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Under The RAINBOW



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NEXT MONTH: Get in touch with our Data Communications issue. Features will include remote driver and file-transfer communication programs, and for those involved with Ham radio, we'll have a program that determines your transmission line losses as well as entry log and QSL card generator. Wayne Day will return with his informative "CommLink" column and an up-to-date nationwide directory of bulletin board systems. Our RainbowTech section will have guest writers Bruce Warner, with a tutorial on getting started with the OS-9 operating system, and Brian Lantz, with the first of a two-part series on developing your own OS-9 utilities.

With our wide variety of games, utilities and product reviews, you can't "get the message" any better than with THE RAINBOW, the most complete source of information available anywhere for your CoCo!

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RAINBOW

October 1985

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LETTERS TO THE RAINBOW

Endorsing Educational Software

Editor:

We love THE RAINBOW at our house. I am a teacher and since school has been out, I have been catching up on all of THE RAINBOW. Our family purchased a CoCo for Christmas and what a terrific investment. We are still finding things the CoCo can do through your magazine. The CoCo without THE RAINBOW is just another computer.

I strongly urge you to have an educational software programming contest followed by another item to be added to "The Rainbow Bookshelf." At one time I had thought I would do my own programming, but there just aren't enough hours in the day to be a mother, homemaker and teacher, too. Therefore, I am looking more for programs to use in the high school classroom and home record keeping as a teacher.

Sheryl J. Smith
York, PA

Thank You, Dr. Lee,
Wherever You Are

Editor:

On June 5, I was in Miami, Fla., on business. While in a computer store inquiring about THE RAINBOW Magazine and video driver/monitor interfaces for the Color Computer 2, I met a gentleman who had all the answers. He volunteered to mail me a RAINBOW subscription form and an article about monitor interfacing. I received the letter he mailed, but the envelope accidentally ended up in the trash.

I've since found a copy of THE RAINBOW . . . in Keflavik, Iceland. I want very much to thank this gentleman, but I remember neither his name nor address (Dr. Lee is the best I can do).

There are not many people who will help someone with no motive other than just being "good people." I envy his friends. Thank you.

Robert Austin
Melbourne, FL

INFORMATION PLEASE

Editor:

I would like to hear from anyone who has built the hardware project "Wireless Inysticks" (Page 105, June 1985 RAINBOW) like the one built by J.O. Shaver. If so, please write to me at P.O. Box 3841, 30721.

Randall Rhudy
Dulon, GA

Sending out an SMS

Editor:

I am unhappy and frustrated with *Musica 2* because I cannot utilize the program's full potential. I purchased the program when Speech Systems was claiming *Musica 2* would work with any printer: a claim they no longer make. When I try to print music from *Musica 2* to my C. Itoh 8510A Prowriter printer, all I get is garbage.

Richard Parry, Speech Systems owner, tried unsuccessfully for several weeks to solve the problem, even going as far as to do some modification programming on *Musica 2* to eliminate the problem. I am still unable to print music on my printer. Mr. Parry also sent me a free copy of the new version of *Musica 2* just hours after it became available. While I appreciate the gesture, I would still like to be able to print music from *Musica 2* on my Prowriter printer.

Therefore, I am sending a desperate SMS (Save My Sanity) signal to all fellow Color Computerists who also own an 8510A Prowriter printer and *Musica 2*. Can anyone throw me a life line and come to my aid? I would really appreciate any help that would solve this dilemma, as I am going down for the third time. Please write to me at 2813 Sunnysdale Drive, 49085.

William T. Grace
St. Joseph, MI

HINTS AND TIPS

Editor:

One day you turn on the old CoCo and get the usual logo on the screen. You sit down and prepare yourself for a few hours of enjoyment and go to enter a command on the screen, then . . . panic stations! No matter what you do, nothing will enter on the screen. No line numbers, no list command, no directory command, nothing — just the cursor on the screen.

In a wild panic you check all the electrical connections — all tight and plugged in. All connections to the printer, tape deck, disk drive, etc. — all tight and plugged in.

You shut the machine off and on . . . nothing. You even disconnect the disk drive (after shutting the machine off, of course) and even the printer, to no avail. Still only the logo!

"Oh, no! Not a chip!" you wail in horror, "not a long down time, not now!"

Well, this of course happened to me and I suspect probably to some of you, too. Luckily, in my case, it wasn't a chip but a foolish error on my part: I had inadvertently left the joystick plugged in the night before.

Normally, this would make no difference, but this time it had gotten buried under the mess of papers and reference books that seem to grow around the machine, and the firebutton had gotten jammed against one of the books and was depressed.

When this happens, the computer will not accept any keyboard input at all (at least not the new 64K version).

Try it. Hold the firebutton down and try to type something. Hope this saves some readers an unnecessary service call or unwanted anxiety. You can be sure I unplug my joysticks after use now.

Richard F. Bellizzi
Victoria, British Columbia

Dusting Up

Editor:

Quite by accident, I discovered that the cover of the 15-Cassette Storage Tray (Radio Shack #44-665) makes a perfect keyboard dust cover for my CoCo 2. Thus, for the same price as the Radio Shack Dust Cover, I now have a cover plus storage space for my favorite cassette software. Hope this will be of use to some of your readers.

Ross Whitney
Kitchener, Ontario

How to Hear the Silence

Editor:

I have an idea that may interest fellow RAINBOW ON TAPE users. Did you ever have to CLOAD five or six times to load a program, only to get an I/O Error each time because you couldn't find the silence between programs? You might end up rewinding the tape and searching from the start to load a program 100 counter units ahead! Each tape comes with a counter directory which is very useful, but it can be several units off.

If you're not successful after one or two attempts, try this: type AUDIOON and then ENTER. Disconnect the REM (remote) plug from the cassette deck and rewind the tape to five or six counter units before the start of the program you want to load. Now, when you press Play you will hear the electronic sounds of the previous program coming over your TV speaker. As soon as you hear the silence at the end of that program, stop the tape, reconnect the REM plug and type AUDIOOFF. Now you have found the silence between programs and you'll have no trouble CLOADING your program.

Rich Dextraze
New Haven, CT

Editor's Note: Thanks, Rich. A method we use a lot, and which doesn't require unplugging the cable is to type MOTORON: AUDIOON and ENTER. This starts the recorder and lets us listen in. As soon as it reaches a blank spot, we hit any key and ENTER, thus causing a deliberate syntax error which stops the recorder and cancels the AUDIO command. Then, we type CLOAD and ENTER.

Food for the Adventurer's Appetite

Editor:

First, I want to tell you how much I enjoy your magazine. It has taught me a whole lot about the CoCo. Please continue to [publish] such interesting articles.

What I am wondering about is when will the *Second Rainbow Book of Adventures* be offered to us, the Adventure fanatics? I have been waiting ever since I solved the last Adventure in your *First Book of Adventures*. I hope the second book will be out soon.

Nathan Fisher
Ponchatoula, LA

Editor's Note: *The Second Rainbow Book of Adventures* is now available. See Page 258.

BOUQUETS

Editor:

I am a custodian engineer for the New York City Public School System. I have a need for various types of software, the best of which has been my payroll program that I purchased from Howard Medical Computers. I did this after purchasing other payroll programs only to find they were hard to use or would not do the things I was led to believe they would.

The real mistake was not subscribing to your great magazine two years ago. I purchased my current payroll program (from Howard Medical Computers) after reading your review of it. I have been using it for four months and had only one problem with it. That was when New York state changed their withholding rates on July 1, 1985. I called Howard Medical Computers in Chicago expecting to be told I would have to purchase a new program. I was told by the company representative I would receive a reply as soon as possible. To my surprise and delight, I received the new tax table on a diskette with instructions on how to copy it to the original program diskette. The best part is that it was free of charge.

I have never been so pleased with a piece of software or a software manufacturer before. I would recommend to any of your readers contemplating buying a payroll program for their business that they give Howard Medical Computers a try. I am sure they will enjoy using it as much as I do.

Thomas J. Malanga, Jr.
Bayside, NY

Editor:

I would like to express my appreciation to the people at Speech Systems. I ordered EARS, *Super Voice* and their triple Y-cable, and everything got to my house within a two-week period. I never thought the CoCo would be one of the first computers to use an electronic audio recognition system device (EARS) and have one of the highest quality speech synthesizers made, but thanks to Speech Systems, the Color Computer is gaining on some of the best computers made today!

Again, I thank Speech Systems for the great job they are doing and I can hardly wait for their next project.

Blake Jurgensen
Charleston, SC

Hello Again

Editor:

I don't usually write letters, but I wanted to tell you I enjoy the magazine and RAINBOW ON TAPE! Also, a special thanks

to Doug Heyza for writing *Hello*, the directory helper in the August 1985 RAINBOW [Page 69]. I've put it on all my disks and the performance is outstanding!

I'll bet it's exactly what John E. Beal of Boise, Id. ["Earth To Ed," Page 92] was looking for in his letter in the same issue. Thanks again. Please try to include a database or two for a 64K system with disk drive in future issues.

Gene Carpenter
Cropwell, AL

SPECIFIC PROGRAM SEARCH

Editor:

I was wondering if you, or perhaps your readers, may be able to help me. I am looking for a computer check list or task manager program for my 64K CoCo. In planning two major conventions and over 300 smaller meetings a year, we are constantly involved in hundreds of steps and it's all too easy to forget a deadline for mailing back a hotel room cutoff list or sending promotion copy to the printer, etc.

I am hoping for a program that could print tasks or activities in ascending or descending order, generate each person's daily, weekly or monthly responsibilities, highlight and store completed and uncompleted tasks, etc.

If anyone knows if, or where, such a program can be obtained, please write me at 38 Boileau Court, 21769.

Gary J. Heimes
Middletown, MD

Editor:

I am wondering if any company carries a pinball Simulation for the CoCo (other than Radio Shack's *Radio Ball*). I have a 64K CoCo with a disk drive. Send any information to P.O. Box 41, 45306.

Larry Wick
Boikins, OH

Caveat Emptor

Editor:

In your August 1985 issue, a number of readers mentioned problems with the United Color Computer Club. The following is a letter I have sent them regarding their new member tape. Also, it took two letters to them, after sending my check, to receive the tape. *Caveat emptor* to all CoCoers.

Jay M. Brown
Hamden, CT

United Color Computer Club
10117 S.W. 53 Court
Ft. Lauderdale, FL 33328

Gentlemen:

After sending you a two-year membership check of \$50 in March and then having to remind you in June

that no information was received, I finally, yesterday, received your newsletter and new member's tape.

After such a long wait, one would have expected a product worthy of what you'd call a "Worldwide Color Computer Club."

Of the 21 programs on the tape, six contain FC, IO, SN, FM, etc. Errors. One would expect some written instructions — none included.

Your original advertisement letter promised free software — yet your new member letter asks for a \$10 handling charge and your regular newsletter requests \$6 — this is not what I consider truth in advertising, or even free!

Your original ad claims a club library with "probably the largest collection of public domain programs available — free," yet your newsletter states you do not have a complete list of your library.

I have dealt with a number of CoCo clubs, but yours is the only one that fails to live up to its advertising, therefore, please terminate my membership and refund the \$50 sent. Upon receipt of your check and it clearing my bank, I will return the new member's tape.

Very truly,
Jay M. Brown

BULLETIN BOARD SYSTEMS

Editor:

In the March 1985 "Letters to Rainbow," the numbers for my BBS and my home phone number were somehow reversed. The real number for the CoCo Pub BBS is (602) 899-1350. There is an answering machine on the other number that announces the correction.

The Pub has been completely redecorated into BASIC9. It runs on a CoCo I, Multipak, RS-232 pak and PBJ *Word-Pak II* and PC-pak. The disk system is three 80-track, double-sided TEACs and a J&M Systems controller.

We support two message bases (public and private), personal mail and several download directories (Text, CoCo BASIC and OS-9). The line editor is unique; it is written to be similar to the CoCo EDIT command and supports 80-column by 50-line posts.

Please stop by the Pub real soon. If you want, send your name, address, phone and a password to me at this address, 125 S. Dobson, #1047, 85224.

*Stephen Roberson
Chandler, AZ*

Editor:

Are there any BBSs in the Honesdale-Carbondale-Forest City-Scranton area in Pennsylvania?

*Andrew Robinson
Pleasant Mt., PA*

Editor's Note: Please check Wayne Day's monthly column "Comm-Link" for new listings of BBSs. See our Communications issue, November 1984, Page 66, for a listing of BBSs in your area. Wayne's annual update will be next month.

Editor:

I would like to announce a new BBS. It's online 24 hours a day, seven days a week. The BBS is open to the general public and offers not only items of local interest, but items useful to all CoCo users. A special invitation is extended to those who may have an interest in using the CoCo in amateur radio or digital communications. The phone number is (205) 649-2894.

*Terry W. Platt
Mobile, AL*

Editor:

Please add our BBS to your list. Orange County Color America, 10112 Melody Park Drive, Data (714) 534-5174; 300/1200; Voice (714) 638-7889.

*Fred K. Wright
Garden Grove, CA*

Editor:

I would like to announce the existence of a modified Colorama; the name of this BBS is the Undersea Kingdom of Golden's Bridge. It's been up and running since January 1985 and has the following features: uploads, downloads, seven plus stories, magazine, tell me, sand writings and crash this BBS. We have almost one meg of memory and we are running 24 hours, seven days a week at 300 Baud. Call us now and check it out — (914) 232-4582.

*Michael Sebar
Golden's Bridge, NY*

Editor:

I am pleased to announce that a new Colorama BBS is now online. The number is (401) 765-2890. It features downloading,





Connects to the RS-232 port of your COCO, no need for Y-CABLES or MULTIPACKS! Runs on minimum 16K to 32K TAPE or DISK. Comes with software easily modifiable to your needs. WHY PAY MORE? Unlimited GREY shade when you use a color camera! The only digitizer that recommends you use a color camera!!

VIX-1 \$99.95 + \$2 Postage
VIX-3 \$124.95 + \$2 Postage
VIX-4 HAS A RS-232 Switcher Built In





By George Zinicovic
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8 THE RAINBOW October 1985

online games, message base, want ads, uploading, magazine section and other good stuff. It runs 24 hours, seven days a week. Users should set their parameters at seven word/one stop/no parity.

*James S. Williams
Woonsocket, RI*

Editor:

The DLOAD OS-9 BBS is online and available seven nights a week from 9 p.m. to 9 a.m. We have E-Mail, bulletins, graphics and, best of all, downloads. We support OS-9, BASIC99, the Model 100, C, and regular Disk Extended BASIC. The BBS has three DS 40TK drives and is running under OS-9. New users may logon at the logon prompt by hitting the ENTER key. Once on, you can leave a message to the SysOp in the Mail section to become a permanent member. Phone (803) 288-0613. Your terminal package must be able to send eight data bits and one stop bit or the BBS will not respond to your requests.

*Jim Taylor
Greenville, SC*

Editor:

The San Antonio Color Board is now active and in full operation 24 hours a day, seven days a week. We support program upload and download, message service, classified ads, text files, peeks and pokes, programming tricks and advice, product reviews, hardware and software purchase discounts from several sources and much more. We are operating a modified CoCo 2 with dual 80-track disk drives. We operate at either 300 or 1200 Baud. The protocol is automatically adjusted to your terminal. Call BBS (512) 674-0264; Voice (512) 674-4294.

*James Leatherman
San Antonio, TX*

Editor:

I would like to inform the CoCo users of the world about a new BBS. It is located in Crowsnest Pass, Alberta. The system is called "Wes-Can Color Board." It will be operational 24 hours a day, except for upkeep time. All users are welcome. We have a download section and mail, all the usual features. Give us a call at (403) 564-4118.

*Ted Kyte
Blairmore, Alberta*

Editor:

I am writing to let you know of a group of dedicated people in the North shore area of Sydney who call themselves "The North Shore CoCo User Group." This group has now been going for almost two years. Among our members are a number of avid OS-9 users. This BBS is online on Tuesday and Thursday evenings between 19.30 and 21.30. The times will be extended as demand warrants and the service is free to all OS-9 devotees. The phone number is 02-451-2954. Callers can leave their name, address and phone number on the "note" board and they will be called back with their password.

*Graeme Nichols
Sydney, Australia*

PEN PALS

Editor:

If anyone is interested in having a CoCo pen pal please write to me at 27 Cedar Road, 06913.

*Jim Partridge
Clinton, CT*

Editor:

I am planning on moving to Germany in January of 1986. I would be interested in meeting other CoCo/Dragon users who live in Europe. Anyone interested can contact me up until January 15, 1986, at 2708 Pinewood Drive, 20601.

*Chris Ahrendt
Waldorf, MD*

Editor:

Would anybody like to be pen pals or start a pen pal club? I'm 12 years old, own a 64K CoCo and would enjoy any letters. Write to me at 210 Tareyton Drive, 14850.

*Zachary Perlman
Ithaca, NY*

Editor:

If there is anybody who would like to have a pen pal please contact me. I am 12 years old, I have a cassette recorder and a CoCo 2. Write to me at 5860 Lane-Kirk Road, 43105.

*Jimmy Dayton
Baltimore, OH*

Editor:

I want to thank you for printing my letter in the April 1985 issue of RAINBOW. I got so many wonderful letters. I answered them all and have made some really good friends.

The only thing I would like to know is, don't women use computers? I didn't hear from one woman! Is there any way to find women home computer fans who use Color Computers (64K with tapes)? My address is 115-2nd Drive S.E., 44663.

*Sandra Steed
New Philadelphia, OH*

Editor:

I am desperately looking for some CoCos in east Texas. If you live near or in the Lufkin area, or just want a pen pal, please write me! Since I moved from Houston to Broaddus (population 225), I haven't talked to another Color Computer owner. The best thing that happens out here is when THE RAINBOW comes each month! Write to me at P.O. Box 258, 75929.

*Allen Huffman
Broaddus, TX*

Editor:

I am looking for a computer pen pal. My address is Route 6, Box 793, 26505.

*Doug Wilburn
Morgantown, WV*

Editor:

I am always looking for pen pals, so if you are interested in the Color Computer then drop me a line to 6071 Park Avenue, H2V 4H4.

*Steve Glezakos
Montreal, Quebec*

Editor:

I am writing to you to ask for a pen pal in any state of the U.S.A. I have been buying your magazine in Australia for the last six months. I have come to realize that you have better programmers over there, so I would like to be in touch with some of them.

*Peter Mayer
5/246 William Street
Kingsgrove, N.S.W.
Australia, 2208*

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

ARTS AND LETTERS



Envelope Of The Month

*Joseph A. Tremblay
Fort Walton Beach, FL*

It's not just

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but a total application software series.

It's a WORD PROCESSOR. It's a DATA BASE. It's a SPREAD-SHEET. And each program of the CHILD'S PLAY software series is available in three different levels of sophistication so you can custom fit CHILD'S PLAY to your individual needs.

Easy is Better!

It took us a year and a half to complete the CHILD'S PLAY series. Our goal was to produce software easy enough for a child to use, yet versatile enough for the home or professional user. The end result is software so easy, so much fun for everyone to use, it's like CHILD'S PLAY.

A Mouse and Click-Down Menus

CHILD WRITER, our elementary word processor, is currently being used in schools by second grade children with amazing ease. Teachers tell us that kids are fascinated with the total control they have with a mouse. Just point and click! And we incorporated click-down menus to eliminate having to memorize dozens of commands. Simple instructions are right there on the screen, but only when you want them. Click the menu in when you need help and click it out when you don't. CHILD WRITER is not only easy to use, it's more fun and powerful.

Does your word processor underline text on the screen? All of the CHILD'S PLAY word processor programs do. For the first time you can reproduce on paper exactly what you've created on the screen. It's neat!

More Sophistication

We could have stopped developing when we completed CHILD WRITER, but we knew that someone always wants more. So we developed MEMO WRITER, designed for the home user. And soon, we will have BUSINESS WRITER, the ultimate word processor designed for professional use.

MOUSE



CHILD WRITER'S MAIN MENU



CHILD WRITER ON-SCREEN UNDERLINING

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TCE Programs, Inc.
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More Power

CHILD FILER and CHILD CALC are our elementary database and spreadsheet programs. LIST MANAGER and SIMPLE CALC are designed for the home user. BUSINESS MANAGER and BUSINESS CALC are for professionals.

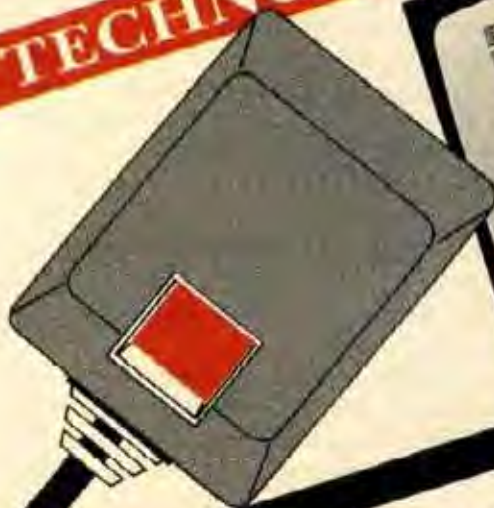
All of these programs, no matter what level of sophistication, are completely compatible with the other CHILD'S PLAY applications on the same level. And, data can be shared between applications by using our unique NOTE PAD feature.

Available through express order at Radio Shack®.

The CHILD'S PLAY Software Series is available for the Tandy 1000.*

* Tandy 1000 is a registered trademark of Tandy Corp.

TECHNOLOGY



NOTE PAD is the program vehicle we use to transfer data when you jump from one application to another, as well as move, cut, and paste text within your word processing program. Information from your database program is stored in NOTE PAD and made available for sharing with the other CHILD'S PLAY programs. It is a breeze to use and it sure beats retyping lots of data from one application program to another.

We have designed this software series for everyone. It doesn't matter if you are using a computer for the first time, or if you are a seasoned hacker, the CHILD'S PLAY application software series is for you. Write or call for more detailed information about the CHILD'S PLAY software series. Ask for the free TCE catalog with over 75 additional Educational Software titles. Ask about your RAINBOW discount too.

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About three years ago, give or take a few months, a fellow by the name of Wayne Green figuratively "shot himself in the foot" by predicting the Color Computer was "dead" and would be discontinued by Radio Shack. That article was accompanied by many pious suggestions for Tandy personnel on how to make the CoCo's successor survive.

Is there a "Peterborough Plague" that inflicts residents of that picturesque New Hampshire hamlet every three years or so? It seems so to read the latest from Michael Nadeau, who despite being editor-in-chief of a magazine that supports our CoCo, states flatly "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."

Nadeau's column, "Digressions," also includes suggestions for Tandy Corp. He concludes "It really is no wonder that the home-computer market is dead in the water."

Michael uses the same word — "dead" — and makes the same mistakes as did Wayne, who was founder and publisher of *80 Micro*.

Interesting.

Gee, Michael, I don't know what you are using your home computer for (unless you're trying to raise turkeys or something), but I have a whole lot of uses for mine and keep finding new ones, too.

You make light of checkbook balancing programs, but I keep mine balanced with my home computer. Also, I have a lot of books, and I have a really nice database set up with my CoCo to keep track of where they all are. And, my daughter went from a 'C' to an 'A' in French in one six-week period just by using a little program I wrote myself on the Color Computer.

THE RAINBOW gets literally dozens of program submissions each week. Usually these are programs people have written to use at home. In short, Michael, I think you, just like Wayne did several years ago, have sold the CoCo and other home computers short.

I remember that I was putting out a pretty brash little newsletter when the "Peterborough Plague" first struck and I wrote an editorial suggesting to Wayne that if he didn't like the CoCo, he should leave it alone. He did for a time, but then apparently saw the error of his ways and ended up starting a magazine to support it.

A lot of people never forgave Wayne Green for declaring the Color Computer to be dead. More than that, I wonder whether people should be in the Color Computer-supporting business if they don't believe in the product in the first place.

Granted, there are slower sales for CoCo right now, but we see new software coming from Tandy and from third-party sources as well. We see an excellent computer system in place. We see a new CoCo on the horizon that will run circles around the competition. And yes, we see our own business as good and the CoCo market as a strong and healthy one.

Here at THE RAINBOW, we like the Color Computer just fine.

* * *

Ever since the first issue of THE RAINBOW was published, I have sent a complimentary copy to my mother in Birmingham, Ala. For everyone who has ever sent anything you did to your mother, I am sure without exception, the critiques have ranged from "wonderful" to "absolutely wonderful."

Mom is 78 and every once in a while she will call when she is particularly

Telewriter-64™

the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
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- Right justification
- Easy hyphenation
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THE ORIGINAL

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

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

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

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

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

— Color Computer News, Jan. 1982

TELEWRITER-64

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

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 (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Termint, 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 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.)

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impressed with an issue to say: "I really don't understand all this computer stuff, but this is really a wonderful magazine. And, your Uncle Herb in Baltimore thinks so, too."

Mom has saved just about everything I've ever written. Which, considering all the time I've spent writing things, is quite a lot of stuff. But, in all that time, *she's* never written anything (except letters) — until now.

Mom's first journalistic effort is reproduced below. I know it doesn't apply to anything having to do with THE RAINBOW, the CoCo or computers. But, she's my Mom and it's her "first" article ever.

It is obviously a vignette from another time. Hey, Mom, it took you 78 years, but welcome to the profession of journalism. Not a badly done debut!

PAGE 7

I REMEMBER

September 5, 1929, was no doubt a memorable day for me. But then, the occasion of one's marriage holds special meaning. It is my wedding ceremony that remains significant as well as the circumstances of the day.

This was an unusually hot, muggy September and of course in those days air conditioners were non-existent. The heat pressed hard and my parents worried about the reception guests. In order to make the ballroom bearable, the hotel placed buckets of ice around the entire dance floor with fans behind to blow the cold air. Quite a sight, not to mention the noise of the whirring fans. Some Champagne would have eased the situation, however, due to prohibition none was available at such an establishment. Thus, to calm my nerves, my delightful new husband sneaked me out the hotel kitchen into a Zimosant and to the closest speakeasy in Harrisburg, Pennsylvania.

Oh, such memories

Ann M. Falk



TUNE IN ROSEHELLE'S HEARING AID
FOR NEWS THE SENIORS MADE

WILL APPEAR AGAIN NEXT MONTH

Reprinted from the August 1985 *Futura Unlimited*, senior adult newsletter.

One of the neatest pieces of productivity software we've seen is a program called *Desk Mate*, which is bundled with the Tandy 1000 and has been an instant hit. Watch for Tandy to soon offer a version of this outstanding program for the CoCo, too.

To me, it is just another example of Radio Shack's commitment to the CoCo. *Desk Mate* is a combination of a spreadsheet, word processor, telecommunications program, daily appointment calendar and other tools.

You should be able to see it up close and personal at RAINBOWfest in Princeton, N.J., Oct. 11-13. Which reminds me, I hope you are planning to be with us for this great show. We're really excited about it, and especially about the acceptance by Bill Barden to be our CoCo Community Breakfast speaker.

Bill, as you know, is one of the biggest names in the computer world and he will be our special guest all during RAINBOWfest. This is really an extra bonus and I hope you'll take advantage of it.

Breakfast tickets, though, are limited. It isn't hype when I urge you to order now. I fully expect a sell-out.

— Lonnie Falk

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984



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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 BO! 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.

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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

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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.

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BUILDING OCTOBER'S RAINBOW

Pyramid Pow(d)er . . .

The RainbowTech Disk . . .

Nearing the Billion-Page Mark . . .

Since this is, after all, a "building" column, let's discuss the latest building theory. I came upon it in the June *Reader's Digest*. It seems a scientist now claims that the pyramids may have been built out of concrete! I kid you not; that's what he says and, so far, I haven't heard anything about his being disproved.

Concrete! Give me a break. If chemist Joseph Davidovits of Barry University in Miami Shores, Fla., turns out to be right, he should get a handsome award, but the rest of the geologists and archaeologists who've pondered the "riddle of the centuries" should turn in their pith helmets — or be ridden out of town on a rail. Scientific hint: Look for some initials in the corners of the blocks, guys.

Legions of slaves heaving countless six-ton limestone slabs, indeed. It may turn out that the oldest of the so-called seven wonders of the world was built using a team of camels pulling a ready-mix wagon. Davidovits believes the pyramid builders filled wooden molds with a slurry of crushed limestone mixed with a mineral binder. In fact, this theory may explain why the pyramid stones are filled with tiny air bubbles not found in the quarry from which they reportedly came. Don't ask me why the high priests of the scientific temples can't tell man-made poured cement from natural rock, but I can't say I'm not surprised, because I am. This shakes up some old foundations, including my belief in science as a science.

If this cement theory holds together, move over Piltdown Man, because this guy may have uncovered the Hoax of the Ages. Stretching across the centuries for a segue, I'd like some concrete ideas from you readers on how to solve a problem that seems to be pyramiding here at THE RAINBOW. You see, we're considering something I've tentatively dubbed the *RainbowTech Disk*, a new service, and we'd like to do it right the first time.

Often, we get letters asking why we don't put assembly language source code on RAINBOW ON TAPE. The most recent plea comes from Jacques Labonte of Acton Vale, Quebec. He makes a good case for providing source code on magnetic media. I agree that there's a need, but I don't think RAINBOW ON TAPE is the vehicle. Of the thousands who avail themselves of this service each month, too many are rank beginners who would pull their hair out trying to CLORD and RUN source code. No, they need the assembled, running binary file — only. There's more to it than that, though.

Others are asking regularly when we are going to offer OS-9 programs ready to load and run. Can't do that on tape, can you? At least, not readily. Besides that, still others want templates for spreadsheets and database managers, and the growing following of "CoCo Gallery" wants these picture data files ready to load in and view, but many of these are very long and useful only to those who have the programs to load them. So, there is a wide variety of programming material — some I haven't even mentioned — we need to package in some convenient way.

Enter the *RainbowTech Disk*, a sort of high-tech service for specialized interests, a diversified magnetic assemblage of computer odds and ends. How to do it? Well, we have a couple of avenues for getting both OS-9 and Disk BASIC files all on the same disk, without even flipping the floppy, but then maybe you know a better way. Also, is this something you'd like to have? And, what else would you want on this "hard-core hackers" service? Let us hear from you; at this point, nothing is carved in stone.

To this brief treatise, my usual footnote: Join the legions of RAINBOW subscribers and we'll order our scribes to parcel out, just for you, a special monthly ration of the almost 300,000,000 pages we print annually — almost a billion pages since we launched a four-page newsletter in June 1981.

— Jim Reed

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HOT Cat's Magazine - (March 1983)

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RAINBOW Magazine - (November 1984)

"The DEFT system people have put together a package which is a complete Pascal and/or assembly programming environment that is reasonably priced and works like a charm." "DEFT Bench and DEFT Pascal set 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, there it gives you a total development environment. Nothing is missing, there is nothing else to buy." "Any college applicant attempting to obtain admission credit will be required to know Pascal in order to complete the exam. DEFT Bench and DEFT Pascal provide an excellent learning environment. The entire package is impressive. It is very well-written and extremely easy to use. In all the years I have been looking at software packages, never have I seen so much offered for so little."

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Graphics Quickies

Drawing the Line

By Jimmy McGill

The following is a Lo-Res line drawing program. Simply use the arrow keys to move up, down, left and right; use the number keys '1' through '8' to select the desired color ('0' will switch to black).

The listing: LINEDRAW

4K

```

10 CLS (0)
15 A=31
17 B=15
20 A$=INKEY$
30 IF A$="" THEN GOTO 20
50 REM DIRECTIONS
51 IF A$=CHR$(94) THEN B=B-1:IF B
<0 THEN B=0
52 IF A$=CHR$(10) THEN B=B+1:IF B
>31 THEN B=31
53 IF A$=CHR$(8) THEN A=A-1:IF A<
0 THEN A=0
54 IF A$=CHR$(9) THEN A=A+1:IF A>
63 THEN A=63
60 REM COLORS
61 IF A$="1" THEN C=1
62 IF A$="2" THEN C=2
63 IF A$="3" THEN C=3
64 IF A$="4" THEN C=4
65 IF A$="5" THEN C=5
66 IF A$="6" THEN C=6
    
```

```

67 IF A$="7" THEN C=7
68 IF A$="8" THEN C=8
69 IF A$="0" THEN GOSUB 100
70 SET(A,B,C)
80 GOTO 20
100 RESET(A,B):GOTO 20
    
```

Read My Lips!

By Bill Bernico

The following program is a graphics display of a fellow named "KoKo" (sound familiar?) who will "spit out" sentences from the user's input information. The fascinating part of the program is the way the information is presented.

For ambitious programmers who would like to substitute different sentences, the programming techniques used are listed below.

Line	Description
80-150	Accepts user input and assigns to variables
170-200	Draws KoKo
210	Allows 20 spaces before the printing begins
220	Holds the framework of the sentence and variables from the user input
240	Creates the sound and prints at 256, the sentences created in Line 220

The listing: SPEAK2ME

16K
ECB

```

10 'SPEAK TO ME
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 '
70 CLEAR 1000
80 CLS:PRINT"WHAT IS YOUR NAME":
INPUT N$
90 CLS
100 CLS:PRINT"HOW OLD ARE YOU":I
NPUT X$
110 CLS:PRINT"ARE YOU A BOY OR G
IRL":INPUT"(B/G)";BG$
120 IF BG$="B"THEN BG$="BOY"ELSE
IF BG$="G"THEN BG$="GIRL"ELSE BG
$="PERSON"
130 CLS:PRINT"WHAT STREET DO YOU
LIVE ON":INPUT Z$
140 CLS:PRINT"WHAT CITY DO YOU L
IVE IN":INPUT CT$
150 CLS:PRINT"WHAT STATE IS THAT
IN":INPUT ST$
160 B$=CHR$(128):Y$=CHR$(159):E$
=CHR$(157)
170 CLS:PRINT@51,STRING$(8,128):
PRINT@02,STRING$(10,128):PRINT@1
13,STRING$(12,128):PRINT@146,Y$;
Y$;Y$;STRING$(8,128)
180 PRINT@178,;Y$;E$;Y$B$;B$;Y$;
STRING$(5,128):PRINT@209,STRING$
(8,159);STRING$(4,128)
190 PRINT@242,STRING$(10,159):PR
INT@275,STRING$(9,159):PRINT@306
,STRING$(9,159):PRINT@340,STRING
$(7,159):PRINT@372,STRING$(7,159
)
200 PRINT@402,STRING$(11,255):PR
INT@433,STRING$(13,175):PRINT@46
5,STRING$(13,255):PRINT@496,STRI
NG$(15,175);
210 FOR U=1 TO 20:Q$=Q$+CHR$(143
):NEXT U
220 S$="HELLO "+N$+", MY NAME IS
KOKO. I'LL BE VISITING "+Z$+" S
TREET WHEN I'M IN "+CT$+" NEXT W
EEK. I'M LOOKING FOR A "+BG$+" A
BOUT "+X$+" YEARS OLD TO HELP ME
FIND THE CAPITAL OF "+ST$+"."
230 L$=Q$+S$+Q$
240 FOR P=1 TO LEN(L$)-19:SOUND
RND(9)+180,2:PRINT@256,MID$(L$,P
,19);:NEXT P

```

```

250 PRINT@481,"aNOTHER OR eND";
260 W$=INKEY$:IF W$="A"THEN 10 E
LSE IF W$="E"THEN 270 ELSE 260
270 CLS:PRINT"BYE, ";N$
280 PRINT"SEE YA LATER

```

It's Charlie the Canadian Dog, Eh!

By Ray Larabie



Charlie's picture can be dumped to a printer for color or black and white printouts using a screen dump program.

The listing: CHARLIE

16K
ECB

```

10 'CHARLIE (C) COPYRIGHT 1985 R
AY LARABIE ALL RIGHTS RESERVED
20 CLS:PRINT"CHARLIE (C) 1985 RA
Y LARABIE":PRINT" ALL RIGHTS RE
SERVED"
30 INPUT"BLACK & WHITE OR COLOR
(B/C)";A$
40 IF A$="C" THEN PMODE3,1:SCREE
N1,0:PCLS2:GOTO70
50 PMODE4,1:SCREEN1,1:PCLS1:COLO
R0,1
60 'left ear
70 DRAW"BM111,24;M98,8;M89,8;M79
,11;M72,19;M68,36;M65,71;M56,87;
M49,96;M43,102;M28,103;M25,107;M
24,119;M27,128;M36,140;M40,145;M
56,152;M72,155;M87,155;M95,149"
80 'right ear
90 DRAW"BM159,24;M164,12;M172,8;
M175,9;M180,16;M182,24;M180,32;M
177,44;M180,67;M191,86;M208,95;M
220,90;M228,95;M229,99;M227,111;

```

M222,124;M208,139;M188,151;M176,153;M165,148"

100 'brow

110 DRAW"BM111,24;M110,15;M125,20;M140,19;M144,11;M143,23;M156,11;M159,13;M159,24"

120 'snout

130 DRAW"BM122,77;M107,80;M98,86;M91,92;M83,100;M70,111;M76,124;M81,117;M83,132;M89,143;M95,149;M99,141;M94,142;M112,157;M131,163;M128,156;M132,152;M135,158;M132,168;M142,163;M156,145;M158,157;M165,145;M167,131;M166,115;M174,120;M172,104;M164,91

140 'shoulders & eyelashes

150 DRAW"BM157,83;M142,79;BM40,145;M22,160;M30,158;M0,188;BM193,148;M225,164;M216,168;M255,187;BM111,55;M152,49"

160 'eyes

170 CIRCLE(125,53),9,,2.2:PAINT(125,49),1,4

180 CIRCLE(141,52),9,,2.2:PAINT(141,47),1,4

190 CIRCLE(131,54),4:CIRCLE(134,54),4

200 'mouth

210 CIRCLE(130,113),15,,1.5,0,.50

220 'nose

230 CIRCLE(136,90),15,,.3:CIRCLE(130,92),25,,.3:PAINT(130,95),,0

240 IF A\$="C" THEN PAINT(0,0),3,4 ELSE PAINT(0,0),0,0

250 'end

260 FORX=255TO1STEP-1:Y=Y+1:POKE140,X:EXEC43345:POKE140,Y:EXEC43345:NEXTX:Y=0:GOTO260

Title Page Power

By Bill Bernico



One thing every program needs is an eye-catching title page. *Kromico* uses the DRAW and PAINT method that puts the title on the screen, paints the letters, switches to an alternate screen and starts over with another color, giving you a possibility of 24 different

screen presentations. Use the power of your CoCo to spruce up those title pages!

The listing: KROMICO

16K
ECB

10 'KROMICO

20 'EXAMPLES OF GRAPHIC TITLES

30 'BY BILL BERNICO

40 '708 MICHIGAN AVE.

50 'SHEBOYGAN, WI 53081

60 '(414) 459-7350

70 '

80 PMODE3,1:SCREEN1,1:PCLS

90 X=1 'START PAINTING WITH COLOR #1

100 'LINES 110-240 DRAW AND PAINT "KROMICO" IN FAT LETTERS

110 DRAW"BM2,1D70R12U25F25R214U10L209H25E35L16G25U25L11" 'K

120 PAINT(6,7),X,4

130 DRAW"BM40,57U44R25F6D14G6L10F18L12H10D10L8BU38BR8R8F4D6G4L8U14" 'R

140 PAINT(44,55),X,4

150 DRAW"BM78,52U32E6R20F6D32G6L20H6BR10BU2UF3R8E3U25H3L9G3D25" 'O

160 PAINT(80,52),X,4

170 DRAW"BM118,57U42R10F8E8R10D42L10U26G8H8D26L10" 'M

180 PAINT(120,55),X,4

190 DRAW"BM163,57U42R10D42L10" 'I

200 PAINT(165,55),X,4

210 DRAW"BM180,46U23E7R20F7D6L8U3H3L11G3D22F3R11E3U3R8D6G6L21H6U4" 'C

220 PAINT(182,44),X,4

230 DRAW"BM221,50U28E6R20F6D28G6L20H6BR10BU2UF3R8E3U21H3L9G3D21" 'O

240 PAINT(224,52),X,4

250 'LINES 260-330 DRAW "SOFTWARE" IN SMALLER LETTERS (NO PAINTING)

260 DRAW"BM75,80U2H2L4G2D4F2R4F2D4G2L4H2U2" 'S

270 DRAW"BR14D2F2R4E2U12H2L4G2D11" 'O

280 DRAW"BR16D3U9NR6U7R9" 'F

290 DRAW"BR7R11L6D16U16BR12" 'T

300 DRAW"D12F4E4NU6F4E4U12BD16BR7" 'W

310 DRAW"U12E5F6D5NL9D6" 'A

320 DRAW"BR6U16R6F2D4G2L6R2F6D2" 'R

330 DRAW"BR6NR9U8NR6U8R9" 'E

340 GOSUB440 'TIME DELAY

350 'LINES 360-400 TRY DIFFERENT

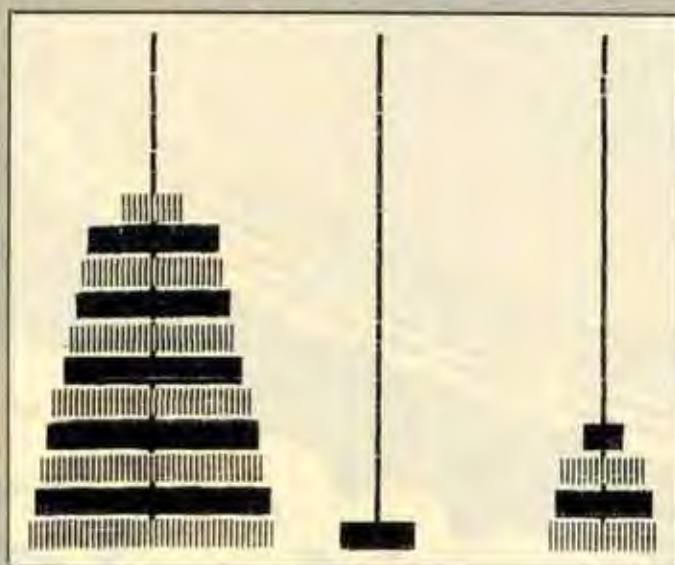
SCREEN STYLES

```

360 PMODE4,1:SCREEN1,0:GOSUB440
370 PMODE1,1:SCREEN1,1:GOSUB440
380 PMODE4,1:SCREEN1,1:GOSUB440
390 PMODE3,1:SCREEN1,0:GOSUB440
400 PMODE1,1:SCREEN1,0:GOSUB440
410 X=X+1 'AFTER ALL 6 SCREEN ST
YLES ARE TRIED, PAINT WITH A DIF
FERENT COLOR
420 IF X>4 THEN 80 'REPEAT AFTER
ALL FOUR COLORS ARE TRIED
430 PMODE3,1:SCREEN1,1:PCLS:COTO
110 'ERASE SCREEN AND START OVER
440 FORT=1TO1500:NEXTT:RETURN
    
```

The Towers of Hanoi

By David Cromley



The following is a graphics demonstration of the "Towers of Hanoi" puzzle. The object is to move all the disks on the left rod over to the right rod in the same order that they were in at the beginning. This shows how the puzzle can be solved.

The listing: HANOI

16K
ECB

```

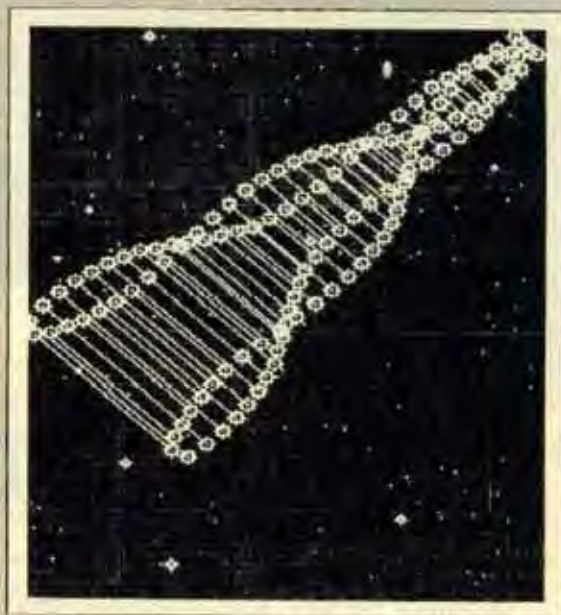
100 '--TOWERS OF HANOI
110 ' D-C DAVID A CROMLEY, 1984
120 PCLEAR 4: PMODE 3,1: COLOR 3
,2
130 PCLS: SCREEN 1,0
140 N=08: NR=N: DIM TN(3),TS(3,1
6),TC(3,16)
150 FOR X=43 TO 213 STEP 85
160 LINE (X,0)-(X,191),PSET: NEX
T X
170 T1=2: T3=1: FOR I=1 TO N: TN
(2)=1
180 TS(2,1)=I: TC(2,1)=I-INT(I/3
)*3+3
190 GOSUB 220: NEXT I
    
```

```

200 T1=1: T2=2: T3=3: GOSUB 340
210 GOTO 210
220 '--MOVE ONE DISC
230 N1=TN(T1): N3=TN(T3)+1
240 TN(T1)=N1-1: TN(T3)=N3
250 XS=TS(T1,N1): TS(T3,N3)=XS
260 XC=TC(T1,N1): TC(T3,N3)=XC
270 X1=T1*85-42: X3=T3*85-42
280 Y1=194-N1*12: Y3=194-N3*12
290 XR=44-INT(XS/NR*19)*2
300 COLOR XC,2: FOR Y=0 TO 9
310 LINE (X1-42,Y1+Y)-(X1+42,Y1+
Y),PSET
320 LINE (X3-XR,Y3+Y)-(X3+XR,Y3+
Y),PSET
330 PSET (X1,Y1+Y,3): NEXT Y: RE
TURN
340 '--SUBROUTINE
350 IF N=0 THEN RETURN
360 T=T2: T2=T3: T3=T: N=N-1: GO
SUB 340
370 T=T2: T2=T3: T3=T: GOSUB 220
380 T=T1: T1=T2: T2=T: GOSUB 340
390 T=T1: T1=T2: T2=T: N=N+1: RE
TURN
    
```

Space Waves

By Joey Goodson



RcRcsin draws sine wave designs on an outerspace background and plays a short sound effect. The design is erased and then starts over with a new picture.

For quicker drawings, POKE 65495,0.

The listing: RCRC SIN

16K
ECB

```

1 '*RCRC SIN* - BY JOEY GOODSON
2 A=RND(-TIMER)
4 G=10:R=3
    
```

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```

5 PMODE4,1:PCLS:SCREEN1,1
6 FORW=1TO15: PSET(RND(252),RND(
191)):NEXTW:FORW=1TO1: CIRCLE(RN
D(255),RND(191)),RND(2):NEXTW
10 IFB=0 THEN X=X+3
11 IFB=1 THEN X=X-3
12 IFBB=0 THEN XX=XX+3
13 IFBB=1 THENXX=XX-3
14 G=G+GG
20 Y=G+10*(SIN(X))
30 LINE(X,Y)-(Y,XX),PSET
31 CIRCLE(X,Y),R:CIRCLE(Y,XX),R
32 IFX=255 THENB=1
33 IFX=0 THEN B=0
34 IFXX=192 THEN BB=1:GOSUB10:P
CLS:R=RND(10):FORW=1TO15:PSET(R
ND(255),RND(191)):NEXTW:FORW=1TO
1: CIRCLE(RND(255),RND(191)),RND
(2):NEXTW
36 IFXX=0 THEN BB=0
37 IFG=248 THEN GG=-2
38 IFG=10 THEN GG=2
50 GOTO10
100 PLAY"V1"
101 J=RND(5):J$="O"+STR$(J):PLAY
J$
110 FORJ=1TO15
120 PLAY"T255V+ABGABG":NEXTJ
130 FORJ=1TO15
140 PLAY"T255V-ABCDEFGABCDEF":N
EXTJ
150 FORJ=1TO46: NEXTJ
160 J=RND(4):ONJ GOSUB 20,25,3
0,35
161 RETURN
200 FORJY=0TO191:LINE(0,JY)-(255
,JY),PRESET:NEXTJY:RETURN
250 FORJY=191TO0STEP-1:LINE(0,JY
)-(255,JY),PRESET:NEXTJY:RETURN
300 FORJX=0TO255:LINE(JX,0)-(JX,
191),PRESET:NEXTJX:RETURN
350 FORJX=255TO0STEP-1:LINE(JX,0
)-(JX,191),PRESET:NEXTJX:RETURN

```

Speed Optimizing

By Doug Farrell

Ball presents a stunning, visual graphics effect. Before loading and running *Ball*, enter the following pokes:

POKE 20160,0:POKE25,110:NEW

The listing: BALL

32K
ECB

```

10 CLS6:PRINT@224,"CAN THE COMPU
TER WORK AT HIGH SPEED? (Y
/N)"
20 A$=INKEY$:IFA$="Y"THENPOKE654
95,0:WA=40:GOTO30ELSEIFA$="N"THE
NPOKE65494,0:WA=20:GOTO30:ELSEIF

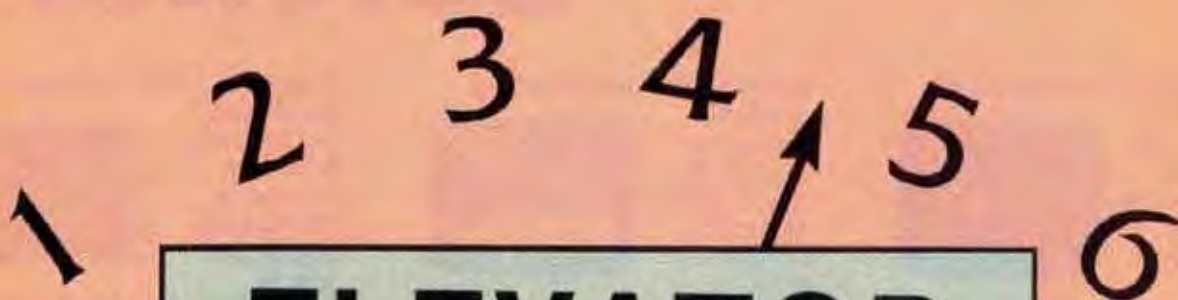
```

```

A$=""THEN20ELSEGOTO20
30 IN=1:S=1.33333333
40 R=-.390625:Z=400:Z1=3600
50 CLS4:PRINT@224,STRING$(32,32)
;
60 PRINT@192,STRING$(32,153);
70 PRINT@256,STRING$(32,153);
80 A$=" 1YOU WON'T BELIEVE THIS!
!! 3PRETTY INCREDIBLE I MIGHT AD
D 5OK, OK, I'M WORKING ON IT!!!
7ALLRIGHT, GET READY, HERE IT IS
9"
90 FORP=1TO13STEP4
100 PMODE3,P:PCLS3:COLOR1,1
110 M1=INSTR(A$,STR$(IN))+2
120 PRINT@224,MID$(A$,M1,INSTR(M
1,A$,STR$(IN+2))-M1)
130 FORL=0TO256STEP64:LINE(L,191
)-(128,96),PSET:NEXT
140 FORL=112TO189STEP8
150 L1=L+IN:L2=L1-96:I2=IN/4:L2
=L1-96
170 LINE(257-L1*S,L1)-(L1*S,L1),
PSET:LINE(257-L1*S,L1)-(257-L1*S
,L1-26+L2*R),PSET:LINE-(0,L1-26+
L2*R),PSET:LINE(L1*S,L1)-(L1*S,L
1-26+L2*R),PSET:LINE-(255,L1-26+
L2*R),PSET
180 NEXT
190 COLOR1,1
200 LINE(0,80)-(255,80),PSET
210 PMODE0,P:PCLS0:P:MODE3,P:PAI
N T(10,78),1,1
220 COLOR1,1
230 LINE(0,127)-(128,70),PSET:LI
NE-(255,127),PSET:LINE(0,80)-(25
5,80),PSET
240 FORX=58TO178STEP4
250 Y=SQR(Z*(1-(X-118)^2/Z1))
260 LINE(X-2,159-Y)-(X-2,159+Y),
PSET
270 NEXT
280 CIRCLE(128,96),60,2:PAINT(12
8,38),2,2:CIRCLE(128,96),60,1
290 FORA=.2TO1STEP.2
300 CIRCLE(128,96),60,1,A-I2,0,.
53
310 NEXT
320 FORA=0TO.8STEP.2
330 CIRCLE(128,96),60,1,A+I2,.5,
1
340 NEXTA
350 IN=IN+2
360 NEXTP
370 P=1
380 PMODE4,P:SCREEN1,1
390 FORW=0TO WA:NEXT
400 P=P+4:IFP>13THENP=1
410 GOTO380

```


This program helps make the 'ups and downs' of learning easy



ELEVATOR

By Bill Bernico

Sesame Street teaches fundamentals to youngsters, helping them understand simple, everyday words like large or small, near or far, alike or different. Here's a program that helps them comprehend up and down.

This program, *Elevator*, at first glance, may appear to be strictly for young kids. Don't believe it! There are some pretty slick programming tricks integrated into this one — tricks you may want to use in your own programs even if you aren't overly entertained by an elevator making the rounds.

Constructing the seven floors of the building is done in lines 80-220, the building being topped off by the word "ELEVATOR" in Line 230. Lines 240-250 ask if the user wants to go up or down. Lines 260-290 accept user input. Line

(Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wis.)

270 keeps the words "GOING UP" on the screen and erases the "OR." Line 280 keeps the word "GOING" on the first line, erasing the rest of that line. It also keeps the word "DOWN" on the second line, erasing "(U/D)."

The basis of the elevator action is held in lines 300 through 420. Lines 300-350 are GOSUBed if the user chooses 'D' and lines 360-420 are GOSUBed if the user chooses 'U'.

In either case, 'S' equals the value of the sound, with the top floor having the highest sound. 'N' equals the number of the floor displayed in the right window and is poked into value 'V'. I used POKE instead of PRINT @ because PRINT @ left unwanted spaces before and after the number.

As the elevator passes each floor a character string that's half black and half yellow appears in the window, which gives the impression of the elevator being halfway

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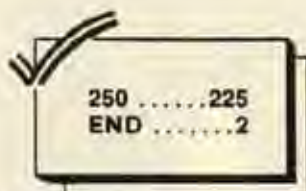
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between floors. I chose the variable BY\$ to represent the "Bottom Yellow" color block. TY\$ is used when the "Top Yellow" block appears.

These actions are merely repeated in a FOR/NEXT loop until you've covered all seven floors. I'd be interested in hearing from anyone who can use this

premise and build a more complex program around it. My address is 708 Michigan Avenue, Sheboygan, WI 53081, phone (414) 459-7350. □



The listing: ELEVATOR

```
10 'ELEVATOR
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 '
70 L$=CHR$(128):A$=STRING$(10,19
1):B$=CHR$(191):C$=B$+B$+B$+L$:D
$=CHR$(159):E$=STRING$(2,191):TY
```

```
$=CHR$(156):BY$=CHR$(147)
80 CLS3:PRINT@498,A$;
90 PRINT@466,C$;C$;E$;
100 PRINT@434,A$;
110 PRINT@402,C$;C$;E$;
120 PRINT@370,A$;
130 PRINT@338,C$;C$;E$;
140 PRINT@306,A$;
150 PRINT@274,C$;C$;E$;
160 PRINT@242,A$;
170 PRINT@210,C$;C$E$;
180 PRINT@178,A$;
190 PRINT@146,C$;C$;E$;
200 PRINT@114,A$;
210 PRINT@82,C$;C$;E$;
220 PRINT@50,A$;
230 PRINT@18,B$;"elevator";B$;
240 PRINT@0,"GOING UP OR";
250 PRINT@32,"DOWN (U/D)?";
260 I$=INKEY$:IFI$=""THEN260
270 IF I$="U"THEN PRINT@8," ";
:PRINT@32,STRING$(11,143);:GOSUB
360
280 IF I$="D"THEN PRINT@6,"
";:PRINT@37," ";:GOSUB 30
0
290 GOTO 80
300 S=180:N=55:V=1113:FOR Y=85 T
O 469 STEP 64
310 PRINT@Y,TY$;:GOSUB420
320 PRINT@Y,D$;:SOUNDS,1:POKEV,N
:GOSUB420
330 PRINT@Y,BY$;:GOSUB420
340 PRINT@Y,L$;:PRINT@Y+4,L$;:GO
SUB420
350 S=S-5:N=N-1:V=V+64:NEXTY:RET
URN
360 S=150:N=49:V=1497:FOR Y=469
TO 85 STEP-64
370 PRINT@Y,BY$;:GOSUB420
380 PRINT@Y,D$;:SOUNDS,1:POKEV,N
:GOSUB420
390 PRINT@Y,TY$;:GOSUB420
400 PRINT@Y,L$;:PRINT@Y+4,L$;:GO
SUB420
410 S=S+5:N=N+1:V=V-64:NEXT Y:RE
TURN
420 FORK-1TO200:NEXTK:RETURN
```

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Uncomplicate Programming Tasks Using Your ROM Routines

By R. Bartly Betts
Rainbow Contributing Editor

I recall a saying I used to hear. The situation went like this:

If I wanted to borrow my friend's yoyo, I said, "Hey, Bryan, can I borrow your yoyo?"

He kindly replied, "Ah, go get your own, dummy."

I said, "Why buy a cow when you can milk one through the fence?"

He promptly hit me on the jawbone with his yoyo.

You Bought it with Your Computer

Well, there are a few things you can borrow from your computer, without endangering your jawbone. They are called ROM routines. Remember? I mentioned them in the August column.

A ROM routine is a machine language routine that resides in ROM. Actually, your computer's ROM (Read-Only Memory) is nothing but a series of machine language routines and tables. Some of the routines only operate as part of the BASIC ROM built into your computer, but other routines

(R. Bartly Betts is currently a technical writer for Tandy Corp. and is a former news reporter and magazine editor. As the father of 10 children, computers are his escape from reality.)

can be called from any program and put to use.

THE RAINBOW has carried numerous articles and listings dealing with ROM routines and I do not propose to compete with them. However, I have talked to a number of people who, after looking over the articles, still didn't know of what value they are or how to put them to use.

Along with ROM routines, your computer also contains some tables and values in a "work space" area of RAM that can also be borrowed and manipulated to make assembly language programming a bit easier. I will leave that discussion for the future.

Are ROM Routines Worthwhile?

Before encouraging you about ROM routines, I should mention that using them is not always the best policy. You may have experienced the frustration of having a program that works on one version of the Color Computer, but does not work properly on another version.

Often this is due to a change made in the ROM routines that the program attempts to directly access. Tandy, of course, does not guarantee it will leave ROM routines alone in new versions

of BASIC. Thus, using them can create future problems for you or someone else.

A good example of this type of problem is found by attempting to use the *Telewriter* word processor with the JDOS disk controller. The JDOS controller contains its own Disk BASIC routines, and *Telewriter* relies heavily on using built-in Disk BASIC. It does not find what it is looking for in JDOS and, as a result, cannot function. A machine language program that is totally independent of ROM does not have this type of problem and could possibly operate on a totally different 6809-based computer.

Despite the problems involved in using ROM routines, it is still a fun way to program. There is something exciting about doing a complicated task with very little programming. For instance, there is a ROM routine available to clear the text screen and home the cursor. To use it, you need only one program line:

JSR \$A928

That's all. Routine \$A928 clears the screen and sends the cursor to the top left-hand corner of the screen. If you

wish to check this out from BASIC, type EXEC &HA92B and ENTER. It is more work than typing CLS and pressing ENTER, but it does the job. From assembly language, however, such a routine is much less work than writing the code to do the job. For instance, the code to only clear the screen might look something like this:

```

LDA      96
LDX     $#400
LOOP STA  ,X+
        CMPX $#600
        BEQ  DONE
        BRA  LOOP

```

Anytime six lines of code can be replaced with one it seems like a good process. However, the one-line program would never work in a 64K machine with BASIC ROM disabled. The six-line program possibly could.

If you like the idea of this kind of programming, I have included a few more routine addresses. Experiment with them. If you get some good results and find some good applications, let me know and I will share them with other readers.

Address	Purpose
\$A30A	Print the character represented by the value in Register A to the screen.
\$A393	Input a line of text from the keyboard and store it in a buffer at memory location \$02DD.
\$A027	Reset your computer.
\$A2BF	Send the character represented by the value in Register A to the printer.
\$A027	Initialize BASIC.
\$A9DE	Sample the joysticks and store the values in the following locations: \$015A - up/down value of left joystick; \$015B - left/right value of left joystick; \$015C - up/down value of right joystick; \$015D - left/right value of right joystick.
\$BDCC	Display the decimal value of Register D.

There are, of course, many other ROM routines. If there are some you especially like, send me a note and I will also share them with other readers.

The Son of Bytecoder

I was pleasantly surprised at the interest in the *Bytecoder* program of some months back. If you remember, it is a BASIC program designed to allow you to examine and change memory locations. Its purpose is to let you enter a machine language program without the use of an editor/assembler. One of its features is the ability to save the machine language program once you have typed it.

I have gotten a lot of letters and calls as a result of the program. Some wanted to say they enjoyed the program and found it useful (thank you very much), and others were having problems. Also, a couple of readers offered help and suggestions.

To Richard D. King of Houston, Texas, and Larry Geiger of Lawrence, Kan., I give thanks. Your suggestions and upgrades are appreciated and are included in my new version. For those who wanted some way to examine registers in BASIC, I have included the feature in the new version of *Bytecoder*. The interest in *Bytecoder* seemed keen enough that I decided to upgrade it and include all of your ideas and suggestions, your corrections and a few other goodies.

What It Does

Bytecoder now has three displays on the screen when you are entering or examining code. Instead of just the hexadecimal values of the memory locations being displayed, you also see the decimal values and the ASCII characters these values represent. If an ASCII value cannot be displayed on the screen (it is less than 32) then the display shows "XX."

I have included the decimal display for those who are still not familiar with hexadecimal. I have retained the requirement that the values you enter are in hexadecimal due to the fact that this is what most assembly language listings show.

I have included the ASCII characters to allow you to read any text located in memory.

Thanks to Mr. King, *Bytecoder* now adds an extension to the filename if you are using disk. It also provides a prompt that asks if you wish to save the program to tape or disk and then acts accordingly. As well, Mr. King included some lines to trap filenames that are too long or if you try to save a file without a filename.

Mr. Geiger provided the solution to the problem of wrong values being displayed if a number less than 16 is entered. The change is in Line 630 for those who have been trying to track it down yourselves.

As mentioned earlier, *Bytecoder* now lets you examine the registers from BASIC. The process is accomplished through a machine language program, but it is accessed by BASIC, so you need not leave the program to use the function.

Other changes are mostly cosmetic and have little bearing on how the program works. The new lines have been inserted between the old lines so you will have little difficulty in spotting them to add to the original program.

Putting it to Use

To use *Bytecoder*, after you have typed it in or loaded it from RAINBOW ON TAPE, type RUN and answer the starting address prompt with the hexadecimal address of where you wish to examine or change memory. The screen displays the contents' 24 bytes, beginning at the address you specify, in Hex, decimal and ASCII. A cursor appears over the first value. To change that value, type it in Hex. When you do, the screen display changes to show the new value.

If you do not wish to change the value, use the right- and left-arrow keys to move the cursor one byte at a time. To move the cursor eight bytes at a time (to the next row above or below), use the up- and down-arrow keys. Use the equals sign (=) or minus sign (-) key to move the display back 24 bytes, or the plus sign (+) or semi-colon (;) key to move the display ahead 24 bytes.

As you move through memory, the current memory location indicated by the cursor is displayed on the left upper corner of the screen. If you press 'R' to display the registers, they appear on the upper right of the screen in this order:

```

Register A
Register B
Register X
Register Y
Register II
Condition Code register

```

To select a new starting address for the memory display, press 'N'.

To save a block of memory into a file (a machine language program),

press CLEAR and answer the prompts.

I have used the speed-up poke to make the display change faster. It is disabled when you save to tape or disk. If you do not wish to use the speed-up poke, or if your machine doesn't like it, edit Line 100. The program runs quite satisfactorily without it.

I have tried to keep *Bytecoder* simple to use but gave it the features it needs.

I have included the complete code in Listing 1 because of the extensive changes that have been made.

As well, the assembly source code for the register display function is included as Listing 2. You may wish to put it to use in other programs. All that Listing 2 does is store the register values in memory locations \$7FF8 through \$7FFF. I then used PEEK to obtain the

values, put them in a string and display them (see program lines 840 through 950). You must use CLEAR 1,&H7FE0 to protect the program and its values if you use it with a BASIC program.

(You may contact Mr. Betts with questions or suggestions at 2251 Lipscomb, Fort Worth, TX 76110, 817-924-3725. Please include an SASF when writing.) □



110	.....	65
305	.....	34
440	.....	102
590	.....	41
740	.....	23
836	.....	24
END	.....	32

Listing 1: BYTECODR

```
1 '*****
2 '* BYTEMASTER CODER *
3 '* BY R. BARTLY BETTS *
4 '* 3351 LIPSCOMB *
5 '* FORT WORTH, TEXAS *
6 '* 76110 *
7 '*****
8 'USE THIS PROGRAM TO INPUT
9 'MACHINE LANGUAGE CODE INTO
10 'MEMORY. USE THESE KEYS:
11 '<N>=GET NEW START ADDRESS
12 'RIGHT ARROW=AHEAD 1 BYTE
13 'LEFT ARROW=BACK 1 BYTE
14 'UP ARROW=BACK 8 BYTES
15 'DOWN ARROW=AHEAD 8 BYTES
16 '<-> OR <=> = BACK 24 BYTES
17 '<+> OR <;> = AHEAD 24 BYTES
18 '<CLEAR> = PREPARE TO SAVE
19 'THE NUMBER KEYS AND THE
20 'ALPHABET CHARACTERS A - F
21 'CAUSE A VALUE BO BE PUT
22 'INTO MEMORY
23 '
24 '
25 '
100 CLS: CLEAR 300, &H7FE0
105 GOSUB 950
110 V=32
120 DIM M(24)
130 A$(1)="BYTEMASTER CODER"
140 A$(2)="R. BARTLY BETTS"
150 A$(3)="JANUARY 1985"
155 ' SET UP SCREEN
156 ' GET ADDRESS
160 FOR T=1 TO 3
170 PRINT TAB(16-LEN(A$(T))/2) A
$(T)
```

```
180 NEXT
190 GOSUB 790
200 PRINT@V*12," START ADDRESS I
N HEX";
210 INPUT BG$
212 PRINT@V*12,STRING$(32,32)
220 B=VAL("&H"+BG$)
230 BB=B
240 FOR T=0 TO 23
250 BB$=HEX$(PEEK(BB)):IF LEN(BB
$)<2 THEN BB$="0"+BB$
252 PRINT@M(T),BB$;
253 D=D+1:PRINT@M(T)+128-2+D,PEE
K(BB);:IF D>7 THEN D=0
254 CR=PEEK(BB):IF CR>31 THEN PR
INT@M(T)+256,CHR$(CR) ELSE PRINT
@M(T)+256,"XX
260 BB=BB+1
270 NEXT T
272 D=0
290 A$=CHR$(128):B$=CHR$(32)
300 P=0
305 ' KEYBOARD INPUT
306 ' TO EXAMINE AND CHANGE
310 IF P>23 THEN P=0:B=B+24:GOTO
230
320 IF P<0 THEN P=0:B=B-24:GOTO
230
322 IF D>7 THEN D=0
330 M=M(P):C=PEEK(M+1024):H$=""
340 PRINT@96,"*"HEX$(B+P)*";
350 IF C>63 THEN G=C-64 ELSE G=C
+64
355 ' WAIT FOR KEYPRESS
356 ' AND PRODUCE CURSOR
360 K$=INKEY$:POKE M+1024,G:IF
K$="" GOTO 360
370 POKE M+1024,C
375 ' LOOK FOR VALID
376 ' KEYPRESS
380 IF K$=CHR$(94) THEN P=P-8:GO
TO 310
390 IF K$=CHR$(10) THEN P=P+8:GO
TO 310
400 IF K$=CHR$(8) THEN P=P-1:D=D
-1:GOTO 310
410 IF K$=CHR$(9) THEN P=P+1:D=D
```

```

+1:GOTO 310
420 IF K$=CHR$(12) THEN 660
430 IF K$="+" OR K$=";" THEN B=B
+P+24:GOTO 230
440 IF K$="-" OR K$="=" THEN B=B
+P-24:GOTO 230
450 IF K$="N" THEN RUN
452 IF K$="R" THEN GOTO 840
455 ' LOOK FOR INVALID
456 ' KEYPRESS
460 IF ASC(K$)<48 OR ASC(K$)>70
THEN 360
470 IF ASC(K$)>57 AND ASC(K$)<65
THEN 360
475 ' INCREMENT MEMORY
476 ' IF END OF DISPLAY
480 IF P<0 THEN B=B-24:P=1:GOTO
230
490 IF P>24 THEN B=B+24:P=1:GOTO
230
495 ' PRINT TO SCREEN
496 ' AND GO TO NEXT CHAR
500 PRINT@M,K$;
510 H$=H$+K$
520 M=M+1
525 ' ROUTINE FOR SECOND
526 ' CHARACTER INPUT
530 C=PEEK(M+1024)
540 IF C>63 THEN G=C-64 ELSE G=C

```

```

164
550 POKE M+1024,G
560 K$=INKEY$:IF K$="" THEN 560
570 IF ASC(K$)<48 OR ASC(K$)>70
THEN 560
580 IF ASC(K$)>57 AND ASC(K$)<65
THEN 560
590 POKE M+1024,ASC(K$)+64
595 ' ADD UP INPUT VALUES
596 ' AND POKE IN MEMORY
600 H$=H$+K$
610 PK=VAL("&H"+H$)
620 POKE B+P,PK
630 IF PK<16 THEN PRINT@M,HEX$(P
K); ELSE PRINT@M-1,HEX$(PK);
632 D=D+1:PRINT@M+D-3+128,PK;:IF
D>7 THEN D=0
634 PRINT@M+256-1,CHR$(PK) " ";
640 P=P+1
650 GOTO 310
655 ' SAVE PROGRAM TO TAPE
656 ' OR DISK ROUTINE
660 CLS
670 A$(1)="BYTEMASER CODER"
680 A$(2)="=====
685 A$(3)="SAVE PROGRAM"
686 POKE 65494,0
690 FOR T=1 TO 3
700 PRINT TAB(16-LEN(A$(T))/2) A
$(T)
710 NEXT T
720 PRINT@V*4+2,"* START (HEX)..
.";:INPUT BM$:BM=VAL("&H"+BM$)
730 PRINT@V*5+2,"* END (HEX)..
.";:INPUT EM$:EM=VAL("&H"+EM$)
740 PRINT@V*6+2,"* EXEC (HEX)..
.";:INPUT EA$:EA=VAL("&H"+EA$)
750 PRINT "NAME OF PROGRAM...";:
INPUT NP$
751 IF LEN(NP$)<1 OR LEN(NP$)>8
THEN 750
752 PRINT:PRINT"TAPE OR DISK (T/
D)?"
753 K$=INKEY$:IF K$="" THEN 753
754 IF K$="D" THEN 760 ELSE IF K
$="T" THEN 770 ELSE 753

```

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```

760 NP$-NP$+"/BIN":SAVEM NP$,BM,
EM,EA
765 GOTO 780
770 CSAVEM NP$,BM,EM,EA
780 CLS
781 PRINT "ANY MORE PROGRAM TO B
E INPUT (Y/N)?"
782 K$=INKEY$: IF K$="" THEN 782
783 IF K$="N" THEN 787 ELSE IF K
$<>"Y" THEN 782
784 RUN 1000
787 END
788 ' DATA FOR POSITION
789 ' OF SCREEN DISPLAY
790 FOR X=160 TO 224 STEP 32
800 FOR T=0 TO 21 STEP 3
810 M(X/4-40+T/3)=X+T-32
820 NEXT T,X
830 RETURN
835 ' PROGRAM TO
836 ' READ REGISTERS
840 DEFUSR1=&H7FE0
850 A=USR1(0)
860 R(1)=PEEK(&H7FF8):R$(1)="a"
870 R(2)=PEEK(&H7FF9):R$(2)="b"
880 R(3)=PEEK(&H7FFA):R$(3)="x"
890 R(4)=PEEK(&H7FFD):R$(4)="y"
900 R(5)=PEEK(&H7FFC):R$(5)="u"

```

```

910 R(6)=PEEK(&H7FFF):R$(6)="c"
920 CT=0:FOR T=57 TO 236 STEP 32
922 CT=CT+1
930 PRINT@T,R$(CT)="R(CT);
940 NEXT T:GOTO 360
945 ' DATA FOR REGISTER
946 ' READING PROGRAM
950 FOR T=0 TO 21
960 READ AA
970 POKE &H7FE0+T,AA
980 NEXT
990 RETURN
1000 DATA 183,127,248,247,127,2
49,191,127,250,255,127,252,16,19
1,127,253,31,168,183,127,255,57

```

Listing 2: Assembly Language Source Code for Register Display Routine

7FE0		00100	ORG	\$7FE0
7FE0	B7	7FF8	STB	\$7FF8
7FE3	F7	7FF9	STB	\$7FF9
7FE6	BF	7FFA	STX	\$7FFA
7FE9	10BF	7FFD	STY	\$7FFD
7FED	1F	A8	TFR	CC,A
7FEF	B7	7FFF	STA	\$7FFF
7FF2	39		RTS	
		0000	END	
00000	TOTAL ERRORS			

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by Steven Hirsch

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ROMMEL 3-D

By Kary McFadden

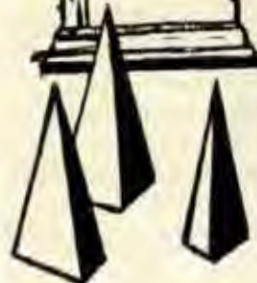
You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

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"This game is for naturally mellow folks who accept success as the reward for perseverance . . ."



