in all. It also looks as though a file is limited to 999 records, but that specification isn't in the documentation.

The program recognizes alphanumeric fields, decimal numbers, dates, and "derived" fields that the program calculates on the basis of other data. Specifying a data type is simple because the identification numbers for the various types are always shown at the bottom

of the screen when you need them. In fact, Databank does a good job of supplying you with just the right prompts at various points throughout its operation.

One point on which the manual could be clearer, however, is the format required for date fields. Databank automatically validates all date information (i.e., it checks the numbers for the month and day and signals you if anything is out of range), but you must give it a particular six-digit format to work with: mmddyy, with no slashes separating month, day, and year. Thus July 4, 1985 can only be entered as 070485. It took a little trial and error for me to discover that.

You can instruct the program to validate any other information at the time you enter it. Validation criteria are expressed as equalities or inequalities, and can be linked with logical AND and OR operations.

Once you have defined your data fields, you can lay out as many as nine "display formats"—screens to be used for data entry and for viewing the contents of an entire record. You can reserve places for your data wherever you like, and set up prompting text using Databank's full-screen editor. I was pleased to find one especially civilized touch: You can add a field to the design of a record even after you have begun to enter data. This isn't a completely trivial task, but it is a worthwhile feature nonetheless. It can be awkward to be working with a data file only to discover that you need a piece of information that you didn't think to include at the outset.

The data entry process is simple, although one or two amenities are missing. I would have appreciated a shortcut for copying information from one record to the next. Such a feature can be a time saver if you must type in a lot of records that have one or more fields in common.

Databank has a comprehensive report generator, with a nice full-screen editor for laying out a document. Before you can actually get a report, however, you have to set up an "access method." This is an important concept: It's Databank's name for a specific record-sorting procedure. Each file can have up to nine access methods, and each method can sort the entire file on as many as three data fields—"sequence fields" in Databank nomenclature. A two-level sort was sufficient for each of my test files, however. I sorted my manuscripts first by the magazine to which they were sub-

mitted and then by date; the expense file was sorted according to IRS expense categories (office supplies, postage, and so on), and then by date again.

You have the option of calling for a subtotal whenever one of the sorting fields changes its value. Any numerical fields (including derived fields) can be totaled at such a point; it was simple for me to find the subtotals of all my expense categories as well as the grand total.

There are some disappointing things about Databank's sort/search capabilities: the fact that sorting operations always put things in ascending order, without giving you the option of a descending sort, for instance. More serious is the program's inability to search anything but the first field on which a file is sorted (the "primary sequence field") when you instruct it to look for information. Once I had sorted my manuscript file according to magazine, for example, I was unable to search the title field for a given piece of writing. I have been reasonably happy with other data managers that could only search a single field—Computerware's own Flexi Filer comes to mind—but the way Databank's search and sort facilities are tied together is restrictive for my purposes.

In the same way, you can only select subsets of a file for printing on the basis of the primary sequence field. I could call for a printout of everything I sent to magazine X, but I had no way of specifying that the report should only contain things I sent after, say, June 30—not without setting up another access method, anyway.

I was sorry to see this restriction, because other aspects of Databank's report-generation facility are quite good. Reports can be up to 132 columns wide, and each record can have up to five lines devoted to it, so you can print out a lot of information. Once again, a full-screen editor makes it simple to get the report layout you want.

Despite my quarrels with the sorting and selection procedures, I think Databank offers enough features to be worth considering. It can produce files that the OS-9 version of DynaCalc can read, and vice-versa; the record structure is also simple enough and sufficiently well documented to make it practical to use Databank files in programs that you write in any of the OS-9 programming languages.

Old and New Friends

In the June column, I mentioned that I might want to tinker with Pro-Color-File (PCF) in order to provide an auto-start feature—to have the program load a specific data file without receiving keyboard commands, in other words. My project probably

won't be necessary now. Dennis Derringer, author of PCF, has sent me Simon; a utility for building keyboard macros. It sits in RAM, monitors any keystrokes you enter in response to a Basic program, and stores them for future use. I gather that it can learn the sequences I use when I command PCF to load my manuscript file and jump to the add/update records section of the code. That, and the keystrokes necessary to exit the program, are my most frequently used command strings.

I will be reviewing Simon in this magazine in the near future. Meanwhile, Mike McGregor of Durham, NC, informs me that the PCF National Users' Group has developed its own modifications to speed up file maintenance, and he promises to send details. That sounds promising; I like PCF a whole lot, but it does take an inordinate number of commands just to jump in, add a manuscript acceptance date to my file, and leave. I'll pass along any information I get.

Finally, I also want to report that I'm hot on the trail of another free-form data manager for my "electronic notebook" applications. Paul Seaward of Patagonia, AZ, recommends Datafile, by Jorge Mir; he says it has both Find and Sort features, which I need even for my unstructured data-keeping. Mr. Mir has written a lot of decent business-oriented software that I know of, so I'm looking forward to trying this one. More to come. ■

Scott Norman is the manager of solid-state science at GTE Laboratories in Waltham, MA. Write to him at 8 Doris Road, Framingham, MA 01701.

Products Mentioned In the Computer Room

Databank Manager
Computerware
4403 Manchester Ave.
Suite 102-Box 668
Encinitas, CA 92024
619-436-3512
64K, disk
\$79.95

Simon
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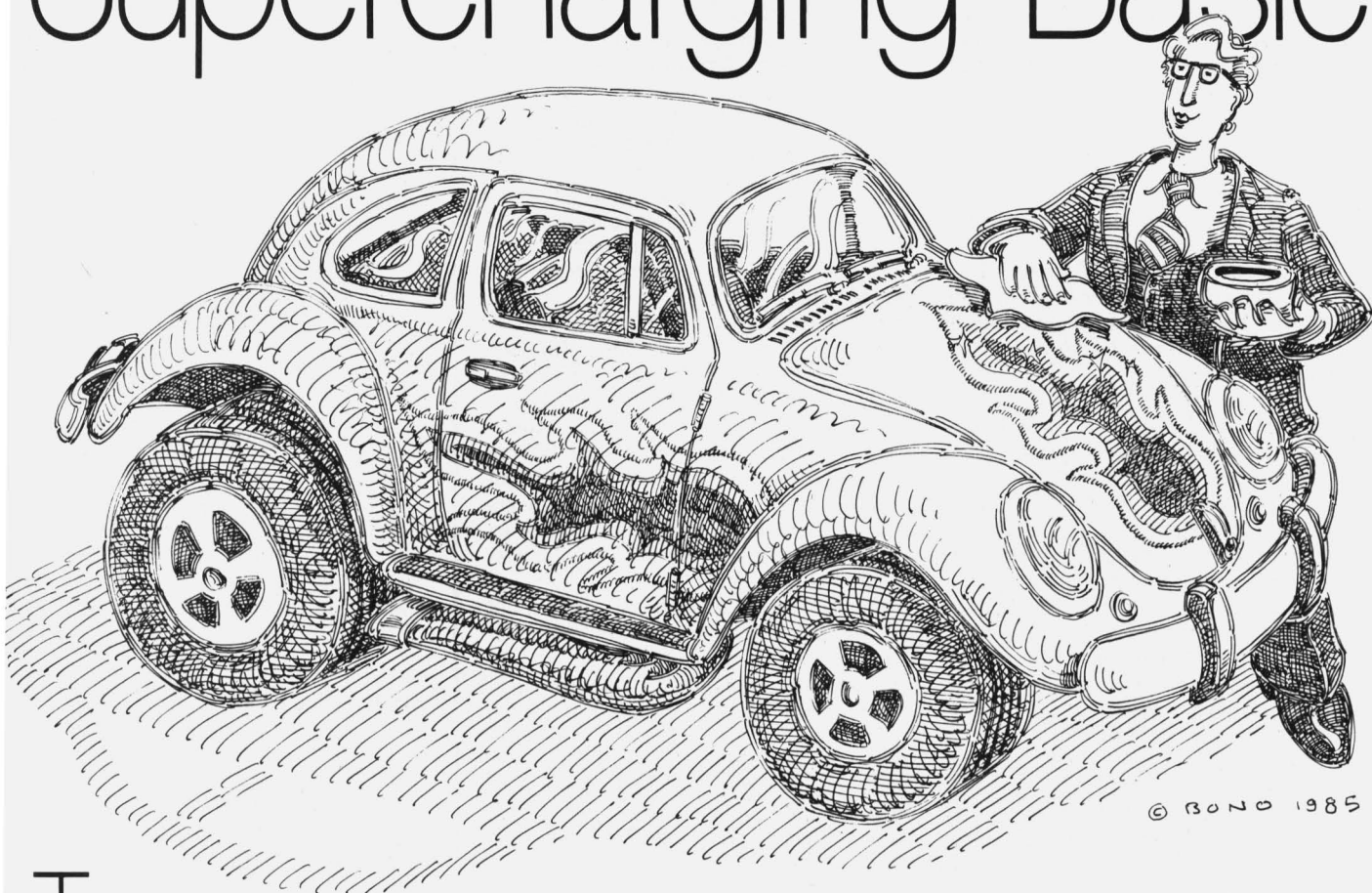
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Supercharging Basic



There probably isn't a CoCo programmer who hasn't longed for more speed than Color Basic can deliver. Most of us have written something that would benefit from a speed boost, but what can we do about it? One way to get your programs into the fast lane is to learn Assembly language. It requires that you become intimately involved with your computer's operations, juggling such details as which data resides in what register at a given time. Many good programmers spurn that route because there are some practical alternatives.

This review explores two such alternatives that are particularly easy for the Color Basic programmer to use: Color Basic Compiler from Computerware and MLBasic from Wasatchware. These compiled versions of Basic offer different features at significantly different prices. They also provide a good introductory look at what the field of Basic compilers for the Color Computer has to offer. In its price range, each of these compilers is a good buy.

Interpreters and Compilers

Conventional Basics are slow because they are interpreted languages. Each line of the English-like source code that you write in a high-level language, such as Basic, has to be translated into a binary form that the computer's microprocessor can understand. The system has no memory; if it comes across an interpreted line 1,000 times during the execution of a FOR...NEXT loop, it has to translate it into binary form 1,000 times.

In addition, interpretation tends to be a lengthy process. It involves looking up the locations of variables in an address table before their values can be used. The computer performs several time-consuming

operations as a result of the use of an interpreted language, such as searching through an entire program from its beginning just to find a particular line number.

Interpreted languages have the advantage of lending themselves to interactive operation, however. As far as the user is concerned, the source code runs on the computer; there is no intermediate step that comes between typing in a program and giving the RUN command. If you get an error message or just want to change some part of the code, all you have to do is retype the affected portion and run the program again.

Compiled languages work differently. A separate program called a compiler reads the source-code file, translates it, and produces another file called the object code, which you load and run to obtain the desired results. The object code is machine language, and generally runs very quickly.

During the translation process, the compiler evaluates the structure of the entire source program and compresses redundant sections in the object code. It can also assign absolute memory addresses to variables and program lines. When the final product runs, it will not lose time searching through variable tables and line numbers.

Using a compiled language usually entails taking the following steps: type and save the source code, load the compiler, compile and save the object code (that is, run the compiler), and load and execute the object code. You might elect to save the object code to RAM instead of disk, or exercise other options, but the steps above serve to outline the fundamental operating procedures of the two compiled Basics reviewed here.

There are some notable differences in the options of these two pro-

Add speed to your Basic programs with a compiler— a practical alternative to Assembly language.

grams. One is that Color Basic Compiler cannot handle floating-point, or "real," variables. For the most part, however, the two compilers use a syntax that is similar to that of the Color Basic family. They should be easy to use for anyone experienced in writing programs for the Color Computer.

Computerware's Color Basic Compiler

This product has been through several revisions. For this review, I tested version 2.1, which was replaced by another upgrade as the magazine went to print. It runs on 32K single-disk-drive systems, making experiments with a compiled language available to a large audience of CoCo owners. It could be an excellent tool for anyone who wants an introduction to compiling, but it is not limited to compiling simple programs. Color Basic Compiler leaves about 16K of RAM free for the machine code it generates. It can handle 200 lines of Basic source code (or more, depending on how long your program lines are). It can work with more than 100 line-number references (GOTOS, GOSUBS, and so on) per program. You can do meaningful work with Color Basic Compiler.

It also offers the speed advantages you expect from a compiled language. Its manual lists the times it took Color Basic and Color Basic Compiler's object code to execute various commands 10,000 times. The speed increases range from a factor of 17 for the PRESET command to an impressive 71 for the RESTORE:READ combination. Dennis Deringer, author of the Pro-Color-File database manager, once marketed two maze-chase games written with the aid of Color Basic Compiler. They were delightfully fast, even allowing for the fact that display operations were in many instances limited by the video-scan rate.

Color Basic Compiler supports a large subset of Color Basic's functions and instructions. (According to Computerware, the latest version of the program, not reviewed here, includes more of Color Basic's functions, particularly in the area of graphics.) The program lacks the floating-point operations, such as trig functions, and you are restricted to using integer variables between -32768 and +32767. The program has most of the popular Color Basic graphics commands and decision-making structures, however, including CIRCLE, DRAW, PAINT, IF...THEN, JOYSTICK, and INKEY\$. If you need floating-point math, you can do calculations in a conventional Basic program that calls your compiled routines when it is finished. In fact, passing data from interpreted Basic to Color Basic Compiler's object code is fairly simple.

For the most part, this compiler is similar to conventional Color Basic. It permits variables to have names of any length and allows nested IF...THEN statements. (According to Computerware, the latest version supports multidimensional string and numeric arrays.) There are some minor differences in syntax, however.

Every program that you intend to compile with the Color Basic Compiler must have an END statement, which provides a vital termination signal to the compiler. You must also place DATA statements at the end of the source code. And only line-number references (not calculations) are allowed to follow the THEN part of an IF...THEN statement. A shortcoming of the compiler is that this last difference can lead to "spaghetti" code.

Color Basic Compiler's output is position independent. You can relocate object code to any portion of the CoCo's memory space. To do this, load it with the proper offset and specify the correct execution address at run time. If you are convinced that your program has reached its final form, you can even burn it into an EPROM (erasable, programmable, read-only memory) chip and locate it at the cartridge port for rapid loading and running.

These last are fairly advanced procedures. Beginners can get default loading and execution addresses from the diagnostic listing that the compiler provides as it processes the source code. (You can direct output to the screen or printer.) Although it would be useful if the slim manual provided explicit coverage of this, in practice it is simple to load and run most programs.

You can have both a Color Basic program and compiled object code in memory at the same time and pass variables between them by means of two special Color Basic Compiler commands, GETV and PUTV. The short Color Basic program that that follows accepts a number N from the keyboard and then jumps to a compiled routine at location \$5000 for some computations.

```
10 CLS
20 DEF USR(0) = &H5000
30 INPUT "GIVE ME AN INTEGER"; N
40 A = USR(0)
50 PRINT "THANKS FOR GIVING ME"; Q
60 GOTO 30
```

You might use the following as source code for a companion routine that computes squares and returns the original number to Color Basic as the variable Q.

```
10 GETV, NUMBER = N
20 PRINT "THE SQUARE IS"; NUMBER*NUMBER
30 PUTV, NUMBER = Q
40 END
```

This is an elementary example, but it illustrates how easy it is to make programs work together with this compiler.

The Color Basic Compiler package includes some demonstration programs, operating tips, and hints for writing your own instructions to expand the compiler's vocabulary (best left to experienced programmers). It provides a sure, low-cost, compiled Basic.

Wasatchware's MLBasic

The official name of this product is MLBasic Extended Basic Compiler, revision 1.0—and it does offer extended features. One of the more important of these is its ability to handle real variables. MLBasic deals with floating-point numbers that have exponents between ± 38 in a manner similar to Color Basic. It can also convert a numeric constant or variable from real to integer format or vice-versa if this is required to complete a calculation. To return to the Fortran jargon I learned in school, it allows "mixed mode" expressions.

Other tricks are available with this compiler, as well. Although integers are usually written in base 10, you can specify any base between 2 and 16 before compilation. This is handy if you have a program that manipulates many hexadecimal numbers. However, once you specify the base, the compiler is locked in; programs cannot contain instructions to switch bases.

Because MLBasic supports real variables, it offers all the trigonometric and transcendental functions of Extended Color Basic. All the graphics, data I/O (input/output), and string-handling functions are there, too. The manual devotes 105 of its 152 pages to detailed discussions of each command, with examples of usage and summaries of differences in syntax between the two dialects.

MLBasic has a dozen special commands for handling 16-bit integers, manipulating the contents of hardware registers, copying blocks of memory, and performing other tasks. One command with which you'll quickly become familiar is REAL. It is required in declaration

statements whenever you plan to use real variables and arrays. For example, the source program line `REAL X,Y,Z,U(5,20)` informs the compiler that in lines to follow, scalar variables X, Y, and Z, as well as the elements of the two-dimensional array U, will all be real. Many other Basics have similar commands for declaring integers or double-precision variables.

Most compilers present you with several options for the allocation of storage space, the selection of program-entry points, and other matters. MLBasic is no exception, but it makes compiling easy for the novice by providing realistic default values. You can get test programs running with a minimum of trouble. That helps you gain experience with the compiler's syntax and the relative speed of its object code without having to worry about memory assignments. Complete listings of all the details are available if you want them.

For the advanced programmer, there are facilities for interfacing MLBasic with homebrew Assembly-language programs and machine-language routines contained in the Basic interpreter ROMs. It is also possible to have a compiled program execute a conventional Basic command via a call to the interpreter. You might think that this feature would have little use, but it can come in handy in some situations.

The MLBasic manual mentions the use of the substring option of the `DRAW` and `PLAY` commands as an example. This is not supported

by MLBasic; if you want to use a command, such as `100 DRAW "BM128,96; XA$"`, you must define the string `A$` with an interpreter call. To do this, use a left bracket before the relevant defining statement in the MLBasic source code, such as in the statement `10 [A$ = "R10; U10; L15; D25; "`.

I have included some detailed examples to demonstrate the degree of flexibility available with this compiler. If you are ready for it, MLBasic is a classy step beyond Color Basic. If, however, you are more interested in getting the feel of compiled Basic or finding a low-cost work horse, the Color Basic Compiler is a respectable choice. These programs are far superior to compilers marketed in the past for the Color Computer. ■

The Color Basic Compiler is available from Computerware, Box 668, Encinitas, CA 92024, 619-436-3512. It requires 32K of RAM and is available on disk for \$39.95. The MLBasic Extended Basic Compiler is manufactured by Wasatchware, 7350 Nutree Drive, Salt Lake City, UT 84121, 801-943-6263. It requires 64K and is available in a combination cassette-and-disk package for \$74.95 or for \$69.95 each.

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BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC, was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Programs can use all 64k of RAM for either program storage or for large numbers of variables and arrays like `A(20000)`
- Full Floating Point arithmetic expressions with functions
- SUBROUTINE and CALL commands allows for structured programming and more independent program development
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory
- Many new commands that expand your programming capability

Commands Supported

1. I/O -Commands

CLOSE	CLOADM	CSAVEM	DIR	DRIVE	DSKIS
DSKO\$	FIELD	FILES	GET	INPUT	KILL
LSET	OPEN	PRINT	PUT	RSET	
2. Program Control Commands

CALL	END	EXEC	FOR	STEP	NEXT
GOSUB	GOTO	IF	THEN	ELSE	ERROR
ON..GO	RETURN	STOP	SUBROUTINE		
3. Math Functions

ABS	ASC	ATN	COS	CVN	EOF
EXP	FIX	INSTR	INT	LEN	LOG
LOC	LOF	PEEK	POINT	PPPOINT	RND
SGN	SIN	SQR	TAN	TIMER	VAL
4. String Functions

CHR\$	INKEY\$	LEFT\$	MID\$	MKN\$	RIGHT\$
STR\$	STRINGS				
5. Graphic/Sound Commands

COLOR	CLS	CIRCLE	DRAW	LINE	PAINT
PCLEAR	PCLS	PLAY	PMODE	PRESET	PSET
RESET	SCREEN	SET	SOUND		
6. Other/Special Commands

DATA	DIM	LLIST	MOTOR	POKE	READ
REM	RESTORE	RUN	TAB	VERIFY	DLD
DST	IBSHFT	LREG	PCOPY	PMODD	PTV
REAL	SREG	SWP	VECTD	VECTI	

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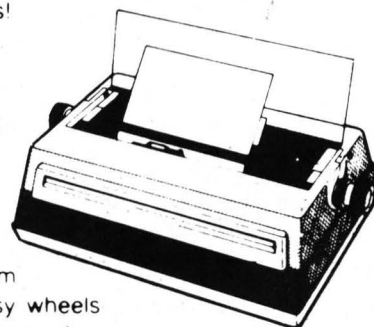


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Tandy's CGP-115 is a fantastic, inexpensive printer with a lot of graphic capabilities. It can generate graphs and pictures in great detail using four colors, as well as your choice of type size and printing direction. The CGP-115 is limited only by its small paper width, slow printing speed, and the lack of powerful graphics commands such as those found with the CoCo's Extended Color Basic.

You must use tedious LINE and DRAW commands to create graphics on this printer, unless you use my Color Dump program. (See Listing.) With Color Dump, you can create graphics using your CoCo's Extended Color Basic and then dump the picture to your CGP-115 in color.

Using the Program

You can either create the graphic display to be reproduced or lift it from an existing program. Figure 1 is a screen dump from a popular education program.

Save the display using the statement

CSAVEM "filename", BEG, END, 0, where B is the beginning address of graphics memory and END is graphic memory's ending address. Use decimal numbers for these values. Lines 100-200 contain the proper addresses to use. Make a note of the PMODE and color set used to create the graphics. If graphic memory saved exists beyond page 4, be sure to PCLEAR enough graphic memory prior to loading Color Dump.

Load Color Dump. Run the program; it will prompt you to load your graphics tape. It then asks for printer-pen color selections to represent a given screen color. I suggest that you do not print the background color. You can select any color pen for any screen color, so you can experiment with different color combinations. Color set 0 in four colors lends

System Requirements

16K RAM
Extended Color Basic
CGP-115 Printer

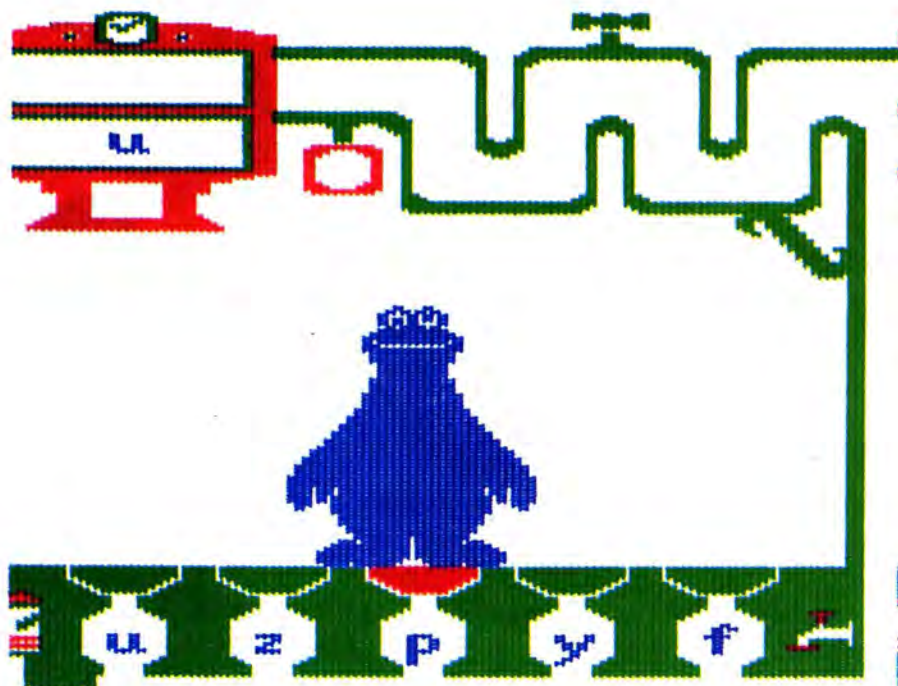


Fig. 1. Color Dump will reproduce graphic screens from commercial software. Note that the first and last eight pixels are missing.

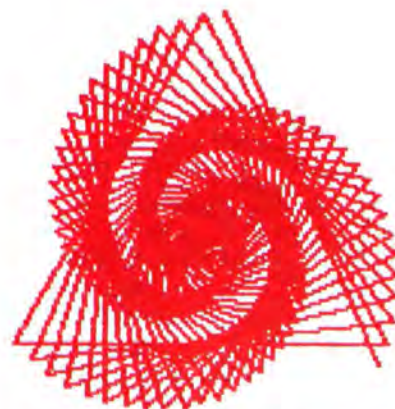


Fig. 2. PMODE 4 High-Resolution Screen Dump

itself quite well to be copied using a yellow background and then selecting the same pen color as the screen color.

Color Dump will copy a screen in all PMODE graphics in surprising detail. However, the first and last eight pixels will not be copied. (See Figs. 1 and 2.)

Screen-dump times range from 30 minutes up to four hours, depending on resolution, color-pen changes, and the number of pixels printed. If the X,Y borders of a specific screen graphics section are known, the copy time can be reduced. You do this by reducing the X,Y loops to the dimension of your screen's graphics border to be copied.

For example, if your graphics are in PMODE 2 and the graphics position to be copied is located in center screen, the four sides that border your graphics are:

Top Side	Y = 70
Bottom Side	Y = 122
Left Side	X = 82
Right Side	X = 164

Then, edit lines 6240 and 6250 to read:

```
6240 FOR Y = 70 TO 122 STEP
      1:PRINT# -2,"M";80*2;" ";Y* -2
6250 FOR X = 82 TO 164 STEP 2
```

The 80 in line 6240 comes from the equation (left side X) - (X loop step), or $82 - 2 = 80$. ■

See program listing on page 44

Address correspondence to John Shaw, 4611 Old Linden Hill Road, Wilmington, DE 19808.

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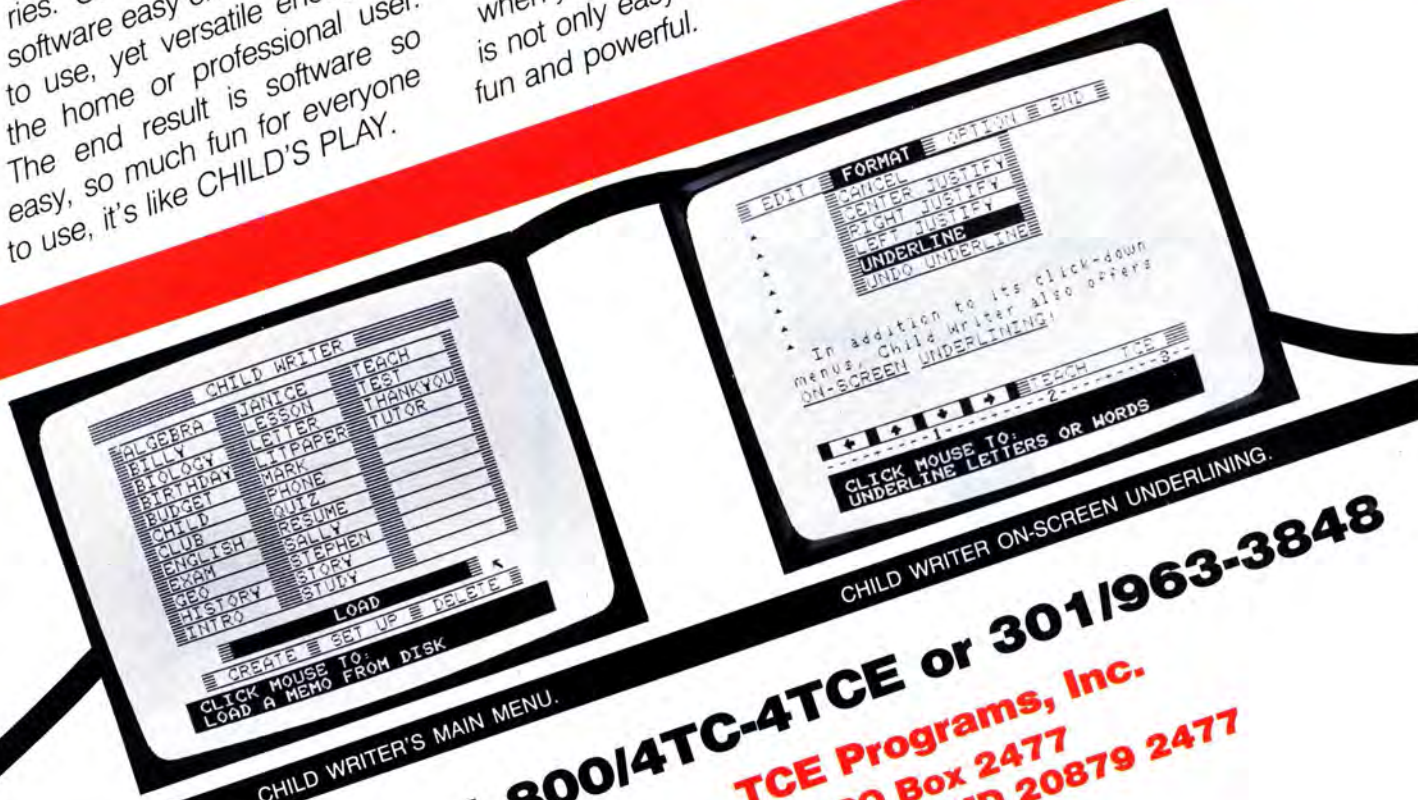
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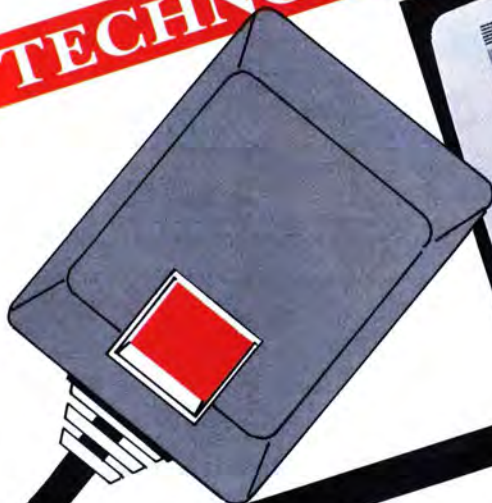
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System Requirements

64K RAM

Although it has been feasible to upgrade your CoCo to 256K of memory for some time, the cost of the necessary chips has put the project out of reach. But now you can buy 256K RAM chips for less than \$5 each, and a new SAM (synchronous address multiplexor) chip with a 256K refresh cycle for \$14.95. You can perform the 256K upgrade on any eight-RAM-chip CoCo or CoCo 2 that is already configured for 64K of memory for a cost of about \$100. If your CoCo isn't configured to receive 64K RAMs, refer to "64K Modification Revisited," *HOT CoCo*, June 1985, p. 40.

You do not need a disk drive or Extended Color Basic to use this upgrade. With it, you have either four banks of 64K or eight banks of 32K. You switch memory banks using PEEK commands to the following addresses:

\$FFFC0-\$FFC7-64K Bank Select
 \$FFC8-\$FFCF-32K Bank Select
 \$FFD0-\$FFD7-VDG (video display generator) Select
 \$FFD8-\$FFDF-Reserved for Future 512K Upgrade

Possible uses for the extra memory include placing different DOSes (disk operating systems) in each bank, giving you concurrent Basic; animation using 30 pages of PMODE 4; and unleashing the power of the Flex and OS-9 operating systems. We've provided some software with this article to get you started. Additional software is being developed by J & R Electronics; possible future offerings include a RAM virtual disk and support for both Flex and OS-9 users.

J & R's upgrade design is, as far as we know, compatible with the stock 64K CoCo with one exception. A problem arises if you program the SAM using the CLR command in machine language (e.g., CLR \$FFC0), because a CLR command PEEKs and then POKes 00s to memory. You can fix this by replacing all offending CLR commands with STA commands (e.g., STA \$FFC0).

You do not need any software or firmware drivers to refresh the RAM, so you do not lose any speed and there is no conflict with existing CoCo software. Since the hardware is set using PEEKs and the addresses used are the same as the original SAM, no address conflict is likely to arise when you use hardware add-ons such as an 80-column card, a parallel printer interface, or a voice synthesizer.

The parts list is short. (See Table I.) Figure 1 presents a schematic for dedicated hardware hackers who are capable of wire-wrapping and building their own project boards. Design the board layout so that it plugs into your original SAM socket. Photo 1 shows a completed unit.

For those of you less inclined to do it all yourself, J & R Electronics (P.O. Box 2572, Columbia, MD 21045) is offering the board, called The Banker, in various stages of completion as listed below:

- Bare board—\$29.95
- Bare board and parts kit (no memory chips)—\$59.95
- Board assembled and tested (no memory chips)—\$69.95
- Board assembled and tested with memory chips—\$99.95

A \$3 shipping and handling fee is charged for each order (\$7 for foreign orders). All versions come etched and drilled with software and

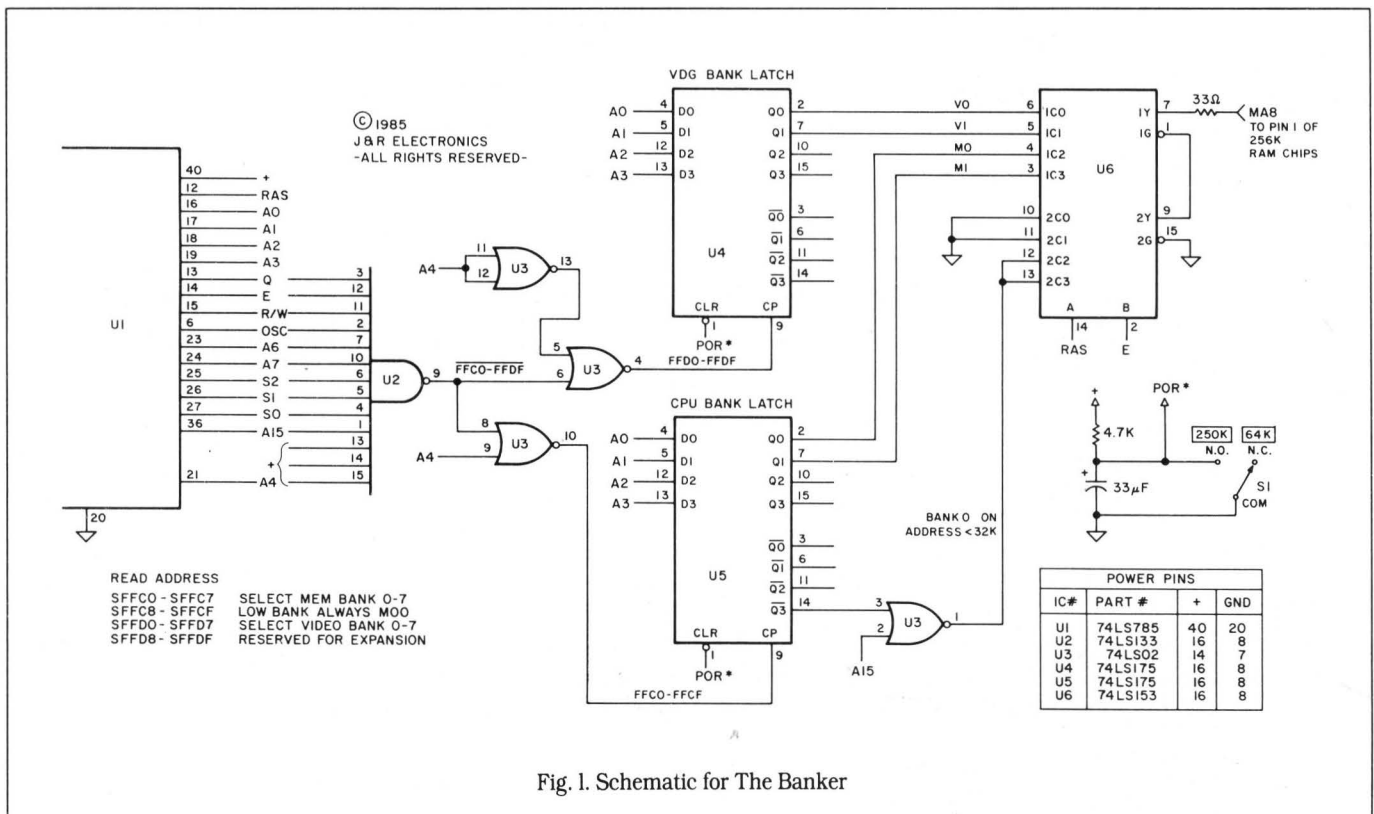


Fig. 1. Schematic for The Banker

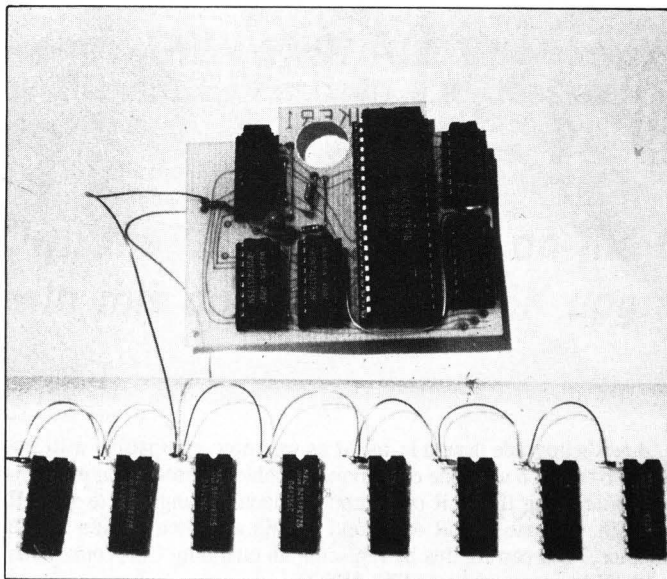


Photo 1. The Completed Unit

documentation. A software package is available separately for \$19.95. It comes on tape or disk and contains the software from this article, RAM disk software, and demos. If you order from J & R, indicate whether you have a disk or tape system, original CoCo or CoCo 2.