NO NINES ALLOWED!

By Richard Ramella

N*o-niner* is an innocent little listing. It's not much trouble to type in and run. But beyond that, it's a tricky test of your thinking ability. Some players have been known to never beat it. If you want to consider that as a dare, then do.

My best score is 39, so that's the score you should equal or *try* to beat. I think a score of 40 or more is impossible, but I hope someone proves me wrong. (If so, I'd like to hear about it.)

When you run the program you're presented with an eight-by-eight grid comprised of all letter O's, except for the 'X' in the northwest corner. To start, move the 'X' to the position where you want to begin. Tap the 'A' key for north, 'Z' key for south, comma key for west and period key for east. When ready to start the test, press 'P' for play. A numeral '1' appears in place of the 'X' and you've scored one point.

From this start, directional moves count upward to '8', then start over at '1'. Every move you make scores a point.

Of course, there's a catch. At any time during play, the game ends if any two numbers in a vertical row total nine or more. For example: At the start you press 'P' for play when the 'X' is in the northwest corner. Then, pressing the period key seven times counts from '2' to '8', ending at the northeast corner.

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 Color Computer programs.)



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The only possible next move is south. You press the 'Z' key, a '1' is set beneath the '8' and the game ends because the two cells' numbers total nine.

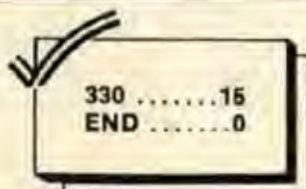
No-niner keeps score, won't let you move off the playing board or into previously set numbers, and ends the game when you have exceeded the legal vertical total of eight.

In keying in the game, remember the material within quotes in lines 160 and 390-430 is comprised of the letter 'O' and *not* a zero. Similarly, the material within quotes in Line 180 is the uppercase word for "OX" (as in strong as an ox).

This is a game for naturally mellow folks who accept success as the reward

for perseverance. Keep the desk pounders away from it; they might smite your CoCo to bits when they score a measly 16 points or so for the 20th time in a row!

(Any questions about *No-niner* may be directed to Mr. Ramella at 1493 Mt. View Avenue, Chico, CA 95926. Please include an SASE.) □



The listing: NONTNER

```

100 REM * NO-NINER * TRS-80 EXTE
NDED COLOR BASIC 16K
110 REM * BY RICHARD RAMELLA
120 CLEAR 500
130 DIM A$(10)
140 CLS: PRINT "CAN YOU SCORE 39
?"
150 FOR C=1 TO 10
160 A$(C)="0000000000"
170 NEXT C
180 A$(2)="OX"+RIGHT$(A$(2),8)
190 X=2: Y=2: B$="12345678"
200 GOSUB 550

```

```

210 A$=INKEY$
220 IF A$="" THEN 210
230 GOSUB 500: GOSUB 390
240 IF A$="P" THEN MID$(A$(Y),X,
1)="1": GOSUB 550: GOTO 270
250 GOSUB 550
260 GOTO 210
270 Q=1: S=1: C=2
280 A$=INKEY$
290 PRINT @ 360,"SCORE"S;
300 IF A$="" THEN 280
310 GOSUB 500
320 IF INSTR("AZ,.",A$)=0 OR A$=
"" THEN 280
330 GOSUB 390: GOSUB 550
340 U=VAL(MID$(A$(Y-1),X,1))
350 M=VAL(MID$(A$(Y),X,1))
360 P=VAL(MID$(A$(Y+1),X,1))
370 IF U+M>8 OR P+M>8 THEN XX=10
0: GOTO 500
380 GOTO 280
390 IF Q=0 THEN MID$(A$(Y),X,1)=
"0"
400 IF A$="A" AND Y>2 AND MID$(A
$(Y-1),X,1)="0" THEN Y=Y-1: L=1
410 IF A$="Z" AND Y<9 AND MID$(A
$(Y+1),X,1)="0" THEN Y=Y+1: L=1
420 IF A$="," AND X>2 AND MID$(A
$(Y),X-1,1)="0" THEN X=X-1: L=1
430 IF A$="." AND X<9 AND MID$(A
$(Y),X+1,1)="0" THEN X=X+1: L=1
440 IF Q=0 THEN MID$(A$(Y),X,1)=
"X": RETURN
450 IF L=0 THEN 280 ELSE L=0
460 MID$(A$(Y),X,1)=MID$(B$,C,1)
470 S=S+1: C=C+1
480 IF C=9 THEN C=1
490 RETURN
500 IF XX<>100 THEN RETURN
510 PRINT @ 416,"END SCORE:S"
520 FOR T=1 TO 1000
530 NEXT T
540 END
550 GH=76
560 FOR D=2 TO 9
570 PRINT @ GH,MID$(A$(D),2,8)::
GH=GH+32
580 NEXT D
590 RETURN
600 END

```

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The Analog-To-Digital Converter, Part 1

By Tony DiStefano
Rainbow Contributing Editor

The world inside your computer consists of zeros and ones — all that goes on inside your computer hinges on two values. Memory, PIAs, CPUs, VDGs and SAM chips all transfer information between each other using only two different states. These states are called *logic states*.

The first logic state is zero, also known as "low" or "lo." In the Color Computer (and most computers) a logic state low is zero volts, also known as *ground level*. The second logic state is one, also known as "high" or "hi." Again, in the Color Computer, a logic state high is five volts. Except for specified tolerances, all other voltages in between are undefined and if encountered can give the computer some unpredictable results. This is the digital universe of computers. Figure 1 shows a typical digital wave form.

The real world, however, deals in ever changing states. Digital ones and zeros are just two of millions of different states that exist. The real world is an analog world. A good example of the

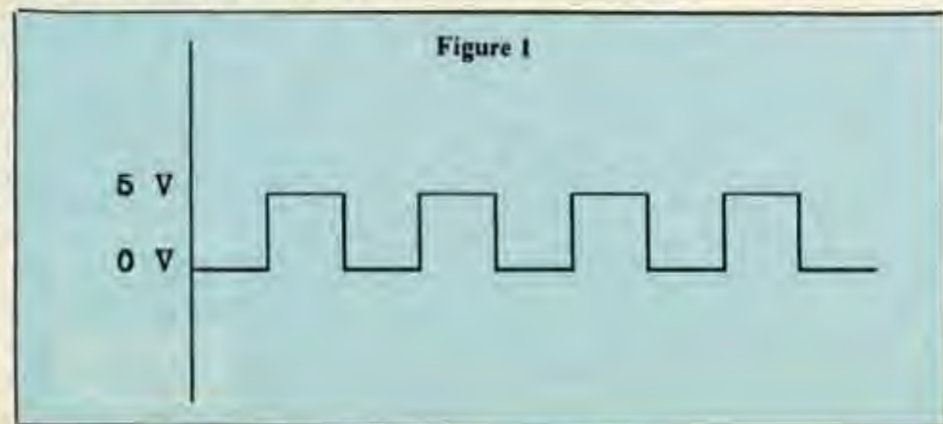
analog world is speech. You can speak loud, you can speak low or many levels in between.

Sound waves are ever changing. For example, if you take a microphone and amplifier and hum into it, the speaker will vibrate, reproducing the sound you are making. That vibration is a back and forth motion. The frequency of the back and forth motion depends on the frequency of your hum. Frequency is measured by how many times a wave form goes back and forth in one second. Every time the speaker moves back and forth is one cycle.

From 1886 to 1888, the work of Heinrich Rudolph Hertz led to his

discovery of electromagnetic waves. The German physicist's revelation opened the way for the development of radio, television and radar. As a tribute to him, the frequency of any wave, be it digital or analog, is measured in hertz (or Hz, for short). In the audible range, the frequency is from about 20 Hz to 20,000 Hz or 20 kHz. The 'k' stands for "kilo" meaning thousand. Our CoCos, for instance, run at 894,000 Hz or .9 MHz. The 'M' stands for "mega" meaning million.

Figure 2 shows a graphic representation of the output of a sound wave. Compare it to the wave form in Figure 1. There are some obvious differences;



(Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ovest, Quebec.)

it is these differences that make it impossible for a computer to directly and accurately read and duplicate an analog wave form.

Don't despair, there are ways around it. This is the first of a two-part project on how you can use a computer to measure analog signals. This project stems from several letters received from my readers requesting that I build a computerized oscilloscope adapter for the joystick port. I looked into the joystick port as an input, but found it to be inaccurate or not fast enough. By the time you finish reading this, you'll know why.

Anyway, this month we'll cover the theory on how a computer (and a little hardware) can convert an analog signal to a digital value. Next month we'll cover how to build and calibrate the analog to digital converter.

Now to the task of explaining how a computer can convert an analog signal to a digital value. The first thing the computer needs is some hardware, a comparator. A comparator is an IC that has two inputs (the "positive" input and the "negative" input) and one output.

The output has two states; on or off, good for a digital computer. The inputs, however, have analog inputs.

Here is how a comparator works. When the positive input voltage is higher (more voltage) than the negative input, the output is high. When the positive input voltage is lower (less voltage) than the negative input, the output is low. Figure 3 shows a block diagram of a computer-controlled comparator.

The way it works is simple. If we had a known voltage at the negative input, by reading the output (high or low) we could tell if the test voltage at the positive input is higher or lower than our reference voltage. Furthermore, if we change our reference voltage and zero into the unknown voltage, we will then know what the unknown voltage is. This technique is known as successive approximation.

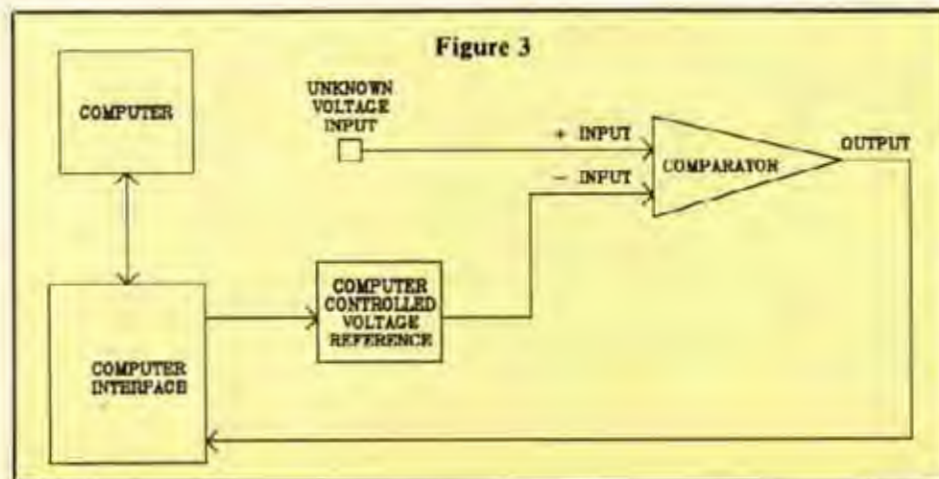
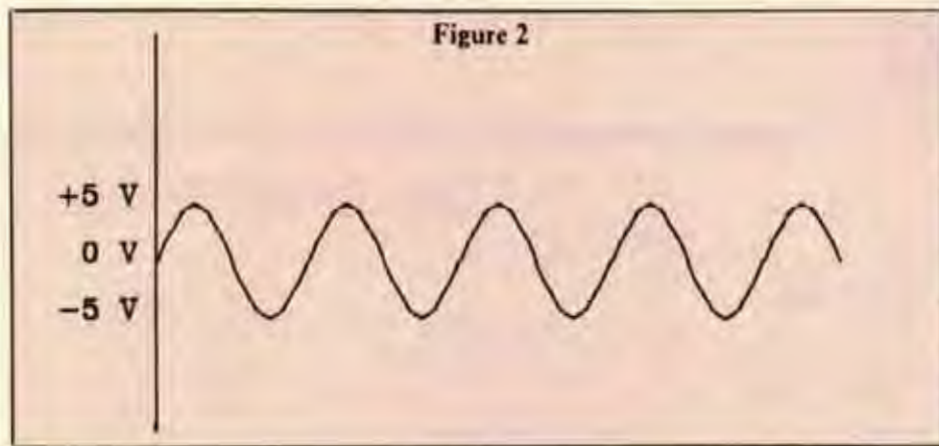
The procedure for successive approximation is as follows: Start by putting half of the maximum voltage your device can measure to the reference voltage. If the output of the comparator is high, that means the unknown voltage

is higher than the reference voltage. We then increase the reference voltage by half the difference of the present value and the last value and test again. If the output of the comparator is low, that means the unknown voltage is lower than the reference voltage. We would then decrease the reference voltage by half the difference and test again. Continue to do this until we have reached the unknown voltage.

Let's take an example. In this example, I round off the reference voltage to the nearest whole number for ease of calculation. The maximum voltage is 100 and the unknown voltage 47. The first reference value is 50 — too high, so we subtract from the present value using the successive approximation method. New reference is now $(100-50)/2$ or 25; the new reference is 25 — too low, so we add. The new reference is now $(25+50)/2$ or 37.5; the new reference is 38, still too low. Add again, $(38+50)/2$ or 44. The new reference is now 45, again too low. Add $(45-38)/2$ or 4. The new reference is 49. That's too high, so subtract $(49-45)/2$ or 2. The new reference is now 47, which is too low, so add $(47-46)/2$ or 1. The new reference voltage is now 48. Too high, so subtract $(48-47)/2$ or 0.5. We have now reached the point where our reference voltage matches the unknown voltage.

Actually, the rounding off is not limited to integer calculation, but rather to the resolution of the reference voltage. When zeroing into the unknown voltage, you divide until the unit change in voltage is one. You cannot divide and get a more accurate fix on the unknown value. No matter how close you get, the comparator will always give a higher or lower value. The more accurate the reference, the closer you get to the real value of the unknown voltage.

This reference accuracy is one of the reasons why I chose not to use the joystick input. You see, inside the Color Computer there is all of the previously mentioned circuitry: a voltage comparator, a variable voltage reference, an unknown voltage input (joystick) and the interfacing circuit to control it all. A more common name for a variable voltage reference is "Digital-to-Analog Converter" or DAC for short. The DAC inside the CoCo is limited. It has a fixed output of .25 to 4.75 volts and the resolution of about 0.0715 volts.



The range is not very good for an analog-to-digital project.

Another reason for not using the joystick input is speed. You see, the successive approximation method talked about earlier is time-consuming. The CPU has to calculate the next reference voltage value, set up the DAC, read the comparator output and make the proper decision.

The speed at which an unknown voltage can be found is very important. When the unknown voltage is stable and not changing, the computer can take all the time in the world to figure out what the voltage is. But, if the unknown voltage is changing, like the humming mentioned earlier, speed is important.

The amount of time it takes the CPU or other device to find an unknown voltage value is called the "conversion time." The faster the conversion time, the more samples can be taken and the more accurate the wave shape reproduction can be. For example, if you have a loop to read the A to D converter which takes 10 ms (ms = milliseconds = 1/1000 seconds), that means you have

100 samples per second. If you are sampling a wave form that is 1,000 Hz, you will miss a lot of information. It is safe to say you need at least 10 times the sample rate to reproduce a particular sine wave with reasonable accuracy.

A BASIC loop using the JOYSTK command will limit you to about 3 Hz — not very fast. In machine language, you can get a lot faster, but it is still slow due to the overhead created by the CPU having to do the conversion. In the case that the CPU has an external A to D converter, a great increase in speed and accuracy can be achieved. With the right software the effective conversion rate for an external A to D could be as high as 800 hertz.

The last thing I must mention this month is that the A to D circuit requires negative voltage. This is no problem with the first CoCos, but it is with the CoCo 2. The CoCo 2 has no negative voltage available at the cartridge connector. There is, however, negative voltage available inside the CoCo 2.

To bring this voltage to the cartridge connector is simple; you just need one

piece of wire and a soldering iron. First, unplug the computer, then open it and locate the chip with the number SC77527; this is the SALT chip. You will find -12 volts on pin 15 of this chip (just what the doctor ordered). Solder one end of a piece of wire to that pin. Locate pin #1 of the cartridge connector (it is the top pin closest to the back of the computer) and solder the other end of wire to this pin. Before you plug anything into the computer, measure the voltage to that pin. It should be about -12 volts, give or take two volts.

On the CoCo 2 this pin is normally not connected to anything. On the regular CoCo, this is the regulated -12 volt pin. The -12 volts you just added to that pin are not regulated, but in this and most cases, it will not matter. There will be a negative voltage regulator on the A to D converter. Of all the peripherals I have seen for the CoCo, only one uses the negative voltage and it doesn't matter that it is not regulated.

If all is well, close your computer and I'll see you next month with Part 2 of the A to D converter. ☺

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Learning The Art Of Written Expression With Proper Punctuation

By Steve Blyn
Rainbow Contributing Editor

“Holy cow, Batman! Watch out for the Penguin!” exclaimed Robin.

There are quite a few punctuation marks in the preceding paragraph. Using punctuation marks correctly was almost becoming a lost art until recently. The “back to basics” movement occurring in many school systems has included stressing the teaching of written expression. The proper use of punctuation marks is an essential part of this skill.

Punctuation Quiz reviews the uses of punctuation marks. A chart is displayed listing major punctuation marks and shows their keyboard symbols. The student is then quizzed on when to use each of the marks illustrated on the chart. The student's task is to type in the answer to the computer's questions.

Rather than having the student insert the actual mark as the answer, we felt

it proper, in this case, to require the correct spelling of names of the punctuation marks. This is always a difficult decision to make when writing any educational program. It presents a double-edged sword: On one hand, we always prefer to teach correct spelling; on the other hand, a child often feels cheated if he knows the correct answer but misspells it and gets marked as wrong.

We compromised on the issue this time. Exact spelling is the only way to get a correct answer in this program. The pressure is eased, however, by omitting any scoring in the program. While we do want the children to learn to spell words correctly, we do not want, at the same time, to penalize them too severely for minor spelling mistakes. After each group of five questions, the student may press 'C' to continue or 'E' to end the program. The program may be played continuously until the student learns all of the marks in the program.

Punctuation Quiz also helps to familiarize children with the keyboard/typewriter symbols. Punctuation marks are often confusing to beginners because the SHIFT key must be used to produce some of them. Fortunately, the CoCo's keyboard is very similar to that

of a standard typewriter. More than half of the punctuation marks are in similar positions. Many other computers have keyboards that are quite different from a standard typewriter keyboard.

Beginners should be encouraged to gain familiarity with using all of the CoCo's keyboard symbols. The only odd punctuation marks we have are the brackets. The left bracket is made by simultaneously pressing the SHIFT and down-arrow keys and the right bracket is made by pressing the SHIFT and right-arrow keys. (I have trouble remembering this myself and always have to check it out first.)

Line 50 reads the DATA statements necessary for the chart. Line 60 reads the DATA statements for the questions and answers. Lines 70-100 print out the chart of quotation marks and their symbols.

Lines 190-320 contain the quiz. Line 210 randomly selects one of the 11 possible question and answer sets. Line 220 prints the chosen question. Lines 260-270 check to see whether the answer is correct. If it is incorrect, the correct answer will be displayed.

After five questions, the student may begin again or end the program by pressing either the letter 'C' or 'E'. The

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

routine on lines 320-340 takes care of this task. A record of the student's score could be added between lines 320-330 if you desire one. This can easily be achieved by incrementing a counter on Line 260. To achieve this, add CR=CR+1 at the end of Line 260.

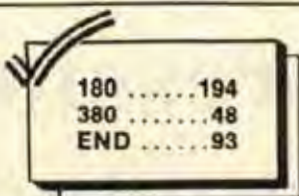
Each time a question is answered

correctly, the counter will increase by one. You could then create a line such as 325 PRINT CR:CR-0. This would indicate the score and reset the count to zero for the next round.

As discussed earlier, we did not feel the need for a scorecard in this particular program. The choice, of course,

is yours. As always, please feel free to alter this program as you see fit to help your children and students benefit the most from it.

(You may contact Mr. Blyn with any questions about *Punctuation Quiz* at 227 Hampton Green, Staten Island, NY 10312. Please include an SASE.) □



The listing: PUNQCUIZ

```

10 REM"PUNCTUATION QUIZ"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1985
30 DIM A$(11),B$(11),C$(11),D$(1
1)
40 CLS
50 FOR I=1 TO 11:READ A$(I),B$(I
):NEXT I
60 FOR I=1 TO 11: READ C$(I),D$(
I):NEXT I
70 PRINT"          PUNCTUATION MARK
S"
80 PRINT"   MARK           NAME"
90 PRINT"   ----           -"
100 FOR A=1 TO 11:PRINT A TAB(2)
A$(A) TAB(13)B$(A): NEXT A
110 REM"CHOOSE A DECORATIVE PATT
ERN"
120 NN=128+RND(127)
130 PR$=STRING$(32,NN)
140 PRINTPR$:
150 PRINT@484,"PRESS <ENTER> TO
GO ON";
160 EN$=INKEY$
170 IF EN$=CHR$(13) THEN 180 ELS
E 160
180 FOR T= 1 TO 5
190 CLS
200 PRINT"          PUNCTUATION  QU
IZ":PRINT PR$:
210 R=RND(11)
220 PRINT@96,C$(R)
230 PRINT@192," ":PRINT@192,"ANS
WER";
240 INPUT E$
250 PRINT@288,PR$:
260 IF E$=D$(R) THEN SOUND 200,2
:PRINT@ 364,"CORRECT"
270 IF E$<>D$(R) THEN SOUND 20,3
:PRINT@362,D$(R):PRINT"IS THE CO
RRECT ANSWER THIS TIME."
280 PRINT@ 484,"PRESS <ENTER> TO
GO ON";

```

```

290 EN$=INKEY$
300 IF EN$=CHR$(13) THEN CLS ELS
E 290
310 NEXT T
320 CLS RND(8):PRINT@96,"      PRE
SS <C> TO CONTINUE          OR <E
> TO END THE PROGRAM."
330 EN$=INKEY$
340 IF EN$="C" THEN RUN ELSE IF
EN$="E" THEN END ELSE 330
350 DATA ",","COMMA
360 DATA ".",PERIOD,?,QUESTION MAR
K,!,EXCLAMATION POINT,;,SEMICOLO
N,":",COLON,-,HYPHEN
370 DATA ( ),PARENTHESES,[ ],B
RACKETS,'"',' ',QUOTATION MARKS,',
APOSTROPHE
380 DATA THIS COMES AT THE END O
F A      DECLARATIVE SENTENCE.,P
ERIOD
390 DATA THIS IS USED TO SHOW ST
RONG    FEELINGS OR EMOTIONS.,E
XCLAMATION POINT
400 DATA THIS IS USED IN PLACES
WHERE YOUWOULD PAUSE IN SPEAKIN
G.,COMMA
410 DATA THIS IS USED BETWEEN TW
O MAIN  CLAUSES NOT JOINED BY A
CONJUNCTION.,SEMICOLON
420 DATA THIS IS USED BEFORE A L
IST OF  ITEMS.,COLON
430 DATA THIS IS USED TO SHOW PO
SSSESSION OR OWNERSHIP.,APOSTROPH
E
440 DATA THIS IS USED TO DIVIDE
A WORD  INTO PARTS AT THE END O
F A LINE.,HYPHEN
450 DATA THESE ARE USED TO ENCLO
SE AN   EXTRA WORD OR WORDS.,PA
RENTHESSES
460 DATA THESE ARE USED TO ENCLO
SE ITEMS FOUND WITHIN PARENTHESE
S.,BRACKETS
470 DATA THESE ARE USED TO SHOW
SOMEONE'S EXACT WORDS.,QUOTATION
MARKS
480 DATA THIS IS USED AT THE END
OF AN  INTERROGATORY SENTENCE.
,QUESTION MARK

```

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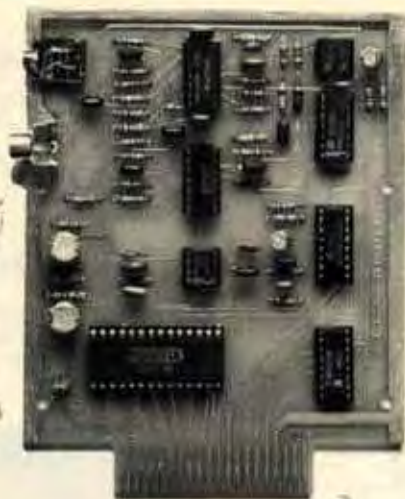
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EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

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You Get Everything You Need. You get everything you need including a specially designed professional headset style noise

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Computers Can Play An Important Role In Art Education

By Michael Plog, Ph.D.
Rainbow Contributing Editor

When dealing with computers and education, the subject matter area getting the short end of the electronic stick is the arts. This is understandable in some ways, but really doesn't make much sense — for the arts or for education.

In general, elementary schools use computers most frequently with math, followed by language arts, reading, computer programming, social studies, science and then art. (This is a finding from the National Commission for Employment Policy, "Uses of Computers in Education," conducted by Education Turnkey Systems, Inc.) We can easily understand why computers are most frequently used with mathematics. After all, computers are mathematical calculating machines, and math teachers have been trained in such things as calculating machines. Art teachers are creative people who deal with such things as paint, clay or other products.

Of course, the concept of "art" covers a wide range of activities. There are the

performing arts, such as dance, theater, mime, magic, music and so on. Commercial art covers such things as photography and drafting. Some schools even include film making in the curriculum.

The amazing thing is that in most fields of art the computer has been used by professional artists, but not in the schools, where students are usually introduced to the arts. Much of the past "computer art" depended on the ability of the computer to produce random numbers. Then, a song or painting or some other artistic product was created using the random numbers.

The random effect has been used in the past with some degree of success. Mozart (in 1777) composed a piece of music by using dice to help pick a scale. One hundred and eighty years later (1957), Lejaren Hiller and Leonard Isaacson composed the "Iliac Suite for String Quartet" using random numbers generated by a computer. Generally, however, the random number approach to art results in a product that is appreciated only by the artist (if that much).

There is much more to computer-assisted art (and art education) than random numbers. We listen to a lot of computer music. Moog synthesizer and electronic guitars are commonplace today. The computer provides not only

the music, but in some cases, provides the structure of a piece and relieves the artist of many mundane tasks, from writing musical notes to reading them. Vangelis, who provided the score for the movie *Chariots of Fire*, cannot read music. But, he can generate art.

Computers are used to help in all kinds of animation, from Saturday morning cartoons to commercials. In fact, were it not for computers, we would have much less animation today than in the past. Salaries have increased a lot since Walt Disney directed a team of animators.

Computer-generated graphics are not only used to present subatomic particles and the structure of DNA (which looks like art to me), but pieces that hang in museums. Computers have been used to analyze the movements of dancers and runners for training purposes. John Swartzwelder has even used a CoCo to create one-line jokes (example: Scientists discover new moon orbiting Kate Smith). Computers have been used to mathematically analyze prose and poetry of great masters and then mimic that style to produce (some not so great) literary efforts.

So, if artists use computers, why should art students not be using them? There are several reasons. First, we do not expect students, especially elementary students, to produce great works

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

of art. We expect them to learn about art instead of attempting to compete with professionals. Second, most of the computer applications mentioned here involve rather sophisticated software, which artists are unwilling to share with a group of elementary students. Also, there are few software publishers who provide computer-assisted instruction packages (still the most frequent use of computers in schools) for art. Finally, art teachers may not realize what students can do with the help of a computer.

I hold the position that students — even in primary grades — can use the computer to help them learn about the arts. I believe students should learn art by actually doing it. They should learn about painting by organizing colors and shapes; about music by organizing sound in meaningful patterns; about dance by studying movement.

Consider the easiest one first: music. My nephew recently showed me a music program for the Color Computer. The screen shows the music staffs, and by movement of the cursor and command keys, notes are placed on the staff. It seems to make sense that students would learn about music by writing it and listening to their compositions being played. The teacher could introduce such concepts as chords and harmony by showing students how to improve their own music. The students have a stake in their creations. Music by other people becomes more "real" to one who has written music.

It is difficult to convince a band to play a piece of music written by an elementary student. Especially when there may be 30 such students, each wanting to hear their own creation 100 times. It is not so difficult, on the other hand, to convince the Color Computer to play a musical composition written by a student. It is easy for the student

to make changes in the music stored in a Color Computer and hear the results. It is hard for a student to change a few notes in a piece of music and expect a "live" band to immediately play again the altered piece. Thus, this piece of software seems to be an ideal teaching tool.

The initial barriers keeping the teacher away from the student are more easily overcome. The student learns about music by actively engaging in the process of organizing sound. It seems reasonable that such an approach would increase the motivation to learn how to play an instrument.

How about other arts? The computer can be used to help the student learn about painting as well as music. The Color Computer has some wonderful graphics packages. Students can first create, then print their masterpiece on paper to be displayed on the refrigerator door.

Beginning students make simple mistakes that can ruin an art project. With a graphics package, it is easy to correct these little problems before the final product is ready. This makes the final product easier to accept, as well as giving the student a valuable lesson that art is a dynamic, changing expression rather than a "first time only" event.

In kindergarten classes, a pre-art activity is to learn colors and shapes. The Color Computer is an ideal machine for computer-assisted instruction with kindergarten students. It is easy to imagine a student running a program which draws a triangle on the screen while the cassette recorder is talking about triangles. The triangle is colored red while the cassette provides a verbal explanation of the color red. As with all computer-assisted instruction packages, a major advantage is that the student can participate in the lesson

as many times as needed.

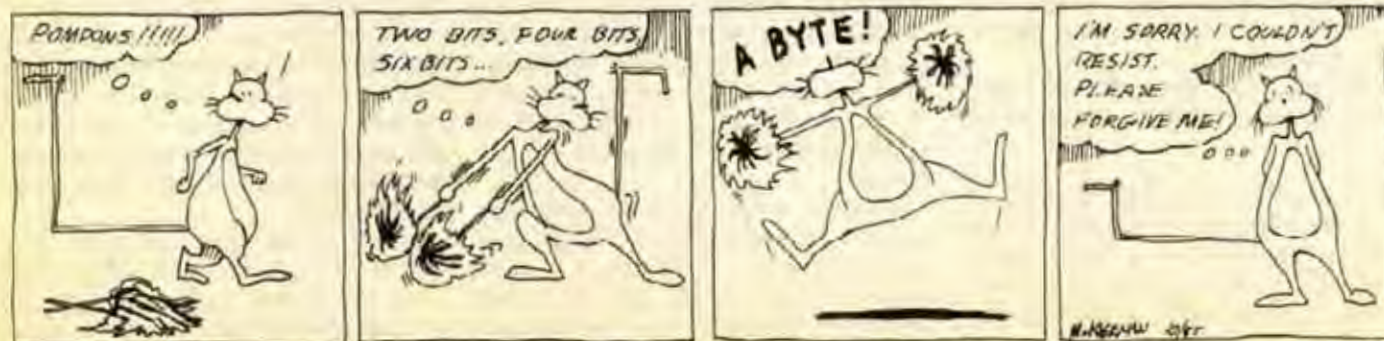
Now, I do not know if such a program is already on the market. I doubt that it would require a master programmer to put together a unit on colors and shapes. If you have written one, please let me know about it and I will share that information through these pages.

So far, we have presented examples of computer-assisted art lessons for primary students. The same graphics packages mentioned could be used as a supplemental activity in a drafting class in a high school. The student could design the initial drafting project using a commercial graphics package, then complete the paper version based on changes and corrections made to the electronic rough sketch. Dance students in high school could use the screen as a model of a stage for choreographing movement, then translate the mental image to physical movement.

There is probably no end to the opportunities offered students with this blend of the computer and the arts. Before leaving this idea, a practical point should be raised. The arts are a very important part of education and one of the key subject matter areas for students to learn about our cultural heritage. Yet, when budget crunches happen in schools, the arts often suffer the most. The use of computers can help continue this crucial part of education while still allowing for budget reductions.

I must mention one of the most creative arts, computer programming. Just think, by your knowledge and skill, you can use a medium of expression (your Color Computer) to generate a work of beauty. Your programs can be poetry, even if you are the only reader. I welcome your thoughts on this subject, and would appreciate reading anything you want to send to me at 829 Evergreen, Chatham, IL 62629. ☺

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COLOR CARTOONS



By Wayne Thume

You may not fill your local theater, but you can create animation that will impress your friends and family

Along with many others, I have always wanted to experiment with animation. Being an avid "Bugs Bunny" fan, I've often said to myself, "Hey! I'd like to make cartoons, too." Now with the help of my Color Computer and this program, I can create animation for games, graphics demonstrations or just for fun.

The first problem confronted in designing this program was space. I wanted the pictures for

(Wayne Thume works as a programmer/operator at Airpax Corporation, a division of North American Phillips. He did his first programming on the Color Computer. Wayne lives in Trappe, on the Eastern Shore of Maryland.)

the animation to be held in the computer's memory and not on tape or disk. Since storing too many pictures would take up an incredible amount of space, I decided to reduce each picture to a 16-by-32 grid.

Now before you quit reading this article in disgust, let me assure you there is more than enough room for significant high resolution animation. Using this grid 96 pictures can be created, which will allow for about 20 seconds of animation. I'll be the first to admit that 20 seconds doesn't sound like very long, but after drawing 96 pictures you will be convinced that it is far too long.

The next problem was which language to write the program in. I chose BASIC so anyone could easily interpret and modify the program to suit his or her own tastes. Using GET and PUT, I was able to store and retrieve pictures at the high rate of speed that is needed to show the animation. The pictures are stored on pages five through eight of the graphics memory. They are displayed on the Hi-Res screen PMODE 4,1 which uses the first four pages of graphics memory.

Using this small amount of memory allows for enough room to create a program to utilize the graphics for some different programming applications.

After the program is typed in and run, there will be a menu which allows you to either 1) create a picture, 2) see the animation, 3) save animation, 4) load animation or 5) quit the program. Choosing the first option will take you to the Hi-Res screen PMODE 4, 1 where there is a flashing rectangle. The size of the rectangle represents the size of the area you may animate. The rectangle may be moved to any area of the screen with a joystick. Once you have chosen the area to animate, press the joystick firebutton and the area within the flashing rectangle will be enlarged and placed on the Lo-Res screen. You have several commands to create the picture at this point (these are all summarized in a chart at the end of this article). Once your picture is finished, it will be stored and you will again return to the menu.

The second option in the menu will display the animation that has been created. If you choose this option, the computer will switch to the Hi-Res mode and the first picture in the animation sequence will be shown. To start the animation, press the space bar. You may stop the animation at any point by pressing any key other than the space bar. To resume animation, press the space bar again. To quit the display sequence before it has ended, press 'Q' and the program will return to the menu.

Option three will save the picture sequence on cassette tape or disk drive. If you choose this option, you will see what appears to be garbage forming at the top of the screen. This "garbage" is actually the screen locations for all 96 pictures that have been poked into the video memory. The program stores all of the information in two files, one for the screen locations of the pictures and one for the pictures themselves. Once you have given a filename and specified tape or disk, the computer will save the data and return to the menu.

With the fourth option you will be asked for the name of a file that has been previously saved. Once this is entered, merely specify whether you are using tape or disk drive and the computer will load the pictures and return to the menu.

The last option allows you to exit the program. The screen will clear and return to the BASIC mode.

There are many areas of the program that are not explained adequately, so I have included a sample animation program. Since an actual cartoon would be too long to create, I had to stick to a simple graphics demonstration. The animation is that of a circle traveling in sine wave moving downward. The circle is simultaneously passing back and forth across a

vertical line in the center of the screen. It may not be the best example, but it does show how much greater speed can be achieved in your BASIC programs.

When the program is run, it will first display a line and the circle, then the program will GET the 16-by-32 area which includes the circle and part of the line. Next the computer clears the screen and redraws the picture with the circle moved to the new position. Slowly, each new position is drawn and recorded until the circle reaches the bottom. The reason it takes so long to draw this sequence is because the computer must draw and erase each picture before it can draw the next one.

After this sequence has been recorded the animation will be displayed. First, some colorful patterns are drawn on either side of the screen to demonstrate that the animation can be displayed on a screen without having to erase



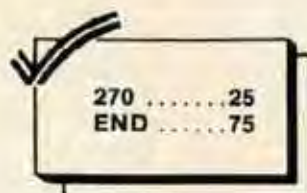
any picture which may already be there. Next, you will see the circle move down the screen — note the smooth and quick movement as the circle glides down the screen.

And now to explain the gimmick. Refer to the graphics picture above. There is no program included to draw this picture. The fact is, I drew this picture dot by dot with a graphics editor and it would be impossible to create a short program to reproduce it. When I create my animation, I display it on the little movie screen in the picture; this makes my feeble cartoons look much more impressive.

If you would like a copy of this screen, I would be glad to send one if you send me a tape or disk and enough money to pay for postage to send it back. I would also like to see any animation you create using my program. My address is Route 2, Box 119, Trappe, MD 21673. □

Summary of Commands for Option 1:
Create Picture

Key	Function
Arrow keys	will move dot around screen to desired position
S	sets point on the screen
R	resets point on screen
O	Shows Hi-Res screen PMODE 4,1. Press any key and it will switch to PMODE 4,5 where the pictures are stored. Press any key again and the computer will return to the Lo-Res screen.
G	gets any of the 96 pictures you choose and puts it on the screen
C	clears screen
X	switch mode. The first time this is pushed you will be given the option to choose the (S)et or (R)eset mode. Now when you move the cursor dot with the arrow keys, it will either erase points or set points wherever it moves. To exit this mode press the 'X' key again.
Q	quit and return to the menu



Listing 1: ANIMATE

```

10 PCLEAR 8
20 PMODE 4,1
30 SCREEN 1,1
40 Z=1:B=8
50 DIM S(32,16)
60 FOR X=0 TO 255 STEP 32
70 FOR Y=0 TO 191 STEP 16
80 GOSUB 140
90 GET(112,B-7)-(143,B+8),S,G
100 PMODE 4,5
110 PUT(X,Y)-(X+31,Y+15),S,PSET
120 NEXT Y,X
130 GOTO 270
140 PMODE 4,1:PCLS
150 B=B+1
160 A=SIN(Z)*10
170 A=A+128

```

```

180 IF C=1 THEN C=0:GOTO 250
190 CIRCLE(A,B),5
200 C=1
210 LINE(127,0)-(127,192),PSET
220 LINE(128,0)-(128,192),PRESET
230 LINE(129,0)-(129,192),PSET
240 Z=Z+.1:GOTO 260
250 Z=Z+.1:GOTO 140
260 RETURN
270 REM SEE ANIMATION
280 PMODE 4,1:PCLS
290 PMODE 3,1
300 FOR UO=1 TO 4:PCLS UO:NEXT:P
CLS2
310 PMODE 4,1:SCREEN 1,1
320 LINE(112,0)-(143,192),PRESET
,BF
330 LINE(9,9)-(102,182),PSET,BF
340 LINE(153,9)-(246,182),PSET,B
F
350 LINE(127,0)-(127,192),PSET
360 LINE(129,0)-(129,192),PSET
370 CIRCLE(56,96),40,0
380 CIRCLE(199,96),40,0
390 W=7
400 FOR X=0 TO 255 STEP 32
410 FOR Y=0 TO 191 STEP 16
420 PMODE 4,5
430 GET(X,Y)-(X+31,Y+15),S,G
440 PMODE 4,1
450 PUT(112,W)-(143,W+15),S,PSET
460 W=W+2
470 NEXT Y,X
480 CLS:PRINT@228,"AGAIN (Y/N)";
490 A$=INKEY$:IF A$="" THEN 490
500 IF A$="Y" THEN SCREEN 1,1:W=
1:GOTO 390
510 END

```



Listing 2: DEMO

```

10 PCLEAR 8
20 DIM S(32,16)
30 DIM T(97,2)
40 PMODE 4,1
50 AB$="NONE"
60 CLS
70 SCREEN 0,0
80 PRINT@40,"graphic";
90 POKE 1071,32
100 PRINT@48,"animator";

```

```

110 PRINT@73,"BY WAYNE THUME"
120 PRINT@133,STRING$(21,"X")
130 PRINT@160,"      X<1> CREATE
PICTURE X"
140 PRINT      "      X
      X"
150 PRINT"      X<2> SEE ANIMATIO
N X"
160 PRINT      "      X
      X"
170 PRINT"      X<3> SAVE ANIMATI
ON X"
180 PRINT"      X
      X"
190 PRINT"      X<4> LOAD ANIMATI
ON X"
200 PRINT"      X
      X"
210 PRINT"      X<5> QUIT
      X"
220 PRINT@453,STRING$(21,"X")
230 A$=INKEY$
240 IF A$="" THEN 230
250 ON VAL(A$) GOTO 270,1270,143
0,1810,2120
260 GOTO 230
270 REM CHOOSE PICTURE
280 CLS
290 PRINT"LAST PICTURE: ";AB$
300 PRINT@224,"WHICH PICTURE ";
310 INPUT AB$
320 IF VAL(AB$)<1 OR VAL(AB$)>96
THEN 300
330 REM CREATE PICTURE
340 SCREEN 1,1
350 J=JOYSTK(0):K=JOYSTK(1)
360 J1=J*3.57:K1=K*2.82
370 GET(J1,K1)-(J1+31,K1+15),S,G
380 PUT(J1,K1)-(J1+31,K1+15),S,P
RESET
390 C=PEEK(65280):T=J1:U=K1
400 IF C=126 THEN R=X:GOTO 440
410 IF C=254 THEN R=X:GOTO 440
420 PUT(J1,K1)-(J1+31,K1+15),S,P
SET
430 GOTO 330
440 REM ENLARGE PICTURE
450 V=VAL(AB$):T(V,1)=T:T(V,2)=U
460 SCREEN 0,0
470 PUT(J1,K1)-(J1+31,K1+15),S,P
SET
480 CLS
490 FOR X=15 TO 46
500 FOR Y=7 TO 22
510 C=PPOINT(J1+(X-15),K1+(Y-7))
520 IF C=1 THEN SET(X,Y,1) ELSE
RESET(X,Y)
530 NEXT Y,X
540 REM START
550 CD=15:CE=7:D=0
560 C=POINT(CD,CE)
570 PRINT@0,STRING$(32,143);
580 A$=INKEY$
590 IF C=1 THEN RESET(CD,CE):SET
(CD,CE,1):ELSE SET(CD,CE,1):RESE
T(CD,CE)
600 IF A$="" THEN 580
610 J2=J1+(CD-15):K2=K1+(CE-7)
620 IF P=1 THEN SET(CD,CE,1):PSE
T(J2,K2)
630 IF P=2 THEN RESET(CD,CE):PRE
SET(J2,K2)
640 IF A$="S" THEN SET(CD,CE,1):
PSET(J2,K2)
650 IF A$="R" THEN RESET(CD,CE):
PRESET(J2,K2)
660 IF A$="X" THEN GOSUB 810
670 IF A$="C" THEN GOSUB 900
680 IF A$="G" THEN GOTO 1000
690 IF A$="O" THEN GOSUB 1100
700 IF A$="Q" THEN GOTO 1200
710 IF A$=CHR$(94) THEN CE=CE-1
720 IF A$=CHR$(10) THEN CE=CE+1
730 IF A$=CHR$(8) THEN CD=CD-1
740 IF A$=CHR$(9) THEN CD=CD+1
750 IF CD<15 THEN CD=46
760 IF CD>46 THEN CD=15
770 IF CE<7 THEN CE=22
780 IF CE>22 THEN CE=7
790 GOTO 560
800 GOTO 60
810 REM SWITCH MODES
820 IF FL=1 THEN FL=0:P=0:RETURN
830 FL=1
840 PRINT@0,"SWITCH TO <S> OR <R
>ESET      ";
850 B$=INKEY$
860 IF B$="" THEN 850
870 IF B$="S" THEN P=1:RETURN
880 IF B$="R" THEN P=2:RETURN
890 GOTO 850
900 REM CLEAR SCREEN
910 PRINT@0,"CLEAR SCREEN (Y/N)"
920 B$=INKEY$
930 IF B$="" THEN 920
940 IF B$="Y" THEN COLOR 0,1:LIN
E(T,U)-(T+31,U+15),PSET,BF:COLOR
1,0:GOTO 970
950 IF B$="N" THEN 540
960 GOTO 920
970 FOR XI=103 TO 359 STEP 32
980 PRINT@XI,STRING$(17,128);
990 NEXT XI:RETURN
1000 REM GET PICTURE
1010 PRINT@0,"GET WHICH PICTURE
";
1020 INPUT AC$:V=VAL(AC$)
1030 IF V<1 OR V>96 THEN 1010

```

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```

1040 GOSUB 1580
1050 PMODE 4,5
1060 GET(X,Y)-(X+31,Y+15),S,G
1070 PMODE 4,1
1080 PUT(T,U)-(T+31,U+15),S,PSET
1090 GOTO 440
1100 REM SEE HI-RES SCREEN
1110 PMODE 4,1
1120 SCREEN 1,1
1130 IF INKEY$="" THEN 1130
1140 PMODE 4,5
1150 SCREEN 1,1
1160 IF INKEY$="" THEN 1160
1170 PMODE 4,1
1180 SCREEN 0,0
1190 RETURN
1200 REM SAVE AND QUIT
1210 GOSUB 1580
1220 GET(T,U)-(T+31,U+15),S,G
1230 PMODE 4,5
1240 PUT(X,Y)-(X+31,Y+15),S,PSET
1250 PMODE 4,1
1260 GOTO 60
1270 REM SHOW ANIMATION
1280 SCREEN 1,1
1290 RJ=1
1300 FOR X=0 TO 255 STEP 32
1310 FOR Y=0 TO 191 STEP 16
1320 PMODE 4,5
1330 GET(X,Y)-(X+31,Y+15),S,G
1340 PMODE 4,1
1350 PUT(T(RJ,1),T(RJ,2))-(T(RJ,1)+31,T(RJ,2)+15),S,PSET
1360 RJ=RJ+1
1370 IF PEEK(339)=251 THEN 60
1380 IF PEEK(345)=247 THEN 1390
ELSE 1370
1390 NEXT Y,X
1400 GOTO 60
1410 END
1420 GOTO 60
1430 REM END PROGRAM
1440 CLS
1450 Y=1
1460 FOR X=1024 TO 1215 STEP 2
1470 POKE X,T(Y,1)
1480 POKE X+1,T(Y,2)
1490 Y=Y+1
1500 NEXT X
1510 PRINT@480," SAVE ON (T)AP
E OR (D)ISK";
1520 A$=INKEY$:IF A$="" THEN 1520
1530 PRINT@480,"
";
1540 IF A$="D" THEN 1650
1550 IF A$="T" THEN 1720
1560 SOUND 1,1:GOTO 1510
    
```

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```

1570 GOTO 60
1580 REM FIND AREA FOR PICTURE
1590 VA=0
1600 FOR X=0 TO 255 STEP 32
1610 FOR Y=0 TO 191 STEP 16
1620 VA=VA+1
1630 IF VA=V THEN RETURN
1640 NEXT Y,X
1650 REM SAVE INFO ON DISK
1660 PRINT@416,"NAME";:INPUT N$
1670 N$=LEFT$(N$,7)
1680 SAVEM N$,9728,15871,0
1690 N$=N$+"2"
1700 SAVEM N$,1024,1215,0
1710 GOTO 60
1720 REM LOAD FROM TAPE
1730 PRINT@416,"NAME";:INPUT N$
1740 N$=LEFT$(N$,7)
1750 PRINT@416,"POSITION TAPE AN
D PRESS ANY KEY.";
1760 IF INKEY$="" THEN 1760
1770 CSAVEM N$,7680,13823,0
1780 N$=N$+"2"
1790 CSAVEM N$,1024,1215,0
1800 GOTO 60
1810 REM LOAD PICTURE
1820 CLS
1830 INPUT"NAME ";N$
1840 N$=LEFT$(N$,7)
1850 CLS:PRINT@224,"LOAD FROM (T -
)APE OR (D)ISK?"
1860 A$=INKEY$:IF A$="" THEN 186
0
1870 IF A$="D" THEN 1900
1880 IF A$="T" THEN 2000
1890 SOUND 1,1:GOTO 1850
1900 LOADM N$
1910 N$=N$+"2"
1920 LOADM N$
1930 Y=1
1940 FOR X=1024 TO 1215 STEP 2
1950 T(Y,1)=PEEK(X)
1960 T(Y,2)=PEEK(X+1)
1970 Y=Y+1
1980 NEXT X
1990 GOTO 60
2000 CLS:PRINT@224,"POSITION TAP
E AND PRESS ANY KEY."
2010 IF INKEY$="" THEN 2010
2020 CLOADM N$
2030 N$=N$+"2"
2040 CLOADM N$
2050 Y=1
2060 FOR X=1024 TO 1215 STEP 2
2070 T(Y,1)=PEEK(X)
2080 T(Y,2)=PEEK(X+1)
2090 Y=Y+1
2100 NEXT X
2110 GOTO 60
2120 CLS:END

```

SUPPORT:

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In the tradition of good guy/bad guy conflicts . . .



By David Billen

Want great sound without sacrificing fast graphics? *Zonx* provides you with both! It proves that, without a doubt, the CoCo can produce sound without slowing the action, and as an added bonus, *Zonx* is fun!

To play *Zonx*, enter and run the program listing. If you have Extended BASIC, begin by typing PCLEAR 1. After you type RUN, the program begins reading the DATA statements and poking the numbers into memory. These numbers make up a machine language program. After all the numbers are poked, the BASIC programs will save

(David Billen is a self-employed programmer. His hobby is music synthesis, ranging from his CoCo to Syncho drums.)

the machine language program to tape. You can load this program by typing CLOADM and run it by typing EXEC. Before testing *Zonx*, be sure to save the BASIC program that created it just in case you make a typing error and it does not work.

Once the program is up and running the first thing you see is a title screen. At this point, *Zonx* also plays a little heavy metal rock-and-roll music while waiting for you to press the right joystick button.

The game begins and your joystick controls a ship that moves right or left near the bottom of the screen. The ship will not stay still — something to do with gravitational photon intervention.

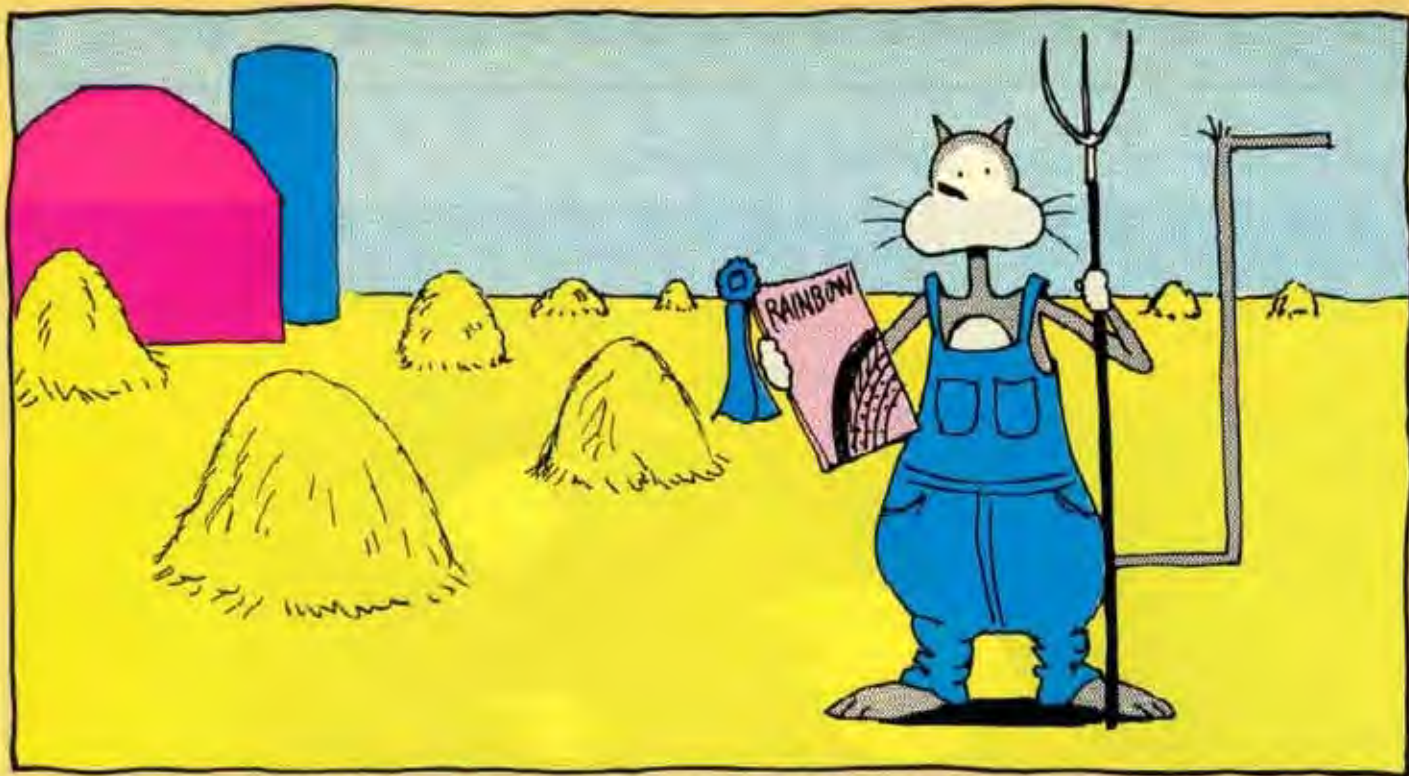
Two different types of characters will fly down the screen. "Zonxes" and "Zugs." Zonxes are the ones that flash;

Zugs are the sluggish-looking things. A Zonx will not harm you, but if you can touch it with the very tip of your ship, the game will have a brief "spasm" and 100 points are rewarded. Conflict with a Zug is always fatal and, since the goal is to earn points, I suggest avoiding them.

You will encounter a wave of Zonxes, a wave of Zugs and a wave of both. If you survive this far, bonus points are awarded and the level of difficulty increases. After the fourth increase in difficulty the game never gets any harder. If you make it that far, you are doing incredibly!

I welcome correspondence from those who have questions or comments. My address is P.O. Box 832, Edmond, OK 73083. Please include an SASE.

Good luck, it's all in the wrist!



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Editor's Note: As we were going to press, David Billen advised us that four POKES will be needed to correct a problem that has arisen on some CoCos. You can type in the following line and CSAVE it on tape before the Zonx ML program; to play the game, simply load this program (leave the Play button down on your recorder) and run it. After the four POKES have been made, the ML program will be loaded and executed automatically.

```
10 CLS:PRINT@264,"LOADING zonx..
.":POKE359,127:POKE360,255:POKE3
61,34:POKE362,57:CLOADM"ZONX":EX
EC
```

If you want to use the Zonx program on disk, change CLOADM in this loader program to LOADM. Since the following listing will not run on a disk system, run it with the controller unplugged and save the machine language on tape, then CLOADM it into your disk system later and type SAVEM "ZONX",13740,16383,13744 and press ENTER.

150	104	890	19
310	74	1030	41
440	106	1170	123
600	255	1300	166
750	26	END	238

The listing: ZONX

```
10 CLEAR 200,13700
15 CLS:PRINT:PRINT"LOADING MACHI
NE CODE..."
20 X=13744
30 READ A:IF A<>999 THEN POKE X,
A:X=X+1:GOTO 30
35 FOR X=15872 TO 16383:POKE X,0
:NEXT
50 T=6:FOR X=15891 TO 15905 STEP
2:POKE X,T:POKE X+1,RND(255):T=
T+1:NEXT X:POKE 15907,13:POKE 15
908,RND(255)
60 PRINT:INPUT "READY RECORDER/P
RESS ENTER":A$
70 CSAVEM "ZONX",13740,16383,137
```

One-Liner Contest Winner . . .

Type this One-Liner in and you've added another "peripheral" to your CoCo system! (You may have to EDIT the line to get it all in.)

The listing:

```
10 V=90:PMODE4:SCREEN1,1:PCLS:DR
AW"BM50,120U12E10R40G10D12NL40M+
20,-6U20NM-10,+3L40M-10,+3DR5G10
D4R30U4E12L30M-4,+15":PAINT(68,9
9),1,1:FORX=75TO220STEP.3:Y=SIN(
X/5)*15+V:LINE(X-10,Y)-(X+20,Y),
PSET:V=V-.14:IFX>108THENPRESET(X
-10,Y+14.4):NEXT:RUNELSENEXT
```

Russ Rowgo
Kalamazoo, MI

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tapes*.)

44

80 END

```
100 DATA 134,85,183,0,113,142,53
,187,191,0,114,18,134,62,31,139
110 DATA 142,53,218,191,1,13,134
,53,183,255,3,28,239,189,169,118
120 DATA 16,223,10,16,206,63,255
,126,56,162,182,255,2,12,0,59
130 DATA 13,12,16,38,1,191,182,2
55,32,31,137,132,3,138,128,183
140 DATA 255,32,182,255,0,247,25
5,32,214,18,132,128,38,3,90,42
150 DATA 7,92,193,62,35,2,214,18
,215,1,142,12,64,214,18,84
160 DATA 58,236,132,221,14,134,8
,16,142,0,0,16,175,132,48,136
170 DATA 32,74,38,247,134,255,15
1,8,142,12,64,214,1,215,18,84
180 DATA 58,37,46,15,15,134,24,1
48,8,167,136,32,134,60,148,8
190 DATA 167,136,64,167,136,96,1
34,219,148,8,167,137,0,128,167,1
37
200 DATA 0,160,167,137,0,192,134
,195,148,8,167,137,0,224,126,54
210 DATA 214,204,1,128,148,8,212
,8,237,136,32,204,3,192,148,8
220 DATA 212,8,237,136,64,237,13
```



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6,96,204,13,176,148,8,212,8,237
 230 DATA 137,0,128,237,137,0,160
 ,237,137,0,192,204,12,48,148,8
 240 DATA 212,8,237,137,0,224,220
 ,14,132,15,196,240,221,14,126,54
 250 DATA 214,222,4,166,192,17,13
 1,192,0,37,3,206,160,0,223,4
 260 DATA 57,142,62,19,16,174,132
 ,111,164,49,168,32,16,140,14,0
 270 DATA 37,11,189,54,161,132,31
 ,16,142,4,0,49,166,16,175,129
 280 DATA 140,62,37,37,223,57,142
 ,62,19,134,3,167,145,140,62,37
 290 DATA 37,249,13,13,16,38,5,98
 ,57,13,16,38,15,142,62,37
 300 DATA 111,129,140,62,53,37,24
 9,12,16,15,73,57,142,62,37,189
 310 DATA 55,82,38,42,167,164,167
 ,168,32,49,168,64,16,140,13,64
 320 DATA 37,11,167,164,167,168,3
 2,16,142,0,0,32,17,134,60,167
 330 DATA 164,148,7,167,168,96,15
 0,7,167,168,32,167,168,64,16,175
 340 DATA 129,156,53,16,37,255,20
 0,150,6,76,132,3,151,6,38,17
 350 DATA 150,7,129,255,38,4,134,
 85,32,5,72,36,2,134,255,151
 360 DATA 7,57,16,174,132,16,140,
 1,0,34,23,189,54,161,132,127
 370 DATA 145,81,44,16,189,54,161
 ,132,31,16,142,4,0,49,166,16
 380 DATA 175,132,79,57,134,255,5
 7,134,255,151,0,150,73,42,2,19
 390 DATA 57,16,38,0,95,214,74,92
 ,196,63,215,74,150,77,92,141
 400 DATA 7,79,214,74,141,2,32,23
 7,183,255,32,13,0,42,4,90
 410 DATA 38,249,57,53,192,150,12
 ,129,1,38,17,151,73,76,151,12
 420 DATA 134,232,183,255,34,19,1
 34,248,183,255,34,57,76,38,8,16
 430 DATA 206,63,255,126,56,162,5
 7,151,12,134,248,183,255,34,142,
 12
 440 DATA 64,214,18,189,54,161,12
 9,5,34,5,134,232,183,255,34,151
 450 DATA 8,126,54,47,129,1,16,38
 ,0,143,150,12,31,137,64,151
 460 DATA 1,189,54,161,148,1,189,
 55,152,32,239,13,17,38,18,142
 470 DATA 62,55,111,129,156,71,37
 ,250,12,17,134,2,151,73,151,76
 480 DATA 57,142,62,55,189,55,82,
 38,86,167,164,167,168,32,49,168
 490 DATA 64,16,140,13,64,37,25,1
 67,164,167,168,32,167,168,64,167



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500 DATA 168,96,167,169,0,128,16
 7,169,0,160,16,142,0,0,32,47
 510 DATA 206,56,148,150,9,76,132
 ,15,151,9,150,17,13,9,38,7
 520 DATA 76,129,5,37,2,134,1,151
 ,17,74,72,51,198,16,159,1
 530 DATA 198,8,166,192,167,164,4
 9,168,32,90,38,246,16,158,1,16
 540 DATA 175,129,156,71,16,37,25
 5,156,57,129,2,16,38,1,211,214
 550 DATA 74,90,90,196,127,215,74
 ,150,77,189,55,152,79,214,74,189
 560 DATA 55,152,32,235,24,36,24,
 66,24,129,24,66,24,36,24,66
 570 DATA 24,129,189,56,222,142,6
 2,82,134,4,111,134,74,42,251,151
 580 DATA 7,151,73,151,77,142,62,
 12,76,167,128,140,62,19,37,249
 590 DATA 142,160,0,159,4,126,58,
 21,79,31,139,16,191,0,136,32
 600 DATA 4,173,159,160,2,166,128
 ,38,248,134,62,31,139,57,142,255
 610 DATA 192,111,132,111,2,111,4
 ,142,62,82,16,142,62,87,95,166
 620 DATA 165,161,133,34,16,37,5,
 92,193,5,37,243,198,5,166,133
 630 DATA 167,165,90,42,249,142,4
 ,0,134,96,167,128,140,6,0,37

640 DATA 249,16,142,4,32,142,58,
 126,189,56,200,16,142,4,96,189
 650 DATA 56,200,16,142,4,203,189
 ,56,200,142,62,82,16,142,4,237
 660 DATA 141,25,142,62,87,16,142
 ,5,45,141,16,142,4,0,166,132
 670 DATA 136,64,167,128,140,6,0,
 37,245,32,31,95,16,191,0,136
 680 DATA 31,155,166,133,139,48,1
 73,159,160,2,92,193,5,37,243,134
 690 DATA 48,173,159,160,2,134,62
 ,31,139,57,182,255,0,132,1,39
 700 DATA 249,126,59,75,142,54,23
 3,159,79,15,16,79,151,81,151,12
 710 DATA 167,226,68,151,77,189,5
 5,119,189,54,177,189,53,224,173,
 159
 720 DATA 62,79,166,224,76,38,233
 ,142,6,0,150,78,151,81,175,227
 730 DATA 189,55,119,189,54,177,1
 89,53,224,13,12,38,20,220,14,39
 740 DATA 16,132,102,196,102,16,1
 31,0,0,39,4,12,13,32,2,12
 750 DATA 12,173,159,62,79,174,22
 5,48,31,38,211,79,151,81,167,226
 760 DATA 68,151,77,189,55,119,18
 9,54,177,189,53,224,173,159,62,7
 9
 770 DATA 166,224,74,38,233,57,14
 2,55,251,159,79,15,17,126,57,123
 780 DATA 142,58,0,159,79,15,17,1
 5,16,15,74,15,75,126,57,123
 790 DATA 189,54,233,189,55,251,1
 3,12,38,10,13,13,38,6,134,3
 800 DATA 151,73,151,76,57,134,1,
 151,78,189,61,21,189,61,138,142
 810 DATA 62,37,150,78,139,3,72,4
 8,134,159,53,142,62,55,48,134
 820 DATA 159,71,189,57,116,189,5
 7,230,189,57,240,189,59,217,134,
 255
 830 DATA 151,7,189,61,138,150,78
 ,76,151,78,129,5,37,209,10,78
 840 DATA 32,205,129,3,16,38,2,38
 ,214,74,92,196,63,215,74,38
 850 DATA 9,214,75,90,39,4,196,12
 7,215,75,214,75,219,74,150,77
 860 DATA 72,189,55,152,214,74,21
 9,75,79,189,55,152,32,218,32,32
 870 DATA 32,32,32,32,32,32,32,32
 ,60,60,40,40,90,79,78,88
 880 DATA 41,41,62,62,0,32,32,32,
 32,32,32,32,32,66,89,32
 890 DATA 68,65,86,73,68,32,66,73
 ,76,76,69,78,13,32,32,32
 900 DATA 32,32,80,82,69,83,83,32
 ,66,85,84,84,79,78,32,84
 910 DATA 79,32,66,69,71,73,78,0,
 76,65,83,84,32,83,67,79

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920 DATA 82,69,13,13,32,32,32,32,32,32,32,32,32,32,32,32,72
 930 DATA 73,71,72,32,83,67,79,82,69,0,151,1,151,2,215,3
 940 DATA 134,252,151,77,15,0,134,4,167,226,150,77,214,1,141,64
 950 DATA 79,214,1,141,59,106,228,38,241,134,4,167,228,150,77,214
 960 DATA 2,141,45,79,214,2,141,4,0,106,228,38,241,166,224,150,0
 970 DATA 145,3,36,38,150,77,39,3,74,151,77,150,1,129,255,39
 980 DATA 3,76,151,1,150,2,129,1,39,3,74,151,2,126,58,246
 990 DATA 183,255,32,90,18,18,18,18,38,249,57,142,59,133,166,128
 1000 DATA 39,249,230,128,129,1,38,18,16,142,4,46,166,164,138,64
 1010 DATA 167,160,16,140,4,50,37,244,134,1,189,58,234,16,142,4
 1020 DATA 46,166,164,132,191,167,160,16,140,4,50,37,244,182,255,0
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 1060 DATA 16,64,16,64,32,1,16,48,16,80,16,16,16,1,16,32
 1070 DATA 32,16,16,1,16,80,16,80,16,16,16,1,16,16,16,16
 1080 DATA 16,16,16,1,16,1,16,0,0,134,10,214,78,61,231,226
 1090 DATA 166,228,198,8,189,58,234,189,60,162,189,60,182,189,55,64
 1100 DATA 189,61,138,106,228,38,233,53,2,142,60,20,166,128,16,39
 1110 DATA 255,72,68,230,128,189,58,234,52,16,189,55,64,189,61,138
 1120 DATA 53,16,32,232,1,255,144,32,144,32,144,32,144,32,144,16
 1130 DATA 128,48,144,16,128,48,144,16,128,16,80,16,96,32,80,16
 1140 DATA 80,16,80,16,144,16,128,16,2,32,144,16,128,16,2,32
 1150 DATA 144,16,128,16,80,16,96,144,0,0,150,13,129,1,38,21
 1160 DATA 150,73,151,76,134,4,151,73,151,13,134,232,183,255,34,189
 1170 DATA 60,162,126,60,182,150,13,139,64,151,13,36,16,15,13,204
 1180 DATA 0,0,221,14,150,76,151,73,134,248,183,255,34,57,129,4
 1190 DATA 16,38,250,251,150,13,6

4,72,138,128,214,13,189,55,152,79
 1200 DATA 214,13,189,55,152,32,237,150,86,76,151,86,129,10,37,21
 1210 DATA 15,86,142,62,82,198,3,166,133,76,167,133,129,10,37,5
 1220 DATA 111,133,90,42,242,57,142,62,82,198,4,16,142,15,112,166
 1230 DATA 133,206,60,227,72,72,171,133,51,198,134,5,151,1,16,159
 1240 DATA 2,166,192,167,165,49,168,32,10,1,38,245,16,158,2,90
 1250 DATA 42,221,57,3,51,51,51,3,15,207,207,207,3,3,243,3
 1260 DATA 63,3,3,243,195,243,3,51,51,3,243,243,3,63,3,243
 1270 DATA 3,3,63,3,51,3,3,243,243,243,3,51,3,51,3
 1280 DATA 3,51,3,243,243,142,4,0,111,128,140,14,0,37,249,134
 1290 DATA 255,167,128,140,16,0,37,249,142,255,192,111,0,111,2,111
 1300 DATA 5,134,248,183,255,34,16,142,15,113,142,62,82,198,4,189
 1310 DATA 60,191,189,60,182,142,61,113,16,142,15,111,16,159,1,16
 1320 DATA 142,15,106,189,61,87,57,52,32,198,5,166,128,152,7,167
 1330 DATA 164,49,168,32,90,38,244,53,32,49,33,16,156,1,38,231
 1340 DATA 57,60,192,48,12,240,60,192,192,192,60,48,204,204,204,48
 1350 DATA 240,204,240,204,204,252,192,240,192,252,142,61,210,16,142,14
 1360 DATA 44,52,32,198,8,215,6,166,128,141,42,215,3,141,38,150
 1370 DATA 3,221,1,68,84,154,1,218,2,148,7,212,7,136,255,200
 1380 DATA 255,237,164,49,168,32,10,6,38,221,53,32,49,34,16,140
 1390 DATA 14,52,37,205,57,198,4,215,1,95,72,89,89,10,1,38
 1400 DATA 249,57,254,4,8,16,32,64,128,254,124,130,130,130,130,130
 1410 DATA 130,124,130,130,162,146,146,138,130,130,130,130,68,40,40,68
 1420 DATA 130,130,65,82,48,50,54,180,150,83,84,65,82,48,52,54
 1430 DATA 205,134,83,84,65,82,88,50,54,219,148,76,73,70,69,60
 1440 DATA 999
 1450 DATA 6,161,7,24,8,154,9,17,10,238,11,16,12,1,13,62,13,153,99

Have a little Halloween fun with . . .

The CoCo Puzzle Maker



By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

Four years ago, back when THE RAINBOW was still a photocopy publication of about a dozen or so pages, I submitted my first program to Lonnie Falk for use in his new publishing venture. The program, *Zelda's Bat Bottle*, was a simple arcade-style graphics game with a Halloween theme. Bats would circle above a witch's boiling kettle while she tried to zap them into her bottle with bolts from her magic wand.

Fortunately, that game was the start of a very long friendship I have enjoyed with THE RAINBOW staff, although our contacts are usually restricted to phone conversations or a RAINBOWfest encounter. Now, some four years down the road, "Wishing Well" is in full swing on a monthly basis, and I am still having as much fun creating new programs as I was with the original *Zelda* game.

With all this in mind, the thought occurred to me that it might be time to create another Halloween game for the October issue. I toyed for a few days with the concept of creating a game called *Peter, Peter, Pumpkin Eater*,

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

but no matter how hard I tried, the program kept looking too much like *Pac-Man* or my own *Snail's Revenge*. Some ideas even surfaced for *Zelda II*, but none seemed to catch my fancy. Over and over again, I kept coming back to the idea of doing something with a pumpkin, while at the same time not making it something limited to the month of October only. Deadline was approaching, what could I do?

The Wish

I took another look over my recent mail. A consistent pattern was always visible: People liked games, but they also like programs that could teach something. Most of all, readers indicated that they usually got the most out of programs they could alter, with my instructions, to include things they would create. After much thought, I came up with a program that would include all of this and still fit into my plans for a special Halloween program. The result is the *CoCo Puzzle Maker*, written for 32K Extended Color BASIC.

The Program

Like a puzzle you would buy in a box or find printed in the pages of a magazine, *CoCo Puzzle Maker* jumbles an image on the screen that the user must reassemble. To fit the Halloween spirit, the image I have chosen is a bright, smiling jack-o'-lantern. Every time the program is run, the puzzle will be jumbled in a different way. Each square of the puzzle on the grid will at some point be surrounded by a flashing square. The square may be moved around the screen using the right- and left-arrow keys on the keyboard.

When the flashing box surrounds a piece you wish to move, press the ENTER key and the image in the box will vanish. Use the keys to position the square over another section where you may want to put the piece selected. Position it where you wish and press ENTER again. That piece will vanish and then the two pieces will have exchanged places.

Continue to move pieces around the screen until you have assembled the image the way it should look. When the puzzle is complete, press the letter 'S' and the screen will clear and tell you how many minutes it took to complete the puzzle.

At this point you may either press 'P' to view the puzzle picture without the grid lines, or press 'R' to run the program again and try for a better time. When you view the completed puzzle, pressing ENTER will return to the text menu.

Sound simple? Well, while the concept is simple, you will be amazed at how tricky it is to complete the puzzle quickly. On first running the program, you will notice the screen is either red or blue. If the screen is not red, press Reset and run again until the screen is red. When it is red, press ENTER to start the program. (I used this method rather than the type used in last month's column since some of you may wish to use your own graphics for the puzzle and this is a more consistent method to use.)

Creating Your Own

Here's where the beauty of *CoCo Puzzle Maker* comes in. I have left considerable space between the start of the program and the actual puzzle routines for you to draw your own picture to use within the puzzle. Those who have *Graphicom*, *CoCo Max* or one of the other graphics programs available could also use graphics created with these and merge them with *Puzzle Maker* according to whatever instructions those programs give to merge your graphics with BASIC programs.

Let's say you simply wish to draw graphics using Extended Color BASIC commands. In that case, place your lines between the numbers 200 and 1999 for the drawing. You may delete my graphics by typing DEL210-1999 and pressing ENTER. Now, enter the following lines to create a concentric circle puzzle:

```
210 CLS:PMODE4,1:PCLS:SCREEN0,0
220 FORI=1 TO 100 STEP8
230 CIRCLE(128,96),I,1,.5
240 NEXT I
```

Believe it or not, the puzzle you create with these few lines will be very challenging to solve. Even I have had

difficulty with it, so if you try it, you will see that this program can be for almost any age level, depending on how difficult the design is. If you really want it to be a challenge, change Line 220 to this:

```
220 FORI=1 TO 200 STEP4
```

That will really make the puzzle tough.

If you want to draw a simple design, try drawing the image outside the program starting with Line 210. To get an idea of the area the drawing should remain within, you may first wish to draw a box using the LINE command with the dimensions:

```
LINE(32,32)-(224,160),PRESET,B
or
LINE(32,32)-(224,160),PSET,B
```

This gives you a square to draw your image within which the shape of the puzzle will fit.

I chose not to use the full screen since some of you may make drawings which would leave too much blank space for the puzzle pieces. Also, some of the available graphics programs do not fill the whole screen because they use a border for the colors and keyboard commands. I think you will find this size fits those programs very well, but you will have to do the experimenting; I do not have any of those commercially available programs at my disposal. Judging from the artwork that has been submitted to the "CoCo Gallery," I am sure you will come up with some outstanding puzzle graphics. Please refer to the instructions of your graphics program to determine how to merge with other BASIC programs.

Conclusion and a Few More Points

You may now wonder what is educational about this. I firmly believe that using puzzles helps young students with logic skills. Molding this with the computer keyboard is only bound to help with those skills.

You will also notice the program does not tell if the completed picture is correct. Pressing 'S' only tells how much time it took to complete, not whether or not you got the picture done correctly. Adding that feature would have made the program a bit too long. As it is, I regret that I couldn't crunch this down into 16K, but it may give some of you an incentive to upgrade.

Also, be patient while the program draws the puzzle picture. It may take as long as a minute, but the program is working. Until next month, enjoy the pumpkin puzzle. Happy Halloween! □

100	.....51	2390	.....206
270	.....125	2560	.....63
2100	.....49	2670	.....194
2260	.....105	2850	.....55
		END	.....111

The listing: PUZLMAKR

```
1 '*****.
2 '* THE CO-CO PUZZLE MAKER *
3 '* BY FRED B. SCERBO *
```

```
4 '*149 BARBOUR ST., N. ADAMS, MA*
5 '* COPYRIGHT (C) 1985 *
6 '*****
10 PMODE4,1:PCLS:SCREEN1,1:PMOD
E3:PCLS3
20 IFINKEY$<>CHR$(13) THEN20
30 SCREEN0,0:CLS:POKE1070,20:PO
KE1071,8:POKE1072,5:FORI=112TO1
311:READ A:POKEI,A+128:NEXT
40 PRINT@358," BY FRED B. SCERBO
";
```

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GAMES

The first screen objective is to catch enough of Elise's lobsters (those Red Head Lobsters) to fill in the squares on the Salmon's board. If you can time your punches just so, you can send the puny bag over to knock the lobster down and with a little bit of luck, right on **Bigfatbedguy's** head. This will give you a little (but not much) time to catch all those lobsters.

You must avoid contact with **Bigfatbedguy** who is actively pursuing you. You must also be careful of **Olukiglyswanman** who will appear at higher difficulty levels to chuck oysters at you. Either avoid the fly or try to catch it with your net (win the fly before it is lost from being shocked into the water).

The second screen objective is to collect enough rocks to play **Flax** a little from time. You may jump all and onto the other end of **Feigeyestinghamburger's** roller coaster to fly up a block, and even two blocks if you manage to catch that of **Smartsleekid's** grab handles. Time it right and away you go.

The third screen objective is to collect enough letters thrown by **Clay's** crane for **HC-L-P** to complete a ladder all the way to the crow's nest where **Elise** is waiting for you. Beware of the **Crane**, however, who chucks you into after her eggs!

On all screens, eating a slice of potato greens (called "G" for Gherkin) and grasped by punching the can just right will give you amazing speed, strength and agility and allow you to send **Bigfatbedguy** into the drink with a single punch!

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Save the villagers of Pandor! They live in fear of Icarus, the blood thirsty dragon. The dragon lives in a cave, way up in the mountains. The cave is a treasure chest, full of gems and cashbags. The trail to the cave is as menacing as Icarus himself. You will have to secure the necessary equipment to climb the rocks and cross the rivers and chasms along the way. Be on the lookout for enemies and barriers at all times.

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NEW! EDUCATIONAL FACTPACK

FACTPACK is a set of 3 programs designed for home or school use. The programs provide drill and practice with basic addition, subtraction, multiplication and division facts and are appropriate in grades 1-6. Each program requires a 32K Extended BASIC Color Computer. Disk drive and printer are optional.

Requires 32 K Ext. Basic

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TEACHER'S DATABASE II

Teachers' Database (TDB) is a program designed to allow a teacher to keep a computerized file of information about his/her students.

The program requires a 64K Color Computer and at least one disk drive. This completely revised program includes all of the capabilities of the original TDB plus many new features.

- Information on as many as 100 students, or more, may be in the computer at one time.
- Each student may have as many as 20, or more, individual items of data in his/her record.
- The program has many easy to follow menus.
- Records may be easily changed, deleted, or combined.
- Information about students may be numerical or text.
- Records may be quickly alphabetized or reordered based on their contents.
- Records may be sorted by various criteria.
- A full statistical analysis of scores may be done and sent to the printer.
- Student test scores may be weighted, averaged, changed to a percentage or changed to a letter grade.
- Individual student progress reports and class gradebook sheets may be printed.
- Three methods of data entry speed the task of typing in student grades and test results.
- The program may be easily customized to work with any printer.
- Student seating charts may be created and printed.
- Graphs of student test results may be created using the computer's high resolution graphic screen.
- Grade distribution can be displayed numerically or as a histogram.

Requires 32K Ext. Basic

Tape \$39.95

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VOCABULARY MANAGEMENT

Requires 16K Ext. Basic or 32K for printer output.

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
- Words and definitions may be saved on disk or tape.
- Remarks and/or comments can be saved with word files.
- A disk loading menu allows students to load disk files without typing file names.
- Word lists may be quickly alphabetized.
- The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
- The printer segments allow full use of your printer's special features.
- The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

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1. Review converting mixed numerals and improper fractions.
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6. Practice converting mixed numerals to mixed numerals.

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1. Definitions of terms and review of finding equivalent fractions.
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3. Practice finding sets of equivalent fractions.
4. Review of finding if one fraction is equal to, not equal to, less than or greater than another.

LOWEST TERMS

1. Review of placing fractions into lowest terms by finding the greatest common factor (GCF) of the numerator and denominator.
2. Practice finding the GCF of pairs of numbers.
3. Practice placing fractions into lowest terms by finding the GCF of the numerator and denominator.

32K EXT BASIC

TAPE \$30.95

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MATH DUEL

MATH DUEL is a challenging mathematics game that pits you against the computer in a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you to get other more numbers and thus more points than the computer.

The game is deceptively simple. You select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules.

32K EXT. BASIC

TAPE \$24.95

DISK \$29.95

SIMULATIONS

P51 Mustang Attack Flight Simulator



JUST IMAGINE! Your movements are shown as if you're flying CoCo across town or across the country. It's hard to believe it's simulation.

P51 Mustang

Attack Flight Simulator

Experience the ultimate video experience. For the first time ever, two computers can be linked together with action and re-action at either location, or play alone. The P-51 Mustang was the attack workhorse during WWII. To experience the flight of this beautiful plane in actual combat situation will give many hours of excitement. You can test your skill against the computer to defend your position or try your hand competing against your opponent at any remote location. Two CoCo's can be linked by cable for TRUE two players adventure. With the use of a modem you can test your skill across town or across country!! This program is another first from Tom Mix Software. Order your excitement today. Direct cable available separately when two computers are used at the same location.

32K Machine Language Tape \$29.95 Disk \$34.95 Cable \$10.95

P40 shown.

Worlds of FLIGHT

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C.L. - "As a pilot I found "Flight" to be an outstanding simulation".

WORLDS OF FLIGHT (WOF) is a "view" oriented flight simulation for the TRS 80 Color Computer, written entirely in Machine Language. "View" oriented means that the pilot may determine his or her position by actually viewing the surrounding landmarks as opposed to using instruments which sense navigational references. This is a major departure from "instrument only" simulations which can be achieved through BASIC programs. Most instrument maneuvers and procedures may be practiced. The craft is a light-weight, single-engine airplane with low wings. A nose wheel which is both steerable and retractable is also modeled. Some aerobatics are possible including sustained inverted flight, aileron rolls, spins and stalls.



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32K MACHINE LANGUAGE

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```

50 PRINT@390," COPYRIGHT (C) 198
5 ";
60 PRINT@422," PLEASE PRESS ENTE
R ";
70 X$=INKEY$:IFX$<>CHR$(13) THEN7
0
80 DATA-125,,,,,127,124,127,,127
,112,127,,124,124,127,,124,124,1
27,,127,112,112,,127,124,124,,,,
90 DATA,-113,,,,,127,124,124,,127
,112,127,,115,124,112,,115,124,1
12,,127,112,112,,127,124,124,,,,
100 DATA,,-100,,124,112,112,,12
4,124,124,,124,124,124,,124,124,
124,,124,124,124,,124,124,124,,
,
110 DATA,,, -125,,,,,63,50,49,63,,
55,60,59,,63,49,62,,63,60,60,,63
,60,63,,,,,
120 DATA,,,,, -113,,63,52,56,63,,
63,60,63,,63,61,50,,63,60,60,,63
,61,50,,,,,
130 DATA,,,,,,60,48,48,60,,60,4
8,60,,60,48,60,,60,60,60,,60,48,
60,,,,,
140 CLS:PRINT@232," PLEASE STAN
D BY ";
200 REM START PICTURE HERE

```

```

210 PMODE4:PCLS0:Pmode3:SCREEN0,
0:JL=RND(-TIMER)
220 CIRCLE(112,102),76,3,.75,.29
,.73:CIRCLE(144,102),76,3,.75,.7
8,.22
230 DRAW"BM128,52C3L8M-10,-4UL10
BM128,52R8M+10,-4UR10BM128,154L8
M-20,+3BM128,154R8M+20,+3"
240 DRAW"C3BM128,90G20R40H20BL20
L40E20F20BR40R40H20G20BM128,122L
6D6L12U6L12D6L12U6L20F12R4DR4DR4
DR0U4R12D4R12U4R12D4R12U4R12D4R8
UR4UR4UR4E12L20D6L12U6L12D6L12U6
L6"
250 PAINT(128,56),3,3:PAINT(128,
34),1,1
260 CIRCLE(128,102),76,1,.85,.35
,.17:CIRCLE(128,102),58,1,.95:CI
RCLE(128,102),30,1,1.9
270 DRAW"BM122,50C2NR4U10H10R4F1
0D10R4U10H10R4F10D10L4"
2000 REM START PUZZLE HERE
2010 DIM A(25),B(25),C(25),D(25)
,E(25),F(25),G(25),H(25),I(25),J
(25),K(25),L(25),M(25),N(25),O(2
5),P(25),Q(25),R(25),S(25),T(25)
,U(25),V(25),W(25),X(25)
2020 DIMGD(6,4),NN(24),MM(24),Z(

```

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```

24), Y(24), AA(25), BB(25)
2030 FORI=1TO4:FORJ=1TO6:K=K+1:G
D(Y,I)=K:NEXTY,I
2040 FORB=32TO128STEP32:FORA=32T
O192STEP32:Q=Q+1:Z(Q)=A:Y(Q)=B:N
EXTA,B
2050 FORB=32TO128STEP32:FORA=32T
O192STEP32:T=T+1
2060 ON T GOSUB2080,2090,2100,21
10,2120,2130,2140,2150,2160,2170
,2180,2190,2200,2210,2220,2230,2
240,2250,2260,2270,2280,2290,230
0,2310
2070 NEXTA:NEXTB:GOTO2320
2080 GET(A,B)-(A+31,B+31),A,G:RE
TURN
2090 GET(A,B)-(A+31,B+31),B,G:RE
TURN
2100 GET(A,B)-(A+31,B+31),C,G:RE
TURN
2110 GET(A,B)-(A+31,B+31),D,G:RE
TURN
2120 GET(A,B)-(A+31,B+31),E,G:RE
TURN
2130 GET(A,B)-(A+31,B+31),F,G:RE
TURN
2140 GET(A,B)-(A+31,B+31),G,G:RE
TURN
2150 GET(A,B)-(A+31,B+31),H,G:RE
TURN
2160 GET(A,B)-(A+31,B+31),I,G:RE
TURN
2170 GET(A,B)-(A+31,B+31),J,G:RE
TURN
2180 GET(A,B)-(A+31,B+31),K,G:RE
TURN
2190 GET(A,B)-(A+31,B+31),L,G:RE
TURN
2200 GET(A,B)-(A+31,B+31),M,G:RE
TURN
2210 GET(A,B)-(A+31,B+31),N,G:RE
TURN
2220 GET(A,B)-(A+31,B+31),O,G:RE
TURN
2230 GET(A,B)-(A+31,B+31),P,G:RE
TURN
2240 GET(A,B)-(A+31,B+31),Q,G:RE
TURN
2250 GET(A,B)-(A+31,B+31),R,G:RE
TURN
2260 GET(A,B)-(A+31,B+31),S,G:RE
TURN
2270 GET(A,B)-(A+31,B+31),T,G:RE
TURN
2280 GET(A,B)-(A+31,B+31),U,G:RE
TURN
2290 GET(A,B)-(A+31,B+31),V,G:RE
TURN
2300 GET(A,B)-(A+31,B+31),W,G:RE

```

The RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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Note: Our Fourth Year Index, including an index to all editions of RAINBOW ON TAPE, is included in the July 1985 issue.

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```

TURN
231Ø GET(A,B)-(A+31,B+31),X,G:RE
TURN
232Ø FORI=1TO24
233Ø K=RND(24):IF NN(K)=1THEN233
Ø
234Ø NN(K)=1:MM(I)=K:NEXTI
235Ø PCLS2:LINE(21,21)-(234,17Ø)
,PRESET,BF
236Ø T=Ø:FORB=32TO128STEP32:FORA
=32TO192STEP32:T=T+1:L=MM(T)
237Ø ON L GOSUB24ØØ,241Ø,242Ø,24
3Ø,244Ø,245Ø,246Ø,247Ø,248Ø,249Ø
,25ØØ,251Ø,252Ø,253Ø,254Ø,255Ø,2
56Ø,257Ø,258Ø,259Ø,26ØØ,261Ø,262
Ø,263Ø
238Ø LINE(A,B)-(A+31,B+31),PRESE
T,B:NEXTA,B
239Ø TIMER=Ø:GOTO264Ø
24ØØ PUT(A,B)-(A+31,B+31),A,PSET
:RETURN
241Ø PUT(A,B)-(A+31,B+31),B,PSET
:RETURN
242Ø PUT(A,B)-(A+31,B+31),C,PSET
:RETURN
243Ø PUT(A,B)-(A+31,B+31),D,PSET
:RETURN
244Ø PUT(A,B)-(A+31,B+31),E,PSET
:RETURN
245Ø PUT(A,B)-(A+31,B+31),F,PSET
:RETURN
246Ø PUT(A,B)-(A+31,B+31),G,PSET
:RETURN
247Ø PUT(A,B)-(A+31,B+31),H,PSET
:RETURN
248Ø PUT(A,B)-(A+31,B+31),I,PSET
:RETURN
249Ø PUT(A,B)-(A+31,B+31),J,PSET
:RETURN
25ØØ PUT(A,B)-(A+31,B+31),K,PSET
:RETURN
251Ø PUT(A,B)-(A+31,B+31),L,PSET
:RETURN
252Ø PUT(A,B)-(A+31,B+31),M,PSET
:RETURN
253Ø PUT(A,B)-(A+31,B+31),N,PSET
:RETURN
254Ø PUT(A,B)-(A+31,B+31),O,PSET
:RETURN
255Ø PUT(A,B)-(A+31,B+31),P,PSET
:RETURN
256Ø PUT(A,B)-(A+31,B+31),Q,PSET
:RETURN
257Ø PUT(A,B)-(A+31,B+31),R,PSET
:RETURN
258Ø PUT(A,B)-(A+31,B+31),S,PSET
:RETURN
259Ø PUT(A,B)-(A+31,B+31),T,PSET
:RETURN
    
```

```

2600 PUT(A,B)-(A+31,B+31),U,PSET
:RETURN
2610 PUT(A,B)-(A+31,B+31),V,PSET
:RETURN
2620 PUT(A,B)-(A+31,B+31),W,PSET
:RETURN
2630 PUT(A,B)-(A+31,B+31),X,PSET
:RETURN
2640 PMODE4,1:SCREEN1,1:Z=1:QQ=0
:RR=0
2650 X$=INKEY$:LINE(Z(Z),Y(Z))-(
Z(Z)+31,Y(Z)+31),PSET,B:IFX$=CHR
$(8)THEN2680ELSEIFX$=CHR$(9)THEN
2690
2660 IFX$="S"THEN2880ELSEIFX$=CH
R$(13)THEN2710

```



```

2670 LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(
Z)+31),PRESET,B:GOTO2650
2680 P=Z:Z=Z-1:IFZ=0THENZ=24:GOT
O2700:ELSE2700
2690 P=Z:Z=Z+1:IFZ=25THENZ=1
2700 LINE(Z(P),Y(P))-(Z(P)+31,Y(
P)+31),PRESET,B:GOTO2650
2710 GET(Z(Z),Y(Z))-(Z(Z)+31,Y(Z
)+31),AA,G:LINE(Z(Z),Y(Z))-(Z(Z
)+31,Y(Z)+31),PSET,BF
2720 QQ=Z
2730 X$=INKEY$:LINE(Z(Z),Y(Z))-(
Z(Z)+31,Y(Z)+31),PSET,B:IFX$=CHR
$(8)THEN2760ELSEIFX$=CHR$(9)THEN
2780
2740 IFX$="S"THEN2880ELSEIFX$=CH
R$(13)THEN2810
2750 LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(

```

```

Z)+31),PRESET,B:GOTO2730
2760 P=Z:Z=Z-1:IFZ=QQ THENZ=Z-1
2770 IFZ=0THENZ=24:GOTO2800:ELSE
2800
2780 P=Z:Z=Z+1:IFZ=QQ THENZ=Z+1
2790 IFZ=25THENZ=1
2800 LINE(Z(P),Y(P))-(Z(P)+31,Y(
P)+31),PRESET,B:GOTO2730
2810 IFZ=QQ THEN2730ELSE GET(Z(Z
),Y(Z))-(Z(Z)+31,Y(Z)+31),BB,G:L
INE(Z(Z),Y(Z))-(Z(Z)+31,Y(Z)+31
),PSET,BF
2820 RR=Z
2830 L=MM(RR)
2840 PUT(Z(RR),Y(RR))-(Z(RR)+31,
Y(RR)+31),AA,PSET:LINE(Z(RR),Y(R
R))-(Z(RR)+31,Y(RR)+31),PRESET,B
2850 L=MM(QQ)
2860 PUT(Z(QQ),Y(QQ))-(Z(QQ)+31,
Y(QQ)+31),BB,PSET:LINE(Z(QQ),Y(Q
Q))-(Z(QQ)+31,Y(QQ)+31),PRESET,B
2870 TY=0:GOTO2640
2880 CLS:SCREEN0,0:TD=TIMER:SC=I
NT(TD/356):MN=SC/10
2890 CLS:SCREEN0,0:PRINT@132,"YO
U TOOK "MN" MINUTES. "
2900 PRINT@196,"PRESS <P> FOR PI
CTURE."
2910 PRINT@260,"PRESS <R> TO RUN
."
2920 X$=INKEY$:IFX$="P"THEN2930E
LSEIFX$="R"THEN RUN30 ELSE2910
2930 PMODE4,1:PCLS1:SCREEN1,1:PM
ODE3:PCLS2:T=0:FORB=32TO128STEP3
2:FORA=32TO192STEP32:T=T+1
2940 ON T GOSUB2400,2410,2420,24
30,2440,2450,2460,2470,2480,2490
,2500,2510,2520,2530,2540,2550,2
560,2570,2580,2590,2600,2610,262
0,2630
2950 NEXTA,B
2960 X$=INKEY$:IFX$=CHR$(13)THEN
2890ELSE2960

```

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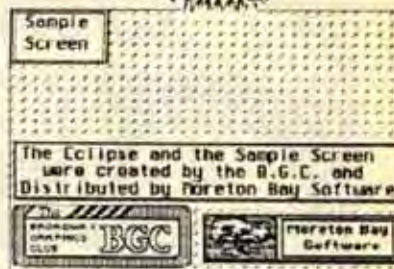
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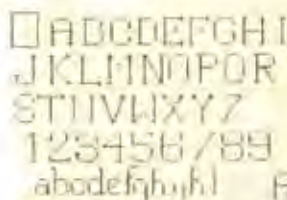
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A Final Session With The 'A' Option

By Joseph Kolar
Rainbow Contributing Editor

Creating graphics on CoCo is so rewarding and the possibilities so endless. To prove the point, we are going to have one final session using the 'A' option of DRAW. Considering that we have limited ourselves to utilizing a single design element, we *have* come a long way, baby! As a beginner, you realize the door being opened for you has countless avenues to explore. The only limitation is the depth of your imagination.

You are urged to ask yourself questions while proceeding through this tutorial. Make a note of them and later pursue these byways; you never know where they will lead. Rest assured you will have learned something.

Turn on your best friend, CoCo, and from Listing 1 key in lines 0 through 40 and 500. AS and CS design units are the same ones you used previously. Perhaps we are in a rut, however, these units are ideal to demonstrate the scope of the 'A' option.

Our project for today is to create a display using the eight possible orientations, radiating from a single, central

point (LHUERFDG). They will be displayed one at a time and then erased. We will put them in an endless loop and attempt to give the display a feeling of motion.

Line 40 creates the horizontal design, AS, radiating to the left from a central point. Note that you could have started in some other quadrant (orientation) of AS. (You may want to explore this on your own.)

After you key in a line, RUN and study it; BREAK unless otherwise directed. You will get the maximum benefit by progressing slowly through this tutorial.

Key in Line 50. CoCo did not require any new or additional information, so it added CS to the display. Key in Line 60. The only new information CoCo needed to know was the new orientation, "A1." Key in Line 70. It is similar to Line 50, serving the same purpose.

LIST and look over what you have worked up. Without referring to Listing 1, create and key in the four design units needed to display all eight orientations. They will be designated as lines 80, 90, 100 and 110.

Note that the diagonal units begin at the central starting location. We prefer to back off three units from the central point to give the entire display a twist to the right. In Line 20, insert after the opening quotation mark ("

BL3. In Line 30, insert BH3. Now the design elements appear to rotate like a whirligig.

Frankly, backing off three units from the central point is a time-consuming project and must be given as information changes to CoCo in lines 40-110. You may want to work it out on your own. If you want to puzzle it out (and it is worth doing), after deleting BL3 from Line 20 and BH3 from Line 30, make a CSAVE "PUZZLE" and set it aside to work on later.

Our next step is to remove each item, one at a time, in the same order that we displayed them. Key in Line 120. We used C0 to inform CoCo of our wish to blank out A0 of AS. In the two-color PMODE4, use either C0, C2 or C4 to blank out the design. Try them all and see! You may prefer to use only the C0.

You must have figured what Line 130 should read to erase the first diagonal — key it in! Then key in the rest of the lines, 140 through 190. You will notice the display was completed and then erased. To recycle it to continue indefinitely, key in Line 200. The only trouble is that nothing happens! Why?

Notice that in Line 40 no 'C' color option is given. CoCo knew it was C1 because, without instructions, it knew that it is the color you desired. It is the default option. CoCo is given a

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

color change in Line 120, C0. When it recycled back to Line 40, the last information regarding color that CoCo had was C0. It assumed there was no change and you see the net result. Nothing!

The solution is to edit Line 40, insert C1, or if you prefer, C3, right after the opening quotation mark ("). Now CoCo knows for sure that every time it reaches Line 40, C1 is demanded.

"The point is that a beginner should always try different values. Take time out to do so. Every try allows you to compare new results with previous ones; it is a good way to learn."

When in doubt, it is best to put all the required option information that CoCo may require, such as 'S' for size and 'C' for color, and since we are working with 'A', 'A' for angle orientation. Even if it is redundant, it won't detract from or affect the resultant display. As we progress, you will omit the extraneous instructions to CoCo.

We have a rapidly revolving whirligig. Suppose we wanted to slow it down. We could try putting pauses between each element displayed. First, let us try slowing down the part that draws the elements. Add Line 45: 45 FOR Z=1 TO 200: NEXT then RUN and press BREAK. You should put on a few more to get a better view. Key in lines 55, 65 and 75 to read the same as Line 45.

That is not too bad! Since we are going to require many pause lines, we might as well create a GOSUB routine. Key in 600 FOR Z = 1 TO 200: NEXT: RETURN. Re-key Line 45 to read 45 GOSUB 600. If it is OK, re-key lines 55, 65 and 75. Key in required lines 85, 95, 105 and 115 (all GOSUB 600).

It looks neat! You might like to change the value in Line 600 (200) to see if a longer or shorter pause appears to be more effective. Using a value of 300 provides more time to study the display as the elements are augmented. A value of 100 or less (to about 30) gives a better sense of speed. It is up to you to choose a value. For the purposes of the tutorial, 200 will be used.

The point is that a beginner should always try *different* values. Take time out to do so. Every try allows you to

compare new results with previous ones; it is a good way to learn. The newcomer gets to know what to expect when he does this or that. Ask yourself "If I do this, it looks like this. If I do that, it looks like that. What is the difference? What did I change? How did it affect the display? Is this important information I want to squirrel away?" That is what the keys are for! Tickle them! CoCo won't get mad.

All these GOSUB lines could have been tacked on to the DRAW lines, separated by colons (:), to make multiple line statements. When you are in a mad frenzy of creativity, make separate lines. Why? It is easier to follow the listing and you may decide to add additional items to the DRAW lines.

It is easier to edit short program lines. Also, errors are easier to spot. There is plenty of time when the program is finalized to make it more elegant by tightening it up: removing unnecessary or redundant program lines and/or making multiple-line statements.

There is no sense in putting GOSUB routines between the erased units in lines 120-190. The only effect would be additional pauses that would cumulatively become one long, additional pause. Who wants to look at a blank screen?

Suppose we added four AS units, size S4, to give the display more body? Add "+S4"+AS to lines 40, 60, 80 and 100. Uh oh! Before we go any further, let's change the size to S12 and RUN. It is too large! Let's try S10.

Note: Usually only S4, S8, S12 and S16 will work properly when diagonal lines H, E, F and G are used to create a design. The figures will become distorted. Coincidentally, the designs we created, AS and CS, have proportional lines in even number of units, 2, 4, 6 and 8, and the geometrical relationship did not suffer.

Let's take time out to illustrate this point. Copy from Listing 1 lines 15, 700 and 710 but omit the REM markers. After running, try in succession S13 to S16. You will get varied degrees of distor-

tion. The more diagonals, the more distortion. The rule is play it safe. Use sizes beginning with S4 and increment upwards to larger sizes by +4.

Make lines 15, 700 and 710 REM lines by inserting an apostrophe (') at the beginning of each line. Back to the drawing board!

Add to Line 40 "+S10"+AS+"S8". The S10 increases the size and AS prints this larger design element over the smaller one. S8 maintains the size of the diagonal element, CS, in the following line without disturbing it.

Make the same additions to lines 60, 80 and 100. In order to make the blanking lines, 120, 140, 160 and 180, erase these additional design units and add "+S10"+AS+"S8" to them.

The design is off-center due to the insinuation of the larger size. Adjust this by changing the BM128,96 part of the instructions to CoCo in Line 40 to BM138,106. The design is swept off the screen very nicely, but the placing of the units is jerky; adjust Line 600. Use a value of about 30 or 40 to get a rapid, yet smooth rotation.

Just to see what happens, remove the BL3 from Line 20 and BH3 from Line 30. It's OK but it must be recentered by changing the BM values in Line 40 to the original BM128,96.

Could we add four S4-sized units to the AS elements? Change the S8 at the end of the Line 40 to "+S4" and add "+AS"+S8". This adds a small unit to the first horizontal orientation. Make the same changes in the other three orientations at lines 60, 80 and 100. That looks good enough. The S4 units add interest to the display as it is created. Not erasing it enhances the grand design.

Just in case it looks better blanked out, modify lines 120, 140, 160 and 180 by changing S8 to S4 and adding "+AS"+S8". Check it out! If you like this result, CSAVE it. If you prefer the other, readjust lines 120, 140, 160 and 180 and CSAVE. Remember to adjust the pause in Line 600 to some value that pleases you.

Out of curiosity, in lines 120, 140, 160 and 180 change S10 to S8 and delete the rest of the line. This is just another variation that erases only the S8 on both the AS and CS elements. CSAVE if you desire.

You could jazz up the diagonals by adding to Line 50 "+S4"+CS+"S8", etc. Or try this: Change the last AS in lines 40, 60, 80 and 100 to CS. There is no end to what you can investigate.

You are encouraged to dream up things to add, remove or change. Take time out to try them all. Make this tutorial a springboard to further experimentation. If you play around, your endeavors may suggest unexpected avenues to explore.

Mentally, question everything you key in. Never be afraid to alter a program. You should always strive to modify a program, giving it your personal imprimatur. Create your own designs on graph paper and even substitute them for the designs in lines

20 and 30. You will be fascinated at the startling designs you create. Are you still sure you're a beginner?

Let me leave you with a challenge. Display and remove each design element in turn. It won't prove anything in particular, but who knows? □

85184
END47

Listing 1: RADIALS

```

Ø 'LISTING1
5 CLEAR5ØØ
1Ø PMODE4,1:PCLS:SCREEN1,1
15 'GOTO7ØØ
2Ø A$="H2L2G6L8H6L2G2F2R2E6R8F6R
2E2"'HORIZONTAL ORIENTATION
3Ø C$="U2H2L6H8U6H2L2D2F2R6F8D6F
2R2"'DIAGONAL ORIENTATION
4Ø DRAW"C1AØS8BM128,96"+A$+"S1Ø"
+A$+"S4"+A$+"S8"
45 GOSUB6ØØ
5Ø DRAW+C$
55 GOSUB6ØØ
6Ø DRAW"A1"+A$+"S1Ø"+A$+"S4"+A$+
"S8"
65 GOSUB6ØØ
7Ø DRAWC$
75 GOSUB6ØØ
8Ø DRAW"A2"+A$+"S1Ø"+A$+"S4"+A$+
"S8"
85 GOSUB6ØØ
9Ø DRAWC$
95 GOSUB6ØØ
1ØØ DRAW"A3"+A$+"S1Ø"+A$+"S4"+A$
+"S8"
1Ø5 GOSUB6ØØ
11Ø DRAWC$
115 GOSUB6ØØ
12Ø DRAW"AØCØ"+A$+"S1Ø"+A$+"S8"
13Ø DRAWC$
14Ø DRAW"A1"+A$+"S1Ø"+A$+"S8"
15Ø DRAWC$
16Ø DRAW"A2"+A$+"S1Ø"+A$+"S8"
17Ø DRAWC$
18Ø DRAW"A3"+A$+"S1Ø"+A$+"S8"
19Ø DRAWC$
2ØØ GOTO4Ø
5ØØ GOTO5ØØ
6ØØ FOR Z=1TO 2ØØ:NEXT:RETURN
7ØØ 'DRAW"S12BM9Ø,9ØU6R3FDGL2NLF
3BR4 HU4ER2FD4GNL2BR4 BUFR2EUHL2
HUER2FBR3BU NR4D2NR3D4R4"
71Ø 'GOTO71Ø

```

225201
END238

Listing 2: DANCE

```

Ø 'DANCE
1Ø '(C) 1984, J.KOLAR
3Ø PMODE3:PCLS:PMODE4
4Ø A=164:B=1Ø2
5Ø DIM S(2),T(2),U(2),K(2),L(2)
6Ø DRAW"BM2,ØR4F2D4G2L4H2U4E2BFR
2F2D2G2L2H2U2E2"
66 DRAW"BM5Ø,4R8"
67 DRAW"BM2Ø,ØF8"
68 DRAW"BM7Ø,8E8"
69 DRAW"BM8Ø,ØBR4D8"
7Ø GET(Ø,Ø)-(8,8),T,G
75 GET(2Ø,Ø)-(28,8),S,G
76 GET(5Ø,Ø)-(58,8),U,G
77 GET(7Ø,Ø)-(78,8),K,G
78 GET(8Ø,Ø)-(88,8),L,G
8Ø PCLS:SCREEN1,1
11Ø FOR Z=2ØØØTO 1946 STEP-9
111 FOR R=3Ø TO -8Ø STEP-5:C=Z
2ØØ X=INT(A-R*SIN(C-.83)):Y=INT(
B-R*COS(C-.83))
212 SOUND5Ø,1
225 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),U,
OR:FORM=1TO3Ø:NEXT
23Ø PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),K,
PSET:FORM=1TO3Ø:NEXT
235 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),S,
OR:FORM=1TO3Ø:NEXT
24Ø PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),L,
PSET:FORM=1TO3Ø:NEXT
245 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),T,
OR
25Ø NEXTR,Z
251 FOR R=9ØTO 9Ø STEP-2Ø:FOR Z=
412 TO 48 STEP-4:C=Z
252 X=INT(A-R*SIN(C)):Y=INT(B-R*
COS(C)):SOUND5Ø,1
253 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),T,
PSET
254 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),T,
NOT:NEXTZ,R
257 PLAY"V2503L8CO2FEFEO1BO2CC V
1503L8CO2FCFL16CFCCO1BL8O2CEEC V
2503L8CO2GECO1BO2CFC V2503L8O3CO
2BBGL4EDL8EDL4ECO1BO2L2C"
3ØØ FORX=1TO2ØØØ:NEXT:PCLS:GOTO8
Ø

```

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WARP FACTOR X was written by an engineer for the Kennedy Space Center and has been three years in the making. You will appreciate the attention to detail and complex inner workings of the program. The program is supported by eight pages of documentation important to the success of your mission. Your progress through the eighteen sectors of the galaxy will be recorded and saved for your next adventure into space. **WARP FACTOR X** includes versions for 32K, 64K, and COCO 2. It requires one disk drive and comes packaged in a vinyl library case. **\$34.95**

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DR. WHO

DR. WHO is a graphics program based on Britain's number one longest running television series, "Doctor Who". As the game begins you are in control of the Tardis, a time machine disguised as a police call box, and you must find and recover the seven keys to time. To accomplish this feat you will travel around the Galifry Solar System from planet to planet. You must find each planet, fight your way through aliens, and land on each planet. The difficulty level increases with each planet. **DR. WHO** is a real time game. No matter what you are doing energy is being consumed and planets are moving in orbit. All controls and commands are entered through the keyboard. Move your Tardis through the galaxy as you search for far away planets and battle aliens in your quest for the seven keys of time. Your ultimate reward, however, lies out beyond the stars. Requires 32K. **Tape — \$24.95; Disk — \$29.95**

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This new and improved version has
been modified for 64K

An Encore Presentation

For The Analog-To-Digital

And Back Again

By Stephen Gunn

After seeing Jeremy Spiller's "Analog-to-Digital And Back Again" article (June 1985, Page 36), I just had to try it! I typed it in and it worked; the only problem was that it would only give about 13 seconds of sound. The program only used 32K, so I modified it for 64K.

The assembly language listing is rather short, so it has been modified. Also included are four routines for moving blocks of memory from the upper page of RAM into the lower page and back again, therefore the BASIC SAVE and LOADM commands can be used.

How the New Program Works

The BASIC program no longer pokes the routine into memory, but loads it from disk (or cassette). This makes changing the assembly language routine easier. The BASIC program then sets a flag in RAM, so even if you press BREAK and then RUN the program again, it won't bother reloading the machine language routine. The BASIC program

(Stephen Gunn has had his computer for three years. He plans to enter college this fall and major in computer science.)

also turns off the interrupts which allows for better sound quality.

You are presented with a menu similar to the old version's. Selection one is the same as in the original program. Selection two is different in that you can now also control the speed at which the tape is read in. Selecting a speed of one will give a higher sampling rate, hence better sound but less playing time (about 15 seconds). Selecting 15 as the speed will give much lower sound quality, but the playback time is 75 seconds, five times longer than the original program.

(One note: If you want something to sound the same when it plays back, select the same speed of playback as when it is read in. For example, if you read something in at the speed of 11, to have it sound the same it must play back at the speed of 11.)

Selection three is playback, same as in the original version. Selection four lets you save what is in memory to disk, but be warned that a disk will hold only two complete dumps from memory. The filename has to be seven characters or less because the program saves memory out in three files, adding the numbers '1', '2' and '3' to the filename given. After you save memory out, what

is in memory is more or less destroyed by the saving process, so to listen to the same file use Selection five to reload it. (Selection five loads files back into memory.)

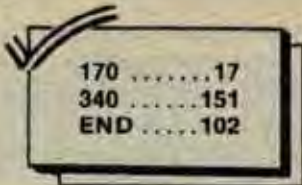
The modifications were created for a disk system, but I see no reason why they shouldn't work for cassette if you change all of the LOADMs to CLOADMs and all of the SAVEMs to CSAVEMs.

Loading Instructions

First, using an editor/assembler, type in and assemble the ML program. If you have a disk system and are using the cartridge EDTASM, assemble it to tape, then reconnect the disk controller and transfer it to disk. If you are using disk EDTASM, just assemble it to disk. Make sure you use the filename SOUND.

If you have the old BASIC version of Jeremy's program, you can just add my routines and changes to his program, otherwise you will have to type in the whole program (it isn't too long).

I enjoyed modifying A/D DRVR for 64K, and I hope you will enjoy using it! If you should have any questions regarding this new version, you may contact me at 944 Wisconsin, Oak Park, IL 60304. Please include an SASE. □



Listing 1: 64KDRVR

```

Ø 'WHEN YOU SAVE A FILE,
  WHATEVER IS IN MEMORY IS
  RUINED BY THE SAVING PROCESS,
  SO THAT IF YOU WANT TO LISTEN
  TO THE FILE YOU JUST SAVED,
  YOU WILL HAVE TO RELOAD IT.
1Ø CLS:GOTO46Ø
2Ø CLEAR1ØØ,&H1AFF:POKE65283,52:
IFPEEK(512)=ØTHENLOADM"SOUND":PO
KE512,85
3Ø POKE65344,Ø
4Ø CLS
5Ø PRINT"  ANALOG TO DIGITAL CON
VERTER"
6Ø PRINT"          BY JEREMY SPILLER
"
7Ø PRINT"          MODIFIED FOR 64K
"
8Ø PRINT"          BY STEPHEN GUNN"
9Ø PRINT
1ØØ PRINT"1. TEST VOLUME OF TAPE
RECORDER"
11Ø PRINT"2. READ TAPE (DIGITALI
ZE)"
12Ø PRINT"3. SAY DATA (PLAYBACK)
"
13Ø PRINT"4. SAVE DATA"
14Ø PRINT"5. LOAD DATA"
15Ø PRINT
16Ø INPUT" PICK A NUMBER";A
17Ø ON A GOTO 19Ø,24Ø,29Ø,33Ø,39
Ø
18Ø GOTO 4Ø
19Ø CLS
2ØØ PRINT"TO GET BACK TO MENU PR
ESS RESET THEN RUN THIS PROGRAM.
"

```

```

21Ø PRINT
22Ø PRINT"SET YOUR TAPE RECORDER
TO THE CORRECT VOLUME"
23Ø MOTORON:EXEC &H1B49
24Ø CLS:INPUT"TYPE A NUMBER 1-15
TO CONTROL THE SPEED. ENTER=
DEFAULT OF 6. =>";S:IFS=Ø THEN S
=6
25Ø IF S>15THEN24Ø
26Ø POKE&H1BØB+3,S
27Ø PRINT"READING TAPE":MOTORON:
EXEC &H1BØØ:MOTOROFF
28Ø GOTO4Ø
29Ø CLS:INPUT"TYPE A NUMBER 1-15
TO CONTROL THE SPEED. ENTER=
DEFAULT OF 6. =>";S:IF S=Ø THEN
S=6
3ØØ IF S>15 THEN29Ø
31Ø CLS:PRINT"SAYING":POKE&H1B35
+3,S:EXEC &H1B25
32Ø GOTO4Ø
33Ø CLS:LINEINPUT"ENTER FILE NAM
E: ";A$:IFLEN(A$)>7THEN33Ø
34Ø PRINT"SAVING"
35Ø SAVEM A$+"1",&H1CØØ,&H7FFF,Ø
36Ø EXEC &H1B69:SAVEM A$+"2",&H1
CØØ,&H7FFF,Ø
37Ø EXEC &H1B8Ø:SAVEM A$+"3",&H1
CØØ,&H37ØØ,Ø
38Ø GOTO3Ø
39Ø CLS:LINEINPUT"FILE TO LOAD:
";A$
4ØØ PRINT"LOADING"
41Ø LOADM A$+"3":EXEC&H1B97
42Ø LOADM A$+"2":EXEC&H1DAF
43Ø LOADM A$+"1"
44Ø GOTO3Ø
45Ø '*PCLEAR Ø*
46Ø POKE&H3CØ,&H5F:POKE&H3C1,&H5
C
47Ø POKE&H3C2,&H96:POKE&H3C3,&HB
C
48Ø POKE&H3C4,&H1F:POKE&H3C5,&HØ
2
49Ø POKE&H3C6,&H7E:POKE&H3C7,&H9
6:POKE&H3C8,&HA3
5ØØ EXEC &H3CØ
51Ø GOTO2Ø

```

Listing 2: SOUND

```

ØØ1ØØ *~~~~~*
ØØ11Ø * SIMPLE A/D CONVERTER *
ØØ12Ø * BY JEREMY SPILLER *
ØØ13Ø * 1985 *
ØØ14Ø *~~~~~*
1BØØ ØØ15Ø ORG $1BØØ

```



```

1B00 7F  FFDF  00160 START  CLR  $FFDF
1B03 8E  1C00  00170          LDX  #$1C00
1B06 7F  FF20  00180          CLR  $FF20
1B09 C6  08     00190 ST010  LDB  #8
1B0B 108E 0006  00200 TIME   LDY  #6
1B0F 31  3F     00210 TIME2  LEAY -1,Y
1B11 26  FC     00220          BNE  TIME2
1B13 74  FF20  00230          LSR  $FF20
1B16 49  00240          ROLA
1B17 5A  00250          DECB
1B18 26  F1     00260          BNE  TIME
1B1A A7  00     00270          STA  ,X+
1B1C 8C  FF00  00280          CMPX #$FF00
1B1F 25  E8     00290          BLO  ST010
1B21 7F  FFDE  00300          CLR  $FFDE
1B24 39  00310          RTS
00320 *****
00330 * RECONSTRUCTS SOUNDS *
00340 *****
1B25 7F  FFDF  00350 PLAY   CLR  $FFDF
1B28 8D  26     00360          BSR  SOUND
1B2A 8E  1C00  00370          LDX  #$1C00
1B2D A6  00     00380 SOUND1  LDA  ,X+
1B2F C6  08     00390          LDB  #8
1B31 48  00400 SOUND2  LSLA
1B32 76  FF20  00410          ROR  $FF20
1B35 108E 0006  00420 TIMER   LDY  #6
1B39 31  3F     00430 TIMER2  LEAY -1,Y
1B3B 26  FC     00440          BNE  TIMER2
1B3D 5A  00450          DECB
1B3E 26  F1     00460          BNE  SOUND2
1B40 8C  FF00  00470          CMPX #$FF00
1B43 25  E8     00480          BLO  SOUND1
1B45 7F  FFDE  00490          CLR  $FFDE
1B48 39  00500          RTS
00510 *****
00520 * VOLUME CHECK ROUTINE *
00530 *****

```



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1B49 8D 05	00540	CHECK	BSR	SOUND
1B4B 76 FF20	00550	VOLUME	ROR	\$FF20
1B4E 20 FB	00560		BRA	VOLUME
1B50 B6 FF01	00570	SOUND	LDA	\$FF01
1B53 84 F7	00580		ANDA	#\$F7
1B55 B7 FF01	00590		STA	\$FF01
1B58 B6 FF03	00600		LDA	\$FF03
1B5B 84 F7	00610		ANDA	#\$F7
1B5D B7 FF03	00620		STA	\$FF03
1B60 B6 FF23	00630		LDA	\$FF23
1B63 8A 08	00640		ORA	#8
1B65 B7 FF23	00650		STA	\$FF23
1B68 39	00660		RTS	
	00670	*****		
	00680	* LOAD/SAVE ADDED BY *		
	00690	* STEPHEN GUNN FOR 64K *		
	00700	*****		
1B69 7F FFDF	00710	SAVE1	CLR	\$FFDF
1B6C 8E 8000	00720		LDX	#\$8000
1B6F 108E 1C00	00730		LDY	#\$1C00
1B73 A6 80	00740	LOOP1	LDA	,X+
1B75 A7 A0	00750		STA	,Y+
1B77 8C E3FF	00760		GMPX	#\$E3FF
1B7A 23 F7	00770		BLS	LOOP1
1B7C 7F FFDE	00780		CLR	\$FFDE
1B7F 39	00790		RTS	
1B80 7F FFDF	00800	SAVE2	CLR	\$FFDF
1B83 8E E400	00810		LDX	#\$E400
1B86 108E 1C00	00820		LDY	#\$1C00
1B8A A6 80	00830	LOOP2	LDA	,X+
1B8C A7 A0	00840		STA	,Y+
1B8E 8C FEFF	00850		GMPX	#\$FEFF
1B91 23 F7	00860		BLS	LOOP2
1B93 7F FFDE	00870		CLR	\$FFDE
1B96 39	00880		RTS	
1B97 7F FFDF	00890	LOAD1	CLR	\$FFDF
	00900	**CORRESPONDS TO SAVE 2**		
1B9A 8E 1C00	00910		LDX	#\$1C00
1B9D 108E E400	00920		LDY	#\$E400
1BA1 A6 80	00930	LOOP3	LDA	,X+
1BA3 A7 A0	00940		STA	,Y+
1BA5 108C FEFF	00950		GMPY	#\$FEFF
1BA9 23 F6	00960		BLS	LOOP3
1BAB 7F FFDE	00970		CLR	\$FFDE
1BAE 39	00980		RTS	
1BAF 7F FFDF	00990	LOAD2	CLR	\$FFDF
	01000	**CORRESPONDS TO SAVE 1**		
	01010	**(\$8000 - \$E3FF)**		
1BB2 8E 1C00	01020		LDX	#\$1C00
1BB5 108E 8000	01030		LDY	#\$8000
1BB9 A6 80	01040	LOOP4	LDA	,X+
1BBB A7 A0	01050		STA	,Y+
1BBD 108C E3FF	01060		GMPY	#\$E3FF
1BC1 23 F6	01070		BLS	LOOP4
1BC3 7F FFDE	01080		CLR	\$FFDE
1BC6 39	01090	END	RTS	
	00000	01100	END	
00000 TOTAL ERRORS				

The RAINBOWfest Reporter

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Innovation, memory expansion mark RAINBOWfest-Chicago

CHICAGO, Ill. — More memory and more innovation sum up the major observations made at RAINBOWfest-Chicago. As we have come to expect, a large turnout of CoCo owners jammed around booths to be astounded by EARS, Colorburst, Thunder RAM and other innovations, or to take advantage of bargain prices on disk drives.

When not crowding into the exhibit room at the Woodfield Hyatt, attendees filled the seminar rooms to hear about topics ranging from speech recognition and spreadsheets to BASIC9 and OS-9.

Interest in OS-9 continued, with Dale Puckett autographing copies of his book *The Complete Rainbow Guide To*

OS-9 at the RAINBOW booth. Unfortunately, sales were so brisk that the supply of books for sale ran out by noon Saturday.

Bare 5¼-inch disk drives sold for prices approaching \$100. One booth was offering a show only special on a pair of Digital Equipment 5¼-inch drives in a case with power supply and cable for only \$249. It takes a show like RAINBOWfest to bring out the bargains.

Chicago treated us to perfect spring days — dry, sunny and comfortably cool. Many bought lunch from a sandwich bar set up by the hotel and ate sitting out on the lawn.

The next RAINBOWfest will be in Princeton, N.J., Oct. 11-13, 1985.



Over 11,000 people attended RAINBOWfest-Chicago.

New speech recognition system brings a glimpse of future



Rich Parry of Speech Systems exhibited EARS, a speech recognition system.

Far and away the most popular exhibit was the Speech Systems booth, which was displaying EARS, Electronic Audio Recognition System. This speech-recognition system consists of a microphone attached to a headset that is, in turn, attached to a hardware module, which plugs into the expansion port of the CoCo.

Designer Rich Parry explained in his seminar on speech recognition that only one year ago he had said it couldn't be done, but the introduction of a "miracle" speech chip has changed all that. EARS is actually a sound recognition system that is remarkably accurate (Parry says 95-98 percent). The accompanying software adds several

new commands to BASIC for system use.

The uses of such a system include the automatic control of external devices (particularly appreciated by the handicapped) and "communication" with a CoCo equipped with *Super Voice* or one of the other speech synthesizers. The limits are one's imagination.

At \$99.95, EARS brings capabilities to the CoCo that could not be purchased for \$10,000 a year ago. Industry and business applications of speech recognition are few and far between. This package allows the CoCo owner to experiment with and be in the forefront of another technology of the future.

Memory at 20 bytes per penny

Bob Rosen of Spectrum Projects introduced his 256K memory upgrade board, appropriately named *Thunder RAM*. They sold out so fast at \$119.95, we didn't even get a chance to see them.

Rosen says the upgrade, which is installed inside the CoCo, emulates a 40-track RAM disk that is 30 times faster than an ordinary floppy drive. It allows you to have a 60K print spooler, create BASIC programs up to 128K long or store up to 30 or more Hi-Res graphics screens in memory at one time. He described it accurately as "a major

breakthrough for the CoCo." This may just be the beginning, however, because Bob promised to keep his programming wizards hard at work over the summer.

Across the room, Dave Skrock of MAX-SYS Electronics and Software Company showed off the Colorburst System, offering up to one megabyte of RAM. Colorburst is a very attractive and sturdy external hardware device that plugs directly into the CoCo expansion port and contains six software selectable expansion ports and a disk controller connector in the back.

Options ranging from 64K to one megabyte cost from \$570 to \$999.

Colorburst memory is in addition to what you already have. The ROM in the unit has routines that will quickly access the extra memory, acting as a print spooler or a RAM disk. It operates with all versions of the CoCo and is OS-9 and Disk BASIC compatible. The unit even includes a parallel Centronics interface.

Both *Thunder RAM* and Colorburst are evolving products whose usefulness will increase as more software becomes available.

Odneal introduces 'portable' CoCo

Steve Odneal of P.R.O. Systems of Kansas City had passers-by doing double takes as they stared at what appeared to be a "portable" CoCo at his booth. Next to it sat a normal CoCo hooked up to a 10 megabyte, half-height hard disk drive ready to run under Disk BASIC, OS-9 or FLEX at the user's whim.

Odneal, a CoCo pioneer and former SysOp of the Kansas City CoCo BBS, told us he took a Commodore portable and "fixed it." And fix it he did. He took out all the insides, replaced them with CoCo 2 components and added a few touches of his own. The unit sports a 5-inch color monitor, two 5¼-inch floppy drives (it also will come with the 10-megabyte hard disk and one floppy drive), detachable keyboard with a 24-inch cord, front panel monitor control, and 64K Disk Extended BASIC.

The PCC (P.R.O.'s name for it) is compatible with all CoCo software since all standard functions and addresses were retained. Odneal's machine is a prototype.

He will begin production only if there is enough interest from the CoCo Community. The estimated cost of the standard unit is approximately \$1,500. If interested, give Steve a call at (913) 631-0665 or write him at 10601 W. 63 Street, Shawnee, KS 66203.

The P.R.O. hard disk drive comes complete with case, power supply and necessary software for \$995. With the supplied drivers, the drive acts just like other drives under OS-9 or FLEX, except it's five times faster and holds lots of files.

Under Disk BASIC, the CoCo must be put into 64K mode with the ROMs copied into the upper 32K. Boot software patches Disk Extended BASIC and adds some system code. This creates no problem with BASIC programs, but there are conflicts where machine language programs are written to use the same memory space. Work is going forward on this problem, and Marty Goodman, of *Graphicom* fame, worked to "fix" *Teletwriter* while RAINBOWfest was in progress.



Chip McGinnis (right) of P.R.O. Systems demonstrated his company's new PCC.

Sports statistics from Sugar Software



Susan Davis (center) announced at RAINBOWfest that she had moved Sugar Software to Hollywood, Fla.

Susan Davis introduced the *Sports Statistics Package* for baseball, football, basketball or soccer. These are designed for the coach, team manager or fan who needs accurate team and opponent records.

Ms. Davis also reported that Sugar Software has moved to Hollywood, Fla., and that she's planning a special sale of sleds, snow shovels, ice skates, sweaters, coats and boots that are not in keeping with a poolside lifestyle. These are guaranteed to work with any type computer.



Two young Sunday visitors talk about the day's events.

Rainbow publisher says Color Computer remains strong despite industry problems

RAINBOW Publisher Lonnie Falk set the record straight at the "CoCo Community Breakfast," as he remembered some events in CoCo and RAINBOW history. The CoCo Community was out in force to hear him at the sold-out event. His conclusion? "Not bad for a little game machine."

Falk is a gadget lover, as anyone who has visited Prospect knows. RAINBOW's offices are full of Falk's gadgets. The new Color Computer looked like a mighty neat gadget in late 1980 and Lonnie fell for a 4K model, the only one then available.

Unlike some of Falk's other gadgets, the CoCo worked. It worked so well that hundreds of thousands of lives have been touched through the RAINBOW, which came to life as a four-page newsletter first written at



Falsoft President Lonnie Falk addresses the CoCo Community Breakfast.

Falk's dining room table. And that same machine proudly continues to perform chores to this day, though surrounded by many supposedly mightier

computers.

Falk noted the ills now afflicting the microcomputer industry and pointed out that the CoCo world has been less affected

than most other makes. The CoCo Community, which is made up of loyal and satisfied owners, plays a major role in the continued vitality of the machine. They stay with the machine and strongly recommend it to others. They are active users and continue to support a market providing a variety of software and hardware products. RAINBOWfest itself is a manifestation of the CoCo Community in action.

The future looks bright to Falk. Radio Shack continues to support the machine. A new and greater CoCo will come, he predicted, although he couldn't say exactly when. New, exciting, high-tech products continue to come to the CoCo market and the CoCo Community thrives.

"Not bad for a little game machine."

His glasses gave him away



Dennis Kitz (sans beard) and Green Mountain Micro exhibited an extender cable for Disk Expansion Interface that was very popular.

Green Mountain Micro's Dennis Kitz had shaved off his beard and gotten a shorter haircut. Fortunately, he kept his distinctive glasses or no one would have recognized him. The only person whose appearance changed more at this RAINBOWfest was Bob Rosen, who was not only sans beard, but also 60 pounds lighter.

Kitz quickly sold out of a hardware product everyone said didn't exist — an extender cable for the Disk Expansion Interface. The heavily shielded cable comes in four lengths ranging from 6 inches to 36 inches and is priced from \$20 to \$40. Another new item is a 16-channel, 12-bit analog-to-digital converter board that plugs into the ROM port or expansion interface.

Be an air traffic controller

Fast on the heels of his fine *P51 Mustang Attack Flight Simulator*, Tom Mix introduced *Air Traffic Controller* by Betasoft Systems. Frequent air travelers who have experienced extended waits in holding patterns and a variety of approaches to a particular airport will appreciate the

situations modeled by this *Simulation*. The air traveler probably does not fully appreciate the magnitude of an air traffic controller's problems. Both experience and a system are needed to stay on top of the variety of situations offered by this excellent program.

Print a graphics letterhead from Telewriter-64

Dennis Derringer and Paul Kush demonstrated *Telegraphics*, an impressive new Derringer Software offering. This utility allows you to use your favorite graphics editing program (*Master Design*, *CoCo Max*, *Graphicom*, etc.) to design a letterhead and then print it out while using *Telewriter-64*.

Hearing about the P.R.O. hard disk, Derringer ambled by with a copy of his *Pro-Color-File*. It worked fine and reported that there was room for 32,000-plus 100-character records. *Pro-Color-File* is not set up to handle much more than 4,000 records. Derringer plans to do some program upgrading.

Criticism of OS-9 leads Hogg to introduce QT

While we've been dreaming about the "CoCo 09," Frank Hogg has been working. He used RAINBOWfest to introduce his QT (Quad Terminal), a 68008 multi-user (up to four) computer with 128K (upgradable to 512K), four serial ports and two parallel ports. It supports two double-sided, double-density 96 tpi floppy disk drives and has an interface for a Winchester hard disk drive. The 68008 is a 32-bit CPU that runs at a scorching eight MHz!

A ton of software is bundled with the QT. You get OS-9/68K, BASIC09, DynaCalc, Strylograph, Mailmerge, Spelling Checker, a relocating macro assembler with linkage editor, screen and line editors, and an interactive debugger. Separately, the software costs about \$400 more than Frank Hogg Laboratory's basic QT price of \$1,595.

An impressive physical feature of the QT is that its sturdy metal case requires no more room than an average box of facial tissue (5½ by 11¼ inches). Of course, the terminal required by the system will add to the space requirements (not to mention the out-of-pocket requirements). One could use the CoCo as a terminal for the QT, but that seems like such a waste.

Frank Hogg has the reputation of being an outspoken member of the CoCo Community and he tells us that his criticism of OS-9 for the CoCo led him to development of the QT. If criticism has such impressive byproducts, then maybe we need more criticism.



Frank Hogg, left, and Tony DiStefano discussed products at RAINBOWfest, including Hogg's QT, a 68008 multi-user computer with 128K.



Tim Jenison of Colorware says his company is almost caught up with orders for CoCo Max.

CoCo Max ships from stock

CoCo Max was the star of the Irvine RAINBOWfest and was in short supply for two months thereafter; Colorware's booth was just as popular at Chicago.

Tim Jenison and John

Monin of Colorware reported they have finally caught up with orders and are shipping disk CoCo Max from stock. A tape version is also being shipped. Coming shortly is a font disk with 14 new typefaces.



Remember when you were in school and longed for an electric pencil!

Next RAINBOWfest is scheduled Oct. 11-13 in Princeton, N.J.

The next RAINBOWfest will be Oct. 11-13 in Princeton, N.J., and among the guest speakers will be well-known computer expert Bill Barden. Barden will be the keynote at the CoCo Community Breakfast and will also hold a seminar on computer languages.

Among other speakers featured during the upcoming RAINBOWfest are: Steve Blyn, "The CoCo and Special Education"; Dan Downard, "Inside Your Color Computer"; Dale Puckett, "Beginners Tour of OS-9" and "Beginners Tour of BASIC09"; Dennis Kitz, "Your Own Color Computer Hardware"; and Paul



Hoffman, "A CoCo Gallery." Also, Puckett will be available during the show to autograph copies of his new book,

The Complete Rainbow Guide to OS-9.

The Hyatt Regency Princeton will serve as host. □

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ed-out signs and beaten favorite. **Greyhound factors** include speed, past performance, maneuvering ability, favorite box, class, kennel record, beaten favorite and breaking ability.

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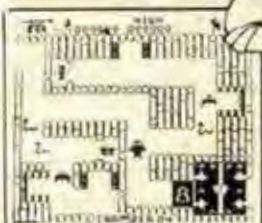
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The DragonTown Library

By Bob Albrecht and Ramon Zamora
Rainbow Contributing Editors

"School Is In The Heart Of A Child" is for parents of quite young children. We want to help you work and play with your 3- to 8-year-old child and learn to use computers as a joyful family experience. We suggest ways to use the home computer as another means to encourage your child's independence, growth and control over her own life. See the pride on her face as she directs the computer to do what she selects with deliberation. See her head gears switch to "on" as she progresses step by step with your presence and caring guidance. We will explore (we hope, with your help) the following:

- Specific "teaching" techniques so the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must!): call the librarian for information; watch TV together and discuss it; work together as volunteers in a community project; take an "awareness" walk.
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge and share our experiences as we learn from our children.

Copyright© 1985 by DragonQuest, P.O. Box 7627, Menlo Park, CA 94026-7627. Portions of "School Is In The Heart Of A Child" are extracted from TRS-80 Color BASIC by Bob Albrecht.

(Well-known author Bob Albrecht has written numerous articles and books on personal computers through his association with DragonQuest. Ramon Zamora is author and co-author of several books, co-founder of Computer Town USA!, and is currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)

You can learn how to help a kid learn.



We read a lot; here are some of the sources of information that we find helpful, useful, entertaining, mind-stretching or inspirational.

The best sources of general information on teaching your own children are books and a newsletter by John Holt. We recommend these: *How Children Fail* (Rev., 1982) \$5.95, *How Children Learn* (Rev., 1983) \$7.95, *Teach Your Own* (1981) \$8.95 and *Growing without Schooling* (newsletter) one year (6 issues) for \$15; single issue, \$2.50. All are available from John Holt Associates, 729 Dolyston Street, Boston, MA 02116.

Basic Skills is a book by Herbert Kohl — a wonderful book by a philosopher and doer who spends his life learning about children from children. We wish every person who is concerned about the growth and well-being of children would read this book. If your bookstore doesn't have it, order it from Bantam Books, Inc., 414 East Golf Road, Des Plaines, IL 60616. Cost is \$3.95 plus \$1.25 postage and handling.

Amazing! Most people can now afford a home computer more powerful than the outrageously expensive institutional computers of yesteryear. To find out why and how it happened, read these two books: *Fire in the Valley* by

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Paul Freiberger and Michael Swaine. From Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710, \$9.95 (paperback). *Hackers: Heroes of the Computer Revolution* by Steven Levy. From Anchor Press/Doubleday, Garden City, NY. \$17.95 (hardback). Together, these books present a definitive history of the computer revolution that brought powerful, inexpensive computers to you, to me, to all of us — the people.

THE NEXT Whole Earth Catalog (second edition, 1981). We can't think of a better way to describe this catalog than the way they do it on Page 2: "*THE NEXT Whole Earth Catalog* is an evaluation and access device. With it, the user should know better what is worth getting and where and how to do the getting.

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WHOLE EARTH Review is a periodical from the same people who put out *THE NEXT Whole Earth Catalog*. Once there was *CoEvolution Quarterly*, then came *The Whole Earth Software Review*. Well, now the last two are merged into *WHOLE EARTH Review*. We recommend you get it. A year's subscription is \$18 (6 issues) from WHOLE EARTH Review, P.O. Box 27956, San Diego, CA 92128.

Parents, Kids, and Computers by Lynne Alper and McG Holmberg — 145 pages of good information for only \$4.95. Lynne is a math and computer teacher who has been sharing computer fun and learning with her own children since 1980, when her kids were 5, 7 and 9 years old. Meg is a technical writer and editor who works closely with educators who are developing new ways for children to learn with computers. Get it at your local bookstore or from SYBEX, 2344 Sixth Street, Berkeley, CA 94710.

Sound and Color Organ

Let's turn the CoCo into a very simple sound and color organ. Your child can play up to eight notes in eight colors using the number keys '1' through '8'.

Listing 1:

```

100 REM**SOUND & COLOR SCH 18-1
110 CLS
199 '
200 REM**FILL TONE ARRAY
210 FOR K=1 TO 8
220 : READ T(K)
230 NEXT K
299 '
300 REM**TELL HOW TO PLAY
310 PRINT @480, "PRESS A KEY (1

```

```

TO 8)";
320 K$=INKEY$: IF K$="" THEN 320
330 IF K$<"1" OR K$>"8" THEN 320
399 '
400 REM**PLAY NOTE & SHOW COLOR
410 K = ASC(K$) - 48
420 CLS K
430 SOUND T(K), 1
440 GOTO 310
499 '
900 REM**TONE NUMBERS
910 DATA 176,185,193,197
920 DATA 204,210,216,218

```

These numbers are in the scale of C.



Block 200 loads the tone numbers for the musical scale of C into subscripted variables T(1), T(2), T(3), etc.



Enter and run the program, then let your child press keys. All keys are ignored except the number keys, 1 to 8, and the BREAK key. Here are the numbers to press to play "Mary Had a Little Lamb."



Encore! How about a little ho, ho, ho? Put the numbers above the notes, then help your child play "Jingle Bells."



Make the duration of the tone longer:

```
430 SOUND T(K),10
```

Then try one of these games:

Guess My Tone Number — One person presses a number key; the other person listens and guesses which key was pressed.

Match My Tone — This one is for people with good pitch! One person hums one of the eight tones; the other person matches it by pressing the corresponding number key.

Make A Tune — Take turns pressing a number key and write down the number of the key. After both of you

press number keys a bunch of times and write down each one, you have made a tune! Take turns playing the entire tune.

Use Letters for 26 Tones

Using the letter keys A to Z, we can make the CoCo play 26 different tones. We will put the following tones in the array 'T'.

K	T(K)	Note	K	T(K)	Note
1	89	Middle C	14	180	C [♯] , D [♭]
2	99	C [♯] , D [♭]	15	185	D
3	108	D	16	189	D [♯] , E [♭]
4	117	D [♯] , E [♭]	17	193	E
5	125	F	18	197	F
6	133	F	19	200	F [♯] , G [♭]
7	140	F [♯] , G [♭]	20	204	G
8	147	G	21	207	G [♯] , A [♭]
9	153	G [♯] , A [♭]	22	210	A
10	159	A	23	213	A [♯] , B [♭]
11	165	A [♯] , B [♭]	24	216	B
12	170	B	25	218	C
13	176	C	26	221	C [♯]

Press the letter 'A' to play Middle C. Press 'B' to play C sharp or D flat; press 'C' to play D; press 'D' to play D sharp or E flat, and so on.

Our program is quite similar to the previous one.

Listing 2:

```

100 REM**SOUND & COLOR SCH 18-2
110 DIM T(26)
120 CLS
199 '
200 REM**FILL TONE ARRAY
210 FOR K=1 TO 26
220 : READ T(K)
230 NEXT K
299 '
300 REM**TELL HOW TO PLAY
310 PRINT @480, "PRESS A KEY, A
TO Z";
320 K$=INKEY$: IF K$="" THEN 320
330 IF K$<"A" OR K$>"Z" THEN 320
399 '
400 REM**PLAY NOTE & SHOW COLOR
410 K = ASC(K$) - 64
420 CLS K-8*INT((K-1)/8)
430 SOUND T(K), 1
440 GOTO 310
499 '
900 REM**TONE NUMBERS
910 DATA 89,99,108,117
920 DATA 125,133,140,147 } — 1st octave
930 DATA 153,159,165,170 }
940 DATA 176,180,185,189 }
950 DATA 193,197,200,204 } — 2nd octave
960 DATA 207,210,213,216 }
970 DATA 218,221 } — a little bit more

```

Or whatever duration you want.

Boggled by Line 420? Perhaps this will help. Remember, 'K' will be an integer from one to 26. Why? (See Line 410.)

K	(K-1)/8	INT((K-1)/8)	K-8*INT((K-1)/8)
1	0	0	1
2	.125	0	2
8	.875	0	8
9	1	1	1
10	1.125	1	2
16	1.875	1	8
17	2	2	1
18	2.125	2	2
24	2.875	2	8
25	3	3	1
26	3.125	3	2

The value of $K-8*INT((K-1)/8)$ will always be an integer in the range one to eight. So, Line 420 will select one of the eight screen colors.

Would you like to change what tone is played by each letter? Easy, just rewrite the DATA statements (lines 910-970).

Guess My Number — A Storyboard

Here is a "Guess My Number" game we play with very young children using paper and pencil. First, we write down the numbers from one to nine.

1 2 3 4 5 6 7 8 9

Then, we secretly pick a number. Let's pick seven. The child guesses. Suppose she guesses three. We put a "pointer" above her guess.

>
1 2 3 4 5 6 7 8 9

The pointer (>) points toward our secret number. Of course, it also means "greater than." So we say, "My number is greater than three."

Now suppose she guesses nine. We put a "less than" pointer above '9'.

> <
1 2 3 4 5 6 7 8 9

Aha! Now she will see that my secret number is caught between three and nine. It is greater than three (>3) and less than nine (<9). We continue until she guesses the secret number, and put an equals sign (=) above her correct guess.

Guess Number:	1	2	3	4	5	6	7	8	9
Hint:			>			>	=		<

We challenge you to write a CoCo program to play this game with a child. Here is the first screen.

COLUMNS

ROWS	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
0																														
1																														
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
13																														
14																														
15																														

While the CoCo is waiting for someone to press a key, "spin" the RND function, like this:

```

line number K$=INKEY$:R=RND(0):IF K$="" THEN line number
  
```

When someone presses a key, pick a secret number and show the next screen.

COLUMNS

ROWS	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
0																														
1																														
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
13																														
14																														
15																														

Suppose the secret number is seven and someone guesses three. Put the proper pointer above the '3'.

COLUMNS

ROWS	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

And so on. After each guess, put the proper pointer (> or <) above the guess — unless the player guesses the number. In that case, put an equals sign (=) above the correct guess, blink the correct guess and tell how to play again.

COLUMNS

ROWS	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Blink, blink, blink

reverse color

Designing a program like this is called *storyboarding*. Use our storyboard to help write the program. Next time we will show you our program.

DragonSmoke and DragonFun

DragonSmoke is our newsletter about personal and family learning, including computers, role playing games, play-by-mail games, COPY ME stuff, public domain instructional materials, software for beginners and, our own play-by-mail game, *DragonFun*.

DragonFun is a play-by-mail role playing game for beginners. It is nonviolent and features cooperation, exploration, problem-solving and story-telling. How to play is described in *DragonSmoke*. Teachers: *DragonFun* can be a great class project. We will start a new game in October 1985 specifically for grades four, five and six. Your class enters two characters and guides their adventures by mail once a month throughout the school year.

DragonSmoke has become too big to stuff into self-addressed, stamped envelopes. For a sample copy, send \$1 to *DragonSmoke*, P.O. Box 7627, Menlo Park, CA 94026.

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*Set your monitor 'swimming'
with this colorful and realistic
animation of life in a fish bowl*

GUPPIE
GRAPHICS

By Jim Kent

I've been a RAINBOW reader for years. The first high resolution machine language graphics program I ever worked was Dennis Lewandowski's shoot-'em-up space game in the November 1982 "Assembly Corner." Since then, I've been plugging away at my little CoCo and now have a program of my own to offer — *Digital Aquarium*.

A "digital aquarium" is no substitute for a real aquarium. It doesn't make gurgling noises (though there are bubbles) and the fish won't recognize you or flare their fins at a mirror. Still, there are no water filters to clean and, if one tires of a fish, one can simply remove it from the object list with no twinges of conscience. It is also a good example of what your CoCo can do when you ask it to. There are over 50 objects being moved at once. (I'd like to see that on a Commodore!)

(Jim Kent is a programmer at Island Graphics. He studied math at UC in Santa Cruz, Calif.)



It would really be best to get RAINBOW ON TAPE to enjoy this article. I've included a listing of the assembly language source. Those who don't already know can see that machine language programs tend to be very long if they intend to do much. This is because each line in assembly code does only something very simple. The basic line:

```
i = j + k
```

translates to:

```
lda j
adda k
sta i
```

Similarly, a BASIC line of any complexity is apt to turn into a CoCo screen-full of assembly language. Unless you are trying to learn assembly language, typing in this program will probably be impossible, for a single typing error will be enough to make everything not work. It is a pretty program, and I hope people not trying to learn assembly language will be able to enjoy it as well.

For those who have done some graphics programming, *Digital Aquarium* derives its remarkable speed and smoothness through the use of pre-shifted shapes, a DRAW-DRAW architecture, as well as from being written in fairly tightly-coded 6809 assembler. Anyone wishing to incorporate parts of this code into any of their programs, even commercial ones, should feel free to do so. I hope it encourages some games that *don't* involve missiles in space or jungle munch-'em-ups. My only regret with *Digital Aquarium* is that it doesn't use joysticks — yet.

There are two listings that accompany this article. Listing 1, *F*, written to be assembled using The Micro Works' Macro-80C, is the machine language code that actually does the work of animating the fish and also contains the code to produce a small aquarium. Listing 2, *FISH*, is a BASIC program that uses the *Digital Aquarium* as a `USR ()` routine. The aquarium will run until a key is pressed, then it will return to BASIC. The `PCLS ()` call can be followed by other BASIC graphics commands if a more elaborate, non-moving background is desired. (The October 1985 RAINBOW ON TAPE includes a longer version of the machine language program, called *FLARGE*, as well. To use this program, just change

Line 20 of Listing 2 to `LOADM "FLARGE"`.

I have tried to document the assembly language as much as possible. I did not have the luxury of an 80-column screen when I developed this program, so comments appear on the line after the code they refer to rather than at the end of the same line. All parameters are passed to subroutines in registers. Subroutines are required to save registers they use unless those registers return values. The one exception to this is the software blitter (rectangle mover) routine named XORBLIT.

The only truly hairy routine in this package is CLPBLT or "clip blit." Personally, I am just happy it works

numbers to define in addition to a "type byte" at the beginning. These are naturally the horizontal and vertical offsets to be added to the character position in each frame.

The SAMPLED path is a bit more complex. The format is a type byte followed by two bytes to say how many samples there are, two bytes to say which sample we're on now, and then a list of the samples themselves. The samples are really offsets just like the straight type path. The difference is that you move each frame on to the next offset rather than always using the same one.

To go with the four types of paths there are three types of images. The first

"The upshot of this is that if you want smooth movement in the horizontal direction, you must have four copies of an image, one for each pixel that lives in a byte."

and that I no longer have to understand exactly how. This is a vital routine, however. If it weren't for CLPBLT, the fish that are half on screen would also be half on the code, and believe me, fins in place of RTSs lead quickly to seaweed soup!

Most of the machine code is set up to interpret the animation list, which is declared at the bottom of Listing 1 and Listing 2. Members of the animation list are characters, which are themselves composed of three parts: position, path and image. In each frame three functions are called for each character. First, a function associated with the path of the character is called and updates the position, then a function associated with the image is called and stuffs Register X with a "raster" (a rectangular array of pixels — little square dots), and Registers A and B with the dimensions of the raster. Next a function to draw the raster at the character position is called. The fun part of this setup is that different images can have the same path and vice-versa. Furthermore, new types of paths and new types of images can easily be added.

Currently there are four types of paths: STRAIT, BOUNCE, YBOUNC and SAMPLED. The STRAIT and BOUNCE paths require only two

of these is STILL. A STILL contains the type byte stating it is a STILL, followed by the dimensions of the raster containing the image, followed by the raster itself. STILL shapes will jerk if moved horizontally, but require only one-fourth the memory of the other types of shapes.

The second type of image is GLIDE. As you may know, in the color Hi-Res screen modes of your CoCo a single pixel takes up two bits. This means there are four pixels in a byte. The CoCo is a byte-oriented machine; it is not especially good at shifting around bits within a byte — it will do it, but not nearly as fast as it will throw around bytes whose bits it doesn't have to twiddle.

The upshot of this is that if you want smooth movement in the horizontal direction, you must have four copies of an image, one for each pixel that lives in a byte. This way, when you want the first pixel of an image to go to a place on the screen that is itself, say, the third pixel of a byte, you do not spend ages shifting the whole image a bit at a time before making the copy, but rather simply decide which one (in this case the third) of four pre-shifted images to put as a byte array onto the screen.

Therefore, when an image is declared to be type GLIDE you supply the first raster just as if it were a STILL, but then you reserve space for three more copies of the image — pre-shifted copies, for the machine to fill in once it gets going.

The type WIGGLE is very much like GLIDE, except instead of the CoCo doing the pre-shifting you do it yourself. The advantage of this is that without using any more memory than it would

take for smooth motion, you can have a shape that wiggles a little as it moves horizontally.

If you don't have RAINBOW ON TAPE, for a copy of the program on disk (\$6 and 1 1/4 supply disk), fresh shapes to animate or perhaps to engage in a digital fish exchange, contact me at 1001-A O'Reilly, San Francisco, CA 95129. As it stands, the program only works on machines with Extended Color Disk BASIC. To get it to run on

a cassette-based system add the line: 25 POKE 3000,8 to Listing 2. This tells it your screen is starting at \$800 instead of \$E00. It should run on 16K machines with no problem.

The *Digital Aquarium* was written using a Micro Works Macro-80C assembler and editor with local labels. (That's what all the A@'s are, folks.) If you own a less intelligent assembler, I'm afraid you'll have to make up new labels for them. □

Listing 1: F

```

0001 0000      XMAX EQU 128
0002 0000      XMAX EQU 96
              *DIMENSIONS OF SCREEN

0003 0000      ORG $3000

0004 0000 0E00  SCREEN FDB 0E00
              *POKE IN NEW SCREEN LOCATION
              *HERE IF WANT TO

0005 0000      ORG $3010
              *SKIP A BIT .. ROOM FOR
              *MORE PARAMETERS FOR LATER
              *VERSIONS

0006 0010      ZIART
0007 0010 C00E00  LDD #SE00
0008 0013 F03000  STD SCREEN
0009 0016 CE3300  LDU #ANLIST
0010 0019 170012  LBSR OBINIT
              *PRE-SHIFT SHAPES

0011 0010 170088  LBSR DRAALL
              *DRAW EVERYTHING ONE UP TOP SO
              *LOOP CAN BE UNDRAW-DRAW INSTEAD
              *GF DRAW-UNDRAW

0012 001F      LOOP
0013 001F 170098  LBSR FRAME
0014 0022 170223  LBSR INTRPT
0015 0025 27FA  ARQ LOOP
              *GO AROUND FOREVER OR UNTIL
              *USER HITS KEYBOARD

0016 0027 CE3300  LDU #ANLIST
0017 002A 17007A  LBSR DRAALL
              *FINAL ERASING XOR

0018 002D 3F      RTS
              *RETURN ALL THE WAY TO BASIC

*****
*
*      OBINIT
*
*INPUT:
*      U->CHARACTER LIST
*
*WILL PROMOTE GLIDE TYPE IMAGES
*TO WIGGLE TYPES BY FILLING
*IN THE PRESHIFTED IMAGES
*****
0019 002E 3452  OBINIT PSRS A,U,X

0020 0030 11830000  CMFU #0
              *JUST TO GET CONDITION CODE

0021 0034 2913      BRA C@
0022 0036 AEC00004  A@ LDX CIMAGE,U,
0023 003A A6800000  LDA ITYPE,X
0024 003E 8102      CMFA #CLIDE
0025 0040 2403      BNE B@
0026 0042 170000  LBSR PRECLI

```

```

0027 0045 EEC00006  B@ LDU CNEXT,U
0028 0049 26E8      C@ BNE A@

0029 004B 35D2      FULS A,U,X,PC

*****
*
*      PRECLI
*
*INPUT:
*      X->IMAGE
*
*MAKES 3 SHIFTED VERSIONS
*OF RASTER AND ALL STENCILS
*****
0030 004D      PRECLI
0031 004D 3476      FSHS X,Y,U,A,B
0032 004F 3276      LEAS -10,S

0033 0051 8601      LDA #WIGGLE
0034 0053 A7000000  STA ITYPE,X
              *PROMOTE TO PRESHIFTED TYPE

0035 0057 E0800001  LDD IXDIM,X
0036 005A E004      STD ,C
              *SAVE DIMENSIONS

0037 005D EC800003  LDD ILENC,X
0038 0061 ED62      STD 2,S
              *SAVE RASTER SIZE

0039 0063 30800005  LEAX IDATA,X
              *POINT X TO START OF FIRST RASTER
0040 0067 330B      LEAU D,X
              *POINT U TO NEXT RASTER

0041 0069 8603      LDA #3
0042 006B A764      STA 4,S
              *COUNT THROUGH THREE RASTERS

0043 006D E0E4      A@ LDD ,S
0044 006F 10FE      ANDCC #3FE      CLEAR CARRY
0045 0071 170013  LBSR ASRXU
0046 0074 1F31      TFR U,X
0047 0076 10FE      ANDCC #3FE
0048 0078 170000  LBSR ASRXU
0049 007B EC62      LDD 2,S
0050 007D 330B      LEAU D,U
0051 007F 6A64      DEC 4,S
0052 0081 26EA      BNE A@
              *SHIFT THE IMAGE

0053 0083 326A      FREANZ LEAS 10,S
0054 0085 33FE      FULS A,B,X,Y,U,PC

```

```

*****
*
*      ASRXU
*
*INPUT:
*      X->SOURCE RASTER
*      U->DESTINATION RASTER
*      A = X DIMENSION OF
*          RASTER
*      B = Y DIMENSION
*

```

```

*SHIFTS RASTER RIGHT ONE.
*CARRY BIT MUST BE SET ABOVE
*****
0055 3087 3436 ASRXU PSHS X,U,A,B
0056 3089 3278 LEAS -5,S

0057 308B EDE4 STD ,S
0058 308D LFA9 TFR CC,B
0059 308E 2742 STD ,2,S

0060 3091 E662 ASRXU1 LDB 2,S
0061 3093 LF9A TFR B,CC

*PUT CARRY BIT IN RIGHT PLACE
0062 3095 E600 A@ LDB ,X+
0063 3097 56 ROBB
0064 3098 E7C9 STR ,U+
0065 309A 4A DECA
0066 309B 26F0 BNE A@

*SHIFT ONE LINE
0067 309D A6E4 LDA ,S
0068 309E 6A61 DEC 1,S
0069 30A1 26EE BNE ASRXU1

*SHIFT RASTER
0070 30A3 3265 LEAS 5,S
0071 30A3 33D6 PULS X,U,A,B,PC

*****
*
* DRAALL
*
*INPUT:
* U->CHARACTER LIST
*
*****
0072 30A7 DRAALL
0073 30A7 3440 PSHS U
0074 30A9 11830000 CMFU #0
0075 30AD 2007 BRA C@
0076 30AF 170038 A@ LBSR DRAOBJ
0077 30B2 EEC00006 LDU CNEXT,U
0078 30B6 26F7 C@ BNE A@

0079 30B8 35C0 PULS U,PC

*****
*
* FRAME
*
*INPUT:
* U-> START OF CHARACTER
* LIST
*****
0080 30BA 3440 FRAME PSHS U
0081 30BC 11830000 CMFU #0
0082 30C0 200D BRA C@
0083 30C2 170025 A@ LBSR DRAOBJ
*ERASE XOR IMAGE
0084 30C5 170008 LBSR MOVORJ
0085 30C8 17001F LBSR DRAOBJ

*ACTUALLY DRAW THE THING
0086 30CB EEC00006 LDU CNEXT,U
0087 30CF 26F1 C@ BNE A@
0088 30D1 35C0 PULS U,PC

*****
*
* MOVORJ
*
*INPUT:
* U->CHARACTER
*
*MOVES CHARACTER
*FORWARD ONE 'CLICK' IN TIME
*****
0089 30D3 3436 MOVORJ PSHS D,X,Y
0090 30D5 10AEC00002 LDY CPATH,U
0091 30DA A6A00000 LDA PTYPE,Y
0092 30DE 48 LSLA
0093 30DF 8E3104 LDX #NOFFT
0094 30E2 AD96 JSR [A,X]

*LOOK UP FUNCTION THAT
*MOVES THIS TYPE OF OBJECT
0095 30E4 EDC00000 STD CXPOS,U
*AND STORE FUNCTION RESULT
*IN OBJECT POSITION
0096 30E8 35B6 PULS X,Y,D,PC

```

```

*****
*
* DRAOBJ
*
*INPUT:
* U->CHARACTER
*****
0097 30EA 3436 DRAOBJ PSHS A,B,Y,X
0098 30EC 10AEC00004 LDY CTMAGE,U
0099 30F1 A6A00000 LDA ITYPE,Y
0100 30F5 48 LSLA
0101 30F6 8E310C LDX #DORJT
0102 30F9 AD96 JSR [A,X]

*CALL FUNCTION TO GET NEXT
*RASTER AND STENCIL
0103 30FB 2CC00000 LDU CXPOS,U
*GET CURRENT POSITION
0104 30FF 17000C LBSR CLPBLT

0105 3102 35B6 PULS A,B,X,Y,PC

0106 3104 3145316831 NOFFT FDB NEWBOU,NEWGMP,NEWSTR
0107 310A 3134 FDB NEWYBC

0108 310C 31103115 DOBJT FDB DSTILL,DWIGGL

*****
*
* DSTILL
*
*INPUT Y->IMAGE
* U->CHARACTER
*
*OUTPUT X->RASTER
*
*DRAW A STILL OBJECT
*****
0109 3110 DSTILL
0110 3110 30A00000 LEAX IDATA,Y
0111 3114 39 RTS

*****
*
* DWIGGLE
*
*INPUT Y->IMAGE
* U->CHARACTER
*
*OUTPUT X->RASTER
*
*DRAW AN OBJECT CAPABLE OF
*SMOOTH MOVEMENT, IE WITH
*4 PRESHIFTED SHAPES
*****
0112 3115 DWIGGL
0113 3115 3406 PSHS A,B
0114 3117 30A00000 LEAX IDATA,Y
*POINT X TO START OF FIRST
*RASTER
0115 3118 E6C00000 LDB CXPOS,U
0116 311F C403 ANDB #3
*FIND WHICH PIXEL IN BYTE

0117 3121 5C INCB
0118 3122 3404 PSHS B
*AND PUSH IT TO USE AS COUNTER

0119 3124 ECA00000 LDD ILENG,Y

0120 3128 2002 BRA C@
0121 312A 3088 A@ LEAX D,X
0122 312C 6AE4 C@ DEC ,S
0123 312E 26FA BNE A@

0124 3130 3504 PULS B
*CLEAR COUNTER

0125 3132 3506 PULS A,B,PC

*****
*
* NEWYBC
*
*NEW Y BOUNCE.
*
*INPUT:
* U->CHARACTER

```

```

*      Y->PATH
*
*OUTPUT:
*      A=XPOS
*      B=YPOS
*
NEWYRG
9126 3134          LDA CXPOS,U
9127 3134 ECC99999 ADDA 1,Y
9128 3138 AB21

```

9129 313A EB22

```

AE      ADDB 2,Y
        CMPB #YMAX
9130 313C 0162      BLO Z@
9131 313E 2594      NEG 2,Y
9132 3140 6922      BRA AE
9133 3142 29F6
9134 3144          Z@

```

RTS

```

*****
*
*      NEWBOU
*
*INPUT:
*      U->CHARACTER
*      Y->PATH
*
*OUTPUT:
*      A - X POSITION
*      B - Y POSITION
*
*UPDATES BOUNCE POSITION,
*AND CHANGES DIRECTION AT WALLS
*****
NEWBOU

```

9136 3145

```

9137 3145 A6C99999 HBX  LDA CXPOS,U      XPOSITION
9138 3149 AB21      ADDA 1,Y      XSFED
9139 314B 817B      CMFA #XMAX-3
9140 314D 2594      BLO NEXOK
9141 314F 8921      NEG 1,Y      BOUNCE
9142 3151 29F2      BRA NBX
9143 3153
NEXOK
9144 3153 E6C99991 AE   LDB CYPOS,U      YPOS
9145 3157 EB22      ADDB 2,Y      YSPEED
9146 3159 015B      CMPB #YMAX-5
9147 315B 2594      BLO Z@
9148 315D 6922      NEG 2,Y
9149 315F 29F2      BRA AE
9150 3161          Z@

```

9151 3161 39

RTS

```

*****
*
*      NEWSIR
*
*INPUT:
*      U->CHARACTER
*      Y->PATH
*
*OUTPUT:
*      A - X POSITION
*      B - Y POSITION
*
*GET NEXT POSITION FOR A
*STRAIGHT PATH CHARACTER
*****
NEWSIR

```

9152 3162

```

9153 3162 ECC99999 LDA CXPOS,U
9154 3166 AB21      ADDA 1,Y
9155 3168 EB22      ADDB 2,Y
9156 316A 39        RTS

```

```

*****
*
*      NEWSMP
*
*INPUT:
*      U->CHARACTER
*      Y->PATH
*
*OUTPUT:
*      A - XPOS
*      B - YPOS
*

```



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```

*UPDATES POSITION OF CHARACTER
*BASED ON A OFFSET LIST TYPE
*PATH
*****
#157 316B
#158 316B 3419
#159 316D 3921
#160 316F 2C84
#161 3171 039991
#162 3174 19A392
#163 3177 2593
#164 3179 0G9999
#165 317C 2D84
#166 317E 3994
#167 3189 38
#168 3181 49
#169 3182 3988
#170 3184 0GG9999
#171 3188 A884
#172 318A E891
#173 318C 3599
#157 316B
#158 316B 3419
#159 316D 3921
#160 316F 2C84
#161 3171 039991
#162 3174 19A392
#163 3177 2593
#164 3179 0G9999
#165 317C 2D84
#166 317E 3994
#167 3189 38
#168 3181 49
#169 3182 3988
#170 3184 0GG9999
#171 3188 A884
#172 318A E891
#173 318C 3599
*****
*
* CLPBLT
*
*INPUT:
* D XY LOCATION OF UPPER LEFT
* X POINTS TO RASTER
* Y ->IMAGE

```

```

*
*CLIPS RASTER TO SCREEN AND
*THEN CALLS XORBLT TO
*ACTUALLY DRAW IT
*****
CLPBLT PGRS A,B,U,X,Y
LEAD -15,B
LEAU 5,S U TO STACK AREA
STD ,S
*SAVE UPPER LEFT POS.OF RASTER
CLEVER
LDH 2,Y
STX ,U * OF LINES
STX 8,U RASTER START
*START OFF OPTIMISTIC, INITIAL-
*WIZZ THINGS FOR NO CLIPPING
CLPUP LDA 1,S
STA 2,S
RPL CLPDN
*IF BELOW TOP OF SCREEN OK
ADDA ,U
LBMI BLITZ
LBEQ BLITZ
STA ,U LESS LINES
*DON'T BOTHER IF COMPLETELY
*OFF THE TOP
NECA
ADDA 2,Y
LDB 1,Y RASTER WIDTH
MUL
ADDD 6,U
STD 6,U
*MOVE RASTER POINTER FORWARD ONE
*RASTER WIDTH FOR EACH PIXEL
*ABOVE SCREEN
*IE "CLIP UPWARDS"
CLR 2,S YCOOR SCREEN #
BRA GLPHOR
CLPDN LDA 1,S UPPER BOUND OF RA
STER
ADDA 2,Y HEIGHT OF RASTER
SUBA #YMAX
BLO GLPHOR
*IF BOTTOM OF OBJECT IN SCREEN
*NO PROBLEM
LDA #YMAX
SUBA 1,S
LBMI BLITZ
LBEQ BLITZ
*IF TOP OF OBJECT BELOW SCREEN
*NOTHING TO DRAW
STA ,U
*ELSE STORE ACTUAL # OF LINES
*OF OBJECT ON SCREEN
CLPCHK
LDB 1,Y RASTER WIDTH
STB 1,U TO SLAT WIDTH
*START OPTIMISTIC W/ NO CLIPPING
CLPLF LDB ,S ABSOLUTE X POSN
ASRB
ASRB FROM PIXEL TO BYTE
STB ,S X BYTE POSITION
STB 3,S XPOSN AFTER CLIP
BPL CLPRT
*IF POSITIVE THEN NOT TOO FAR
*LEFT
CMPB #09 HALF WRAP-AROUND
BLO CLPRT
*IF THINK WAY POSITIVE INSTEAD
*OF JUST NEGATIVE HAND IT TO
*RIGHT CLIPPING
ADDB 1,Y RASTER WIDTH
BMI BLITZ
BEQ BLITZ
*IF EVEN RIGHT BYTE NEGATIVE
*DON'T EVEN BLIT
STB 1,U SLAT WIDTH
NEGB
ADDB 1,Y S HAS MODULO
LDX 6,U RASTER START
ANX
STX 6,U ADD TO RASTER FT
*ELSE ADJUST WIDTH AND MODULUS
*(SKIP WIDTH) FOR RASTER, AND
*MOVE RASTER POINTER FORWARD
*TO FIRST BYTE ACTUALLY DRAWN
#174 318E 3476
#175 3199 3271
#176 3192 3365
#177 3194 EDE4
#178 3196
#179 3196 E222
#180 3198 E7C4
#181 319A AF46
#182 319C A661
#183 319E A762
#184 31A9 2A1A
#185 31A2 A8C4
#186 31A4 192B997F
#187 31A8 1927997B
#188 31AC A7C4
#189 31AE 49
#190 31AF A222
#191 31B1 E621
#192 31B3 3D
#193 31B4 E346
#194 31B6 ED46
#195 31B8 6F62
#196 31BA 2916
#197 31BC A661
#198 31BE
#199 31BE A222
#200 31C9 8969
#201 31C2 259E
#202 31C4 8669
#203 31C6 A961
#204 31C8 192B995B
#205 31C0 19279957
#206 31D9 A7C4
#207 31D1
#208 31D2 E621
#209 31D4 E741
#210 31D6 E6E4
#211 31D8 57
#212 31D9 57
#213 31DA E7E4
#214 31DC E7E3
#215 31DE 2A18
#216 31E9 C1C9
#217 31E2 2514
#218 31E4 E821
#219 31E6 293F
#220 31E8 273D
#221 31EA E741
#222 31EC 59
#223 31ED E821
#224 31EF AE46
#225 31F1 3A
#226 31F2 A746

```

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Many of the persons who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer your questions, technical and otherwise. You also will meet lots of other people, just like you, who share your interest in the Color Computer. It's a person-to-person event, as well as a tremendous learning experience,

in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in three parts of the country. If you missed the fun in Irvine, Calif. and Chicago, why don't you make plans now to join us in Princeton, N.J.? For members of the family who don't share your affinity for CoCo, you'll be comfortable knowing that RAINBOWfest is located in an area with many other attractions.

The Hyatt Regency - Princeton offers special rates (\$65, single or double room) for RAINBOWfest.

The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. (There will be no exhibition hours or seminars Saturday evening.) On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest! Let's all celebrate the CoCo Community!

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Saturday — CoCo Community Breakfast at 8 a.m.

Exhibits open at 10 a.m. and close at 6 p.m.

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Free Seminars

Bill Barden

As well as keynoting our CoCo Community Breakfast (Saturday at 8 a.m.), Bill will hold a seminar discussing the right language for your application. His overview will cover the most popular microcomputer languages, including BASIC, C, PASCAL and Assembly

Computer Languages

Dennis Kitz

Dennis Kitz, RAINBOW's newest contributing editor, is a composer, veteran hardware and software designer and president of Green Mountain Micro. His new column in our RainbowTech section debuts in this issue.

Your Own Color Computer Hardware

Paul Hoffman

Paul Hoffman is an independent designer/artist and Color Computer programmer. He is the author of *Master Artist* and other graphics programs from Owl-Ware.

A CoCo Gallery

Dale L. Puckett

The author of *The Complete Rainbow Guide To OS-9* and *The Official BASIC09 Tour Guide* will discuss the advantages of the BASIC09 language, explain the available commands and demonstrate various functions. He also will give an overview of how to use the multitasking OS-9 operating system. Dale will be autographing copies of *The Complete Rainbow Guide To OS-9*.

Beginners Tour of OS-9 also, Beginners Tour of BASIC09

Dan Downard

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 25 years through ham radio (K4KWT). His interest in computers began about six years ago and he has built several 68XX systems.

Q & A on Peripherals and Modifications also, Inside Your Color Computer

Steve Blyn

Steve Blyn teaches both exceptional and gifted children and has won awards for the design of programs to aid the handicapped. He is the author of the THE RAINBOW's "Education Notes" column. He and his wife, Cheryl, own Computer Island.

The CoCo and Special Education

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```

9227 3174 6763      ULR 3,S
                    *START SCREEN AT LEFT
9228 3176 299C      BRA ALLCLF

9229 3178           G1.PRT
9230 3178 862D      LDA #XMAX/4
9231 317A A9E4      SUBA ,S
9232 317C 2B29      RMI BLITZ

                    *ALL THE WAY OFF SCREEN
9233 317E A171      CMPA 1,Y
9234 3200 7402      BHS ALLCLF

                    *ALL IN SCREEN
9235 3202 A741      STA 1,U          BYTES/LINE

9236 3204           ALLCLF
                    *END OF CLIPPING, (WHEN)
9237 3204 A462      LDA 2,S          Y DEST.
9238 3206 C62D      LDB #32
9239 3208 3D        MUL
9240 3209 F3000D     ADDD SCREEN
9241 320C 1F91      TFR D,X
9242 320E E663      LDB 3,S          X DEST.
9243 3210 3A        ABX

                    *X POINTS TO DESTINATION ON
                    *SCREEN

9244 3211 AF44      STX 4,U          SCREEN START

9245 3213 EC46      LDD 6,U          RASTER START
9246 3215 E323      ADDD 3,Y         RASTER LENGTH
9247 3217 ED48      STD 8,U          STENCIL START

9248 3219 862D      LDA #32
9249 321B A941      SUBA 1,U         LINE LENGTH
9250 321D A742      STA 2,U         SCREEN MODULO

9251 321F A621      LDA 1,Y          RASTER WIDTH
9252 3221 A941      SUBA 1,U         LINE LENGTH
9253 3223 A743      STA 1,U         RASTER MODULO

9254 3225 8D94      BSR KORBLT

9255 3227           BLITZ

```

```

9256 3227 328F      LEAS 15,S
9257 3229 35F6      PULS A,B,U,X,Y,PC

*****
*
* KORBLIT
*
* INPUT: U->
* ,U LINES IN RASTER
* 1,U #OF LINES IN RASTER
* 2,U SCREEN MODULUS
* 3,U RASTER MODULUS
* 4,U SCREEN START
* 6,U RASTER START
*
* XORS SOURCE WITH DEST,
* TRASHES ALL REGISTER AS WELL
* AS INPUT STRUCTURE.
* THIS IS OK - CLPBLT EXPECTS IT
*****
KORBLT
LDX 4,U
LDY 6,U
AQ LDB 1,U
BQ LDA ,X
EORA ,Y+
STA ,X+
DECS
BNE D0
LDA 2,U
LEAX A,X
LDA 3,U
LEAY A,Y
DEC U
BNE AQ
RTS

```

```

*****
*
* INTRUPT
*
* CHECKS FOR KEYBOARD OR PENDING
* RETURNS EQ FOR NO KEYBOARD OR
* NEW PENDING
*****
INTRPT
PNSX X,A
GLRA
STA $FFF2
LDA $FF99
ORA #88F
COMA
PULS X,A,PC

```

```

9274 3248
9275 3248 3412
9276 324A 4F
9277 324E 37FF92
9278 324E 36FF99
9279 3251 8A8F
9280 3253 43
9281 3254 3592

9282 3256           ZENDD
                    *END CODE
9283 9999           BOUNCE EQU 0
9284 9991           SAMPLE EQU 1
9285 9992           STRAIT EQU 2
9286 9993           YBOUNC EQU 3
                    *PATH TYPES

                    **
                    **
                    **PATH STRUCTURE
                    **
                    **
9299 9999           PTYPE EQU 0
                    *THE REST DEPENDS ON WHAT
                    *TYPE OF PATH

9291 3256 99
9292 3257 FE91      SPATH0 FCB BOUNCE
                    FCB -2,1

9293 3259 99
9294 325A 91FF      SPATH1 FCB BOUNCE
                    FCB 1,-1          INITIAL DIR

9295 325C 99
9296 325D 91FF      SPATH2 FCB BOUNCE
                    FCB 1,1

9297 325F 99
9298 3260 91FF      SPATH3 FCB BOUNCE
                    FCB 1,-1

9299 3262 99
9300 3263 95FE      SPATH4 FCB BOUNCE
                    FCB 3,-2

```



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9394 3269 9391      FCB 3,1

9395 326B 99      SPATH7 FCB BOUNCE
9396 326C 9199      FCB 1,9

9397 326E 99      SPATH8 FCB BOUNCE
9398 326F 9F91      FCB -1,1

9399 3271 99      SPATH9 FCB BOUNCE
9319 3272 9F91      FCB -1,1

9311 3274 93      YBOUN1 FCB YBOUNC
9312 3275 9E91      FCB -2,1

9313 3277 93      YBOUN2 FCB YBOUNC
9314 3278 9F91      FCB -1,1

9315 327A 93      YBOUN3 FCB YBOUNC
9316 327B 9F91      FCB -1,1

**
**IMAGE STRUCTURE
**
9317 9999      ITYPE EQU 9
                *STILL, GLIDE, OR WIGGLE
9318 9991      IXDIM EQU 1
                *IN BYTES - 4 TIMES PIXELS
9319 9992      IYDIM EQU 2
                *# OF LINES - IN PIXELS
9320 9993      ILENG EQU 3
                *ALWAYS - IXDIM*IYDIM
9321 9995      IDATA EQU 3
                *START OF RASTER(S)

9322 327D 92      BALL FCB GLIDE
9323 327E 9395      FCB 3,3          DIMENSIONS
9324 3280 999F      FCB 9           LENGTH IN BYTES
9325 3282 99FF99      FCB 9,9FF,9
9326 3285 93FFC9      FCB 3,9FF,9C9
9327 3288 93FFC9      FCB 3,9FF,9C9
9328 328B 93FFC9      FCB 3,9FF,9C9
9329 328E 99FF99      FCB 99,9FF,9

9339 3291      RMB 15*1

9331 328E 92      GUPPY FCB GLIDE
9332 328F 9396      FCB 3,6
9333 32C1 9912      FCB 18

9334 32C3 99A999      FCB 999,9A9,999
9335 32C6 929999      FCB 992,999,999
9336 32C9 2A9A99      FCB 92A,99A,999
9337 32CC 856999      FCB 985,969,999
9338 32CF 2A8899      FCB 92A,988,999
9339 32D2 999289      FCB 999,992,989

9349 32D5      RMB 3*18
                *SPACE FOR SHIFTED IMAGES

**
** CHARACTER STRUCTURE
**
9341 9999      CKPOS EQU 9
9342 9991      CYPOS EQU 1
9343 9992      CPATH EQU 2
9344 9994      CIMAGE EQU 4
9345 9996      CNEXT EQU 6
                *OFFSETS WITHIN CHARACTER
                *STRUCTURE
9346 9998      CHARLN EQU 8
                *LENGTH OF CHARACTER STRUCTURE

9347 3398      ANLIST
9348 3398 1621      FCB 22,33
9349 339D 3274      FCB YBOUN1
9350 339F 328E      FCB GUPPY
9351 3311 3313      FCB ANLIST+CHARLN

9352 3313 1A19      FCB 26,25
9353 3315 3277      FCB YBOUN2
9354 3317 328E      FCB GUPPY
9355 3319 331B      FCB ANLIST+2*CHARLN

9356 331B 1716      FCB 23,22
9357 331D 327A      FCB YBOUN3

9358 331F 328E      FCB GUPPY
9359 3321 3323      FCB ANLIST+3*CHARLN

9369 3323 2A39      FCB XMAX/3,YMAX/2
9361 3325 3256      FCB SPATH9
9362 3327 327D      FCB BALL
9363 3329 332B      FCB ANLIST+4*CHARLN

9364 332B 4929      FCB XMAX/2,YMAX/3
9365 332D 3259      FCB SPATH1
9366 332F 327D      FCB BALL
9367 3331 3333      FCB ANLIST+5*CHARLN

9368 3333 4939      FCB XMAX/2,YMAX/2
9369 3335 325C      FCB SPATH2
9370 3337 327D      FCB BALL
9371 3339 333B      FCB ANLIST+6*CHARLN

9372 333B 2A29      FCB XMAX/3,YMAX/3
9373 333D 325F      FCB SPATH3
9374 333F 327D      FCB BALL
9375 3341 3343      FCB ANLIST+7*CHARLN

9376 3343 4918      FCB XMAX/2,YMAX/4
9377 3345 3262      FCB SPATH4
9378 3347 327D      FCB BALL
9379 3349 334B      FCB ANLIST+8*CHARLN

9389 334B 2939      FCB XMAX/4,YMAX/2
9381 334D 3265      FCB SPATH5
9382 334F 327D      FCB BALL
9383 3351 3353      FCB ANLIST+9*CHARLN

9384 3353 2A18      FCB XMAX/3,YMAX/4
9385 3355 3268      FCB SPATH6
9386 3357 327D      FCB BALL
9387 3359 335B      FCB ANLIST+10*CHARLN

9388 335B 2929      FCB XMAX/4,YMAX/3
9389 335D 3265      FCB SPATH7
9390 335F 327D      FCB BALL
9391 3361 3363      FCB ANLIST+11*CHARLN

9392 3363 2918      FCB XMAX/4,YMAX/4
9393 3365 326E      FCB SPATH8
9394 3367 327D      FCB BALL
9395 3369 336B      FCB ANLIST+12*CHARLN

9396 336D 4913      FCB XMAX/2,YMAX/5
9397 336D 3271      FCB SPATH9
9398 336F 327D      FCB BALL
9399 3371 9999      FCB #          END OF LIST

9499 3373      ZENDDA
                *END DATA

9401 3373      END

```

Listing 2: FISH

```

10 CLEAR 50,&H3000
20 LOADM"F
30 PMODEL,1
40 PCLS(1)
50 DEFUSR0 = &H3010
60 SCREEN 1,1
70 A=USR0(0)
80 SCREEN 0,1
90 INPUT "AGAIN";A$
100 IF A$ = "Y" THEN 60

```

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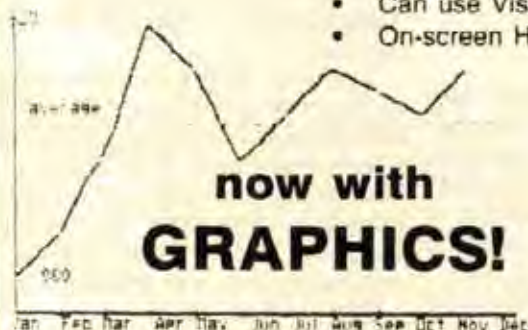
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PIPELINE

INK-A-DINK-A-DO — Computer Friends of Portland, Ore., has introduced the first of its second generation of automatic ribbon re-inkers. The Universal Cartridge Mac Inker and the Universal Spool Mac Inker allow users to use the same inker when they change printers. The new inkers practically eliminate the cost of replacing ribbons.

Operation is simple and wholly automatic, Computer Friends says, and the carbonless ink yields a printout darker than many original ribbons. Re-inked ribbons last longer than the average original ribbon and can be re-inked up to 100 times, depending on their original length.

Mac Inker can ink and re-ink blank cartridges in six different colors: red, blue, green, yellow, brown and purple.

Computer Friends, 6415 SW Canyon Court, Suite 10, Portland, OR 97225.

NO DISCARD — If you've been looking for a way to encourage clients to hang onto your business cards, CP Products may have just the thing.

If you supply CP Products with your business card, they will embed it in clear plastic and bond it to the back of a wafer-thin, solar-powered, six-function (with memory) calculator. The "business card with a brain" weighs less than an ounce and does not use batteries.

CP Products, Box 431, San Pedro, CA 90733.

LABELS — Try-O-Byte has just announced a new printer utility called Try-O-Print. It is written in BASIC to permit easy customization of various labels. Try-O-Print is designed for a Color Computer and the printer of your choice.

Available on cassette or diskette, it provides routines to print multiple mailing labels, multiple cassette labels, purchase orders, invoices and a diskette directory in label format, directly from the diskette, using labels of two different sizes.

The memory required for the program is 16K and it runs in either Extended or Non-Extended BASIC. Some customizing is required.

Try-O-Byte, 1009 Alton Circle, Florence, SC 29501.

READIN', RITIN' AND RAM — Computer literacy is being touted as the fourth 'R' in education circles these days. This leaves many parents — unfamiliar with the possibilities of computers as learning tools, but concerned with their children's education — wondering what to do.

The New American Library has just published a book, *Compukids: A Parent's Guide to Computers and Learning*, that is designed to provide parents with all the information they need to know about their child's computer education.

Written by Felicia Antonelli Holton, *Compukids* seeks to explain computers and how they are used: at different age and grade levels; in teaching subjects like art, music, math and grammar; in homework; and in the education of children with handicaps or learning disabilities. The book also tries to help parents assess the quality of computer education their children are receiving.

The New American Library, 1633 Broadway, New York, NY 10019.

BLACK BOX — The Black Box Corporation recently issued its mid-year catalog of 160 pages. It includes more than 500 basic, unique and hard-to-find data communications devices. A 12-page, full-color insert highlights 36 new products introduced in the issue.

The Black Box Catalog is considered by many people to be the catalog of the data communications field. Its publishers claim the catalog offers the largest selection of data switches available anywhere and the broadest line of problem-solving products in the industry.

The Black Box Corporation, P.O. Box 12800, Pittsburgh, PA 15241.

PERSONAL COMPUTER NET — NewsNet, the nation's largest distributor of specialized business newsletter information, has begun carrying a new publication designed to provide users with the latest information on all aspects of personal computers — hardware, software, systems and peripherals.

The Personal Computer Report, as the new publication is known, covers Tandy, IBM, Apple, AT&T, Compaq, Kaypro, Microsoft, Lotus and Ashton-Tate, among other companies.

The Personal Computer Report is published monthly by Advance Microcomputers, Inc., a computer consulting, sales and publishing company in Mineola, N.Y.

NewsNet, which began in April 1982, offers full text delivery and back issue retrieval of specialized business news ranging from aerospace and investment to taxation and telecommunications.

Marcia Cheetham, NewsNet, 945 Haverford Road, Bryn Mawr, PA 19010.

ARTS BULLETIN BOARD — Artists and art organizations may be interested in a new computer bulletin board service called the Electronic Call Board, which features entertainment and theater listings for major U.S. cities. Callers can post and read free casting notices.

The new service contains one-half million bytes of online storage with five to 20 megabytes planned for the future.

Also featured on The Electronic Call Board are free software files for download, free want ads, electronic mail, an online magazine for the performing arts and general computer support and advice.

A unique feature allows callers to role play, create characters, write a scene or add to a play in progress.

The Electronic Call Board is seeking artists and organizations without computer access to list their shows, casting notices and want ads.

Bobby Ballard, Atmospheres, 1207 Fifth Ave., Brooklyn, NY 11215.

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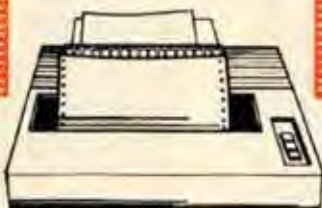
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An Adventure Into Sound Experimentation

By Bill Bernico

*A demonstration on sound production with the
SOUND, PLAY and EXEC commands*

One of the things a lot of programs overlook is also one of the things the CoCo is very good at . . . producing sounds. With the help of SOUND, PLAY and even EXEC commands, you can produce some very impressive sounds to help showcase your programs and make them more interesting.

The SOUND statement is the simplest. A combination of SOUND 191,1: SOUND 220,2: SOUND 10,5, for example, will produce three separate notes. A shorter, easier way is to use the PLAY command. With it, simply tell the computer to PLAY "CFG" and you will also get three separate notes.

As for EXEC, I had to experiment with different combinations to come up with a sound. For example, in lines 530 and 550, I used it to create the "helicopter" and "raspberry" sounds. EXEC 43345 by itself will produce a short "click" or "blip" sound. Enclose it in a loop, as in Line 550, and you will get the raspberry sound.

In Line 530 you'll probably wonder why there is a CIRCLE command when there are no graphics. CIRCLE is there only to create a delay between EXECs so there won't be one continuous sound, rather a broken sound such as a helicopter taking off. You can substitute a short FOR/NEXT loop if you don't have Extended BASIC.

Running the Program

Sound Story could have simply been a menu with different sounds to pick from, but careful analysis revealed that the attention span of the program would be about 83 seconds. With that in mind, I decided to integrate these sounds into a short (and I do mean short) Adventure.

(Bill Bernico is a self-taught computerist who enjoys programming, golf, TV and music. He has played with a '60s rock band for 18 years.)



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The REM statements are highlighted in the listing so that you might examine how each sound is created. I came across a lot of these sounds by accident, by trial and error, and by experimentation. I keep a one-word reminder taped over my CoCo at all times —

Experiment!

(Any questions about *Sound Story* may be directed to Mr. Bernico at 708 Michigan Ave., Sheboygan, WI 53081, phone 414-459-7350. If you write, please include an SASE.)