Assuming you have a 64K-configured CoCo, the upgrade procedure is quite simple:

- Remove the eight 4164 dynamic RAMs.
- Remove the 6883 SAM chip.
- After bending the pin 1's of the eight 41256 chips so that they are in a horizontal position, place the chips in conductive foam and solder a 30-gauge insulated wire to each of the bent pins, connecting them together so that you can install them in the sockets vacated by the 4164s.
- Install The Banker into the 6883 SAM socket, lining up the notches with each other.
- Install the 41256 RAMs into the 4164 sockets.
- Solder a wire so that it connects the point indicated on the schematic with the wire connecting the pin 1's of the new 41256 memory chips.

Be sure to orient the new chips with the notches in the sockets. A backward chip can wreak havoc upon your SAM, PIAs, and CPU. Solder splashes in strategic places can do likewise. Photo 2 shows the complete unit installed.

With The Banker installed, the SAM is programmed as usual by POKEing values into the range \$FFC0 to \$FFDF. (The actual values POKEd are irrelevant.) The Banker is programmed in much the same way as the SAM, except PEEK is used instead of POKE according to

74LS785 (new SAM chip): Radio Shack no. MX-6433—\$14.95

74LS133: available at most electronics stores

74LS02: available at most electronics stores

74LS175 (two needed): available at most electronics stores

74LS153: available at most electronics stores

41256 (150 ns) dynamic RAMs (eight needed) *

* The best price we've seen for these chips as of June 19, 1985, was \$4.32 each from Microprocessors Unlimited, 24000 S. Peoria Ave., Beggs, OK 74421, Telephone 918-267-4961. Since the prices on these RAMs are quite volatile, call for the latest price before placing an order.

Table 1. 256K Upgrade Parts List.

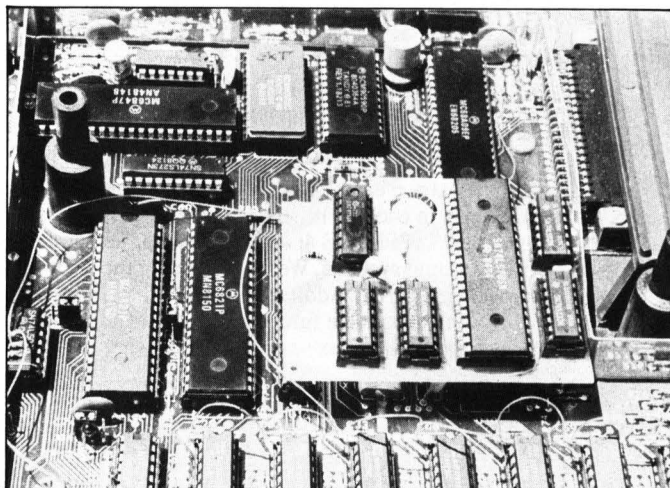


Photo 2. The Complete Unit Installed

\$FFFF									
\$FF00	I/O								
\$FEFF	Map Type 0 ROM	Map Type 1 >0	Map Type 1 >1	Map Type 1 >2	Map Type 1 >3	ROM	ROM	ROM	ROM
\$8000									
\$7FFF	Page = 0 <0	Page = 0 <0	Page = 0 <1	Page = 0 <2	Page = 0 <3	Page = 1 >0	Page = 1 >1	Page = 1 >2	Page = 1 >3
\$0000									

> = Upper Bank (\$8000-\$FEFF)

< = Lower Bank (\$0000-\$7FFF)

4 Banks of 32K in Upper RAM—Step 1

4 Banks of 64K—Steps 1 and 2

8 Banks of 32K in Lower RAM—Steps 1, 2, and 3

Step 1. Using Map Type 1 and \$FFC8-\$FFCF, transfer from <0 to >0 through >3

Step 2. Using Map Type 1 and \$FFC0-\$FFC7, transfer from >1 to <1, >2 to <2, >3 to <3

Step 3. Using Map Type 0, Page Bit and \$FFC0-\$FFC7

Fig. 2. The Banker Memory Map

NEW!

the memory map in Table 2. Figure 2 displays a memory map that shows the possibilities available, given the combinations of PEEKs to the addresses in Table 2.

Below are the PEEKs needed to change the graphics memory page accessed by the VDG:

PEEK	VDG Memory Bank
\$FFD0	0
\$FFD1	1
\$FFD2	2
\$FFD3	3
\$FFD4	4
\$FFD5	5
\$FFD6	6
\$FFD7	7
\$FFD8-\$FFDF	Reserved for future expansion

PEEK	Lower bank (\$0000-\$7FFF)	Upper bank (\$8000-\$FEFF)
\$FFC0	0	0
\$FFC1	1	1
\$FFC2	2	2
\$FFC3	3	3
\$FFC4*	4	4
\$FFC5*	5	5
\$FFC6*	6	6
\$FFC7*	7	7
\$FFC8	0	0
\$FFC9	0	1
\$FFCA	0	2
\$FFCB	0	3
\$FFCC*	0	4
\$FFCD*	0	5
\$FFCE*	0	6
\$FFCF*	0	7

* Reserved for 512K upgrade

Note: must be in Map Type I to use upper banks

Table 2. CPU Memory

Software

Program Listing 1, Banker Test, is a POKE routine that gives you a machine-language program that tests your new memory. It also works for 64K upgrades; just specify the tests for bank 0 only.

Program Listing 2, Banker 32K, is an Assembly-language routine that demonstrates how to initialize the upper four 32K banks of RAM memory.

Program Listing 3, Bank Switcher, switches upper banks and alters Basic's prompts to indicate which bank is being used. Use it in conjunction with the assembled version of Listing 2.

Program Listing 4, Banker Backup, generates a machine-language program that lets you copy an entire Tandy-format disk on a single-drive machine without swapping disks. It copies the entire disk into RAM, and after the first copy, you have the option of copying the contents of RAM to additional disks.

If you have difficulty securing parts or have questions concerning assembly, write J & R Electronics. Please enclose a stamped, self-addressed envelope for a reply. ■

See program listing on page 46

Address correspondence to J & R Electronics, P.O. Box 2572, Columbia, MD 21045.



MAROONED!

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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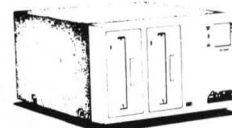
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Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X,Y Coordinate Cursor	Yes	Yes	No
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	Yes	No	No
Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85	Yes	No	No
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	Yes	No	No
Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatibility	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	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 traded 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.

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Spectaculator Collector



From Work Horse to Hobby Horse: A Spreadsheet Transformation

When I completed my golf-handicap program (*HOT CoCo*, May 1985, p.66), I cast about for other uses for Spectaculator, Radio Shack's versatile spreadsheet program. One candidate was my stamp collection. It was fun to page through my albums and admire the artwork or rarity of my stamps. But there were thousands of them, and I didn't know what stamps I had nor what their total value was.

Manually listing page after page of the collection was out of the question. But to insure the stamps for their real value, my insurance company insisted on a complete list of my holdings. Without a list, I would receive only a fraction of the stamps' value if they were damaged, destroyed, or stolen.

My situation was not unique: The same insurance requirements apply to other collectibles. I was also sure that, like me, other collectors wanted to periodically review their holdings with an eye toward acquiring or selling items. My prior experience with Spectaculator convinced me that it would be useful for keeping track of collectibles.

Planning Your Adaptation

The first step in adapting Spectaculator as a collectible recordkeeper is to read the documentation thoroughly. I have read it many times and pick up new ideas each time. Then, back up the program disk to a newly formatted disk to eliminate the possibility of crashing your master disk inadvertently. The backup disk will contain the format that you develop as well as the collection inventory. Of course, if you have a large collection, you will need more than one disk.

Insert the program disk in your drive, type `RUN"DOS"`, and press the enter key. This loads and runs the program; the basic spreadsheet format appears on the screen. You will probably have to adjust it to suit your needs. Before you make any changes, you should decide the number of columns you need, the headings, the spaces for each column, and the calculations you want to use for each row and column. For my stamp collection I needed:

- the Scott catalog numbers for each stamp,
- the denomination of each stamp,
- a brief stamp description,
- the color(s) of the stamp,
- the stamp condition
- the catalog value (I use the Harris catalog), and
- a running subtotal of stamp values.

Setting Column Widths

As Fig. 1 shows, you can vary column widths. When planning your columns, determine the maximum space needed for each and set the column width accordingly. Keep in mind, however, that most printers are limited to a total of 80 characters, so you may have to abbreviate some information.

Spectaculator's default column width is seven. To change it, enter the command mode, type `CW`, and press the enter key. Position the

cursor at the beginning of row 1 using the arrow keys. Make column-width changes by moving the cursor to the beginning of the proper column and entering the changes in the following format: column number, number of spaces. Be sure to put a comma but no space between the two numbers. For example, I typed 2,8 to change the width of the second column of the stamp-collection format to eight. The black cursor then moves to the beginning of the next column, and you are ready to specify additional column widths.

Creating Headings

The next step is typing column headings. To improve the appearance of my printouts, I used equal signs to make a border, but you could use another symbol. Enter the ET mode, and, with the cursor at row 1 under column 1, type your symbol until it fills the screen. When you press the enter key, a row of symbols extends across part of the screen. Move the cursor to the point where the symbols stop (about the middle of column 3) and repeat the procedure. If the symbols spill over into a column you won't use, press the enter key at these columns and they will disappear. Move the cursor down a few rows, leaving ample space for the text of your headings. (If you have planned the headings carefully, you will know how many rows to skip.) Then repeat the above sequence to box your heading.

You also label columns from the ET mode. Position the cursor in the row where you want your headings to begin, type the heading, and press the enter key. Continue until you have labeled all the headings. (In Fig. 1, the (ET), (EN), and (CA) notations are optional. They are reminders to type information for those columns from the ET, EN, or CA modes.) Use the clear key to backspace and correct spelling mistakes. If you want to change a heading—to improve spacing, for example—press the enter key, retype the heading, and press the enter key again.

It would be a good idea to save what you have created thus far. To save to disk, enter the command mode, type `SA`, and press the enter key. Name the file (using eight or fewer characters) and press the enter key to start the save procedure. For simplicity, I will refer to this file as *Format*. Once you save your work, you can quit the program at any time and later load the file by running the program and loading *Format*. The proper sequence is: type `RUN"DOS"`, enter the command mode, type `LO`, press the enter key, type `FORMAT`, and press the enter key. I recommend that you save your file periodically from now on to avoid having to retype your data and that you keep a standard file name for your collection. (I use *Stamp-1*, *Stamp-2*, and so on.) Later on, I will show you how to record the file name for each sheet.

Calculating Values

Saving your work was a precautionary measure; there are a few more formatting details to take care of. The last two columns display the value of each stamp and a cumulative total for the collection, respectively. You can also have the cumulative total appear at the bottom of the page. (You must submit the stamp values from the EN mode, which tells the computer that the figure will be used in ensuing calculations and must be right justified.)

To establish the formula used in calculating the cumulative total, position the cursor in row 1 and move it to the beginning of the running-total column (column 7 in Fig. 1). Type `CF` and press the enter key; then type `SMTCn`—summary total of column n (column 6 in Fig. 1)—and press the enter key. This command tells the computer to take in all previous values of a certain column; when the calculate com-

System Requirements

16K RAM
Disk Extended Color Basic
Disk Drive
Printer Optional
Spreadsheet Program

SCOTT NUM- BER	STAMP DENOMI- NATION	STAMP DESCRIPTION	COLOR	CON- DITION	CAT. VALUE	RUNNING SUB- TOTAL VALUE (CA)
(ET)	(ET)	(ET)	(ET)	(ET)	(EN)	(CA)
0007	1 CENT	FRANKLIN TYPE I	BLUE	AVE	70.00	70.00
0010	3 CENT	WASHINGTON	OR-BROWN	AVE	50.00	120.00
0033	10 CENT	WASHINGTON TYPE III	GREEN	FINE	190.00	310.00
0056	3 CENT	WASHINGTON	BROWN-ROSE	AVE	1.00	311.00
0068	10 CENT	WASHINGTON	YELLOW-GREEN	AVE	17.50	328.50
0078-B	24 CENT	WASHINGTON	LILAC	AVE	30.00	358.50
0114	3 CENT	LOCOMOTIVE	ULTRAMARINE	V FINE	10.00	368.50
0119	15 CENT	COLUMBUS, TYPE II	BROWN-BLUE	AVE	50.00	418.50
0153	15 CENT	WEBSTER	BRIGHT ORANGE	FINE	70.00	488.50
(LAST ENTRY WOULD GO HERE)					0.00	488.50
SAVED IN DRIVE 0 AS FILE: <STAMP-1>						
PAGE TOTAL OF VALUE						488.50

Fig. 1. Sample Stamp-Collection Format

mand, CA, is typed, the computer prints a subtotal in the running-total column.

To get a neat printout on one sheet of standard computer paper with 57 rows, a little planning is in order. You should make the last entry on the sheet in the 50th row. (Keep this in mind when entering data.) Save one space for aesthetic reasons. In the ET mode with the cursor in row 52, column 1, type:

SAVED IN DRIVE 0 AS FILE:

Press the enter key. When you have filled a sheet, type the file name for that sheet after the colon.

In ET mode, place the cursor in row 54, column 4 and type:

PAGE TOTAL OF VALUE:

Press the enter key. In the stamp-collection format, the last cumulative subtotal appears in row 50, column 7. That cell is designated as R50C7. To arrange for the value of R50C7 to appear after the page-total notation in row 54, enter the AV mode and assign the cumulative total to variable VA by positioning the cursor on VA, typing R50C7, and pressing the enter key. Press the break key to return to the command mode; move the cursor to row 54. Type RF and press the enter key; then type VA and press the enter key.

Whenever you enter a figure in cell R50C7 and type CA to submit it, the same value appears after your page-value notation in row 54. If you do not fill the page but still want a page total, move the cursor to R50C7, type EN, press the enter key, submit 0.00 as the value, and press the enter key again. You have entered a dummy value that will allow the total to be computed as if the entire page were filled.

There is one final detail. Since you entered a row formula, calculated values will appear in rows 52 and 54 wherever there is no text entered in a cell. You want these calculated values to appear only in column

7. Enter the ET mode, move the cursor along rows 52 and 54 and in each empty column, press the enter key to clear the space, press the spacebar a few times, and press the enter key again. This submits a blank space that prevents the computer from placing calculated values in those cells.

Using Format

Formatting is now complete. Save your work by typing MM and pressing the enter key twice to move the cursor to row 1, column 1. Type SA, press the enter key; then type FORMAT (or your format's file name). The format will then be available on disk for subsequent use.

When you are ready to list the items in your collection, enter the ET mode, which accepts alphanumeric characters. Change to the EN mode to submit values for your collectibles. These entries are right justified—do not center them. After you have filled the page and are ready to calculate the total value of items listed on that page, enter the CA mode. The screen changes to pink, reverting to green when the calculations have been performed. If you have filled the page or added a dummy value to R50C7, the total value for the page also appears in line 54.

To find out how much memory remains, type FR from the command mode and press the enter key. The number of free characters will be displayed above the command-mode prompt. A 16K machine accommodates 2,550 characters; a 32K machine, 18,900. As you enter collectibles data, the free memory decreases, but there is room for many items on a disk. I found that I could list about 1,000 stamps per disk.

When you run out of memory, use the master disk to make another backup disk. Load and run the new backup copy, load Format, and you are ready to list your collectibles. I recommend that you save Format on each new disk.

Before you send your data to the printer, it is wise to save it first. Then move the cursor to line 52 and type the file name. From the command mode, type LI, and press the enter key twice. After a slight pause, the printer begins operation.

Your Turn

Throughout the article I referred to the disk version of Spectaculator. Although Radio Shack sells a ROM-pack version of the program designed to work with cassette, I found it slow and troublesome during saves. Furthermore, it will not perform all the calculations in this program.

I do not collect coins, matchbook covers, or other collectibles. But I am sure that those of you who do can find creative ways to modify Spectaculator to fit your collection. You can also adapt my format to any spreadsheet program. I welcome your questions or comments on the article. Please enclose a stamped, self-addressed envelope for my reply. ■

A.J. Sabel is a retired U.S. Army colonel and has been an active amateur radio operator for over 50 years. Address correspondence to him at 27 South Shore Drive, Gulf Harbors, New Port Richey, FL 33552.



Illustration by Alfonso Gobeia

The Truth About Monitors

Professor Byte explains the differences between TV sets and monitors.

We all have our heroes. One of mine is Professor Byte, a real computer whiz. Whenever I need to know anything about computers, I visit the professor. Today was one of those days.

Professor Byte greeted me at the door. As usual, the elderly gentleman had a twinkle in his eye. His long curly gray hair was unkempt, and his full, white mustache bounced as he spoke.

"Hello, Fred," the professor began. "When you called, you said you were confused about monitors. Come in and perhaps I can answer your questions."

We sat down in the professor's modest living room. Upstairs, I could hear a printer clanking and whirring. I'd learned through the grapevine that the professor had 11 com-

puters up there, but no one had seen them.

"What do you need to know?" asked Professor Byte.

"I have several questions, Professor. Everyone is talking about monitors these days. After printers, monitors are the best-selling computer peripheral. What is a monitor, and why is it different from a TV set? Do I really need one for my Color Computer, MC-10, or other computer? What do ads mean when they say a monitor has low, medium, or high resolution? What are composite and RGB monitors?"

Video Monitors

"I can understand your confusion," the professor replied. "Video monitors have been

around a long time, but are now becoming more popular. Video games and home computers have sparked interest in monitors among nontechnical computer users. They want a better picture, especially for displaying color. And, for some computers, a monitor is a necessity.

"A video monitor is a display device for video signals from video cameras, video recorders, or the video outputs of computers."

"Then isn't a TV set a video monitor?" I queried.

The professor paused for a moment and then said, "Part of it is. A television station broadcasts a carrier on an assigned channel in the radio-frequency spectrum. The video information modulates the carrier; a TV set is a video monitor with a tuner that picks up

the carrier conveying the video signal.

"Inside the TV set," the professor continued, "the circuitry separates the video signal from the carrier—that's called demodulation—amplifies it, and applies the video signal to the display tube. This is usually a cathode-ray tube, or CRT." The professor hesitated. "I hope I'm not using too many buzz words."

"No, that's okay," I replied as I feverishly jotted down notes. "I'm looking for an overview and don't expect a definition for every word. I can look up unfamiliar words in a microcomputer or electronics dictionary. I don't want to take too much of your time."

Monitors Versus TV Sets

The professor continued, "TV sets are designed to accept over-the-air transmission. They must contend with modulation and demodulation. But computer monitors deal directly with the video signal, so they produce a sharper image.

"In addition, TV sets have tuners, which limit the range of signals—the bandwidth—that can squeeze through the tuner and ensure that you receive one channel at a time. The tuner also limits the video signal, thereby reducing the clarity, or resolution, of a picture."

"You mean that, no matter how good the signal from a computer is, the TV tuner limits it?" I asked.

"That's right," the professor answered. "That is, assuming your TV tuner uses the typical switch box connected to the antenna terminals. You can get a good television picture on a TV set with a good antenna, but, when your computer puts a lot of text on a screen line, resolution is poor—especially on a color set. The limit for clear text is about 32 characters per line, although a good television set accommodates up to 40 characters per line. Do you want me to explain the mathematics of why this is so?"

The Mathematics of Resolution

"Could you cover the highlights?" I asked, hoping I wasn't getting in over my head.

"Dots make up characters on the screen; each dot is a picture element, called a pixel. As the CRT circuitry scans the screen, it either lights a pixel at a particular location or leaves it off. The number of distinguishable dots you can put on a line depends on how fast you're scanning the screen and how fast you can turn a dot on or off.

"U.S. television standards are based on 60 fields of 262.5 interlaced lines every second. Some computers deviate from this, or don't interlace, but for illustration let's use 60 times 262.5, or 15,750 scanning lines a second.

"If you divide that number into 1, you get .000063 seconds (63 microseconds)—the time for one line to sweep across the screen. However, other considerations, such as over-scan and distortion, reduce this to about 43 microseconds of usable time.

"The Color Computer uses 32 characters per line on 16 lines. Each character uses an 8- by 12-pixel matrix; that's 8 across and 12 high. The display has to distinguish 256 dots on a line—8 dots for each of the 32 characters—in 43 microseconds. If you consider the positive and negative half-cycles, that means 128 transitions in 43 microseconds, or about 3 million cycles per second. That's 3 MHz—the effective bandwidth of an average TV set."

"But what about vertical resolution?" I asked.

"That's not normally a problem. You need 16 lines of character spaces, each 12-dots high; that is within the resolution of any well-adjusted TV set. But I've been thinking of black-and-white displays, which are also called monochrome since they can have green, amber, or blue screens. There are other problems with color displays."

Color Displays

"I'm not sure I want to hear this," I said as I slumped in my chair. My mind was spinning already.

"It's just getting interesting," The professor got up from his chair and began scratching his head as he paced back and forth. "When you use a color TV as a monitor, you have to contend with interference, convergence, phosphor pitch, and limited bandpass. The computer signals usually interfere with the internal TV set signals, giving you herringbone patterns on the screen. If the convergence is off, the color signals won't hit the individual red, green, and blue screen phosphors exactly right, and you get color fringing. And, if you have a small or a low-resolution screen with a relatively large distance between phosphor dots, you can't separate the computer pixels. In most cases, you'll get a clearer picture on a black-and-white TV than on a color set."

"What's different about a monitor? Doesn't it still have interference, convergence, and pitch problems?" I queried.

"Sure," the professor responded. "But the interference is reduced because you don't have a tuner and its oscillators. The bandpass limitation for TV-channel separation is no longer required, so higher-quality circuitry and components are used in the video amplifiers to increase the bandpass. Since monitors are designed for display, more attention is paid to convergence adjustments. And, the distance between the color phosphor dots—

the pitch—is much smaller, so you can achieve higher horizontal resolution."

"You keep mentioning resolution," I commented. "I've seen different monitors advertised as having low, medium, or high resolution. What are the specifications for each?"

"Good question," responded the professor. "I wish I had a good answer. There are no industry standards for the terms 'low,' 'medium,' or 'high' resolution, but you can expect high resolution to be better, and more expensive, than low resolution. Some manufacturers state the bandpass in MHz, some use resolution figures, and others talk about screen-dot pitch. Look for at least a 4-MHz bandpass, or 300-line horizontal resolution for a 32-character line. A .7-millimeter pitch (about 28 thousandths of an inch) is adequate for a 32-character line display. To evaluate a monitor, connect it to your computer and fill the screen with lowercase m's. That's a tough test for any monitor!"

Composite and RGB Monitors

"That makes sense," I observed. "But I'm still confused by the different kinds of monitors. Are composite and RGB monitors the same?"

"Not at all!" Now the professor was getting excited. "A composite monitor looks for a signal based—in the U.S.—on NTSC standards established years ago. NTSC stands for National Television Systems Committee.

"Color-TV signals combine the three colors (red, blue, and green), their intensity information, and synchronization into a single signal that can be carried on two wires. This is the single-wire cable with a shield that we recognize as video cable. A video signal is like a TV signal without the radio-frequency carrier. Inside the monitor, the color information and sync are separated and fed to the three CRT guns and the sweep circuits.

"On the other hand," he continued, stopping in the middle of the room, "an RGB monitor—RGB stands for red, green, and blue—looks for each of these signals on separate wires, although sometimes the green signal carries the sync information. In addition, there are both digital (usually called TTL) and analog RGB monitors, which might have positive or negative sync and different voltage levels. Different brands might also have different connectors. How is that for standardization?"

"You mean that even if I decide to get a color monitor, I can't be sure it will work with my Color Computer?"

The professor looked confused. He sat down. "Wait a minute. Did you say you wanted to know about monitors for your Color Computer?"

"Yes. And the MC-10."

The professor leaned forward. "I've over-

looked something. You realize, of course, that neither the Color Computer nor the MC-10 has an NTSC video-monitor output, don't you?"

I felt like an idiot; I had never looked. "I connect them to a TV-computer switch box at the TV antenna. Can't I run a cable to a monitor instead?"

"No; you need monitor output on your computer. However, all is not lost. Before you leave, I'll give you information on five monitor adapters for the Color Computer for use with a composite monitor. They are on small preassembled circuitboards, but require installation. The adapters I've seen are designed for the Color Computer, but the manufacturers might have versions for the MC-10.

"But there's something else you should know. Since the sound from your Color Computer and MC-10 normally comes through your TV set, your monitor must also have a provision for sound. Most modern monitors have a built-in audio amplifier. The video adapters from the Moreton Bay and Computerware provide an audio-output cable. The TV Buff IIc instructions tell you where to find the audio on the Color Computer's circuitboard. If the monitor does not have an amplifier, you'll need an external audio amplifier, like the one sold by Radio Shack, to get sound."

I wondered whether a monitor would be worth the trouble. It must have showed because the professor leaned back and said, "I can see, Fred, that you've lost your enthusiasm for monitors. You must decide what you want. Even a low- or medium-resolution color monitor provides a better Color Computer display than a color TV set does. And, you can use the monitor with your other video equipment. What's more, there are companies selling TV tuners that allow you to receive a high-quality picture on your monitor when it's not hooked up to your computer. I'll give you their addresses.

"Don't be confused by too many choices. Forget about RGB monitors. A 4-MHz band-pass composite monitor, which you can get for about \$250, is sufficient. The 13-inch BMC Model BM-AU9191U is in that price range. It has 350-by-350 resolution and a built-in audio amplifier."

"Professor Byte, as usual, you've been extremely helpful. You always seem to have the answers."

"Everything is relative, Fred," the professor remarked as he gave me the information on the video-monitor adapters and TV tuners (see Table 1). ■

Fred Blechman has been writing magazine articles for 25 years. He specializes in introducing computer topics to beginners. Address correspondence to him c/o HOT CoCo.

List Of Manufacturers

Video Plus Monitor Driver
\$24.95 plus \$2 shipping
Computerware
P.O. Box 668
Encinitas, CA 92024
619-436-3512

TV Buff IIc
\$19.95 plus \$2.50 shipping
Green Mountain Micro
Bathory Rd.
Roxbury, VT 05669
802-485-6112

Double Driver or Mono II
\$24.95
Moreton Bay
316 Castillo St.
Santa Barbara, CA 93101
805-962-3127

Universal Video Driver
\$29.95
Mark Data Products
24001 Alicia Parkway
No. 207
Mission Viejo, CA 92691
714-768-1551

TV Tuner
Call or write for details.
Micro 4
P.O. Box 41008
San Jose, CA 95160
408-268-0837

BM-AU9191U
Order from a regional distributor.
BMC
16830 S. Avalon Blvd.
Carson, CA 90746
213-515-6005

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Matrix

*Untangle a web
of superimposed
blocks.*

Maneuvers

A game does not have to be intricate or have high-resolution graphics to be effective. A simple strategy game is often more absorbing than a fast-moving shooting gallery that requires little more than quick reflexes to attain a high score. To do well at Matrix Maneuvers, you need to think.

Playing the Game

The gameboard is a 22-by-14 grid filled with plus signs. The program randomly places 3-by-3 blocks of reverse-video plus signs on the grid (see Fig. 1). If a block's central coordinate

the coordinates of the central points of the 3-by-3 blocks. Messages at the top of the screen prompt you for the horizontal (letter) and vertical (number) coordinates. Preface single-digit numbers with a zero. For example, to eliminate the block in Fig. 1, you would specify C and then 03.

The number of blocks that appear on the screen depends on the level of difficulty you choose. Block placement is randomly generated, and blocks frequently overlap. Where two blocks intersect, the plus signs return to normal (see Fig. 2). Where another block intersects previously overlapped blocks, light

background changes to dark background and vice-versa.

Unraveling the sequence to clear the grid of dark areas in the fewest possible moves can be easy or hard, according to the skill level you choose. At the end of the game your score is displayed. The higher the difficulty level you choose, the higher your potential score. You receive 100 points for each skill level. The computer adds a point for each step it takes to set up the puzzle and subtracts a point for each step you take to solve the puzzle.

If you started at the recommended beginning level of 15, you would get 1,500 points (15×100). Because it takes the computer 16 steps to make the puzzle, you would get an additional 16 points. If you solved the puzzle in 20 moves, your total score would be 1,496 ($1,516 - 20$).

Matrix Maneuvers is a little like chess in that you must plan moves ahead of time. Once you get the hang of the game, work your way up to the harder levels by choosing a higher number at the skill-level prompt. Try to beat my high score of 4,453 on level 45!

Program Flow

A five-note trumpet call accompanies the timed opening screen. If you type Y in response to the instructions prompt, the program switches control to the instruction routine in lines 250-299. The subroutine in lines 800-810 uses the INKEY\$ function to have the computer pause for user input between instructions. When you complete the explanatory sequence (or if you answer N to the instructions prompt), the skill-level prompt appears.

The FOR...NEXT loops in lines 100-150, which increment and place ASCII values, draw the playing grid. The IF...THEN statement in line 103 prefixes a zero or one to the

	A	B	C	D	E	F
01	+	+	+	+	+	+
02	+	+	+	+	+	+
03	+	+	+	+	+	+
04	+	+	+	+	+	+
05	+	+	+	+	+	+
06	+	+	+	+	+	+
07	+	+	+	+	+	+

Fig. 1. A 3-by-3 Block

	A	B	C	D	E	F
01	+	+	+	+	+	+
02	+	+	+	+	+	+
03	+	+	+	+	+	+
04	+	+	+	+	+	+
05	+	+	+	+	+	+
06	+	+	+	+	+	+
07	+	+	+	+	+	+

Fig. 2. Two Overlapping Blocks

is on an edge, the remainder of the block appears on the opposite edge. And, if the central coordinate is in a corner, the remainder appears at the other three corners.

The object of the game is to return the grid to its original state. You do this by naming

System Requirements

4K RAM
Color Basic

horizontal label. Another loop in lines 110-114 uses the skill-level value to determine the number of blocks placed on the playing grid. The block's central coordinates are randomly chosen in line 111. Line 112 finds the screen address for the coordinates; line 113 sends the program to the inverse-square subroutine in lines 1000-1054.

The FOR. .NEXT loop (lines 1000-1006) runs nine times—once for each square in the block. First, the program READs the difference between the addresses of the current block and the coordinates supplied by random generation (or later in the program by the player) from a DATA line, which corresponds to the main FOR. .NEXT loop. To find the address of the current block, the program adds the number found to the address of the coordinate. The current-block value is found by PEEKing at the above address.

The next step is reversing the value at each of the nine locations. This is done by taking the sum of the two desired ASCII values—43 and 107. By subtracting this sum (150) from the value at a given address, the program gets the opposite value. But the value is neg-

ative; to avoid an error, the program uses the ABS function to make it positive. The original value of the current block is reversed.

The computer then checks for blocks running off the grid. Four test-flag variables—CA, CB, CX, and CY—are set to zero. If the reversed value does not equal 43 or 107, the computer goes to a subroutine to change the address to which the reversed value is PEEKed. The ON. .GOTO command sends the value to the correct subroutine—there is a different routine for each square in the block. Line 1002 PEEKs the value of the new address. After the nine reversed values are POKed into the proper addresses, control returns to the main program.

Lines 120-130 contain the main routine. Line 120 is a counter that keeps track of the number of steps a player uses to complete the puzzle, incrementing S by one each time a coordinate is entered. Lines 121-127 control acceptable coordinate input. An incorrect submission sends the program to the subroutine in lines 900-913. A two-tone sound is played and a resubmit message is printed on the screen. A single tone signaling

admissible data sounds when letters and numbers are accepted.

After the program calculates the screen address of the coordinate submitted by the player, it returns control to the inverse-square subroutine (lines 1000-1054). This reverses the 3-by-3 block specified by the player.

The subroutine in lines 2000-2006 determines whether the game is over. Two FOR. .NEXT loops, one for the vertical axis and the other for the horizontal axis, set up the addresses to be tested. The computer uses an IF. .THEN statement to determine whether the value at all addresses is equal to 107. If they are, the playing grid is clear. If the grid is not clear, control returns to the main loop and S is incremented. Once the game is over, the program displays a score and asks whether to begin another game. A Y response returns the player to the instructions prompt. ■

See program listing on page 49

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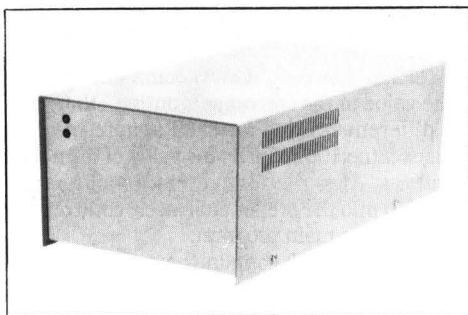


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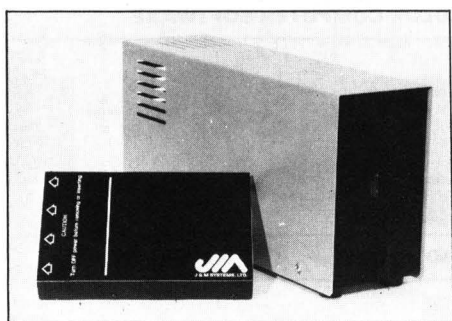
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Mindbusters

(Article on page 18)

```

100 REM * STAMPEDE * TRS-80 EXTE
NDED COLOR BASIC 16K / RAMELLA
110 DATA 22,22,52,22,82,22,112,2
2,142,22,52,52,82,52,112,52,142,
52,112,82,142,82,142,112
120 DATA 22,52,22,82,52,82,22,11
2,52,112,82,112,112,22,142,5
2,142,82,142,112,142,142
130 CLS: CLEAR 1000: PMODE 3,1:
PCLS 1: COLOR 1,2: SCREEN 1,1
140 DIM K(48), P(1,12), Q(1,12),
ST$(2): V$="AZ,."
150 M$="AA./AA/A...A/..Z/Z../
ZZ../ZZ/ZZ/,/ZZ/,/Z/Z,,/A/A,,/
AA/,AA": DR$="R30D30L30U30"
160 FOR X=21 TO 151 STEP 30: FOR
Y=21 TO 151 STEP 30
170 DRAW"C3BM"+STR$(X)+"," +STR$(
Y)+DR$: NEXT Y,X
180 CIRCLE(12,180),10,2: PAINT(1
2,180),2
190 CIRCLE(180,12),10,4: PAINT(1
80,12),4
200 H$="G2D2G2D2G2D2G2R23H2U23G3
L10"
210 FOR X=1 TO 48: READ K(X): NEXT
220 DRAW"C2BM154,34;" +H$: CIRCLE
(154,30),10,,.5,.25,.7
230 PAINT(156,34),2,2: PSET(159,
28,1)
240 DRAW"C4BM34,154;" +H$: CIRCLE
(34,150),10,,.5,.25,.7
250 PAINT(36,150),4,4: PSET(38,1
48,1)
260 GET(142,22)-(169,50),P,G: GE
T(22,142)-(49,169),Q,G
270 FOR X=1 TO 47 STEP 2
280 IF X<25 THEN PUT(K(X),K(X+1)
)-(K(X)+27,K(X+1)+27),P,PSET: GO
TO 300
290 PUT(K(X),K(X+1))-(K(X)+27,K(
X+1)+27),Q,PSET
300 NEXT X:X=82:Y=82:X1=X:Y1=Y
310 A$=INKEY$: IF A$="" OR INSTR
(V$,A$)=0 THEN 310 ELSE S$=S$+A$
320 IF A$="," THEN X1=X1+30 ELSE
IF A$="." THEN X1=X1-30

```

```

330 IF A$="Z" THEN Y1=Y1-30 ELSE
IF A$="A" THEN Y1=Y1+30
340 IF X1>142 OR X1<22 OR Y1>142
OR Y1<22 THEN GOSUB 470:GOTO 310
350 IF LEN(S$)<3 THEN 310
360 IF INSTR(M$,S$)=0 THEN GOSUB
470: GOTO 310
370 PT=PPOINT(X1+15,Y1+15): IF P
T=5 THEN GOSUB 470: GOTO 310
380 ST$(H)=ST$(H)+MID$(STR$(INST
R(M$,S$)),2)+"/": IF LEN(ST$(H))
>243 THEN H=H+1
390 B=B+1: COLOR 1,1: LINE(X1,Y1
)-(X1+27,Y1+27),PSET,BF:COLOR 3,1
400 IF PT=6 THEN PUT(X,Y)-(X+27,
Y+27),P,PSET ELSE PUT(X,Y)-(X+27
,Y+27),Q,PSET
410 IF PPOINT(97,97)<>5 THEN 480
420 FOR R=1 TO 23 STEP 2: IF PPO
INT(K(R)+15,K(R+1)+15)<>8 THEN 4
80 ELSE NEXT R
430 FOR X=1 TO 50: SOUND RND(13)
*13,1: NEXT
440 F$=INKEY$: IF F$="" THEN 440
450 CLS: FOR J=0 TO H: PRINT ST$
(H): NEXT
460 PRINT "SCORE";B: END
470 X1=X: Y1=Y: S$="": SOUND 1,5
: RETURN
480 IF B=100 THEN FOR G=250 TO 1
0 STEP -5: SOUND G,1: NEXT: GOTO
480
490 X=X1: Y=Y1: S$="": GOTO 310
500 END

```

Me and My CGP 115

(Article on page 25)

Program Listing. Color Dump

```

60 'PCLEAR DEFAULTS TO 4 PAGES
ON START UP, IF GRAPHICS
EXIST BEYOND PAGE 4 PLEASE
PCLEAR PAGES NEEDED AND
RELOAD THIS PROGRAM. PLEASE
NOTE <PMODE#, #>, <SCREEN#, #>
OF GRAPHIC SCREEN
70 'SAVE GRAPHICS ON TAPE PRIOR
TO RUNNING THIS PROGRAM BY
CSAVEM"NAME",START,END,0

```

START & END = BEG. & END
DECIMAL ADDRESS OF GRAPHICS

800 'PAGE# BEG. END 'ADDRESS

Address	BEG.	END	ADDRESS
1100			
1200	1	1536	- 3071
1300	2	3072	- 4607
1400	3	4608	- 6143
1500	4	6144	- 7679
1600	5	7680	- 9215
1700	6	9216	- 10751
1800	7	10752	- 12287
1900	8	12288	- 13823

2000 DIM P(8)

10000 '*** PROGRAM START***

10001 'SET UP MATCHING GRAPHICS

10100 CLS

10200 PRINT"PMODE OF YOUR GRAPHIC

S #, #"

1025 PRINT"FIRST # GRAPHIC MODE

0-4"

1026 PRINT"SECOND # START PAGE 1

-8"

1030 INPUT R,P

1040 PMODE R,P

1050 PRINT:PRINT"SELECT COLOR SE

T # USED"

1060 IF R=3 OR R= 1 THEN PRINT "

0=GREEN/YELLOW/BLUE/RED

1=BUFF/CYAN/MAGENTA/ORANGE" ELSE

PRINT "0=BLACK/GREEN

1=BLACK/BUFF"

1070 INPUT"#";CS

1080 CLS

20000 '***LOAD GRAPHICS TAPE***

2010 PRINT"DO YOU HAVE A DISPLAY

ON TAPE"

2020 INPUT"(Y/N)";Q\$

2030 IFQ\$="N" THEN 30000

2035 CLS

2040 PRINT"LOAD CASSETTE AND POS

ITION PRESS PLAY BUTTON THE

N PRESS <ENTER>"

2045 LINEINPUT Q\$

2050 PCLS

2060 SCREEN 1,CS

2070 CLOADM

30000 '***SET UP PRINTER PENS***

3010 CLS

3020 SCREEN 0

3030 PRINT"LOOK AT YOUR GRAPHICS

AND NOTE COLOR SCHEMES PRESS <

ENTER> TO SELECT PRINTER PENS"

3040 FOR X= 1 TO 9000:NEXT

3050 SCREEN1,CS

3060 LINEINPUTQ\$

3070 CLS

3080 SCREEN 0

4000 '***PENS FOR 2 COLORS***

4010 PRINT"TO LOOK AT GRAPHICS E

NTER '9', THEN PRESS <ENTER> TO

RETURN"

4020 PRINT:PRINT"PEN # COLOR"

4030 PRINT:PRINT" 0 BLACK"

4040 PRINT" 1 BLUE"

4050 PRINT" 2 GREEN"

4060 PRINT" 3 RED"

4070 PRINT" 10 NO PRINT"

4080 PRINT

4090 IF R=3 OR R=1 THEN 4500

4100 IF CS=1 THEN 4160

4110 INPUT"PEN# FOR BLACK PIXELS

";P(0)

4120 IF P(0)=9 THEN 9000

4130 INPUT"PEN# FOR GREEN PIXELS"

;P(1)

4140 IF P(1)=9 THEN 9000

4150 GOTO 5000

4160 INPUT"PEN# FOR BLACK PIXELS

";P(0)

4170 IF P(0)=9 THEN 9000

4180 INPUT"PEN# FOR BUFF PIXELS"

;P(5)

4190 IF P(5)=9 THEN 9000

4200 GOTO 5000

4500 '***PENS FOR 4 COLORS***

4510 IF CS=1 THEN 4610

4520 INPUT"PEN# FOR GREEN PIXELS

";P(1)

4530 IF P(1)=9 THEN 9000

4540 INPUT"PEN# FOR YELLOW PIXEL

S";P(2)

4550 IF P(2)=9 THEN 9000

4560 INPUT"PEN# FOR BLUE PIXELS"

;P(3)

4570 IF P(3)=9 THEN 9000

4580 INPUT"PEN# FOR RED PIXELS";

P(4)

4590 IF P(4)=9 THEN 9000

4600 GOTO 5000

4610 INPUT"PEN# FOR BUFF PIXELS"

;P(5)

4620 IF P(5)=9 THEN 9000

4630 INPUT"PEN# FOR CYAN PIXELS"

;P(6)

4640 IF P(6)=9 THEN 9000

4650 INPUT"PEN# FOR MAGENTA PIXE

LS";P(7)

4660 IF P(7)=9 THEN 9000

4670 INPUT"PEN# FOR ORANGE PIXEL

S";P(8)

4680 IF P(8)=9 THEN 9000

5000 '***PRINTING ROUTINE***

5020 SCREEN0

5030 PRINT"TURN ON PRINTER"

5040 FOR X= 1 TO 5000:NEXT

5050 SCREEN1,CS

5060 ON R+1 GOTO 6000,6100,6200,

6300,6400

6000 '***PMODE 0***

6010 '128X96 GRID TWO COLORS

6020 PRINT#-2,CHR\$(17):PRINT#-2,

CHR\$(18)

6030 PRINT#-2,"I":PC=99

6035 GOSUB 8000

6040 FOR Y=0 TO 190 STEP 2:PRINT

#-2,"M0,";Y*-2

6050 FOR X=8 TO 246 STEP 2

6060 P=PPOINT(X,Y)

6070 IF P=B THEN 6090

6080 IF PC<>P THEN GOSUB 7000

6085 PRINT#-2,"J4,-4":PRINT#-2,"

R0,4":PRINT#-2,"J-4,-4":PRINT#-2

,"R0,4"

6090 PRINT#-2,"M";(X-6)*2,";Y*-

2

6095 NEXT X,Y

6099 GOTO 10000

6100 '***PMODE 1***

6110 '128X96 GRID FOUR COLORS

6120 PRINT#-2,CHR\$(17):PRINT#-2,

CHR\$(18)

6130 PRINT#-2,"I":PC=99

6135 GOSUB 8000

6140 FOR Y=0 TO 190 STEP 2:PRINT

#-2,"M0,";Y*-2

6150 FOR X=8 TO 246 STEP 2

6160 P=PPOINT(X,Y)

6170 IF P=B1 OR P=B2 OR P=B3 OR

P=B4 THEN 6190

6180 IF PC<>P THEN GOSUB 7000

6185 PRINT#-2,"J4,-4":PRINT#-2,"

R0,4":PRINT#-2,"J-4,-4":PRINT#-2

,"R0,4"

6190 PRINT#-2,"M";(X-6)*2,";Y*-

2

6195 NEXT X,Y

6199 GOTO 10000

6200 '***PMODE 2***

6210 '128X192 GRID TWO COLORS

6220 PRINT#-2,CHR\$(17):PRINT#-2,

CHR\$(18)

6230 PRINT#-2,"I":PC=99

6235 GOSUB 8000

6240 FOR Y=0 TO 191 STEP 1:PRINT

#-2,"M0,";Y*-2

6250 FOR X=8 TO 246 STEP 2

6260 P=PPOINT(X,Y)

6270 IF P=B THEN 6290

6280 IF PC<>P THEN GOSUB 7000

6285 PRINT#-2,"J4,-2":PRINT#-2,"

R0,2":PRINT#-2,"J-4,-2":PRINT#-2

,"R0,2"

6290 PRINT#-2,"M";(X-6)*2,";Y*-

2

6295 NEXT X,Y

6299 GOTO 10000

6300 '***PMODE 3***

6310 '128X192 GRID FOUR COLORS

6320 PRINT#-2,CHR\$(17):PRINT#-2,

CHR\$(18)

6330 PRINT#-2,"I":PC=99

6335 GOSUB 8000

6340 FOR Y=0 TO 191 STEP 1:PRINT

#-2,"M0,";Y*-2

6350 FOR X=8 TO 246 STEP 2

6360 P=PPOINT(X,Y)

6370 IF P=B1 OR P=B2 OR P=B3 OR

P=B4 OR P=B5 THEN 6390

6380 IF PC<>P THEN GOSUB 7000

6385 PRINT#-2,"J4,-2":PRINT#-2,"

R0,2":PRINT#-2,"J-4,-2":PRINT#-2

,"R0,2"

6390 PRINT#-2,"M";(X-6)*2,";Y*-

2

6395 NEXT X,Y

6399 GOTO 10000

6400 '***PMODE 4***

6410 '256X192 GRID TWO COLORS

6420 PRINT#-2,CHR\$(17):PRINT#-2,

CHR\$(18)

6430 PRINT#-2,"I":PC=99

6435 GOSUB 8000

6440 FOR Y=0 TO 191 STEP 1:PRINT

#-2,"M0,";Y*-2

6450 FOR X=8 TO 247 STEP 1

6460 P=PPOINT(X,Y)

6470 IF P=B THEN 6490

6480 IF PC<>P THEN GOSUB 7000

6485 PRINT#-2,"J2,-2":PRINT#-2,"

R0,2":PRINT#-2,"J-2,-2":PRINT#-2

,"R0,2"

6490 PRINT#-2,"M";(X-7)*2,";Y*-2

6495 NEXT X,Y

6499 GOTO 10000

7000 '***PEN CHANGE ROUTINE***

7010 PC=P

Listing continued

```

7020 PRINT#-2,"C";P(P)
7030 RETURN
80000 '***DEFINE NO PRINT COLOR**

8001 'FOUR COLOR CHECK
8010 IF R=0 OR R=2 OR R=4 THEN 8
500
8020 Z=0:IF CS=1 THEN Z=4
8030 B1=99:B2=99:B3=99:B4=99
8040 IF P(Z+1)=10 THEN B1=Z+1
8050 IF P(Z+2)=10 THEN B2=Z+2
8060 IF P(Z+3)=10 THEN B3=Z+3
8070 IF P(Z+4)=10 THEN B4=Z+4
8080 RETURN
8500 'TWO COLOR CHECK
8505 B=99
8510 IF CS=0 AND P(0)=10 THEN B=
0
8515 IF CS=0 AND P(1)=10 THEN B=
1
8520 IF CS=1 AND P(5)=10 THEN B=
5
8525 IF CS=1 AND P(0)=10 THEN B=
0
8540 RETURN
9000 '*SCREEN GRAPHIC DISPLAY*
9010 SCREEN1,CS
9020 LINEINPUT QS
9030 CLS
9040 SCREEN0
9050 GOTO 4000
10000 SOUND100,100
10010 PRINT#-2,CHR$(17)
10020 END

```

The Fat CoCo

(Article on page 28)

Program Listing 1. Banker Test

```

10 'BANKRTST.BAS V1.0
20 CLEAR 200,&H77FF
30 LA=&H7800:EA=LA+&H330:TA=LA
40 CLS
50 PRINT " "STRING$(30,"*")
60 PRINT " *          BANKER TEST
   "
70 PRINT " *          MEMORY BANK TE
ST   "
80 PRINT " *
   "
90 PRINT " *          J & R ELECTRONI

```

```

CS      "*"
100 PRINT " *          (C) 1985
   "
110 PRINT " *          ALL RIGHTS RESER
VED  "
120 PRINT " "STRING$(30,"*")
130 INPUT" PRESS A KEY ";XX$
140 CLS
150 PRINT "          MENU SELECTIONS
   "
160 PRINT"1. TEST UPPER BANK
170 PRINT"2. TEST LOWER BANK
180 PRINT"3. LOAD TEST PROGRAM
190 PRINT"4. QUIT
200 INPUT" YOUR CHOICE <1,2,3,4>
   ";YC
210 IF YC<1 OR YC>4 THEN 140
220 IF (YC = 1 OR YC= 2) AND (PE
EK(LA) <> &H16) THEN GOSUB 440
230 ON YC GOSUB 260,290,440,250
240 GOTO130
250 END'*****
260 GOSUB320'GET BANK #
270 POKE LA+17,255:EXEC LA
280 RETURN
290 GOSUB320'GET BANK #
300 POKE LA+&H11,0:EXEC LA
310 RETURN
320 INPUT"SELECT BANK <0,1,2,3>
   ";BK
330 IF BK<0 OR BK>3 THEN 320
340 POKE LA+9,BK
350 RETURN
360 INPUT"FILE NAME TO SAVE ";FL
$
370 INPUT"TAPE OR DISK <T*/D> ";
TDS$
380 PRINT"SAVE "FL$ "TO";:IF TDS$
="D" THEN PRINT"DISK" ELSE PRINT
"TAPE"
390 INPUT"IS THAT CORRECT ";XX$
400 IF XX$ <> "Y" THEN 360
410 IF TDS$="D" THEN SAVEM FL$,LA
,EA,TA ELSE INPUT "READY TAPE";X
X$:CSAVEM FL$,LA,EA,TA
420 RETURN
430 END
440 PRINT"POKEING PROGRAM INTO M
EMORY"
450 RESTORE
460 FOR I=LA TO EA
470 READ XS
480 POKE I,VAL("&H"+XS)
490 IF I/16 = INT(I/16) THEN PRI
NT". ";

```

```

500 NEXT I
510 PRINT:PRINT" LOADED "
520 RETURN
530 DATA16,01,0B,16,00,53,16,00
540 DATA21,00,FF,FF,FF,00,00,7F
550 DATA FE,00,00,00,7F,FE,80,0
0
560 DATA FE,FE,20,DF,DF,00,00,D
F
570 DATA FF,00,00,DF,FF,00,00,D
F
580 DATA FF,00,1A,50,AE,8C,E7,A
F
590 DATA8C,DB,AE,8C,E3,AF,8C,D7
600 DATA7F,FF,40,B7,FF,DF,CC,FF
610 DATA FF,ED,8C,C7,A7,8C,C3,C
E
620 DATA FF,C0,A6,8C,BC,84,07,8
A
630 DATA08,A5,C6,8D,62,B7,FF,DE
640 DATA39,1A,50,AE,8C,B4,AF,8C
650 DATA AC,AE,8C,B0,AF,8C,A8,7
F
660 DATA FF,40,B7,FF,DF,CC,FF,F
F
670 DATA ED,8C,98,A7,8C,94,CE,F
F
680 DATA C0,A6,8C,8D,84,07,8A,0
8
690 DATA A5,C6,17,00,5F,30,8D,0
0
700 DATA06,30,89,80,00,6E,84,A6
710 DATA8D,FF,76,84,07,CE,FF,C0
720 DATA A5,C6,8D,1B,CE,FF,C0,A
6
730 DATA8D,FF,66,84,07,8A,08,A5
740 DATA C6,30,8D,00,06,30,89,8
0
750 DATA00,6E,84,B7,FF,DE,39,AE
760 DATA8D,FF,52,A6,84,43,B7,04
770 DATA00,A7,84,A1,84,26,14,43
780 DATA B7,04,00,A7,84,A1,84,2
6
790 DATA0A,30,01,AC,8D,FF,38,2F
800 DATA E2,20,08,6F,8D,FF,2B,A
F
810 DATA8D,FF,28,39,30,8D,00,24
820 DATA AF,8D,00,20,30,8D,FF,1
0
830 DATA CE,FF,C0,A6,8D,FF,12,8
4
840 DATA07,8A,08,A5,C6,A6,84,A7
850 DATA89,80,00,30,01,AC,8D,00
860 DATA03,2F,F2,39,00,00,30,8D
870 DATA00,DC,17,00,90,6D,8D,FE

```

```

880 DATA F8,27,0C,17,FF,0C,30,8
D
890 DATA01,C8,17,00,80,20,0A,17
900 DATA FF,2F,30,8D,01,C4,17,0
0
910 DATA74,30,8D,01,C5,17,00,6D
920 DATA A6,8D,FE,CD,17,00,3B,A
6
930 DATA8D,FE,C7,43,27,0C,30,8D
940 DATA01,C1,17,00,58,17,00,0D
950 DATA20,07,30,8D,01,AB,17,00
960 DATA4C,17,00,3C,39,A6,8D,FE
970 DATA AA,17,00,16,A6,8D,FE,A
4
980 DATA17,00,0F,17,00,05,39,8D
990 DATA00,8D,00,86,20,AD,9F,A0
1000 DATA 02,39,34,02,46,46,46,4
6
1010 DATA 17,00,06,35,02,17,00,0
1
1020 DATA 39,84,0F,81,0A,2D,02,8
B
1030 DATA 07,8B,30,AD,9F,A0,02,3
9
1040 DATA 86,0D,AD,9F,A0,02,86,0
A
1050 DATA AD,9F,A0,02,39,A6,80,2
7
1060 DATA 06,AD,9F,A0,02,20,F6,3
9
1070 DATA 34,30,6F,A4,17,FF,EE,1
7
1080 DATA 00,13,26,02,6C,A4,30,8
D
1090 DATA 01,56,17,FF,E0,17,00,0
5
1100 DATA 35,30,26,E4,39,17,00,1
7
1110 DATA 81,59,27,06,81,4E,27,0
2
1120 DATA 20,F3,AD,9F,A0,02,81,5
9
1130 DATA 39,AD,9F,A0,00,27,06,A
D
1140 DATA 9F,A0,00,27,FA,39,0D,0
D
1150 DATA 0D,0D,0D,0D,20,2A,2A,2
A
1160 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1170 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1180 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1190 DATA 2A,20,0D,20,2A,20,20,2
0

```



```

1200 DATA 20,20,20,42,41,4E,4B,5
4
1210 DATA 45,53,54,20,50,52,4F,4
7
1220 DATA 52,41,4D,20,20,20,20,2
A
1230 DATA 20,0D,20,2A,20,20,20,2
0
1240 DATA 20,20,43,4F,50,59,52,4
9
1250 DATA 47,48,54,20,31,39,38,3
5
1260 DATA 20,20,20,20,20,20,2A,0
D
1270 DATA 20,2A,20,20,20,20,20,2
0
1280 DATA 4A,20,26,20,52,20,45,4
C
1290 DATA 45,43,54,52,4F,4E,49,4
3
1300 DATA 53,20,20,20,2A,0D,20,2
A
1310 DATA 20,20,20,20,20,20,50,2
E
1320 DATA 4F,2E,42,4F,58,20,32,3
5
1330 DATA 37,32,20,20,20,20,20,2
0
1340 DATA 20,20,2A,0D,20,2A,20,2
0
1350 DATA 20,20,20,20,43,4F,4C,5
5
1360 DATA 4D,42,49,41,2C,20,4D,4
4
1370 DATA 2E,20,32,31,30,34,35,2
0
1380 DATA 2A,0D,20,2A,20,20,20,2
0
1390 DATA 20,20,41,4C,4C,20,52,4
9
1400 DATA 47,48,54,53,20,52,45,5
3
1410 DATA 45,52,56,45,44,20,2A,0
D
1420 DATA 20,2A,2A,2A,2A,2A,2A,2
A
1430 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1440 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1450 DATA 2A,2A,2A,2A,2A,0D,0D,0
D
1460 DATA 0D,00,20,55,50,50,45,5
2

```

```

1470 DATA 20,00,20,4C,4F,57,45,5
2
1480 DATA 20,00,20,42,41,4E,4B,2
0
1490 DATA 00,20,50,41,53,53,45,4
4
1500 DATA 20,0D,00,20,66,61,69,6
C
1510 DATA 65,64,20,41,54,20,24,0
0
1520 DATA 20,41,52,45,20,59,4F,5
5
1530 DATA 20,53,55,52,45,20,3C,5
9
1540 DATA 2F,4E,3E,20,3F,20,00,0
0
1550 DATA 00,FF,DF,00,00,DF,FF,0
0
1560 END 'BANKRTST.BAS

```

Program Listing 2. Banker 32K

(Not available on the Instant CoCo cassette.)

```

10 NAM B256
20 *BANKER 256K
30 *COPYRIGHT 1985
40 *J & R ELECTRONICS
50 *ALL RIGHTS RESERVED
60 *
70 ORG $0E00
80 ORCC #$50
90 LDX #$8000
100 LDY #$FFC0 *BANK 0
110 COPY STB $FFDE
120 LDB 0,Y
130 LDA 0,X
140 LDB $08,Y *BANK 00/00
150 STB $FFDF
160 STA 0,X
170 LDB $09,Y *BANK 01/00
180 STB $FFDF
190 STA 0,X
200 LDB $0A,Y *BANK 02/00
210 STB $FFDF
220 STA 0,X
230 LDB $0B,Y *BANK 03/00
240 STB $FFDF
250 STA 0,X
260 LDB 0,Y *BANK 00
270 STB $FFDF
280 LEAX 1,X
290 CMPX #$FF00
300 BNE COPY
310 LDX #$ABEE *OK PROMPT

```

```

320 LDB 0,Y *BANK 00
330 STB $FFDF
340 LDA #'>
480 STA 0,X
490 LDA #'0 BANK #
500 STA 1,X
510 LDB $09,Y *BANK 01/100
520 STB $FFDF
530 LDA #'>
540 STA 0,X
550 LDA #'1
560 STA 1,X
570 LDB $0A,Y *BANK 02/00
580 STB $FFDF
590 LDA #'>
600 STA 0,X
610 LDA #'2
620 STA 1,X
630 LDB $0B,Y *BANK 03/00
640 STB $FFDF
650 LDA #'>
660 STA 0,X
670 LDA #'3
680 STA 1,X
690 LDB 0,Y *BANK 00
700 STB $FFDF
710 RTS
720 END

```

Program Listing 3. Bank Switcher

(Not available on the Instant CoCo cassette.)

```

10 REM NEEDS "B256/BIN" IN RAM
20 CLS
30 A=&HFFC8:V=&HFFD0
40 I=PEEK(A)
50 FOR I=0 TO 3
60 CLS
70 IF PEEK(A+I) THEN
80 IF PEEK(V) THEN
90 PRINT "BANK"CHR$(PEEK(&HABEF)
)" ";
100 PRINT:PRINT"PRESS A KEY"
110 IF INKEY$="" THEN 110
120 NEXT
130 GOTO50

```

Program Listing 4. Banker Backup

```

10 'BANKRBAK.BAS V1.0
20 CLEAR 2000,&H77FF
30 LA=&H7800:EA=LA+&H48F:TA=LA

```

```

40 CLS
50 PRINT " "STRING$(30,"*")
60 PRINT " * BANKER BACK
UP " "
70 PRINT " * MEMORY BANK TE
ST " "
80 PRINT " *
" "
90 PRINT " * J & R ELECTRONI
CS " "
100 PRINT " * (C) 1985
" "
110 PRINT " * ALL RIGHTS RESER
VED " "
120 PRINT " "STRING$(30,"*")
130 INPUT" PRESS A KEY ";XX$
140 CLS
150 PRINT " MENU SELECTIONS
"
160 PRINT"1. POKE PROGRAM TO MEM
ORY
170 PRINT"2. MACHINE LANGUAGE SA
VE
180 PRINT"3. QUIT
190 INPUT" YOUR CHOICE <1,2,3> "
;YC
200 IF YC<1 OR YC>3 THEN 140
210 IF YC= 2 AND (PEEK(LA) <> &H
16) THEN GOSUB 320
220 ON YC GOSUB 320,250,240
230 GOTO130
240 END'*****
250 INPUT"FILE NAME TO SAVE ";FL
$
260 INPUT"TAPE OR DISK <T*/D> ";
TD$
270 PRINT"SAVE "FL$ "TO";:IF TD$
="D" THEN PRINT"DISK" ELSE PRINT
"TAPE"
280 INPUT"IS THAT CORRECT ";XX$
290 IF XX$ <> "Y" THEN 250
300 IF TD$="D" THEN SAVEM FL$,LA
,EA,TA ELSE INPUT "READY TAPE";X
X$:CSAVEM FL$,LA,EA,TA
310 RETURN
320 PRINT"POKEING PROGRAM INTO M
EMORY"
330 RESTORE
340 FOR I=LA TO EA
350 READ X$
360 POKE I,VAL("&H"+X$)
370 IF I/16 = INT(I/16) THEN PRI
NT". ";
380 NEXT I

```

```

390 PRINT:PRINT" LOADED "
400 RETURN
410 FOR I=&H7800 TO &H7C8F
420 READ XS
430 POKE I,VAL("&H"+XS)
440 NEXT I
450 DATA16,00,64,16,00,1D,00,00
460 DATA01,00,00,00,00,FE,00,00
470 DATA00,00,00,DF,FF,00,00,DF
480 DATA DF,20,00,FF,DF,00,00,D
F
490 DATA FF,00,00,1A,50,AE,8C,E
1
500 DATA EE,8C,E6,10,8E,FF,C0,A
6
510 DATA8C,D4,84,07,31,A6,A5,28
520 DATA A6,C4,81,02,27,07,81,0
3
530 DATA27,13,A5,28,39,EE,44,C6
540 DATA00,A6,C0,A5,A4,A7,80,A5
550 DATA28,5A,26,F5,39,EE,44,C6
560 DATA00,A5,A4,A6,80,A5,28,A7
570 DATA C0,5A,26,F5,39,00,00,1
A
580 DATA50,7F,FF,40,B7,FF,DE,FE
590 DATA C0,06,EF,8C,9C,30,8D,0
2
600 DATA3A,17,01,E6,30,8D,03,2F
610 DATA17,01,DF,30,8D,03,58,17
620 DATA01,D8,17,02,1F,17,01,C1
630 DATA FE,C0,06,CC,06,00,ED,4
4
640 DATA86,02,A7,C4,17,00,51,30
650 DATA8D,02,10,17,01,BC,30,8D
660 DATA03,1B,17,01,B5,30,8D,03
670 DATA2E,17,01,AE,17,01,F5,17
680 DATA01,97,FE,C0,06,86,03,A7
690 DATA C4,17,00,2C,30,8D,01,E
B
700 DATA17,01,97,30,8D,03,1F,17
710 DATA01,9B,6D,8D,01,BB,10,27
720 DATA00,12,30,8D,03,28,17,01
730 DATA8C,6D,8D,01,AC,10,26,FF
740 DATA B6,16,FF,7B,B7,FF,DE,3
9
750 DATA FE,C0,06,86,00,A7,42,A
7
760 DATA8D,FF,14,30,8D,00,E4,C6
770 DATA02,A1,85,2C,03,5A,20,F9
780 DATA5C,E7,8D,FE,F9,5A,A0,85
790 DATA A7,8D,FE,F3,4C,8E,00,0
0
800 DATA4A,27,06,30,89,12,00,20
810 DATA F7,AF,8D,FE,E4,30,89,0
0

```

```

820 DATA FF,AF,8D,FE,DE,86,01,A
7
830 DATA43,A7,8D,FE,DB,A6,C4,81
840 DATA02,27,4D,81,03,10,26,00
850 DATA9B,DC,88,ED,8D,03,46,30
860 DATA8D,03,08,17,01,14,17,00
870 DATA C5,EC,8D,03,38,DD,88,1
7
880 DATA00,8C,AE,8D,FE,AF,AD,03
890 DATA B7,FF,DE,AD,9F,C0,04,1
A
900 DATA50,FE,C0,06,A6,46,84,40
910 DATA10,27,00,3F,30,8D,02,F4
920 DATA17,00,E7,30,8D,02,60,17
930 DATA00,E0,17,01,27,16,00,54
940 DATA B7,FF,DE,DC,88,ED,8D,0
2
950 DATA FC,30,8D,02,A5,17,00,C
A
960 DATA17,00,7B,EC,8D,02,EE,DD
970 DATA88,AD,9F,C0,04,1A,50,17
980 DATA00,3C,AE,8D,FE,5F,AD,03
990 DATA B7,FF,DE,AE,8D,FE,52,3
0
1000 DATA 89,01,00,AF,8D,FE,4A,3
0
1010 DATA 89,00,FF,AF,8D,FE,44,F
E
1020 DATA C0,06,A6,43,4C,81,12,1
0
1030 DATA 2F,FF,5C,A6,42,4C,81,2
2
1040 DATA 10,2F,FF,19,B7,FF,DE,7
F
1050 DATA FF,40,39,00,0E,1C,34,7
6
1060 DATA 30,8D,FE,79,AF,8D,FE,7
5
1070 DATA 30,8D,FE,0C,10,AE,8D,F
E
1080 DATA 14,CE,FF,C0,A6,8D,FE,0
6
1090 DATA 84,07,8A,08,A5,C6,B7,F
F
1100 DATA DF,A6,80,A7,A0,AC,8D,F
E
1110 DATA 54,2F,F6,35,76,39,A6,8
D
1120 DATA FD,F5,17,00,16,A6,8D,F
D
1130 DATA EF,17,00,0F,17,00,05,3
9
1140 DATA 8D,00,8D,00,86,20,AD,9
F
1150 DATA A0,02,39,34,02,46,46,4

```

```

6
1160 DATA 46,17,00,06,35,02,17,0
0
1170 DATA 01,39,84,0F,81,0A,2D,0
2
1180 DATA 8B,07,8B,30,AD,9F,A0,0
2
1190 DATA 39,34,02,86,0D,AD,9F,A
0
1200 DATA 02,86,0A,AD,9F,A0,02,3
5
1210 DATA 02,39,A6,80,27,06,AD,9
F
1220 DATA A0,02,20,F6,39,34,10,6
F
1230 DATA 8D,00,1E,17,FF,EC,17,0
0
1240 DATA 19,26,04,6C,8D,00,12,1
7
1250 DATA FF,CF,30,8D,01,9C,17,F
F
1260 DATA D9,17,00,06,35,10,26,D
D
1270 DATA 39,00,17,00,17,81,59,2
7
1280 DATA 06,81,4E,27,02,20,F3,A
D
1290 DATA 9F,A0,02,81,59,39,AD,9
F
1300 DATA A0,00,27,06,AD,9F,A0,0
0
1310 DATA 27,FA,39,0D,0D,0D,0D,0
D
1320 DATA 0D,20,2A,2A,2A,2A,2A,2
A
1330 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1340 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1350 DATA 2A,2A,2A,2A,2A,2A,20,0
D
1360 DATA 20,2A,20,20,20,20,20,2
0
1370 DATA 42,41,4E,4B,52,42,41,4
B
1380 DATA 20,50,52,4F,47,52,41,4
D
1390 DATA 20,20,20,20,2A,20,0D,2
0
1400 DATA 2A,20,20,20,20,20,20,4
3
1410 DATA 4F,50,59,52,49,47,48,5
4
1420 DATA 20,31,39,38,35,20,20,2
0

```

```

1430 DATA 20,20,20,2A,0D,20,2A,2
0
1440 DATA 20,20,20,20,20,4A,20,2
6
1450 DATA 20,52,20,45,4C,45,43,5
4
1460 DATA 52,4F,4E,49,43,53,20,2
0
1470 DATA 20,2A,0D,20,2A,20,20,2
0
1480 DATA 20,20,20,50,2E,4F,2E,4
2
1490 DATA 4F,58,20,32,35,37,32,2
0
1500 DATA 20,20,20,20,20,20,20,2
A
1510 DATA 0D,20,2A,20,20,20,20,2
0
1520 DATA 20,43,4F,4C,55,4D,42,4
9
1530 DATA 41,2C,20,4D,44,2E,20,3
2
1540 DATA 31,30,34,35,20,2A,0D,2
0
1550 DATA 2A,20,20,20,20,20,20,4
1
1560 DATA 4C,4C,20,52,49,47,48,5
4
1570 DATA 53,20,52,45,53,45,52,5
6
1580 DATA 45,44,20,2A,0D,20,2A,2
A
1590 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1600 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1610 DATA 2A,2A,2A,2A,2A,2A,2A,2
A
1620 DATA 2A,2A,0D,0D,0D,0D,00,2
0
1630 DATA 49,4E,53,45,52,54,20,5
3
1640 DATA 4F,55,52,43,45,20,44,4
9
1650 DATA 53,4B,20,0D,00,20,49,4
E
1660 DATA 53,45,52,54,20,44,45,5
3
1670 DATA 54,49,4E,41,54,49,4F,4
E
1680 DATA 20,44,49,53,4B,0D,00,2
0
1690 DATA 50,52,45,53,53,20,41,2
0
1700 DATA 4B,45,59,20,0D,00,0D,2