The listing: SNDSTORY

180	.....	42
350	.....	52
460	.....	96
END	.....	146

```

10 'SOUND STORY
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 '
70 '*** TITLE PAGE SOUND ***
80 CLS3:PRINT@43,"SOUND STORY";
90 FORX=1TO255STEP10:SOUNDX,1:NE
XTX
100 FORX=1TO500:NEXTX
110 '*** AUTHOR'S NAME SOUND ***
120 PRINT@201,"BY ";:SOUND220,2:
FORX=1TO150:NEXT:PRINT"BILL ";:S
OUND110,2:FORX=1TO150:NEXT:PRINT

```

```

"BERNICO";:SOUND10,2
130 GOSUB560
140 CLS:PRINT"IMAGINE YOURSELF W
ALKING THROUGH THE WOODS. YOU CO
ME ACROSS A HOUSE SET BACK IN
THE TREES. AS YOU APPROACH, Y
OU SEE THE DOOR TO THE HOUSE.
150 GOSUB560
160 CLS:PRINT"ON THE DOOR YOU NO
TICE THERE IS A KNOB, A DOORBELL
, A KNOCKER AND A SMALL PANE O
F GLASS IN THE CENTER. THERE DOE
SN'T APPEAR TO BE ANYBODY HOME.
170 GOSUB560
180 CLS:PRINT@40,"WHAT WILL YOU
DO?
-----
190 PRINT@100,"1.) KNOCK ON THE
DOOR
200 PRINT@132,"2.) RING THE DOOR

```

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```

BELL
210 PRINT@164,"3.) TRY THE DOORK
NOB
220 PRINT@196,"4.) LOOK IN THE W
INDOW
230 PRINT@228,"5.) GO AROUND THE
BACK
240 PRINT@260,"6.) ESCAPE IN HEL
ICOPTER
250 PRINT@292,"7.) GIVE UP
260 PRINT@360,"CHOOSE (1-7)
270 A$=INKEY$:IFA$=""THEN270
280 A=VAL(A$)
290 IF A<1 OR A>7 THEN 260
300 ON A GOTO 330,370,410,430,46
0,530,550
310 GOTO 310
320 '*** DOOR KNOCK SOUND ***
330 CLS:FORX=1TO3:PLAY"T15001V31
CDCGABV25CV20CV15DV10DV5EV1E":PR
INT@133,"KNOCK! KNOCK! KNOCK!"
:NEXTX
340 PRINT@330,"NOBODY HOME":GOSU
B580:GOTO180
350 GOSUB 580
360 '*** DOORBELL SOUND ***
370 CLS:PRINT@135,"RRRRRRRRRRRI
NG!!":PLAY"L20V30T5005GBGBGBGBG
BGBGBGBGBGBGBGBGBGBGBGBGBGBG
380 PRINT@330,"NOBODY HOME":GOSU
B580:GOTO180
390 GOSUB 580
400 '*** BURGLAR ALARM ***
410 CLS:PRINT@162,"WARNING! WAR
NING! WARNING!":PRINT@224,"(FOR
GOT ABOUT THE BURGLAR ALARM)":Q$
="1;2;3;4;5;6;7;8;9;10;11;12":F
ORX=1TO15:PLAY"O5L242V15;":PLAY
Q$:NEXTX
420 GOSUB580:GOTO180
430 CLS:PRINT@195,"YOU SEE A BIR
D CAGE ON A STAND. THERE
'S A SMALL BIRD IN IT. H
E JUST SAW YOU."
440 '*** BIRD CHIRP SOUND ***

```

```

450 FORX=1TO5:PLAY"L255T255V2005
CGCEC":FORY=1TO200:NEXTY,X:GOSUB
580:GOTO180
460 CLS:PRINT@100,"YOU'RE IN THE
BACK YARD. YOU SEE THE O
WNER OF THE HOUSE WITH A
MACHINE GUN! BETTER R
UN....
470 GOSUB580
480 '***MACHINE GUN SOUND ***
490 FORF=1TO3
500 FORX=1TO10:PLAY"L19001V28CV2
9DV20EV10F#V21G#V16GV31":NEXTX:F
ORD=1TO500:NEXTD
510 NEXTF:GOTO180
520 '***HELICOPTER SOUND ***
530 CLS:FORF=449TO42STEP-31:PRIN
T@F,"UP, UP AND AWAY":FORY=1TO3:
CIRCLE(10,10),4:EXEC43345:PRINT@
F,"":NEXTY,F:GOSUB580:GOTO 180
540 '*** RASPBERRY SOUND ***
550 CLS:FORX=1TO100:EXEC43345:NE
XTX:PRINT"MY, WHAT A SHORT ADVEN
TURE":END
560 PRINT@484,"HIT ANY KEY TO CO
NTINUE";:EXEC44539:RETURN
570 GOTO 570
580 FORX=1TO2000:NEXTX:RETURN

```

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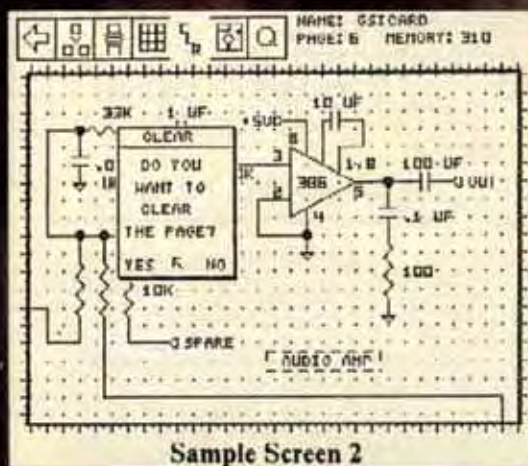
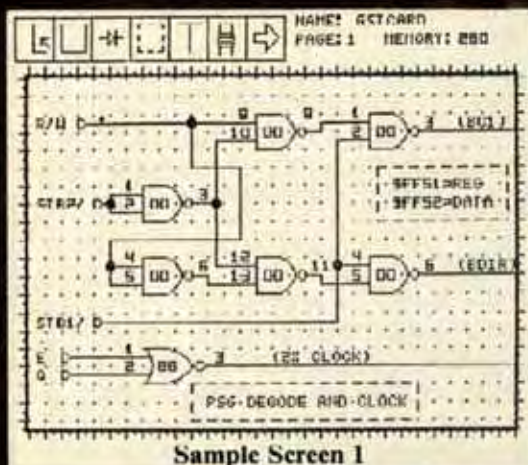
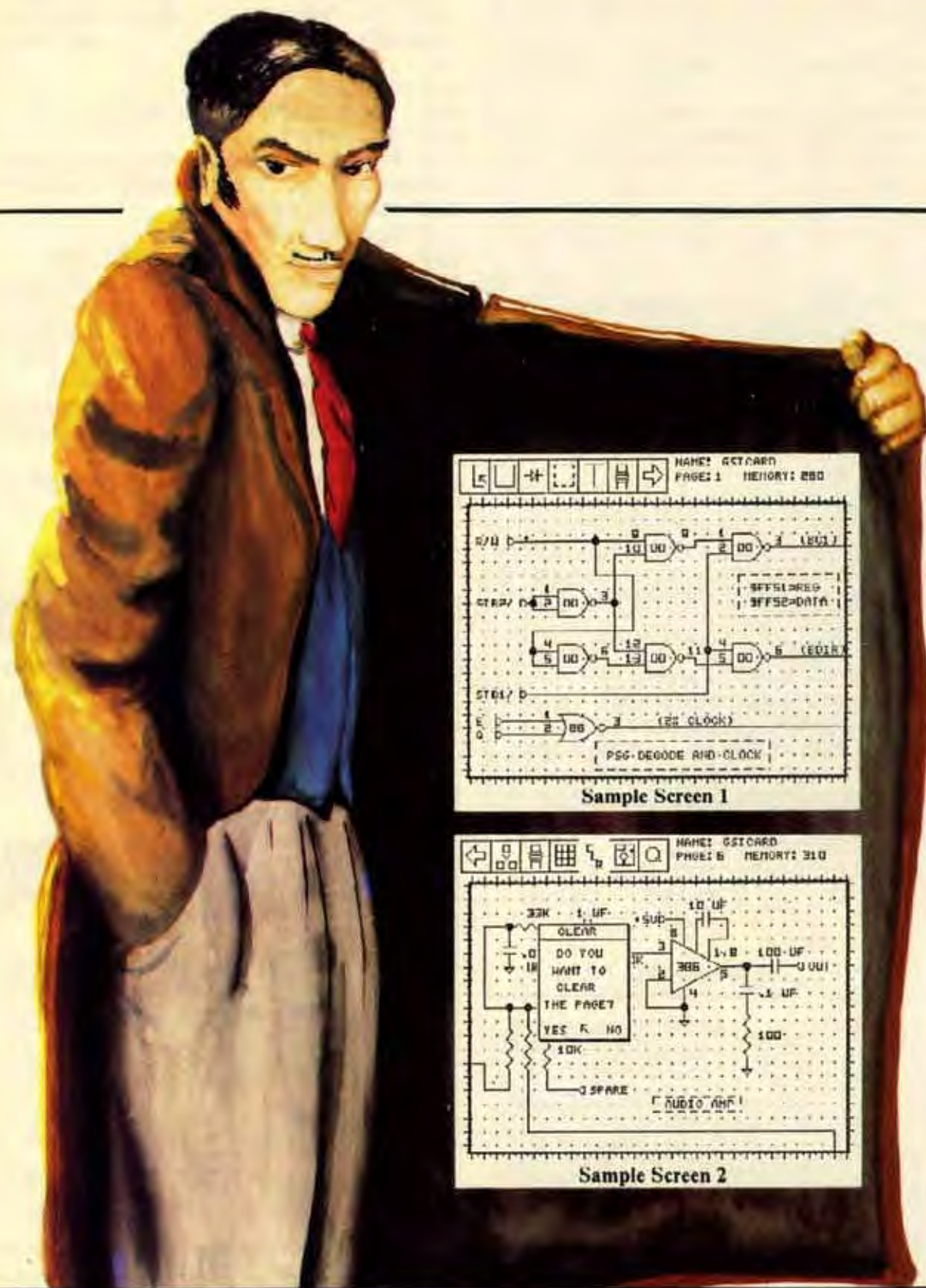


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CoCocad:

The Schematic Scoundrel

Don't let the name fool you, for this schematic drawing aid makes illustrating a breeze . . .

By Peter Kerckhoff

A "mini-cad" (computer-aided design) program for the Color Computer, *CoCocad* aids you in drawing schematics. It requires a 32K Color Computer, one disk drive, a printer with bit mapped graphics ability and a positioning device (Radio Shack color mouse, joystick, X-pad or touch tablet). *CoCocad* is icon menu driven, and the keyboard is seldom used. Some functions make use of a "pop-up" menu for their options.

Instead of digging into the program and describing how I got each function to work, I have provided a highly commented listing (*COCOCAD.REM*): as they say, "leave the proof to the student." A word of caution: The commented listing is rather long and you'll have to `PCLEAR 1` just to load it in. You'll also have to remove all of the remark statements and resave the program (use the name *COCOCAD.BAS*) before you try to run it. If you are keying in the program, just leave the remarks out and don't do the `PCLEAR`.

I've also included a short program listing, *REMOVREM*, to remove the

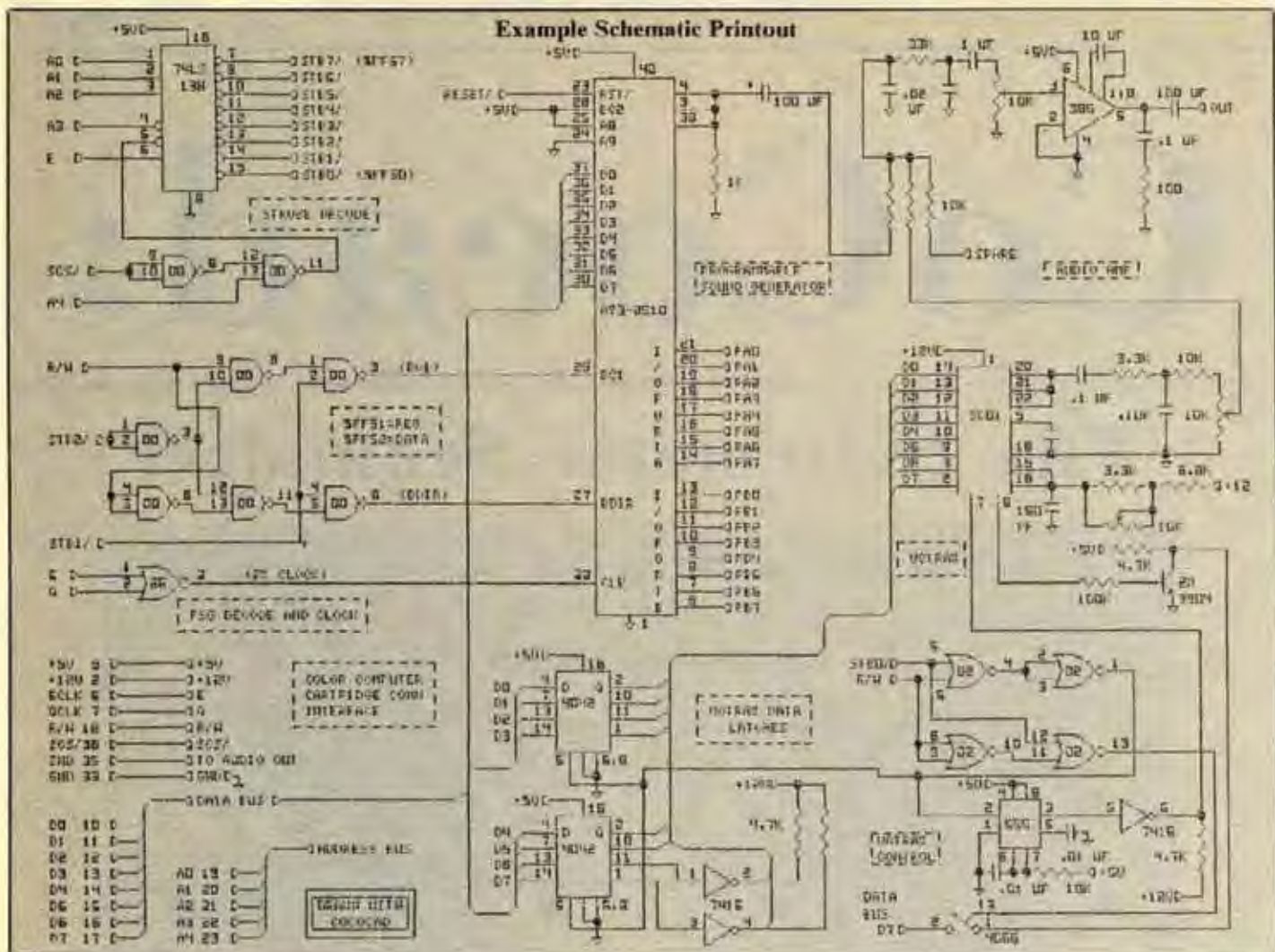
(Peter Kerckhoff has been working with computers since 1975 and has a bachelor's degree in electronics engineering technology. He and his wife, Renee, and daughter, Danielle, live in Silicon Valley.)

remarks for you. Just remember to reload and resave the new *CoCocad* program as the remark remover program generates an ASCII file (program) that takes awhile to load.

Once you've got an uncommented copy of the program, load it into the computer and run it. The screen should clear and a header line followed by a question dealing with clearing memory should appear at the top of the screen. The memory clear question is so you can restart the program with a schematic in memory without losing the schematic. Since you do not have a schematic in memory, you should answer 'Y'. After a very short delay the screen will again clear and the work sheet screen will appear.

The work sheet screen is where almost all of the action takes place. At the upper left-hand corner of the screen is a series of boxes with small figures (icons) in them. I've provided a couple of screen dumps, Sample Screens 1 and 2, that show the work sheet screens. These boxes are used to call the various functions into use (more about this in a moment). In the upper right-hand portion of the display is a display of the current filename, the current page number and the memory remaining in the page.

A page is a sub-page of the whole schematic. The schematic is made up of nine sub-pages arranged in an array



three across and three down. Page zero is the upper left-hand corner of the finished schematic. Page one is just below page zero and page two just below page one. Page eight is the lower right-hand corner.

The memory for a page is used for storing each function you use to draw the schematic. If you start running out of memory space, the computer will warn you by beeping.

The main portion of the screen is taken up by the schematic work area. The sides of the work area have grid marks on them to ease the drawing of lines between pages. The work area itself is stippled with dots every eight pixels. When you are in the schematic work area, your cursor will "snap" to either the dots or to the area halfway between the dots. This makes the positioning of line end points, components and text easier.

Somewhere on the screen there should appear an arrow. The arrow should be under positional control by

your mouse (X-pad, joystick, touch pad, etc.). The arrow cursor appears when the computer wants you to select an item from the menu (or submenu, as we'll see in a minute). To select an item, position the arrow on the item and click the mouse button (press down on the button, then release).

Let's select our first menu item. Move the mouse so the arrow is in the menu box which contains the icon that looks like the letter 'Z'. Now click the mouse button. The sides of the box should disappear, letting you know the computer has accepted your command.

To activate the menu item, move the mouse down into the schematic work area. A new cursor will appear in the work area. This cursor should be shaped like a box whose corners have been flipped inwards. This is the end point (or point) cursor. The point cursor is used to identify an end point or a spot in the work area to the computer.

To draw the line, position the point

cursor to the spot in the work area where you want one end of the line to be and click the mouse button. The cursor should flicker and be replaced by a new cursor shaped like a box. This cursor identifies the first end point for your line. If you move the mouse you'll see that you still have control over the point cursor. Move the cursor to the second end point and click the mouse button. A couple of things will happen: The cursors will disappear, a line will be drawn and the memory remaining display will be updated. You still have control of the point cursor, so you can draw another line by identifying end points and so on.

To exit the line function (or any other), move the cursor up into the main menu. The point cursor will disappear and be replaced with the menu-selecting arrow cursor. Whenever you have control of the action on the screen with the mouse you can exit by going up into the main menu. This can come in handy, for example, if you've selected

the wrong first end point for a line and you'd like to start over.

OK, a quick review: To select a function from the menu, move the arrow cursor to the function and click, then move down into the schematic work area; to exit a function move the cursor back into the main menu. Easy, isn't it?

The next menu selection is the box function. We'll include in our discussion of the box function the fourth menu item (dashed box) and the fifth menu item (erase), as these functions are very similar.

Select the box function and move the mouse so the point cursor is in the schematic work area. Move the cursor to a point where you want one corner of the box to appear and click the mouse button. The cursor will vanish and, if you look closely, there will be a single pixel blinking on and off at the point where the cursor was. Now move the mouse; a box will follow the mouse's movement. When you are satisfied with the box, click the mouse button again and a box will be drawn and page memory updated. You should have the point cursor back again so you'll be all set to draw another box.

The dashed box and erase functions work much in the same way. The differences are that with the dashed box, when the box has been defined, a dashed box will be drawn. With the erase, the area in the box defined will be erased.

The third menu item, the diode, is used to select one of the preprogrammed components from the component library. Get the arrow cursor back and go up and select the component function. A pop-up menu will appear on the screen in the schematic work area. At the top of the menu is the menu title, in this case "components." In the center of the menu is the currently active component. Down at the bottom of the menu on the left are the words "PREV" and "NEXT." Placing the arrow cursor on either of these words and clicking the mouse button will change the active component displayed in the center of the menu. Holding down the mouse button while the arrow cursor is over one of these words will cycle you through the components.

At the right of the menu on the bottom is the word "USE." Clicking the mouse button while the cursor is over this word will clear the menu from the

screen and give you the active component to use. The component will be under mouse control and move about in the schematic work area as you move the mouse. When you have placed the component to the desired position, click the mouse button and the component will be drawn onto the screen. If you move the mouse again, you'll notice that you still have control over the component so that another one can be drawn onto the screen. To select another component or another menu item, just move up into the main menu.

"To select a function from the menu, move the arrow cursor to the function and click . . . to exit a function move the cursor back into the main menu. Easy, isn't it?"

There are two more menu items, the big 'T' and the right pointing arrow. The 'T' function is used to put text on the screen. Get the arrow cursor back and select the text function. When you move the mouse back down into the work area you will notice there is a new cursor, a small horizontal line; this is the text cursor. Move the text cursor where you want the text to appear and click the mouse button. The cursor will move upwards two pixels and no longer be under mouse control. The cursor moves up so that if you are labeling a line or an end point of a line, the text will line up properly.

Enter text by typing on the keyboard. The backspace (left arrow) key has been implemented so if there is a typing error, use it to correct the error. When you finish with the text entry, press the ENTER key and the page memory will be updated with your text. The text cursor will be under mouse control again so you can move the cursor to the next spot and enter more text.

The final menu item is the right pointing arrow. This function will switch the current menu to the second menu. Try out the function by placing the arrow cursor in the box and clicking the mouse button (don't forget to move the mouse downwards to execute the function). The old menu will disappear and be replaced with a new one.

The first item in this new menu is a left pointing arrow and, you guessed it, will get you back to the original menu. The third menu item is another copy of the erase function and is identical to the one on the original menu. The remaining menu items are new.

The second menu item, the one with the three little squares, is the copy function. Select the function and move down into the work area. Move the point cursor to the area near the object you wish to copy and click the mouse button. Move the mouse so the box that is under mouse control surrounds the object you want to copy and click the mouse button again. The box will disappear and if you move the mouse you'll notice that a copy of the item you boxed will move. When the copy click has been positioned, the mouse button and the copy will be left on the screen and you'll get the point cursor back. Note the size of the boxed area will directly affect how fast the image will move — the larger the box the slower the move.

The fourth menu item, the one with the nine little squares, is the page switch function. When you select the function, a blinking cursor will appear as the current page number (upper right-hand portion of the display). Press a key between zero and eight to select the page. Remember, page zero is in the upper left and page eight is in the lower right of the final schematic. When a page number is selected, the current page will be cleared and the selected page displayed.

The fifth menu item, the box with the "CLR" in it, is the clear page function. Selecting the function will produce a pop-up menu asking if you really want to clear the page. Answer by positioning the cursor over your answer and clicking the mouse button.

The sixth menu item, the box with the little floppy disk, is for disk I/O and will display a pop-up menu when the function is selected. You must enter a filename before you can load or save. Once again, select the commands from the pop-up menu by positioning the cursor over the command and clicking the mouse button.

The last menu item, the large 'Q', is used to quit the program with the option of getting a printout of the schematic in memory. If you do decide to get a printout the computer will check to see if there is enough room

on the disk for the temporary storage of the sub-page image files and, if there is, will load and run the schematic printout program (*Cadprint*) after saving the image files.

The best and easiest way to get familiar with *CoCocad* is to use the program. You'll find the mouse really does work well with the program and that selecting and using the various functions follow a logical order. Before

going in and modifying the program, make sure you look it over. There are quite a few subroutines you may want to use.

For X-pad users, you will have to change the mouse scan routine to read the X-pad. You will also notice the pen status is stored in the variable 'P' and can be read directly from the X-pad (guess what positioning device I started writing the program with!).

In closing, if you use *CoCocad* to draw a schematic you hope to have published, please put a little note somewhere on it denoting *CoCocad* was used to draw the schematic — my ego will get a kick out of it. Any questions you have regarding these programs may be directed to me at 4335 Hendrix Way, San Jose, CA 95124. Please include an SASE. □

43	172	436	57	831	213
90	134	460	167	874	89
110	252	494	143	960	81
141	42	530	117	1100	49
170	237	562	206	1280	153
211	225	610	125	1580	254
241	115	641	4	1730	217
280	38	690	17	1780	95
314	240	720	223	1860	50
345	69	747	72	1966	97
400	42	773	200	END	23

Listing 1: COCOCAD

This is a commented listing of the program *CoCocad*. To load the program you must first PCLEAR 1. To run the program you must remove all of the comment lines. Don't forget to PCLEAR 4 before running.

```

0 '
1 '      COCOCAD      VR 2.0
2 ' (C) 1985 BY P.KERCKHOFF
3 ' 4335 HENDRIX WAY SAN JOSE CA
4 '
5 ' A cad SYSTEM FOR THE COLOR
6 ' COMPUTER. REQUIRES 32K, DISK
7 ' MOUSE AND A GRAPHICS PRINTER
8 '
9 '
10 CLEAR 500,&H64FF:CLS:INPUT"CO
COCAD VR 2.0 P.KERCKHOFF CL
EAR PAGE MEMORY (Y/N)";A$:GOTO12
0
11 '
12 '
13 ' READ MOUSE POSITION => X,Y
14 ' BUTTON STATUS =>P (P=3 IF
15 ' BUTTON IS PRESSED)
16 '
20 X=JOYSTK(0)*4:Y=JOYSTK(1)*4:P
=ABS((1 AND PEEK(&HFF00))*3-3):I
F X<3 THEN X=3 ELSE IF X>252 THE
N X=252
30 IF Y<3 THEN Y=3 ELSE IF Y>188
THEN Y=188
40 RETURN

```

```

41 '
42 '
43 ' PUT A CURSOR INTO ARRAY C2
44 ' TO BE USED LATER
45 '
50 GET(0,0)-(6,6),C1,G:LINE(0,0)
-(6,6),PRESET,BF:DRAW"BM3,3XC$(N
);":GET(0,0)-(6,6),C2,G:PUT(0,0)
-(6,6),C1,PSET:RETURN
51 '
52 '
53 ' PUT A CURSOR ON THE SCREEN
54 ' OLD SCREEN DATA => C1
55 '
60 GET(X-3,Y-3)-(X+3,Y+3),C1,G:P
UT(X-3,Y-3)-(X+3,Y+3),C2,AND:RET
URN
61 '
62 '
63 ' REMOVE CURSOR FROM THE
64 ' SCREEN
65 '
70 PUT(X-3,Y-3)-(X+3,Y+3),C1,PSE
T:RETURN
71 '
72 '
73 ' DRAW A CHARACTER ROUTINE
74 ' ENTER WITH THE CHARACTER
75 ' IN A$
76 '
80 IF ASC(A$)>62 THEN 90 ELSE ON
ASC(A$)-31 GOTO 1120,1130,1140,
1150,1160,1170,1180,1190,1200,12
10,1220,1230,1240,1250,1260,1270
,1280,1290,1300,1310,1320,1330,1
340,1350,1360,1370,1380,1390,140
0,1410,1420
90 ON ASC(A$)-62 GOTO 1430,1440,
1450,1460,1470,1480,1490,1500,15
10,1520,1530,1540,1550,1560,1570
,1580,1590,1600,1610,1620,1630,1
640,1650,1660,1670,1680,1690,170
0
91 '
92 '
93 ' DRAW A STRING OF CHARACTERS
94 ' ENTER WITH CHARACTER STRING

```

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Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print & fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	78 to 254 (0) 28 to 255 (0)	28 to 255 (0)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Enable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Scroll or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X,Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Composite Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/Line/Screen key	Yes	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dist Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function Switch to & from the Standard	Yes	Yes	No
To 16.32 Screen for full compatibility	Yes	No	No
On Enter Gate Function	No	No	Yes
Extended Base Required	No	Yes	Yes
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```

95 ' IN T$, SCREEN POSITION IN
96 ' TX AND TY. TX IS UPDATED
97 '
100 FOR C=1 TO LEN(T$):DRAW"BM=T
X; ,=TY;":A$=MID$(T$,C,1):GOSUB 8
0:TX=TX+5:NEXT C:RETURN
101 '
102 '
103 ' UPDATE THE SCREEN DISPLAY
104 ' OF MEMORY SPACE REMAINING
105 '
110 LINE(221,9)-(236,13),PRESET,
BF:T$=STR$(768-AD(PG)+A(PG)):T$=
RIGHT$(T$,LEN(T$)-1):TX=221:TY=1
3:GOSUB100:IFLEN(T$)=1THENPLAY"E
EO3EEO2EEO1EEO4EE":RETURN ELSE R
ETURN
111 '
112 '
113 ' START OF THE PROGRAM.
114 '
120 DIM C$(3),A(8),AD(8),C1(1),C
2(1),C3(1),L1(6),L2(6),L3(6),L4(
6),CM(15),CO(15),MD(255),MO(255)
:B$="V31L1004B":NF$="NONE"
121 '
122 '
123 ' DEFINE CURSOR FONTS AND
124 ' SUBPAGE STORAGE ADDRESSES
125 ' CLEAR FIRST BYTE IN MEMORY
126 ' IF CLEARING MEMORY
127 '
130 C$(0)="BHN2U2BR2D2R2BD2L2D2
BL2U2L2":C$(1)="BH3ND2R2BR2R2D2B
D2D2L2BL2L2U2":C$(2)="R3":C$(3)=
"NF2H2ND3R3":FOR X=0 TO 8:A(X)=X
*768+&H6500:IF A$="Y" THEN POKEA
(X),0:NEXT ELSE NEXT
131 '
132 '
133 ' SETUP THE SCREEN AND
134 ' CREATE AN ARROW CURSOR
135 '
140 PG=0:GOSUB1710:MN=0:N=3:GOSU
B50
141 '
142 '
143 ' MOVE THE ARROW AROUND,
144 ' WAITING FOR A VALID
145 ' COMMAND.
146 '
150 GOSUB20:GOSUB60:IF P<>3 OR Y
>20 THEN GOSUB 70:GOTO 150 ELSE
GOSUB 70: F=INT(X/20):IF F>6 THE
N 150 ELSE LINE(F*19+1,1)-(F*19+
20,20),PRESET,B:F=F+1:PLAYB$
151 '
152 '
153 ' WAIT FOR BUTTON NOT

```

```

154 ' PRESSED AND NOT IN MENU
155 ' AREA THEN GO TO MENU
156 ' SELECTION.
157 '
160 GOSUB 20:IF Y<20 OR P=3 THEN
160 ELSE IF MN=0 THEN ON F GOTO
190,290,440,290,520,290,180 ELS
E ON F GOTO180,580,290,680,700,7
40,820
161 '
162 '
163 ' BACK FROM MENU SELECTION,
164 ' REBUILD MENU, LOOP FOR
165 ' NEXT SELECTION.
166 '
170 PLAYB$:F=F-1:LINE(F*19+1,1)-
(F*19+20,20),PSET,B:N=3:GOSUB50:
GOTO150
171 '
172 '
173 ' SWAP MENU
174 '
180 LINE(0,0)-(134,20),PRESET,BF
:FORX=0TO6:LINE(X*19+1,1)-(X*19+
20,20),PSET,B:NEXT:IF MN=1 THEN
MN=0:GOSUB 1760:GOTO170 ELSE MN=
1:GOSUB 1770:GOTO170
181 '
182 '
183 ' LINE FUNCTION, CREATE
184 ' POINT CURSOR
185 '
190 N=0:GOSUB50:LX=-1
191 '
192 '
193 ' WAIT FOR BUTTON NOT
194 ' PRESSED
195 '
200 GOSUB20:IFP=3THEN200
201 '
202 '
203 ' MOVE POINT CURSOR, EXIT
204 ' IF IN MENU AREA
205 '
210 GOSUB20:GOSUB60:IFY>20THEN22
0ELSEGOSUB70:IFLX=-1THEN170ELSEP
UT(LX-3,LY-3)-(LX+3,LY+3),C3,PSE
T:GOTO170
211 '
212 '
213 ' CONTINUE MOVING THE CURSOR
214 ' UNTIL BUTTON IS PRESSED
215 '
220 GOSUB70:IFP<>3THENX1=X:Y1=Y:
GOTO210ELSEPLAYB$:X=X1:Y=Y1
221 '
222 '
223 ' IF NO PREV POINT SET THEN
224 ' SET FIRST POINT, DRAW A

```



```

225 ' CURSOR THERE AND LOOP BACK
226 ' FOR SECOND END POINT
227 '
230 IF LX=-1 THEN LX=X:LY=Y:GET(
LX-3,LY-3)-(LX+3,LY+3),C3,G:DRAW
"BM=LX; ,=LY;XC$(1)";:GOTO200
231 '
232 '
233 ' REMOVE FIRST END POINT
234 ' CURSOR, EXIT IF IN MENU
235 ' AREA
236 '
240 PUT(LX-3,LY-3)-(LX+3,LY+3),C
3,PSET:IF Y<27 THEN 170
241 '
242 '
243 ' SNAP COORDINATES
244 '
250 X=INT(X/4)*4:Y=INT(Y/4)*4
251 '
252 '
253 ' DRAW THE LINE, UPDATE SUB
254 ' PAGE MEMORY, LOOP BACK FOR
255 ' THE NEXT LINE.
256 '
260 LINE(X,Y)-(LX,LY),PSET:POKEA
D(PG),52:POKEAD(PG)+1,X:POKEAD(P
G)+2,Y:POKEAD(PG)+3,LX:POKEAD(PG
)+4,LY:AD(PG)=AD(PG)+5:POKEAD(PG
),0:GOSUB110:LX=-1:GOTO200
261 '
262 '
263 ' ROUTINE TO SAVE THE SCREEN
264 ' DATA WHERE A BOX IS DRAWN
265 ' AND TO DRAW THE BOX.
266 '
270 GET(PX,PY)-(LX,PY),L1,G:GET(
PX,PY)-(PX,LY),L2,G:GET(LX,LY)-(
PX,LY),L3,G:GET(LX,LY)-(LX,PY),L
4,G:LINE(PX,PY)-(LX,LY),PSET,B:R
RETURN
271 '
272 '
273 ' ROUTINE TO UNDRAW THE BOX
274 ' BY PUTTING THE ORIGINAL
275 ' DATA BACK
276 '
280 PUT(PX,PY)-(LX,PY),L1,PSET:P
UT(PX,PY)-(PX,LY),L2,PSET:PUT(LX
,LY)-(PX,LY),L3,PSET:PUT(LX,LY)-
(LX,PY),L4,PSET:RETURN
281 '
282 '
283 ' BOX ROUTINE, SET UP FOR
284 ' POINT CURSOR
285 '
290 N=0:GOSUB50
291 '
292 '

```

```

293 ' MOVE THE CURSOR, EXIT IF
294 ' IN MENU AREA, WAIT FOR
295 ' BUTTON PRESSED.
296 '
300 GOSUB20:GOSUB60:IF Y<20 THEN
GOSUB70:GOTO170 ELSE IF P<>3 TH
EN GOSUB70:GOTO300
301 '
302 '
303 ' REMOVE THE POINT CURSOR,
304 ' SET UP BOX COORDINATES
305 '
310 GOSUB70:LX=X:LY=Y:PX=LX:PY=L
Y
311 '
312 '
313 ' WAIT FOR BUTTON NOT
314 ' PRESSED
315 '
320 GOSUB20:IFP=3THEN320
321 '
322 '
323 ' DRAW A BOX, SCAN MOUSE,
324 ' EXIT IF IN MENU AREA,
325 ' LOOP IF BUTTON NOT PRESSED
326 ' (WHEW!)
327 '
330 GOSUB270:GOSUB 20:IF Y<20 TH

```

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```

EN GOSUB 280:GOTO 170 ELSE IF P<
>3 THEN GOSUB 280:PX=X:PY=Y:GOTO
 330
331 '
332 '
333 ' UPDATE MEMORY AS TO BOX
334 ' COORDINATES, IF FUNCTION
335 ' WAS A BOX THEN UPDATE MEM
336 ' WITH BOX COMMAND AND LOOP
337 ' BACK FOR THE NEXT BOX.
338 '
340 POKEAD(PG)+1,LX:POKEAD(PG)+2
,LY:POKEAD(PG)+3,PX:POKEAD(PG)+4
,PY:POKEAD(PG)+5,0:IF F=2 THEN P
OKE AD(PG),53:AD(PG)=AD(PG)+5:GO
SUB110:GOTO290
341 '
342 '
343 ' IF DASHED BOX THEN ERASE
344 ' THE OLD (CURSOR) BOX,
345 ' UPDATE MEMORY FOR THE
346 ' DASHED BOX COMMAND.
347 '
350 IF F<>4 THEN 410 ELSE LINE(L
X,LY)-(PX,PY),PSET,B:POKEAD(PG
),55:
351 '
352 '
353 ' MAKE SURE THE COORDINATES
354 ' WILL WORK IN THE FOR/NEXT
355 ' LOOP
356 '
360 X=PX:Y=PY:IF X>LX THEN PX=LX
:LX=X:X=PX
370 IF Y>LY THEN PY=LY:LY=Y:Y=PY
371 '
372 '
373 ' DRAW THE DASHED BOX
374 '
380 AD(PG)=AD(PG)+5:GOSUB110:FOR
X1=X TO LX STEP 8:Y1=X1+4:IF Y1
>LY THEN Y1=LY
390 LINE(X1,Y)-(Y1,Y),PSET:LINE(
X1,LY)-(Y1,LY),PSET:NEXT:FOR X1=
Y TO LY STEP8:Y1=X1+4:IF Y1>LY T
HEN Y1=LY
391 '
392 '
393 ' WHEN ALL DONE, LOOP BACK
394 ' FOR THE NEXT DASHED BOX
395 '
400 LINE(X,X1)-(X,Y1),PSET:LINE(
LX,X1)-(LX,Y1),PSET:NEXT:GOTO290
401 '
402 '
403 ' MUST BE THE CLEAR AREA
404 ' FUNCTION SO CLEAR THE
405 ' AREA.
406 '

```

```

410 LINE(LX,LY)-(PX,PY),PSET,B
F:IF PX>LX THEN X=PX:PX=LX:LX=X
420 IF PY>LY THEN Y=PY:PY=LY:LY=
Y
421 '
422 '
423 ' REBUILD THE STIPPLED
424 ' BACKGROUND DESTROYED IN
425 ' THE CLEAR AND THEN LOOP
426 ' BACK FOR THE NEXT CLEAR.
427 '
430 PX=INT(PX/8)*8:PY=INT(PY/8)*
8+4:FOR X=PX TO LX STEP 8:FOR Y=
PY TO LY STEP 8:PSET(X,Y):NEXT Y
,X:POKEAD(PG),54:AD(PG)=AD(PG)+5
:GOSUB110:GOTO290
431 '
432 '
433 ' COMPONENTS FUNCTION,
434 ' BUILD POP-UP MENU, GET
435 ' ARROW CURSOR
436 '
440 T$="COMPONENTS":GOSUB850:T$=
"NEXT USE":TX=55:TY=115:GOSUB1
00:T$="PREV":TX=55:TY=107:GOSUB1
00:N=3:GOSUB50:N=1:DRAW"BM65,65"
:GOSUB870
441 '
442 '
443 ' SCAN THE MOUSE, IF IN THE
444 ' MENU AREA THEN EXIT ELSE
445 ' LOOP UNTIL BUTTON IS
446 ' PRESSED ON A VALID COMMAND
447 '
450 GOSUB20:GOSUB60:GOSUB70:IF Y
<27 THEN PLAYB$:PUT(50,50)-(110,
120),MO,PSET:GOTO170 ELSE IF Y<1
00 OR Y>110 OR X<55 OR X>110 OR
P<>3 THEN 450 ELSE PLAY B$
451 '
452 '
453 ' IF 'USE' THEN GET THE
454 ' COMPONENT AND BRANCH ELSE
455 ' ERASE THE COMPONENT AND
456 ' EITHER DRAW THE NEXT ONE
457 ' AND LOOP
458 '
460 IF X>80 THEN GET(65,65)-(65+
XW,65+YW),CM,G:PUT(50,50)-(110,1
20),MO,PSET:GOTO480 ELSE DRAW"BM
65,65C5":GOSUB870:DRAW"BM65,65C0
":IF Y<109 THEN 470 ELSE N=N+1:I
F N<25 THEN GOSUB870:GOTO450 ELS
E N=1:GOSUB870:GOTO450
461 '
462 '
463 ' OR DRAW THE PREVIOUS
464 ' ONE AND LOOP
465 '

```



BUT... CHECKERBOARDS ARE FOR TABLECLOTHS!

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LOWERKIT III Display (reverse video, too)

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```

470 N=N-1:IF N>0 THEN GOSUB870:G
OTO450 ELSE N=24:GOSUB870:GOTO45
0
471 '
472 '
473 ' SCAN THE MOUSE
474 '
480 GOSUB20
481 '
482 '
483 ' MOVE THE COMPONENT UNTIL
484 ' BUTTON IS PRESSED OR
485 ' IN MENU AREA
486 '
490 GET(X,Y)-(X+XW,Y+YW),CO,G:PU
T(X,Y)-(X+XW,Y+YW),CM,AND:LX=X:L
Y=Y:GOSUB20:IF P<>3 AND Y>26 THE
N PUT(LX,LY)-(LX+XW,LY+YW),CO,PS
ET: GOTO 490
491 '
492 '
493 ' IF IN MENU AREA THEN ERASE
494 ' THE COMPONENT AND EXIT
495 '
500 IF Y<27 THEN PUT(LX,LY)-(LX+
XW,LY+YW),CO,PSET:GOTO 170
501 '
502 '

```

```

503 ' LEAVE THE COMPONENT ON
504 ' THE SCREEN AND UPDATE
505 ' MEMORY. THEN LOOP BACK
506 ' TO PUT THE NEXT COMPONENT
507 ' ON THE SCREEN.
508 '
510 PLAYB$:POKEAD(PG),N:POKEAD(P
G)+1,LX:POKEAD(PG)+2,LY:AD(PG)=A
D(PG)+3:POKEAD(PG),0:GOSUB110:GO
TO480
511 '
512 '
513 ' TEXT FUNCTION
514 ' GO CREATE THE TEXT CURSOR
515 '
520 N=2:GOSUB50
521 '
522 '
523 ' MOVE THE CURSOR, WAITING
524 ' FOR EITHER BUTTON CLICK
525 ' OR IN MENU AREA
526 '
530 GOSUB20:GOSUB60:GOSUB70:IF P
<>3 AND Y>26 THEN 530 ELSE Y=Y-2
531 '
532 '
533 ' IF IN MENU AREA THEN EXIT
535 ' ELSE UPDATE MEMORY FOR
536 ' THE TEXT FUNCTION
537 '
540 IF Y<27 THEN 170 ELSE PLAYB$:
POKEAD(PG),51:POKEAD(PG)+1,X:POK
EAD(PG)+2,Y:AD(PG)=AD(PG)+3:GOSU
B110:X1=AD(PG)
541 '
542 '
543 ' GO SCAN THE KEYBOARD, IF
544 ' ENTER IS PRESSED THEN EXIT
545 '
550 GOSUB60:A$=INKEY$:GOSUB70:IF
A$="" THEN 550 ELSE PLAY B$:IF
A$=CHR$(13) THEN POKE AD(PG),255
:AD(PG)=AD(PG)+1:POKEAD(PG),0:GO
SUB110:GOTO520
551 '
552 '
553 ' IF BACK SPACE IS PRESSED
554 ' THEN DO A BACK SPACE
555 '
560 IF A$=CHR$(8) THEN IF AD(PG)
>X1 THEN AD(PG)=AD(PG)-1:X=X-5:L
INE(X,Y)-(X+5,Y-6),PRESET,BF:GOT
O550 ELSE GOTO550
561 '
562 '
563 ' ELSE DRAW THE CHARACTER
564 ' AND LOOP FOR MORE
565 '
570 POKEAD(PG),ASC(A$):AD(PG)=AD

```

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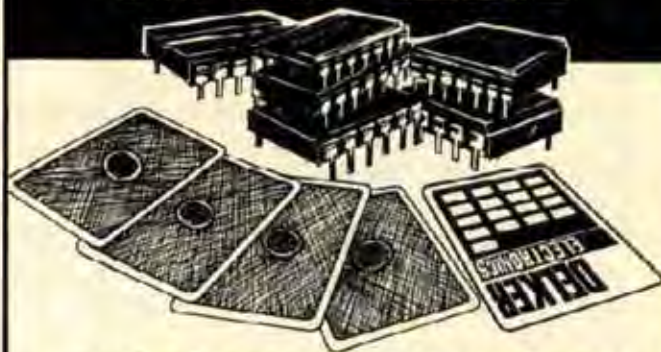


```

(PG)+1:DRAW"BM=X; ,=Y;":GOSUB8Ø:X
=X+5:GOSUB11Ø:GOTO55Ø
571 |
572 |
573 | COPY ROUTINE, GO GET
574 | A CURSOR
575 |
58Ø N=Ø:GOSUB5Ø
581 |
582 |
583 | MOVE CURSOR UNTIL IN MENU
584 | AREA OR BUTTON CLICK
585 |
59Ø GOSUB2Ø:GOSUB6Ø:IF P<>3 AND
Y>26 THENGOSUB7Ø:GOTO59ØELSEGOSU
B7Ø:IF Y<27 THEN17Ø
591 |
592 |
593 | SAVE CURSOR COORDINATES
594 |
6ØØ PLAYB$:LX=X:LY=Y:PX=LX:PY=LY
6Ø1 |
6Ø2 |
6Ø3 | WAIT FOR BUTTON NOT DOWN
6Ø4 |
61Ø GOSUB2Ø:IFP=3THEN61Ø
611 |
612 |
613 | DRAW A BOX, SCAN MOUSE IF
614 | IN MENU THEN ERASE BOX AND
615 | EXIT, IF BUTTON NOT CLICK
616 | THEN ERASE BOX AND LOOP
617 |
62Ø GOSUB27Ø:GOSUB2Ø:IFY<26THENG
OSUB28Ø:GOTO17ØELSEIFP<>3THENGOS
UB28Ø:PX=X:PY=Y:GOTO62Ø
621 |
622 |
623 | ERASE BOX, GET BOXED AREA
624 | UPDATE MEMORY
625 |
63Ø GOSUB28Ø:PLAYB$:XW=ABS(PX-LX
):YW=ABS(PY-LY):IF(XW*YW)>1ØØØØ
THEN 58Ø ELSE GET(LX,LY)-(PX,PY
),MD,G:POKEAD(PG)+1,PX:POKEAD(PG
)+2,PY:POKEAD(PG)+3,LX:POKEAD(PG
)+4,LY
631 |
632 |
633 | SCAN MOUSE, PUT IMAGE ONTO
634 | THE SCREEN, LOOP UNTILL
635 | IN MENU OR BUTTON CLICK
636 |
64Ø GOSUB2Ø:GET(X,Y)-(X+XW,Y+YW)
,MO,G:PUT(X,Y)-(X+XW,Y+YW),MD,AN
D:PUT(X,Y)-(X+XW,Y+YW),MO,PSET:I
FY<27THEN17ØELSEIFP<>3THENX1=X:Y
1=Y:GOTO64ØELSEX=X1:Y=Y1:PUT(X,Y
)-(X+XW,Y+YW),MD,AND

```

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```

641 '
642 '
643 ' UPDATE MEMORY, LOOP
644 '
650 POKEAD(PG),56:POKEAD(PG)+5,X
:POKEAD(PG)+6,Y:AD(PG)=AD(PG)+7:
POKEAD(PG),0:GOSUB110:COTO580
671 '
672 '
673 ' PAGE (SWITCH) FUNCTION
674 ' PUT CURSOR AT PAGE DISPLAY
675 ' WAIT FOR VALID PAGE #
676 ' (KEY) PRESSED
677 '
680 LINE(166,13)-(171,8),PSET,BF
:A$=INKEY$:LINE(166,13)-(171,8),
PRESET,BF:IF A$<"0" OR A$>"8" TH
EN 680
681 '
682 '
683 ' DISPLAY NEW PAGE
684 '
690 PG=VAL(A$):DRAW"BM166,13":GO
SUB80:LINE(8,28)-(247,183),PRESE
T,BF:GOSUB1790:FORX=8TO248STEP8:
FORY=28TO184STEP8:PSET(X,Y):NEXT
Y,X:GOSUB110:GOTO170
691 '
692 '

```

```

693 ' CLEAR (THE PAGE) FUNCTION
694 ' DISPLAY CLEAR MENU
695 '
700 T$=" CLEAR":GOSUB850:T$="YE
S
NO":TX=55:TY=115:GOSUB100:
N=3:GOSUB50:TX=63:TY=70:T$="DO Y
OU":GOSUB100:TX=60:TY=80:T$="WAN
T TO":GOSUB100:TX=63:TY=90:T$="C
LEAR":GOSUB100:TX=55:TY=100:T$="
THE PAGE?":GOSUB100
701 '
702 '
703 ' SCAN MOUSE, MOVE ARROW
704 ' CURSOR, WAIT FOR VALID
705 ' OPTION CLICK OR IN MAIN
706 ' MENU AREA
707 '
710 GOSUB20:GOSUB60:GOSUB70:IFY<
27 THEN PLAYB$:PUT(50,50)-(110,1
20),MO,PSET:GOTO170 ELSE IF Y<10
0 OR Y>120 OR X<55 OR X>110 OR P
<>3 THEN 710 ELSE PLAY B$
711 '
712 '
713 ' NOPE, DIDN'T REALLY WANT
714 ' TO CLEAR THE PAGE
715 '
720 IF X>80 THEN PUT(50,50)-(110
,120),MO,PSET:GOTO170

```

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```

721 '
722 '
723 ' CLEAR THE PAGE BY SETTING
724 ' FIRST MEMORY BYTE TO 0
725 ' THEN CLEAR THE SCREEN
726 ' AND LOOP BACK TO MAIN
727 '
730 POKEA(PG),0:AD(PG)=A(PG):GOS
UB110:LINE(8,28)-(247,183),PRESE
T,BF:FORX=8TO248STEP8:FORY=28TO1
84STEP8:PSET(X,Y):NEXTY,X:GOTO17
0
731 '
732 '
733 ' DISK FUNCTION(S)
734 ' DISPLAY DISK MENU
735 '
740 T$=" DISK":GOSUB850:T$="NA
ME":TX=70:TY=70:GOSUB100:T$="LOA
D":TX=70:TY=80:GOSUB100:T$="SAVE
":TX=70:TY=90:GOSUB100:N=3:GOSUB
50
741 '
742 '
743 ' SCAN MOUSE, EXIT IF IN
744 ' MAIN MENU AREA, LOOP IF
745 ' BUTTON NOT DOWN OR NOT
746 ' IN DISK MENU
747 '
750 GOSUB20:GOSUB60:GOSUB70:IF Y
<27 THEN PLAYB$:PUT(50,50)-(110,
120),MO,PSET:GOTO170 ELSE IF Y<6
0 OR Y>90 OR X<70 OR X>90 OR P<>
3 THEN 750 ELSE PLAY B$
751 '
752 '
753 ' IF NAME OPTION THEN GET
754 ' A FILE NAME
755 '
760 IF Y>70 THEN 770 ELSE CLS:LI
NEINPUT"FILE NAME =>":NF$:SCREEN
1,1:LINE(170,5)-(210,0),PSET,B
F:TY=5:TX=170:T$=NF$:GOSUB100:GO
TO750
761 '
762 '
763 ' IF LOAD OR SAVE THEN FIRST
764 ' CHECK FOR A FILE NAME
765 ' IF LOADING THEN LOAD
766 ' THE PAGES (MEMORY) AND
767 ' EXIT
768 '
770 IF NF$="" OR NF$="NONE" THEN
750 ELSE IF Y>80 THEN 780 ELSE
TX=60:TY=110:T$="LOADING":GOSUB1
00:LOADM NF$:A$="0":GOTO 690
771 '
772 '
773 ' SAVE THE PAGES (MEMORY)

```

```

774 '
780 IF Y>90 THEN 750 ELSE TX=60:
TY=110:T$="SAVING":GOSUB100:SAVE
M NF$,&H6500,&H7FFF,&H6500:LINE(
60,110)-(90,105),PSET,BF:GOTO7
50
811 '
812 '
813 ' QUIT FUNCTION
814 ' DISPLAY QUIT MENU
815 '
820 T$=" QUIT":GOSUB850:TX=60:
TY=70:T$="SAVE TO":GOSUB100:TX=7
0:TY=80:T$="DISK":GOSUB100:T$="Y
ES NO":TX=55:TY=115:GOSUB100
:N=3:GOSUB50
821 '
822 '
823 ' THE OL' LOOP UNLESS THE
824 ' OPTION IS CALLED LINE
825 '
830 GOSUB20:GOSUB60:GOSUB70:IF Y
<27 THEN PLAYB$:PUT(50,50)-(110,
120),MO,PSET:GOTO170 ELSE IF Y<1
00 OR Y>120 OR X<50 OR X>110 OR
P<>3 THEN 830 ELSE PLAY B$
831 '
832 '
833 ' BRANCH IF DISK SAVE NEEDED

```



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```

834 ' ELSE CHECK TO SEE IF A
835 ' PRINTOUT IS WANTED ELSE
836 ' EXIT (STOP) THE PROGRAM
837 '
840 IF X<80 THEN PUT(50,50)-(110
,120),MO,PSET:GOTO740 ELSE CLS:I
NPUT"DO YOU WANT A PRINTOUT (Y/N
)";A$:IF A$="Y" THEN 1970 ELSE P
RINT "OK...BYE.":STOP
841 '
842 '
843 ' DISPLAY A (POP-UP) MENU
844 '
850 GET(50,50)-(110,120),MO,G:LI
NE(50,50)-(110,120),PRESET,BF:LI
NE(51,51)-(108,118),PSET,B:LINE(
52,119)-(109,119),PSET:LINE-(109
,52),PSET:LINE(51,60)-(108,60),P
SET:TX=54:TY=57:GOSUB100:RETURN
861 '
862 '
863 ' DRAW A COMPONENT (N)
864 '
870 ON N GOTO 880,890,900,910,92
0,930,940,950,960,970,980,990,10
00,1010,1020,1030,1040,1050,1060
,1070,1080,1090,1100,1110
871 '

```

```

872 '
873 ' DRAW (STRINGS) FOR THE
874 ' COMPONENTS (IDENTIFIED
875 ' AT THE END OF THE LINES)
876 '
880 DRAW"BD15U15R13FRF4DFD2GDG4L
GL13":XW=23:YW=18:RETURN:'AND
890 DRAW"BD15U15R12FRF4DFD RE2RF
2G2LH2L DGDG4LGL12":XW=28:YW=18:
RETURN:'NAND
900 DRAW"BD16RE2UEU2EU2 HU2HUH2L
R13FR2FRF2RF4 G4LG2LGL2GL12":XW=
25:YW=16:RETURN:'OR
910 DRAW"BD16RE2UEU2EU2HU2HUH2LR
13FR2FRF2RF4 E2R2F2G2L2H2 G4LG2L
GL2GL13":XW=31:YW=17:RETURN:'NOR
920 DRAW"BD16U16FRFRFRFRFRFRFRFG
LGLCLCLGLGLGLG":XW=15:YW=17:RETU
RN:'BUFFER
930 DRAW"BD15U15FRFRFRFRFRFRFRFRF
RER2FDGL2HU GLGLGLGLGLGLGLGL":XW
=20:YW=17:RETURN:'INVTR
940 DRAW"BD17RE2UEU2EU3HU2HUH2LB
R4R8FR2FRF2RF4DG4LG2LGL2GL7RE2UE
U2EU3HU2HUH2L":XW=24:YW=17:RETUR
N:'XOR
950 DRAW"BD16BR2RE2UEU2EU2HU2HUH
2LBR4R8FR2FRF2RF4 RE2RF2G2LH2L G
4LG2LGL2GL8RE2UEU2EU2HU2HUH2L":X
W=32:YW=17:RETURN:'XNOR
960 DRAW"BD21U19FRFRFRFRFRFRFRFRFR
FRFGLGLGLGLGLGLGLGLGLGU6 BR3R2LD
U2 BU7LR2":XW=19:YW=22:RETURN:'O
PAMP
970 DRAW"BD8R6NU5ND5E6U2D2G6F5U2
G2R2FD2":XW=12:YW=16:RETURN:'NPN
980 DRAW"BD8R6NU5ND5E6U2D2G2U2F2
L2G4F6D2":XW=12:YW=16:RETURN:'PN
P
990 DRAW"BD4R4E2F4E4F4E4F4E2R4":
XW=32:YW=8:RETURN:'H-REST
1000 DRAW"BR4D4F2G4F4G4F4G4F2D4":
XW=8:YW=32:RETURN:'V-REST
1010 DRAW"BD4R4NU4ND4BR4NU4ND4R4
":XW=12:YW=8:RETURN:'H-CAP
1020 DRAW"BR4D4NL4NR4BD4NL4NR4D4
":XW=8:YW=12:RETURN:'V-CAP
1030 DRAW "BD4BR8 L4H2L2R2F2G2L2
U4":XW=7:YW=10:RETURN:'INPUT
1040 DRAW"BD4R4E2R2D4L2H2":XW=10
:YW=6:RETURN:'OUTPUT
1050 DRAW"BD3ER2FD2GL2HU2":XW=8:
YW=8:RETURN:'NOT DOT
1060 DRAW "BD3BR2END2RND2RND2FDN
L2DNL2GLNU2LNU2HUR2UR2":XW=8:YW=
8:RETURN:'CON DOT
1070 DRAW"BR4D4L3F3E3L3":XW=8:YW
=8:RETURN:'GND
1080 DRAW"BD4R5ND4U4F4NG4RNU4ND4

```

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R5":XW=15:YW=8:RETURN:'>DIODE
 1090 DRAW"BD4R5ND4NU4RNF4E4D4ND4
 R5":XW=15:YW=8:RETURN:'<DIODE
 1100 DRAW"BD8R2E2F4E4U6D5NH2NE2D
 F4E4F4E2R2":XW=28:YW=10:RETURN:'
 H-POT
 1110 DRAW"BR4D2F2G4F4R6L5NE2NF2L
 G4F4G4F2D2":XW=14:YW=28:RETURN:'
 V-POT
 1111 '
 1112 '
 1113 ' DRAW (STRINGS) FOR THE
 1114 ' TEXT CHARACTERS
 1115 '
 1120 DRAW"BR4":RETURN
 1130 DRAW"RBU2U2LD2":RETURN
 1140 DRAW"BU2U2BR2D2":RETURN
 1150 DRAW"BRU4BR2D4URL4RU2LR4":R
 ETURN
 1160 DRAW"R3U2L3U2R3LD4":RETURN
 1170 DRAW"E4BL3DBR3BD2D":RETURN
 1180 DRAW"BR2NU4H2R3":RETURN
 1190 DRAW"BRBU4D2":RETURN
 1200 DRAW"BR2HU2E":RETURN
 1210 DRAW"BREU2H":RETURN
 1220 DRAW"BUE2GHF2":RETURN
 1230 DRAW"BU2R2LUD2":RETURN
 1240 DRAW"BRU2":RETURN

1250 DRAW"BU2R3":RETURN
 1260 DRAW"BRURD":RETURN
 1270 DRAW"UE2U":RETURN
 1280 DRAW"U4R3D4L3":RETURN
 1290 DRAW"R2LU4G":RETURN
 1300 DRAW"NR3U2R3U2L3":RETURN
 1310 DRAW"R3U2NL2U2L3":RETURN
 1320 DRAW"BU4D2R3U2D4":RETURN
 1330 DRAW"R3U2L3U2R3":RETURN
 1340 DRAW"NU2R3U2L3U2R3":RETURN
 1350 DRAW"BU4R3DGD2":RETURN
 1360 DRAW"NU4R3U2NL3U2L3":RETURN
 1370 DRAW"R3U2L3U2R3D2":RETURN
 1380 DRAW"RULBU2RUL":RETURN
 1390 DRAW"BU4RDLBD2RD":RETURN
 1400 DRAW"BU2NE2F2":RETURN
 1410 DRAW"BUR3BU2L3":RETURN
 1420 DRAW"E2H2":RETURN
 1430 DRAW"BU3UR3D2LBDD":RETURN
 1440 DRAW"NR3U3ER2BD2LDRU":RETUR
 N
 1450 DRAW"U3ERFDNL3D2":RETURN
 1460 DRAW"U4R2FGNL2FGL2":RETURN
 1470 DRAW"BRREGLHU2ERF":RETURN
 1480 DRAW"U4R2FD2GL2":RETURN
 1490 DRAW"NR3U2NR2U2R3":RETURN
 1500 DRAW"U2NR2U2R3":RETURN
 1510 DRAW"BU4BR3L2GD2FREUL":RETU

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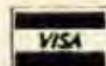
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```

RN
1520 DRAW"U4D2R3U2D4":RETURN
1530 DRAW"R2LU4NLR":RETURN
1540 DRAW"BUFREU3":RETURN
1550 DRAW"U2RNF2NE2LU2":RETURN
1560 DRAW"NR3U4":RETURN
1570 DRAW"U4FRED4":RETURN
1580 DRAW"U4F3DU4":RETURN
1590 DRAW"BUU2ERFD2GLH":RETURN
1600 DRAW"U4R2FGL2":RETURN
1610 DRAW"BUU2ERFD2GNUNRLH":RETU
RN
1620 DRAW"U4R2FGL2RF2":RETURN
1630 DRAW"R2EHLHER2":RETURN
1640 DRAW"BU4R2LD4":RETURN
1650 DRAW"NU4R3U4":RETURN
1660 DRAW"BU4D3FREU3":RETURN
1670 DRAW"NU4ERFU4":RETURN
1680 DRAW"UE2UDGHUFD2D":RETURN
1690 DRAW"BU4DFEUDGD2":RETURN
1700 DRAW"NR2UE2UL2":RETURN
1701 '
1702 '
1703 ' CREATE THE CAD SYSTEM
1704 ' SCREEN (DISPLAY)
1705 '
1710 PMODE4,1:SCREEN1,1:COLOR0,1
:PCLS:DRAW"C0S4":TX=140:TY=5:T$=
"NAME: "+NF$:GOSUB100:TX=140:TY=

```

```

13:T$="PAGE:":GOSUB100:TX=184:TY
=13:T$="MEMORY:":GOSUB100
1720 FORX=0TO6:LINE(X*19+1,1)-(X
*19+20,20),PSET,B:NEXT:LINE(7,27
)-(248,184),PSET,B:LINE(6,26)-(2
49,185),PSET,B:GOSUB1760
1730 FORX=8TO248STEP8:LINE(X,27)
-(X,23),PSET:LINE(X+4,27)-(X+4,2
5),PSET:LINE(X,184)-(X,188),PSET
:LINE(X+4,184)-(X+4,186),PSET:NE
XT:LINE(252,23)-(252,191),PRESET
1740 FORY=28TO184STEP8:LINE(7,Y)
-(3,Y),PSET:LINE(7,Y+4)-(5,Y+4),
PSET:LINE(248,Y)-(252,Y),PSET:LI
NE(248,Y+4)-(250,Y+4),PSET:NEXT
1750 GOSUB1790:FORX=8TO248STEP8:
FORY=28TO184STEP8:PSET(X,Y):NEXT
Y,X:GOSUB110:A$=RIGHT$(STR$(PG),
1):DRAW"BM166,13":GOSUB80:RETURN
1751 '
1752 '
1753 ' MAIN MENU #1 DISPLAY
1754 '
1760 DRAW"BM4,4R6D12R6 BM24,4R12
D12L12U12 BM43,10R4NU3D3E3NH3RNU
3ND3R3 BM62,4R2BR3R2BR3R2D2BD3D2
BD3D2L2BL3L2BL3L2U2BU3U2BU3U2 BM
81,4R12L6D12 BM102,4D4NR6GFNR6GF
NR6GFND4R6ND4EHEHEHU4L6 BM119,8N
D4R6U4F6G6U4L6":RETURN
1761 '
1762 '
1763 ' MAIN MENU #2 DISPLAY
1764 '
1770 DRAW"BM4,10E6D4R6D4L6D4H6 B
M100,4R12D3L2DR2D8L6U3E2H2LG2F2D
3L5U12D3R6U3 BM28,9U4R4D4L4BD2F2
E2BD4R4D4L4U4BL4L4D4R4U4 BM46,4D
4NR6GFNR6GFNR6GFND4R6ND4EHEHEHU4
L6 BM62,4R4ND12R4ND12R4D4NL12D4N
L12D4L12U12 BM82,4NR3D4R3BDD4R3B
DND4R3D2L2NF2L"
1780 DRAW"BM122,6R4F2D4GNHFRLHGL
4H2U4E2":RETURN
1781 '
1782 '
1783 ' DISPLAY A PAGE BY GETTING
1784 ' INFO OUT OF MEMORY AND
1785 ' DRAWING IT ONTO THE
1786 ' SCREEN
1787 '
1790 AD(PG)=A(PG)
1800 D=PEEK(AD(PG)):IF D=0 THEN
RETURN
1810 X=PEEK(AD(PG)+1):Y=PEEK(AD(
PG)+2):AD(PG)=AD(PG)+3:IF D>50 T
HEN 1830
1820 DRAW"BM=X;=Y;":N=D:GOSUB87
0:GOTO1800

```

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```

183Ø IF D<>51 THEN 185Ø
184Ø D=PEEK(AD(PG)): AD(PG)=AD(P
G)+1:IF D=255 THEN 18ØØ ELSE A$=
CHR$(D):DRAW"BM=X; ,=Y;":GOSUB8Ø:
X=X+5:GOTO 184Ø
185Ø LX=PEEK(AD(PG)):LY=PEEK(AD(
PG)+1):AD(PG)=AD(PG)+2
186Ø IF D=52 THEN LINE(X,Y)-(LX,
LY),PSET:GOTO 18ØØ
187Ø IF D=53 THEN LINE(X,Y)-(LX,
LY),PSET,B:GOTO18ØØ
188Ø IF D=54 THEN LINE(X,Y)-(LX,
LY),PRESET,BF:GOTO18ØØ
189Ø IF D<>55 THEN 195Ø
19ØØ IF LX<X THEN X1=LX:LX=X:X=X
1
191Ø IF LY<Y THEN Y1=LY:LY=Y:Y=Y
1
192Ø FOR X1=X TO LX STEP 8:Y1=X1
+4:IF Y1>LY THEN Y1=LY
193Ø LINE(X1,Y)-(Y1,Y),PSET:LINE
(X1,LY)-(Y1,LY),PSET:NEXT:FOR X1
=Y TO LY STEP8:Y1=X1+4:IF Y1>LY
THEN Y1=LY
194Ø LINE(X,X1)-(X,Y1),PSET:LINE
(LX,X1)-(LX,Y1),PSET:NEXT:GOTO18
ØØ
195Ø IF D<>56 THEN AD(PG)=AD(PG)
-5:POKE AD(PG),Ø:RETURN

```

```

196Ø GET(X,Y)-(LX,LY),MD,G:LX=AB
S(X-LX):LY=ABS(Y-LY):X=PEEK(AD(P
G)):Y=PEEK(AD(PG)+1):PUT(X,Y)-(X
+LX,Y+LY),MD,AND:AD(PG)=AD(PG)+2
:GOTO18ØØ
1961 '
1962 '
1963 ' PRINTOUT (WELL PART OF)
1964 ' ROUTINE, CHECK FOR FREE
1965 ' SPACE ON THE DISK
1966 '
197Ø PRINT:PRINT"CHECKING FREE D
ISK SPACE":X=FREE(Ø):IF X<28 THE
N PRINT "NOT ENOUGH ROOM ON THE
DISK.":STOP ELSE PRINT "CREATING
SUB PAGE IMAGE FILES.":FOR X=1
TO 1ØØØ:NEXT
1971 '
1972 '
1973 ' FOR EACH PAGE=> DRAW THE
1974 ' PAGE AND THEN SAVE IT
1975 ' AS PRT.PG# WHERE # IS THE
1976 ' PAGE NUMBER
1977 '
198Ø FOR PG=Ø TO 8:FL$="PRT.PG"+
RIGHT$(STR$(PG),1):PMODE4,1:SCRE
EN1,1:COLORØ,1:PCLS:GOSUB179Ø:SA
VEM FL$, &HØEØØ, &H25FF, &HØEØØ:NEX
TPG

```

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```

1981 '
1982 '
1983 ' RUN THE REST OF THE
1984 ' PRINTOUT PROGRAM
1985 '
1990 RUN "CADPRINT"

```



Listing 2: CADPRINT

This program is called by the program *CoCocad* when a schematic printout is performed. The program was written for use with the Gemini-10 printer and will have to be modified if another printer is used.

```

0 '
1 ' CADPRINT VR 1.0
2 ' (C) 1985 BY P.KERCKHOFF
3 ' 4335 HENDRIX WAY SAN JOSE CA
4 '
5 ' THE PRINTOUT PART OF THE
6 ' PROGRAM COCOCAD, USED WITH
7 ' THE GEMINI 10 OR 10X PRINTER
8 '
9 '
10 CLEAR100,&H379A:CLS:PRINT"cad
print RUNNING":CS=0:FOR X=&H379B
TO &H37FF:READ A$:D=VAL("&H"+A$
):CS=CS+D:POKE X,D:NEXT:READ X:I

```

```

F CS<>X THEN PRINT "ERROR IN DAT
A STATEMENTS.":STOP
11 '
12 '
13 ' PICK YOUR BAUD RATE, 1=
14 ' 9600 BAUD
15 '
20 POKE150,1
21 '
22 '
23 ' SETUP LINEFEED LENGTH TO
24 ' 16/144THS OF AN INCH
25 '
30 PRINT#-2,CHR$(27);CHR$(51);CH
R$(16)
31 '
32 '
33 ' FOR EACH SUB PAGE OF THE
34 ' SCHEMATIC (LOOP)
35 '
40 FOR PG=0 TO 8 STEP 3
41 '
42 '
43 ' GET THE PAGES FROM DISK
44 ' AND STORE THEM IN MEMORY
45 ' (UPPER MEMORY)
46 '
50 LOADM "PRT.PG"+RIGHT$(STR$(PG
),1),&H2A00
60 LOADM "PRT.PG"+RIGHT$(STR$(PG
+1),1),&H4200
70 LOADM "PRT.PG"+RIGHT$(STR$(PG
+2),1),&H5A00
71 '
72 '
73 ' CALL THE MACHINE CODE
74 ' PRINTOUT ROUTINE POKED
75 ' IN EARLIER
76 '
80 EXEC &H379B
81 '
82 '
83 ' ERASE THE PAGES FROM THE
84 ' DISK AND LOOP UNTIL DONE
85 '
90 KILL "PRT.PG"+RIGHT$(STR$(PG
),1):KILL "PRT.PG"+RIGHT$(STR$(PG
+1),1):KILL "PRT.PG"+RIGHT$(STR$(
PG+2),1):NEXT PG
100 PRINT:PRINT"DONE.":STOP
500000 DATA 86,FE,97,6F,86,1,34,2
,86,1B,AD,9F,A0,2,86,4B,AD,9F,A0
,2,86,D4,AD,9F,A0,2,86,1,AD,9F,A
0,2,35,2,8E,7E,E0,30,86,34,2,8D,
26,35,2,8E,66,E0,30,86,34,2,8D,1
B,35,2,8E,4E,E0,30,86,34,2,8D,10
,86,D,AD,9F,A0,2,35,2,4C,81,1F,2
6,B8,F,6F,39,C6,9C
500100 DATA A6,84,43,34,14,AD,9F,
A0,2,35,14,30,88,E0,5A,26,EF,39
500200 DATA 9974

```

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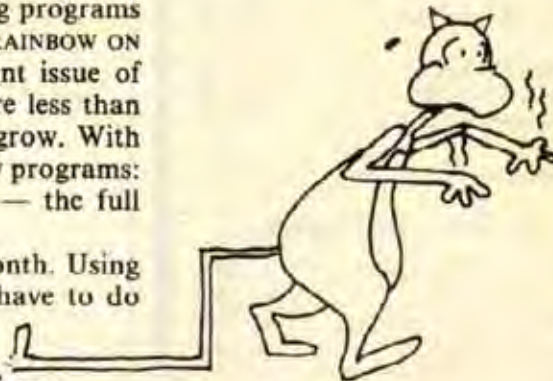
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Listing 3:

This program is a short machine language printer driver that is poked into memory and called by the *Cadprint* program.

```

3798          00100
3798 7E      379B 00110      ORG $379B
379E          0065 00120      BEGIN JMP      START
          00140      FDB      DONE-BEGIN
          00150
          00160      TITLE      CADCODE
          00170
          00180 * A ROUTINE TO QUICKEN
          00190 * UP THE PRINTOUT
          00200
379B          00210      ORG $379B
          00220
          00230
AA92 00240      GHR0UT EQU      $A992      COCO'S OUTPUT ROUTINE
996F 00250      DEVNUM EQU      $996F      -2 FOR PRINTER
          00260
          00270
          00280 * PRINT THREE SUB PAGES
          00290 * OUT TO THE PRINTER
          00300 * ASSUMES BAUD RATE HAS
          00310 * BEEN SET AND PRINTER
          00320 * IS ALL SET
          00330
379B 86      FE      00340      START LDA      #5FE      SET OUTPUT TO
379D 97      6F      00350      STA      DEVNUM THE PRINTER
379F 86      01      00360      LDA      #1      SET X POS
37A1 34      02      00370      MLOOP PSHS      A      SAVE IT, MAIN LOOP
37A3 86      1B      00380      LDA      #27     SET PRINTER UP
37A5 AD      9F      A992 00390      JNR      [CHROUT]
37A9 86      4B      00400      LDA      #75     EGG,K (GRAPHICS MODE)
37AB AD      9F      A992 00410      JSR      [CHROUT]
37AF 86      D4      00420      LDA      #212    468 BYTES AT A TIME
37B1 AD      9F      A992 00430      JSR      [CHROUT]
37B5 86      01      00440      LDA      #1      468/256
37B7 AD      9F      A992 00450      JSR      [CHROUT]
37BB 35      02      00460      PULS      A      GET X POS
37BD 8E      7EE9 00470      LDX      #57EE9  BOTTOM SUB PAGE
37C0 39      86      00480      LEAX      A,X     CALC ADDRESS->X REG
37C2 34      02      00490      PSHS      A      SAVE X POS
37C4 8D      26      00500      BSR      PRINT   GO PRINT BYTES
37C6 35      02      00510      PULS      A      GET X POS
37C8 8E      66E9 00520      LDX      #66E9  MIDDLE SUB PAGE
37CB 39      86      00530      LEAX      A,X
37CD 34      02      00540      PSHS      A
37CF 8D      1B      00550      BSR      PRINT
37D1 35      02      00560      PULS      A
37D3 8E      4EE9 00570      LDX      #4EE9  TOP SUB PAGE
37D6 39      86      00580      LEAX      A,X
37D8 34      02      00590      PSHS      A
37DA 8D      19      00600      BSR      PRINT
37DC 86      0D      00610      LDA      #13     A CR/LF
37DE AD      9F      A992 00620      JSR      [CHROUT]
37E2 35      02      00630      PULS      A      GET X POS
37E4 AC      00640      INCA
37E5 81      1F      00650      CMPA      #31     DONE?
37E7 26      B8      00660      BNE      MLOOP  NOPE, LOOP
37E9 0F      6B      00670      CLR      DEVNUM YEP. SET OUTPUT FOR SCREEN
37EB 39          00680      RTS      EXIT TO BASIC
          00690
37EC C6      9C      00700      PRINT LDB      #156   Y COUNTER
37EE A6      84      00710      PLOOP LDA      .X      GET BYTE
37F0 43          00720      COMA      INVERT BITS
37F1 34      14      00730      PSHS      B,X     SAVE REG'S
37F3 AD      9F      A992 00740      JSR      [CHROUT] PRINT BYTE
37F7 35      14      00750      PULS      B,X
37F9 39      8B      00760      LEAX      -32,X   NEXT Y ADDRESS
37FC 5A      00770      DECB      DONE ALL Y'S?
37FD 26      EF      00780      BNE      PLOOP  NOPE, LOOP
37FF 39          00790      RTS      YEP, RETURN
          00800
          00810
3800          00820      DONE EQU      *
0000          00830      END
    
```

Listing 4: REMOVREM

This program will remove lines not evenly divisible by 10 from a program on disk saved in the ASCII format. (The program is used to remove the comment lines from COCOCAD.REM.)

```
0 '
1 ' REMOVREM
2 ' A VERY SIMPLE REMARK
3 ' REMOVER PROGRAM. REMOVES
4 ' LINES NOT EVENLY DIVISIBLE
5 ' BY TEN.
6 '
7 ' (C) 1985 P.KERCKHOFF
8 '
9 '
10 CLEAR 500
11 '
12 '
13 ' OPEN THE OLD PROGRAM AS
14 ' AN ASCII FILE
15 '
20 OPEN "I",#1,"COCOCAD.REM"
21 '
22 '
23 ' OPEN A FILE FOR THE NEW
24 ' PROGRAM TO GO INTO
25 '
30 OPEN "O",#2,"COCOCAD.BAS"
31 '
32 '
33 ' IF END OF THE FILE THEN
34 ' WE'RE ALL DONE
35 '
40 IF EOF(1) THEN 80
41 '
42 '
43 ' GET THE DATA FROM THE OLD
44 ' FILE (PROGRAM)
```

```
45 '
50 LINEINPUT #1,A$
51 '
52 '
53 ' IF THE LINE NUMBER IS NOT
54 ' EVENLY DIVIS. BY TEN THEN
55 ' DON'T SAVE IT IN THE NEW
56 ' FILE (PROGRAM)
57 '
60 IF VAL(A$)<>INT(VAL(A$)/10)*10
  THEN PRINT "REMOVED LINE: ";VAL
  L(A$):GOTO 40
61 '
62 '
63 ' ELSE THE LINE IS GOOD SO
64 ' SAVE IT IN THE NEW FILE
65 '
70 PRINT #2,A$:GOTO 40
71 '
72 '
73 ' ALL DONE. CLOSE IT AND
74 ' STOP.
75 '
80 CLOSE
90 PRINT "NOW LOAD 'COCOCAD.BAS'
  AND RESAVE (THE LOAD WILL
  TAKE QUITEAWHILE)."
100 STOP
```

Hint

ONGOing Error Trapping

When you use an ON . . . GOTO or ON . . . GOSUB statement on the CoCo, you don't need to check for an out-of-range value. If the value presented is out of range, BASIC will skip the statement and jump to the next one. Here's an example:

```
10 INPUT "YOUR CHOICE";D
20 ON D GOTO 50,70,90,110:GOTO 10
```

If a number outside the range (here, less than '1' or greater than '4') is put in, the statement will be skipped and the next one (GOTO 10) will loop back to the INPUT statement.