```

```

1710 DATA 41,4E,4F,54,48,45,52,2
1720 DATA 43,4F,50,59,20,3C,59,2
1730 DATA 4E,3E,20,3F,20,00,0D,2
1740 DATA 43,4F,50,59,20,46,52,4
1750 DATA 4D,20,4D,45,4D,4F,52,5
1760 DATA 20,3C,59,2F,4E,3E,20,3
1770 DATA 20,00,0D,20,41,52,45,2
1780 DATA 59,4F,55,20,53,55,52,4
1790 DATA 20,3C,59,2F,4E,3E,20,3
1800 DATA 20,00,20,52,45,41,44,4
1810 DATA 4E,47,20,54,52,41,43,4
1820 DATA 2F,53,45,43,54,4F,52,2
1830 DATA 26,48,00,20,57,52,49,5
1840 DATA 49,4E,47,20,54,52,41,4
1850 DATA 4B,2F,53,45,43,54,4F,5
1860 DATA 20,26,48,00,0D,2A,2A,2
1870 DATA 44,69,73,6B,20,69,73,2
1880 DATA 57,72,69,74,65,20,50,7
1890 DATA 6F,74,65,63,74,65,64,2
1900 DATA 20,2A,2A,0D,00,05,00,F
1910 END 'BANKRBAK,BAS

```

Matrix Maneuvers

(Article on page 40)

```

10 CLS8:PRINT@136,"matrix maneuvers";:SOUND150,6:FORT=1TO25:NEXT
:SOUND150,3:FORT=1TO25:NEXT:SOUN

```

```

D150,3:HS=4453:SOUND194,12:PRINT
@224,"DESIGNED BY :";:PRINT@298,
"DAVE BENSON";:PRINT@330,"P.O. B
OX 142";:PRINT@357,"GRANTSVILLE,
MD. 21536";
11 PRINT@425,"(301) 895-5893";:F
ORT=1TO2000:NEXT
12 GOTO 2000
90 CLS7:PRINT@256,"";
91 INPUT"ENTER SKILL LEVEL ";SK
99 BB$=STRING$(32,175)
100 S=0:CLS3:FORT=1TO22
101 PRINT@T+38,CHR$(T+64);
102 NEXT
103 FORT=1TO14:IF T<10 THEN Y$="
0"+CHR$(48+T) ELSE Y$="1"+CHR$(3
8+T)
104 PRINT@T*(32)+35," ";Y$;" ";S
TRING$(22,43);" ";
105 NEXT
110 FORT=1TO SK+1
111 X=RND(22):Y=RND(14)
112 ADDR=(X+6)+((Y*32)+32)+1024
113 GOSUB1000
114 NEXT
120 S=S+1
121 PRINT@0,"letter (a-v)";:X$=I
NKEY$
122 IF X$="" THEN 121 ELSE IF AS
C(X$)<65 OR ASC(X$)>86 THEN 910
123 SOUND170,5:X=ASC(X$)-64:PRIN
T@0,BB$;
124 PRINT@0,"NUMBER (01-14)";:Y$
=INKEY$
125 IF Y$="" THEN 124 ELSE IF AS
C(Y$)=48 OR ASC(Y$)=49 THEN Y=VA
L(Y$)*10:SOUND150,1 ELSE 900
126 Y$=INKEY$:IF Y$="" THEN 126
ELSE IF ASC(Y$)=48 AND Y<10 THE
N 900 ELSE IF ASC(Y$)<48 OR ASC(
Y$)>57 THEN 900
127 IF Y>14 THEN 900 ELSE SOUND1
70,5:Y=VAL(Y$)+Y:PRINT@0,BB$;:AD
DR=(X+6)+((Y*32)+32)+1024
128 GOSUB1000
129 GOSUB2000
130 GOTO120
200 CLS3:PRINT@256,"";:INPUT"DO
YOU WANT INSTRUCTIONS (Y
OR N)";Q$
201 IF Q$="N" THEN 90
250 CLS0:PRINT@2,"MATRIX MANEUVE
RS OPERATES ON A22 (ACROSS) BY
14 (DOWN) GRID.";

```

```

251 PRINT@66,"THE OBJECT OF THIS
GAME IS TO CLEAR THE BOARD OF E
VERY GREEN +, WITH A BLACK BACK
GROUND.";
252 PRINT@162,"YOUR SCORE GETS H
IGHER EVERY TIME YOU INCREASE T
HE SKILL LEVEL. ALSO, THE LO
WER THE NUMBER OF TRIES THE
HIGHER YOUR SCORE.";
253 PRINT@322,"YOU WILL BE SHOWN
A HIGH SCORE AT THE END OF THE G
AME, ALONG WITH YOUR OWN SCORE
.";
254 GOSUB 800
260 CLS0:PRINT@2,"TO INPUT COORD
INATES FIRST YOU ENTER A LETTER (
POSITION LEFT TORIGHT). THEN YOU
ENTER A NUMBER (POSITION TOP TO
BOTTOM), THERE MUST BE A ZERO (
0) IN FRONT OF ANY SINGLE-DIGIT
NUMBER (1 THROUGH 9).";
261 GOSUB800
270 CLS0:PRINT@2,"THE COORDINATE
YOU ENTER WILL BE THE CENTER OF
A 3 BY 3 GRID WHERE REVERSING
OF COLORS TAKES PLACE, EITHER FR
OM BLACK TO GREEN OR FROM GR
EEN TO BLACK.";
271 GOSUB 800
280 CLS0:PRINT@2,"IF YOUR SQUARE
RUNS OFF THE SIDE OF THE GR
ID IT WILL COME BACK ON THE OP
POSITE SIDE.";
282 PRINT@226,"IF YOUR SQUARE IS
PLACED IN A CORNER THE SQUARE
WILL COME BACK AT THE THREE (3)
OTHER CORNERS.";
283 GOSUB 800
299 GOTO90
799 END
800 PRINT@483,"press <enter> to
continue";
810 IF INKEY$=CHR$(13) THEN RETU
RN ELSE 810
900 SOUND225,5:FORT=1TO25:NEXT:S
OUND200,5
901 PRINT@0,"please start again
...";
902 FORT=1TO1000:NEXT:PRINT@0,BB
$;
903 GOTO121
910 SOUND200,5:FORT=1TO25:NEXT:S
OUND175,5
911 PRINT@0,"PLEASE START AGAIN

```

```

...";
912 FORT=1TO1000:NEXT:PRINT@0,BB
$;
913 GOTO121
1000 RESTORE:FOR L=1TO9:I=0:READ
D
1001 V=ADDR+D
1002 P=PEEK(V)
1003 I=ABS(P-150)
1004 CA=0:CB=0:CX=0:CY=0:IF I=10
7 OR I=43 THEN ELSE ON L GOTO 10
10,1015,1020,1025,1030,1035,1040
,1045,1050
1005 POKE V,I
1006 NEXT
1007 RETURN
1010 CA=PEEK(ADDR-1):CB=PEEK(ADD
R-32)
1011 IF CA<>43 THEN IF CA<>107 T
HEN CX=1
1012 IF CB<>43 THEN IF CB<>107 T
HEN CY=1
1013 IF CX=1 THEN V=V+22
1014 IF CY=1 THEN V=V+448:GOTO10
02 ELSE GOTO 1002
1015 V=V+448
1016 GOTO1002
1020 CA=PEEK(ADDR+1):CB=PEEK(ADD
R-32)
1021 IF CA<>43 THEN IF CA<>107 T
HEN CX=1
1022 IF CB<>43 THEN IF CB<>107 T
HEN CY=1
1023 IF CX=1 THEN V=V-22
1024 IF CY=1 THEN V=V+448:GOTO10
02 ELSE 1002
1025 V=V+22
1026 GOTO 1002
1030 NEXT
1031 RETURN
1035 V=V-22
1036 GOTO 1002
1040 CA=PEEK(ADDR-1):CB=PEEK(ADD
R+32)
1041 IF CA<>43 THEN IF CA<>107 T
HEN CX=1
1042 IF CB<>43 THEN IF CB<>107 T
HEN CY=1
1043 IF CX=1 THEN V=V+22
1044 IF CY=1 THEN V=V-448:GOTO10
02 ELSE 1002
1045 V=V-448
1046 GOTO 1002
1050 CA=PEEK(ADDR+1):CB=PEEK(ADD
R+32)

```

Listing continued


```

1051 IF CA<>43 THEN IF CA<>107 T
HEN CX=1
1052 IF CB<>43 THEN IF CB<>107 T
HEN CY=1
1053 IF CX=1 THEN V=V-22
1054 IF CY=1 THEN V=V-448:GOTO10
02 ELSE10002
2000 FORX=1095TO1511STEP32
2001 FORY=0TO21
2002 IF PEEK(X+Y)<>107 THEN RETU
RN
2003 NEXT:NEXT:TS=(SK*100)-S+SK:
IF TS>HS THEN HS=TS
2004 CLS4:PRINT0,"HIGH SCORE ="
;HS;:PRINT@224,"YOUR SCORE IS";T
S;:PRINT@320,"";:INPUT"ANOTHER G
AME";QS
2005 IF QS="Y" THEN 200
2006 END
5000 DATA -33,-32,-31,-1,0,1,31,
32,33

```

Disk Data Recovery

(Article on page 55)

```

100 REM DISKFIX BY DAVID MEREDITH
1984. COPY GRANULES OR FILES T
O NEW DISK, REWRITE BAD SECTORS
ON OLD DISK, OR EDIT SECTORS ON
OLD DISK
200 CLEAR 1000, &H4000: REM MEMORY
ABOVE $4000 IS DISK BUFFER
300 EX=256*PEEK(&HC004)+PEEK(&HC0
05):PO=256*PEEK(&HC006)+PEEK(&HC0
07):BY=10*32+5:CO=BY+64:TP=&H40
0:POKEPO+1,0:TR=PO+2:SE=PO+3:BF=
PO+4:ER=PO+6:TGS="*"+CHR$(13)+C
HR$(8)+CHR$(9)+CHR$(94)+CHR$(10)
:CU=159
400 REM EX=EXECUTION ADDRESS FOR
DISK I/O. PO=LOCATION TO CONTRO
L READ=2 OR WRITE=3. BY,CO=SCRE
EN LOCATIONS USED IN EDIT ROUTIN
E. TP=TOP OF SCREEN. POKE SELEC
TS DRIVE 0
500 REM POKE POKE TRACK # INTO TR, SEC
TOR # INTO SE, BUFFER ADDRESS (2
BYTES) INTO BF. ER RECEIVES DI
SK I/O ERROR CODES. TGS IS USED

```

```

IN EDIT ROUTINE.
600 DIM FB(30): REM HOLDS ADDRESS
ES OF DIRECTORY ENTRIES WHEN DIR
ECTORY READ INTO DISK BUFFER
700 CLS:PRINT@44,"DISK FIX
BY DAVID MEREDITH
1984":PRINT:P
RINT:INPUT"PRINTED RECORD (Y/N)"
;PR$:IFPR$="Y"THENPR=-2ELSEIFPR$
="N"THENPR=0ELSE70
800 CLS:INPUT"COPY(C) EDIT(E) C
HECK(K) ";C$:PRINT:ONINSTR("CEK
",C$)+1GOTO800,80,90,550,90
900 INPUT"FILE(F) GRANULE(G) DI
R(D) ";C1$:ONINSTR("FGD",C1$)+1
GOTO90,90,240,100,200
1000 INPUT"FIRST, LAST GRANULES";
G1,G2:IFG1<0ORG1>G2 ORG2>67THEN1
000
1100 IFPR=0THEN1400ELSEIFC$="C"THE
NJ$="COPYING"ELSEJ$="CHECKING"
1200 G1$=STR$(G1):G2$=STR$(G2)
1300 PRINT#-2," ":PRINT#-2,J$;"
GRANULES ";G1$;" TO ";G2$
1400 REM CHECK OR COPY GRANULES G
1 TO G2
1500 GS=G1
1600 IFGS>G2 THEN800ELSEGE=GS+6:IF
GE>G2 THENGE=G2
1700 BU=&H4000:FORG=GS TOGE:N=9:G
OSUB450:NEXT: REM READ IN UP TO
7 GRANULES IN RANGE G1 TO G2
1800 IFC$="C"THENINPUT"INSERT DES
TINATION DISK AND PRESS ENTER";X
X$:FORG=GS TOGE:N=9:GOSUB500:NEX
T:INPUT"INSERT SOURCE DISK AND P
RESS ENTER";XX$:REM IF COPYING
1900 GS=GE+1:GOTO160
2000 REM CHECK OR COPY DIRECTORY
2100 IFPR=0THEN2300ELSEIFC$="C"THE
NE$="COPYING"ELSEE$="CHECKING"
2200 PRINT#-2," ":PRINT#-2,E$;" D
IRECTORY"
2300 G=-1:BU=&H4000:GOSUB450:IFC$
="K"THEN800ELSEINPUT"INSERT DESTI
NATION DISK AND PRESS ENTER";XX$
:G=-1:BU=&H4000:GOSUB500:INPUT"I
NSERT SOURCE DISK AND PRESS ENTE
R";XX$:GOTO800
2400 REM COPY OR CHECK A FILE
2500 BU=&H4000:G=-1:GOSUB450:REM
READ DIRECTORY. FAT GOES $4100-
$41FF.
2600 REM PRINT DIRECTORY TO SCREE
N, NUMBERING EACH ENTRY CONSECUT

```

```

IVELY WITH FP
270 CLS:J=16:FP=0:PRINT@0," 0. B
ACK TO MENU":FORBU=&H4200 TO&H42
00+71*32 STEP32:P=PEEK(BU):IFP>3
2ANDP<128THENFP=FP+1:PRINT@J,USI
NG"##.";FP:FB(FP)=BU:FORK=0TO10:
POKETP+J+3+K,PEEK(BU+K):NEXT:J=J
+16:NEXTELSENEXT
280 INPUT"FILE #";F:IFF=0THEN800E
LSEIFF<0ORF>FP THEN280ELSEF=FB(F
):REM GET INDEX OF DIR ENTRY FOR
FILE AND CHECK IF IN RANGE THEN
TRANSLATE TO ASSOCIATED BUFFER
ADDRESS
290 NG=1:G=PEEK(F+13):REM NG WIL
L BE NUMBER OF GRANULES IN FILE
300 G=PEEK(&H4100+G):IF(G AND128
)=0THENNG=NG+1:GOTO300
310 IFPR=0THEN350ELSEIFC$="C"THE
NE$="COPYING"ELSEE$="CHECKING"
320 PRINT#-2," ":PRINT#-2,E$;" F
ILE ";FORW=0TO10:CH=PEEK(F+W):I
FCH<32THENCH=CH+64
330 PRINT#-2,CHR$(CH);:IFW=6THEN
PRINT#-2,"/";
340 NEXT:PRINT#-2," "
350 ST=1:G=PEEK(F+13):REM G=FIRS
T GRANULE OF FILE
360 IFST>NG THENGOTO270ELSEEN=ST
+4:IFEN>NG THENEN=NG:REM READ UP
TO 5 GRANS FROM FILE
370 BU=&H5200:G1=G:FORN=ST TOEN
:G2=PEEK(&H4100+G):REM G2=FAT IN
FO FOR GRANULE G. G1 SAVES FIRS
T GRANULE FOR COPYING. SAVE OLD
BUFFER $4000-$51FF WITH DIRECTO
RY INFO
380 IFG2 AND128THENNG=G2 AND15ELS
EN=9:REM N=NUMBEROF SECTORS FILE
USES IN GRANULE G
390 GOSUB450:G=G2:NEXT: REM READ
GRANULE G AND GET NEXT GRANULE
IN FILE
400 IFC$="K"THEN440ELSEINPUT"INS
ERT DESTINATION DISK AND PRESS E
NTER";XX$:REM IF COPYING
410 BU=&H5200:G=G1:FORN=ST TOEN
:G2=PEEK(&H4100+G):REM G2=FAT IN
FO FOR GRANULE G.
420 IFG2 AND128THENNG=G2 AND15ELS
EN=9:REM N=NUMBEROF SECTORS FILE
USES IN GRANULE G
430 GOSUB500:G=G2:NEXT:INPUT"INS
ERT SOURCE DISK AND PRESS ENTER"

```

```

;XX$:REM WRITE GRANULE G AND GET
NUMBER OF NEXT GRANULE IN FILE
440 ST=EN+1:GOTO360
450 REM READ N SECTORS FROM GRAN
ULE G INTO BUFFER BU AND ADVANCE
POINTER BU. G=-1 FOR DIRECTORY
.
460 IFG=-1THENG=34:N=9:GOSUB470:
G=35:N=2ELSEIFG>33THENG=G+2:REM
ADJUST G TO REFLECT DISK LOCATIO
N,IF G=-1 THEN WE DO DIRECTORY
470 T=INT(G/2):IFG AND1THENS=10E
LSES=1
480 FORS=S TOS+N-1:GOSUB700:IFC$
="K"ANDPEEK(ER)THENGOSUB720: REM
READ N SECTORS OF GRANULE G. I
F CHECKING AND BAD SECTOR FOUND,
THEN REWRITE IT.
490 BU=BU+256:NEXT:RETURN
500 REM WRITE N SECTORS FROM GRA
NULE G FROM BUFFER BU AND ADVANC
E POINTER BU. G=-1 FOR DIRECTOR
Y.
510 IFG=-1THENG=34:N=9:GOSUB520:
G=35:N=2ELSEIFG>33THENG=G+2:REM
ADJUST G TO REFLECT DISK LOCATIO
N,IF G=-1 THEN WE DO DIRECTORY
520 T=INT(G/2):IFG AND1THENS=10E
LSES=1
530 FORS=S TOS+N-1:GOSUB720: REM
WRITE N SECTORS OF GRANULE G.
540 BU=BU+256:NEXT:RETURN
550 REM EDIT A SECTION
560 CLS:PRINT"SELECT TRACK AND S
ECTOR, OR PUSH<ENTER> TWICE TO R
ETURN TO MAIN MENU.
TO EDIT SECTOR, US
E ARROW KEYS TO MOVE CURSOR TO
CHARACTER TO CHANGE, THEN PRESS
SPACE BAR ANDENTER NEW CHARACTE
R CODE.":PRINT
570 PRINT"PU SH<ENTER> TO QUIT E
DITING ANDREWRITE SECTOR TO DISK
."
580 PRINT:INPUT"TRACK, SECTOR";T
,S:IFT=0ANDS=0THEN800ELSEIFT<0ORT
>34ORS<1ORS>18THEN560ELSECLS:BU=
TP
590 IFPR THENPRINT#-2," ":PRINT#
-2,"EDITING TRACK";T;"", SECTOR";
S
600 CLS:GOSUB700
610 PRINT@BY-35,"use hex codes":
PRINT@BY-5,"BYTE":PRINT@CO-5,"CO

```

```

DE":B=0
620 SA=PEEK(B+TP):PRINT@BY,HEX$(
B):PRINT@CO,HEX$(SA):POKEB+TP,CU

630 I$=INKEY$:ONINSTR(TG$,I$)+1G
OTO630,630,640,650,660,670,680,6
90
640 PRINT@CO+8,,:INPUT"CORRECTIO
N";CO$:C=VAL("&H"+CO$):IFC<0ORC>
255THENPRINT@CO+8,"":GOTO630ELSE
SA=C:PRINT@CO,HEX$(C):GOTO630:RE
M I$=SPACE, EDIT BYTE B IN SECTO
R DISPLAYED
650 POKETP+B,SA:GOSUB720:GOTO550
:REM I$=<ENTER>, REWRITE SECTOR
AND STOP EDITING
660 IFB AND 31THENPOKEB+TP,SA:B=
B-1:GOTO620ELSE630:REM LEFT ARRO
W
670 IF(B+1)AND31THENPOKEB+TP,SA:
B=B+1:GOTO620ELSE630:REM RIGHT A
RROW
680 IFB>31THENPOKEB+TP,SA:B=B-32
:GOTO620ELSE630:REM UP ARROW
690 IFB<224THENPOKEB+TP,SA:B=B+3
2:GOTO620ELSE630:REM DOWN ARROW
700 REM READ TRACK T, SECTOR S I
NTO BUFFER BU. IF READ ERROR, R
EPORT IT.TO PRINTER
710 POKE TR,T:POKESE,S:POKEPO,2:
POKEBF,INT(BU/256):POKEBF+1,BU A
ND255:EXCEX:IFPEEK(ER)THENSE$="R
EAD":GOSUB740:RETURNELSERETURN
720 REM WRITE TRACK T, SECTOR S
FROM BUFFER BU. IF WRITE ERROR,
REPORT TO PRINTER
730 POKE TR,T:POKESE,S:POKEPO,3:
POKEBF,INT(BU/256):POKEBF+1,BU A
ND255:EXCEX:IFPEEK(ER)THENSE$="W
RITE":GOSUB740:RETURNELSERETURN
740 REM REPORT READ/WRITE ERRORS
TO PRINTER (PR=-2) OR SCREEN (P
R=0)
750 IFC$="E"ANDPR=0THENFORI=0TO2
55:POKE&H4000+I,PEEK(&H4000+I):NE
XT:REM IF EDITING, SAVE DATA FRO
M DISK BEFORE MESSING UP VIDEO S
CREEN WITH ERROR MESSAGE
760 IFPR=0THENCLS
770 RESTORE:P=PEEK(ER):PRINT#PR,
"BAD ";E$;" ON TRACK";T;" , SECTO
R";S:X=2:FORJJ=2TO7:X=X+X:READA$
:IFP ANDX THENPRINT#PR,A$:NEXTEL
SENEXT

```

```

780 IF PR=0 THEN PRINT:INPUT"PRE
SS ENTER TO CONTINUE";A$:CLS
790 IFC$="E"ANDPR=0THENFORI=0TO2
55:POKE&H4000+I,PEEK(&H4000+I):NE
XT:REM RESTORE DISK DATA TO SCRE
EN
800 RETURN
810 DATA . LOST DATA,. CRC
ERROR,. SEEK ERROR,. WRITE F
AULT,. WRITE PROTECT,. DRIVE
NOT READY

```

John-B System, Part Three

(Article on page 60)

```

1 'THIS PROGRAM NOT TO BE SOLD.
2 'FOR USE BY THE HANDICAPPED.
3 'PROGRAM FURNISHED NO CHARGE
  WITH UNRESTRICTED ACCESS TO
  USE OR COPY.
4 'BY J. F. SOBIESKI
5 '2277 MENOHER BLVD.,
6 'JOHNSTOWN, PA 15905
7 'MODIFICATIONS BY
8 'J.J. BARBARELLO
9 'REQUIRES 16K, EXTENDED BASIC
10 CLS0:PMODE 0:PCLEAR 1:CLEAR 5
  00,16000:DIM A(22):DIM Z(21)
20 MA=16000:DEFUSR=MA+1:GOSUB 20
  00
30 CLS(8):PRINT"      ---THE JOHN
  B. SYSTEM---      #####
                        PUFF ONCE FOR CO
NTROL MODE OR PUFF TWICE FOR
THE TELEPHONE MODE.      ":FOR DLY
=1 TO 500:NEXT
40 S=PEEK(PK) AND 1
50 IF S<>0 THEN 40
60 CLS RND(8):I=0
70 FOR DLY=1 TO 50:NEXT DLY
80 S=PEEK(PK) AND 1
90 I=I+1
100 IF S=0 THEN 500
110 IF I<100 THEN 80
120 REM **** CONTROL MODE ****
130 CLS4:T=1:PRINT"CHOOSE HOUSE
CODE OR TYPEWRITER":FOR G=1 TO 1
000:NEXT

```

```

140 ON T GOTO 150,160,170,180,19
0
150 CLS8:PRINT@68,"A":GOTO200
160 CLS4:PRINT@144,"B":GOTO 200
170 CLS0:PRINT@220,"C":GOTO 200
180 CLS3:PRINT @334,"TYPEWRITER"
:GOTO 200
190 CLS5:PRINT@420,"CANCEL CONTR
OL MODE"
200 FOR I=1 TO 100:S=PEEK(PK) AN
D 1
210 IF S=0 THEN 230 ELSE NEXT
220 T=T+1:IF T>5 THEN 130 ELSE 1
40
230 IF T=4 THEN 150 ELSE IF T=5
  THEN 30
240 FOR DLY=1 TO 500:NEXT
250 POKE MA+114,A(T)
260 D=1:CLS:PRINT"CHOOSE DEVICE
NUMBER"
270 PRINT @175,D
280 FOR I=1 TO 100:S=PEEK(PK) AN
D 1
290 IF S=0 THEN 310 ELSE NEXT
300 D=D+1:IF D>16 THEN 260 ELSE
270
310 FOR DLY=1 TO 500:NEXT
320 CLS(2):E=1
330 ON E GOTO 340,350,360
340 PRINT@68,"TURN ON":GOTO370
350 CLS:PRINT @144,"TURN OFF":GO
TO 370
360 CLS:PRINT @226,"TURN ALL OFF
":GOTO 370
370 FOR I=1 TO 100:S=PEEK(PK) AN
D 1
380 IF S=0 THEN 400 ELSE NEXT
390 E=E+1:IF E>3 GOTO 320 ELSE
GOTO 330
400 E=E+16:C=3
410 POKE MA+115,A(D):POKE MA+113
,C:X=USR(0)
420 FOR H=1 TO 10:NEXT H 'SHORT
  DELAY REQUIRED.
430 POKE MA+115,A(E):POKE MA+113
,C:X=USR(0)
440 GOTO 30
490 REM***** TELEPHONE *****
500 CLS 3:FOR DLY=1 TO 50:NEXT
510 PRINT"START-WHEN READY TO DI
  AL"
520 S=PEEK(PK) AND 1:IF S<>0 THE
  N 520
530 CLS0:RESTORE:K=1
540 PRINT"CHOOSE PHONE NUMBER":F

```

```

OR I=1 TO 8:PRINT:NEXT I
550 FOR I=1 TO 500:NEXT I
560 PRINT@96,K"- ";:READ A$
570 IF A$="X" THEN 830 ELSE READ
  N$:PRINTA$,N$
580 FOR G=1 TO 100
590 S=PEEK(PK) AND 1
600 IF S=0 THEN 630
610 NEXT G
620 K=K+1:GOTO 560
630 PRINT@97,"DIALING "A$" NOW..
  .":PRINT:PRINT
640 POKE 65313,4:J=LEN(N$)
650 FOR G=1 TO 1000:NEXT G
660 FOR I=1 TO J
670 Z(I)=ASC(MID$(N$,I,1))-48
680 IF Z(I)=0 THEN Z(I)=10
690 NEXT I
700 FOR I=1 TO J:IF Z(I)=10 THEN
  PRINT 0; ELSE PRINT Z(I);
710 FOR V=1 TO Z(I)
720 POKE 65313,52
730 FOR G=1 TO 18:NEXT G
740 POKE 65313,4
750 FOR G=1 TO 18:NEXT G
760 NEXT V
770 FOR G=1 TO 500:NEXT G
780 NEXT I
790 CLS2:PRINT"LIFT THE RECEIVER
  -SAY HELLO"
800 FOR G=1 TO 2000:NEXT G
810 POKE 65313,52
820 RESTORE:GOTO 30
830 PRINT@97,"end of list...PLEA
  SE TRY AGAIN":FOR G=1 TO 2000:NE
  XT G:GOTO 820
840 REM*PHONE NUMBERS (END LIST
  WITH "X")
850 DATA OPERATOR,0
860 DATA JIM B., 12015365499
870 DATA JOE,2556469
880 DATA TOM,2552913
890 DATA TEST RING,9544
900 DATA EDDIE,17544067
910 DATA SHOP,4794023
920 DATA JOHN,2456872
930 DATA MATT.B,3234022
940 DATA BECKY,2881926
950 DATA INEZ,2064832
960 DATA EMORY,2786543
970 DATA SKIP,2554026
980 DATA BLACKIE,2058933
990 DATA IDA,5356654
1000 DATA KENA,2556743
1010 DATA GLEN K.,3221124

```

Listing continued


```

1020 DATA PENITO,17544923
1030 DATA DON W.,2546467
1040 DATA X
1500 REM** PC PRIMER APPLICATION
2
1510 REM** TYPWRITER FOR THE
1520 REM** HANDICAPPED.
1530 REM** NAME: TYPE
1540 REM** REV 1.0 1 MARCH 1983
1550 REM** J.J. BARBARELLO
1560 REM**
1570 REM** REQUIRES COCO I/O
1580 REM**
1590 CLS1: CNT=415: SPD=100
1600 FOR I=0 TO 5: FOR J=1 TO 11
1610 POKE I*64+J*2+1063, I*11+J:
NEXT J, I: POKE 1401, 0: POKE
1403, 96: POKE 1405, 96
1620 FOR I=1408 TO 1439: POKE I, 1
40: NEXT
1630 FOR I=1440 TO 1536: POKE I, 1
28: NEXT: PRINT @CNT+1, CHR$(197);
1640 PRINT@33, "ENTER";: PRINT@97,
"RUBOUT";: PRINT@161, "FASTER";: PR
INT@225, "SLOWER";: PRINT@289, "END
THE";: PRINT@353, "SESSION";: PRINT
@194, ;: PRINT USING "####" ; (50-
SPD)/5;
1650 FOR I=1 TO 29 STEP 2: IF I=3
THEN I=9
1660 PRINT@I, CHR$(207);
1670 SOUND 10, 1
1680 FOR J=1 TO SPD: S=PEEK(PK) A
ND 1: IF S=0 THEN 1710 ELSE NEXT
1690 PRINT@I, CHR$(32);: NEXT I
1700 GOTO 1650
1710 POKE I+1024, 255: FOR K=1 TO
200: NEXT: FOR J=I+1056 TO I+1408
+(I=1)*64 STEP 64: POKE J, PEEK(J)
+64
1720 SOUND 50, 1
1730 FOR K=1 TO SPD: S=PEEK(PK) A
ND 1: IF S=0 THEN 1750 ELSE NEXT
1740 POKE J, PEEK(J)-64: NEXT: POKE
I+1024, 96: GOTO 1650
1750 IF I=1 THEN 1810
1760 CNT= CNT+1: SOUND 200, 1
1770 POKE CNT+1024, PEEK(J): POKE
CNT+1025, 197
1780 FOR X=1 TO SPD*5: NEXT
1790 PRINT@I, CHR$(32);
1800 POKE J, PEEK(J)-64: GOTO 1650

```

```

1810 SOUND 200, 1: ON ((J-1057)/64
)+1 GOTO 1820, 1830, 1840, 1860, 188

```

```

0
1820 GOSUB 1890: IF SS=0 THEN 192
0 ELSE 1780
1830 IF CNT>415 THEN CNT= CNT-1: P
RINT@CNT+1, CHR$(197); CHR$(128);:
GOTO 1780 ELSE 1780
1840 IF SPD>0 THEN SPD= SPD-5
1850 GOTO 1870
1860 SPD= SPD+5
1870 PRINT@194, ;: PRINT USING "####
* " ; (50-SPD)/5;: GOTO 1780
1880 GOSUB 1890: IF C$="V" THEN C
LS0: PRINT@137, " " ;: PRINT@448, ;: G
OTO 30 ELSE 1780
1890 C$="": FOR S=1 TO 200: NEXT: F
OR S=1 TO 10: IF S/2<>INT(S/2) THE
N PRINT@J-985, "### ARE YOU SURE
? ###" ELSE PRINT@J-985, " "
1900 FOR T=1 TO SPD: SS=PEEK(PK)
AND 1: IF SS=0 THEN 1910 ELSE NEX
T T, S: RETURN
1910 C$="V": PRINT@J-985, " ": RETU
RN
1920 C$="": FOR I=1440 TO CNT+102
4: J=PEEK(I): IF J>97 THEN J=J-64
1930 C$=C$+CHR$(J): NEXT: PRINT#-2
, C$: C$="": CNT=415: GOTO 1630
1990 REM** STARTUP SUBROUTINE**
2000 PRINT@234, "INITIALIZING";
2010 H1$="60E020A0109050D070F030
B0008040C0283808185848"
2020 FOR I=1 TO 22: A(I)=VAL("&H"
+MID$(H1$, (I*2)-1, 2)): S=S+A(I): N
EXT: IF S<>2208 THEN PRINT "CHECKS
UM ERROR # 1": END ELSE S=0
2030 H2$="308D006CE68434048D2F8D
2D8D2B8D21A601C6048D0CC605A6028D
0635045A26E5394824028D128D082502
8D0C5A26F23934063401C60020063406
3401C6FDB6FF204424FA86344A26FD86
03F7FF20340286B24A26FDB7FF203502
4A26053501350639340286F88A004A26
FB350220DC"
2040 FOR I=1 TO 112: S=VAL("&H"+M
ID$(H2$, (I*2)-1, 2)): CK=CK+S: POKE
I+MA, S: NEXT: IF CK<>9736 THEN PR
INT "CHECKSUM ERROR # 2": END
2050 PK=65280: RETURN

```

Radio-Systems Calculations

(Article on page 70)

```

10 CLEAR
20 REM/UPDATED DEC 83 ON THE REC
EIVE SIGNAL CALCULATIONS(0DB)
30 CLS3
40 SCREEN 0, 1: POKE 359, 57
50 PRINT STRING$(35, 170);
60 PRINT@35, "RADIO SYSTEM CALCUL
ATIONS";
70 PRINT STRING$(36, 170);
80 PRINT: PRINT" PROGRAM BY
VERN EPP"
90 PRINT" 705 6TH ST."
100 PRINT" NELSON, B.C."

```

```

110 PRINT" COPYRIGHT (C
) 1983"
120 FORX=1 TO 1600: NEXT
130 CLS3: PRINT STRING$(35, 170);
140 PRINT@35, "RADIO SYSTEM CALCUL
ATIONS";
150 PRINT STRING$(36, 170);
160 PRINT@129, "(A) WATTS-DBW CON
VERSION ";
170 PRINT@193, "(B) PATH LOSS CA
LCULATION ";
180 PRINT@257, "(C) RECEIVE SIGNA
L CALCULATION";
190 PRINT@321, "(D) ANTENNA GAIN+
BANDWIDTH ";
200 PRINT@390, "PRESS ENTER FOR M
ORE";
210 PRINT@465, "make selection";
220 POKE 1493, 32
230 AS=INKEY$: IF AS="" THEN 230

```

```

240 IF AS="A" THEN 300
250 IF AS="B" THEN 400
260 IF AS="C" THEN 520
270 IF AS="D" THEN 890
280 A=ASC(AS)
290 IF A=13 THEN 1040 ELSE 230
300 CLS3: PRINT: INPUT "POWER IN WA
TTS, ***"; P
310 IF P=0 THEN 300
320 D=10*LOG(P)/LOG(10)
330 PRINT: PRINT "THE POWER IN DBW
IS";: PRINT USING "####.###"; D
340 F=30+D
350 PRINT "THE POWER IN DBM IS";:

```

```

PRINT USING "####.###"; F
360 PRINT@462, "press enter";
370 POKE 1491, 32
380 AS=INKEY$: IF AS="" THEN 380
ELSE CLS
390 GOTO 130
400 CLS3: PRINT "*****PATH LOSS CA
LCULATIONS*****": PRINT;
410 PRINT: PRINT "PATH LOSS CALCUL
ATIONS ARE CALC-ULATED WITH NO O
BSTRUCTIONS."
420 PRINT "SHADOW LOSS AND KNIFE
DEFACTIONARE NOT TAKEN INTO ACC
OUNT."
430 PRINT: INPUT "FREQ. IN MHZ. ***
*****"; K
440 IF K=0 THEN 430
450 INPUT "PATH DISTANCE- MILES."
; R
460 IF R=0 THEN 450
470 A=36.6+20*LOG(K)/LOG(10)+20*
LOG(R)/LOG(10)
480 PRINT "PATH LOSS IS*****
";: PRINT USING "####.###"; A;: PRIN
T " DB."
490 PRINT@462, "press enter";: POK
E 1491, 32
500 AS=INKEY$: IF AS="" THEN 500
ELSE CLS
510 GOTO 130
520 CLS3: PRINT "*****RECEIVE SIGNA
L STRENGTH*****": PRINT;
530 PRINT: PRINT "THIS CALCULATION
ADDS UP ALL OF THE GAINS OF THE
SYSTEM AND SUB-TRACTS IT FROM A
LL THE LOSSES."
540 PRINT "THESE CALCULATIONS ARE
ACCURATE FOR TERRESTRIAL SYSTEMS
."
550 PRINT "EARTH TO SATELLITE CAL
CULATIONS REQUIRE DIFFERENT MATH
EMATICAL FORMULAS AS THE SIGNAL
S TRAVEL IN FREE SPACE AND ATM
OSPHERE."
560 PRINT@462, "PRESS ENTER";
570 AS=INKEY$: IF AS="" THEN 570 E
LSE CLS
580 CLS3: PRINT "*****RECEIVE SIGNA
L STRENGTH*****": PRINT;
590 PRINT "SYSTEM LOSSES"
600 INPUT "PATH LOSS IN DB."
; L
610 IF L=0 THEN 600
620 INPUT "COAXIAL CABLE LOSS

```



```

";C$
630 IF C$="" THEN GOTO 620
640 C=VAL(C$)
650 INPUT "DUPLEXER LOSS
";V$
660 IF V$="" THEN GOTO 650
670 V=VAL(V$)
680 U=L+C+V
690 PRINT "TOTAL SYSTEM LOSS IS
";:PRINT USING "###.##";U;:PRI
NT "DB":PRINT
700 PRINT "SYSTEM GAINS"
710 INPUT "TX POWER IN DBM.IS
";Q$
720 IF Q$="" THEN GOTO 710
730 Q=VAL(Q$)
740 INPUT "TX ANTENNA GAIN IN DB
";D$
750 IF D$="" THEN GOTO 740
760 D=VAL(D$)
770 INPUT "RX ANTENNA GAIN IN DB
";S$
780 IF S$="" THEN GOTO 770
790 S=VAL(S$)
800 Z=Q+D+S
810 PRINT "TOTAL SYSTEM GAIN IS I
S";:PRINT USING "###.##";Z;:PRINT
"DB"
820 W=Z-U
830 PRINT "THE RECEIVE SIGNAL IS"
;:PRINT USING "###.##";W;:PRINT
"DBM";
840 X=W-30
850 PRINT "THE RECEIVE SIGNAL IS
";:PRINT USING "###.##";X;:PRINT
"DBV";
860 PRINT@462,"press enter";:POK
E 1491,32
870 A$=INKEY$:IF A$="" THEN 870
ELSE CLS
880 GOTO 130
890 CLS3:PRINT "*****PARABOLIC D
ISH GAIN*****";:PRINT
900 PRINT:PRINT "THESE CALCULATIO
NS ARE BASED ON EFFICIENCY OF AP
PROX. 55%."
910 PRINT:INPUT "DIAMETER IN FEET
OF DISH ";P
920 IF P=0 THEN 910
930 IF P>30 THEN 910
940 INPUT "FREQ. OF OPERATION IN
MHZ";E
950 IF E=0 THEN 940
960 IF E<400 THEN 940

```

```

970 G=20*LOG(P)/LOG(10)+20*LOG(E
)/LOG(10)-52.5
980 PRINT:PRINT "THE ANTENNA GAIN
IS ";:PRINT USING "###.##";G;:PRI
NT "DB."
990 Y=68700/(P*E)
1000 PRINT:PRINT "THE ANTENNA BEA
MWIDTH (3DB DOWN)IS";:PRINT USIN
G " ###.##";Y;:PRINT " DEGREES"
1010 PRINT@462,"press enter";:PO
KE 1491,32
1020 A$=INKEY$:IFA$="" THEN 1020
ELSE CLS
1030 GOTO 130
1040 CLS3:PRINT STRING$(35,170);
1050 PRINT@35,"RADIO SYSTEM CALC
ULATIONS";
1060 PRINT STRING$(36,170);
1070 PRINT@129,"(F) INDUCTOR CAL
CULATIONS ";
1080 PRINT@193,"(G) CAPACITOR CA
LCULATIONS ";
1090 PRINT@257,"(H) MICROVOLT-DB
V. CALC. ";
1100 PRINT@321,"(I) DBV.-MICROVO
LT CALC. ";
1110 PRINT@390,"PRESS ENTER FOR
MORE";
1120 PRINT@465,"make selection";
1130 POKE 1493,32
1140 A$=INKEY$:IF A$="" THEN 1140
1150 IF A$="F" THEN 1210
1160 IF A$="G" THEN 1310
1170 IF A$="H" THEN 1680
1180 IF A$="I" THEN 1430
1190 A=ASC(A$)
1200 IF A=13 THEN 1820 ELSE 1140
1210 CLS3:PRINT "*****INDUCTOR CA
LCULATIONS*****"
1220 PRINT:INPUT "FREQUENCY IN MH
Z. IS ";F
1230 IF F=0 THEN 1220
1240 INPUT "CAPACITOR USED IN PFD
.";C
1250 IF C=0 THEN 1240
1260 L=25330/(F^2*C)
1270 PRINT "INDUCTOR REQUIRED IS"
;:PRINT USING "###.##";L;:PRINT "UH
"
1280 PRINT@462,"press enter";:PO
KE 1491,32

```

```

1290 A$=INKEY$:IF A$="" THEN 129
0 ELSE CLS
1300 GOTO 130
1310 CLS3:PRINT "*****CAPACITOR CA
LCULATIONS*****"
1320 PRINT:INPUT "INDUCTANCE IN U
H.IS ";L
1330 IF L=0 THEN 1320
1340 INPUT "FREQUENCY IN MHZ.IS "
;F
1350 IF F=0 THEN 1340
1360 C=25330/(F^2*L)
1370 PRINT "CAPACITOR REQUIRED IS
";:PRINT USING "###.##";C;:PRINT "P
FD."
1380 PRINT@462,"press enter";:PO
KE 1491,32
1390 A$=INKEY$:IF A$="" THEN 1390
ELSE CLS5
1400 GOTO 130
1410 A$=INKEY$:IFA$="" THEN 1410
ELSE CLS
1420 GOTO 130
1430 CLEAR: CLS3:PRINT "*****DBV
-MICROVOLT CALC.*****":PRINT;
1440 PRINT:INPUT "DBV WITH POSITI
VE NUMBER IS";DB
1450 IF DB=0 THEN 1440
1460 E=EXP(DB*-11513+15.771)
1470 PRINT "THE CONVERSION IN MIC
ROVOLTS IS ";:PRINT USING "#####
.##";E;:PRINT "UV."
1480 PRINT:PRINT "EXAMPLE:"
1490 PRINT "50 MICROVOLTS EQUALS
-103 DBV. OR
-73 DBM."
1500 PRINT@462,"press enter";:PO
KE 1491,32
1510 A$=INKEY$:IFA$="" THEN 1510
ELSE CLS
1520 GOTO 130
1530 CLS3:PRINT "***COIL DESIGN C
ALCULATIONS*****"
1540 PRINT:INPUT "COIL RADIUS IN
INCHES IS";R
1550 IF R>3 THEN 1540
1560 IF R=0 THEN 1540
1570 INPUT "THE NUMBER OF TURNS I
S ";N
1580 IF N>100 THEN 1570
1590 IF N=0 THEN 1570
1600 INPUT "COIL LENGTH IN INCHES
IS";B
1610 IF B>10 THEN 1600

```

```

1620 IF B=0 THEN 1600
1630 L=R^2*N^2/(9*R+10*B)
1640 PRINT "INDUCTANCE REQUIRED I
S ";:PRINT USING "###.##";L;:PRI
NT "UH"
1650 PRINT@462,"press enter";:PO
KE 1491,32
1660 A$=INKEY$:IFA$="" THEN 1660
ELSE CLS
1670 GOTO 130
1680 CLS3
1690 PRINT "*****MICROVOLT-DBV. CON
VERSION***"
1700 PRINT:INPUT "SIGNAL IN MICRO
VOLTS IS";E
1710 IF E=0 THEN 1700
1720 P=(E/1000000)^2/50
1730 DBV=10*LOG(1/P)/LOG(10)
1740 PRINT "SIGNAL IS ";:PRINT US
ING "###.##";DBV;:PRINT "DBV"
1750 DBM=DBV-30
1760 PRINT "SIGNAL IS ";:PRINT US
ING "###.##";DBM;:PRINT "DBM"
1770 PRINT:PRINT "NOTE:YOU MAY BE
REQUIRED TO PUT A MINUS SIGN BE
FORE THE ANSWER."
1780 PRINT "EXAMPLE:50 MICROVOLTS
IS EQUAL TO -73.DBM OR-103.DBV
"
1790 PRINT@462,"press enter";:PO
KE 1491,32
1800 A$=INKEY$:IFA$="" THEN 1800
ELSE CLS
1810 GOTO 130
1820 CLS3:PRINT STRING$(35,170);
1830 PRINT@35,"RADIO SYSTEM CALC
ULATIONS";
1840 PRINT STRING$(36,170);
1850 PRINT@129,"(K) T-PAD CALCUL
ATIONS ";
1860 PRINT@193,"(L) VSWR CALCULA
TIONS ";
1870 PRINT@257,"(M) COIL DESIGN
CALCULATIONS ";
1880 PRINT@321,"(N) PARALLEL RES
ISTORS ";
1890 PRINT@385,"(X) TO EXIT OR E
NTER TO RETURN";
1900 PRINT@465,"make selection";
1910 POKE 1493,32
1920 A$=INKEY$:IF A$="" THEN 192
0

```

Listing continued

```

1930 IF A$="K" THEN 2000
1940 IF A$="L" THEN 2210
1950 IF A$="M" THEN 1530
1960 IF A$="N" THEN 2370
1970 A=ASC(A$)
1980 IF A=13 THEN 10
1990 IF A$="X" THEN 2530 ELSE 19
20
2000 CLS3:PRINT"*****
*****"
2010 PRINT"          T-PAD CALCULAT
IONS":
2020 PRINT"*****
*****"
2030 INPUT"DESIRED ATTENUATION I
S ";AA
2040 IF AA=0 THEN 2030
2050 INPUT"THE SYSTEM IMPEDANCE
IS";II
2060 IF II=0 THEN 2050
2070 R1=II*((10^(.05*AA)-1)/(10^
(.05*AA)+1))
2080 R2=(R1+II)/(10^(.05*AA)-1)
2090 PRINT"VALUE OF R1 SERIES";:
PRINT USING"####.##";R1;:PRINT" O
HMS"
2100 PRINT"VALUE OF R2 SHUNT ";:
PRINT USING"####.##";R2;:PRINT" O
HMS"
2110 INPUT"ACTUAL VALUE FOR R1 I
S";R1
2120 INPUT"ACTUAL VALUE FOR R2 I
S";R2
2130 Z=(R2*(II+R1))/(R1+R2+II)+R
1
2140 PRINT"WITH TERMINATION ON O
NE SIDE WILL APPEAR AS";:PRIN
T USING"####.##";Z;:PRINT"OHMS"
2150 E=R2/(II+R1+R2)
2160 DB=20*(LOG(1/E)/LOG(10))
2170 PRINT"THE ACTUAL ATTENUATIO
N IS";:PRINT USING"####.##";DB;:PR
INT"DB"
2180 PRINT@462,"press enter";:PO
KE 1491,32
2190 A$=INKEY$:IF A$="" THEN 219
0
2200 GOTO 130
2210 CLS3:PRINT"*****
*****"
2220 PRINT"STANDING WAVE RATIO C

```

```

ALCULATION"
2230 PRINT"*****
*****"
2240 PRINT" THIS PROGRAM CALCUL
ATES THE VOLTAGE SWR WHEN THE
POWERS OF THE REFLECTED AND INC
IDENT WAVES ARE KNOWN.
"
2250 PRINT
2260 INPUT"THE INCIDENT WAVE POW
ER IS";IP
2270 IF IP=0 THEN 2260
2280 INPUT"THE REFLECTED WAVE PO
WER IS";RP
2290 IF RP=0 THEN GOTO 2280
2300 IF RP=0 THEN 2280
2310 AA=1+SQR(RP/IP)
2320 BB=1-SQR(RP/IP)
2330 VSWR=AA /BB
2340 PRINT"THE ACTUAL VSWR IS *
*****";:PRINT USING"###.##";VSWR
2350 PRINT@462,"press enter";:PO
KE 1491,32
2360 A$=INKEY$:IF A$="" THEN 2360
ELSE GOTO 130
2370 CLS3:PRINT"*****
*****"
2380 PRINT"          PARALLEL RESIS
TORS"
2390 PRINT"*****
*****"
2400 XT=0
2410 PRINT
2420 INPUT"NO.OF RESISTORS DESIR
ED ";AA
2430 IF AA=0 THEN 2420
2440 FOR X=1 TO AA
2450 INPUT"ENTER RESISTOR VALUES
";XX
2460 IF XX=0 THEN 2450
2470 XT=1/XX+XT
2480 NEXT X
2490 XT=INT(1/XT*100+.5)/100
2500 PRINT"THE EQUIVALENT PARALL
EL RESISTANCE IS";XT;:PR
INT" OHMS"
2510 PRINT:PRINT@462,"press ente
r";:POKE 1491,32
2520 A$=INKEY$:IF A$="" THEN 252
0 ELSE GOTO 130
2530 SCREEN 0,0:POKE 359,126:CLS

```

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Disk Data Recovery

**Overcome I/O errors
and recover valuable data.**

Have you ever crashed a disk containing valuable data? It can happen for no apparent reason: One day you can read the files, and the next you get an I/O (input/output) error message. Most frustrating of all is the fact that most of the disk's magnetic data is probably correct, so a few unreadable bits in the file are preventing you from reading any of it.

The Radio Shack DOS (disk-operating system) cancels any disk operation if an I/O error occurs. You cannot, for example, examine the results of an input operation if a read error occurs. Even the primitive commands, DSKI and DSKO, are cancelled by I/O errors. DOS protects you from using erroneous data, but there are times when you need to force the computer to read a disk in spite of I/O errors.

Diskfix lets you read any part of a disk, tells if it finds errors, and recopies what it finds without errors. Diskfix also permits you to edit the data on a disk. You can examine individual sectors exactly as recorded, including disk directories. You can change individual characters on the disk to patch a file or discover how the changes affect your files.

Diskfix uses subroutines contained in the Disk Basic ROM for reading and writing on disks. (See p. 60 of Radio Shack's manual, *Color Computer Disk System*.) These routines, which transfer data between the disk and memory, set a flag and continue working if they encounter an error.

If you have a bad disk, Diskfix transfers the data from it to memory and then writes it from memory to a new disk. The new disk might not contain exactly what was written

on the old disk, but it will contain an approximate copy. And the copy will be free of I/O errors.

I don't recommend using Diskfix for recovering object-code files or important accounting data from crashed disks. Individual characters in these files are too important to permit any variation. But word-processing files or Basic programs can be recovered with only a few errors—these are usually obvious in context. It is easier to find and fix the errors than to retype the entire file.

How Disks Are Organized

The CoCo's disks are divided into 35 concentric rings, or tracks. Each track is divided into 18 sectors. A sector can hold 256 bytes (characters) of data and additional information used by the disk system to keep track of itself. When the disk-operating system writes a block of 256 characters to the disk, it also calculates and writes the housekeeping information used when the sector is read to check for I/O errors.

Tracks are numbered 0-34; each track contains sectors numbered 1-18. Track 17 is used for the disk directory, which contains the names of all files and information about

their location on the disk. The rest of the disk is divided into half-tracks or granules (grans) for recording files. Files are recorded in one or more granules, but two files are never recorded in the same granule. The granules occupy 34 tracks, so there are 68 of them, numbered 0-67. (For more information about the organization of information on disks, consult *Color Computer Disk System*, pp. 57-59.)

Using Diskfix

Diskfix will copy granules or files from one disk to another, check granules or files for errors (automatically rewriting any bad sectors encountered), or examine and alter data on individual sectors on the disk. The program is entirely menu driven. To use it, you select an option from those listed on the video display. You must first decide whether to list all operations on your printer as they are performed.

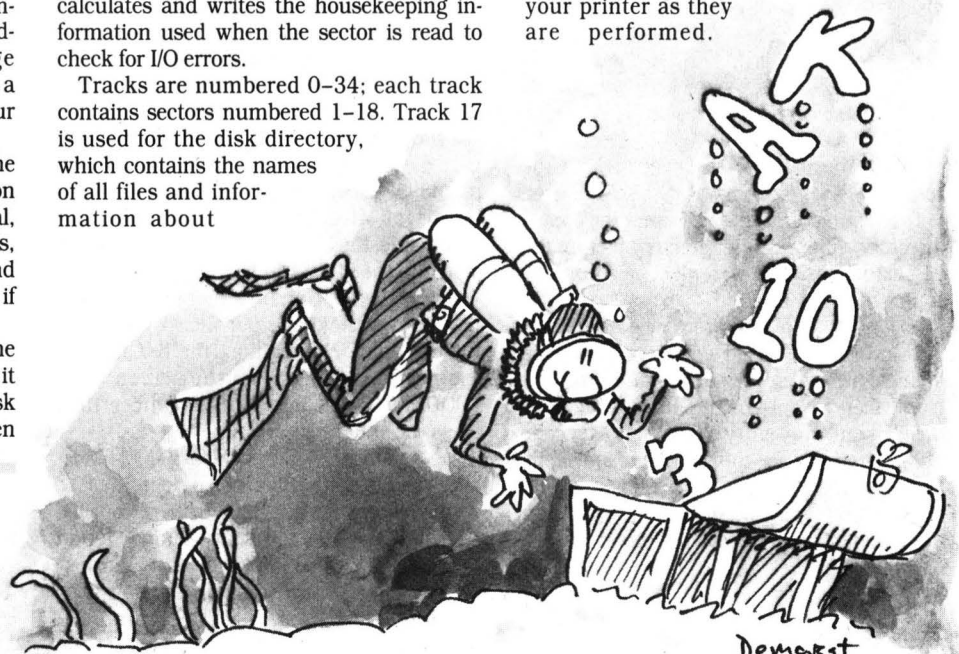


Illustration by Chris Demarest

System Requirements

32K RAM
Disk Extended Color Basic
Disk Drive
Printer Optional

Then you choose which of three functions you wish to perform: check, copy, or edit.

Check and Copy

If you choose the check or copy function, you are asked whether you want to work with a file, granules, or the directory. If you select directory, no further choices are necessary. If you select granules, you must specify the first and last granule you wish to check or copy. If you select file, you see a list of the files on your disk numbered consecutively. Select the number of the file you wish to check or copy.

If you choose to check a file, granules, or the directory, the information you selected is read one sector at a time. If a read error is discovered, the bad sector is rewritten in its original location on the disk. Sometimes this is enough to fix a bad sector. If you are keeping a printed record of your session, you get a report of bad sectors and the nature of the errors found there; otherwise the errors are reported on your video display.

If you are copying information, you are instructed when to insert the destination or source disk in the disk drive. Be careful: Data is copied onto the destination disk in the same location it occupied on the source disk. This could wipe out existing files on the destination disk, so use a blank disk for copying.

Copying, like checking, produces a list of all errors on your printer or video display. Copying a file does not create a directory entry for the file. Only the data in the file is copied from the source to the destination disk. If you want to read the copied file with the disk-operating system, you must create a directory entry for the copied file by copying the directory as well as the file from the source to the destination disk.

Unfortunately, the copied directory will contain information about all files on the source disk, whether or not they were copied to the destination disk. To correct the copied directory, you must kill directory files on the destination disk that weren't copied from the source disk.

As long as there is a directory entry for the file, the KILL command works even if you are killing a file not on your disk. The KILL command merely replaces the first character in the file's directory entry with a character code of zero. You can see this by killing a disk file and using the edit feature of Diskfix to examine the directory. The directory entry is almost intact; only the first character is altered.

Editing

If you choose the Edit option, you must se-

"You can use Diskfix to examine data stored on disk or to fix crashed disks."

lect a track and sector to edit. The codes for the 256 bytes of data stored in the selected sector are then stored in the first 256 bytes of video memory; they appear on the top half of the screen. Use the arrow keys to move the yellow cursor around the disk information. The bottom half of the screen tells you the position of the cursor and the hexadecimal code stored under it.

To change a character in the sector on the screen, position the cursor over the character, press the spacebar, and enter the hex code to replace the existing code. The hex codes for ASCII characters are listed in the CoCo's two Basic manuals and the disk manual. When you finish editing, press the enter key; the sector containing your changes is written to the disk.

Sample Editing Sequence

You can use Diskfix to examine data stored on disks or fix crashed disks. First, let's examine a disk. To edit track 17, sector 3 of any disk, select the edit option (E), and type 17,3 in response to the track/sector prompt. You see the first part of the disk directory. Compare the entries with the format described on pp. 58-59 of the disk-system owners' manual. Each directory entry occupies one screen line; the file names and extensions are stored in the first 11 bytes.

Byte \$0D (13) contains the number of the first granule holding your file. If you move the cursor to that position, the hex form of the number appears on the screen after "CODE:". Make a note of that number, then press the enter key.

Next edit track 17, sector 2: the FAT (file-allocation table). Look at the byte in the FAT corresponding to the granule where your file begins. Make a note of the number found there. If the first digit is not C, the number indicates the second granule holding your file. Make a note of that granule number; then look at the corresponding byte of the

FAT to find the number of the third granule holding your file. Continue in this fashion. Eventually you will find a granule number of the form Cx, where $1 < x < 9$. The digit x is the number of sectors used by the file in the last granule. Press the enter key.

Now edit the first sector of the granule holding your file. You should see the first part of your file as it is written on the disk. Notice that digits appear in reverse video and other characters appear incorrect in your file. Diskfix loads ASCII codes from your file directly into screen memory. Screen-print codes—except for uppercase letters and a few other symbols—aren't the same as ASCII codes. To determine the ASCII code at any position of your file, move the cursor there. The code, in hex form, appears after "CODE:" on the screen.

If you examine a program file, you will probably see the Basic program in tokenized form because this is how programs are stored in memory and on disk. Each line begins with the number of characters in the line and ends with a zero. Keywords like PRINT and GOTO are replaced by single-byte graphics characters. ("Doculist/C"—HOT CoCo, June 1983, p. 63,—lists all keywords and their tokens.) However, if you saved the file in ASCII format using the A option, you see keywords and line numbers written out.

Recovering Data From Crashed Disks

If you have a file that won't load, follow the steps below.

Step 1. Use Diskfix to copy the directory and your file from the bad disk to a freshly initialized disk. From the Diskfix menu, select copy(C), then directory(D), and file(F). If you successfully copy the directory and your file to the new disk, kill all directory entries on the new disk, except the one for the file you copied, and go to step 5. If the copy function didn't work, the fault probably lies with the directory on your original disk. Continue with step 2.

Step 2. You have to find the granules holding your file on the original disk. Select the edit function, then find the directory entry for your file by searching track 17, sectors 3-11 of the original disk. Byte \$0D (13) of the directory entry should list the first granule holding your file. Examine the first sector of that granule to make sure your file is there. Then examine the FAT (track 17, sector 2) to locate the other granules holding your file, checking the granules themselves to be sure they contain your file.

If this process fails because some directory or FAT information is altered on your original disk, you will have to search all 68 granules on the disk for your file. Examine the first sector of each granule, noting which granules hold part of the file. Also estimate how many sectors are used in the last granule and how many bytes are used in the last sector.

Step 3. You should now have a list of the granules containing your file. Copy these granules to a second, freshly initialized disk. From Diskfix's menu, select copy(C) and then granule(G).

Step 4. Using the edit function again, create entries for your file in the disk directory and FAT on the second disk. For example, suppose your file is called Xanadu/BAS and is stored in granules \$15, \$16, and \$22, occupying four sectors in the last granule and 8 bytes in the last sector.

You must create a 32-byte directory entry for your file that looks like this on the screen (the underline means reverse video):

XANADU BAS@U@H@@@@@
@@@@@@@@

The 32 hex codes for the entry are:

58 41 4E 41 45 55 20 20 42 41 53 00 15 08 0 . . 0

You must also enter codes into the FAT as follows: byte \$15 gets \$16, byte \$16 gets \$22, and byte \$22 gets \$C4.

Step 5. At this point your new disk should contain one readable file and a directory entry for it. The file is an approximate copy of the crashed file with which you started. All that remains is to correct any incorrectly copied data.

If your file is a Basic program, load it into memory and list it. Use the Basic EDIT procedure to correct any incorrect lines from the original disk. (I assume you have a listing of your program. Without one, you have to guess what the code should be.) Save the corrected program.

If your file is a Telewriter-64 file, read it as you would any other Telewriter file. Use the

Telewriter editor to repair any errors in the file. Save the corrected file.

If your file is the output from another program, you might be able to use that program to read and edit it. If not, you will have to write a short editing program to fix your file. Save the edited file.

I hope you find Diskfix useful. It has helped me when I encountered bad disks. I wrote the program when a disk containing a 10-page Telewriter-64 file crashed. I was able to recover 90 percent of the file and easily filled in the rest. ■

See program listing on page 50

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



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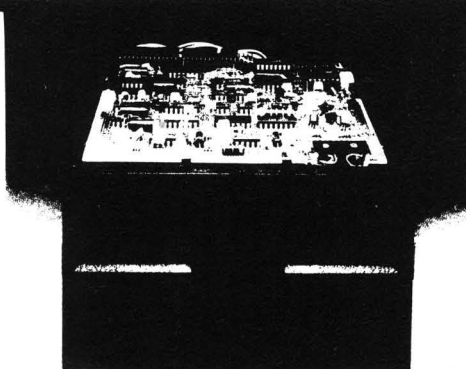
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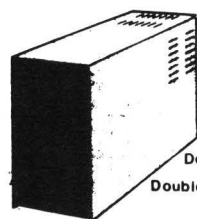
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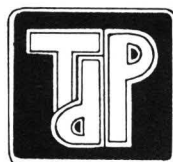
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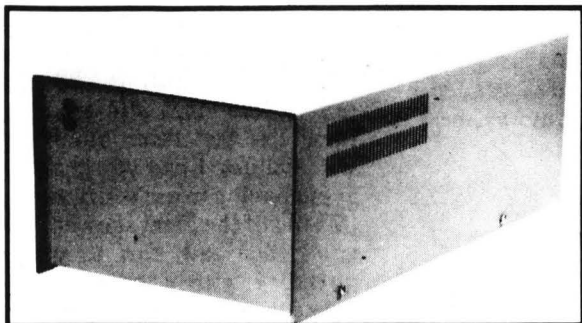
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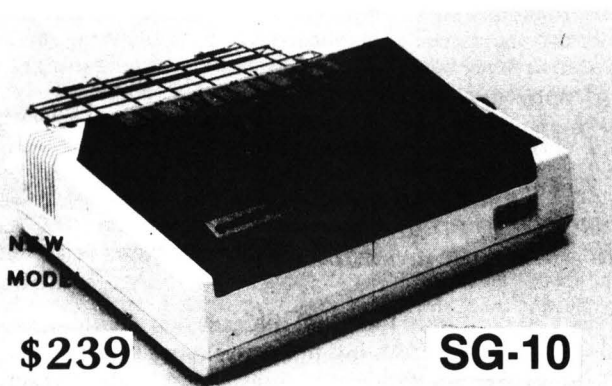
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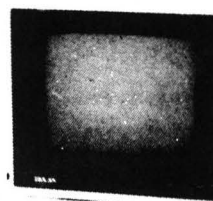
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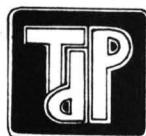
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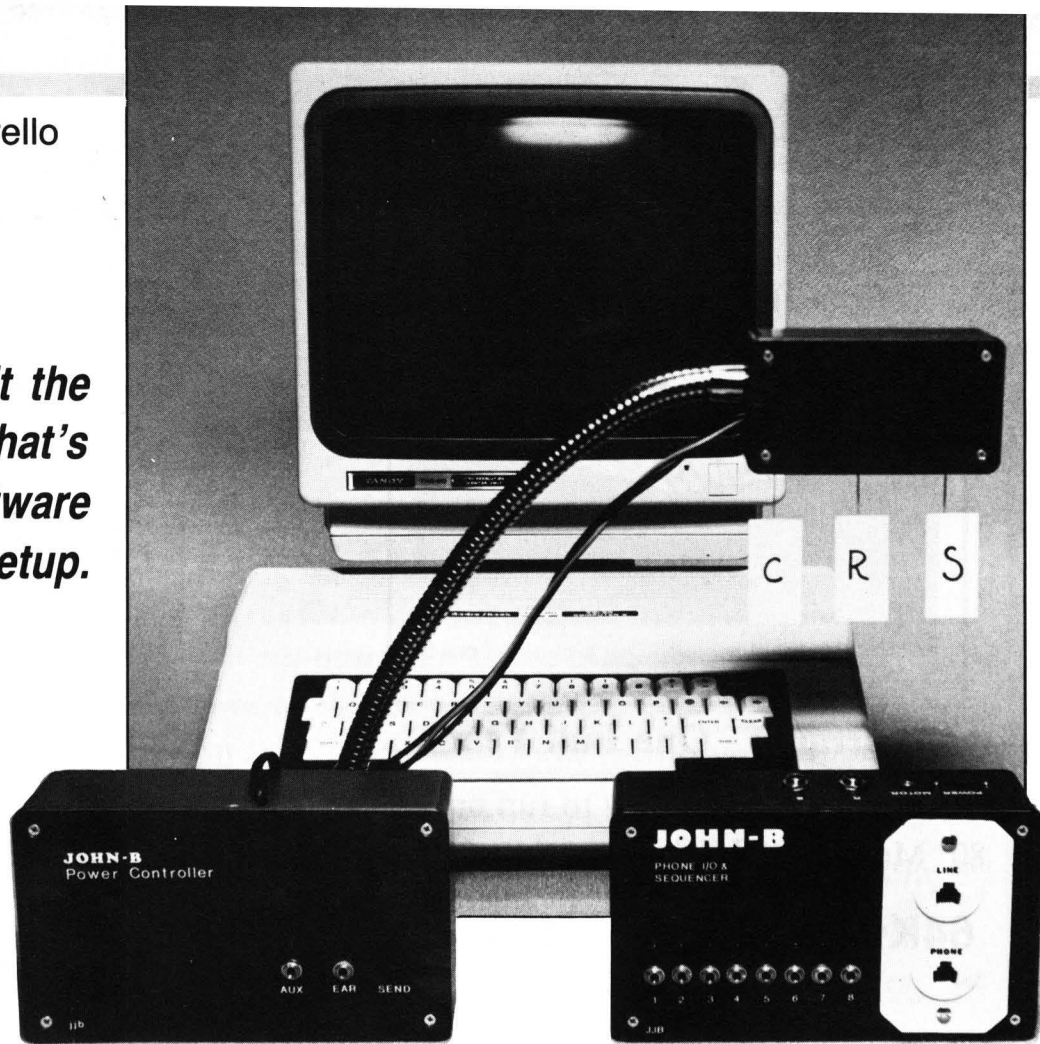
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The John-B System,

Part Three

Last month I completed the instructions for building the John-B System and provided the JBPow program for the power controller. This month I'll describe how that program works, give you the main John-B program, and describe how to do the final setup.

The JBPow Program

This program forms the basis for more elaborate software, once you understand how it works. Line 10 clears the maximum available memory and limits Basic's memory usage to location 16000. Array A is dimensioned to 22.

Line 20 defines MA (machine-code starting address less one) as 16000. To use the available memory in a 32 or 64K CoCo, redefine MA as 32000, since the machine code is relocatable. The user entry point is then defined, and execution passes to the subroutine at line 2000 (where the A array is filled and the machine code is POKEd into protected memory).

Two screen-formatting strings, BL\$ (a blank green line) and BR\$ (a blank black line) are then defined. Line 30 formats the screen. Line 40 asks for the house code, while line 50 waits for your single-keystroke input. That input is then converted to its associated ASCII code, from which 64 is subtracted. Therefore, letters A through P produce values of T between 1 and 16. If T's value is outside of this range, execution returns to line 50. If you enter a valid house code, line 60 prints it and POKEs the appropriate X-10 code into a memory area that the machine-language portion of the program reserves for this information.

Line 70 asks for the device number (unit code), storing your input in variable D. Line 80 tests for an unacceptable value of D and, if

found, causes execution to return to line 70 after erasing the previous device number question and response. Line 90 initializes E (command) to one and defines string S, which contains the allowable commands. Line 100 asks for your desired action, saving your selection in string variable A\$. Line 110 checks S\$ to see if your input is valid. If not, you are informed that you have entered an illegal option, and execution returns to line 100.

Line 120 adjusts E for use as an array element pointer. Line 140 POKEs the device number into protected memory and calls the machine code, which sends out the address packet. Line 150 provides a short, required delay. Line 160 POKEs the command into protected memory and again calls the machine code, which now sends out the command packet. When done, line 170 loops back to the beginning of the program.

Line 2000 prints the "Initializing" message on the screen for about five seconds while the program defines array A and POKEs the machine code into memory. Line

System Requirements

16K RAM

Extended Color Basic

2010 defines H1\$ (hex code string 1), which contains the hexadecimal equivalent values of the 16 house/unit codes and the six control codes that fill the 22-element array.

Note that the first 16 hex values all end in zero. The zero byte contains all zero bits, the most significant of which is the packet identifier (address packet). Also note that the last six (control) hex values have the second byte as eight (most-significant bit = 1) to identify the packet to be sent out as a control packet. Line 2020 fills the array and performs a checksum to alert you to typing errors.

Line 2030 defines the second hex-code string (H2\$), which contains the machine code. Line 2040 POKes the code into memory and, as in line 2020, performs a checksum.

The JBRobot Program

Listing 1, JBRobot, is the main John-B controlling program. JBRobot provides three functions: house control, telephone, and typewriter. The house-control program is essentially the same as the JBPower listed last month; the telephone portion appeared in Part I. The typewriter portion appeared in Part II of my "PC Primer" series (*HOT CoCo*, August 1983, p. 52). Rather than discuss the complete program in detail, I'll describe its functioning while reviewing portions not previously covered.

The main screen appears after initialization. All screen presentations are stark, but functional. They do not dazzle the user, but provide needed information to the person who must view these screens daily for a long time. The screen clears when you puff the C switch once. Puff it again while the screen is clear to select the telephone mode's control-mode screen, which asks you to "Start when ready to dial." (If you don't puff again, you'll get the control mode.)

Puff the C switch again and you are asked to choose a phone number. Each person's stored name and number appears in turn. Puff the C switch to choose the number on the screen. The message "Dialing (name) now" appears. Each digit is displayed below the message as it is dialed. The program asks you to lift the receiver and say hello when dialing is completed. Do this by puffing the R switch. The main screen reappears after a few seconds. If you fail to choose a number, the program tells you that the end of the list has been reached and returns you to the main screen.

In the control mode, you can select house control (by choosing house codes A, B, or C as they appear) or the typewriter function. Each mode provides a way for you to exist if you chose it by mistake. In the control mode

you just select the cancel function. In the telephone mode you just default by not selecting a number. The typewriter mode has an end-of-session option.

If you select house control, you are asked to choose a device number. The number one appears on the screen for a time, then the number two, and so on up to number 16. Puffing the C switch sets the program to the number currently on the screen. After you've chosen a device number, you are presented with control options (turn on, turn off, turn all off). Select the desired option by puffing the C switch when that option appears on the screen. After the program executes the option, it returns to the main menu.