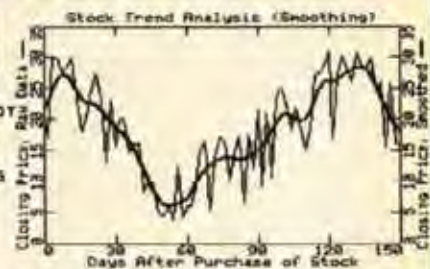
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# Reversing The Screen — Revisited

By Ed Ellers  
Rainbow Technical Editor

• I read your reply to the first letter in the August 1985 issue. Your method of turning all of the graphics screen to an inverse color (white to black, etc.) is good but slow. I have a faster way by using the NOT function of PUT. Here is my listing:

```
5 'EL WHITE TO BLACK PROGRAM INVER
SING:BY DAVID KELLER
10 DIM IN(100)
15 PMODE 4,1
20 SCREEN 1,1
25 FOR X=0 TO 192 STEP 17
30 PUT(0,X)-(255,X+16),IN,NOT
35 NEXT X
40 GOTO 40
```

David Keller  
Fort Mill, SC

Thanks for the program. My own sample was just an attempt to show how it can be done; there's always room for experimentation and improvement.

## A Rumor Behind Its Time

• My question is about a rumor I heard about the new Disk BASIC 1.1 ROM coming out; if this is true or if

(Ed Ellers, a RAINBOW and PCM staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)

it already came out, what does it have over Disk BASIC 1.0?

Rick Cadorette  
Biddeford, Maine

Disk BASIC 1.1 has been around since late 1983. The only advantage it has is a DOS command for booting OS-9. Many of the routines in 1.1 have been moved from their 1.0 locations, and quite a few programs that used them directly did not work with 1.1. For this reason I recommend sticking with 1.0.

## Is It Extended, or Something Else?

• I am 9 years old and just love to play with Dad's CoCo. When the new RAINBOW comes, I grab it and type in the "One-Liner Contest" listings from it. Sometimes they will not fit in, and my dad does something called "edit" and then they will fit. Dad says his computer is Extended and very long "packed" lines cannot be put into a standard computer. Can this be so?

What do all the people without Extended do?

Natasha Swaine  
Hantsport, Nova Scotia

That trick (using the EDIT mode to squeeze a few extra characters in) is

quite common in our "One-Liners." Your father is right in that EDIT is an Extended BASIC command and isn't available on the "standard" models. I suspect, though, that a program that's been packed in this way is likely to have been written for Extended BASIC anyway. At any rate, those without Extended Color BASIC can always divide the One-Liner into two shorter lines in order to use them.

## Reversed in Some Respects

• I decided to try a hardware project in your April 1985 issue, the video reverser modification ("Turn Your Monitor Inside Out," Page 116). The project is relatively simple and after completing it, it worked fine, except when I went to the edit mode of Telewriter-64. The screen was again white with black lettering. My question is, is this normal, and if so, why?

Bill Spillane  
Phoenix, AZ

The video reverser project simply forces the 6847 video chip, when it's in text mode, to use the green-on-black

characters instead of black-on-green. *Telewriter's* edit mode uses the PMODE 4 Hi-Res screen, which is unaffected.

### Forbidden Variables

• *When I have attempted to use the string variable designated as FN\$, I get an error message. Why?*

Marc A. Schneider, Psy.D.  
Evanston, IL

Some of Microsoft's several BASICs designed for various computers (including the CoCo's BASIC) are set up so you can't use variable names that are the same as commands or functions. In this case, Extended command DEF FN precludes the use of FN as a variable name. Later BASICs, like the BASIC on the IBM PC, let you do this, but these also make you type a space between a command word and the rest of the command (such as FOR N = 1 TO 10, instead of FORN=1TO10).

### Limousine that Won't Start

• *In the January 1984 RAINBOW, Page 48, there is a disk utility for transferring programs from tape to disk. At the time I didn't have a disk system, so it has sat in my RAINBOW ON TAPE cassette for over a year. I now have a disk system and have need to use the program, only to find that it won't work. What happens is the program EXECs, a question mark and some graphics characters appear in the first four of five columns in the upper left corner of the screen, and the cassette player motor starts. The computer is locked up at this point.*

*I have wondered if there is an error in the program. I have not been able to locate the February or March 1984 issues to see if there is an errata. Could you please check for me?*

Larry Cole  
Demidji, MN

The program in the magazine is correct, but in the process of making that month's RAINBOW ON TAPE, that file was damaged. The correct program (TPTDSK) was appended to the February 1984 RAINBOW ON TAPE, and (if I may be permitted a plug) anyone who needs to transfer tape files to disk will do well to consider it.

### Modem Matters

• *What happens to the modem signal when it enters the serial I/O port? How is it processed, and in which memory locations? I am thinking of making a communications program. I want to know how the other programs access the serial I/O port, and how they translate all of those beeps into characters and characters into beeps.*

Robert Davis  
Winnipeg, Manitoba

First of all, the "beeps" are handled in the modem, which takes DC signals from the computer and translates them into tones while translating the tones from the other end into DC signals for the computer. (In RS-232 interfaces, a '1' is represented by a positive voltage of three volts or more; a '0' is represented by a negative voltage, not by zero voltage as in a computer's own logic circuitry.)

The CoCo handles serial I/O using an inexpensive method that, unfortunately, makes terminal programs more complex. The serial input and output signals (shifted to the standard "TTL" levels) are connected to two input and output lines on the second PIA (Parallel Interface Adapter) chip. Input is fed to input bit 0 of Port B (at address FF22 Hex); output comes from output bit 1 of Port A (at FF20 Hex). This means the microprocessor itself has to take care of the Baud rate, number of start and stop bits and such. Understandably, this makes serial I/O on the CoCo somewhat unreliable and slow, especially when both sending and receiving are involved.

Many other computers use a circuit called a "Universal, Asynchronous Receiver/Transmitter" (UART for short), which can be programmed to take care of the Baud rate and number of bits automatically. The processor then sends the data to be sent out to the UART in parallel form and the UART sends it out serially, while also taking incoming serial data and converting it to parallel to send to the processor. Tandy's Deluxe RS-232 Program Pak and some other packs provide UART-based RS-232 ports for the CoCo, which make modem and other operations more reliable and faster as well as freeing up the CoCo's serial port for printer hookup.

### Educational Programs



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by Jeff Stevens

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by John Ashurst

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# CoCo Community

**W**e have compiled a list of Color Computer Clubs because of the many requests we have received. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs which have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

**CoCo Clubs  
THE RAINBOW  
The Falstaff Building  
P.O. Box 385  
Prospect, KY 40059**

## ALABAMA

Birmingham Alabama Color Computer Club, Robert Matthews, 3529 Laurel View Lane, Birmingham, 35216, (205) 933-0887

Huntsville Color-80 Users Group, Randy Niemann, 1011 Versailles Dr. S.F., Huntsville, 35803, (205) 882-2485

## ALASKA

Alaska Color Computer Users' Group, Rick McDaniel, 430C Beluga Ave., Ft. Richardson, 99505, (907) 428-0392

## ARIZONA

Huachuca Hot Pokers, James Standley, 235-A Jeffords Street (NBU-96H), Ft. Huachuca, 85613, (602) 458-5338

Tucson Color Computer Club, Marshall R. Madole, 3721 S. Le Beaux Place, Tucson, 85730

## ARKANSAS

Central Arkansas CoCo Club, Melinda Braslovsky, 1203 Irving Rd., LP Cabot, 72023, (501) 982-8854

## CALIFORNIA

Color America Users Group, Mark Randall, 2227 Canyon Rd., Arcadia, 91006, (213) 355-5111

Los Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213

The Davis CoCoNuts, Adam Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

Sacramento Color Computer Club, Wayne Chrisupe, P.O. Box 9, Elverta, 95626

North American CoCo Orange County, Eric Wilson, 8405 Sweetwater Circle, Huntington Beach, 92646, BBS (714) 847-2268

Jane Rennett, 1169 Florida Street, Imperial Beach, 92023, (474-6213)

CoCoHolics and Tandy Computer Club, Kenneth M. Denny, 801 W. Roseburg Ave., Suite 200, Modesto, 95350, (209) 523-5176

Ventura County Color Computer Club (VC4), John Basque, Oxnard Public Library, 214 "C" Street, Oxnard, 93030, (805) 957-4752 or DATA (805) 484-5491

Sacramento CoCo Club, Charles Doughty, Box 60511, Sacramento, 95860

Salinas Color Computer Club, Larry Livingston, 501 Monterey Highway, Salinas, 93908, (408) 484-9697

Citrus Color Computer Club, Joseph Kohn, P.O. Box 6991, San Bernardino, 92412, (714) 792-8721

The MC-10 Newsletter Club, Jose J. Bray, 4730 Cass Street, San Diego, 92109, (619) 483-8744

Local Color—A CoCo Club of San Francisco, Andrew G. Kieval, P.O. Box 421242, San Francisco, 94142

San Joaquin CoCo Club, Steven Paul Moreno, P.O. Box 99024, Stockton, 95209, (209) 951-3938

Silicon Valley Color Computer Club, Shawn Jipp, P.O. Box 61593, Sunnyvale, 94088, (408) 749-1947

CoCo Nutz Computer Club, Walter V. Seay, 88-461 Highway 86, Thermal, 92274, (619) 397-4252

Conejo Color Computer Users Group, Robert S. Rimmer, 472 Sundance Street, Thousand Oaks, 91360, (805) 492-4972

South Bay Color Computer Club, Karen Schlottz-hauer, 23113 Dana Ave., Torrance, 90501, (213) 539-2539

## COLORADO

Lowry Microcomputer Club/CoCo Users' Group, Jerry D. Surrutte, 2249 Moline St., Aurora, 80010, (303) 343-3273

Colorado Color Computer Club, Joe Applegate, P.O. Box 33492, Northglenn, 80233, (303) 650-9768

## FLORIDA

Northwest Florida CoCo Nuts, William N. Lamb, P.O. Box 1032, Fort Walton Beach, 32549, (904) 244-5281

Alachua County CoCo Special Interest Group, Chris Meyers, P.O. Box 14927, Gainesville, 32604, (904) 378-9598

Jacksonville Color Computer Club, William H. Brown III, 2111 Hirsch Ave., Jacksonville, 32216, (904) 731-0282

CoCo Chips Color Computer Club, 6 Belle Mead Circle, Largo, 33540, (813) 581-7779

Broward County Color Computer Club, Timothy D. Neary, 510 S.W. 64th Ave., Margate, 33068, (305) 972-4074

South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609

The Naples CoCo Club, Matt Tari, 3320 7th Avenue S.W., Naples, 33964, (813) 455-4830

Color-8009 Users Group, Emary Mandel, 4301 11th Avenue North, St. Petersburg, 33713, (813) 323-3570

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33582, (813) 921-7510

Broward CoCo Club, Sue Spatin, 11950 N.W. 29th Manor, Sunrise, 33582, (305) 741-4737

## IDAHO

CoCo-AG Farm Computer Users Group, Kelly Klass, Rt. 1, Box 4133, Twin Falls, 83301, (208) 733-4251

## ILLINOIS

Glenside Color Computer Club, Ed Hathaway, 5 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694

Town & Country CoCo, 5461 S. Kenwood, Chicago, (312) 493-3748

Cook County Color Computer Club, Tim Powers, 1633 Fifth Ave., Chicago Heights, 60411, (312) 747-7062

Illinois Color Computer Club of Elgin, Steven Stroud, 1098 Florimond Dr., Elgin, 60120, (312) 695-3186

Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377

Northern Illinois Color Computer Club, 580 Milton Lane, Hoffman Estates, 60194, (312) 885-2573

Peoria Color Computer Club, Lawrence Parker, 418 Lakemper Dr., Metamora, 61548, (309) 383-4312

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Chicago OS-8 Users Group, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

## INDIANA

Evansville Color Computer Users Group, Dave Jenkins, 1418 E. Illinois Street, Evansville, 47711, (812) 424-0099

Three Rivers Users Group, George Barber, 2410 New Haven Ave., Fort Wayne, 46815

Indy Color Computer Club, Mike Davis, P.O. Box 68702, Indianapolis, 46268, (317) 257-3300

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

CoCo Program, Erik Merz, 310 Appletree Dr., Noblesville, 46060, (317) 842-1340

## IOWA

Metro Area Color Computer Club, K.L. Knudtson, 3324 11th Ave., Council Bluffs, 51501

Mid Iowa CoCo, Terry Simons, 1328 48th Street, Des Moines, 50311, (515) 279-2570

Dubuque Tandy Users Group, Wesley Kulhem, 1995 Lombard, Dubuque, 52001, (319) 558-4137

Iowa City TRS-80 Users Group, Susan Chapler, R.R. 6, The Woods, Iowa City, 52240, (319) 351-5959

## KANSAS

Kansas City CoCo Club, Mike Allinder, P.O. Box 11192, Kansas City, 66111, (913) 287-1904

Topeka Color Computer Club, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Color Computer Club of Wichita, Rex Rivers, 1206 N. Mosley, Wichita, 67214, (316) 264-9193

Walnut Valley C.C. Users Club, David Anderson, 1212 E. 4th St., Winfield, 67156, (316) 221-0040

## KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Harburbury, 41747, (606) 439-4209

LOCO-COCO, Mike Standefer, 3141 Doreen Way, Louisville, 40220, (502) 458-6690

#### LOUISIANA

Red Stick Color Computer Club, Gary Cash, 8929 Metairie Drive, Baton Rouge, 70810, (504) 293-7799

Cajun CoCo Club, Bob Hoevel, 104 Karen St., New Iberia, 70560, (318) 365-7706

#### MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

New England C.C. Users Group, Christopher E. Sweet, R.D. 2, Box 261, Harvard, 01451, (617) 456-8291

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenburg, 01462, (617) 582-6514

6809ers, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

#### MICHIGAN

Petoskey Area CoCo Club (PAC<sup>3</sup>), Dennis Hoshield, 670 Liegl Drive, Alanson, 49706, (616) 347-0607

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Midland C.C. Club, Neil Drake, 709 Coolidge, Midland, 48640, (517) 631 2030

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49081, (616) 651-4248

#### MISSISSIPPI

Singing River C.C. Club, Mark Welch, 3606 Vancleave Rd., # 118, Gautier, 39553

CoCo Art Club, Joel Bunyard, Rt. 7, Box 10, Meridian, 39301, (601) 483-0424

#### MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

Mid-America Color Computer Users Group, Jerry Morgan, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, 1610 N. Marian, Springfield, 65803

#### MONTANA

Billings C.C. Club, Jayne Kenyon, 4306 Phillip, Billings, 58101

#### NEBRASKA

TRS-80 Color Computer Users Group of Lincoln, Jonathan Skean, 2629 South 15th St., Lincoln, 68502, (402) 476-9815

#### NEW JERSEY

Intrasoft, Ravi Sakaria, 139 Candace Lane, Chatham Twp., 07928, (201) 635-8025

The Kid CoCo Club, Derrick Kardos, 11 Regal Drive, Colonia, NJ 07067, (201) 382-6662

Bug 80 Users' Group, George R. Miller, Jr., Box 62, Glen Gardner, 08826

Garden State Color Computer Users Group, Darren Nye, 5 North 20th Ave., Manville, 08835; Voice (201) 725-8385, Data (C.C.I.E. BBS) (201) 725-5028

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

#### NEW MEXICO

Chaves County Color Computer Club, Lee Mitchell, 1102 Melrose Drive, Roswell, 88201, (505) 623-0789

#### NEW YORK

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4214, Albany, 12204

Adirondack CoCo Club, (Athens Chapter), Pete Chast, P.O. Box 61, Athens, 12015

Adirondack CoCo Club (Glens Falls Chapter), Dave and Richard Mitchell, 39 Center St., Fort Edwards, 12828

Queensboro Color Computer Club, Bob Rosen, Springfield Blvd. & 56th Ave., Bayside, 11364, (212) 631-6233

Local CoCo, Charles Marlin, P.O. Box 901, Bellmore, 11710

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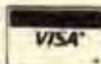


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- C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Illion, 11357, (315) 895-7730
- Rockland County Color Computer Users Group, John S. Scibrán, P.O. Box 131, Monsey, 10952, (914) 357-5580
- Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 218, Olean, 14760, (716) 372-1170 or 372-3121
- The CoCo Clan, John David, 56 Willowood Lane, Staten Island, 10308, (718) 317-8228
- New York Color Computer User Group, Carl Glownsky, 15 Bolivar St., Staten Island, 10314, (718) 761-0268
- NORTH CAROLINA**
- TRS-80 Users' Group of Charlotte, Jason Foodman, 240 Medearis Dr., Charlotte, 28211
- Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348
- Raleigh Color Computer Club, David Roper, P.O. Box 681, Garner, 27529
- NORTH DAKOTA**
- Musica 2 Users Group (MUG), Solveig Pederson, 711 3rd Street S.E., Valley City, 58072, (701) 845-5063
- OHIO**
- CoCo Club of Youngstown, Timothy McFadden, P.O. Box 478, Canfield, 44406, (216) 788-4218
- Columbus & Central Ohio Color Computer Club, D.E. Sparrow, 18 E.N. Broadway, Columbus, 43214, (614) 268-5366
- Dayton CoCo Users' Group, Joseph P. Evans, 809 Applehill Dr., W. Carrollton, 45449
- Cincinnati TRS-80 Users Group, R.A. White, 44 Dow Court, Fairfield, 45014
- Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45410, (513) 293-2228
- M.U.G. of CoCo—Middletown Users Group, James Carr, Middletown, 45042, (513) 424-6905
- Greater Toledo Color Computer Club, Ronald L. Hall, 9648 Garden Road, Monclova, 43542, (419) 865-3663
- Northeastern Ohio (N.E.O.) CoCo Club, Tony Ruggia, 527 Malvern Drive, Painesville, 44077, (216) 354-2736
- Tri-County Computer Users Group, William J. Loeffler, 2812 Dale Avenue, Rocky River, 44116, (216) 356-0779
- Miami Valley CoCo Club, R. Douglas Wales, 2065 LeFeure Rd., Troy, 45373
- OKLAHOMA**
- CoCo Inc., Robert L. Pace, 1726 W. Rose Oak Dr., Mustang, 73064, (405) 376-3569
- OREGON**
- Willamette Valley CoCo Users, Brian James, P.O. Box 11468, Eugene, 97440, (503) 687-9286
- PENNSYLVANIA**
- HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789
- Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001
- CAPATUG, Inc., 340 Lewisberry Rd., New Cumberland, 17070, BBS (717) 774-6543
- Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616
- Pittsburgh Color Group, William Tucker, P.O. Box 351, West Mifflin, 15122, (412) 468-3078
- RHODE ISLAND**
- New England CoCo Nuts, P.O. Box 6604, Providence, 02940
- SOUTH CAROLINA**
- Invitation Software Group, Tom Reed, 3562 Linbrook Dr., Columbia, 29204, (803) 786-0541
- Midlands 80 Computer Club, Tommy Sanders, P.O. Box 7594, Columbia, 29202, BBS (803) 755-3414
- Metropolitan Greenville CoCo Club, Ed Lowe, P.O. Box 6, Gray Court, 29645, (803) 876-3928
- Hilton Head Island CoCo Club, Kevin Clark, P.O. Box 6187, Hilton Head Island, 29926, (803) 785-9630
- Spartanburg County CoCo Club, Dennis Shattuck, 473 Royal Oak Drive, Spartanburg, 29302, (803) 583-3017
- TENNESSEE**
- Chattanooga CoCo Club, Jim Perkins/Jim Cox, P.O. Box 9625, Chattanooga, 37412, (615) 870-2439
- Foothills Micro-Computer Club, Aaron Sentell, Route 14, Box 289, Maryville, 37801, (615) 982-4629
- Memphis Color Computer Users Group, Ben Barton, 4903 Warrington Rd., Memphis, 38118, (901) 795-7075 or 362-5945
- TEXAS**
- CoCo User Group, David Karam, 1809 Dexter, Austin, 78704, (512) 442-6317
- B/CS Color Computer Users Group, Dale Guthbertson, 1812 Michael Lane, Bryan, 77801, (409) 822-0731
- Deer Park Color Computer Club, Donald Burr, 4314 W. Grant, Deer Park, 77536, (713) 479-5313
- International Color Computer Club, Inc., Robert L. Garrett, 2101 East Main Street, Henderson, 75052, (214) 657-7834
- TRS-80 Users' Group of New Braunfels, John Mendez, 408 Acorn, New Braunfels, 78130, (512) 629-3207
- UTAH**
- Ogden CoCo, Kathy Rush, 4535 S. 2600 W. Roy, Ogden, 84067
- Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032
- VIRGINIA**
- Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Road, Dale City, 22193, (703) 670-4962
- Central Virginia Color Computer Club, Lane Lester, 413 Woodland Circle, Lynchburg, 24502, (804) 237-4188
- WASHINGTON**
- Northwest Computer Club, Larry Haines, East 2924 Liberty, Spokane, 99207, (509) 483-5547
- WEST VIRGINIA**
- Kanawha Valley Personal Computer Club, P.O. Box 5354, Charleston, 25311, BBS (304) 925-3338 or 345-6502
- Mtn. State CoCo Users Group, Donald G. Barber, Jr., P.O. Box 1084, Morgantown, 26507, (304) 599-4493
- Mil-O-Bar Computer Club, Jim LeMaster, P.O. Box 130, Ona, 25545, (304) 743-4752 after 4 p.m.
- Blenheim/Assault CoCo Club, David Greathouse, Rt. 9, Box 119, Parkersburg, 26101
- West Virginia Color Computer Club, William Mucklow, 949 Baier Street, St. Albans, 25177, (304) 727-6764
- WISCONSIN**
- CoCo-MUG, Tom Fandre, P.O. Box 10152, Milwaukee, 53210, (414) 542-0600
- Southern Wisconsin CoCo Club, David C. Buehn, P.O. Box 411, Twin Lakes, 53181
- CANADA**
- ALBERTA**
- Calgary Color Computer Club, Don Towson, 832 Cannell Rd. S.W., Calgary, T2W 1T4, (403) 281-2855
- Edmonton CoCo Users Group, Dexter Dombro, P.O. Box 4507 Stn. South, Edmonton, T6E 4T7, (403) 461-4750
- Medley Computer and Electronics Club, P.O. Box 1257, Medley, T4A 2M0
- NEW BRUNSWICK**
- Color Computer Moncton Users Group (CoCoMUG), Leo Allain, 91 Woodland Dr., Moncton, E1E 3C4, (506) 382-2190
- BRITISH COLUMBIA**
- North Island CoCo Club, Ann Marie MacKay, P.O. Box 1740, Port Hardy, B.C., V0N 2P0
- Salmon Arm CoCo, David Coldwell, 2981 N. Broadview, Salmon Arm, B.C., V0E 2T0, (604) 832-8247
- MANITOBA**
- Winnipeg Micro-80 Users Group, Mel Seder, 884 Aah St., Winnipeg, R3N 0R9, (204) 284-0376
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- Avalon CoCo Club, A.R. Thompson, 10 Foran St., St. John's, A1E 4G1
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- Halifax Dartmouth CoCo Users Group, P.O. Box 572, Dartmouth, B2V 3Y9, (902) 469-3658
- ONTARIO**
- International Adventurer's Club, Maurice Dow, 84 Camberley Cres., Brampton, L6V 3L4
- K-W C.C. Club, Peter Karwowski, 23 Hudson Crescent, Kitchener, N2B 2V7
- London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-1706
- Meadowdale Color Computer Club, Howard Porter, P.O. Box 186, Streetsville, Mississauga, L5M 2B8
- Niagara Regional CoCo Club, Harry VanDyke, 1701 Jubilee Drive, Niagra Falls, L2G 7J3
- Ottawa 6809 Users Group, Norm Shohet, 1497 Meadowbrook Road, Ottawa, K1B 5J9, (613) 741-1760
- QUEBEC**
- Club d'Ordinateur Couleur du Quebec, Inc., Jean-Marie Beaujean, Centre de Loisirs St-Mathieu, 7110- Ave. St-Michel, Montreal, H2A 3C4, (514) 270-7507
- South Shore CoCo Club, Jacques Bedard, 33 Lalire, St-Constant, P.Q., J0L 1X0
- Le Club Couleur du Nord, Gabriel Pigeon, RR 2, Villa Montel, J0Y 2S0, (819) 732-2346
- SASKATCHEWAN**
- Regina Color Computer Club, Georges Glass, 26 Tweedsmuir Bay, Regina, S4X 2B1, (306) 949-3942
- Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, S7L 4H9
- AUSTRALIA**
- Blacktown City TRS-80 Colour Computer Users Group, Keith Gallagher, P.O. Box 264, Riverstone, New South Wales, 2765
- CoCo Polyteens of Gylton, Dwayne Manson, P.O. Box 506, St. Marys, New South Wales, 2760
- Color Computer Penrith User Group, Alexander Schofield, 15 Tasman Avenue, Lothbridge Park, New South Wales, 2770
- The Hills District Color Computer Club, Andrew Rankin, 42 Lucas Road, Seven Hills, New South Wales, 2147, phone (02) 674-3741
- CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, 7005
- MEXICO**
- MEXCOCO Users Group, Sergio Walker, Pachina 87-109, Mexico City D.F., 06140, phone 553-11-98
- WEST GERMANY**
- First CoCo Club Hamburg, Theis Klauberg, 2000 Hamburg 65, Op de Solt 53 a, West Germany

## new clubs

### Editor:

I'd like to announce the formation of The CoCoholics and Tandy Computer Club of Modesto. We hold meetings once a month and ask that anyone who joins pay an annual fee of \$18 to help publish our *COLOR* newsletter. For more information write us at 801 W. Roseburg Ave., Suite 200, 95350.

Ken Denny  
Modesto, CA

**Editor:**

For information about joining the Orange County TRS-80 Users Group write to 10112 Melody Park Drive, 92640.

*Fred K. Wright  
Garden Grove, CA*

**Editor:**

The Color Computer Club of Riverview holds monthly meetings on the second Friday of each month at 7 p.m. We have a bimonthly newsletter. The club offers programming help, hardware hacking and any information or assistance available. Write to 13002 Lincoln Road, 33569.

*Jessie A. Ray  
Riverview, FL*

**Editor:**

This letter is to inform you of the existence of the Color-6809 Color Computer Users Group. We have about 50 members and meet the third Monday of each month. Usually, we have a speaker at our meetings. We publish a newsletter once a month and have both public domain software and firmware libraries. All residents of Pinellas, Hillsborough, Pasco and other counties of Florida are welcome to attend our meetings; anyone is welcome to inquire with us for further information about our club. Write to 4301 11th Avenue North, 33713 or call (813) 323-3570.

*Emery Mandel  
St. Petersburg, FL*

**Editor:**

I am happy to announce the formation of a new CoCo club in the Hazard-Perry county area called the Perry County CoCo Users Group. Inquiries about the club should be sent to General Delivery, 41747.

*Keith W. Smith  
Hardburly, KY*

**Editor:**

The Greater Kalamazoo Color Computer Club meets the third Wednesday of every month in the Community Room of the Crossroads Mall. The meetings start at 7:30 p.m. Along with club meetings we publish a newsletter. The club also has a 150-program public domain library. For more information call Mike at 657-3850 or Jim at 344-7631.

*Michael Marcelletti  
Paw Paw, MI*

**Editor:**

A new national CoCo Art Club is starting in Meridian. We plan to have a monthly newsletter, discount prices on software, contests, a CoCo gallery (similar to THE RAINBOW's), software library, BBS/DATA library (just for art) and many other features. If anyone has any ideas or would like to become a member please write to CoCo Art Club, Rt. 7, Box 10, 39301.

*Joel Bunyard  
Meridian, MS*

**Editor:**

I am interested in starting a Color Computer club in the St. Louis county area. Anyone interested can contact me after 5 p.m. at (314) 739-0326 or write to 11826 Gay Glen Drive, 63043.

*Jay Harris  
Maryland Heights, MO*

**Editor:**

This is to announce a new chapter in the Adirondack Color Computer Club. The Greene County chapter meets in the Athens Elementary School the second and fourth Thursday of each month at 7 p.m. during the school year.

We have chapters in Glens Falls, Fort Edward, Albany and now Greene County. Our members are widespread and we are constantly looking for more people to organize new chapters. Write to P.O. Box 61, 12015.

*Pete M. Chast  
Athens, NY*

**Editor:**

I would like to announce the formation of the New York Color Computer Group. The club meets on the second Thursday of each month at Clove Lakes Nursing Home, Fanning Place in Staten Island. The meeting time is 7 p.m. For more information please send an SASE to P.O. Box 626, 10314.

*Brian Twomey  
Staten Island, NY*

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**Editor:**

The Rockland County Color Computer Users Group holds monthly meetings at the Cooperative Extension in New York City. In addition to regular meetings the club plans to publish a monthly newsletter. For additional information you may call 357-5580 between 10 a.m. and 2 p.m. or Harold Laroff at (914) 425-2274 in the evenings. The clubs mailing address is P.O. Box 131, 10952.

*Harold L. Laroff  
Monsey, NY*

**Editor:**

To anyone interested in forming a Color Computer club in Suffolk County Long Island please give me a call at (516) 475-3957 or drop me a line at P.O. Box 485, 11772.

I would also be grateful to those of you that run a Color Computer club, or belong to one, if you would send me some advice or ground rules for a club to get started.

*William C. Mulvey  
Patchogue, NY*

**Editor:**

I am pleased to announce the beginning of the CoCo Clan. Its newsletter is packed with programs, game and programming hints, game reviews and contests. Also, there are special discounts on programs we are selling. The club is run by teenage computer whizzes who are anxious to show their programming skills. Anyone interested in joining should write to 56 Willowood Lane, 10308.

*John Davis  
Staten Island, NY*

**Editor:**

The San Antonio Color Computer Club offers membership to the club for \$25 per year. We offer a newsletter, contests and awards, low cost disks and drives, discounts on software and hardware items, plus more. For information write to 2430 Rawhide Lane, 78227.

*James Leatherman  
San Antonio, TX*

**Editor:**

This is to announce the formation of The Skyline Color Computer Club of Berks County. We hold meetings on the third Friday each month. We teach BASIC programming and have software and hardware demonstrations. We also have classes on graphics and telecommunications. Interested users may call Louie Brubaker at (215) 921-3616 after 6 p.m. for more information.

*John K. Weidman  
Hamburg, PA*

**Editor:**

Would you inform your readers of a free CoCo club. It has no meetings. To find out what it's about send an SASE to 217 Graves Road, 37379.

*Computer Master  
Soddy Daisy, TN*

**Editor:**

I would like to announce the emergence of another CoCo club in the southeast Wisconsin area. Johnson Laboratories, Inc. is a new users group for anyone who would like to join. You can call (414) 639-1028 or write to me at 4132 North Greenbay Road, 53404.

*Shawn A. Johnson  
Racine, WI*

**Editor:**

The Ottawa 6809 Users Group is a non-profit club devoted to the Color Computer and other 6809-based computer systems. We have meetings on the third Monday of each month in which we discuss and demonstrate new products available for the CoCo and answer questions and problems from the members. For information contact me at (613) 225-3122 or Norm Shoihet at (613) 741-1763.

In addition, there is an OS-9 users group in Ottawa which meets on the second Tuesday of each month. Inquiries may be addressed to 3 Woolmsley Cres., Canada K2G 1J3.

*David Buck  
Nepean, Ontario*

**Editor:**

The Winnipeg Micro-80 Users Group meets alternate Saturdays at 9:15 a.m. in Room 205, Technical Vocational High School, 1500 Wall Street. We feature a speaker at every meeting and give courses in BASIC and assembler. Phone Murray Day at 257-3537 or write to me at 108 Kingsway Ave., Canada R3M 0G9.

*Mrs. C. C. Blunderfield  
Winnipeg, Manitoba*

**Editor:**

There is now another Australian CoCo club in existence. The Hills District C.C.C. meets every fortnight for three hours and is devoted to our CoCos. We are looking for clubs to correspond with from any part of the world. Correspondents can write to the following address.

*Andrew Rankin  
Hills District C.C.C.  
42 Lucas Road, Seven Hills  
N.S.W., Australia 2147*

**Editor:**

We are here! The 6809 Color Club. We are up to 200 members. We like the topics that have been published in THE RAINBOW magazine. RAINBOW is by far the best CoCo magazine in our country. Interested persons can write to me at the following address.

*Francisco R. Maia Sobral  
Real Grandeza, 219, Bloco C, sala 1102  
Rio de Janeiro, Brazil  
CEP 22283*

**Editor:**

I proudly announce the Color Computer Users Group in Antwerp (Belgium). The group cooperates intensively with six other independent groups in Belgium and in the Netherlands. Together we have almost 1,000 members. We are interested in any kind of application or program for the Color Computer. If you are interested please write me at the following address:

*Jorgen te Giffel  
Eikenlaan 1  
4641 GB Ossendrecht  
the Netherlands  
01131-1647-2214*

**One-Liner Contest Winner . . .**

This One-Liner shows a missile flying to its target and detonating.

**The listing:**

```
Ø PMODE4:PCLS:SCREEN1:X=128:Y=19
Ø:CIRCLE(X,Y),15Ø,,.25:PAINT(X,Y)
,,1:FORA=.6TO1STEP.Ø2:CIRCLE(X,Y)
,1ØØ,Ø,1,A-.Ø2,A:CIRCLE(X,Y),1
ØØ,,1,A,A+.Ø2:NEXT:LINE(22Ø,Y)-(
226,14Ø),PSET,BF:FORA=1TO1Ø:CIRC
LE(223,14Ø),A,,.5:NEXT:FORA=ØTO1
:A=Ø:B=1-B:SCREEN1,B:NEXT
```

*Eric Ball  
Calgary, Alberta*

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

**One-Liner Contest Winner . . .**

This One-Liner is hard to describe without giving it all away. Try it and see why!

**The listing:**

```
2Ø PMODE3,1:SCREEN1,Ø:PCLS3:X=82
:Y=154:FORR=1TO4:CIRCLE(X,Y),16Ø
+(2Ø*R),2,.6,.4,1:NEXT:FORM=4TO6
:PAINT(Y,(M*8)-3),M,2:NEXT:CIRCL
E(X,Y),24Ø,4,.6:CIRCLE(X,Y),22Ø,
1,.6:COLOR3,2:DRAW"BMØ,Ø;D191R25
5U191":FORX=ØTO99999:NEXT
```

*Barbara Paquin  
Weymouth, MA*

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)



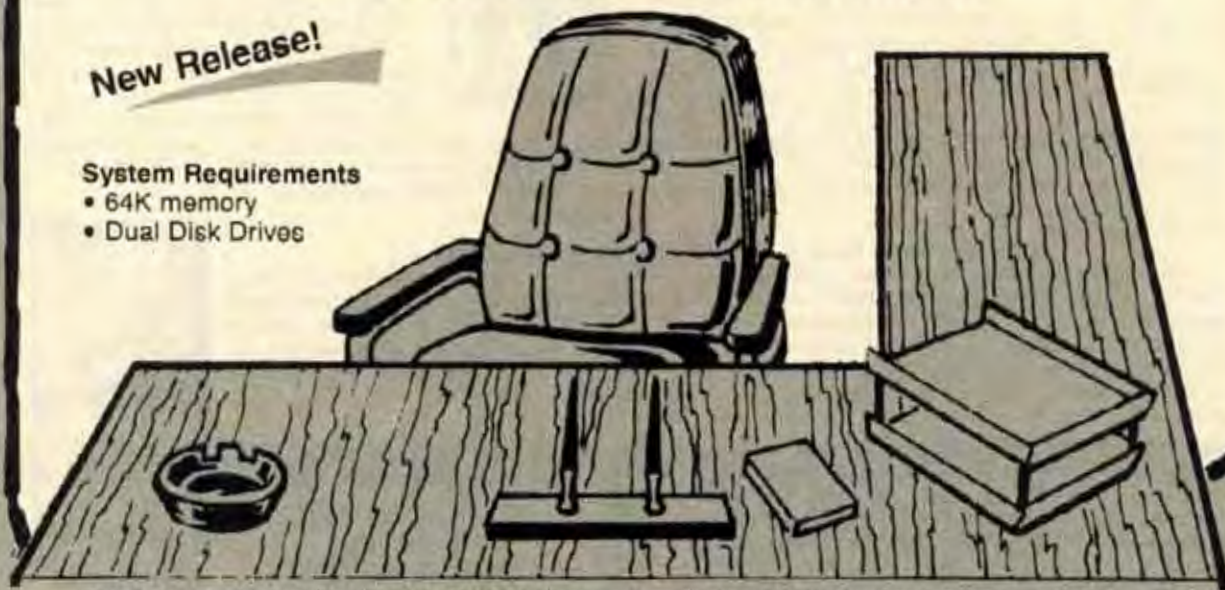
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## ACCOUNTS RECEIVABLE

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|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

■ Use for appointments or a log of past activity. ■ Search capability allows you to list or print all memos between two specified dates or only ones meeting key-word criteria. ■ Date computation shows elapsed time between two dates in days, weeks, months and years. ■ Printed graphic calendar available with optional Graphic Screen Print Program. ■ Requires 32K in BASIC

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*Using association to learn the parts of the heart*

# A LESSON STRAIGHT FROM THE HEART

**By Denis Santerre**

**T**he CoCo is a wonderful machine for learning. It is an asset when association is helpful. In the September 1984 issue of *THE RAINBOW*, Joseph S. Paravati showed us how association can be used to learn the states and capitals ("GeoGraphics," Page 177). From his program I got my character data, which he had gotten from *TRS-80 News*, April 1982, by R. Van Dyke.

*Heart Quiz* is a program that uses association to learn the parts of the heart. Before you load the program, type `POKE 23040,0 : POKE 25,90` and `ENTER`, then type `NEW` and `ENTER`. This will clear the memory for 12 pages of graphics instead of the usual eight. If you do the poke after you load in the program, it will be gone, so be sure to save it as soon as it is typed in.

When you run the program the computer will draw the heart in two locations in memory. These two drawings are a little different: one is the outside of the heart and the other is the inside chambers. For each part, the program will select one of these two drawings; it then will copy the selected drawing. To this drawing it will add the needed graphics for the part that is to be identified. By switching pages back and forth, this added graphics will give a flashing image until a key is hit.

*(Denis Santerre is a biomedical equipment technician at Eastern Maine Medical Center. He is a self-taught computer hobbyist.)*





As an aid to the clues, the length of words is given with dashes. Spaces, numbers and unrelated keys will be ignored. The back-arrow key will clear all you have typed in and let you change your answer. If the answer is wrong, the correct answer will be given. Your score will be shown as a percentage of correct answers to the total answers. A new part of the heart is selected and the routine is repeated.

The heart is only one of the many subjects that can be learned with this type of program. To select your own

drawings and words, simply replace the ones in *Heart Quiz* with your own. To make the drawing easier, a temporary routine at the end of the program will help. This will let you find line lengths, DRAW statements and circle sizes.

I have included such a program. Type in Listing 2 at the end of the program into which you want to put DRAW statements. From the menu, select the function you want: CIRCLE, LINE, BOX or DRAW. The joysticks and keyboard are used to control the size and shape of the added feature; typing X and

pressing ENTER will give the statement needed for the added feature.

You can use the space I left to put each new graphics line as it comes up (see remark lines). If you prefer, you can put your lines anywhere as long as you put RETURN at the end of your last line and change the GOSUB line number on Line 540.

(If you have any questions about *Heart Quiz*, you may contact Denis at Rt. 1, Box 511, E. Holden, ME 04429, phone 207-947-3711. If you write, please include an SASE.) □

|      |       |     |
|------|-------|-----|
| 250  | ..... | 153 |
| 520  | ..... | 185 |
| 750  | ..... | 8   |
| 899  | ..... | 23  |
| 1040 | ..... | 210 |
| 1160 | ..... | 229 |
| 1250 | ..... | 6   |
| 1410 | ..... | 93  |
| END  | ..... | 183 |

Listing 1: HEART

```

Ø '***POKE 23Ø4Ø,Ø:POKE25,9Ø <ENTER> NEW <ENTER> BEFORE YOU LOAD THIS PROGRAM.
1Ø CLS:PRINT@1Ø7,"THE HEART":PRINT@196,"AN EDUCATION PROGRAM BY":PRINT" denis santerre"
2Ø DIMN$(3Ø),X$(46),Y$(46):GOSUB 13ØØ:GOSUB 12ØØ:PMODE4,1:CLS:PRINT"THESE ARE THE WRONG ANSWERS":SCREEN1,Ø:COLORØ,1:PCLS
99 '*****DRAWS THE MAIN SCREENS*****
1ØØ CIRCLE(98,86),7Ø,,1.4,Ø,.42
11Ø CIRCLE(45,1ØØ),35,,1.2,.27,.92
12Ø CIRCLE(128,85),4Ø,,1,.73
13Ø CIRCLE(98,4Ø),2Ø,,1,.4Ø,.85
14Ø CIRCLE(98,43),4Ø,,1,.4Ø,.88
15Ø LINE(4,4Ø)-(4,165),PSET
16Ø LINE(3Ø,138)-(3Ø,165),PSET
17Ø LINE(3Ø,62)-(3Ø,4Ø),PSET
18Ø CIRCLE(17,39),13,,.3
19Ø CIRCLE(17,164),13,,.3
2ØØ CIRCLE(165,65),12,,1,.6,.8

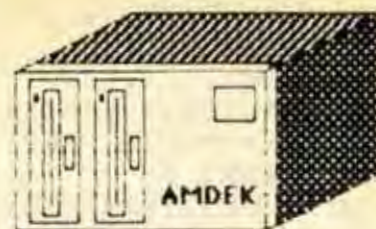
```

```

21Ø CIRCLE(165,65),2Ø,,1,.6,.8
22Ø CIRCLE(175,8Ø),12,,1,.6,.8
23Ø CIRCLE(175,8Ø),2Ø,,1,.65,.8
24Ø LINE(169,46)-(169,54),PSET
25Ø LINE(179,7Ø)-(179,6Ø),PSET
26Ø FORA=1TO4:PCOPYA TOA +8:NEXT
:PMODE4,9:COLORØ,1:CIRCLE(88,84),15,,.3:LINE(8Ø,52)-(125,45),PSET
T
27Ø CIRCLE(98,4Ø),2Ø,,1,.85,.Ø5
28Ø CIRCLE(98,43),4Ø,,1,.88,.Ø2
29Ø PMODE4,1:COLORØ,1
3ØØ CIRCLE(15Ø,86),5Ø,,1,.5,.8
31Ø CIRCLE(15Ø,86),76,,1,.49,.6
32Ø CIRCLE(15Ø,86),76,,1,.65,.79
33Ø LINE(1Ø3,28)-(82,28),PSET
34Ø LINE(87,44)-(8Ø,44),PSET
35Ø LINE(5Ø,28)-(61,28),PSET
36Ø LINE(5Ø,44)-(57,44),PSET
37Ø CIRCLE(5Ø,31),3,,2
38Ø CIRCLE(5Ø,41),3,,2
39Ø CIRCLE(165,25),7,,2
4ØØ CIRCLE(88,84),13,,1,.5
41Ø CIRCLE(45,1ØØ),3Ø,,1.2,.2Ø,.Ø7
42Ø CIRCLE(75,79),1Ø,,1,Ø,.25
43Ø CIRCLE(99,8Ø),1Ø,,1,.25,.5
44Ø CIRCLE(1ØØ,9Ø),1Ø,,1,.9,.2Ø
45Ø CIRCLE(129,8Ø),1Ø,,1,.25,.5
46Ø CIRCLE(13Ø,9Ø),1Ø,,1,.75
47Ø CIRCLE(16Ø,9Ø),1Ø,,1,.5,.75
48Ø CIRCLE(62,138),1Ø,,1,.6,.9
49Ø CIRCLE(8Ø,116),1Ø,,1,.34,.6
5ØØ LINE(11Ø,17Ø)-(1Ø2,84),PSET
51Ø LINE(98,173)-(99,84),PSET
52Ø LINE(13Ø,8Ø)-(13Ø,9Ø),PSET
53Ø LINE(13Ø,8Ø)-(1Ø5,65),PSET

```

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```

540 CIRCLE(98,86),63,,1.4,0,.42:
PRESET(103,172)
550 CIRCLE(27,100),7,,3.2
560 CIRCLE(128,85),34,,1,.68
599 '*****DOES PART DRAWING*****
600 PMODE4,5
610 R=R+1:IFR>18THEN N=8 ELSEN=0
620 GOSUB890
630 ON R GOSUB900,910,920,940,95
0,960,970,980,1000,1010,1020,103
0,1040,1050,1060,1070,1090,1100,
1110,1120,1130,1140,1150,1170,11
80,990,1190
699 '*****DOES THE QUIZZING*****
700 A=N$(R):B=1:PMODE4,5:COLOR0
,1:GOSUB880
710 A=INSTR(A$," "):IFA=0THENAS(
B)=A$:GOTO730
720 A$(B)=LEFT$(A$,A-1):A$=RIGHT
$(A$,LEN(A$)-A):B=B+1:GOTO710
730 FOR A=1TOB:DRAW "BM142,"+STR
$(160+(A*10)):FORC=1TOLEN(A$(A))
:DRAW"BM+2,-3;R2;BM+3,+3":NEXTC:
NEXT
740 D$="":A=0:A$=INKEY$:C$=""
750 A=A+1:D$=D$+A$(A):DRAW "BM14
2,"+STR$(156+A*10)
760 IFC$=""THENGOSUB860

```

```

770 A$=INKEY$:IF A$=CHR$(13)THEN
830
780 IFA$=CHR$(8)THEN700
790 IF A$=>"0"AND A$<="Z"THEN CO
SUB 1340:C$=C$+A$
800 IF LEN(C$)=LEN(D$)THEN IFA<B
THEN750ELSE IF A=B THEN 830
810 IF C$=""THEN760
820 GOTO770
830 T=T+1:DRAW"BM180,135":IF C$=
D$THEN A$="CORRECT":GOSUB1340:CO
=CO+1:GOTO850
840 PRINTN$(R):SCREEN1,0:A$="WRO
NG":GOSUB1340:GOSUB880:FORA=1TOB
:DRAW"BM142,"+STR$(A*10+156):A$=
A$(A):GOSUB1340:NEXTA:GOTO850
850 A$="SCORE ":DRAW"BM180,150":
GOSUB1340:A$=STR$(INT(CO/T*100))
:GOSUB1340:FORA=1TO700:NEXTA:GOT
0600
860 FOR C=1 TO 100:NEXT:PMODE4,N
+1:SCREEN1,0
870 FOR C=1 TO 100:NEXT:PMODE4,5
:SCREEN1,0:COLOR0,1:RETURN
880 LINE(254,190)-(140,158),PRES
ET,BF:LINE-(254,190),PSET,B:RETU
RN
890 PMODE4,5:SCREEN1,0:COLOR0,1:
FORA=1TO4:PCOPYA+N TOA+4:NEXT:RE
TURN
899 '*****STEPS TO DRAW PARTS**
900 PAINT(55,40),0:PAINT(150,20)
,0:RETURN
910 CIRCLE(87,87),10:RETURN
920 PAINT(162,50),0
930 PAINT(167,68),0:RETURN
940 LINE(140,90)-(150,90),PSET:P
AINT(140,70),0:RETURN
950 LINE(140,90)-(150,90),PSET:L
INE(110,90)-(120,86),PSET:PAINT(
140,110),0:RETURN
960 LINE(85,80)-(90,80),PSET:LIN
E(75,125)-(70,132),PSET:PAINT(90
,130),0:RETURN
970 LINE(75,125)-(70,132),PSET:P
AINT(50,130),0:RETURN
980 GOSUB 910:GOTO1040
990 CIRCLE(85,165),10,,1,0,.25:C
IRCLE(125,160),10,,.7,.25,.5:LIN
E(95,165)-(93,110),PSET:LINE-(11
5,160),PSET:CIRCLE(88,110),5,,1
,.75,0:LINE(88,105)-(50,110),PSET
:RETURN
1000 CIRCLE(145,90),10:RETURN
1010 CIRCLE(70,125),10:RETURN
1020 GOSUB1000:GOTO1010
1030 LINE(110,90)-(121,85),PSET:
PAINT(80,50),0:PAINT(110,75),0:R
ETURN

```

### STRING VARIABLE EQUATION SOLVER -- A "FIRST" IN MICROCOMPUTERS --

What is it??

It is a program in which YOU put ANY equation that YOU want solved, such as:  
 $(A*N/B) + 2X = F + Y$

Then YOU put in what YOU want solved for such as "N".

Then your computer solves the equation and gives,  
 $N = B*(F + Y - 2*X)/A$

### WOW, A GENUINE EQUATION SOLVER.

For students, technically minded & those who want to show their computers "brains".

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JUST \$49.00 plus \$3 shipping & handling

```

1040 CIRCLE(117,90),10:RETURN
1050 PAINT(160,70),0:RETURN
1060 CIRCLE(98,84),63,,1.4,0,.42
:RETURN
1070 CIRCLE(98,88),70,,1.4,0,.42
:A$="NOT A SACK":DRAW"BM170,100
":GOSUB1340:RETURN
1080 LINE(20,100)-(40,100),PSET:
CIRCLE(30,50),1:RETURN
1090 LINE(4,100)-(9,100),PSET:PA
INT(20,50),0:RETURN
1100 LINE(4,100)-(9,100),PSET:PA
INT(20,140),0:RETURN
1110 CIRCLE(40,85),4:RETURN
1120 CIRCLE(50,105),4:RETURN
1130 CIRCLE(98,95),60,,1.2,.1,.4
:DRAW "BM110,171;H6;E10;BM+15,+5
;H3;U5;BM+15,+1;H4;U4;BM80,171;E
6;H10;BM-15,+0;E3;U5;BM-12,+1;E5
;U5":RETURN
1140 CIRCLE(95,80),50,,1.5,.3,.4
:CIRCLE(90,85),30,,1.5,.25,.42:C
IRCLE(70,110),30,,1.5,.25,.42:CI
RCLE(30,75),40,,1.7,.99,.22:CIRC
LE(34,72),40,,1.7,.02,.2:PAINT(7
0,90),0:RETURN
1150 LINE(83,52)-(167,77),PSET:L
INE-(84,58),PSET:LINE-(83,52),PS
ET:DRAW"BM82,132;M+6,-2;BM+6,-2;
M+6,-2;BM+5,-2;M+5,-2;BM+5,-1;M+
5,-2;BM+5,-2;M+5,-5;BM+5,-5;M+5,
-5;BM+5,-5;M+5,-5;BM+5,-5;M+5,-5
":PAINT(98,58),0:RETURN
1160 CIRCLE(84,104),10:RETURN
1170 CIRCLE(98,88),70,,1.4,0,.42
:A$="THE SACK":DRAW"BM170,100":G
OSUB1340:RETURN
1180 CIRCLE(100,84),20,,1,-.75,0:
CIRCLE(100,84),23,,1,-.75,0:LINE(
123,84)-(115,150),PSET:LINE-(120
,84),PSET:LINE(100,61)-(85,61),P
SET:LINE-(88,65),PSET:LINE-(100,
65),PSET:PAINT(122,84),0:RETURN
1190 PRINT"SCORE "INT(CO/T*100)
:END
1199 '*****LOADS WORDS TO ARRAY*
1200 RESTORE:READA$:IFA$<>"NAME
S"THEN1200
1210 A=0
1220 A=A+1:READA$:IFA$<>"END"THE
NN$(A)=A$:GOTO1220
1230 RETURN
1240 DATA NAMES,PULMONARY ARTERY
,PULMONARY VALVE,PULMONARY VEINS
,LEFT ATRIUM,LEFT VENTRICLE,RIGH
T VENTRICLE
1250 DATA RIGHT ATRIUM,SEMILUNAR
VALVES,MITRAL VALVE,TRICUSPID V
ALVE,ATROVENTRICULAR VALVES,AORT

```

```

A
1260 DATA AORTIC VALVE,MYOCARDIU
M,ENDOCARDIUM,EPICARDIUM
1270 DATA SUPERIOR VENA CAVA,INT
ERIOR VENA CAVA,SA NODE,AV NODE,
PURKINJE FIBERS,RIGHT CORONARY,C
IRCUMFLEX ARTERY
1280 DATA PERICARDIUM,ANTERIOR I
NTERVENTRICULAR BRANCH,BUNDLE OF
HIS,END
1299 '***LOADS LETTER ARRAY***
1300 RESTORE
1310 READA$:IFA$<>"LETTERS"THEN
1310ELSEA=0
1320 A=A+1:READA$,B$:IFA$<>"END"
THENX$(A)=A$:Y$(A)=B$:GOTO1320
1330 RETURN
1340 FOR J=1 TO LEN(A$)
1350 X$(J)=MID$(A$,J,1)
1360 IF X$=>"-" AND X$<="Z"THEND
RAW Y$(ASC(X$)-44)
1370 IF X$=" "THENDRAW"BM+7,0"
1380 NEXT J:RETURN
1390 DATA LETTERS,-,"BM+2,-3;R2;
BM+3,+3",,"",,"",0,"BM+1,0;H1U4E
1R2F1D4G1L2;BM+6,0",1,"BM+1,0;R1
NR1U6G1;BM+6,+5",2,"NR4U1E1R1E2U
1H1L2G1;BM+7,+5",3,"BM+0,-1;F1R2

```

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(See June 1985 Rainbow Review)

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 HARTSELLE, AL 35640

```

E1H2E2H1L3;BM+7,6"
140 DATA 4,"BM+3,0;U2NR1L3U1E3D
3;BM+4,3",5,"BM+0,-1;F1R2E1U2H1L
3U2R4;BM+3,+6",6,"BM+4,-5;H1L2G1
D4F1R2E1U1H1L3;BM+7,+3",7,"U1E4U
1L4;BM+7,+6",8,"BM+1,-0;H1U1E1H1
U1E1R2F1D1G1NL2F1D1G1L2;BM+6,0"
141 DATA 9,"BM+0,-1;F1R2E1U4H1L
2G1D1F1R2;BM+4,+3",,"",,"",,"",,"
",,"",,"",,""
142 DATA A,"U4E2F2D2NL4D2;BM+3,
0",B,"U6R3F1D1G1NL3F1D1G1L3;BM+7
,0"
143 DATA C,"BM+1,-0;H1U4E1R2F1;
BM+0,+4;G1L2;BM+6,0",D,"U6R3F1D4
G1L3;BM+7,0",E,"NR4U3NR2U3R4;BM+
3,+6"
144 DATA F,"U3NR2U3R4;BM+3,+6",
G,"BM+1,-0;H1U4E1R2F1;BM+0,+2;NL
1D2G1L2;BM+6,0",H,"U3NU3R4NU3D3;
BM+3,0",I,"BM+1,0;R1NR1U6NL1R1;B
M+4,+6"
145 DATA J,"BM+0,-1;F1R1E1U5NL1
R1;BM+3,6",K,"U3NU3R1NE3F3;BM+3,
0",L,"NU6R4U1;BM+3,+1",M,"U6F2ND
1E2D6;BM+3,0"
146 DATA N,"U6F1D1F2D1F1NU6;BM+
3,0",O,"BM+1,0;H1U4E1R2F1D4G1L2;
BM+6,0",P,"U6R3F1D1G1L3;BM+7,3"
147 DATA Q,"BM+1,0;H1U4E1R2F1D3
G1NH1NF1G1L1;BM+6,0",R,"U6R3F1D1
G1L2NL1F3;BM+3,0",S,"BM+0,-1;F1R
2E1U1H1L2H1U1E1R2F1;BM+3,+5"
148 DATA T,"BM+2,+0;U6NL2R2;BM+
3,+6",U,"BM+0,-1;NU5F1R2E1U5;BM+
3,6",V,"BM+0,-6;D2F1D1F1ND1E1U1E
1U2;BM+3,+6"
149 DATA W,"NU6E2NU1F2U6;BM+3,6
",X,"U1E4U1;BM-4,0;D1F4D1;BM+3,0
",Y,"BM+0,-6;D2F2ND2E2U2;BM+3,6"
,Z,"NR4U1E4U1L4;BM+7,6"
150 DATA END,END

```

|     |       |     |
|-----|-------|-----|
| 140 | ..... | 241 |
| 260 | ..... | 63  |
| 410 | ..... | 64  |
| END | ..... | 64  |

Listing 2: HELPDRAW

```

10 PMODE4,1
20 CLEAR1000
30 SCREEN1,1:GOSUB 540'the graph
ics will begin at this gosub # e
ven if you do a renum.
40 CLS:PRINT"THIS PROGRAM WILL H
ELP YOU FIND GRAPHIC STATEMENTS.
":PRINT"SEE THE REMARKS LINES.":

```

```

PRINT"by denis santerre ":PRINT"
1) CIRCLE":PRINT"2) LINE":PRINT"
3) BOX":PRINT"4) DRAW":INPUT I
50 ON I GOTO60,170,170,280
60 CLS:PRINT"USE THESE":PRINT"E
xit":PRINT"SCREEN":PRINT"UP AND
DOWN ARROWS CHANGES STARTOF ARC"
:PRINT"LEFT AND RIGHT ARROWS CHA
NGES FINISH OF ARC":PRINT"USE
BOTH JOYSICKS":LINEINPUTZ$
70 SCREEN1,1
80 GOSUB180:CIRCLE(V,H),V1,,H1/V
1,S,F
90 GOSUB270:IF I$=CHR$(94)THEN I
F F<.99THEN S1=S+.05 ELSE S1=0
100 IF I$=CHR$(10)THEN IFS<.05 T
HENS1=1ELSE S1=S-.01
110 IF I$=CHR$(8)THEN IF F<.99TH
ENF1=F+.05 ELSE F1=0
120 IF I$=CHR$(9)THEN IFF<.05 TH
ENF1=1 ELSE F1=F1-.01
130 IF I$=">"THEN SS=SS+.01 ELSE
IFI$="<"THEN SS=SS-.01
140 IF I$="X"THEN CLS: PRINT"CIRC
LE("INT(V)","INT(H)","INT(V1)",
,"INT(H1*100/V1)/100","S","F":GOT
O530
150 CIRCLE(V,H),V1,0,H1/V1,S,F:S
=S1:F=F1
160 GOTO80
170 CLS:INPUT"USE YOUR JOYSTICKS
, EXIT,SCREEN CLEAR":Z$:SCREEN1,
1:ONI-1GOTO190,230
180 GOSUB260:V1=V1*254/63+1:H1=H
1*190/63+1:RETURN
190 GOSUB 180:LINE(V,H)-(V1,H1),
PSET
200 GOSUB 270:IF I$="X"THEN CLS:
PRINT"LINE("INT(V)","INT(H)")-("
INT(V1)","INT(H1)",PSET":GOTO53
0
210 LINE(V,H)-(V1,H1),PRESET
220 GOTO190
230 GOSUB 180:LINE(V,H)-(V1,H1),
PSET,B
240 GOSUB 270:IF I$="X"THEN CLS:
PRINT"LINE("INT(V)","INT(H)")-("
INT(V1)","INT(H1)",PSET,B":GOTO
530
250 LINE(V,H)-(V1,H1),PRESET,B:G
OTO230
260 V=JOYSTK(0)*250/64:H=JOYSTK(
1)*190/63:V1=JOYSTK(2):H1=JOYSTK
(3):RETURN
270 I$=INKEY$:IF I$="S"THENGOTO5
40ELSERETURN
280 CLS:PRINT"THESE ARE YOUR COM
MANDS YOU WILLHAVE TO REMEMBER."
:PRINT"uP, dOWN, LEFT, rIGHT, mO

```