Line 2050 defines variable PK as 65280. This is the address of the right joystick port that is PEEKed to sense the C switch closure. Lines 40 and 50 scan for C switch closure. They set S to the value of the least-significant bit of the value PEEKed from the joystick port. ANDing the value with the number one accomplished this. If the bit is too high, the switch is open and line 50 loops back to line 40 for another look. When the bit goes low (switch closed), execution continues at line 60. This procedure is analogous to an IN-KEY\$ routine to scan the keyboard.

Lines 700-780 perform the dialing by activating the cassette motor relay. Line 700 prints the current digit being dialed and converts the number zero to a 10 to cause 10 dialing pulses. The digit dialing loop begins in line 710. Line 720 turns the relay off. Line 730 waits for a time equal to that required by the phone company to ensure proper dialing (the 18 in the FOR...NEXT loop). Line 740 then energizes the relay.

Line 750 performs the delay. Line 760 loops back the number of times equal to the digit being dialed. Line 770 creates the prescribed delay between digits. When dialing is completed, the program asks you to pick up the receiver and say hello. Line 800 creates a delay of a few seconds before disconnecting the Phone I/O's load resistor, which connects the line when the phone is on the hook. If this load resistor were left on, phone volume would be reduced, as when an extension phone is also off the hook.

The DATA statements that follow contain the phone numbers in the form name, number. The last DATA statement must always be a single X, since lines 560 and 570 use it as a flag to sense the end of the list.

The typewriter function assumes that you have a printer on line. The enter function reads the text that you have composed (line 1920) and then sends it to the printer (line 1930). If you aren't using a printer, delete the PRINT# - 2,C\$ statement in line 1930. Oth-

erwise, the program will hang up at this point, waiting for a printer to respond. You could send the text to another device, such as a modem or disk drive, by inserting the appropriate code in place of the PRINT# - 2 statement.

CoCo 2 Differences

As previously mentioned, the Power Controller senses a zero crossing and sends a pulse to your CoCo's AUX input, so it knows that it is time to send out commands. But there is a difference in the cassette circuitry between the original CoCo and CoCo 2. If you sample the cassette input port (\$FF20) on the original CoCo, you'll see a string of zeros with an occasional one (the zero-crossing pulse). On the CoCo 2 it is the opposite; you see a string of ones with an occasional zero.

The machine code in the program is for the original CoCo; it waits for a one to appear and presumes that it is the pulse indicating the zero crossing. The one appears immediately on the CoCo 2 with no regard to zero crossing, causing the Power Controller to send out data at the wrong time.

For proper operation with the CoCo 2, you must change one digit in the H2\$ string (line 2030)—note the substring B6FF204424 about halfway into the string. Simply change the last digit, 4, to a 5. Also change the CK value in line 2040 from 9736 to 9737 to accommodate the increase in count due to the change in line 2030.

The CoCo 2 operates noticeably faster than the original CoCo. Depending on your phone service, you might have to increase the dialing delay described above to obtain proper dialing. I had no problem with this in the New Jersey and Pennsylvania area.

A Typical John-B System

A typical system would consist of a CoCo, TV set, the Puff switch assembly, the Phone I/O hardware, a low-cost phone, the Power Controller hardware, a number of control modules, the Sequencer hardware, and a number of transistor radios. Figure 1 shows a typical interconnection.

Position the phone and Puff Switch assembly for easy access with minimum movement. Place the TV where the user can easily view it. Tune the radios to the desired listening stations and connect them to the Sequencer. The Phone I/O device receives the phone and connects to the phone line. Set each control module for the house and unit codes and attach them to the appropriate appliances to be controlled.

Modify the program on initial installation

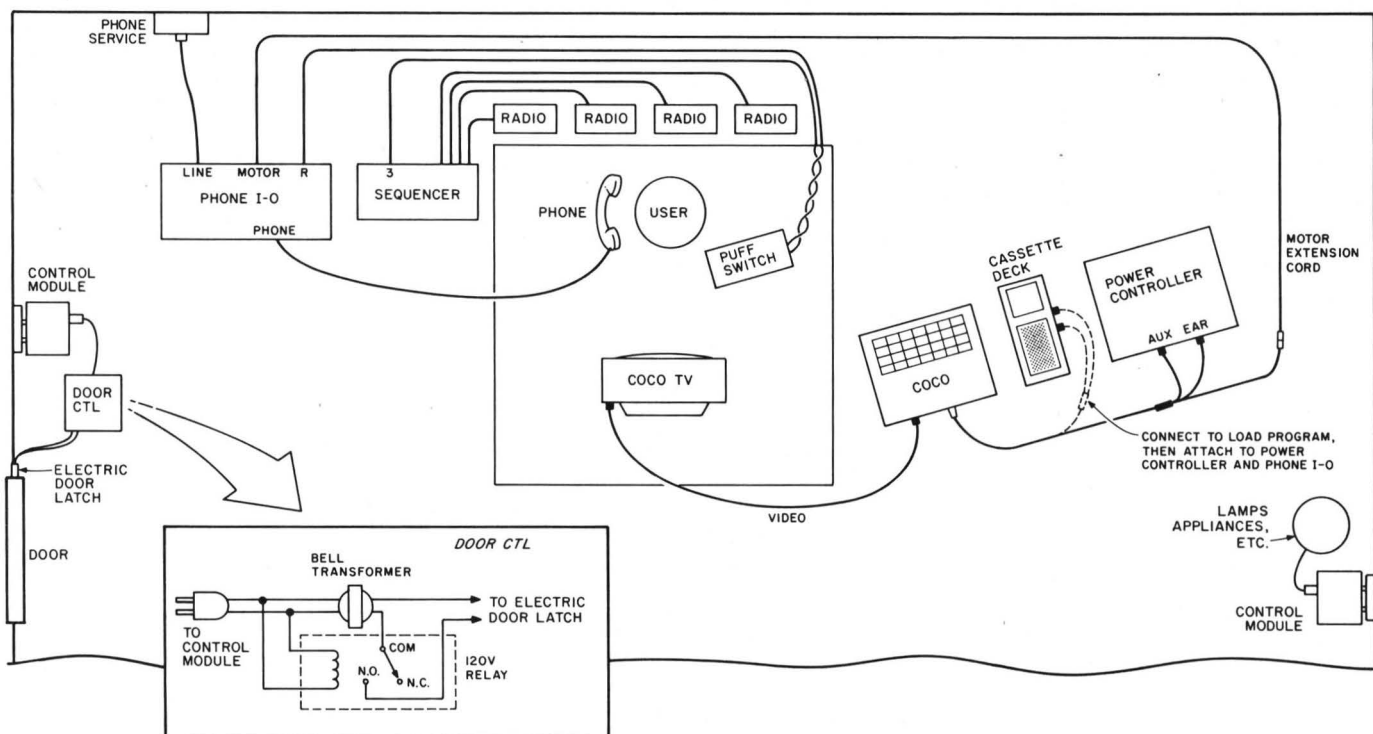


Fig. 1. Typical John-B Setup

to hold the desired phone numbers. Educate the user on which house and unit codes control which appliances. Load the program into the CoCo and then connect the AUX and EAR plugs to the Power Controller. Step through each function with the user; expect to spend some time providing guidance. You will have to make provisions for severely handicapped persons in the event of power outages as the CoCo will lose the program.

John-B configurations are virtually limitless. You could opt for an uninterruptible power supply to guard against power outages. In this case, power only the CoCo to retain the program. Many users want to be able to lock their doors. You can allow them to do this by installing electric door latches in place of the standard door lock. A relay operated by a control module can activate the latch. Place all door latches on the same house code to allow the user to lock all doors by selecting that code and the turn-all-off option.

You can add an entertainment TV that the user can turn on and off and change channels. A control module can handle the on/off function. You will have to route the S switch differently to implement channel changing.

Instead of connecting the S switch to the Sequencer, connect it to the common contacts of a 120-volt ac relay. Connect the normally closed contacts to the S switch input on the Sequencer and the normally open contacts to the TV's channel-changing switch. Connect the relay coil to a control module. In operation, the user selects the control module, turning it off. After he selects a channel, the user reselects the control module, turning it off and reconnecting the S switch to the Sequencer.

Installation Information

Before connecting to the phone lines, call the local phone company. They might require an isolating coupler, which they will provide in many instances. Also, you can contact the retired phone company employees club, Pioneers of America, through the phone company. They are usually more than willing to provide any assistance you might need.

Safety is of the utmost importance. No metal parts should contact the user. You might want to contact the local electric wiring inspector to review your installation. (De-

pending on the installation's location, an inspection certificate could be required.)

Summary

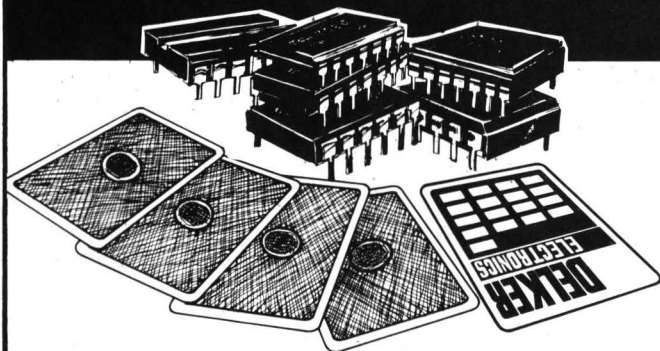
This series has presented a computer-based approach to house control for the handicapped that you can adapt for everyday use for nonhandicapped people. I urge you to spend a little time and effort to help those who are unable to help themselves. As Joe Sobieski put it, "I was surprised when I visited a man who could not even scratch his nose playing with the typewriter function as a game! He was writing names and other things onto the screen and having a lot of fun. It seems that anything the handicapped can do themselves is a great lift to them."

I am interested in hearing your thoughts on this series. Please include a stamped, self-addressed envelope if you want a reply. ■

See program listing on page 51

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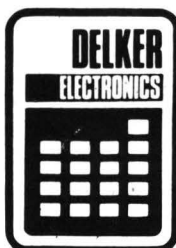
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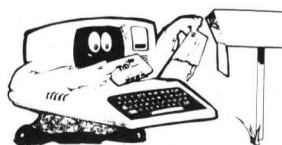


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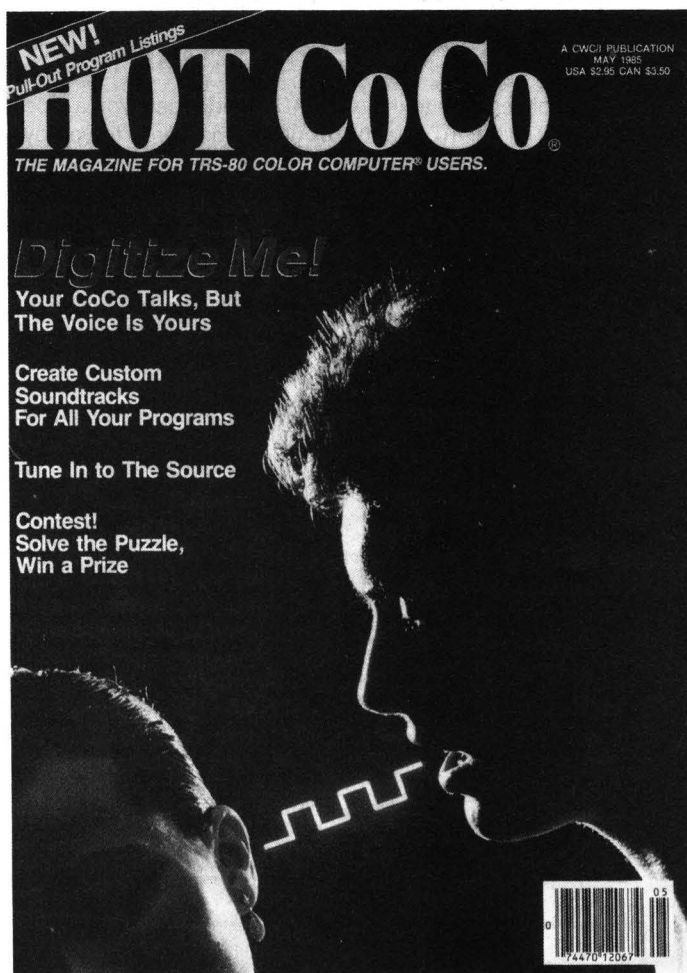
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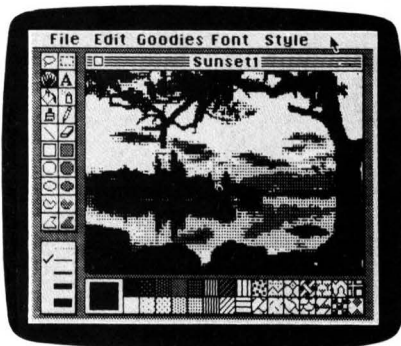
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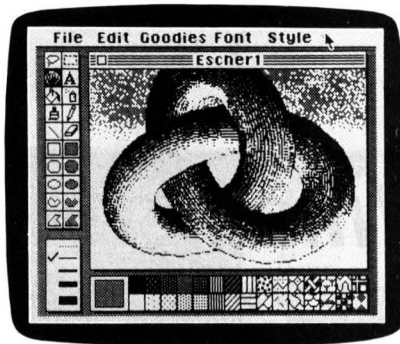
CoCo Max

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!



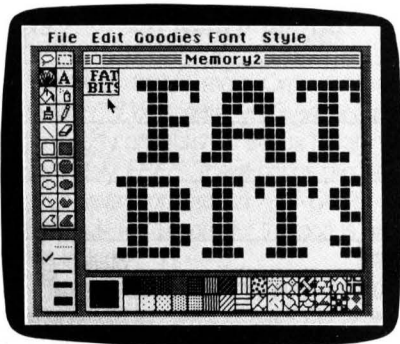
We are all witnessing an exciting revolution in microcomputers: a radically new kind of computer and software that opens a whole new world of creative power to computer users.

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

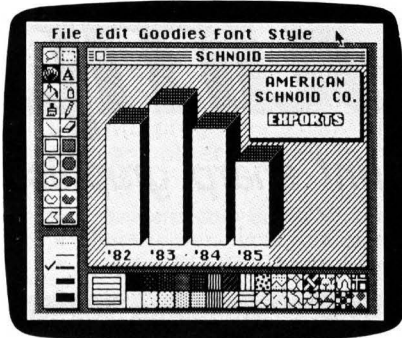
The large image box in the middle of the CoCo Max screen is actually only a window on an even larger image. Use the Point-and-Click "Hand" to effortlessly move your window over any portion of the larger image. You have a working area of up to 3-1/2 times the area of the window itself.

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,



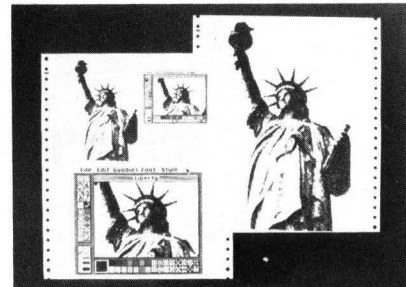
graphs, and computer art – for serious use or just for creative fun.



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.

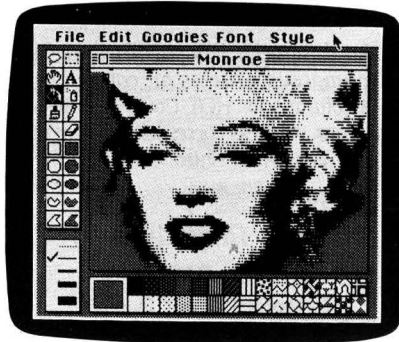
Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limita-

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.

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by Richard Ramella

Daisy Dump

Now the DWP-210 can print sharp graphics.

Dot-matrix printers take well to screen-dump programs; daisy-wheel printers usually don't. But the Daisy Dump program (see Listing) changes that, allowing the Tandy DWP-210 printer to produce a black-and-white picture from Extended Color Basic's PMODE4 screen. With a carbon ribbon, the result is sharp, as Fig. 1 shows.

The DWP-210 printer is slow but versatile. Using Basic-activated printer codes, it advances and backspaces the printer carriage by microincrements. It also offers a $\frac{1}{48}$ -inch line feed.

Program Operation

The program uses PPOINT tests to determine if a screen pixel is on or off—black or white—at every horizontal- and vertical-axis point. It prints a period if the point is on.

The printer codes compress the area on which the screen is printed, so the periods and spaces are printed solidly. Daisy Dump creates a printout that is slightly elongated in comparison to the original screen graphics, producing a picture that is $4\frac{1}{4}$ inches wide and 4 inches long.

The bad news? Daisy-wheel printers are generally slower than dot-matrix machines. Because the program tests nearly 25,000 screen points, it takes 65 minutes for the DWP-210 to dump an entire screen.

With a disk system, you can save the program as an ASCII file and then use MERGE to combine it with a graphics program whose lines are numbered from 130 to 9999. The graphics must also conform to the Extended Color Basic statements in line 110. When you run the newly merged program, the graphics are drawn and printed out. Be sure to set the printer pitch to PS (proportional spacing).

An alternative is to integrate graphics from a binary file by adding a program line:

```
130 LOADM"FILE NAME": EXEC
```

You can also print screen graphics during program execution by using a GOSUB statement to switch control to the print routine in line 10000.

Even if you have another type of daisy-



Fig. 1. Sample Printout

wheel printer, you might be able to convert the program so it will work for you. Check your printer manual to see if it offers Basic-activated printer codes that backspace and line-feed by microincrements. Experimentation is the key to success. ■

Richard Ramella has published two books and numerous articles on computers. He writes columns for HOT CoCo and 80 Micro magazines. Address correspondence to him at 1493 Mt. View Ave., Chico, CA 95926.

System Requirements

16K RAM

Extended Color Basic

Tandy DWP-210 Printer

```
100 REM * DAISY DUMP * 16K ECB
110 REM * REQUIRES DWP 210 PRINTER
120 PMODE 4: COLOR 2,1: PCLS 1:
SCREEN 1,1
130 REM * GRAPHICS START
9999 REM * GRAPHICS END
10000 FOR Y=0 TO 191: FOR X=1 TO
255
10010 IF PPOINT(X,Y)=0 THEN PRINT#-2,".": PRINT#-2,CHR$(8);CHR$(4); ELSE PRINT#-2,"": PRINT#-2,CHR$(27);CHR$(2);
10020 NEXT X: PRINT#-2,CHR$(27);CHR$(10);: PRINT#-2,CHR$(27);CHR$(26): NEXT Y
10030 SOUND RND(100),1: GOTO 1030
```

Program Listing, Daisy Dump

THE DIFFERENCE BETWEEN *PROGRAMMING* AND *SUCCESSFUL PROGRAMMING*

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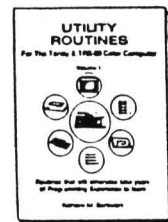
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Radio-Systems Calculations

Letting your CoCo do radio calculations saves time and bother.

If you are a radio experimenter; a ham-radio buff; or a radio technician in the VHF, UHF, or microwave field, the program accompanying this article might be of interest. It is designed to work for frequencies that fall within a 50-MHz to 4-GHz range and performs 12 standard radio calculations. (See Table 1.)

Using the Program

The program is menu driven. After the opening screen, the first four menu items are listed on the screen. If you do not want to use one of these options, press the enter key to bring up the next four items. Repeat this procedure to bring up the last group of options. Press X to exit the program or the enter key to return to the opening screen.

When you select an option, the program prompts you to input the information needed for the calculation. You may need to use several of the options to obtain the necessary information. Let's assume, for example, that you wish to communicate with a man in a spacecraft. He is circling 130 miles above the earth and is using a 2-watt portable radio on 147 MHz. The craft's antenna has unity gain. You have a 25-watt base station and a 10 dB gain-beam antenna.

To find out whether communication is possible, convert 2 watts to dBm (33 dBm) using option A. Then compute the path loss (147 MHz at 130 miles is 122.2 dBm) using option B. When you use option C to compute the receive signal, you get -110.2 dBV. Changing this to microvolts with option I, you get 21.8 volts—an adequate signal to provide good communication when the spacecraft is generally above you.

I think you will find the program useful in computing many other what-ifs in radio communication. It has saved me a great deal of time. My thanks to Tony Lippert for his assistance in writing routines. ■

See program listing on page 52

Vern Epp is a microwave technician who has written articles for amateur-radio magazines. Address correspondence to him at Box 371, Nelson, B.C., Canada V1L 5R2.

System Requirements

16K RAM

Extended Color Basic

Photo courtesy of The National Radio Astronomy Observatory, operated by Associated Universities, Inc. under contract with the National Science Foundation

Watts/dBW (decibel referred to a 1-watt power level) or dBm (decibel referred to a 1-milliwatt power level) Conversion: conversion based on 50-ohm impedance.

Path-Loss Calculation: calculates the free-space loss in the atmosphere, using frequency (MHz) and distance (miles) variables. It is based on direct line of sight with no obstructions.

Receive-Signal Calculation: uses path loss, cable loss, duplexer loss, transmitter power, transmitter-antenna gain, and receiver-antenna gain to calculate the theoretical receive signal. It provides a useful tool for designing radio systems and performing experiments.

Antenna Gain and Beamwidth (Parabolic Antenna): performs calculations for systems utilizing a dish. For other types of antennas, such as dipoles and yagis, you must estimate gain or obtain a spec sheet. The gain and bandwidth can be calculated for a parabola using a 55-percent efficiency figure.

Inductor Calculation: calculates inductance for a given frequency and capacitance.

Capacitor Calculation: calculates the capacitance for a given frequency and inductance.

Microvolt/dBV Conversion and dBV/Microvolt Conversion: two useful conversions based on a 50-ohm impedance.

T-Pad Calculation: A T-Pad consists of three resistors—two series resistors and a shunt resistor—in the shape of a T. It is frequently used for audio work in which a constant impedance is required.

VSWR (Voltage Standing-Wave Ratio) Measurement: Some RF (radio-frequency) meters read only forward and reverse power. The actual VSWR can be computed, with a reading of 1.5 or better considered usable in most circumstances.

Coil Design Calculation: calculates the size of a coil to determine the actual inductance required.

Parallel Resistors: measure the overall resistance with two or more resistors.

Table 1. Glossary of Calculations

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6809 on Line

by Bobby Ballard

Start a BBS

Running a BBS is a hobby; it involves a great deal of your time and you can't make money at it. That sounds like a hobby to me! If you've ever wanted to start your own BBS or have wondered what's involved, this is your chance to join in, speak up, and even start your own board.

I will put a board on line in New York and together we can go through the process of starting a BBS from the beginning. When I have problems, you'll hear about them. If you're having problems, call the board or contact me and we'll solve the problems together. The BBS number is 718-499-1633. Check the end of this column for other methods of reaching me.

Initial Decisions

Running a BBS involves decisions beyond money, equipment, time, and software. First, you must evaluate your reasons for adding another board to the growing list of BBSes. You should also decide how the board will be accessed and what resources you will provide to motivate people to call your board.

For example, are you going to provide a local service? If so, do the people who need your service or information know about your BBS? Do they have the equipment to access it? If not, how will they find out about your board? Will they want to call back again? Will they make it their primary BBS? If you are going to provide a service of nation-wide interest, how will you publicize your board? To keep the attention of a large audience, you need to provide incentive for them to call periodically.

In other words, you must provide information that the callers can use and that will keep them coming back. This information can take many forms: from electronic mail to public-domain software, or specific industry data.

You might say lively conversation is important to keeping people on line; I agree. But a central theme and a changing base of information guarantee lively conversation and electronic-mail activity. As callers check to

see the latest files you've posted, they will also spend the extra time to participate in the message base. Typically, the message base on a BBS with interesting files contains informative messages about the files and how to make the most of them. One feature adds value to the other.

By comparison, a BBS with little usable information often has a message base containing shallow elevator talk, like "How's the weather?" and "Nice day!" There's nothing wrong with this, but don't expect to find many repeat users.

The Phone Connection

Hooking up a BBS to the phone system increases your responsibilities to the outside world. You must ensure that your BBS is not being used for illegal activities, such as copyright violations of software, trading of confidential codes, and distribution of charge-card numbers. You must also ensure the security and integrity of your board and its related files.

Security will be your biggest concern once you make that outside connection. Much of your time will be spent either restarting a crashed board or verifying users and setting security codes. When I discuss software, I will cover security in greater depth.

As you can see, starting a BBS is a lot of work, but keeping a BBS running is even more work. It is not like buying a game or word processor, plugging it in, and typing RUN "FUN". It takes hours of work to start a BBS, set access levels, and design menus. What's more, you have to collect information to be downloaded, publicize your board, and maintain the hardware. Once your BBS is running, you will spend hours verifying new users, checking the message base, and providing new and interesting files to download.

BBS Software

The next consideration is software. As I write this column, Peter Banz and Ceratec

Inc. are releasing the newest version of Banz' Colorama BBS software: version 3.0, which has Xmodem protocol and timer capabilities. This is already a popular program and I will give you a peek at it here in *HOT CoCo*, as soon as it's available.

For those who have access to CompuServe, Richard Duncan of West Memphis, AR, has generously donated an extensive collection of BBS software and documentation. The software is COBBS and is available in Data Library 7 for downloading.

The COBBS operating system and BBS software support Tandy's Deluxe RS-232 Pak and multiple drives. The editors and other software are written in BASIC, making modification easy, and Richard has provided an elaborate security system to protect the board. At 300 baud, it takes over two hours to download COBBS, so before you start, read the documentation and file descriptions to make sure that it suits your needs and that you have the necessary equipment. A word of personal thanks to Richard Duncan for contributing COBBS. If you like COBBS, he requests that you reward his three years of work by sending a donation.

To contact Richard Duncan, write to 2504 North Gathings Drive, West Memphis, AR 72301, call the headquarters COBBS board Richard operates at 501-732-5614, or leave an e-mail message on CompuServe #71515; 1420. The Colorama Headquarters BBS is running at 512-285-5028; you can write to Ceratec Inc., c/o Peter Banz, P.O. Box 663, Elgin, TX 78621. Let me know how you're doing as we proceed with this project. ■

Address correspondence to Bobby Ballard, 1207 Eighth Ave., 4R, Brooklyn, NY 11215. You can also reach him on line through CompuServe (#72746,2373 or #73135,255), The Source (#BCT173), and MCI Mail (#172-3476). Bobby's BBS number is 718-499-1633.

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Review-Ratings Key

6	Unsurpassed
5	Excellent
4	Above Average
3	Acceptable
2	Needs Improvement
1	Unsatisfactory

Ed. note—The overall ratings that appear in the review-rating graphs are an average of the ratings for all the categories rounded to the nearest quarter of a rating point.

The DMP-105 Bargain

by Peter Paplaskas
HOT CoCo staff

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

The DMP-105 is a thoughtful addition to Radio Shack's line of printers. If you are looking for a low-cost dot-matrix printer with most of the features you find in higher-priced models, you'll appreciate the little touches that Radio Shack has put into this one. At \$199.95, it is a good choice for beginners and doesn't leave out all the tricks for old hands.

The DMP-105 is fully compatible with the Color Computer and comes with the CoCo's nonstandard serial interface, so there is no fussing with cable interfaces. You also won't have to perform complicated and intimidating setup procedures involving rows of DIP (dual in-line package) switches. Setup takes only a few moments. All you do is insert the ribbon cartridge, plug in the serial cable, and you're off and running.

In addition to the DIN-plug serial interface that fits the CoCo, the DMP-105 comes with a 36-pin parallel port. The fully adjustable tractor-feed system can handle fan-fold paper as wide as 9½ inches. The printer also offers the option of friction feed for single-sheet operation. On the right side of the printer is the paper-feed knob for manually

advancing the paper. A smoke-colored transparent cover deadens noise and protects the print head and other electronic components from dust. A DIP switch is located in the rear of the printer and allows for selection of either 600 or 2,400 baud and either serial or parallel interfacing.

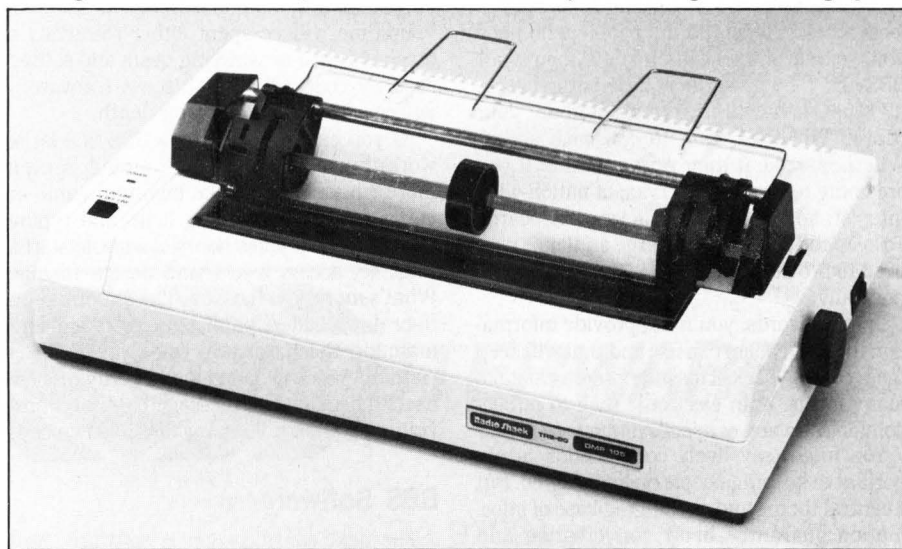
Features

The DMP-105 is an 80-column printer that prints at 80 characters per second. This speed is fast for a low-cost printer and adequate for most needs. Print-head life is rated at 50 million characters. You can select bi-directional or unidirectional printing by sending control codes to the printer. Print-

head impact is sufficient to produce an original plus one copy.

The printer has a variety of printing capabilities. Its character sets consist of 94 standard-ASCII, 32 European-symbol, and 30 block-graphic characters. The standard character face, based on a 9- by 7-dot matrix, has three basic type styles: normal, elite, and condensed. (See Figs. 1 and 2.) Each style can be printed in three character widths, 10, 12, and 16.7 characters per inch. Each width can be elongated to double width. The DMP-105 also offers options for creating boldface characters and underlined text. Italic print is not supported. Another drawback is that the printer is limited to one-pixel descenders.

It is easy to make high-resolution graphics



The DMP-105 printer from Radio Shack offers solid performance at an economical price.

STANDARD CHARACTERS NORMAL
STANDARD CHARACTERS ELITE
STANDARD CHARACTERS CONDENSED

Fig. 1. Examples of the DMP-105's Text Characters in Boldface

GRAPHIC CHARACTERS NORMAL
GRAPHIC CHARACTERS COMPRESSED
GRAPHIC CHARACTERS CONDENSED

Fig. 2. Variations of the DMP-105's Graphics Characters in Boldface

screen dumps with the DMP-105. The printer is capable of producing 480, 576, and 800 dot-column bit graphics in the normal, compressed, and condensed character styles. You can use only one line-feed control code in the graphics mode. A line-feed code controls paper advance, which moves in increments of $\frac{1}{2}$ of an inch. This is the only paper-advance code allowed in the graphics mode. Higher-priced printers usually permit more flexibility. Radio Shack's Hi-Res Screen Print Utilities (catalog no. 26-3121) will help you display your graphics masterpieces. The VersaDump program (HOT CoCo, March 1985, p. 24) is another screen-print utility. Figure 3 is a condensed-font screen dump made with VersaDump and the DMP-105.

Other features include a carriage-movement test that allows you to check for free carriage movement and a "self-test" that lets you check print quality and general printer operations. There is also a repeat function for

repeating a graphic pattern as many as 255 times. This is useful for underlining, graphics codes, and patterns.

But you don't get all this without a few catches. In this price range, what a printer lacks is often more significant than what it has. Besides the lack of an italic character set, the DMP-105 also does not have a complete foreign-language character set. You cannot download characters to generate a customized character set. And there are no form-feed or line-feed switches; you must advance paper manually with the paper-feed knob. (The printer does have a power indicator and an on/off switch.) You use

control codes to select print styles and character sets—something you can usually set with DIP switches on more expensive printers.

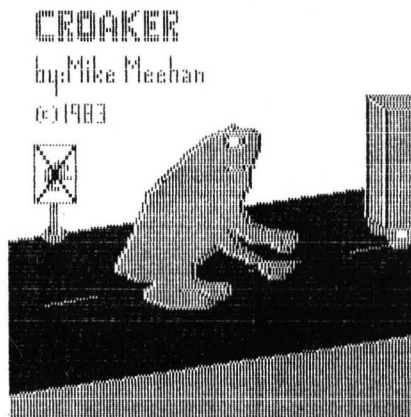


Fig. 3. A Graphics Dump of a Graphics Screen in the Condensed Mode

Documentation

The manual that comes with the DMP-105 provides all the necessary setup procedures you need. It gives Basic program examples at every step that explain how to program control codes to access the various font styles and printer modes. Some examples show you how to print normal and elongated characters on the same line. Others define how to print condensed, compressed, and standard characters in an orderly sequence.

Unlike other printer manuals, the DMP-105 manual is geared toward the Color Computer user. It provides the changes necessary to send control codes to the printer's buffer. Because MicroSoft Basic commands vary from system to system, this booklet offers the correct Color Computer command for forwarding the line feed, `PRINT#-2, CHR$(28)`, instead of `LPRINT CHR$(28)`, which might confuse CoCo novices. You don't have to be programmer to take advantage of the DMP-105's font styles and other control-code accessed features.

Summary

The DMP-105 is a bargain at its low price. A quick check of some advertisements for mail-order houses shows that you can purchase the printer for around \$160. Although it lacks italics and some conveniences, the DMP-105 provides the necessities for most applications at a price you might not be able to refuse. ■

The DMP-105 is manufactured by Tandy Corp. (catalog no. 26-1276), 1400 One Tandy Center, Fort Worth, TX 76102. It requires a serial cable (catalog no. 26-3020) or serial-to-parallel interface and sells for \$199.95.

Bob's Magic Graphic Machine

by Richard Ramella

	ease of use	documentation	performance	error handling
6				
5				
4				
3				
2				
1				
OVERALL RATING 5.00				
Application Software				

Superb! Has a lot to offer! The graphics bargain of the year!

Bob's Magic Graphic Machine from The Other Guy's Software deserves these words of praise. Although it is not in the same league with CoCo Max, which could well be the product of the year, Bob's Magic Graphic Machine sells for under \$15. (See the product information box following the review for more information about this product's price.)

It can reduce hours of Color Computer graphics work to minutes. If you are interested in generating graphics in Extended Color Basic, this might be it.

What is the best feature of this program? It compiles a graphics screen into a Basic listing that you can store on disk or cassette and retrieve, edit, and integrate into other programs. You can use the resulting compiled Basic code in your own programs.

The program also generates upper- and lowercase text in Extended Color Basic. This requires a separate, copyrighted, machine-language program—and Bob's Magic Graphic Machine supplies it. You may even use it in software that you sell. The only stipulation is that you must include a copyright notice in the listing.

I was amazed and pleased by how simple it was to create pictures and words with this program. A Color Computer with Extended Color Basic already has graphics commands that are unsurpassed by other microcomputers: CIRCLE, DRAW, LINE, PAINT, GET, PUT, PSET, and PRESET. These commands serve programmers well in creating screen graphics, but the Magic Graphic Machine uses machine language to enhance them. All the features mentioned in this review are available in malleable forms. You can try out a shape or line, make it larger or smaller, set it, erase it, and move it around the screen.

The Magic Easel

The main menu of the program offers a doodle mode, Basic picture compiling, and subroutine picture compiling. The help

menu offers: CIRCLE, ARC, GET, PUT, LINE, BOX, DRAW, FILL (paint) commands and set point, write to screen, miscellaneous-menu, and quit-to-main-menu options. You can also set PMODE, PCLS, screen, background, and foreground colors.

If you type C for circle, the program displays a screen with a cross-hair cursor that you can move with a joystick. For fine positioning, you can set the joystick for no motion and tap the arrow keys to move the cross hair. For circle drawing, you position the cross hair and press the fire button on the joystick. Moving the joystick makes your circle larger or smaller. By pressing the fire button a second time, you set the circle in place.

In the DRAW command, you press the fire button to set a starting point of your drawing. When you move the joystick away from the starting position, a line is drawn from where you began to your new position. The line changes as you move.

This is often called "rubber band" graphics, an apt description because using this feature is similar to stretching a rubber band between a fixed and a moving point. You set the line by pressing the fire button. The end point of your first line becomes the beginning

point for your second line, and so on. As you move your rubber band, the Magic Graphic Machine draws the line directly over other lines you might have drawn without disturbing them. The program lets you erase shapes that you don't want by pressing the hyphen key. This feature works in all drawing modes; you can even erase a full screen. When it comes to detail work, Bob's Magic Graphic Machine lets you press the space bar for a window of the cross-hair cursor area that is magnified four times.

Machinations

The options you get with the Magic Graphic Machine simplify what Extended Color Basic can do already. Drawing a box is simply a matter of getting into that mode, positioning the cursor, pressing the fire button, moving to a diagonal coordinate, and firing again. The box appears in various stages of completion, and you can control it easily. The draw and line options work the same way. You can draw arcs by specifying their degrees. You can also paint areas and set and reset points.

Basic's GET and PUT commands are avail-

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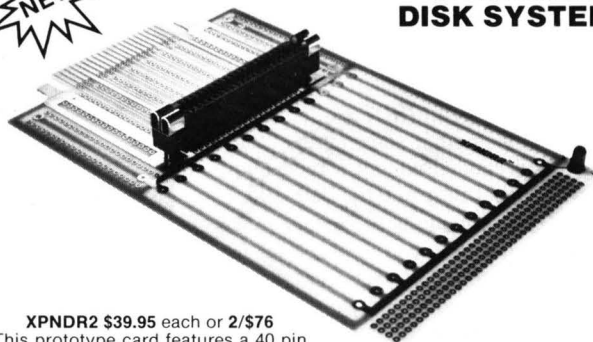


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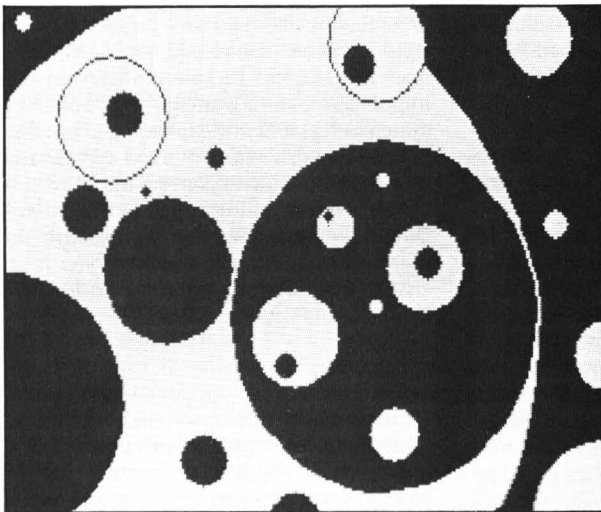
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Swiss Cheese? Microscopic minutiae? A piece of the cosmos?
A design made with Bob's Magic Graphics Machine

able in an enhanced form in this package. You can define a screen area of 64-by-64 pixels in a box with GET and save it. In the PUT mode, you can move the cross-hair cursor to another location and position a saved shape a second time. When the screen is compiled in Basic, the difficult GET and PUT work is done automatically.

The Magic Graphic Machine incorporates text on a screen in an interesting way. In the Write mode, upper- and lowercase text is typed into a string. When you return to the graphics mode, the text appears on screen and can be moved and locked into any position you want. If you access the machine-code program when you run the compiled version, the type is instantly printed on the graphics screen.

The 32-page instruction book that comes with the Magic Graphic Machine is written with admirable simplicity. It describes all the possibilities and includes a section for programmers who want to try their creativity. This is augmented by easily accessible help menus for every option. Two other advantages of the program are a blinking cursor that you can turn on or off and the ability to save screens as binary data that you can load into and edit on other graphics editors.

Summing Up

The first time I tried this program I was enchanted for several hours. Its capabilities sparked a growing sense of excitement. I was envisioning many hours of saved programming time. None of the several other graphics editors I have looked at combines this program's low price and flexible features. How impressed am I? As a reviewer, I got a free copy of the program. But I sent in my \$15 to purchase a copy so that I could be a buyer of record. I want to be able to use the system in my own programs. Program author Bob Dayley has done a terrific job. His decision to allow customers to put the text-generating machine code in programs that use the Magic Graphic Machine graphics is generous and possibly the beginning of a trend. ■

Bob's Magic Graphic Machine is available from The Other Guy's Software, 875 South Main, Logan, UT 84321, 801-753-7620. It requires 64K, Extended Color Basic, and comes on cassette or disk. At press time the program was selling for \$14.95 plus \$3 for shipping, down from its original price of \$39.95. However, the price reduction could be temporary.

Entering Elite-Word/OS-9

by Bruce Warner

	ease of use	documentation	performance	error handling
6				
5				
4				
3				
2				
1				
OVERALL RATING				3.00
Application Software				

Word processing is one of the most popular applications for the Color Computer. I remember buying a word processor shortly after purchasing my first CoCo, one of the earliest models. It was an inexpensive program written in Basic called Word CC7, which still has a place in my software library. Most of us graduated to Radio Shack's Color Disk Scripsit as our knowledge

grew. It had limited capabilities, but it was an improvement. More word processors followed and were explored in turn, including Telewriter-64, VIP Writer, and a host of others. I've examined at least 10 word-processing programs over the years, so I was ready to put Elite-Word/OS-9 to the test.

Performance

Elite-Word/OS-9 offers some excellent features. The best is that you can work with two separate files at the same time, passing text between them. This is a great feature for cutting and pasting. I use a similar option on my MS-DOS computer at work when I write press releases. Beginners should be careful not to accidentally delete text that they intend to paste into another file. This is a powerful option; you should practice it several times before using it to manipulate important blocks of text.

Another strong point of this word proces-

sor is its ability to set printer control codes in a file so you don't have to type them during every computing session. It requires that you use the same disk for all your data storage or that you make additional copies of the data disk that contains the printer controls for each text file if you are using a standard disk drive or drives. One way around this is to create your own bootable master disk and work from backup copies that you make periodically. If you have two or more disk drives, you can also create a separate working directory disk.

The command mode of Elite-Word/OS-9 is easy to use. In place of a one-screen menu, you find a main-menu that spreads across the top line of several screens. In many cases, user friendliness means a succession of obstructive menus; Elite Software solves this problem by using only the top line.

Elite-Word/OS-9 uses shell commands from the editor. There is a momentary disruption of the display when your computer

toggles between the Elite-Word screen and your usual display. The program does not crash at this point, but gives up its display screen temporarily to allow you to access a new shell.

Elite Software recommends that you leave the word processor to change from one data directory to another. This is good advice for beginners. If you are comfortable with OS-9, you might prefer to keep a list of macros on a disk under a separate directory—but one of the program's shortcomings is apparent here. It does not support changing of directories. You might have to go through a complicated series of commands to get to your macros.

The OS-9 word processor makes extensive use of the data directory for temporary storage, which lets you work with text files that are larger than available memory. This might present a storage problem to owners of one-disk-drive Radio Shack systems. To work a 64K file, you need about 128K of the available memory on your data-directory disk, less the current buffer storage. You might want to consider expanding to two double-sided disk drives if you intend to write using OS-9.

Elite-Word/OS-9 is limited to 64K files regardless of your disk-storage capabilities. If you have more than one disk drive and are hoping to expand your files beyond the 64K limit defined in the Elite-Word/OS-9 manual, you might be in for a disappointment.

Setup

Most OS-9 word-processor manufacturers have made sure that their products will operate in several system configurations. This is possible because OS-9 is a versatile oper-

ating system. Some companies incorporate specific provisions for Frank Hogg Laboratories' O-Pak, PBJ's Word-Pak and Word-Pak II, and other 80-column devices available for the Color Computer.

Elite-Word/OS-9 comes with its own high-resolution graphics for its 32- by 16-character screen. Although this lowercase display is pleasant looking, it creates havoc for people who have opted to use one of the popular third-party hardware items for improving the CoCo's screen appearance. The word processor crashes when run with the O-Pak Hi-Res utility, Word-Pak, and Word-Pak II. O-Pak owners can avoid this by making a display change. But Word-Pak II owners must create a separate OS-9 disk with the standard Radio Shack OS-9 modules CCI0 (Color Computer input/output) and Term (input or output terminal). And Word-Pak owners must fully dismantle their systems to use this word processor.

Documentation

For advanced computerists, the manual that comes with this package is well written, well organized, and complete. But OS-9 users are seldom advanced, and the more than 300 pages Radio Shack provides for the operating system are not always clear. To be fair, Elite Software cannot and should not attempt to rewrite the OS-9 manual. However, a manual that makes assumptions about the user's knowledge is a liability. Many of the problems that beginning users are likely to encounter with the word processor could be avoided if the product's manual explained a step or two instead of referring readers to the OS-9 commands manual.

Another problem with the documentation

is that it is directed at owners of one-disk-drive Radio Shack systems. It expects you to have advanced knowledge about OS-9, but does not address the possibility that you might have taken advantage of the operating system's versatility by expanding to two disk drives. Two drive owners must spend extra time learning how to convert the word processor's documentation to their systems. One easy-to-miss two-drive procedure the manual does not mention is that you must change your working directory to the drive that contains your data disk.

Summary

Elite Software has missed the boat on some important considerations with this program. If you are looking for the flexibility and device compatibility you have come to expect from OS-9, there are other OS-9 word processors on the market. However, if your application for the program allows you to put aside the shortcomings outlined here, this word processor proves more than capable of meeting its advertising claims. Elite-Word/OS-9 has many of the best features of the finest word-processing programs available for the Color Computer. And despite its documentation drawbacks, many people will find the program easy to learn. It is a very useful program for buyers who want extensive cut-and-paste capabilities, a legible character set, and a reasonable price. ■

Elite-Word/OS-9 is manufactured by Elite Software, Box 11224, Pittsburgh, PA 15238, 412-795-8492. It requires 64K, OS-9, and a disk drive. It comes on an OS-9 disk for \$79.95 plus \$3 for shipping.

File One, File Two, Fire Three

by John Ogasapian

	ease of use	documentation	performance	error handling
6				
5				
4				
3				
2				
1				
OVERALL RATING				3.50
Application Software				

The world of cassette database-management systems struggles with nagging tradeoffs. They are usually among the most "RAM intensive" of programs—a drawback that offers some advantages. For instance, a truly fast sort is possible only when the machine-language sort routine is applied from an in-memory program to a body of in-memory data. But the more versatile and attractively formatted a cassette-based database manager is, the more RAM it uses. Every byte used for

these purposes limits data capacity.

The larger capacity cassette-based file-management programs have little more than about 20K bytes for storage, though a program written in machine language can occupy the upper 32K bank of a 64K machine. Radio Shack's Color File ROM pack is probably the nondisk file program with the largest capacity. But it has drawbacks, such as having only one print format. Cassette-based file-management programs are restricted to

small data-storage capacities in economic configurations. Programming such software requires that you delicately balance features, formats, and capacity.

With these thoughts in mind, File One and File Two, small-scale cassette-based file-management systems from West Bay Company, are well-programmed file managers with help routines, sound signals, prompts, and a good selection of print format routines.

File One stores records in free form. It does not call for field titles; instead, each record accommodates prose notes and data in 10 lines of 32 characters each, to a total of 200 characters per record. The documentation states that the program has a capacity of 140 records in 200-character increments, but this is not supported by the amount of RAM available from the program. File One is a handy tool for student research notes, commentaries, synopses, recipes, and other free-form formats. It has the search-by-character or -string routine found in File Two. Each line functions as a field in File One and is subject to an alphanumeric sort.

File Two offers calculating capabilities within selected fields. It also has alphanumeric sorting; user-definable fields; search by key words, numbers, or both; file viewing one by one; and save and load to and from cassette or disk. Its main menu screen indicates a capacity of as many as 60 records in each of 10 files. The RAM left over after File Two is loaded in is not sufficient to support all possible parameters at capacity. But you can always check on available memory because it is displayed in bytes on the main-menu screen.

Despite the warning about storage space in cassette-based databases, the capacity of File Two is not skimpy. It also functions smoothly and has a well-designed format. It does a bang-up job of storing, manipulating, and printing while offering a large variety of options for database formats of modest dimensions, including personal information, card files, mailing lists, and similar structured materials.

File One and File Two are easy to use. The documentation that comes with them is con-

cise. They also share an excellent help routine accessible from the main menu. Their error trapping is based on the GOTO 1000 command. Something to note: These programs come with a PCLEAR 0 routine for cassette operation (POKE 25,6:NEW) as part of their loader. This command must be altered if you attach a disk controller during use because the address is otherwise occupied. The manual gives you simple alternative commands.

File Two will fill the needs of anyone seeking a small, standard-format, file-card-style, database program for addresses and other small-field oriented uses. File One is better suited to creative, large-field data that does not fall neatly into categories. These programs are well thought out and well worth their modest prices. ■

File One and File Two are available from West Bay Company, Route 1, Box 666, White Stone, VA 22578. They require a minimum of 32K and come on cassette. Each program sells for \$20.

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Seesawing on *The Color Computer Playground*

by Richard Ramella

	organization thoroughness	production readability	quality
6			
5			
4			
3			
2			
1			
OVERALL RATING 3.75			
Books			

The *Color Computer Playground*, by Fred D'Ignazio, comprises 42 simple Color Basic programs. It is likely to interest kids from first to fourth grades. Although the book does not make this claim, it is my guess that the listings will also work on the MC-10.

Young Color Computer veterans, who were weaned on Extended Color Basic graphics

and wore out their first joysticks in a month, might find the games simplistic and the educational emphasis somewhat overbearing. The book's ideal audience might be an adult Basic beginner working on behalf of a young child who is new to computers. Together, they could have a great deal of fun with the programs.

The Color Computer Playground's format is sharp; its listings are presented in large type. Its programs are short and yield quick results for the determined typist. Each of its games comes with the following sections: an explanation for parents and teachers, an imaginative introduction for kids, the listing, typing hints, highlights explaining the program, a variable list, and suggestions for expanding or enhancing the listing.

The book begins with routines for a happy and a sad face. You can plug these into many of the programs to signal right and wrong

answers. There are other program divisions: the alphabet, words, numbers, color, music, drawing, knowledge, hand-eye coordination, foreign language, and imagination. Experienced Basic programmers might become impatient with *The Color Computer Playground's* listings because they are simple enough that they could be reduced in length by half in many cases. However, this style is perfect for beginners because it makes Basic's logic easier to follow.

The author used the input of high-school computer students to write many of the book's programs. But you can find some of *The Color Computer Playground's* ideas in magazines and other books. I rate the book highly in production quality and writing style. But in my tests, a 9-year-old with much computer experience scoffed at the programs he entered. "It's just school stuff, not good games," he pronounced.

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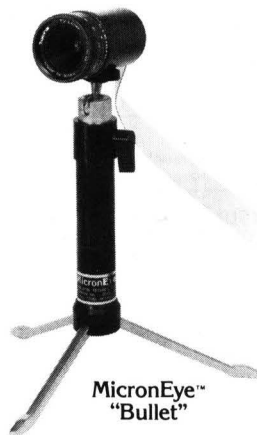
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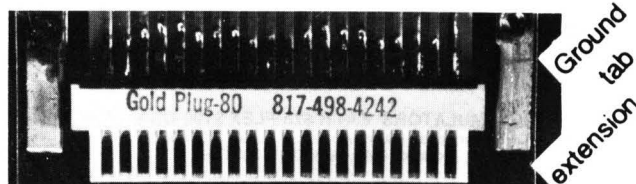
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A kindergartener enjoyed some of the book's activities, but I had to type the listings for her. An 11-year-old read the book's introduction and apologetically went back to her Judy Blume book. I could not interest any

of my kids in *The Color Computer Playground* for long. It might help to offer cassette or disk copies of the listings so that younger audiences could use the book for instructions on play. ■

The Color Computer Playground was written by Fred D'Ignazio and is published by Tandy, Fort Worth, TX, 1984, softcover, 225 pp., \$7.95 (catalog no. 26-3196).

Inspecting Space Frame

by Gary W. Clemens



	ease of use	documentation
	performance	error handling
6		
5		
4		
3		
2		
1		
OVERALL RATING 3.50		
Application Software		

Space Frame from Kage Engineering is a program designed to help structural engineers. It is an unusual program to find available for the Color Computer because comparable software is usually designed for much larger computer systems. It uses a modeling technique called finite-element analysis to evaluate the stress and strain that occur in complex man-made structures. Space Frame is a simplified version of the finite-element modeling program used on

larger systems. It supports only "beam elements," and loads can occur only at "nodal points."

The finite-element approach breaks a structure into simple members (or beam elements) and defines the locations of the ends of the members (or nodal points) in three-dimensional space. When a structure is designed in this way, force must be applied to the nodal points to test it. The computer uses the resulting information to construct a

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mathematical model and solve the problems of deflection, stress, strain, and force occurring in each element. Some typical uses for this kind of application include designing trusses or utility-line towers. (See Figs. 1 and 2.)

Program Operation

The cassette and disk versions of Space Frame contain two utilities in addition to the main program. The first provides an extra 8K of memory in 64K systems by moving Color Basic to RAM. The disk version of this utility also locates Extended Color Basic above Disk Extended Color Basic. The second utility draws a graphics representation of the model in PMODE 4.

The disk version of Space Frame includes a third 64K utility for relocating the graphics pages in the upper half of memory at hexadecimal address E000 and a sample program of a truss. Space Frame supports print routines with options to print the entire model or input data only. Although disk and cassette versions are available, they are not interchangeable. Neither version contains I/O (input/output) routines for the other memory medium.

Space Frame and its extra utility programs are compatible with JDOS from J & M Systems. The exception to this is the ROM-relocation routine, which is also incompatible with Disk Basic version 1.1. Space Frame and some of its utilities are written in Basic; the other utilities are written in machine language. All the programs can and should be backed up. The easiest way to use the disk version is to copy the program and attendant utilities onto new data disks as you fill up the old ones.

Performance and Ease of Use

The Space Frame package of programs is interesting just for some of the programming techniques it employs. Its routines for moving ROMs and video pages are "neat," as my teenagers say. The program performs the math routines within the generally accepted limits for structural engineering problems. I verified some simple two-dimensional models by using hand calculations and another kind of program. My results closely agreed with those of Space Frame.

The program's numeric data-entry routines are a breeze to use. You can correct mistakes during entry or with the editing routines the program offers after you enter each group of data. The prompt routines use both text and sound to indicate the kind of information the program requires.

You have two opportunities to save information to disk or cassette. The first comes after all data has been entered, the second

"Space Frame's numeric data-entry routines are a breeze to use. The prompts use both text and sound to indicate the kind of information the program requires."

after all calculations have been made. The save routine requests you to type your name, the file and model names, the date, and comments. This is a nice touch, but the input routines for this data are incomplete. You cannot make mistakes while typing this information because the program doesn't offer an editing routine here. You can't even backspace to correct a typo.

The disk I/O routines are another area containing imperfections. Once you select the option to load a previous model from disk, the program displays a catalog of each of the models on the current disk. It does not support multiple disk drives; if you use a separate data disk, you must switch disks before responding to the load prompt. You can avoid some confusion by using the same disk for both programs and data, but this limits

you to a maximum of nine models per disk because Space Frame and its utilities use 21 granules of disk space. Cassette operation is similar to the disk version without the catalog feature. It offers a high-speed POKE option.

When you save a model to cassette or disk, Space Frame actually saves the data in five separate ASCII files. For disk systems, this uses up an extra granule for each data file, or five granules per model. Because of the single-drive limitation, Kage Engineering should investigate a more efficient means of storing data for disk users.

As Space Frame loads each data group from cassette or disk, it displays every keystroke of the original input, including all the prompts. Then the data is redisplayed in the edit routine. The program authors could reduce loading time significantly if these unnecessary screen displays were omitted.

Error Handling

This program employs two methods of error handling. It screens all data entry to check the data against preset limits, rejecting out-of-range entries with both audio and visual error indicators. It also screens out and rejects nonnumeric data during the data-entry routines.

When you run Space Frame, the clear key

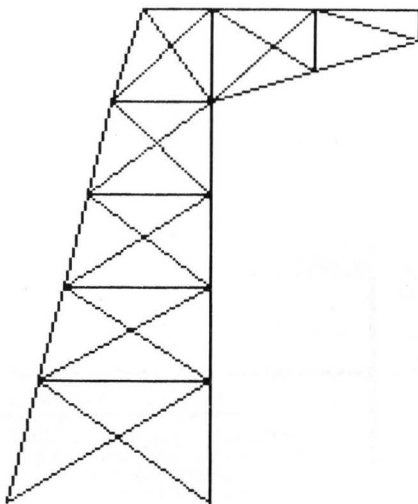


Fig. 1. A Screen Dump of a Tower Model Designed with Space Frame

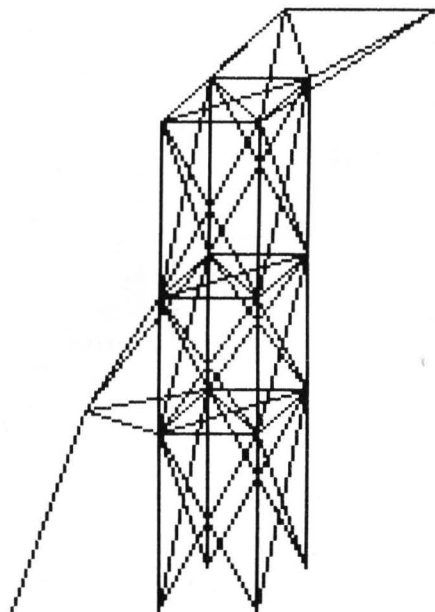


Fig. 2. A Screen Dump of a Utility-Line Tower Model Created with Space Frame

is disabled, but the break and reset buttons are active. Pressing the reset key while in the 64K, all-RAM mode either locks up the computer or forces a cold start. Your only recourse if this happens is to start over.

The easiest way to verify that your model is defined correctly is to display it and look for missing or mislocated elements and nodes. Space Frame provides graphics capability within a modified version of the program and with a display-only utility. However, the graphics-display utility does not work with the ROM-relocation utility, a restriction that limits its use to small models only. You can view most larger models by using the utility that relocates the graphics screen to the top of memory, but it is also possible to create a mathematically correct model that is too large to display graphically.

Documentation

The user's manual consists of 23 pages of

instructions and sample problems. It does not inform the reader about finite-element theory, but does cover actual program operation thoroughly. The manual provides examples of system requirements and discusses data-entry criteria, prompts and user responses, loading the program, and saving and loading models with cassette-based systems. A separate single-sheet insert briefly explains each of the program's disk routines.

Space Frame's documentation is more than adequate for cassette I/O and explains system prompts and expected user responses thoroughly. It could explain the various disk modules (especially their memory requirements) and maximum model sizes more clearly.

Summary

Space Frame is a unique program written for a small minority of Color Computer users.

Few *HOT CoCo* readers will have a serious need for this program. But if you are at all interested in finite-element theory, you should try this program. ■

Space Frame is manufactured by Kage Engineering, P.O. Box 3010, Lakewood, CA 90711-3010, 213-866-1998. It requires 16K for the cassette version and 32K for the disk version. Extended Color Basic and a printer are optional. It sells for \$50.

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Circle Reader Service card #91

Testing SDisk and Bootfix

by Jeffrey S. Parker

	ease of use	documentation
performance	error handling	
6		
5		
4		
3		
2		
1		
OVERALL RATING		3.75
Application Software		

SDisk and Bootfix are utility programs from D.P. Johnson designed to let you get more from your OS-9 disk system. They let you use double-sided, double-density, 80-track disk drives, for example. Standard Radio Shack disk drives are 35-track, 18-sectors-per-track, single-sided, double-density drives. This is the only drive format you can use with the Color Computer—even using OS-9—unless you have this package or one like it.

SDisk is a device descriptor that gives each drive two descriptors. The first emulates the regular Radio Shack format so that the computer perceives your non-Radio Shack drives as the real McCoy. The second provides the actual capabilities of your drive with an OS-9 format. The OS-9 format is the standard used on systems "other than the Color Computer," according to Radio Shack.

Bootfix is designed to let you boot SDisk-formatted disks; it enables the system to rec-

ognize and read whatever kind of disk you have formatted for a given drive. Bootfix also permits direct reads and writes to and from a specific sector on a given track and drive. The package offers commands for formatting a track and freezing, unfreezing, and restoring the head to track 0.

SDisk is easy to use. It comes with instructions on loading and starting the SDisk program that vary depending on your disk-drive configuration. After loading and linking SDisk, the DESCGEN command (which generates SDisk's device descriptors) autostarts and begins transfer of files to the new source disk. Then it gives you prompts for disk swapping and drive configuration. When the program ends, you have a new system disk ready for OS-9 Boot; it has the Sformats installed in the I/O (input/output) modules. If your copy of SDisk does not include Bootfix, you must manually transfer the OS-9 Boot file.

A nice feature of this automated file-transfer and module-rebuild routine is an on-screen check of the program; it displays its activities on your monitor. This can come in handy if, for example, you encounter an error during file transfers.

SDisk has its shortcomings. The most notable is that while it is in the process of reconfiguring the drive attributes, the keyboard will still accept input. An accidental key press could force a cold reboot of OS-9, which would require you to start the entire 20-minute process over from scratch. SDisk is also limited to use with a maximum of three disk drives, it

cannot configure four-drive systems.

Novices take note. Another drawback of SDisk is that its manual is designed for knowledgeable users. It expects you to have more than a passing familiarity with OS-9. While the manual is no more than adequate for knowledgeable users, it does describe patches, commands, and file transfers, and give examples for configuring drives and disks. To flesh out the documentation, D.P. Johnson includes a disk directory called DOCS. It contains updated information, hints and tips on usage, instructions on how to use a sophisticated SDisk module called Modbuster to maintain disk files, and additional documentation for SDisk. Like the manual, DOCS is geared to knowledgeable OS-9 users.

SDisk and Bootfix are utilities for owners of double-sided, multitrack drives who have been unable to make full use of their hardware's extra features. Despite some shortcomings in error trapping and documentation, the SDisk/Bootfix package offers compatibility with other OS-9 programs, such as Frank Hogg Laboratories' O-Pak, making it valuable software for serious OS-9 users. ■

SDisk and Bootfix (revision 3, edition 24) are available from D.P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223, 503-244-8152. They require 64K, one disk drive (two or more drives desirable), and OS-9. The SDisk/Bootfix package sells for \$35.95. D.P. Johnson sells SDisk separately for \$29.95 to customers who do not own a double-sided drive 0.

Sizing Up Some of Matchmaker

by Dennis W. Peterson

The Matchmaker educational series from American Educational Computer offers a lot for your money. The package boasts several topics and includes four teacher-oriented authoring applications. The programs covered by this review are U.S. Geography Facts, World Geography Facts, Grammar, and Vocabulary.

Students will find the software easy to run. Each lesson contains 10 objective-test questions in true/false, multiple-choice, correct-the-wrong-word, and fill-in-the-blank formats. Multiple-choice questions present several answers from which you choose. To respond to a question, you type out the answer. Entering a wrong letter in a response

tallies up an incorrect answer. When you type a correct word, it appears in the answer blank. Fill-in-the-blank questions allow you to guess the letters in an answer. Every occurrence of a letter in the correct answer will appear in the blank if you guess it. Guessing three incorrect letters elicits the scoring of an incorrect answer.

Students who get seven or more correct answers on two lessons can select a brief maze game as a reward. Although the game is enjoyable, most students will probably skip it after a time; it appears on all the Matchmaker software reviewed here.

You probably wouldn't expect 35 or more lessons per disk, but that is what these Matchmaker programs offer. And if a topic you want to teach is not covered, there is a feature that lets you create and edit programs that you can store on a separate disk.

Other special features let you use a printer to compare your responses to the correct answers or print questions with answers for study purposes. The Matchmaker "Hall of Fame" screen lets you keep a record of high scores on disk, the way commercial video games do. This is handy if you are using the software with a group of students.

Documentation

The user's guide does an adequate job of explaining how to load and run the Matchmaker programs, but I ended up calling the manufacturer to clarify the create-your-own-lesson features. American Educational Computer stands behind its products; you'll find helpful service if you need to call them. The problem is that you shouldn't need to call them over the documentation. The Matchmaker programs could use clearly written and typed documentation that is free of promotional material. It should be directed specifically to the Color Computer.

Geography

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 3.75			

U.S. Geography Facts

Some of the lessons in U.S. Geography Facts focus on terms and concepts that are also taught in earth science classes. They provide as good an introduction to physical geology as to U.S. geography. The program's other lessons contain what you expect from a U.S. geography program—regional study of the country. Although the single disk does not hold enough information to cover the topic in as much detail as you might like, the lessons can provide a useful review or over-

view. I encountered a couple of questions that were confusing, but the vast majority are well worded.

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 3.50			

World Geography Facts

World Geography Facts starts with the same lessons on terms and concepts that begin U.S. Geography Facts. They provide a strong introduction to either geography package. The rest of the lessons continue in the same fashion as those of the U.S. geography program. They won't be as complete as a geography text; trying to fit the world on a disk is even more unlikely than trying to fit the U.S. But the facts the program presents form an excellent primer on the subject. The geography programs will be of interest to seventh- through eleventh-grade students.

Grammar

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 3.25			

Grammar

Like those of the geography programs, Grammar's lessons are designed in the objective-test, drill-and-practice format. The lessons cover the fundamental points of grammar and are of use to middle-school students, or older learners who need review or remediation. This program provides what you might expect to find in a fifth-grade language text. As with geography, there is too much grammar information to fit on one disk. Therefore, the program does not cover the perfect tenses, but most students will learn a great deal by studying participles. The program also contains many activities related to usage, parts of speech, simple tenses, and modifiers. There is so much that kids don't know about grammar that this is a good start.

Vocabulary

	meets objective	maintains interest	documentation ease of use
6			
5			
4			
3			
2			
1			
OVERALL RATING 3.00			

Vocabulary

Vocabulary contains lessons on antonyms, synonyms, homonyms, word meaning, context, and just about everything kids need to learn when they come back to school from a beach vacation using expressions such as "grody to the max!" The program includes a study on similes and metaphors that is somewhat confusing. Students must determine what terms in the lesson sentences are being compared with a simile or metaphor construction. As a teacher, I felt that some of the comparisons were unclear, and a couple seemed incorrect. It is possible to skip this part of the program (and perhaps create a similar lesson of your own) while using the other lessons to supplement reading and teaching skills.

Brass Tacks

The word "excellent" is misspelled in all the programs in this package. On the vocabulary disk, one lesson confuses "stationary" with "stationery." The geography disks share an excellent lesson on geography/earth science terms. Lessons in all the packages have good potential for supplemental classroom use, even though the packages are labeled "home version." These programs do not have school versions; the authoring systems are the school-version part of the Matchmaker series. Teachers and parents should preview lessons before using them because of the shortcomings mentioned above. However, the good points of these programs far outweigh the bad. ■

U.S. Geography Facts, World Geography Facts, Grammar, and Vocabulary are available from American Educational Computer, 2450 Embarcadero Way, Palo Alto, CA 94303, 800-222-2811. They require 32K and a disk drive. They sell for \$19.95 each.

Assembly 101

by Victor and James Perotti

Different Commands Different Assemblers,

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 assemblers will work, but the programs may require some additional modification. The documentation that comes with your software should provide the commands you need.

Many years ago we bought an SDS80-C as an expensive present for ourselves. It is a popular ROM pack editor, assembler, monitor, and debugger from The Micro Works. Tandy sells a similar ROM pack called EDTASM+. Both of these are very nice packages, but both use the cassette for storage. We have since moved on to Micro Works' disk software, Macro-80C, and find it much easier to retrieve programs from disk.

Each brand of editor/assembler uses different commands in its editor, different commands to assemble the text from the editor, and different commands to run the binary code. It would be confusing to attempt to give several different sets of commands in this column, so, as the introductory note states, we'll write the programs for the Macro-80C

and provide changes for EDTASM+. If you're using any other brand of editor/assembler, it's up to you to make the modifications necessary to run our programs with your utility. The documentation that the manufacturer includes with the product should provide all the necessary commands. If you want more information, William Barden's book, *TRS-80 Color Computer Assembly-Language Programming* (Radio Shack, cat. no. 62-2077) does a nice job explaining how to use EDTASM+. Don and Kurt Inman's *Assembly-Language Graphics for the TRS-80 Color Computer* (Reston: Reston, VA, 1983) discusses the commands for the SDS80-C.

Debugging the Programs

Each of the assemblers has a monitor or debugging feature. What really happens when a program crashes is that one of the registers controlling addresses goes astray, letting the program store junk everywhere, until it eventually writes over something like the screen controller. The technical name for this loss of control is going to Lala Land. The ZBug, ABug, CBug, or DCBug with your assembler is invaluable in figuring out what went wrong.

The trick in debugging the program is to

stop the execution before it blows everything away, have it jump to the Bug program, and then check the registers with a register dump. It is easy, once you get the hang of it. When the Bug program is running in the background, an SWI instruction in your program interrupts execution and jumps to Bug. So with EDTASM+, start with ZBug, enter a breakpoint or SWI with the Xlabel command, run the program with G, and upon returning to ZBug, dump the registers with R. It's the same way with Micro Works' products: Insert an SWI, which is \$3F at a critical point or the end, run the program with G, and dump the registers with R.

We use the screen address in many of the sample programs we are describing; either the X or the Y register will hold that address. When the register dump appears, that X or Y register should be in the \$0400 to \$0600 range. The absence of an address is a symptom of the problem. Often the cause of the problem is a poorly controlled loop: The COMPARE and BRANCH instructions are not working correctly. When programs run but do weird stuff, a check of the A and B accumulators can be revealing.

Breakpoints, which halt execution and jump to a Bug program, should be put in at critical points. Make sure that all the registers are correctly loaded before the critical

System Requirements

16K RAM
Color Basic
Editor/Assembler

- Print and Erase displays text and erases with left arrow.
- POLCAT gets a character from the keyboard, saves CHR in A, and increments the cursor location.
- PRINT displays CHR in A at cursor location, but does not move cursor.
- CURSOR is the storage address for the cursor display.
- These three subroutines work together.
- GO is the main part of the program.

Program Explanation

0001 A1B1	POLCAT EQU \$A1B1	GET CHARACTER
0002 A30A	PRINT EQU \$A30A	PRINT ROUTINE
0003 0088	CURSOR EQU \$088	ADDR OF CURSOR
0004 A928	CLS EQU \$A928	CLRS THE SCREEN
0005 A027	BASIC EQU \$A027	WARM STRT BASIC
0006 0400	VIDRAM EQU \$0400	TOP OF SCREEN
0007 086E	START NAM CURSOR	
0008 086E BDA928	JSR CLS	CLEAR SCREEN
0009 0871 8E0440	LDX #VIDRAM+64	PUT CRSR 2
0010 0874 9F88	STX CURSOR	LINES FROM TOP
0011 0876 BDA1B1	JSR POLCAT	CHECK KEYBOARD
0012 0879 8103	CMPA #03	IS IT THE BREAK
0013 087B 2713	BEQ DONE	RETURN TO BASIC
0014 087D 8108	CMPA #08	LEFT ARROW?
0015 087F 2709	BEQ LEFT	
0016 0881 BDA30A	CHROUT JSR PRINT	DISPLAY CHR
0017 0884 3001	LEAX 1,X	MOVE CRSR AHEAD
0018 0886 9F88	STX CURSOR	
0019 0888 20EC	BRA GO	DO IT OVER AGAIN
0020 088A 301F	LEFT LEAX -1,X	MOVE CRSR BACK
0021 088C 9F88	STX CURSOR	OVER OLD CHAR
0022 088E 20E6	BRA GO	
0023 0890 7EA027	DONE JMP BASIC	RETURN TO BASIC
0024 0893	END START	
BASIC A027	CHROUT 0881	CLS A928
DONE 0890	GO 0876	LEFT 088A
PRINT A30A	START 086E	VIDRAM 0400
		CURSOR 0088
		POLCAT A1B1

Program Listing, Print and Erase

loop begins and put a breakpoint in before the loop. Remember the pound sign, #, which means that the register picks up the absolute number rather than the contents of memory. A register dump will show that. Stop the loop after it has run through once and check the registers; all kinds of surprises are possible.