```

VE, NO UPDATE BLANK MOVE":PRINT"
e,h,g,f-FOR 45,135,225,315
DEGREES":PRINT"OK, CANCEL, EXIT,
INSTRUCTIONS":PRINT"SCREEN UPDA
TE"
290 PRINT"THE LEFT AND RIGHT ARR
OWS WILL CHANGE DISTANCE"
300 PRINT"USE YOUR RIGHT JOYSTIC
K AND <ENTER> FOR MOVE"
310 INPUT"PRESS ENTER TO CONTINU
E";I$
320 IFA$=""THENA$="BM127,95"
330 SCREEN1,1
340 GOSUB 270
350 DRAWA$
360 IFLen(A$)>240 THENGOTO520
370 IF I$=""THENGOTO340
380 IF I$="N"THEN N$="N":GOTO340
390 IF I$="B"THENN$="B":I$="M"
400 ON INSTR("MUDLREFGHXI",I$)+1
GOTO 340,440,450,450,450,450,45
0,450,450,450,520,280
410 SCREEN1,1:DRAW A$+B$
420 K$=INKEY$:IFK$=""THEN420 ELS
E IFK$="O"THENA$=A$+N$+B$:N$="":
GOTO340ELSE DRAW"C0"+A$+B$:DRAW"
C1"+A$:IFK$="C"THENN$="":GOTO340
:ELSE GOTO400
430 RETURN
440 COSUB 460:COTO410
450 COSUB 470:GOTO410
460 GOSUB260:X$=STR$(INT(V)):Y$=
STR$(INT(H)):B$=I$+X$+", "+Y$:RET
URN
470 GOSUB490:X$=STR$(D)
480 B$=I$+X$:RETURN
490 IF K$=CHR$(9)THEND=D+5ELSE I
FK$=CHR$(8)THEND=D-1
500 IF D<1THEND=1ELSEIF D>254THE
ND=254
510 RETURN
520 CLS:PRINTA$
530 PRINT"..... IS THE GRAPHIC S
TATEMENT TO ADD TO YOU PROGRAM.
":PRINT"YOU MAY OMIT SPACES.":EN
D
540 PCLS:SCREEN1,1'***THIS AREA
IS FOR ROUTINES AS YOU WRITE THE
M*****
1000 RETURN

```



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| Angina               | Indigestion         |
| Branchitis           | Vaginitis           |
| Obesity              | Gall bladder        |
| Abdominal pain       | Allergy             |
| Nervousness          | Blood pressure      |
| Dizziness            | Alzheimer's disease |
| Coughing             | Osteoporosis        |
| Endometriosis        | Anemia              |
| Ulcers               | Hot flashes         |
| Urinary problem      | Prostate gland      |
| Shortness of breath  | "PMS"               |
| Varicose veins       | Yeast vaginitis     |
| Diarrhea             | Depression          |
| Constipation         | Fibroids            |
| Low sex drive        | Painful periods     |
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| Breast cysts         | Heart failure       |



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# The CoCo Gallery



1st

PRIZE

*Andrea C. Bain*  
**Hummingbird**

This special expanded edition of the CoCo Gallery presents Andrea Bain's first prize portrait of one of nature's smallest wonders. Andrea lives in San Diego, Calif.

*Gay Crawford*  
**Liberty**  
From Merriam, Kan., Gay sends the Gallery this prize-winning portrayal of the beloved "Lady with the Torch."

2nd

PRIZE



3rd

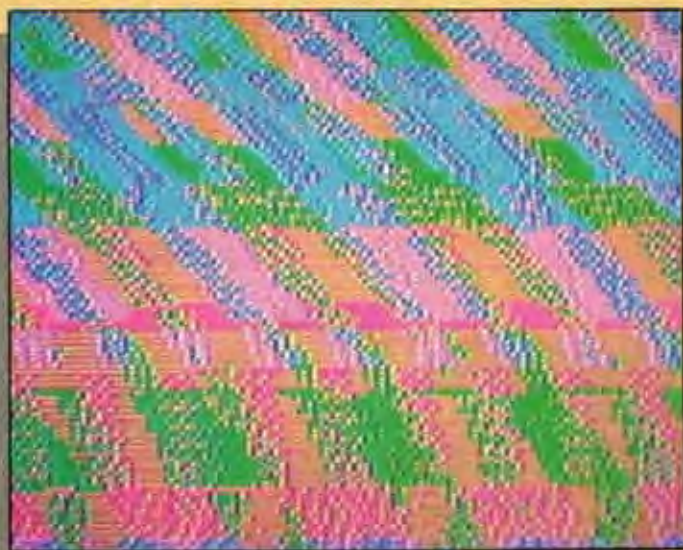
PRIZE

*James C. Graves, Jr.*

**Rose**

Poets have long waxed lyrical over the rose, but James shows us once again why pictures are worth a thousand words. James lives in Sierra Vista, Ariz.





HONORABLE

*Michael E. Murray*

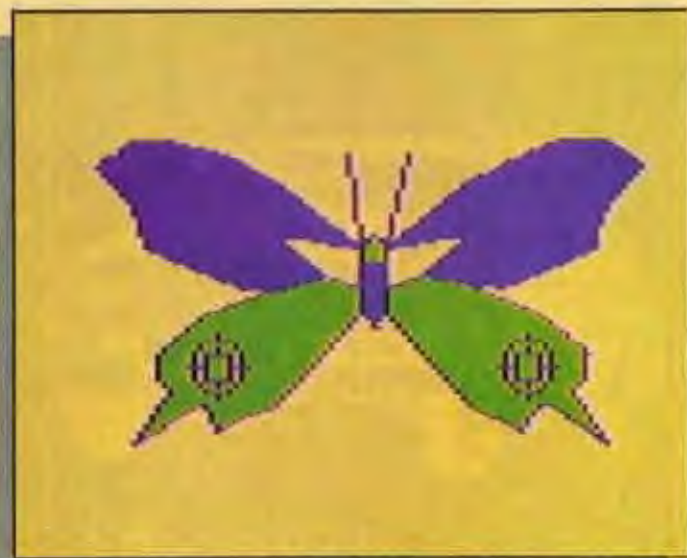
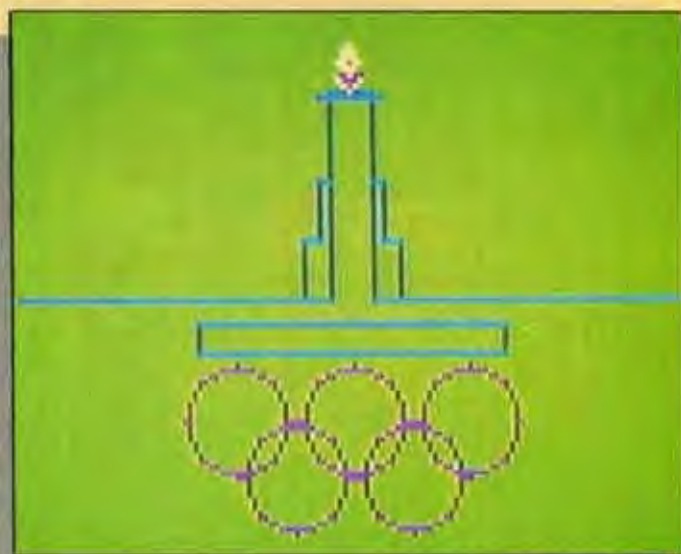
**Abstract**

Michael lives in Venice, Calif., and sends us this graphics image produced from his own program for converting sound into digital data.

*Don Duquet*  
**Olympic Rings**

Don drew this tribute to the 1984 Olympic Games in Los Angeles with the aid of a BASIC program he wrote. Don lives in Winslow, Maine.

HONORABLE



HONORABLE

*Merwyn Bly*

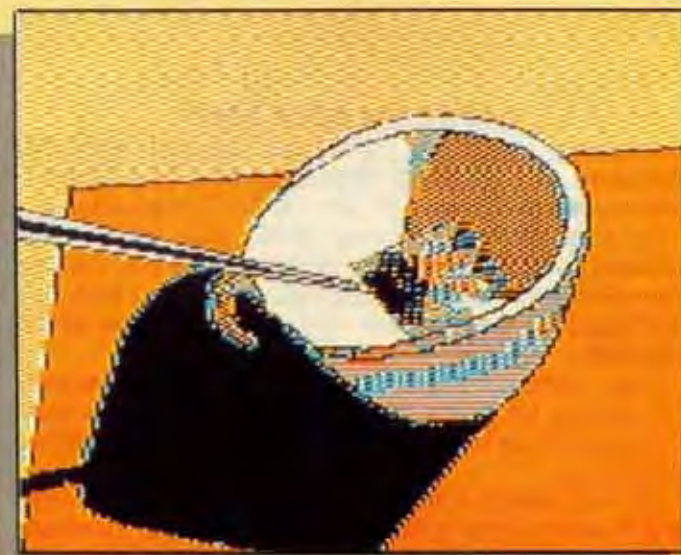
**Butterfly**

From Vienna, Va., Merwyn gives the Gallery a butterfly drawn using BASIC LINE commands, which produce the curves we see in the upper wings.

*Maureen Iverson*  
**English Breakfast**

Maureen is an art student and sends THE RAINBOW this cheery still life. Maureen lives in St. Croix, Wis.

HONORABLE



*Nicolas Cote*  
**Grand Prix**  
 Nicolas lives in Alma, Quebec, and gives the Gallery another international racer's delight.

HONORABLE MENTION



HONORABLE MENTION

*Steven Baker*  
**Flood**  
 Steven really gripped us with this dramatic depiction of a benighted house during a flood. Steven lives in Hattiesburg, Miss.



*Patrick Van Driel*  
**Rally Car**  
 This month, we go international with Patrick's portrait of a French Citroen Visa. Patrick lives in Hellvoetsluis, Holland.

HONORABLE MENTION



**SHOWCASE YOUR BEST!**

You are invited to nominate original work for inclusion in upcoming showings of CoCo Gallery. Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

We will award a first prize of \$25, a second prize of \$15 and a third prize of \$10. Honorable mentions also will be given.

Send your entry on either tape or disk to:  
 CoCo Gallery  
 THE RAINBOW  
 P.O. Box 385  
 Prospect, KY 40059  
 Attn: Monica Dorth



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*Brian S. Thorn*  
**U.S.S. Enterprise**

Brian has created a stirring illustration of The Federation's most famous ship approaching Earth. Brian lives on Patrick Air Force Base, Fla.

*Ray Larabie*  
**Street Scene**

Ray lives in White Lake, Ontario, and offers this impressive display of perspectives in a contemporary setting.

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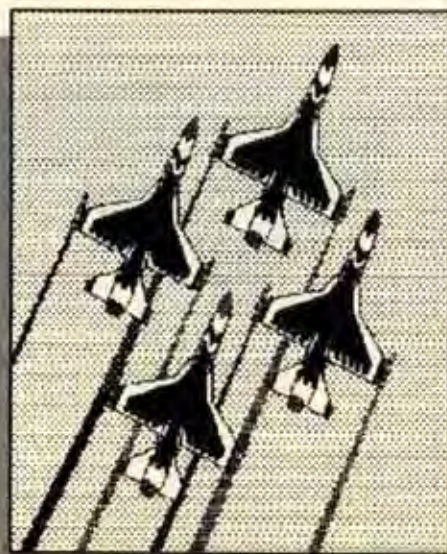
*Michael Keefe*  
**Gyrfalco**

From Philadelphia, Pa., Michael has submitted a portrait of a gyrfalcon, a strong and fierce predator of great dignity.

*Clay Howe*  
**USAF Thunderbirds**

Clay lives in Sturgis, Mich., and has captured the "right stuff" of the Thunderbirds' straight up, diamond formation.

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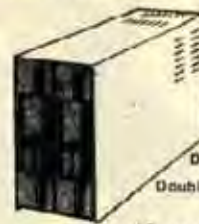
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## Important Message

16K  
ECB

By Bill Bernico

1Ø CLS:FORX=96TO448STEP96:PRINT@X,STRING\$(32,45);:NEXTX:FORY=4TO484STEP32:PRINT@Y,CHR\$(33);:NEXTY:FORZ=8TO488STEP32:PRINT@Z,CHR\$(33);:NEXTZ:FORC=12TO492STEP32:PRINT@C,CHR\$(33);:NEXTC:FORV=16TO496STEP32:PRINT@V,CHR\$(33);:NEXTV

2Ø FORB=2ØTO5ØØSTEP32:PRINT@B,CHR\$(33);:NEXTB:FORN=24TO5Ø4STEP32:PRINT@N,CHR\$(33);:NEXTN:FORM=28TO5Ø8STEP32:PRINT@M,CHR\$(33);:NEXTM:FORF=96TO384STEP96:PRINT@F,"";:NEXTF

3Ø POKE1Ø58,15:POKE1Ø9Ø,3:POKE1122,2Ø:POKE1154,15:POKE1186,2:POKE1218,5:POKE125Ø,18:POKE1314,113:POKE1346,121:POKE1378,12Ø:POKE141Ø,117

4Ø POKE1Ø37,113:POKE1Ø41,114:POKE1Ø45,115:POKE1Ø49,116:POKE1Ø53,117:POKE1157,118:POKE1161,119:POKE1165,12Ø:POKE1169,121:POKE1173,113:POKE1174,112:POKE1177,113:POKE1178,113:POKE1181,113:POKE1182,114:POKE1253,113:POKE1254,115:POKE1257,113:POKE1258,116

5Ø POKE1261,113:POKE1262,117:POKE1265,113:POKE1266,118:POKE1269,113:POKE127Ø,119:POKE1273,113:POKE1274,12Ø:POKE1277,113:POKE1278,121:POKE1349,114:POKE135Ø,112:POKE1353,114:POKE1354,113:POKE1357,114:POKE1358,114:POKE1361,114:POKE1362,115

6Ø POKE1365,114:POKE1366,116:POKE1369,114:POKE137Ø,117:POKE1373,114:POKE1374,118:POKE1445,114:POKE1446,119:POKE1449,114:POKE145Ø,12Ø:POKE1453,114:POKE1454,121:POKE1457,115:POKE1458,112:POKE1461,115:POKE1462,113

7Ø POKE15Ø9,18:POKE151Ø,1:POKE1511,9:POKE1512,14:POKE1513,2:POKE1514,15:POKE1515,23:POKE1516,6:POKE1517,5:POKE1518,19:POKE1519,2Ø:POKE1521,16:POKE1522,18:POKE1523,9:POKE1524,14:POKE1525,3:POKE1526,5:POKE1527,2Ø:POKE1528,15:POKE1529,14

8Ø FORU=1TO1ØØØ:POKE1177,49:POKE1178,49:POKE1181,49:POKE1182,5Ø:POKE1253,49:POKE1254,51:FORX=1TO6ØØ:NEXTX:POKE1177,113:POKE1178,113:POKE1181,113:POKE1182,114:POKE1253,113:POKE1254,115:FORB=1TO6ØØ:NEXTB,U





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## TALKHEAD

If you have a 'Real Talker', do not deprive yourself of this absolutely incredible machine-language Talking Head simulation program. While other talking head simulations use a minimal cartoon-like face, TALKHEAD uses high resolution, full-screen, digitized images of an actual person's face to create a life-like animated effect.



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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. Its 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 1/4 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 30 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-

pad into this new input and you have a whole new kind of control. The difference is remarkable.



## 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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# NUMBER

*For a challenge of your wits, try this mental stumper.*

**A**n arcade game calling more for mental than physical reaction, *Number Bumper* works in Color BASIC and — with the change noted in Line 150 — on the MC-10.

I've corresponded with hundreds of Color Computer owners, and while we all share one interest — the CoCo — we are a community of differing physical abilities. I know of a recovering stroke victim who uses two fingers of the same hand to type the BASIC listings found in *THE RAINBOW*. And there are users with degrees of impaired movement or paralysis caused by a range of circumstances.

*Number Bumper* is a game that such users can play. It is not meant to condescend to anyone's physical disability, but rather to equalize play among the range of our CoCo family by making the gist of the game a mental decision triggered by the tap of any key. I think *Number Bumper* will be challenging to all who enjoy recreations calling for nimble wits.

*(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 Color Computer programs.)*

To start the game, type RUN and press ENTER. Orange bars are drawn at top and bottom of the screen, with the word "SCORE:" at the bottom. Tap any key to start the game. As play begins, a number ranging from zero to nine scoots across the top of the bottom orange bar. Pressing any key shoots it to the top of the screen. It rests where it hits.

If a number is allowed to scoot all the way across the screen, 10 points are deducted. Points are scored by shooting a number up to rest against a higher number. For example, a '9' has stuck against the top bar; a '1' comes scooting across. A key tap sends the '1' upward to stick against the '9'. Since  $9 - 1 = 8$ , the turn is worth eight points. There is no score if the top number is lower than the number that hits it.

The game ends if two of the same number end up touching, either side by side or top to bottom. This produces a razzing sound, after which another game may be started by tapping any key twice.

(For those having any questions about this program, Mr. Ramella can be contacted at 1493 Mt. View Avenue, Chico, CA 95926. Please include an SASE.) □

By Richard Ramella

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DON'T GO TO THE LEFT!



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```

100 REM * NUMBER BUMPER * TRS-80
    COLOR BASIC 16K
110 REM * BY RICHARD RAMELLA
120 CLS: FOR X=1 TO 18: QS=Q$+C
    HR$(128): NEXT
130 Z$=CHR$(255): FOR X=1 TO 5:
    Z$=Z$+Z$: NEXT
140 S$="0123456789"
150 PK=1024: REM * MC-10 MAKE TH
    IS PK=16384
160 PRINT Z$;
170 PRINT @ 448,Z$;
180 PRINT @ 488,"SCORE:";
190 PRINT @ 232,"TAP A KEY TO ST
    ART";
200 IF INKEY$="" THEN Z=RND(0):
    GOTO 200
210 PRINT @ 232,Q$;
220 N$=MID$(S$,RND(10),1)
230 X=RND(2)
240 IF X=1 THEN FOR L=447 TO 416
    STEP -1
250 IF X=2 THEN FOR L=416 TO 447
260 PRINT @ L,N$;
270 FOR T=1 TO 40: NEXT T
280 PRINT @ L,CHR$(128);
290 A$=INKEY$: IF A$<>" THEN 350
300 NEXT L: FOR X=1 TO 10
310 SOUND RND(13)*RND(13),1
320 NEXT X: SC=SC-10
330 PRINT @ 494,SC;" ";
340 GOTO 220
350 FOR L=L TO L-384 STEP -32
360 PRINT @ L,N$;
370 L1=PEEK(PK+L-1)
380 R1=PEEK(PK+L+1)
390 U1=PEEK(PK+L-32)
400 IF U1<>128 THEN 430
410 PRINT @ L,CHR$(128);
420 NEXT L: GOTO 220
430 P=PEEK(PK+L)
440 IF L1=P OR R1=P OR U1=P THEN
    480
450 S1=U1-P: IF S1<0 OR U1=255 T
    HEN 220
460 SC=SC+S1
470 PRINT @ 494,SC;: GOTO 220
480 PRINT @ 14,"END";
490 FOR T=1 TO 30
500 SOUND 100,1: NEXT
510 PRINT @ 448,"";
520 Z$=INKEY$: IF Z$="" THEN 520
530 GOTO 120
540 END

```



**64K EXT. BASIC 134<sup>95</sup>**

**Color Computer II**



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**READY,**



**SET,**



**PRINT!**



# MAKE THE RIGHT CONNECTION WITH A TANDY® PRINTER

When you invest in a printer, the last thing you want is to find that it's not compatible with your Color Computer. So why take chances? Come to Radio Shack, where you'll find a wide selection of printers that are ready to use with your Color Computer. All you need is cable—and we have that, too! Just choose the Tandy printer that best fits your specific needs.

## What Type of Printer Should You Choose?

When you are ready to select a printer, whether it be for home or business, remember that print quality, speed and product dependability are important considerations as to the type of printer you need. Choosing a satisfactory printer today may be as important to your work as it once was to hire an accurate, efficient and dependable typist. It's also important that the company you buy your printer from is nearby with answers to your questions, top quality supplies and spare parts.

**NEW!**



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## Correspondence Printing for Just \$349.95

If you need correspondence-quality printing with variety, our new DMP 130 is the ideal printer for you! It prints in four character styles: standard or italic cursive in front panel selected draft or correspondence modes at up to 100 characters per second. It also supports super/subscripts, double-width, bold, double-strike and microfonts. Prints original, plus two copies on 4" to 10" fanfold paper or single sheets. It also features a tractor for continuous forms and auto load/eject. (#26-1280, \$349.95.)



DMP 105

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There are several reasons why dot-matrix printers are more commonly used with personal computers than any other type of printer. One is price. If you are looking for an affordable printer, you'll find our DMP 105 is ideal. For under \$200, this bi-directional dot-matrix printer will fulfill your data processing and general purpose uses. Another reason dot-matrix printers are so popular is speed. Our DMP 105 produces 80 upper and lower case characters per line at 43 lines per minute (80 cps). But the most important reason is performance. With bit-image graphics mode, removable adjustable tractor, our DMP 105 is hard to beat! (#26-1276, \$199.95.)



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How good do the printouts you produce have to look? If you are producing business letters or important reports, you know it's essential to get clean, sharp characters. With our DWP 220 you'll get full-featured letter-perfect printing for under \$600. Crisp, electric typewriter-quality characters are printed at over 200 words per minute (20 cps). Also includes forward and reverse paper feed and 1/2-line feed, underline and programmable backspace. (#26-1278, \$599.)

**NEW!**



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Never before has such fine print quality been so affordable! The print head of our DMP 430 contains 18 wires to produce excellent correspondence-quality fonts in a single pass. Prints 10, 12 or 16.7 characters per inch, plus elongated standard, elite and condensed at up to 180 characters per second. You can choose from micro, italic and double-high fonts, too. Produces bit-image graphics at 7 or 16-dot columns. The DMP 430 features a true pin-driven tractor—not sprocket, and is compatible with the IBM® PC. (#26-1277, \$899.)

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# RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

**No-Stat II**, an 11- by 15-inch antistatic pad to rest CoCo on, protect it from static electricity and draw dust and lint away from sensitive chips. The pad is made of inert conductive foam, laminated to a tufted fabric and contains no sprays or chemicals. *Amber Enterprises, P.O. Box 7439, Greenville, SC 29610, \$5.95*

**Escape From Denna**, a 32K ECB graphics Adventure set in the medieval Castle of Denna. The Adventurer is challenged to escape the dark, damp and stinking dungeon of the Castle Denna armed with nothing more than good sense and survival skills. *Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette \$25.95, disk \$28.95*

**Island Adventure**, a 32/64K graphics oriented Adventure game requiring a disk drive. The scenario: your private aircraft crash-lands on a remote Atlantic island. You awaken uninjured to find your demolished plane missing its radio. Did it fall into the ocean? Did someone take it during your unconsciousness? Is the island, therefore, inhabited? Where are you? How do you get off this island? *Stephen B. Boothby, 435 Dorset Commons #93, So. Burlington, VT 05401, two disks \$11.95 plus \$2 S/H*

**Battle Stations**, a 32/64K one-player interactive game to test skill and strategy. CoCo is your adversary as you face off in this game of tactics. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$21.95, disk \$24.95 plus \$2 S/H*

**Blackbeard's Island**, a 32K Hi-Res graphics Adventure requiring a disk drive wherein you, Tom Wentworth, wash ashore on Captain Edward Teach's (a.k.a. Blackbeard) island paradisc. Can you find his treasure

before the volcano erupts? *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, disk \$19.95 plus \$2 S/H*

**Buzzworm**, a 32K maze arcade wherein you guide Buzzworm to eat snakebait and gain points. But as Buzzworm grows longer, it must avoid biting itself; Buzzworm bites are fatal. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$15.95, disk \$18.95 plus \$2 S/H*

**Color Car**, a 64K racing arcade game requiring joysticks. Among the hazards are other drivers, air and water jumps. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$19.95, disk \$22.95 plus \$2 S/H*

**Gold Runner**, a 64K arcade game with joystick option. The object is to collect all the bricks of gold on the screen, avoid the guard and reach the top of the screen where an escape ladder appears. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$14.95, disk \$17.95 plus \$2 S/H*

**Moneypoly**, a 32K CoCo version of the popular board game "Monopoly" requiring joysticks and containing all the features of the original game. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$19.95, disk \$22.95 plus \$2 S/H*

**Panic**, a 32K arcade game requiring joysticks. The object is to dig holes and wait for a Meany to fall in, then bury him before he gets out. *NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, tape \$14.95, disk \$17.95 plus \$2 S/H*

**Scepter of Ursea**, a 32K graphics Adventure requiring a disk drive wherein you explore the countryside

and harbors of exotic Ursea where dragons dwell. *Prickly-Pear Software, 2640 Conestoga Avenue, Tucson, AZ 85749, disk \$29.95 plus \$1.50 S/H*

**EARS**, a 32/64K audio recognition device to allow users to train CoCo to recognize their voices for hands-off programming. Up to 64 voice prints can be loaded into memory and then saved to tape or disk. *Speech Systems, 38W 255 Deerpath Road, Batavia, IL 60510, \$99.55*

**The Best Screen Dump Utility for Epson Type Printers**, a 16K screen dump utility featuring three sizes of printouts (11 by 7 cm., 17 by 17 cm. or 28 by 28 cm.), double-strike option for darker printouts, reverse printing switch and use of double-density, bit-image mode. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, cassette \$14.95 plus \$2 S/H*

**The Disk Pilot**, a 32K disk maintenance utility that features error trapping, complete information on any file including granules used, size, execute addresses, copies, kills, renames files and is cursor driven. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, tape \$14.95 plus \$2 S/H*

**Disk Utility Package**, a 32K utility including the following programs: Archive, to save tape to disk; Backup, supports 40-track systems; Format, replaces *DSK1N1*, will work with 35- or 40-track systems; Find, reports all occurrences of a pattern; Compare and Menu. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, disk \$19.95 plus \$2 S/H*

**HIRES+**, a 16K high resolution text display with BASIC enhancements. Features include true upper- and lowercase displays with 24 lines and scroll protection, same version for either cassette or disk systems, variable line width and instant change between two character sets. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, cassette \$19.95 plus \$2 S/H*

**Label Maker 3.0**, a 32K ECB utility for printing labels compatible with all types of printers. Features include Hi-Res screen preview before printing, automatic centering, all defaults can be customized and same version for cassette or disk systems. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, tape \$19.95 plus \$2 S/H*

**Magazine Index System**, a 16K utility requiring a disk drive to keep track of magazine articles. Features include transfer utility insuring compatibility with other database programs, fast search routines and the saving of data in a compressed format for more records per disk. *CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, disk \$14.95 plus \$2 S/H*

**CBASIC**, a 32/64K programming utility requiring a disk drive to convert Color BASIC programs into machine language programs. Features include over 100 BASIC commands and functions that support disk, tape, screen and printer I/O, high and low resolution graphics, sound, play and string operations. Also included is a full-featured BASIC program editor using a 51.64 or 85-by-24 line display. 64K is recommended. *Cer-Comp, 5566 Richochet Avenue, Las Vegas, NV 89110, disk \$119 plus \$2.50 S/H*

**Speak Up! 3.3**, a 16/32/64K text-to-speech converter using just over 7K. Features include voice synthesizer requiring no additional hardware, may be embedded in BASIC to give your programs voice and documentation with hints to help CoCo's pronunciation and change the pitch of voice. *Educational Micro, Inc., 1926 Hollywood Blvd., Suite A620, Hollywood, FL 33020-4524, cassette \$29.95*

**Insights into Personal Computers**, a book of general information about PCs with overviews of the history of PCs, the anatomy of the portable computer, the role of communication technologies in the PC revolution and chapters dealing with the structure capabilities and design of PC software. *The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017-2394, \$29.50 plus \$2 S/H*

**Trigger 64**, a 64K machine code utility for the CoCo 2 that acts as an interface between *EDTASM* and BASIC, allows switching between the two and EXECs ML routines in BASIC with crash-proof *EDTASM* edit buffer. *Master Creations, P.O. Box 2040, Pine Bluff, AR 71613, cassette \$34.95, Arkansas residents please add 4% sales tax*

**OTERM**, a terminal emulation program requiring 64K, OS-9, at least one disk drive with controller, a deluxe RS-232 Program Pak, TRS-80 MultiPak Interface or PBJ CC-Bus and modem. *OTERM* permits you to use CoCo as a terminal to access BBSs, information services or any host computer (even another CoCo) that supports communication with remote terminals. *New World Technologies, Box 1209, Dublin, OH 43017, \$39.95 plus \$2 S/H*

**Kansas City BASIC**, an OS-9 implementation that requires 7K for the program and approximately 2K for data and program storage. Feature enhancements include functions such as PEEK and POKE, variables dynamically located, sequential and random disk files provided using standard operating calls. OS-9 Shell commands can be executed from command line and ability to add floating point math. *Steve Odneal, 8609 East 73 Terrace, Kansas City, MO 64133, disk \$25*

**Tele Addresser**, a 64K record-keeping utility requiring a disk drive. Features include over 1,000 records per disk, printing of address labels, telephone record organization, telephone directory printing, sales call formatting and sequential alphanumeric ordering of any field users select. *PKM Software, 1117 Denton Street, Lakeland, FL 33803, disk \$49.95 plus \$2.50 S/H*

**Software Success**, a book by Brian King advising programmers on how to mar-

ket software successfully. Included are chapters on planning a software business, finding markets for software and deciding what software to market. *Potomac Pacific Engineering, Box 2027, Gaithersburg, MD 20879, \$4.95*

**Investograph**, a 32K ECB investment analysis tool requiring a disk drive. Features include analysis of price and volume data (high, low and closing prices and trading volume) for stocks, bonds, listed puts and calls, stock indexes, stock futures, mutual funds and commodities. *Radio Shack Stores nationwide, disk \$49.95*

**Orchestra-90CC**, a 16K combination of software and hardware to make you maestro of your own electronic orchestra and transform CoCo into a programmable music synthesizer. Features include a cartridge that connects CoCo's I/O connector to your stereo to produce a stereo synthesizer; six octave ranges; up to five simultaneous voices using two stereo channels; Music Language programming method that lets you enter all components of a piece of music line by line; four or five voices, each of which can be assigned to any of five instrumental choices (tone color registers); one program in ROM allowing you to create, play, load, edit and save to tape or disk; and a Transfer Mode to transmit files via a 300 Baud modem. *Software Affair, distributed by Radio Shack, available at Radio Shack stores nationwide, \$79.95*

**BriteFace**, an intelligent serial-parallel interface requiring a Centronics compatible parallel printer, a 110-volt, 60 Hz power source and CoCo with Color BASIC 1.1 ROM or later, which samples incoming data and computes transmission rate for maximum efficiency. *Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, \$59.95 plus \$3 S/H*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

## Trivia — A Question Feast For The Trivia Buff

True or False? Henry Fonda played the leading role in the movie *High Noon*.

If you answered "true," shame on you. Everybody knows Gary Cooper was the star of one of the last great movies of an era that was dominated by cowboy heroes. Clint Eastwood? He was just an also-ran on an old TV series called *Rawhide*.

Here's one for you sports fans: Who is the leading home run hitter of all time in baseball's major leagues?

Babe who? How long has it been since you've been to a game? The correct answer, of course, is Henry Aaron. Now, who was Aaron playing for when he connected on his historic blast? How old was he?

If such information captures your interest, welcome to the growing club of trivia buffs who thrive on bits and pieces of sometimes inconsequential facts from the past. You will probably also enjoy *Trivia*, a new quiz program from Moore Computer Services featuring 500 questions in the following categories:

- A) Entertainment, Movies, TV, Music
- B) History, Geography, Politics
- C) Art, Literature, Science, Nature

- D) Sports, Games, Leisure
- E) Mixed Subjects (all of the above)

Something for everybody, right? Well, most of us anyway. If your interest isn't listed, don't fret; in the documentation accompanying the program, Moore promises there will be 23 additional "volumes" released during the next few months.

They seem to have thought of everything. There is a 32K disk version, a 32K cassette version and even a 16K cassette version (which has eight different quizzes of 50 questions each — four on each side of the cassette). All three versions feature three clock speeds, for beginners, advanced players and geniuses, respectively.

Extended BASIC is not required, they note, which is good for those who do not have this feature on their CoCo. What this means, of course, is that graphics are held to a bare minimum. It also means you're looking at a screen that is largely green most of the time, except for the questions. By turning down the color on the TV, my eyestrain was greatly alleviated.

The authors appear to have done thorough research on the questions in every category. And they show a lot of thought in the questions selected — except for the true and false questions, most of them have up to eight multiple choices.

You have two opportunities to answer the questions (unless it's in the true or false category) and your score for that turn depends upon how fast you answer before time runs out. There's a clock at the bottom of the screen, which is at once helpful and distracting, especially if the question is a difficult one.

After answering the question, you're ready for another. However, I found the flashing prompt "Press any key for the next question" to be unnecessary and downright irritating — especially after trying to beat the clock on the previous round. It had a kind of neon-light effect, trying to dazzle me when I wasn't in the mood for it.

I was also a little annoyed that there was no random selection of questions. They seem to be in the same order for every category every time the game is played. There is too much programming information readily available for the authors not to take advantage of it.

Aside from these minor irritations, *Trivia* is a good program. And if the authors follow through with 23 additional volumes, I'm sure we'll see some dramatic improvements along the way. They are off to a good start.

(Moore Computer Services, 1090 East Country Club Circle, Plantation, FL 33317, cassette \$19.95, disk \$21.95)

— Charles Springer

### ADOS ENHANCED, EPROM-ABLE DISK BASIC

Now, you can supercharge Basic with an impressive array of extra features. WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing abilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have it burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 64K disk utility. (EPROM — burning will cost about \$20—we provide information concerning how you can have this done.) Features include: \* repeat and exit of file and direct mode command \* 26 definable control key abbreviations \* automatic line number prompts \* UDS command \* lowercase command entry is true containment (i.e. Lovershit is PBJ WordPak) \* COPY (filename) to (drive number) \* AC error override option \* RAM command (64K) \* RUNM command \* text echoing to printer \* ML monitor \* test file scan \* enhanced directory \* error trapping \* hexa text utility (includes A9, 51 or 5A characters per line).

"I COULD NOT FIND ANY SOFTWARE THAT WOULD NOT RUN UNDER ADOS."

— THE RAINBOW, December 1984

"I LOVE ADOS! ... A GENUINELY FIRST RATE PRODUCT."

— Color Micro Journal, February 1985

"I WON'T PART WITH MY ADOS EPROM FOR ANYTHING ... NO COMPATIBILITY PROBLEMS."

— NSE CoCo May 1985

Disk... \$27.95

### THE PEEPER ML PROGRAM TRACER

Monitor machine-language programs AS THEY ARE RUNNING! Peeper actually timeshares with the target program, giving F88 CONTROL as ML programs run. Peep! Instantly displays (including regular program values) and Peeper's trace of registers and stack on screen or printer. (Input) memory in any of 25 0-100% modes. Execution speed can be varied from full speed to the slowest crawl, or halted entirely, as programs run. Single-stepping, breakpoints, memory or register examination. Relocatable, supports 64K use. (16K required). See February '85 review.

Disk... \$23.95 Tape... \$21.95 Assembler source listing... Add \$3.00

### FASTAPE THE NEXT BEST THING TO A DISK DRIVE

Fastape allows cassette (U) or 3000 baud—TWICE NORMAL SPEED, 6 use the high-speed (POKE \$6495.0) mode, and makes it convenient to stay in this mode throughout. Features automatic adjustment of cassette and printer parameters when speed mode is changed. Control key functions for many Basic commands and for changing speed modes. Compatible with all file types and can be used with Teletext-64 and many other tape utilities.

Tape... \$21.95 (16K required). See July '83 review.

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### Hint...

#### Recording CoCo Music

If you want to record the sounds produced by the CoCo's sound generators (say, from a music program), you can do it easily using the cassette recorder (if you use one with your CoCo) by unplugging the smaller gray plug or entering MOTORON. Note that this doesn't apply to speech or sound generator packs you may have plugged into the cartridge port.

## COLOR DISK MANAGER

Color Disk Manager will do selective initializations, verifies, backups, repairs and much more!

- Will initialize single tracks, a range of tracks, or the entire disk to more than 35 tracks
- allows you to make a backup of the directory out of reach of basic and put it back if a directory crash occurs; has a recover file command which will load entire files off the disk if the directory crashes and the allocation table is good; will repair or salvage crashed disk several ways
- is 64K compatible allowing a 64K backup; does backups by track, a range of tracks, or the whole disk (will do more than 35 tracks)
- gives an allocation table map with granules x-referenced to tracks and sectors, and showing which granules are used; displays a file granule map showing which granules, tracks, and sectors the file uses, and the length
- will do a directory displaying file names in two columns, the number of free granules, and the free bytes if below 65535; has a kill file command
- loads and saves, sectors, tracks or files; loads files two ways, as done by basic, or with header bytes left in, which helps in studying how files are saved on disk; has an append sector command
- verifies tracks or the entire disk showing the track and sector if an error occurs, with the option of continue or stop
- is multiple drive compatible
- allows you to save a block of memory to disk; transfers programs from tape to disk
- has a rapid scan feature which allows you to scan the disk by tracks and sectors using the arrow keys
- will dump memory to the screen in ascii, good for listing basic programs or source files; has a move memory block command, and a transfer control command
- converts decimal to hex or hex to decimal
- allows you to examine memory using the arrow keys with displays in hex (or decimal) and ascii
- will load and execute rompac's saved on disk; has a move rom to ram command
- allows you to change origin (start addr.) of ML programs; displays the start, end, and execute addresses of ML programs
- 32K - 64K ECB \$34.95 Disk

## RAINBOW SCREEN MACHINE

- Add these features to your computer/program: ML extension of Basic loads on top of 16, 32, or 64K machines to enable easy mixture of hi-res graphics and text in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
- User definable 224 character set featuring lower case descenders, Greek, cars, tank, planes, etc., completely interfaced with all keys, commands, and PMODES. 12 sizes (most colored) from 16 x 8 to 64 x 24. PRINT for, TAB and comma fields are fully supported.
- 2 distinct character sets automatically switch for sharpest lettering featuring underline, subscript, superscript, reverse video, top and bottom scroll protect, double width, colored characters in PMODE 4, and help screen.
- Simple 2-letter abbreviated commands inside your program or control key entry from keyboard, even during program execution!
- Includes demo program, character generator program and manual. 16K Basic required. 32K recommended. \$29.95 Tape; \$32.95 Disk.

## COLOR TAPE MANAGER

- merges multiple basic programs into one; appends multiple machine language programs into one; appends machine language to basic (example included)
- converts numbers from hex to decimal or decimal to hex; allows input in hex or decimal
- rapidly scans memory using the arrow keys with auto-key repeat
- displays memory in hex (or decimal) and ascii; allows the changing of memory in decimal or hex
- deals with missing end of file blocks, loads and saves data with or without a filename block
- handles programs with varying block lengths
- displays the start, end, and execute addresses of ML programs; displays the buffer start, end and top addresses
- converts ML programs into basic data statements which can be loaded as, or merged with, a basic program
- turns the audio and cassette motor on and off with one key commands; has inverted displays which lessen eye fatigue
- finds the end of programs on tape even from within a program with a skip file command; allows the transferring of control to other programs with a go command
- moves blocks of memory from start through end address to new start address; allows the changing of the origin (start addr) or ML programs
- has an 8,380 byte loading buffer with 16K systems and 24,760 byte loading buffer with 32K systems
- 16K ECB minimum \$19.95 Tape \$22.95 Disk

## SUPER SCREEN MACHINE

All of the features of Screen Machine and more:

- Variable SMOOTH Scroll for professional displays, listings, business use.
- Variable volume KEY Click (tactile feedback).
- EDTASM + command for instant compatibility with cartridge EDTASM
- Superpatch + command for instant compatibility with the Superpatch + Editor Assembler.
- True Break key disable and recognition.
- 10 User Definable commands used to activate your special drivers or subroutine
- Dynamic Screen Dump command for use with Custom Software, Engineering's Graphic Screen Print program for simple printer "Snapshots" of your screen even during program execution!
- Super Screen Machine - \$44.95 Tape; \$47.95 Disk.

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is truly unlimited.

Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer's Basic manuals will turn you on to the power of computing with Screen Machine.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by typing.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T8J-3L1, (403) 421-8003.

Disk software compatible with Radio Shack DOS only.

### SUGAR SOFTWARE

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Hollywood, Florida 33021

(305) 981-1241

A complete catalog of other sweet Sugar Software products is available.

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VISA

## Get Organized With Easy-To-Use Merge 'n Mail

I need to get organized. My boss keeps telling me to get organized, my wife thinks I should get organized and my kids think I should get my stuff together. It's not that I am a sloppy person, I just use the "file by pile" method of storage and retrieval. When something comes in I need to keep, I put it in a pile. The problem is that I end up with piles of stuff here, there and everywhere, and I spend too much time rooting through piles looking for stuff I know is there, but I just don't know where.

All I needed was the correct software to help my CoCo store things and retrieve them on command in a usable format. To my assistance comes *Merge 'n Mail* from the folks at Computerware. Designed primarily as a mailing list maker, this program has additional capabilities and also functions as an easy-to-use mini-database.

The emphasis with this program is on ease of use. Unlike *dBASE III*, which I have great difficulty using because of its complexity, *Merge 'n Mail* is very easy to use.

The fields which would normally be used to generate a mailing list are preset. These fields are:

|            | Maximum<br>characters |
|------------|-----------------------|
| Last Name  | 15                    |
| First Name | 13                    |
| Company    | 26                    |
| Address    | 30                    |
| City       | 20                    |
| State      | 2                     |
| ZIP        | 5                     |

There is also a set field for telephone numbers.

Additionally, there are up to 12 fields which can be configured by the user. For these fields, the user also specifies the number of characters each field contains. Once these fields are set, changes can be made to the data stored in the data file, but not to the fields themselves and their characteristics.

These additional fields can be used to store information which you want to store about the person, but not necessarily print on a mailing label (such as birthday, spouse's name, etc.). Examples are given in the well-documented instruction manual. These would aptly pertain to a computer club. In that instance, pertinent data could be the number of drives, maximum memory and date dues are due.

*Merge 'n Mail* can also print out the data on standard 8 1/2 by 11-inch sheets as well as labels. Two choices are offered: long listing with all the programmable fields, or a short listing with just the name and address fields.

For printers offering compressed printing (132 characters in the normal 80-column space), the program allows you

to enter the printer control codes for compressed and expanded typestyles to obtain maximum function from your printer. My DMP-100 does not have this capability, so I used the standard short listing mode which worked just fine.

Once data has been entered, it can be recalled for examination, changes, additions or deletions. Several search options are given to assist you in finding a particular file in the database. As new persons are added to the database, the entire file is re-sorted by last name. When labels are printed, you are given the option of re-sorting by ZIP code, since significant mail cost savings are available if bulk mailings can be presorted by ZIP code.

*Merge 'n Mail* also has a feature which allows you to merge the information in your database into a form letter that won't look like a form letter. (Hence the "Merge" in *Merge 'n Mail*).

After composing a letter on any of the disk-based, ASCII-generating word processors (*Color Scribes*, *Telewriter* changed to ASCII output, *VIP Writer*, etc.), you put control codes where you would normally put the name, address and the other data which is now contained in your database files. *Merge 'n Mail* then pulls this data out, prints the information, justifies the remainder of the text and continues onward until the list is completed. *Voila!* Form letters without the "form letter" look. My friends and relatives are going to be surprised when they start receiving letters from me. I've even put a field for birthdays in each file so birthday cards will be on time.

My list of suggestions for improvements for *Merge 'n Mail* is a short one. The first eight fields are fixed regarding subject and field width. While this simplifies the set-up routine for most mailing applications, the lack of flexibility regarding field width creates some problems.

The ZIP code block is set to five spaces, thus eliminating the ability to use the six-digit Canadian alphanumeric postal code. The first name is set at 13 spaces. Enough for one first name, but I ran into problems with entering the first names of married couples I wanted to include on one letter (i.e., Dear Maryanne and William). The ability to specify the field width in the first eight fields would eliminate this problem, or just adding a few more spaces to these field widths would help.

If you are very good at BASIC, you can go into the program and modify it, but be forewarned that it was written to be memory efficient, not easy to modify. I took a peek at the listing and gave up.

The other limitation is only one mailing list can be on one disk, even if it is a very short one. Not a big problem, except that disks (and the required backups) are not cheap.

*Merge 'n Mail* requires a 64K disk CoCo. This is not a problem with the program, as the features justify the memory required; it just limits the number of potential users.

Overall, I consider it an excellent program — more than just a simple mailing list and less than a full-featured database. Considering the price, it is quite a value.

(Computerware, 4403 Manchester Ave., Suite 102-Box 68, Encinitas, CA 92024, requires 64K, disk \$27.95)

— Bruce Rothermel



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## Guide To Computer Magazines Is Comprehensive And Informative

Are you searching for computer publications to suit your particular needs? Steve Davis Publications has a new book, *Guide To Computer Magazines*, that will make your search easier. *Guide To Computer Magazines* is divided into three major areas: 1) Popular and General Interest Magazines, 2) Trade and Professional Magazines and 3) Newspapers and Newsletters.

Francis Amato, the author, tried to include as many details as possible about each publication. Some of the publishers did not respond to requests for information; consequently, data concerning these publications is rather limited. On the other hand, many of the publishers did respond with a wealth of data. Information such as description of the audience, the editorial scope, regular features and subscription information is provided. (The description of RAINBOW takes up nearly a page.)

One of the most useful parts of *Guide To Computer Magazines* is the "Subject Index." Applicable publications are listed under specific subject areas. This is a partial list of subject areas that CoCo users might find interesting: Computer Languages, Databases, Education, Epson, Games, Graphics, Handicapped, Legal, Tandy/Radio Shack and Telecommunications.

The "Title Index" lists the publications in alphabetical order and gives the page where the publication is described. By using the "Subject Index" and "Title Index" you can quickly find publications that will meet your needs.

Overall, I think *Guide To Computer Magazines* will make a good reference addition to your CoCo library.

(Steve Davis Publishing, P.O. Box 190831, Dallas, TX 75213, \$9.95)

— Gabriel Weaver

### One-Liner Contest Winner . . .

Run this graphics One-Liner and see how long your eyes can last!

#### The listing:

```
Ø POKE65495,Ø:S=1:Z=RND(-TIMER):
PMODE4,1:COLORØ,1:PCLS:SCREEN1,Ø
: DRAW"BMØ,Ø":FORZ=ØTO1STEPØ:A=RN
D(192)-1: DRAW"M=Y; ,=A;":Y=Y+4:S=
NOTS:SCREEN1,S+2:IFY=>255THENY=Ø
: DRAW"BMØ,Ø":NEXTSENEXT'
RAINBOW-----FLASHWAVE-----1 LINER
BY MARC ANDREESSEN
```

Marc Andreessen  
New Lisbon, WI

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventures Tape*.)

## Personal Bookkeeping 2000 Has Significant Improvements

*Personal Bookkeeping 2000* is an enhanced version of *Personal Bookkeeping 84*. In the November 1984 issue of THE RAINBOW (Page 214), I did an extensive review of *Personal Bookkeeping 84*. This version is basically the same program, except the author has modified many of the areas I found objectionable in the original review.

Those improvements include the ability to easily define your own expense categories rather than have to live with those selected by the author. In the original program, it only provided for check numbers of three digits; you can now enter four digits. I think this will meet the needs of most users. You can now easily add service charges to your accounts which makes it much easier to reconcile accounts.

In the earlier version, it was assumed we all would make entries into our bookkeeping system on a daily basis. Because of this you had to go back to the main menu to change dates. With *Personal Bookkeeping 2000* that is not necessary and, believe me, it makes data entry much more user friendly, especially for those who enter these type records on a weekly basis.

Another significant improvement is in the documentation. It's more clear than the original and the author has included a tutorial that shows how to use most of the major functions of the program.

*Personal Bookkeeping 2000* is a powerful program that is user friendly. It provides the user with a wealth of information. It requires 32K ECB, disk drive and printer.

(AMDT-Stardancers, 762 Brady Avenue, Bronx, NY 10462, disk \$39.95 plus \$1.50 S/H)

— Michael Hunt

### One-Liner Contest Winner . . .

This one-liner, inspired by some previous one-liner contest winners in THE RAINBOW, is called *Cosmic Birdhouse*.

#### The listing:

```
1Ø CLS:P MODE1,1:PCLS:SCREEN1,Ø:D
RAW"BM45,61;L5ØE7ØF7ØR1ØU2ØR1ØD1
1ØL1ØØU1ØR2ØU5L25D1ØR1Ø5H4G4H1ØE
6U5L2ØD6L12ØD4ØR2ØØF5E5F5E5F5U2Ø
ØL99D1ØØL1ØØU4ØBM47,67;E5F5G5H5"
: PAINT(4Ø,44),2,8: PAINT(2ØØ,62),
4,8: PLAY"L25;A;Ø3;A+;A-":FOR X=1
TO 112Ø:NEXT X:GOTO 1Ø
```

Michael Holt  
Victoria, British Columbia

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

## Probaloto — Not Just A Random Number Lottery

It's in the news a lot lately: "Local Citizen Wins Millions in State Lottery." With more and more states getting into the lottery business, *Probaloto*, by Gary Olander, may be just the ticket for you.

The documentation points out that *Probaloto* is not "just another random number-generating lottery program"; the object, however, is to pick the numbers to win you millions. This machine language program is available on tape for 16K ECB, while the version I received on disk requires 32K ECB (or 64K under JDOS). It is well-documented and the program is menu driven — it's so easy to use that after going through the documentation once, you'll probably file it away.

The user is prompted for information about the particular lottery being entered: how many numbers are picked and out of how many numbers. The example given for a regular lottery picks six numbers, from one to 40, but these parameters can be changed. Output can be routed to the screen, or to screen and printer. Printer Baud rates from 300 to 9600 can be selected.

The first three selections from the main menu are strictly random number generators. The first picks three numbers (zero to nine), the second picks four numbers (zero to nine)

and the third picks six numbers (one to 40), for what is called the regular lottery game.

The fourth selection from the main menu is labeled "weighted" random selections. This is the feature which makes the program more than just a random number generator. The user has the option of setting up weighted data files using lists of past winning numbers which are available where lottery tickets are purchased. This is easily done by answering prompts to input the number of times each number (one to 40 or zero to nine) has been a winner. These files can be labeled and saved to disk (or tape) and a hard copy can be listed by the printer.

The weighted random selection process can use these data files in one of two ways. If the user feels that the process used to select winning numbers picked twice as many 4s as 17s in the past, and is, therefore, likely to continue that trend in the future, *Probaloto* can weight towards the most-picked numbers. In the example given, the program would be twice as likely to "randomly" select a 4 as a 17. If, however, the user feels that Lady Luck plays her hand such that poor old 17 is due, the program can weight toward least-picked numbers.

This weighted selection procedure can also be used to set up data files which will favor the selection of your lucky numbers, or conversely, tend to avoid your unlucky numbers.

To test this weighting process, I wrote a short BASIC program to generate at random regular lottery-game winning numbers. I input 60 sets of six numbers into a data file and used this to have *Probaloto* make selections weighted toward the most-picked numbers. I then had *Probaloto* make an equal number of selections strictly at random. When these results were compared to my original list, the weighted selections produced 7.5 percent more matches than the random selections. My original list was fairly well-distributed. More pronounced variations in frequencies in the data input would have added to the weighting effect and increased that percentage.

My criticisms of *Probaloto* are very minor. The data file printout produced by the program is a narrow column near the left margin consisting of numbers and the times each has been picked. For a regular lottery game this column is 40 lines long, using much more paper than would be necessary if the output were better formatted. Also, when finished with either printing or saving a data file, the program returns to the beginning with initial questions about your state's lottery. It would be more useful to return to the main menu at this point. Lastly (dare I be so picky?), the word "array" is misspelled on one of the screens.

If you are into playing a lottery and believe the game is truly random in practice as in theory, stick to the random number generator already in your CoCo. On the other hand, if you feel that Lady Luck is not always random and want to use some sophisticated mathematics to bring her in on your side, then *Probaloto* may be just the thing for you. I'll second the program's sign-off message: good luck!

(Gary Olander, 322 Haymarket Pl., Gahanna, OH 43230, 16K ECB (tape or 32K ECB disk, \$19.95)

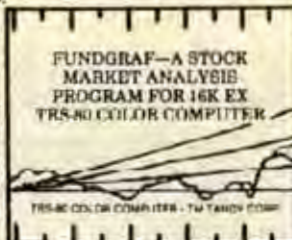
— Stanley Townsend

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## Dungeon Quest Combines Adventure Intrigue With Arcade-Game Action

*Dungeon Quest* by Computerware is a graphics Adventure game using a combination of the keyboard and joystick. Both 32K Color BASIC and a joystick are required to play the game. The action is similar to games played on home video arcades which involve using a joystick with a touch pad combination.

In the game, you are a lad named Brodrick who has just come of age. He is a restless lad and decides to go out into the world and make his fortune. His father gives Brodrick his inheritance, a rusty old sword which is rumored to be magical. As Brodrick travels to the East, he hears tales of an underground palace nearby. To make a long story short, the emperor named Darius dies of a plague and, having no heir, decrees that the finder of his crown will rule his empire. The story has it that the crown has never left the keep.

A fortnight later Brodrick enters the dungeon and within a few steps the floor gives and he tumbles into the depths of the dungeon. This is where we start our quest; with pencil and graph paper, I began. After several deaths, many hours and a few bottles of eye drops, I found the crown but discovered I did not have the right key to open the door, so the quest went on.

Your disk or cassette comes with two versions of the game, LOAD in the version you want and you're off. The game auto-executes; all you need to do to get started is answer the questions: "Do you want to have the objects randomize Y/N" and "Which level of difficulty do you want, 1, 2 or 3?" Both game versions are different, the second being a more complex maze of tunnels, corridors and rooms.

There are several types of treasures which, besides increasing your wealth, also move you up the social ladder. You are only able to carry eight objects at one time, meaning you must make frequent trips back to the start of the dungeon to drop off some of your treasures in order to get more. In addition to treasures, you may also find other weapons or keys to aid you in the game. The joystick control for the character is adequate, but controlling the weapon is difficult at best. In addition to escaping with treasure, you may also increase your score by fighting the monsters.

I found *Dungeon Quest* to be quite enjoyable if I mapped it out. Otherwise, it became merely a pointless trial-and-error search of an extremely complicated maze. If you enjoy Adventures and arcade games, you will surely like this combination of both.

(Computerware, P.O. Box 668 Encinitas, CA 92024, cassette \$24.95, disk \$27.95 plus \$2 S/H)

— Stephen Hess

## CoCo Checkbook Disk: As Good As The Tape Version

First, I would like to refer you to the *Color Checkbook* review I did which appeared in the April 1985 issue of THE RAINBOW, Page 210. The very last line of the review reads, "Now all we need is a disk version." Well, that is exactly what we have!

Spectrum Projects is now selling *CoCo Checkbook Disk*, the disk version of this useful utility which allows one to balance the checkbook. This version is every bit as good as the original, and even better for those with disk systems. All of the original features (modified to work with disk data files) are there. The manual is again professionally done with many helpful hints and advice.

FOXX Software has made all of the needed modifications to make this a perfect checkbook balancer. Now we have everything!

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— Jim Sewell

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## Print Master Helps Master The Screen Dump

By Dennis A. Church

*Print Master*, from Dataman International, is a two-program package that helps solve the problem of getting the graphics screen to the printed page. You are thinking that this is a graphics screen dump program. Yes, that is what it is, but it is different and more sophisticated in several ways.

*Print Master* was reviewed from the disk version. It is contained on a single, copy-protected disk and requires a 32K Color Computer; it has some features which take advantage of a 64K CoCo. It is also available on tape.

The main program is titled *PMAS* (for "Print Master"). With it you select from an extensive list of options designed to load your graphics screen and print it out any way you want it. You select and execute options almost exclusively with joystick and firebutton. They call it "clicking the mouse" and it will work with a mouse, but I found the joystick more convenient.

Ease of use for this program is not very user friendly. The question is, will I instinctively know what to do from the choices presented to end up with what I want? The answer is, "No." But I'm one of those who doesn't think "instinctive" programs are all that possible; I expect to need a manual to operate a complex program. I'll just

say that *Print Master* presents easy options to those who understand the options. It also recovers from improper input without damage to your work. Though you can **BREAK** in the program, the graphics screens are all intact when you rerun.

The menus available are the Main Menu, File I/O, Image Dump and Dump a Screen. Graphics screens may be loaded from tape, disk, *Graphicom* and *CoCo Max*. Image dump parameters are pixel size (controlling the size of the image), inverse, rotate, dumping more than one graphics screen, shading, tabs, dump using text, as well as a choice that selects a user-programmed option for unique printer codes.

Before dumping one or more graphics screens, you can select the PMODE and which screen (or portion of screen) you wish to print. You can have two PMODE 3/4 screens in memory at once; eight if you are in PMODE 0. A 64K computer gives double this area. The added memory also makes it possible to store screens in high memory, load a second screen and print multiple screens in a user-selected order.

Before any image can be dumped, however, the printer driver must be loaded. If you have a printer of the following type, the driver is included with the program (with more promised in time): Tandy, Gemini, Imagewriter, C. Itoh, Spirit 80, Mannesmann Tally and the CGP-115. If you don't have one of these printers, or you want to employ custom codes in the printer driver, the second part of this program comes into play. It is called *The Customizer*.

*The Customizer* creates a printer driver for use by *Print Master*. Even though it is menu driven, it requires a good understanding of your printer. The manual warns that using *The Customizer* may be difficult because of poor printer manuals and the complexity of dot graphics printing. (That warning rang true on several midnight sessions for me.)

Here is a sampling of knowledge needed to design a custom printer driver: Baud rate, number and configuration of pins in the printhead, Most and Least Significant bit order required and the control codes you want sent to the printer in sets of custom designed strings. *The Customizer* includes a Store Buffer, Clear Buffer and Test Options capability. Bad control codes can be selectively replaced before saving the file. The file you create from *The Customizer* is the printer driver you load to *Print Master* before making a screen dump.

As I mentioned, the manual warns about the complexity of the program. The manual itself is an impressive looking, three-ring binder printed in brown on brown in a curious two-column format. It has an index, a helpful appendix and reproductions of program menus and other illustrations. I suspect the manual was prepared using this program plus two other Dataman programs helpfully explained in Appendix D: *Text Master* and *Graphic Master*. Despite these assets, it still requires a careful, cover-to-cover reading to use the program effectively.

I obtained printouts of their test picture and a *Graphicom* picture you select within *Print Master* from the *Graphicom* menu on both a Gemini-10X and a Line Printer VII. Options to control the size and rotation of the dump worked well. (No, the program doesn't make the LP VII any quieter.)

Now I must fault this program. Using my Gemini-10X printer, the graphics output invariably left a blank line between printhead passes. Using one-by-one pixel size, the blank was one pixel in size. Larger printouts resulted in larger blanks. "Now is the time for *The Customizer*," I

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(813)-942-1436 (7 DAYS, 24 HOURS)

said to myself. Unfortunately, while the prepackaged screen dumps can be altered and resaved, the driver itself cannot be inspected. I suspected the line spacing was incorrect, but had no way to see what code was sent by the original driver. Further, altering the strings is not possible except by rewriting from the beginning.

I tried to write an original Gemini dump using *The Customizer* from the command strings supplied in the appendix. My efforts, guided by the manual and printer manual, produced a misaligned, garbage-laden printer output. I really do feel the fault lies in my inability to correctly design the program, as well as inappropriate information in the appendix. Of course, the manual could include more information. Instead, it warns about the complexity of designing screen dumps.

Whether or not to buy *Print Master* is, as always, a question of what you need, what you have and what you are interested in. You will find a smoothly functioning, reasonably priced program for your needs if you're in one of these categories: those who need a screen dump program with great versatility for modifying the output, especially with the ability of adding text to the output; those who own an oddball printer requiring a custom designed printer driver; those who use a variety of printers or who plan on changing printers — this program will not become obsolete; and "techie" types (people who will sit up nights designing custom drivers for strange printers that, with joystick selection, will change the screen dump to mirror image, allow five colors or simulate cinemascope movie images). These possibilities are not necessarily *Print Master* program functions until the user can devise the driver, with *The Customizer's* help, to make them possible.

The manual offers customer support to registered owners. When I called, I spoke to the program's author, Scott Nudds. He was helpful and friendly. He did suggest that users would be better advised to write with their questions in the interest of clarity and economy. From Mr. Nudds' helpfulness, I'm sure he would promptly respond to letters from owners.

(Dataman International, 125 South Fifth St., Lewiston, New York 14092, U.S. prices \$33.95 tape, \$37.95 disk; 420 Ferguson Ave. North, Hamilton, Ontario, Canada, L8L 4Y9, CDN. Prices \$39.95 tape, \$43.95 disk)

## Personal Program Protection With *EZ Cassette Encrypt* And *EZ Disk Encrypt*

If many people use your disks or tapes and you don't want them to be able to access all of the programs, here is a solution. This solution is very easy to use for disk and a bit bulky, but workable, for cassette.

*EZ Disk Encrypt* and *EZ Cassette Encrypt* take the file (on disk, any type of file; on cassette, only ASCII files) and exclusive-OR it with any password you choose. Not an extremely stupendous feat, but it does the job.

With *EZ Disk Encrypt*, the program reads the file off disk a sector at a time, exclusive-ORs it with the password and writes that sector back to the same place on the disk. This could present a problem if an input/output error occurs during the process. Only part of the program would be encrypted and it would not be recoverable. You *must* have a backup copy of the file before you use this program!

With *EZ Cassette Encrypt*, the program reads in the entire file before it starts encrypting it. It then does its job and prompts for a name for the output file. This way is not as fast, but it is more reliable than the disk method and the only method possible for cassette. With this procedure, the file can only be so long, but with the disk procedure, a file of any length can be encrypted.

To decrypt a file, rerun the program using the exact same password. It will be decrypted because exclusive-ORing is the exact opposite of itself.

Unless you share disks or cassettes with other people and have confidential files on them, I see no real need for these programs. But if you require such protection, then they will work well for you.

(Landware, 6 Larchmont Road, Edison, NJ 08817, cassette \$25, disk \$29)

— Andrew Dater

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## EZ Profiler Helps Streamline Programming Techniques

So you've finally written the "Great American Program." It has everything, every bell, whistle, toot and honk you could ever want. You allow yourself the luxury of typing those three letters that make all of your dreams come true — R-U-N. A couple of seconds fly by and the screen remains blank; a few more and still not a sound. You panic. How could your masterpiece have crashed the system? As you quickly grope for the Reset button, the title screen you spent three weeks drawing finally appears. Now you realize the problem is something much worse than a system crash: Your program is S-L-O-W!

A high speed POKE won't help now. It is time to recode, but what part of the program? *EZ Profiler* by Landware offers an answer, or at least some suggestions.

Before running *EZ Profiler*, the source program must be saved in ASCII format on the disk. A simple RUN "EZPRD" will get you underway. Upon execution, the program offers instructions that explain the program more completely than the 2¼-page instruction booklet. *EZ Profiler* will then prompt for the name of the program you wish to modify, and a memory area the input program does not utilize. *EZ Profiler* will access the drive, read the input program and create a new version of the program

saved as *TEMP/BAS*. The new version will then be loaded and you must type RUN to execute the new program.

Running the newly created program is exactly like running the old version, except for a speed slowdown as the profiler tabulates the execution data. When the source program is terminated by an END or STOP command or by pressing BREAK, a subroutine that is appended by *EZ Profiler* must be executed. This routine will dump the tabulations to either the screen or a printer.

The result is simply a count of how many times each program line is executed, which, according to the instruction sheet, "will show . . . which loops in a program are most heavily used. These loops can then be rewritten . . . to make the overall program much faster."

The major deficiency of *EZ Profiler* is that it offers no suggestions to speed up the code, nor does it even hint at how to determine which routines are truly "wasteful" and which routines are written as tightly as possible. (For example, a FOR/NEXT loop might have been executed 500 times, but not necessarily be wasteful.)

The instructions that come with the program are adequate enough to operate the program, but really aren't enough to put the program to use, which is the most important reason for using a utility.

Other problems with *EZ Profiler* include the additional processing time it adds onto the source program (almost a 3,000 percent increase) and the additional memory required. The time factor is only deadly in applications where program flow is greatly changed by timed responses (such as games). In this case, the program is of dubious value.

The memory factor can be debilitating. The program appends an additional 20 characters onto each line which, on longer programming endeavors, could prevent the program from loading into memory.

*EZ Profiler* is not a program that will answer all programming woes. It will help streamline software, but not unless the programmer is willing to put in much more work than the program. *EZ Profiler* is essentially an extension of BASIC's TRON command and should be treated as such. It does exactly what it claims, but be wary of reading any other uses into it. Potential purchasers should beware that although *EZ Profiler* can help hone their programming techniques, the work is still up to them. Happy programming!

(Landware, 6 Larchmont Road, Edison, NJ 08817, requires 32K and disk, \$20)

— Eric Oberle

# WORKBASE



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*Hint* . . .

### Random Number Ranges

Have you ever wanted to devise a simple "odd/even" or "heads/tails" program? These variations on the RND(x) function may help:

|                      |                           |
|----------------------|---------------------------|
| RND(2) - 1           | will yield either 0 or 1  |
| RND(2) > 1           | will yield either 0 or -1 |
| (RND(2) > 1) * 2 + 1 | will yield either 1 or -1 |

RND(2) > 1 is especially useful because -1 represents a logic "true" and 0 a "false" in BASIC.



## EARS Pioneers The Way For Spoken Command Response

By Randy Graham

Personal computing is a piece of cake. Just turn it on and start typing; it all appears right there on the screen. If you make a mistake, back up and correct it. Write programs in many languages. Run software for word processing, spreadsheeting — even play games. Print it all out letter-perfect then save it and share it. Nothing to it. Unless you have no hands to type or no eyes to see the screen.

I work with handicapped people. Jonathan was a lineman before his accident. Because he severed his spinal cord, he is confined to a wheelchair. He has very poor use of his arms; he needs help to dress and to eat. When I met him, he was beating everyone in the rehabilitation unit at chess. I thought that a good chess player ought to make a good computer programmer.

Paul has had cerebral palsy since birth. He can get around with crutches although it is difficult; his arms and legs just won't do what his brain tells them. His speech is difficult for most of us to understand. He is a college graduate and would like to be a writer, but trying to type can be a tearful frustration for him.

As a result of a disease, everything looks blurred to Betsy. She can manage to read with a magnifying glass, holding the material close to her face; she has not been able to find a computer screen she can read.

For Jonathan and Paul and Betsy, the keyboard and screen which give us access to all the marvels of personal computers are just as formidable barriers to computing careers as the six-inch curb which locks them out of a shopping mall or an office building. We can cut notches in the curbs and build ramps around the steps. What can we do to open up our favorite activity to some very fine people?

It was for these friends and others that I flew to the RAINBOWfest in Chicago to find out what Rich Parry and Lester Hands were up to at Speech Systems. It was fun meeting them and I became so excited about their work that I brought an EARS home with me so I could join the adventure. EARS (Electronic Audio Recognition System) is a device and program through which a Color Computer responds to spoken commands.

Yes, I said spoken commands! No other computer has it — just CoCo. We are coming along with voice synthesizers which can electronically vocalize text in memory, but going the other way? Little more than a year ago I attended a conference in which an expert in the field said that speech recognition was not even on the horizon. He was wrong. Say "hello" to the expert, EARS.

### What You Get

In a nice plastic envelope you get two pieces of hardware, a piece of software and a very good manual. One piece of hardware is a ROM pack which contains the magic

and the other piece is a headset. There are no earphones in the device; it is just there to hold the microphone close to your mouth. The headset plugs into the ROM pack and you know where that goes.

The software (tape or disk) contains a machine language program, a utility and several demonstration programs. Load and execute the EARS program and you are in business. To the user, the effect is that all of your Extended Color BASIC ROM still works but some new commands have been added. Time to start learning.

### How it Works

LISN is the first new command you meet. Like all BASIC commands, it can be used in direct mode or within a BASIC program. Type LISN "1" and say "one." You have taught CoCo/EARS its first word. Let's note that you have also taught it your accent — and language.

EARS is a "speaker-dependent" system. The user teaches the machine and thereby sets up a unique relationship. There is nothing romantic about this; it seems to be the easiest way to do it. A "speaker-independent" system which can recognize any voice in any accent, pitch and inflection must be much more complex. This way, whether I say "one" or "uno" or "ein," when I say it again, EARS will respond with "one." Space is reserved in memory for a speech synthesizer like *Voice*. If you tell EARS to SAY "one," it will speak it from the speech system.

OK, I have taught EARS one word. I can now repeat that process. In its present shape and form, EARS can "learn" 64 strings. Apparently, the program sets up a two-dimension array. One element is a string of up to 16 characters which I type in. The other element is a voice print of what I say into the microphone. EARS calls this pair a "template." Let's see what I can do with this array.

MATCH lets me use the vocabulary list. After this command, I say "one"; there is a noticeable pause, then the screen prints '1'. EARS has searched the array of voice prints, found a match and printed the character string.

Let's note again that the relationship between the input string and the spoken part is what I want it to be. "Gadzooks" can make the computer type out "My name is Randy" if that is the way I made the template.

What if I forget my own list? TLIST will produce the string part of the list of templates for me one screen at a time. TSAVE will save the whole list of strings and voice prints to tape or disk (EARS checks to see which you are using); TLOAD will load a list so I do not have to do it over every time.

### Vocal Programming

Now for the great part. I have taught EARS the digits, alphabet and as many BASIC commands as it will hold. Time for another command.

DRECT instructs EARS to accept BASIC statements from me. I can say "one-zero-a-equals-one-two-three-enter" and a BASIC line appears on the screen. Then, "two-zero-print-a-enter" and the second line is in place. I can say "list" and it will (because I added the "enter" to my string); when I say "run," it does it! Primitive? Yes, but I wrote and ran a BASIC program without touching the keyboard! I feel like I have the first horseless carriage in town.

While in DRECT mode, the computer will accept keyboard input, but it will continue to respond to voice commands until turned off with BREAK.

## A Fairy Tale

Jonathan is up and dressed and has finished breakfast. It is time to go to work. He rolls down the hall to the den where CoCo/EARS is waiting. He activates a remote control switch by sound or however and the computer comes on and loads EARS which loads the template list. (This last part will require an enhancement that EARS does not have. Right now, Jonathan would have to leave his computer on and only turn his monitor and peripherals on and off.)