Debugging with breakpoints and register dumps is the fastest and best way to diagnose and fix a fouled-up program. After it is running, don't forget to remove the breakpoints that you stuck in with the editor.

Ending the Program

When the program has run, you'll usually want to jump back into Basic. But if you are using one of the ROM pack assemblers, it is likely that, at least during the development of programs, you will want to jump back to EDTASM + or SDS80-C. If you run a binary program from Basic (e.g., CLOADM"LINE":

EXEC), the END command will normally return you to Basic. If you want to be absolutely certain that you won't end up in Lala Land, end your programs with a jump to Basic's ROM address: JMP \$A027. If you run your programs from the ROM pack, and you would like to return to EDTASM + or SDS80-C, conclude your program with an SWI instruction.

Displaying Text and Adding Backspace Delete

Think of Basic, stored in ROM, as a large collection of machine-language subroutines. It is far easier to incorporate the ROM subroutines into your program than to write something comparable. There is a danger, however. Tandy keeps changing ROMs in the Color Computer; the POLCAT routine used in the program listing, Print and Erase, has been moved in the new 1.1 ROM! If you are writing software for sale, it is important to watch your ROM calls and make different

versions for different ROMs—just change the addresses in the EQUATEs section.

Print and Erase uses two of the most popular ROM subroutines: POLCAT and (screen) PRINT. POLCAT gets a character from the keyboard and stores it in the A register. PRINT takes a character from the A register and prints it at the location to which register X points. Obviously, they work nicely together; POLCAT passes the character from the keyboard to PRINT using the A register.

If you're using EDTASM +, change line 7 to ORG \$0E00 and delete START in line 24. After you assemble the program, type EXEC &H0E00 to execute the program in Basic.

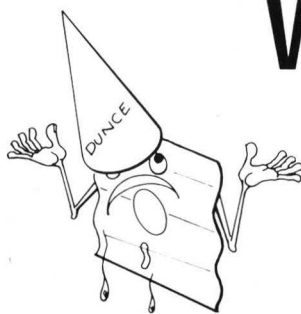
The trick with a screen editor is to control the location of the cursor and, in that way, gain access to the specific screen address that needs to be altered. If you've entered a wrong character, positioning the cursor on that character's address makes it possible to print something else at that location. You can either erase the character, which is equiva-

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Hot CoCo—May 1985
Assembly 101; by James and Victor Perotti

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lent to printing a blank, or substitute another letter for the wrong character by writing over it. So how can you control the cursor? It's not too difficult.

Controlling the Cursor

There is a cursor storage location at \$088 that holds the screen address at which the cursor will be printed. Change the address in that cursor storage location and the cursor will move when POLCAT is used. As an example, line 9 of the Listing has LDX #VIDRAM + 64, and line 10 STX CURSOR; VIDRAM is equivalent to \$400, the top of the screen address. Adding 64 more characters or spaces moves the cursor down two lines to the beginning of the third line. Line 9 gets the new address for the cursor, line 10 sticks it in the cursor's storage location, and POLCAT prints the blinking square.

The program begins by clearing the entire screen and loading X with VIDRAM + 64,

\$440, and then storing that as the cursor's address. In the main part of the program, there is an immediate jump to POLCAT to check for a key press. The next four lines check to see if you pressed the break key, signaling the end of the program, or the left arrow key, indicating a need to backspace and delete. If you pressed any other key, the program moves into the CHROUT routine. The letter that POLCAT put into A is now printed on the screen at the cursor position. Both register X and the CURSOR storage location hold that address, and the LEAX 1,X instruction, which is stored in CURSOR to update it, increments the address by one. The program then always branches back to check for another key press, since the break key controls the looping.

Backspace and Delete With the Left Arrow

You can use the left-arrow (backspace) key

to delete the character to the left of the cursor by, in effect, moving the cursor backwards over that character. A branch out of the main subroutine with CMPA #08, BEQ LEFT accomplishes this. Compare the keyboard character in the A register with 08 (the value of the left arrow). If A contains 08, branch to the left subroutine. The left subroutine decrements register X, which holds the screen address, sticks it into CURSOR, and returns to the main subroutine. That is really all it takes. ■

Address correspondence to Victor and James Perotti, 163-D Pine Grove Heights, Athens, OH 45701.

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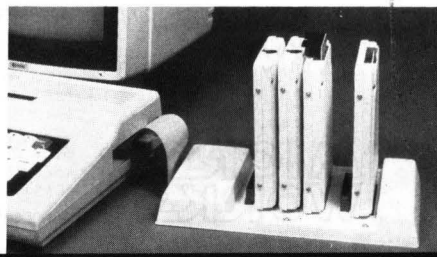
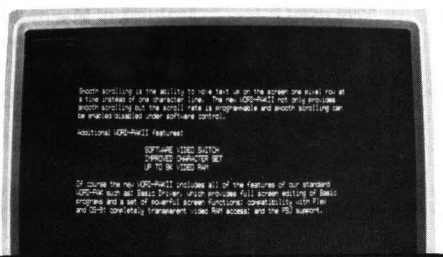
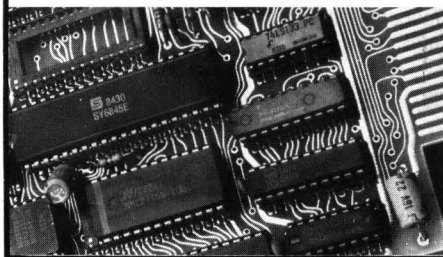
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Coming Next Month

Computers have certainly made their mark in education, and no computer is better suited as a learning aid than the Color Computer. Next month, we're doing something very special for those of you who use CoCos either in the classroom or to enhance your children's education at home.

October's *HOT CoCo* contains 32 pages of type-in listings, reviews, commentary, and advice related to educational uses of the CoCo. We tell you how you, as a parent, can contribute to your local school computer program, and how you can access educational resources via modem.

Our type-in program listings include Rob Ainscough's Terms, a generic study aid. You enter vocabulary words and definitions and the CoCo generates a multiple-choice quiz—a great way to get ready for that big exam.

John Griggs' World Geography program is nothing less than a masterpiece. It creates all seven continents, with all countries outlined, in high resolution. You can name countries, capitols, oceans, mountains, and seas. Or you can ask the program to name them for you. It is a mini-atlas in your CoCo.

We also review TCE's Child Writer program. Child Writer is a word processor that makes use of a mouse to create click-down menus. It is easy enough to use that one school has its second-graders doing class work on it. And we review Tandy's new Super Logo, which looks like a serious contender for the King of Logos title.

Don't care about educational uses for the CoCo? Not to worry. We still have Eric White's Sketchpad program. Many of you have drawing devices—X-Pads, Touch Pads, or Color Mouses (Mices?). Eric's program enhances the capabilities of all these so that anyone can produce respectable graphics with a minimum of effort.

Steve Brown shows you how to squeeze more speed from Basic programs, and Larry Landwehr presents a utility to lock up data stored on cassettes.

October's *HOT CoCo* is one more reason to look forward to the fall. ■

Product News

by J. Scot Finnie

Child Writer, the Latest from Computerware, Colorburst, Testmaker, Hot Dog Stand, Socrates, the PenGraph EB50, Ultra—an Odds-On Favorite—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.

TCE made a big splash at Rainbowfest in Chicago this spring. The company demonstrated **Child Writer**, an innovative word processor for children of all ages and first-time computer users that incorporates mouse technology, a notepad feature, and what TCE calls "click-down" menus. Click-down menus could do for the CoCo what pull-down menus did for the Apple Macintosh. They allow you to look at Child Writer's menus without leaving your file. A separate box at the bottom of the screen describes the function of each command you point to with the mouse. Child Writer's classy appeal and special features were well received in Chicago.

TCE began research and concept planning for Child Writer, the first in the Child's Play series, more than 18 months ago. The Child's Play concept encompasses a full spectrum of business-oriented programs. (For more information about the Child's Play series, see the Product News column in the June, 1985, issue of *HOT CoCo*, p. 88.) When several school systems in which TCE tested Child Writer concluded that the program might be useful at the second-grade level, the company decided to launch a three-part word-processing series. Set for release sometime soon, Memo Writer will offer additional features for home word processing. Business Writer will

offer business-oriented features. Look for an in-depth review of Child Writer next month in *HOT CoCo*.

Tech Row

Computerware has several new releases this month. Following in the footsteps of Color Connection II, **Color Connection III** is the company's new terminal program. It has a 42K buffer and can up- and download files even bigger than that. It gives you CompuServe's Protocol B, xmodem protocol for up- and downloading directly to and from disk, and automatic xon/xoff protocol for downloading directly to disk. It also provides support of smart-modem features, including auto-dial and autoanswer for Hayes and Radio Shack modems. In addition, it has selectable printer baud rates. You can also print the buffer directly from the program. Color Connection III requires 32K and a disk drive. It sells for \$49.95 plus \$2 for shipping.

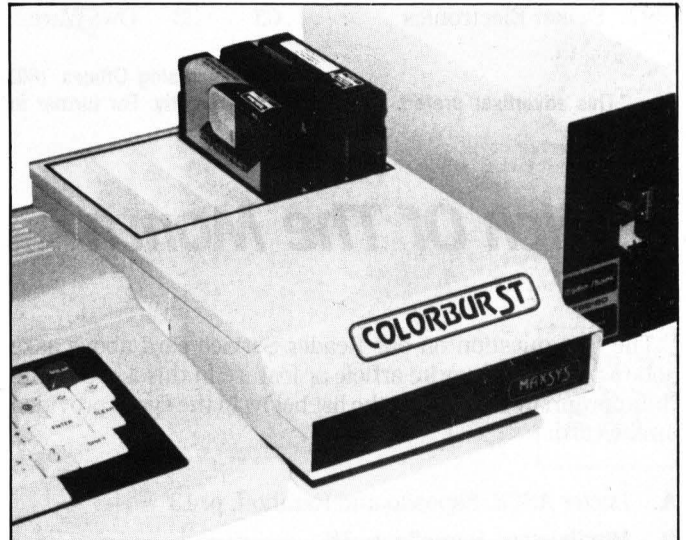
Also from Computerware this month are three OS-9 utility programs: the **OS-9 Macro Conditional Assembler**, the **OS-9 Text Formatter**, and the **CBUG Debugger for OS-9**. The Macro Conditional Assembler supports all standard 6809 assembler mnemonics and directives. It can take on macros, conditional assembly, repeat sequences, and the inclusion of source library files. The assembler can also handle any size source input file. It sells for \$49.95.

The OS-9 Text Formatter interfaces with any editor that produces ASCII text files, such as Computerware's Advanced Editor and Radio Shack's TS/Edit. Its features include centering, page numbering, special margins and spacing, footnotes, page

headings, and dynamic dates. It sells for \$34.95.

CBUG is a screen-oriented debugger that has a built-in disassembler, single-step capabilities, memory window, and access to the OS-9 shell. It even has a built-

vice. Maxsys also intends to release the programmer's panel option, an EPROM-burner panel that snaps into the front of Colorburst. The price for Colorburst ranges from \$570 for 64K to \$999 for the 1-megabyte upgrade.



Maxsys is bursting the mold with new technology.

in hexadecimal calculator. It sells for \$39.95. Each of the three utilities requires 64K, a disk drive, and OS-9.

An interesting new product on the Color Computer market is **Colorburst** from Maxsys. Colorburst is a hardware device that can add as much as a megabyte of continuous memory to your RAM—no need for bank switching. It has a ROM chip containing a print spooler, RAM spooler, and disk cache in memory. Optional controller card and software provide floppy-disk and hard-disk capability for all sizes of drives. Colorburst offers six software-selectable expansion ports and one for a disk controller. It is Radio Shack DOS and OS-9 compatible and designed to run with a parallel printer or other parallel de-

Education And Instruction

With back-to-school time approaching, it might be a good idea to think about education. Saguaro Software (pronounced sa-wha-ro) has an interesting program for teachers called **Testmaker**. It generates true/false and multiple choice tests that you can print or display on screen. Testmaker offers an unlimited number of files with 160-character questions and 29-character answers. It also has an editor for writing questions and allows you to print out an answer key. Testmaker requires 16K and a disk drive. It sells for \$29.95.

Sunburst Communications has released another new educational program for the Color

Computer. **Hot Dog Stand** is a simulation for grade 6 to adult that uses real-life concepts to develop fundamental math and business skills. Hot Dog Stand's premise is that of a snack concession at a school athletic field. The objective is to build \$200 of initial capital into \$2,500 by the end of the football season. To accomplish this, players buy, price, and sell varying quantities of hot dogs, buns, soda, and potato chips. Other variables come into play, including weather, crowd size, food perishability, and pricing. Hot Dog Stand requires 32K and a disk drive and sells for \$55. Computerware recently released a similar simulation program called **Franchise**.

Timothy McIlwee sent *HOT CoCo* a copy of his program **Addition & Subtraction of Fractions & Mixed Numbers**. It is written by a math teacher and designed to walk students through every step of a problem. It also advises students on how to correct errors. There are nine entry levels. The program adjusts the level of play depending on performance. Addition & Subtraction requires 16K and Extended Color Basic. It sells for \$10.

Arrakis Technologies, creators of the Arrakis Advantage series of educational programs being marketed by Prentice-Hall for other computers, has created a new authoring language and development system called **Socrates**. The new system will allow the company to transfer programs from one computer to another more easily. It also presents text, graphics, and sound in an entertaining manner. With Socrates, users can question the computer and request answers to problems in everyday language. As a result, nontechnical people can program the system quickly and easily. Socrates is expected to reduce the price of Arrakis' educational programs because it will cut development costs. Rumors in the industry hint that Socrates could become a standard used by several software companies.

Cybertron Inc. has introduced **Cybertron Forth**, a language and instructional package. Forth

is a modern, interactive programming language that you can use to create and store software systems or games of your own design. Cybertron Forth can be used by beginners and professionals alike. The package comes with all the features you need for applications development, an instruction book for getting started, and a comprehensive manual on the language. It includes full source listings for experienced users as well as programs to assist beginners in learning the language. Cybertron Forth is available on cassette or disk and sells for \$55.

The Microsearch Database, the largest on-line database in the country devoted to microcomputers and microcomputer products, is now available in printed form. The first edition, **Educational Resources for Microcomputers: The 1984 Software Dictionary**, covers educational software released in 1984. It combines product specifications with product reviews from microcomputer magazines. Subjects covered include English, social studies, mathematics, science, language arts, educational games, thinking skills, and problem solving. *Educational Resources for Microcomputers* sells for \$27.50.

The **Electronic Edition** of the *Academic American Encyclopedia*

is now accessible from the 15 public and school libraries affiliated with SELCO (Southeastern Libraries Cooperating), the regional agency for public libraries in southeastern Minnesota. The database contains 31,000 articles and more than 10 million words. Librarians do all Electronic Edition searches at this time, but the company hopes to make searches available to library patrons on public-access terminals. The encyclopedia contains articles on science, technology, politics, business, law, the arts, social sciences, and a full range of historical data. The Electronic Edition is published by Grolier Electronic Publishing Inc.

Doubleday & Co. has released a new instructional book called **Computer Typing Made Simple**, by Betty and Warner A. Hutchinson. It offers complete instruction on typing with your computer, including explanations of common word-processing concepts and simple print formatting. The large softcover book contains black on white diagrams and runs 111 pages. It sells for \$4.95.

Computing Aids

Anchor Automation, manufacturer of the Volksmodem, has released the **Signalman Computer**

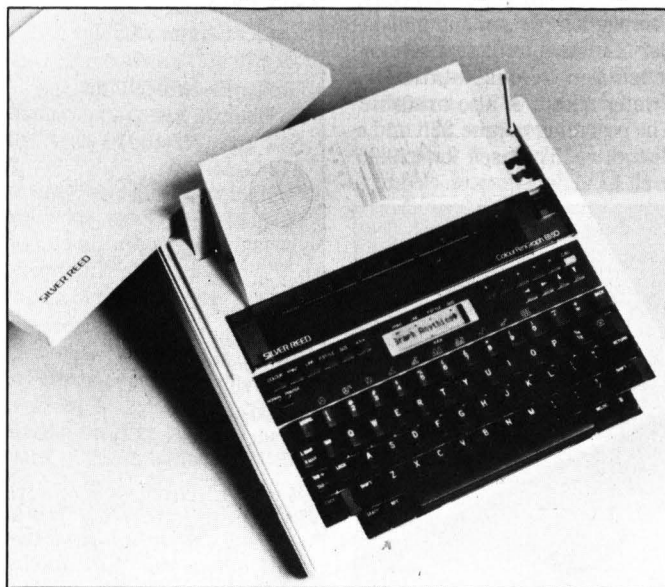
Mailbox. It is designed to make using electronic mail an easier prospect for individuals and small businesses. The product receives and stores incoming messages whether or not your computer is on line. It also provides remote access and message pickup with multilevel password protection. The Signalman Computer Mailbox sells for \$299.

Magnavox, a division of the N.A.P. Consumer Electronics Corp., has announced **Magnavox Professional Monitors**. The series includes two monochrome monitors, the 7BM623 (amber) and 7BM613 (green), with non-glare tube faces and built-in tilt stands. They have a 22-MHz amplifier bandwidth for sharp image definition and 1,000 lines of horizontal resolution. The amber monitor sells for \$199 and the green monitor sells for \$189. Magnavox Professional Monitors have a two-year warranty.

Silver Reed has released a combination color plotter, printer, and typewriter called the **PenGraph EB50**. It offers 12 kinds of graphs and two print styles, Courier and Italic, that can output in three sizes. It has a rotating ball-pen writing head that makes graphs or charts in four colors. The EB50 comes with a Centronics parallel interface, optional Corrector Set, one-line memory correction, calculator mode, 10-key buffer, and 16-character LCD (liquid-crystal display). It runs on an optional ac adapter or five D-cell batteries. The plotter/printer/typewriter sells for \$299.

Diskette Trays are a new line of disk-storage containers with dividers and optional locks. Each tray has a built-in label holder. The dividers snap in and out, making it easy to reorganize the structure of your files. Diskette Trays come in sizes to hold 40 or 80 disks. They are made of high-impact, antistatic polystyrene with clear, smoke-colored tops that swing open on one hinge or lift away. Diskette Trays are manufactured by Wilson Jones Company and sell for \$13.95 to \$39.95.

Ever wished for a way to save



The PenGraph EB50 From Silver Reed

money on printer ribbons? **Ebonize** is an aerosol ribbon reinker from E.A.P. Co., makers of Gold Plug-80. It revitalizes black-fabric ribbons for printers, typewriters, and cash registers and is designed to work with cartridge as well as spool ribbons. You spray Ebonize on coiled ribbons and let them stand. The new ink spreads evenly over the entire width of the ribbon by osmosis. Ebonize restores 95 percent of the original life of your ribbons and provides darker inking in most instances. The ribbon reinker sells for \$11.95 and can provide as many as 20 reinkings.

By the Numbers

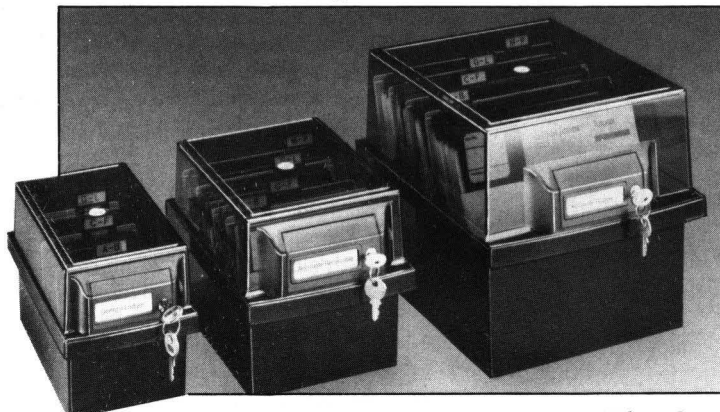
Want to beat the odds? Or at least discover what they are? Professor Jones offers a full line of programs for handicapping all the major sports, including horse and dog racing, basketball, and football. The company's newest programs are **Lottery** and **Ultra**. Lottery works on three- or four-digit numbers, offers complete statistical analysis, and provides the percentages of occurrences by digit and entire number. It sells for \$79.95. Lottery Lotto can analyze as many as six balls numbered 1 to 77. It sells for \$99.95.

Ultra is a multiple-regression analysis program and a new addition to Professor Jones' Limited Edition handicapping series for thoroughbred, trotter, and greyhound racing analysis. It is designed to store as many as 10 races along with the top three finishes on disk. It can "reweight"

factor values based on the results. It can also provide a win percentage that exceeds the 50-percent level in a short period of time. It sells for \$149.95. Professor Jones programs require 32K and a disk drive.

Software Exchange also offers a handicapping program. The **Thoroughbred and Harness Racing Handicapping Software Package** contains three separate programs: thoroughbred-racing, harness-racing, and bet-return analyses. The package comes on cassette or disk and sells for \$29.95. Program author Howard Berenbon notes that only the most important data is used by the program, which requires about five minutes of data entry for each analysis. Contact the manufacturer for more information.

Sugar Software will be basking in Florida sunlight from now on. The company's new address is 1710 North 50th Ave., Hollywood, FL 33021. They have also released four sports-statistics packages: **Baseball Statistics**, **Football Statistics**, **Basketball Statistics**, and **Soccer Statistics**. The programs help coaches, players, and fans keep accurate records of their teams and opponents. Each program offers mid-season entry, update and additions, correction and review of all statistics in a file, correction on all input screens, compilation of team and individual statistics, and separate offense and defense statistics. Printer output is also available. The programs require 32K and a disk drive. They sell for \$29.95 each. ■



Diskette Trays From Wilson Jones

List of Manufacturers

Anchor Automation Inc.
6913 Valjean Ave.
Van Nuys, CA 91406
818-991-6493
Reader Service ✓ 550

Arrakis Technologies
1425 Dorchester W., Suite 400
Montreal, Quebec
H3G 1T7, Canada
514-875-5477
Reader Service ✓ 551

Computerware
Box 668
4403 Manchester Ave.,
Encinitas, CA 92024
619-436-3512
Reader Service ✓ 552

Cybertron Inc.
30600 Solon Industrial Parkway
Solon, OH 44139
216-248-3300
Reader Service ✓ 553

Doubleday & Co.
245 Park Ave.
New York, NY 10167
212-953-4479
Reader Service ✓ 554

E.A.P. Co.
P.O. Box 14
Keller, TX 76248
817-498-4242
Reader Service ✓ 555

Grolier Electronic Publishing
95 Madison Ave.
New York, NY 10016
212-696-9750
Contact Nan Hudes
Reader Service ✓ 556

Magnavox
Interstate 40 and
Straw Plains Pike
P.O. Box 6950
Knoxville, TN 37914
615-521-4316
Reader Service ✓ 557

Maxsys Electronics & Software
P.O. Box 25336
Milwaukee, WI 53225
414-281-2671
Reader Service ✓ 558

Microsearch
Information Inc.
1725 K Street, NW
Washington, DC 20006
Reader Service ✓ 559

Professor Jones
1940 W. State St.
Boise, ID 83702
208-342-6939
Reader Service ✓ 560

Saguaro Software
7331 E. Beverly
Tucson, AZ 85710
Reader Service ✓ 561

Silver Reed America Inc.
19600 South Vermont Ave.
Torrance, CA 90502
800-252-7760
800-421-4191 in CA
Reader Service ✓ 562

Software Exchange
P.O. Box 5382
W. Bloomfield, MI 48033
313-626-7208
Reader Service ✓ 563

Sugar Software
1710 North 50th Ave.
Hollywood, FL 33021
Reader Service ✓ 564

Sunburst Communications Inc.
39 Washington Ave.
Pleasantville, NY 10570
800-431-1934
914-769-5030 in NY, AK,
and Canada
Reader Service ✓ 565

TCE Programs
P.O. Box 2477
Gaithersburg, MD 20879
800-4TC-4TCE
Reader Service ✓ 566

Timothy McIlwee
R.R. 2, Box 462A
Dundee, IL 60118
Reader Service ✓ 567

Wilson Jones Co.
6150 Touhy Ave.
Chicago, IL 60648
312-774-7700
Reader Service ✓ 568

Telewriter's Global-Replace Command

Telewriter-64 is useful for all sorts of writing. But one helpful aspect of the global-replacement command is not fully explained in the manual: imbedding commands in replacement strings.

Global replacement lets you type a one- or two-letter abbreviation for a phrase; later you can substitute the complete phrase for all occurrences of the abbreviation. This saves you time, and you only have to spell the phrase correctly once. However, if you attempt global replacement with a phrase you want to underline, italicize, expand, condense, or emphasize, you are out of luck. The words appear with no imbedded printer commands. Since the codes tell the printer to change fonts, your title is printed like ordinary text if the codes aren't present. To change the font for a phrase, you have to insert the control codes manually for each occurrence.

Telewriter's printer-control characters are usually used to send to the printer codes or sequences that do not exist on the ASCII keyboard or screen. You generate the characters by holding down the control (clear) key and pressing a number from one to nine. That number then appears on the screen as a half-height numeral.

The problem is that Telewriter uses the high-resolution screen, but when you invoke the global-replacement command, Telewriter moves you to the normal Basic screen. You then type the target string (the word or phrase to be replaced) and the replacement string (the word or phrase replacing the target string). However, the Basic screen does not react to Telewriter's control key; consequently you cannot obtain the half-size numbers that Telewriter uses to represent control/1 through control/9.

When you press the clear key at the Basic screen, the screen clears. Because of this, I thought that the control codes couldn't be used with the global-replacement command until I noticed up arrows in the text while data was being saved or read in ASCII format. These arrows are Telewriter's representation of the control codes generated by the clear key.

The arrows are usually followed by lowercase letters b through j—the ASCII format to imbed printer commands. The control/1 sequence becomes an up arrow followed by the letter b, control/2 becomes an up arrow followed by the letter c, and so on.

In the hi-res screen, you could, for example, use control/1 to turn the underline feature on, type the word to be underlined, and then press control/2 to turn the underline off. In ASCII, that sequence would be `↑bTITLE↑c`. (Note that there is no space between the arrows and the letters next to them.) So, if you wanted to replace the abbreviation VLT with the phrase "A Very Long Title" and underline it at the same time, you would type `↑bA Very Long Title↑c` as the replacement string.

There is one final hitch. Telewriter evidently expects to see its own binary information, not ASCII codes. It therefore doesn't translate the arrow-and-letter sequence into the half-height numbers you need as printer controls. To get around this, save the document through the ASCII transfer menu and then read it back in. Reading the file back in interprets the ASCII codes into Telewriter codes. When you look at the screen, the arrows and letters have been changed to control codes. Once it has been interpreted, the file can be saved in ASCII or binary format and will print out as if you had originally typed the entire file with control codes.

Duff Kennedy
Santa Barbara, CA

Keyboard Overlay

Many utility programs allow you to execute commands with one keystroke. To remember what functions keys perform, you can label them with the commands from your most frequently used utilities. You need transparent tape, scissors, a stick or pen with a round tip, and a sheet of adhesive letters and symbols. You can purchase the latter for about \$2. I used Prestype II, 1/8-inch Helvetica medium type (catalog no. R351). I recommend that you use typefaces that are 1/8-inch or smaller.

You can fit up to four capital letters or seven lowercase letters or symbols on each key. Larger keys can accommodate more. First, cut the sheet of letters into horizontal strips. Cut a piece of tape 2 inches longer than you need; place it adhesive-side down on a nonporous surface (e.g., formica). Transfer the letters, one by one, onto the non-adhesive surface of the tape. Place the first letter about an inch from the end of the tape. Rub gently at first and then firmly burnish the letter onto the tape. Pull the piece of tape up gently. Trim it above and below the letters; cut the ends into points.

Affix the command label to the face of the key (the top is already labeled), wrapping the ends of the tape around the sides. For a tight seal, burnish the borders of the word. Do not press the letters themselves, as they will separate or split.

I used white press type on the gray keys of my HJL keyboard. You can use black letters for white keys. For larger keys, I cut up colored gum labels instead.

Arthur Cortes
Medford, NY

The Learning Page

by Nancy Kipperman

Your Opinion Matters. . .

Before another school year starts and the summer once more telescopes into too few days, take a minute and give some thought to what you'd like to see on The Learning Page during this school year.

A column is much like a newborn child—white space waiting to be influenced according to the whims of its author (or parent) and those readers (or outside influences) with which it comes in contact as its personality develops.

Image at Conception

The Learning Page was conceived to provide a forum for sharing ideas and information about the potential and use of the Tandy Color Computer in the field of education—both at home and in the schools. To that end, in the last eight months, I've covered developments in the computer market that affect what you can purchase to make the most of your computing dollar. I've looked at programs for handicapped students, networking systems in the schools, information about Tandy's role in the education market, developments in the software industry, and the role of graphics in our children's software. I've received supportive and critical responses, which is helpful to any writer.

My question is: Where do you want me to go from here? What do you parents, fellow teachers, programmers, and computerists want to read about?

There is a wealth of educational software on the market, with new releases coming out every day. Much of it is designed for classroom use, but quantities can also be used at home for instruction and enrichment. What do you want your child to learn from using the computer?

Side Benefits

It seems obvious that familiarity with a computer keyboard will teach a child how to type as a natural side benefit. After all, proficiency in typing comes from practice. The kind of practice a child does on a computer

keyboard is relatively painless—because it's unconscious practice. The motivation is not to learn the keyboard but to make the computer work. The desired result can only be accomplished by hitting the right keys. How many kids still have to look at the keyboard to type RUN or LOAD?

Another skill that your child practices each time he or she uses the computer is following directions. Computers are fussy; if you don't follow the directions carefully, the computer won't cooperate.

Reading skills are reinforced constantly with computer use. You can't follow directions if you can't read them, and your reward—words of praise or a game—will be denied unless the question is correctly asked or answered.

Critical thinking skills are another side benefit of computer use. By critical thinking, I mean the process of deciding what answer or action will move a program toward its conclusion.

If I am working on a simulation problem, I have to consider my input and my questions before I can decide what my course of action should be. I have to employ critical thinking if I'm involved in an interactive adventure game. What's nice about the computer is that I can start over, knowing more than I did on my first try, and make new decisions.

Your Input Counts

Aside from the natural benefits of computer use, what are your children learning with their computers? Are they using subject-specific software, writing programs, creating with word processing, or playing games? Is it hard work or just fun? What do you want to read about here?

I would like to write about classroom management software, but I need the expertise of teachers out there who have experience in what works well. Are there many of you who issue weekly, computerized progress reports to your students? Is anyone making up or correcting secondary-school tests or compositions with a CoCo?

I'd like to know how you parents decide which software packages to purchase for your children. Are you looking for software that doesn't lose its appeal in three or four sessions? Do you depend on advertising or reviews for your information? If your child is weak in math skills, for example, are you pushing programs that reinforce these skills?

It's much easier for me to gather information on what is happening with computers in the schools than it is to measure the educational use of computers in the home. Sales for Tandy's Home Education Systems are going well, according to Julie McGee, director of software development. However, I still need to hear from the parents and children who are involved. I haven't been handed any homework that came from a computer print-out lately (although I did confiscate a CoCo computer-printout "study sheet" just prior to a test in June). However, from where I sit, computer ownership in the home is not the norm, and my students who love computers are in the minority. How is it in your city or town?

Inspiration Appreciated

Some of you can already take credit for being an inspiration. A letter I received from David Czuba of Hamburg, NY, about an old Tandy publication he found on sale in a Radio Shack store resulted in a column on how to apply for a computer grant from Tandy. Your concerns do make a difference!

So . . . before school begins and the routine settles in once again, take your pen in hand and let me hear from you. As a subscriber, you are a real part of this magazine. Your opinion counts, and I'll welcome it. I'll even invest in a bigger mailbox! ■

Nancy Kipperman is HOT CoCo's Education Editor and a high-school English teacher. Write her c/o HOT CoCo, 80 Pine St., Peterborough, NH 03458.

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The Corner Office

by Jeff DeTray, Publisher

Whose Program Is It, Anyway?

Picture this. You're at a friend's house, and you see a clever new program he's just purchased to run on his Tandy 1000. You say to yourself, "I'll bet I can do that on my CoCo." Upon returning home, you set to work, and in a few days, you've created a CoCo clone of your buddy's expensive commercial program. Other CoCo owners think it's great! The reaction is so good, you decide to set up a small business to sell the program. After all, the CoCo version is entirely your creation, right? Not a single byte of code has been lifted from the commercial program, so you have full rights to sell your version, right? Not necessarily, folks!

In a little-publicized court decision reached last January, a Pennsylvania district court judge ruled that copyright protection may extend even to programs that have been recoded in a different language for an entirely different computer. A full report on the case was carried in the June 17 issue of *Micro Marketworld*, a trade journal for computer dealers. Apparently, this is the first time a court has had the chance to rule in a software duplication case not involving line-for-line copying.

Under the law, an idea is not subject to copyright. It is the expression of the idea, as in a book, photo, or computer program, that is protected. Whereas the defense had argued that copyright protection applied only to the literal program code, the judge, in effect, extended the definition of "expression" to include such nonliteral elements as the structure, layout, design, and flow of the program. In his decision, the judge relied quite heavily on the fact that the outputs of the two programs looked quite similar.

Of course, anyone who has ever written a computer program has probably "borrowed" ideas and algorithms from other programmers. In fact, many of us learn how to program by modifying the code of others. Eventually, if we make enough changes to a program, we come to think of it as our own. Whether the modified program is legally ours doesn't much matter unless we try to sell or distribute it. In that case, the owner of the original program may scrutinize our program very carefully, indeed, to see if we have stepped on his legal toes. It seems to me that the Pennsylvania court has given software authors a level of protection they've never before enjoyed.

I see a great deal of software around that might run afoul of this sort of broad interpretation of copyright law. Just think of all the Pac-Man and Donkey Kong clones! There are programs that mimic expensive software as well—I sometimes use a WordStar work-alike on HOT CoCo's Tandy 1200HD. Other examples abound, I'm certain.

So what does it all mean? Darned if I know! Possibly, we might see fewer outright rip-offs of popular programs. Maybe other lawyers will try to build on the Pennsylvania decision. It's just a start, but it appears that the legal system is finally coming to grips with one of the most difficult remaining software rights questions: At what point does a modified program become a new and original one? One thing is for certain—it won't be long before we see a few more lawsuits based on this case.

What do you think? I'd especially like to hear from a few lawyers on this one. Drop a note on your finest legal-size stationary to:

Jeff DeTray
HOT CoCo
80 Pine Street
Peterborough NH 03458

EOS Impressions, Part II

Thanks to those of you who have written with your impressions of Tandy's Express Order Software program. It seems some of you have found it useful, but that some Radio Shack store personnel don't know enough about it.

Our readers don't know as much about EOS as they might, either. The first results from a Reader Service Card question on the subject indicate that over 55 percent of our readers don't know how EOS works, and less than 8 percent has ever ordered a product through EOS. Conclusions? Tandy needs to explain the system more clearly to both customers and its own personnel. ■

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Amdek Video 300 Amber Monitor	159.00
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Compare Installation.

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new bezel for a totally finished conversion.

Compare Warranties.

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