He says "Terminal" and the screen says RUN "TERM BIN",R (ENTER). Before starting to work, like many businesspeople, he says, "Get Dow." "Get" tells the terminal program to go to its autodial/autologon section. "Dow" calls and logs on to DJNS. At the menu he says "news" and the screen shows //NEWS (ENTER). He goes through the news by menu selections, reads the Wall Street Journal online and logs off. Now he says, "Get office." Autodial and logon gets him into the office computer. Perhaps he will first read "Mail" and "Memo" before calling for the file on which he is working. It is slow and tedious, having to give all digits and spelling out words. But, he is working!

This is only just barely a fairy tale. If you devote 36 templates to the letters and digits, you only have 28 left for words. But CLEAR will empty the template buffer so you can load another list tailored to the specific application you are running. And needless to say, he will need the help of a typist to construct his template lists.

## Come on Along

It sometimes seems like the pioneering days of personal computing are over. Nobody builds his own any more — what did I do with that wirewrapping tool? Hardly anybody writes programs — software is too readily available. Everybody is into graphics. Well, if you sometimes look longingly at the old covered wagon gathering dust in the shed, hitch up. A whole new land mass has been opened for exploration.

Someday there will be listening typewriters that write it all out as you dictate. Other control applications will become as common as digital microwave ovens and calculator watches. And perhaps we will have Hal, the conversational computer, by 2001. But you can still get ahead of the parade. EARS is the place to start, and you can only do it with a CoCo!

I have told you about my excitement with this new tool. I would like to hear from others who are experimenting with EARS for handicapped applications. My complete address is 2115 Buford Road, Richmond, VA 23235. Or, maybe we can share our experiences in the "Letters to Rainbow" department.

I did not write this review with EARS — I am glad I did not have to. It would have taken forever, spelling out each word. If your template list is full, there is a pause of a couple of seconds before the computer responds. And, let's face it, EARS can be quirky. Rich tells you to imagine you are training your puppy. That's the way you must speak. Sometimes I say a couple of words that are not on the template list and get up and walk away. When I do that, I remember the old proverb: "I had no shoes, and complained, until I met a man who had no feet."

(Speech Systems, 38W 255 Deerpath Rd., Batavia, IL 60510, \$59.95)

## Test Your Management Skills With *PETSTORE*

Pal Creations is marketing yet another Simulation game, this one called *PETSTORE*. The game has you as an owner of one pet store and \$200. From there it is simple, just buy animals at a cheap price and sell them at a higher price. The complicated part is that you have to keep track of what the price is for each of 20 animals. These animals come in four categories: fish, snakes, birds and amphibians/reptiles.

If you can remember what the previous prices are for each animal, then it is easy to tell whether to buy or sell. There is some speculation involved, however, in that sometimes even though prices go down, they may go even lower, making you wait longer to realize profits. Another problem you may encounter on the more difficult levels is a greater chance of fire and disease, which will diminish your supply of animals.

The game has little documentation but is fairly easy to play, so it doesn't really need much. If you intend to play the game alone or in a small amount of time, forget it! This game is strictly meant for two to four players and even the quickest game will easily take nearly an hour to complete. *PETSTORE* does, however, have a practical benefit in that it teaches the basic principles involved in the stock market and other speculation-type investments.

The game comes on cassette only, but can easily be moved to disk. For the money, *PETSTORE* is an interesting and educational program which is worth the price.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, distributed by CoCoNut Software, RR#2, Site 9, Box 1, Tofield, Alberta, Canada T0B 4J0, 32K ECB cassette \$14.95)

— Mark Anderson

### Hint . . .

#### Putting on the Brakes

When using the STOP command to debug your program, ask for the information you want before you request the STOP action. For instance:

```
10 INPUT "NUMBER";A
20 IF A=3 THEN Y=10:X=30
30 IF A=4 THEN Y=20:X=40
40 PRINT X,Y:STOP
```

Line 40 shows the format I used. It saves typing in the print request after the STOP command has been executed. A little thing, but it has saved me many finger strokes.

George B. Sullivan  
New Carrollton, MD

# "The CBASIC Compiler"

## Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optimizing two-pass higher Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly in disk in a LOADM compatible format.

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 it requires 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 3 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 features 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 keyword, indexing, 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 load rate and direct normal or compressed listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "taking off a log". If CBASIC finds an error when compiling, it points to the place in the program but 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 BASIC, it's simple.

### HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51 by 24 line display. It is also the only compiler that supports both the FBI "Ward-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 utilize 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 character set font, underline, character highlight, view 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 Coordinates 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 the kind of flexibility?

### 64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 68K 5AM (Sixteen-Kilobyte 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 ten 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 low 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 24K 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 compile 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 20 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 in 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 complex 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 eliminated 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). 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 A\$(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 undimensioned string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 32-bit 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 30 strings with 64 characters each, you would have to DIM A\$(2560) and then to access string #30, you would have to multiply 30 by 64 and use a special variable name format to access it very clumsily at a time. Not very compatible or convenient to use, and difficult to edit.

### 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 books draw 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 imitation covers. Some of the requests 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 Disk 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\$(L\$),3),5)? Can you use low 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 a few of them. If you want a cheap compiler, we'll sell you one of those loaded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

### ORDERING INFORMATION

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

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## Football Statistics Package Keeps Thorough Stats

*Football Statistics Package* is a well-written statistics program for those who want to keep records of their team and its opponents. It requires 32K, one disk drive and a printer. For those with only one drive, it will be necessary to switch from the program disk to the data disk when prompted. According to the author, the package is designed to track little league, high school, college or any level desired. It is not a league secretary but can be used for one if desired. It is primarily designed around one team, with individual, team and opponents stats.

*Football* is completely menu driven and very user friendly. Single key entries are used when possible, and there are many submenus to make things simple. An easy-to-understand, nine-page documentation booklet is included to give you a general overview of the package.

After running the boot program, you are asked to enter the number of drives and Baud rate of your system. The main menu program is used to move from item to item. When returning from a support program, you are returned to the main menu.

There are many features of this program that are too numerous to mention, but a few which appear on the documentation cover are: Mid-season entry, update and

additions; Correct and review all stats in file; Correction on all input screens; Raw dump of data to the printer — for the player and opposing team's files; Summary of the player and opposing team's stats; Track 90 individual player stats; Summarize 17 cumulative team stats; Summarize 28 cumulative opposing team stats; Team summaries of 87 stats; Comparative summary printouts 63 stats for your team; Comparative summary printouts 62 stats for opposing team; and over 350 total possible stats to record.

Included with *Football* are two disks: One is the system disk which includes all the support programs; the other is a sample data disk with 75 team members' stats recorded. I did start my own data disk and just used my imagination for all the individual player's statistics, but soon gave up as the task was very monotonous because of all the different statistics to be entered.

Finally, I decided to try number 11 from the main menu (RUN TEAM SUMMARY) using the provided data disk. The following was printed on the 21-page team summary: my score and the opposing team's scores in each quarter, the total score, penalties, penalty yards and first penalty. Then my team's roster was printed, which included each player's number, height, weight, year (or grade) and position played. Next, for each of the 11 opposing teams recorded, each of my player's and the opponent team name was printed, with the total quarters played and number of plays for each individual. This amounted to about 12 pages. After that, the passing stats for certain quarterbacks were printed, including passes attempted, passes completed, yards, intercept, first down and touchdowns.

To save space, I will only list the last six stat sections printed: Rushing stats, Receiver stats, Kickoff team, Kick receival team, Punting team and Punt receival team. The last two total sections were for defensive and opponent team stats.

There was a small problem with the *PRINT/DAT* program. CoCo gave me a syntax error in Line 170 when the program began to run. This was a result of a FILES 3 statement, in conjunction with my 1.0 disk ROM which has a few bugs. A simple fix for this is to type FILES 3 from the command mode before running *Football*.

Overall, I was impressed with the ease of use and wide variety of options and functions. If you are interested in keeping track of your favorite football team, and don't want to keep notebooks full of your sloppy writing, help our economy and purchase *Football Statistics Package!*

(Sugar Software, 1710 N. 50th Avenue, Hollywood, FL 33021, printer and 32K required, disk \$29.95)

— Darren Nye

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## Sound Generator For The Sounds Of Your Life

*Sound Generator* is a program that allows the custom design of sounds. As the instructions explain, sound is a combination of sound waves and loudness. With this program you can enter any wave form desired. You are also allowed to enter the "sound envelope," which is simply the varying loudness of the sound. Either of these can be entered graphically or numerically.

To get started, the instructions tell you how to load in either of the two sets of wave and envelope tables recorded on the program tape. They then take you step by step through most of the commands available, showing you how to use them. The first command is to allow you to draw or view the table. The second will allow numeric entry of either table. There are commands to allow changes of pitch, number of envelopes to be played and cassette save and loads.

Others allow the listing of the table values to screen, delete current table from memory, stretch table, end program, shrink table and duplicate table values. Three of these need some explanation. The first, stretch table, takes the current table and duplicates each element, truncating the last half of the current table. Shrink table will delete every other element, leaving the last half of the table empty. The last, duplicate values, will take the portion of the table entered and repeat it until it reaches the maximum table length, allowing you to enter only part of a repeating table.

There is one other command which is excellent for sound synthesis. This command will allow you to create a machine language sound effects routine. The way it works is by prompting for the pitch and number of repetitions of each note to be played. It will then use the wave form and envelope tables to play each of the notes entered. This is great for playing songs.

If you are interested in sound synthesis I recommend *Sound Generator*. Although there seems to be an expectation of a previous knowledge of how sounds are generated, the instructions are helpful enough to get you started. From there you can experiment and learn what you didn't already know.

(Tuthian Software, P.O. Box 663, Rimersburg, PA 16248, cassette \$19.95)

— Jim Sewell

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## BASTXT Puts A Variety Of Options At Your Fingertips

By Dale Shell

If you do a lot of BASIC programming and you are getting tired of seeing the same old green and buff screen, Valley Micro Systems may have just come to your rescue with *BASTXT*. *BASTXT* was developed to enhance BASIC, adding 21 more commands and eight functions. It also adds high resolution text to the graphics screen. *BASTXT* requires 64K and at least one disk drive.

There are two text screen modes with *BASTXT*, 32 by 16 and 42 by 16. The 32-by-16 mode should allow most BASIC programs to run unmodified. The 42-by-16 mode is very handy, but remember when the PRINT statement is used, it will not cover the entire screen. Mode 42 will also not allow any color or inverse highlighting commands to be used. Some of your BASIC programs may have to be modified, but this mode allows almost a third more information to be displayed on the screen.

Inverse highlighting is invoked using the INVERSE ON command. The INVERSE command can be used two ways. INVERSE can totally reverse the text and background colors. The second use, highlighting text, is very useful to call attention to special words on the screen.

Another way to bring attention to certain parts on the screen is to underline words. This can be done using the ULINE ON/OFF command. It can be used to underline any text printed on the screen. Once this feature is turned on, it will underline everything that goes to the screen until it is turned off, even if the program running is stopped.

*BASTXT* has many features to enhance the appearance of your screen. Smooth scrolling is available; with SMOOTH ON, the screen is scrolled up a pixel at a time instead of a line. This slows the scrolling down considerably. Another way to slow things down is with the SPEED command. This command changes the speed at which characters are printed to the screen. The default, SPEED 0, is the fastest, with SPEED 255 being the slowest — it really creeps along at a snail's pace. You can choose any speed in between.

*BASTXT* also has a PAGE command which causes the scrolling to pause every time the screen fills up. Two other commands allow you to tab to any horizontal or vertical position (i.e., XIAB and YIAB). A WINDOW command has also been included. This command allows you to protect from zero to 14 lines of text at the top of the screen from scrolling. You can still use PRINTs to get into the window, but the window is protected from commands like CLS and WCLS. WCLS is a fancy way of clearing the screen. It makes the screen sort of "dissolve" away. You can also disable the BREAK key with a simple command, BREAK ON/OFF.

There are three different cursors you can choose from, or you can edit and create your own. The three that come with *BASTXT* include an underline (nondefinable), a single block (single-character definable) and a man waving his arms (seven-character definable). A SCAN command is

The next four commands, BLACK, RED, BLUE and NORMAL, provide four different colors of printing. The NORMAL is close to BLUE but appears to be a different shade. All these can be used together and in conjunction with the INVERSE command; they can yield some interesting displays. INIT is used to put all the commands back to their default values and EXIT is used to disable BASTXT and return your system back to normal BASIC.

The eight functions available are comparable to assembly code instructions. I will not describe their functions but will list them. If you are familiar with machine language, then you will probably have a good idea of what they do. They are: COM(0-255), ARSL(0-255), LSL(0-255), ROL(0-255), EOR(0-65535,0-65535), ARSR(0-255), LSR(0-255) and ROR(0-255).

A program also comes on the disk which allows you to customize the defaults of BASTXT. It will also allow you to customize the cursor or any other character.

Valley Micro Systems has done a lot of work and they have developed a very useful product, but "every silver lining has its clouds," as they say. I tried to evaluate BASTXT's compatibility with as many DOSs as I could get my hands on. BASTXT appears to be fully compatible with KDOS and works fine if the DISABLE command is used with ADOS before booting the program. It would not work with JDOS version 1.11; a later version was not available. Of course, the Radio Shack DOSs worked fine. I didn't have other DOSs available to try.

Valley Micro Systems disabled the DOS command. It is stated that "this was done to facilitate compatibility with all ROM revisions." I use the DOS command on most of my diskettes from the PUTDOS article in RAINBOW,

included to cause the computer to pause until a key is pressed. This seems the same as EXEC 44539.

November 1984 (Page 140). I wish they would put that command back.

Because the BACKUP command uses some of the graphics area of memory, you cannot use BACKUP with one single-sided disk drive. If you have two drives, or are using a double-sided drive as two singles, you can use BACKUP from one drive to another. You just cannot use the single drive backup. Also, when using BACKUP, the graphics/text screen will go "bonkers" and fill up with garbage. Don't worry, this is normal, just press the CLEAR key when the backup is finished.

One other good feature of BASTXT is the ability to enter BASIC commands in lowercase. However, if you want the program to print text in lowercase, you have to insert the text with the EDIT mode. You must also be careful not to enter a command in lowercase when in the EDIT mode or you will get the old SN Error.

Now for the bottom line. All considered, I believe BASTXT is a very useful and well-done program if you are aware of its limitations. They may concern you or they may not be limitations at all. If you do a lot of programming, you will enjoy the different options you will have at your fingertips. The WINDOW, ULINE, INVERSE (etc.) commands can provide some very impressive displays. But, if you give or sell your program to someone who does not have BASTXT and you use some of the effects and features of BASTXT, the person who gets the program will not be able to use it. You may want to contact VMS about including their program embedded in your own if you want to market it.

(Valley Micro Systems, 801 W. Roseburg Avenue, Suite 200, Modesto, CA 95350, disk \$34.95)

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### Hint ...

#### Unpacking BASIC Programs

If you have come across a program that has had its lines packed so tightly that parts of the lines can't be seen when listed, here is a way to make them visible again in a 64K CoCo. First RUN a program, such as this one from Frank Hogg, to put the CoCo in its 64K model:

```
10 'ROMRAM
20 CLEAR999
30 DATA 26, 80, 190, 128, 0, 183, 255, 2
  22, 166, 128
40 DATA 183, 255, 223, 167, 31, 140, 22
  4, 0, 37, 241, 57
50 FOR I=1 TO 21: READ A: A$=A$+CHR$(A
  ): NEXT I
60 P=VARPTR(A$)+1
70 POKEP, 126
80 EXEC P
90 PRINT "BASIC IS NOW IN RAM"
```

Then simply enter POKE &HBB16, 4. This poke into the BASIC interpreter will allow the full line to be listed. This POKE will affect the LIST, LLIST and ASCII save functions, but will not affect the EDIT mode.

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## CoCo Echo Gets It All In Writing

I was just thinking the other day about how nice it would be to get a hard copy (a hard copy is a printed copy) of anything typed from the keyboard, so I was happy to receive *CoCo Echo* for review.

*CoCo Echo* is available from Tothian Software. There were two versions of this program on the cassette. The first version of this program, *ECHOLO*, is for use with 16K machines with or without Extended Color BASIC. The second version, *ECHOHI*, is for use with at least a 32K machine with or without a disk drive attached.

To use the program with a 16K Non-Extended BASIC machine, you will need to type `POKE 359,126` and `ENTER` after you type `LOADM:EXEC:` and `ENTER`. To turn the program off, you will need to type `POKE 359,57` and `ENTER`.

To use the program with a 16K Extended BASIC machine, all you need to do is type `LOADM:EXEC:` and `ENTER`, and you're ready to go. *CoCo Echo* will load into the first graphics page of memory. This is fine, though, because this program will print only text and not graphics.

After the program is loaded, you have to separate functions at your command. The first function is a screen dump. This will cause the contents of the text screen to be dumped to the printer. The text screen consists of 32 lines; it is the area from the top of your TV screen to the bottom of the screen. To use this function, you need to press the `SHIFT` and `right-arrow` keys at the same time.

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The second function of *CoCo Echo* will take whatever text is typed from the keyboard and send it to the printer. To use this function, you need to press the `SHIFT` and `down-arrow` keys at the same time. You can end this duplicating process at any time by pressing the `SHIFT` and `down-arrow` keys a second time.

As I have a 16K Extended BASIC computer, I was only able to try out the first version of *CoCo Echo*. I was happy with the ease of operation. Although the instructions I received with the program were very short, I had no trouble getting it loaded and running.

Since I wanted to try out the 32K version of this program, I called my local Radio Shack store and explained what I wanted to do. When I got to the store, Don (the manager of the computer center), took me to a computer, set up the printer and let me go. With a 32K computer, you need to type `LOADM:EXEC:` and `ENTER` before you type `LOADM:EXEC:` and `ENTER`. This will load the program into the top of your computer's memory and out of your way. You use this program in the same way you use the 16K version. Once again, I had no trouble with the program operation.

Some of you might be asking yourselves, "Gee, it sounds like a good program, but what could I use it for?" Well, let's say you would like a directory of programs. No problem! If you have a disk drive, just type `DIR`, `ENTER` and you will get a hard copy of the directory. How about if you're typing in a BASIC program; just turn on the duplicating process and while you're writing your program, you'll be getting a hard copy of the listing at the same time. These are just two suggestions for the use of *CoCo Echo*. I'm sure if you buy it you will find more.

As you might have already guessed, I think *CoCo Echo* is a very useful program. I had no trouble at all getting it to work and it did everything it was supposed to do. If you have a need for this type program, I would recommend it.

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248,  
\$9.95)

— John H. Appel

### One-Liner Contest Winner

Here's a One-Liner called *Rug Weaver*. It has 40 different patterns and can draw them in three colors for a total of 120 different "rugs." The program uses only two line statements, but the space between each line is the secret.

#### The listing:

```
Ø C=RND(4)+4:P=RND(1Ø)+5:PMODE3:
PCLS:COLORRND(3)+1:SCREEN1,1:FOR
Y=3ØTO16ØSTEPØ:FORX=5ØTO21ØSTEPØ
:LINE(X+1Ø,Y+1Ø)-(X,Y),PSET:LINE
-(X-1Ø,Y+1Ø),PSET:NEXTX,Y:FOR T=1
TO3ØØØ:NEXT:GOTO 1
>THE RUG WEAVER<>BY JIM COCKRUM<
```

Jim Cockrum  
Martinsville, IN

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventures Tape*.)



## Telepatch — An Excellent Enhancer For Telewriter

By John R. Curl

When I first got *Telewriter-64* last year, I was in heaven. I couldn't believe the program's versatility and ease of use. I didn't have to study the manual and several other books for a month before I could start using it. I didn't have to remember complicated command strings. Most of my documents were less than six pages long. This was the word processor I had been looking for.

As time went on, though, I began making a mental wish list of things *Telewriter-64* didn't have that it needed. This list included key click, block move, key repeat, easier disk I/O and more. *Telewriter-64* was still the word processor for me; I just wished it had some little improvements.

Enter Spectrum Projects' *Telepatch* by Bob Van Der Poel. As the name implies, *Telepatch* is a *Telewriter-64* enhancer. It adds all of the above improvements and more. After using it for a week, I can't believe *Telewriter* never had the enhancements that *Telepatch* provides.

*Telepatch* requires a 64K Color Computer with at least one disk drive. You must also have the disk version of *Telewriter-64*. Even with all of the enhancements, the basic functions of *Telewriter-64* are still the same.

Installation of *Telepatch* is very simple. First, make a backup of your *Telewriter-64* and *Telepatch* diskettes.

(Never use your originals!) Next, format a blank diskette (known as the destination diskette). Insert the *Telepatch* diskette and type RUN "PATCHER" and press ENTER. After this, all you have to do is follow the prompts — it's as simple as that.

When finished, your new systems diskette should have the following programs on it: *TW64/NEW*, *T/BAS*, *\*/\*\*\** and *TSPPOOL/BAS*. These four programs handle everything including disk I/O. *TW64/BIN* is the new patched *TW64/BIN*. *T/BAS* replaces *U/BAS* as the boot program. *\*/\*\*\** is the new disk I/O routine replacing *S/XXX*, *S/BIN* and *S/ASC*. I'll discuss *TSPPOOL/BAS* later in the review.

To boot your patched *Telewriter-64*, just type RUN "T" and press ENTER. You will be greeted by a new title screen. It states that *Telewriter-64* is "modified, improved and made better in many ways" (it's the truth). You won't notice anything different on the main menu or the format menu. However, the Disk I/O menu has been totally replaced.

The new features added to the editor are: True Block Move, Visible Carriage Returns, Key Beep, Key Repeat, Lowercase, Faster Cursor Movement and Overstrike Mode.

The new boot program is the best improvement. With regular *Telewriter-64*, I had to set all of the print parameters in the format menu before I could print a document. This aggravated me very much! With the new boot program, you can set almost all of these parameters beforehand and not have to worry about them. This is made possible because the boot program now uses the PDK command to set the parameters.

You can also determine whether or not the new features are on or off. All you have to do to change a parameter

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or to turn a feature on is use BASIC's EDIT command to change different values in the boot program. The manual explains the procedure and also gives the different values that you need.

The format menu's printing parameters that can be set are: page numbering, spacing, queue function, printer type, one-page function, where to put the page number, characters per line, upper margin, bottom margin, left margin, lines per page and printer Baud rate. As you can see, almost all of the format features can be set to any default value needed.

The editor features which can be set in the boot program include: editor screen's background color (green or buff), key click on or off, key click length, key click tone, key-repeat rate, repeat delay, shift-repeat delay, lowercase/uppercase toggle and overstrike/insert toggle.

There are also several disk I/O parameters that can be changed in the boot program. These are: verify on or off, default drive number, binary or ASCII I/O default and drive stepping rate (for those who have drives which can run faster than 30 ms).

While I'm on the subject of disk I/O, I will explain the features of the new disk I/O driver. With the original *Telewriter-64* if you wanted to switch between binary and ASCII I/O, you had to exit the program and load either *S/BIN* or *S/ASC* and then save this as *S/XXX*. That's quite a hassle. With the new driver, *\*/\*\*\**, all you have to do to toggle between binary or ASCII I/O is press the 'I' key at the disk I/O menu. No more problems. When the "Kill" function is selected, you will be asked if you are sure you want to kill the file. You will also be asked

if you are sure when you try to read in a file and there is already text in the buffer.

The program will also remember the last filename used. Thereafter, this will be the default filename for any I/O functions. If you would like to change the default filename, press the '@' key at the disk I/O menu. You will then be prompted for the new default filename. All other disk I/O functions still operate the same.

I will now explain the *TSPPOOL/BAS* program. In order to run this utility, you must exit to BASIC from the disk I/O menu, and type RUN "TSPPOOL" and press ENTER. This utility program allows you to print a file to the disk instead of a printer. This means the file will be printed to disk in the exact same format as if you had printed it on paper: margins and spacing will be observed, centered text will be centered and pages will be numbered.

This enables you to print the file at a later time using a simple little BASIC program with the LINE INPUT command. You don't have to have *Telewriter-64* to print the file on a printer. Just OPEN the file on disk, LINE INPUT the text from the disk and then PRINT#-2, the text. You would have to actually use this feature to appreciate it.

The only limitations of this utility are that it will only work with files that have been saved in binary format and it will not work with files that have embedded 'Q' (queue) commands.

*Telepatch* is an excellent program. It adds several outstanding features to *Telewriter-64*. In my opinion, whether you already own *Telewriter-64* or are thinking of purchasing it, you must purchase *Telepatch* in order to get the most benefit from *Telewriter-64*.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, \$19.95 plus \$3 S/H)

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## RS232IO Allows Adaptation Of Compatible Peripherals

Why do you need an RS-232 I/O program? Well, we can start out by saying that the four-pin DIN connector on the back of your CoCo is not in itself a complete user port. Programs are often required to allow the use of this port to drive RS-232 compatible devices.

The software packages for the CoCo that make use of this port are usually dedicated to a specific hardware device such as graphics screen dump programs and telephone modems. But what if you want to control some special purpose device such as a robot? What software would you use?

RS232IO is a short (134 byte) machine language program which provides the CoCo programmer with the tools needed to run just about any peripheral from the CoCo port that is RS-232 compatible. The program is multi-saved on cassette tape and a nine-page instruction manual is supplied.

The software is not copy protected and backup copies for the original owner are easily made. The program can also be saved and executed from disk and is fully relocatable to any unused RAM area which can be protected with a CLEAR statement, or it can be stored in a graphics page without the need for a CLEAR statement.

While the documentation is thorough, it must be studied carefully. Several spelling errors were found, but did not prevent comprehension of the information. The author gives in detail how to load and make use of the software. As written, it provides one start bit, two stop bits and eight data bits to be either sent or received via the CoCo RS-232 Port.

After loading RS232IO, it is necessary to POKE in five variables which control where in RAM the data for sending and/or receiving is stored. They are:

- 1) Data In Count — Counts each data byte received from one to 256.
- 2) Match Byte — If the match byte is the same value as the received data, transmission stops. It can be turned on/off with a poke.
- 3) Data In Address — Tells the computer where in RAM to store the received data.
- 4) Data Out Address — Tells the computer where in RAM to store the data to be sent.
- 5) Data Out Count — Counts each data byte sent from one to 65536.

By simply poking these addresses with this program in RAM, you are able to "customize" your RS-232 port. Receive and send Baud rates can also be changed. One word of caution, however: This is not a ready-to-run, menu-driven program; rather, it allows the user to develop his/her own BASIC programs that call the RS232IO as a subroutine.

With RS232IO and some BASIC programming skills, the user can adapt many RS-232 compatible peripherals that do not offer companion software for the CoCo.

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— Jerry Semones

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Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send an SASE to: Submissions Editor, THE RAINBOW, The Falsoft Building, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

# Nutriguide Lets CoCo Guide Calorie And Nutrition Intake

By J.B. Garner

*Nutriguide*, by Homeseft Company, is a fun program enabling the user to analyze meals or daily food intake in terms of 13 basic nutrients, ranging from calories to cholesterol. The program also enables you to keep a regular weight chart, advises on recommended calorie intake to maintain reasonable weight levels and indicates how your present eating style compares with recommended calorie, protein, fat and carbohydrate intake.

I am neither a dietician nor a nutritionist but, as a biostatistician, I have analyzed the data pertaining to several research projects in which daily nutritional intake was of critical importance. At present, one project is closely monitoring the sodium (salt) intake of patients with high blood pressure. Another researcher is attempting to prevent the re-formation of gall stones (after first chemically dissolving them) by recommending a diet relatively high in fiber and protein. All these studies have shown me the importance of our everyday diet to our state of health and how useful it is to monitor, in nutritional terms, our daily food intake.

*Nutriguide* comes on a disk together with an 18-page booklet. The disk contains several programs, including a

very large food file, which are all run from a single program, *NUTRIENT*. The programs are written in BASIC, apart from the food file, and an attractive initial screen display which mixes text and Hi-Res graphics. The whole program is very disk interactive.

The booklet gives detailed, step-by-step instructions on how to use *Nutriguide* and how to use each program option. It contains the index of the 658 types of food in the food file and gives a useful summary of elementary nutritional information.

The author recommends making a separate disk copy for each person using *Nutriguide*, since the space remaining on a single-sided disk is limited. As I wanted to try out the program with my family, I copied it file by file onto a double-sided disk (I&M DOS) without problems. After entering RUN "NUTRIENT" and watching the Hi-Res display (which informs you the program is written for people between 25 and 50 years of age, between 56 and 70 inches in height for women, and 61 and 75 inches in height for men), you are presented with a menu of options: Set Up Personal File, Daily Nutrition Report, Examine Weight Record, Start New Weight Record, Recipe Evaluation, Food File Menu and End This Program.

The limitations by age and height affect only the recommendations included in the program; the breakdown of food intake into nutrient components remains informative to all users.

Selecting Option 1, you are prompted to give your name, frame size, gender, height and activity level. The program then prints two weight values, between which your ideal weight is prescribed and a recommended range of daily

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All programs require a printer and a minimum of 32K and 1 disk drive but will take advantage of 64K and 2 drives. Each package features a hi-res 51 x 24 black on green screen.

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calorie intake. All these values appeared very reasonable to me (as a layperson).

You then have the option to store this information to disk. The program does not give a file extension and so the disk ROM adds the default extension "/DAT," saving the file under the label NAMES/DAT. The program next asks whether you wish to create a new weight record and creates a file containing the date and your weight. This time the program replaces NAMES by NAMES and "/WGT" and creates a file. Unfortunately, the program then fails to strip off the /WGT extension from NAMES and I had repeated FD Errors in Line 77 before I tracked down this small omission. A quick fix is to insert: `NAS = LEFT$(NAS,LEN(NAS) - 4)` as the second to last statement in Line 193 of program *NGUIDE/BAS*.

The Daily Nutrition Report allows you to enter each food consumed during the day, item by item, by standard serving, ounce or gram, and then, at the close, lists the caloric, protein, fat, carbohydrate, calcium, iron, sodium, vitamin A, thiamine, riboflavin, niacin, vitamin C and cholesterol content of your meals. Probably, for most of us, this is a sufficiently long list, although other nutrients are of daily interest such as potassium (or the potassium/sodium ratio), fiber and alcohol. The program requests the date and your weight, then compares your intake with recommended intakes and predicts the future effect on your weight of continuing consumption in this manner.

The Recipe Evaluation option enables you to add additional items to the permanent food file. You enter each ingredient (and amount) of the recipe and the program analyzes it into its nutritional components just as described above, requests a definition of the amount of a standard serving and then (optionally) adds the recipe to the permanent food file. Very nice!

The constituent breakdown of any food item in the food file may be examined by using the Food File option. At present you cannot send this breakdown to the printer; hopefully this facility will be added in later versions.

Finally, by using the Examine Weight Record option you will see a Hi-Res plot of your weight values (up to 14 daily values) on a graph which also shows horizontal bars at ideal and various obese weights for people with gender and build similar to your own.

The author has tried very hard to construct an informative and entertaining nutrition program. The disk contains a great deal of nutritional information, and the programs interchange and run each other very nicely. *Nutriguide* runs fine with 32K and does not seem to require the advertised 64K. About 120 commercial foods and beverages, such as Burger King and Coca-Cola products, are included together with 540 basic foods in the food file. However, there are some surprising omissions: table salt, coffee, tea, ordinary (non-whole wheat) flour, meat drippings (for gravy) and fried eggs, for example.

In the review copy of the program there are still one or two rough edges, such as an occasional spelling error and an omission or two. Judging by the overall care taken with the program, I am sure these small difficulties will soon be solved.

If you have a general interest in your own nutrition, *Nutriguide* is a good program to buy!

(Homesoft, P.O. Box 8, Supply, NC 28462, \$29.95)

## CoCo Calligrapher Captures Calligraphy's Penmanship

"What," you ask, "is a calligrapher?" Well, the phrase "Once upon a time" is a good beginning. Way back in the old days (well before CoCo) the world's scholars often wrote their manuscripts using a quill pen. A quill pen is a large feather with a hollow stem which was used to hold ink (and was often plucked from a large, unsuspecting bird). The beautiful penmanship that often resulted is known today as "calligraphy"; it is a skill learned with a great deal of practice.

Today's calligraphers use much more modern tools to practice their art. Special pens and inks allow unique and beautiful printed text. Most high school diplomas and college degrees are good examples of calligraphy as are formal invitations to weddings and graduations, and so forth.

Now this attractive printing technique can be accomplished with your 32K Extended Color BASIC CoCo and a bit-image printer. Printers such as Epson, Gemini, several Radio Shack, Okidata 92, Banana and the Prowriter 8510 can be used. The resultant lettering on the printed page is approximately 36 point or 1/2-inch high letters which are variably spaced at an average of 13 upper- or 26 lowercase per line. The Epson, Gemini and Prowriter also provide the capability to center the text as well. These printers also allow the use of condensed letters which will double the number of characters per line. The maximum number of lines per message is 17.

The disk version supplied for this review worked beautifully. It contained three fonts: Old English, Gay Nineties and Cartoon. Each was tried with no problems. The program is menu driven and requires the type of printer

to be selected and the appropriate Baud rate to be set (600 Baud default).

After the printer is set up and online, the program will ask you to select any of the three supplied fonts or you can select a special font. While the instruction booklet does not state what these special fonts are, the advertisements appearing in RAINBOW do list quite a few optional fonts sold separately. The three that are supplied, however, are excellent and the results must be seen to be believed. I used the Old English fonts to make up several certificates for our church members; they were genuinely impressed and could not believe they were the result of a computer program!

A nice feature of the program is that automatic lowercase is selected during the menu option to print your message. This makes your keyboard respond like a typewriter in that you must press the SHIFT key to get a capital letter. If you prefer all uppercase, you can press SHIFT-0 as is done in BASIC. In any case, after the message is printed, the program will take you back to the main menu in uppercase for further selections or additional copies. Provisions are made to save the text onto tape or disk, depending on which version you have, and also to correct or change the text.

The four-page instruction booklet is complete, well-written and to the point. A 90-day exchange warranty is included and a procedure for making personal backup copies of the software is explained.

I liked *CoCo Calligrapher*. It offers many uses for the CoCo user and provides expansion capabilities through the use of optional fonts. So put away your quill pen and see how high-tech can be used to simulate an ancient art form.

(Sugar Software, 1710 North 50th Avenue, Hollywood, FL 33021, tape \$24.95, disk \$29.95 plus \$1.50 S/H)

— Jerry Semones


### SOFTWARE



 Color Computer MACHINE MONITOR - professional software and manuals published by R.C.I. EDIT memory Content, TRACE program Instructions, TRAP data References, 3 display Formats. Program distribution includes both [2K] CoCo-dependent and [4K] stand-alone Versions. #10101/Tape = \$14.45. #10102/Disk = \$16.95; User Guide #20101/Small manual = \$9.95


### HARDWARE



 Color Computer PCBoards, FR4, [4x8]", 40 Pin, gold plated Connectors, design by R.C.I.  
#30101/A Bus Extender, cartridge Slot width (4.25"), 40 parallel signal Lines = \$14.00  
#30102/A Prototype "P", [3.5X6]" grid, .042" PTH, .1" spacing, 34 pin Connector = \$20.00  
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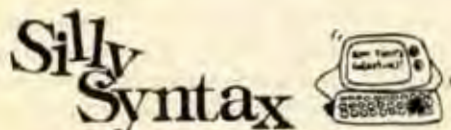
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## HARDCOPY

### A Five-Star Choice For A Printer Utility

By Larry Birkenfeld

Having a hard time getting that beautifully artistic creation off the disk and into a more tangible form for others to admire? Never fear, *HARDCOPY* is here. It is such a great printer utility it will make you want to hire an artist just to create pictures to print. *HARDCOPY* was written by Eric White and Scott Smith and is distributed by Computize, Inc.

*HARDCOPY* requires a 64K CoCo or CoCo 2, one disk drive and a printer to match the version you buy. At the time of this writing, the only printers supported are the Epson MX-80/100, RX-80 and FX-80, the I.D.S. 560-G and the Okidata 92. Support for other printers is supposedly on the way. Since each version supports only one printer, you must be sure to order the one that matches your printer. I reviewed the MX-80 version and it ran like a dream. Needless to say, I was very impressed.

The package comes with a single diskette and a nicely printed 27-page manual. The manual is well-organized, nicely illustrated (by *HARDCOPY* no doubt) and is quite sufficient.

*HARDCOPY* itself is capable of using four disks. They are 1) the *HARDCOPY* disk, 2) *Graphicom Part II* user fonts, 3) *Graphicom* format picture disks and 4) any disk containing a Hi-Res picture in binary format, including those saved from *CoCo Max* using the *SCREEN.BIN* file. I tested using the sample files on the *HARDCOPY* disk and a small picture made with *Graphicom*; all worked fine. Each picture processed is 6144 bytes long. The manual states that only 6144 byte images from *CoCo Max* can be processed, however, Bruce, at Computize, has informed me that this is no longer true. If you have *CoCo Max* and are interested in *HARDCOPY*, you might discuss this with him.

Before booting the program there are three parameters in the boot file that may be changed if you so desire. The parameters and their default settings are as follows:

- 1) Self-centering or non self-centering joysticks: default, self-centering.
- 2) Printer Baud rate: default, 9600 Baud.
- 3) Character set: default, ASCII/SET (*Graphicom Part II* fonts may be used).

After booting you will be requested to press Reset until the screen corner appears red. After this, pressing any key will bring up the main menu. At this point, pressing the space bar selects the keyboard as the main input device, while pressing the joystick firebutton selects the joystick as the main input device. Once selected, the input device may be changed while on any menu screen by pressing either the space bar or the joystick firebutton.

Once the main menu has appeared you see eight possible choices:

- 1) 1 x 1 print (¼ page)
- 2) 2 x 2 print (½ page)
- 3) 3 x 3 print (full page)
- 4) Label print
- 5) Card Shop
- 6) Poster
- 7) Special Effects
- 8) Disk Access

Each selection is represented by a picture on the screen. Your choice is made by placing a movable square around the picture representing the desired option and pressing the firebutton (I selected the joystick as my input device for this review).

The first three main menu options produce identical submenus. You may 1) return to main menu; 2) look at the screen; 3) change *PMODE*; 4) select color or black-and-white print; 5) choose a positive print; 6) choose a negative print. Since multiple printer dots are required to provide shades of gray for color prints, the color option is not functional on a 1 x 1 print.

The Special Effects option lets you define two shades of gray, rotate your print, choose only a portion of a picture to print by using a variable window, change the size of a pixel in the 'x' and/or 'y' direction, adjust the space between pixels, make the space between pixels either black or white, and produce mirror images. If all this doesn't impress you, nothing will. These features make *HARDCOPY* a very versatile printer utility.

The Label print option has all the features of the first three options. The "color or B & W" feature has been replaced with a "# of labels" feature. Once a print type is selected, a label size window appears over the picture for you to select which portion of the picture to print on the label.

The Card Shop option lets you take a picture, add text above or below it (you choose the text size), create text for the inside of the card and print all of this on one sheet of paper in such a fashion so as to be able to fold the sheet into a greeting card, complete with your picture and text.

The Poster option allows you to take a picture, or part of a picture, and enlarge it into a poster. It is made of several 8½ by 11-inch pages and must be put together to form a complete picture. You may choose your own scale factor. A word of caution is in order here: A large scale factor produces many output pages. This may overheat your printer head, so it is best to consult your printer manual before printing posters.

Last but not least is the Disk Access option. Naturally, this allows you to load the picture you wish to work with. You may also view a directory or view each picture on the disk one at a time.

For those who would like to print pictures from your own BASIC routines, *HARDCOPY* provides a "usercall" file and complete instructions for passing all required parameters through the BASIC routine to the usercall routine.

*HARDCOPY* is an excellent product that gives excellent results. If you're looking for a printer utility, it is a five-star choice.

(Computize, P.O. Box 207, Langhorne, PA 19047, disk \$29.95)

## Color Computer Machine Monitor Gets The Job Done

Serious programming in assembly language requires a good editor/assembler, a monitor, possibly a disassembler and other software devices. Minor patching or debugging of assembler programs requires only a monitor, which is a machine language program to observe (or "monitor") changes in RAM caused by the assembler program one is debugging.

The standard for assembler-support software programs is Radio Shack's *EDTASM+* because not only is it easily available and low in price, but it is the most frequently used assembler for CoCo ML programs. Considering that a monitor program represents only a portion of the *EDTASM+* package, this implies that a monitor program, to be competitive, must sell for about 40 percent of the *EDTASM+* price and ought to be more user friendly. RCI's *Color Computer Machine Monitor* (or *CCMM* for short) easily meets these requirements.

What must one have in a monitor? To begin with, its primary purpose is to observe the contents of both RAM and the CPU registers as the values vary during program operation. The monitor must be capable of conveniently inserting break points into the ML program being debugged, and displaying the values of memory and registers when these break points are encountered.

The ability to remove the break points is as important as the ability to set them. One must be able to begin execution at any location (to simulate unusual entries or unexpected branching) and also limit execution to a short enough series of commands for the user to understand what happened. In addition, the ability to list the data to a printer must be present.

A good monitor must also include a FILL command. This is used to load large pieces of memory with a user-defined hexadecimal value whose change will be readily apparent. A COPY or MOVE command must be available to relocate subroutines. All of the commands should ideally be single keystroke and the monitor must be written in relocatable code so it can be loaded where it will not

### One-Liner Contest Winner . . .

This One-Liner demonstrates the CoCo's PLAY command by playing the theme from *Raiders of the Lost Ark*. Try a tempo value of '5' for best results.

```
Ø CLS:PRINT"RAIDERS OF THE LOST
ARK THEME...":INPUT"TEMPO";I:PL$
="O2T=I;L4GG#A#O3L2D#O2L3.FGL2G#
":PA$="P255L4O2B-O3CDL2G#P255L4.
O3CP255DP255D#P255P255FP1ØØL2G":
PY$="O2L5B-B-B-O3L4GF02L5B-B-B-O
3L4GL2FP1ØØO1L9E-O3E-O4E-O5E-":P
LAYPL$+PA$:PLAYPL$+PY$:GOTO
```

Donny Schiavone  
Tulsa, OK

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

interfere with the program being debugged. Other features are nice, but these mentioned are the "bare bones" monitor requirements. RCI's *CCMM* includes all these monitor options.

Ideally, the monitor should be small (so as to leave a lot of memory for the programs being worked on) and be self-protective. RCI's monitor comes in two versions in one package and is small enough that it might even work in the older 4K models. The documentation is not too clear on whether 4K operation is feasible, but this program will work properly in 16K models that do not have Extended Color BASIC. That point may be very important to some users.

Unfortunately, the RCI monitor got poor marks from me on self-protection; I could crash it quite easily and it usually required a cold start (with loss of the program under development) to get going again. In addition, the keyboard sensitivity with *CCMM* running changes, which made me uncomfortable. The documentation, while neatly printed, conveniently arranged and comprehensive, is unintelligible. (I'm an MIT engineer and 25-year computer user, and I often could not understand this author.)

I must give RCI's effort only a second-place rating. Still, what is user friendly to me may be the opposite to you, and *Color Computer Machine Monitor* may be well-suited for your particular assembly needs.

(Real Computers and Intelligence, P.O. Box 74, Santa Clara, CA 95050, tape \$24.40, disk \$26.90)

— H. Larry Elman

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## OS-9 Hi-Res Screen Dump Utilities For Quality Printouts

Tandy has released a new product in the OS-9 line, a Hi-Res screen dump package called *OS-9 Hi-Res Screen Dump Utilities*. The programs come neatly packaged in a 7 by 11-inch book-like container including the instruction booklet, program diskette and software registration information. This information will allow the owner to receive updates to the programs. Enclosed with the registration card is a software version log to help avoid any confusion with later patches or problems.

*OS-9 Hi-Res Screen Dump Utilities* comes in two versions, both requiring 64K. One for Tandy (or compatible) dot matrix printers and the other for the ink-jet printer and its color capability. These programs will allow the user several options, the first of which is to print whatever is on the graphics screen to the printer. This mode has several options I will discuss later.

It is also possible to print a picture file to the printer. The third mode is one I found rather interesting. It will allow the graphics screen or picture file to be sent to disk. This is not so great in itself, but all it takes to print the file later is to LIST <pathname> >>p. Why is this so great you ask? If the picture has been dumped to the disk in this manner, it will be much easier to make multiple printouts of it.

### E.T.T. Electronic Typing Teacher by CHERRYSoft

Learning to type the right way can save you hours of tedious work when entering programs into your CoCo, and this is just what ETT was designed to do. Devote a little time every day practicing with ETT and before you know it you will be typing with confidence. Entering those programs will no longer be the chore it use to be.

ETT's video keyboard lets you practice with all the keys labeled, all the keys blank or only the "home" keys labeled. The visual cues guide you while you learn to type without watching your fingers. ETT shows your accuracy, response time, and words per minute. You will quickly see that you are improving with practice.

With the sentences provided by ETT learning to type can be fun. Over 1000 variations chosen because they include every letter in the alphabet. You can also create your own practice sets. This outstanding program was written by a certified teacher and professional programmer and comes with a ten page student manual-study guide. Requires 16K Extended Basic.

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Each of the programs has its own set of options to allow the user to customize the dump. The black-and-white program has three options: 'I', 'C' and '7'. Very simply, these stand for Inverse (swap black and white), Condensed and LP VII(7) mode. If the LP VII or DMP-100 is used, the '7' option must be used to accommodate those printers. Also, the Condensed mode will not work on either of these two printers.

The color dump program has 10 different options, each specifying a different color set. The first six determine which set of four colors are to be used and the last four are for setting the two-color modes. When using the two-color modes, the horizontal resolution is 256; the four-color modes each have a horizontal resolution of 128. The two-color modes consist of combinations of black, white and green, while each of the four-color modes consist of combinations of the colors available in Extended Color BASIC.

These utility programs are very well-packaged, sufficiently documented and extremely easy to use. The disk is not in any way protected which allows easy backups for archival purposes. One thing I would like to have seen in the documentation is a procedure that could be used to save a section of graphics memory to a picture file.

A drawback to these programs is that if the user has the Hi-Res (*O\*PAK*) program installed and calls up either of the programs to dump that screen, the screen is cleared and the program's logo is printed on the screen. This results in loss of the information on the Hi-Res screen and print out of the screen dump program's banner — a major problem. The only way around that is to save the screen to disk and then print it in that manner, which once again demonstrates the need for a discussion of saving graphics screens to disk.

If you use the Hi-Res graphics capabilities of OS-9 and wish to have a printout of your Hi-Res screens, I would highly recommend this package to you.

(Radio Shack stores nationwide, 64K OS-9, disk \$14.95)

— Mark Anderson

#### One-Liner Contest Winner . . .

*Dotbounce* shows a dot bouncing around the screen. When it hits the edge of the active screen area, you'll hear a random tone; the dot will change direction and speed randomly.

#### The listing:

```
Ø CLSØ:W=1:Z=1:X=Ø:Y=Ø:PLAY"L8Ø"
:FORA=1TO2STEPØ:IFX+W>63THENW=-1
-W:PLAY"O3C":NEXTA:ELSEIFX+W<ØTH
ENW=-1-W:PLAY"O3E":NEXTA:ELSEIFY
+Z>31THENZ=-1-Z:PLAY"O3G":NEXTA:
ELSEIFY+Z<ØTHENZ=-1-Z:PLAY"O4C":
NEXTA:ELSESET(X+W,Y+Z,5):RESET(X
,Y):X=X+W:Y=Y+Z:NEXTA
```

Steven Ostrom  
Minnetonka, MN

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Type*.)

## Professor Pressnote's Music Machine Makes Perfect Practice

Anyone who has gone through the experience of music training with their children on an instrument can appreciate a program that makes note recognition a lot simpler.

Not only are the fundamentals of music-making made easier by *Professor Pressnote's Music Machine*, but this new program distributed by Tandy makes those early lessons in music appreciation twice as fun.

The program was designed for use with a 32K system (tape or disk) with Extended BASIC, and a TRS-80 Electronic Book that makes interaction with the computer simple. You will have to purchase the Electronic Book separately, but it works with a series of learning programs for CoCo.

A clearly written 50-page user's guide describes in detail all of the six learning activities, how to use the Electronic Book, and provides a step-by-step demonstration for each of the activities, which consist of:

- Play A Tune, which displays a musical staff with the notes of the C scale and plays three familiar tunes.
- Note-Finder, which helps the learner become familiar with the notes of the C scale by showing their names and their positions on the musical staff.
- Length-Maker, which presents the concept of note

values by letting the child write short tunes using notes of different pitches and lengths.

— Tone Machine, which allows the student to play live music, either by reading from sheet music or by composing original tunes.

— Copy A Tune, which lets the learner enter the notes of a tune that is copied or created, then play it back.

— Quizzes consists of "Name The Notes," which tests the student's understanding of the locations and names of different notes on a musical staff, and "Add The Lengths," which tests understanding of the length values of notes.

The package is complete with pages that you simply insert into the Electronic Book. The book plugs into the right joystick port; no special adaptors or connectors are required. The child enters commands simply by pressing marked areas on the pages of the book instead of the keyboard.

As noted earlier, *Professor Pressnote's Music Machine* is a fun experience. But I would suggest or caution that it is only for families who are serious about music education — primarily because of the expense involved in two separate purchases, and you should also be prepared for hours of serious study. Don't expect to sit down and start playing such traditional children's favorites as "Mary Had A Little Lamb" or "Twinkle, Twinkle Little Star" right away.

(Radio Shack stores nationwide, \$24.95, Electronic Book \$24.95)

— Charles Springer

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# RAINBOW

Give us your best! Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your full name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

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|                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                 |
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| <b>ATOM (Radio Shack)</b><br>53 *Alan Drazen, Longwood, FL<br>41 Erik Huffman, Rochester, MI                                                                                                                                                                                         | <b>CUR'BER (Tom Mix)</b><br>19,550 *Rodney Mullineaux, Gig Harbor, WA                                                                                                                                                                                                 | <b>KEY BOMBER (THE RAINBOW)</b><br>20,052 *Tony Boring, Armagh, PA                                                                                                                                                                                                              |
| <b>BASEBALL (Radio Shack)</b><br>526-80 *Bob Dewitt, Blue Island, IL                                                                                                                                                                                                                 | <b>DALLAS QUEST (Radio Shack)</b><br>93 *Robert Sunderland, Sacramento, CA<br>36 Erik Huffman, Rochester, MI                                                                                                                                                          | <b>KEYS OF THE WIZARD (Spectral Associates)</b><br>582 *John Fulton, Boydton, VA                                                                                                                                                                                                |
| <b>BATS AND BUGS (THE RAINBOW)</b><br>24,600 *Michael Rosenberg, Preatonburg, KY                                                                                                                                                                                                     | <b>DEFENSE (Spectral Associates)</b><br>58,730 *Brett DuPont, Oregon, OH                                                                                                                                                                                              | <b>THE KING (Tom Mix)</b><br>1,670,900 *Yolanda Farr, Sayre, PA                                                                                                                                                                                                                 |
| <b>BEAM RIDER (Spectral Associates)</b><br>577,330 *Bart Lyon, Queensland, Australia<br>51,210 Tim Hart, Salt Lake City, UT                                                                                                                                                          | <b>DEMON II (THE RAINBOW)</b><br>21,925 *Keith Schuler, Merritt Island, FL                                                                                                                                                                                            | <b>KING TUT (Tom Mix)</b><br>138,500 *Martin Cuiver, San Francisco, CA                                                                                                                                                                                                          |
| <b>BLACKBEARD'S ISLAND (NOVASOFT)</b><br>74 *Jeff Roberg, Winfield, KS                                                                                                                                                                                                               | <b>DEVIL ASSAULT (Tom Mix)</b><br>64,741 *Eugene Little, Pierceland, Saskatchewan                                                                                                                                                                                     | <b>KLENDATHU (Radio Shack)</b><br>1,177,590 *Dan Franzer, Westlake, OH                                                                                                                                                                                                          |
| <b>BLACKJACK (THE RAINBOW)</b><br>\$10,000 *Wayne Dewitt, Blue Island, IL                                                                                                                                                                                                            | <b>DOODLEBUG (Computerware)</b><br>826,370 *Susan Ballinger, Uxbridge, Ontario                                                                                                                                                                                        | <b>KRON (Oregon Color Computers)</b><br>31,000 *Chris Cope, Central, SC                                                                                                                                                                                                         |
| <b>BLACK SANCTUM (Mark Data)</b><br>115 *Bette Haichter, Norwalk, CA                                                                                                                                                                                                                 | <b>DOUBLE BACK (Radio Shack)</b><br>614,450 *Eugene Roosa, Stone Ridge, NY                                                                                                                                                                                            | <b>LANGER (Spectral Associates)</b><br>883,000 *Jay Roberg, Winfield, KS<br>312,000 Eric Roberg, Winfield, KS<br>258,000 Kevin Roberg, Winfield, KS                                                                                                                             |
| <b>BLOC HEAD (Computerware)</b><br>188,700 *Pierre-Jean Douillard, Granby, Quebec<br>41,075 Michael Hebb, Victoria, Australia<br>27,000 Rodney Mullineaux, Gig Harbor, WA<br>23,500 Paschal Wilson, Kentwood, LA                                                                     | <b>DOWNLAND (Radio Shack)</b><br>20,900,400 *Adam Peterson, Portland, OR<br>68,346 Alain Cyr, Valcour, Quebec<br>67,456 Chris Mitchell, Byron, GA<br>67,141 Cliff Farmer, McGregor, TX<br>86,145 Jeanine McCueh, Rulland, MA<br>16,951 David Hart, Salt Lake City, UT | <b>LASERWORM &amp; FIREFLY (THE RAINBOW)</b><br>38,380 *Brian Vogel, Jasper, IN                                                                                                                                                                                                 |
| <b>BREWMASTER (NOVASOFT)</b><br>279,600 *Alan Drazen, Longwood, FL<br>98,875 Chris Cope, Central, SC<br>78,100 Steve Leonard, Roselle Park, NJ<br>80,925 David Hart, Salt Lake City, UT<br>38,875 Brent Hotewick, Coltonville, IL                                                    | <b>DRACONIAN (Tom Mix)</b><br>028,470 *Jeff Coladonato, Roslyn, PA                                                                                                                                                                                                    | <b>LUNAR ROYER PATROL (Spectral Associates)</b><br>136,700 *Lon Day, Arlington, TX                                                                                                                                                                                              |
| <b>BUSTOUT (Radio Shack)</b><br>15,520 *Brett DuPont, Oregon, OH                                                                                                                                                                                                                     | <b>DRAGON FIRE (Radio Shack)</b><br>1,520 *Bette Haichter, Norwalk, CA                                                                                                                                                                                                | <b>MADNESS &amp; THE MINOTAUR (Radio Shack)</b><br>240 *Chris Mitchell, Byron, GA                                                                                                                                                                                               |
| <b>BUZZARD BAIT (Tom Mix)</b><br>3,091,700 *Blossom Mayor, East Greenbush, NY                                                                                                                                                                                                        | <b>DUNKY-MUNKY (Intellectronics)</b><br>16,500 *Biju Shah, Deep River, Ontario<br>11,000 Mariano Frazzini, Blue Island, IL                                                                                                                                            | <b>MARATHON (THE RAINBOW)</b><br>307,790 *James Shedy III, Tonawanda, NY<br>206,580 Eric Gjovaaq, Bainbridge Is., WA<br>169,083 Eric Gadlage, Jasper, IN                                                                                                                        |
| <b>CALIXTO ISLAND (Mark Data)</b><br>115 *Glenn Della-Monica, Sacramento, CA<br>135 Bette Haichter, Norwalk, CA                                                                                                                                                                      | <b>FOODWAR (Arcade Animations)</b><br>185,980 *Chris Cope, Central, SC                                                                                                                                                                                                | <b>MAZELAND (Chromasette)</b><br>21,980 *Todd Knapp, Prairie du Chien, WI                                                                                                                                                                                                       |
| <b>CANYON CLIMBER (Radio Shack)</b><br>0,100,100 *Gary Mohnen, Tucson, AZ<br>286,600 Beverly Herberts, Glencida, CA<br>162,500 Michael Sileo Jr., Glendale, NY<br>168,500 Scott Bellman, Davenport, IA<br>148,400 Brett Fancher, Hooksett, NH<br>143,200 Sara Bentley, Schofield, WI | <b>FOOTBALL (Radio Shack)</b><br>266-0 *Tim Hart, Salt Lake City, UT                                                                                                                                                                                                  | <b>MEGA-BIG (Radio Shack)</b><br>10,661 *Blair Jamison, Kingston, Ontario<br>10,273 James Mancari, Ravenswood, WV<br>6,054 Jeremy Johnson, Nokomis, FL<br>7,930 Ron Haines, Naples, Ontario<br>3,996 Christopher Romano, Massapequa Park, NY<br>2,925 Scott Swedis, Spencer, MA |
| <b>CASHMAN (MichTron)</b><br>517,850 *Matt Mancor, Hallinore, MD                                                                                                                                                                                                                     | <b>THE FROG (Tom Mix)</b><br>11,080 *Mark Ferris, Deep River, Ontario                                                                                                                                                                                                 | <b>MISSILE BARRAGE (THE RAINBOW)</b><br>0-1 *Joe Calcaterra, Ridgewood, NY                                                                                                                                                                                                      |
| <b>CAVERN COPTER (THE RAINBOW)</b><br>2,431 *Jay Boem, Louisville, KY<br>1,535 Pierre-Jean Douillard, Granby, Quebec<br>1,240 Sean Conner, Summit, NJ<br>1,213 Doug Schwartz, Glendale, AZ<br>1,036 Steve Black, Palmdale, CA                                                        | <b>FROGGER (Cornsoft)</b><br>15,000 *Erik Huffman, Rochester, MI                                                                                                                                                                                                      | <b>MONKEY KONG (Med Systems)</b><br>365 *Mark Ferris, Deep River, Ontario                                                                                                                                                                                                       |
| <b>CHAMBERS (Tom Mix)</b><br>104,200 *Blossom Mayor, East Greenbush, NY                                                                                                                                                                                                              | <b>FURY (MichTron)</b><br>172,300 *Daniel D'Amour, Pincourt, Quebec                                                                                                                                                                                                   | <b>MONSTER MAZE (Radio Shack)</b><br>10,740 *Scott Swedis, Spencer, MA                                                                                                                                                                                                          |
| <b>CLOWNS &amp; BALLOONS (Radio Shack)</b><br>15,130 *Brett DuPont, Oregon, OH                                                                                                                                                                                                       | <b>GALAGON (Spectral Associates)</b><br>1,306,640 *Jackie Maddox, Iron Station, NC<br>887,920 Darrin Blake, Vinton, VA<br>219,670 Brian Wagner, Lawrence, KS<br>214,920 Tony Smith, Gig Harbor, WA<br>204,870 Arnold Sotnar, Los Angeles, CA                          | <b>MOON HOPPER (Computerware)</b><br>79,630 *Daniel D'Amour, Pincourt, Quebec<br>73,550 Eric Gadlage, Jasper, IN<br>60,280 Rodney Mullineaux, Gig Harbor, WA                                                                                                                    |
| <b>COLOR BASEBALL (Radio Shack)</b><br>105-0 *Francis Yu, Calgary, Alberta<br>96-1 Brian Bruan, Cortland, NY                                                                                                                                                                         | <b>GHANA SWANA (Radio Shack)</b><br>91,000 *Hollis Holcomb, Blanchard, OK                                                                                                                                                                                             | <b>MR. DIG (Computerware)</b><br>6,787,000 *Jeff Roberg, Winfield, KS<br>3,503,000 Gary Mohnen, Tucson, AZ<br>3,258,750 Ellen Ballinger, Uxbridge, Ontario<br>3,100,650 Biagio Di Lorenzo, Montreal, Quebec<br>3,001,100 Ross & Daniel Mahiman, Todd Boehm, Nashville, TN       |
| <b>COLOR CAR (NOVASOFT)</b><br>525,620 *Dan Bouges, Niantic, CT<br>229,710 Jerry Falicki, Brent Rapids, MI<br>163,032 Frank Canopa III, Santoroc, Puerto Rico<br>154,600 Scott Cunningham, East Lyme, CT                                                                             | <b>GLAXONS (Mark Data)</b><br>19,146 *Terry Moore, St. Catharines, Ontario                                                                                                                                                                                            | <b>MUDPIES (MichTron)</b><br>981,733 *Jon Slow, San Diego, CA                                                                                                                                                                                                                   |
| <b>COLORPEDE (Microcolor)</b><br>3,107,194 *John Day, Goodlettsville, TN                                                                                                                                                                                                             | <b>GOLD RUNNER (NOVASOFT)</b><br>163,400 *Jeff Roberg, Winfield, KS<br>49,450 Chris Cope, Central, SC<br>138,550 Eric Orshlow, Las Vegas, NV<br>85,800 Dan Bouges, Niantic, CT<br>65,800 Sean Colson, East Lyme, CT                                                   | <b>NINJA WARRIOR (Programmer's Guild)</b><br>28,800 *Dave Iverson, Oakville, Ontario                                                                                                                                                                                            |
| <b>COSMIC INVADERS (Spectral Associates)</b><br>15,400 *Mariano Frazzini, Blue Island, IL<br>5,960 Derek Potter, Deep River, Ontario                                                                                                                                                 | <b>GUARDIAN (Quasar Animations)</b><br>4,350 *Jason Forbes, Mexico, NY                                                                                                                                                                                                | <b>OUTHOUSE (MichTron)</b><br>172,270 *Matt Johnson, Eagle, PA                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                      | <b>ICEMASTER (Arcade Animation)</b><br>14,525 *Jean-Pierre Dolacclair, Asbestos, Quebec                                                                                                                                                                               | <b>PAC-EM (THE RAINBOW)</b><br>575 *Greg Lewis, North Augusta, SC                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                      | <b>THE INTERPLANETARY FRUIT FLY (THE RAINBOW)</b><br>37,000 *Scott Perkins, Purl Orange, FL                                                                                                                                                                           | <b>PAC-TAC (Computerware)</b><br>120,050 *Matt Johnson, Eagle, PA<br>22,815 Maris Cawood, Houston, TX<br>17,910 Greg Lewis, North Augusta, SC                                                                                                                                   |
|                                                                                                                                                                                                                                                                                      | <b>THE JUNGLE (THE RAINBOW)</b><br>588,660,000 *Jeff Lawrence, Cambridge, Ontario                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                      | <b>JUNIOR'S REVENGE (Computerware)</b><br>1,072,600 *Matthew Ramsay, Detroit, MI                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                      | <b>JUNKFOOD (THE RAINBOW)</b><br>1,187,520 *Larry Thomson, Menominee, MI                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                 |

# SCOREBOARD

## PENGUIN (THE RAINBOW)

- 48,250 \*Paul Wagorn, Carp, Ontario  
 39,250 Kirby Smith, York, PA  
 22,670 Gary Bedford, Piqua, OH  
 10,450 Nick Kessel, Appleton, WI  
 14,550 Matt Funk, Hanover, PA

## PHANTOM SLAYER (Med Systems)

- 1,320 \*Susan Ballinger, Uxbridge, Ontario  
 208 Greg Lewis, North Augusta, SC  
 1/4 Chris Morris, Colonial Heights, VA

## PINBALL (Radio Shack)

- 4,370,000 \*Christopher Ward, Burlington, IA  
 336,030 Brad Houlden, Kenora, Ontario

## PIPELINE (THE RAINBOW)

- 2,820 \*Mike Garozzo, Morrisville, PA

## PLANET INVASION (Spectral Associates)

- 15,700 \*Manoj Hippola, Deep River, Ontario

## POLTERGEIST (Radio Shack)

- 6,000 \*Billy Fairfull, Charleston, SC

## POOYAN (Datasoft)

- 3,705,000 \*Ben Collins, Clemson, SC  
 1,546,000 Jeff Connell, Winona, MN  
 1,433,000 Rupan Young, Sheffield, MA  
 1,250,250 Richard Hawkins, Cleveland, TN  
 978,450 Christopher Romance,  
 Massapequa Park, NY

- 39,800 Denise Abbott, Hutchinson, KS

## POPCORN (Radio Shack)

- 45,210 \*Mike Norris, Columbia, SC  
 41,910 Nicole Freedman, Westley, MA  
 36,500 Barry Stanton, North East, PA  
 34,900 William Blaine III, Gallipolis Ferry,  
 WV

- 32,430 Chris Bosl, Temple, TX

- 39,360 Dale Cote, Courtenay,  
 British Columbia

- 27,200 Keri Cote, Courtenay,  
 British Columbia

- 26,000 Scott Swedis, Spencer, MA

## PROJECT NEBULA (Radio Shack)

- 2,750 \*Jeff Murphy, Lake City, GA

- 2,005 Christopher Romance,  
 Massapequa Park, NY

- 548 Jeremy Brosius, Sand Springs, OK

- 295 Richard Young, Mesa, AZ

## PYRAMID (Radio Shack)

- 229,112 \*Byll Adams, Pasadena, TX

- 229,112 \*George Fairfield, Victoria,  
 British Columbia

- 229,112 \*David Oelhaupf, Calgary, Alberta

- 229,112 \*Robbie Sablotny, Mt. Zion, IL

- 229,113 John Fulton, Houghton, VA

- 229,114 Chris Mitchell, Byron, GA

- 229,140 Bettie Hatcher, Norwalk, GA

- 229,237 James Mancani, Ravenswood, WV

## Q-NEED (THE RAINBOW)

- 1,958,950 \*Bruce Baltzer, Hanover, Ontario

## QUIX (Tom Mix)

- 807,320 \*Andrew Norris, Mississauga, Ontario

## RAAKA-TV (Radio Shack)

- 50 \*Ryan Devlin, Louisville, KY

- 50 \*John Fulton, Boydton, VA

- 50 \*Todd Knapp, Prairie du Chiex, WI

- 50 \*Robbie Sablotny, Mt. Zion, IL

- 40 Robbie Haines, Nepan, Ontario

- 40 John Porepctuk, Blairtown, NJ

## RACER (THE RAINBOW)

- 1749 \*Kirby Smith, York, PA

## RADIO BALL (Radio Shack)

- 4,510,740 \*Les Don, Eau Claire, WI

- 3,708,810 Stephen Zamonski, Ewing, NJ

- 1,985,250 Nick Kessel, Appleton, WI  
 1,736,150 Mickey Lambert, Indianapolis, IN  
 1,629,200 Benoit Labeau, Montreal, Quebec  
 1,097,750 Paul Vandenberg, Appleton, WI

## REFACTOIDS (Radio Shack)

- 5,257,250 \*Gary Bedford, Piqua, OH

## RETURN OF THE JET-1 (ThunderVision)

- 536,452 \*Matt Griffiths, Stillwell, KS

- 429,100 Jean-Francois Bruneau, St-Hubert,  
 Quebec

- 300,001 Cory McKay, Montreal, Quebec

- 203,500 Jamey Maumius, New Orleans, LA

## REVERSE (THE RAINBOW)

- 7 \*Jon Hobson, Plainfield, WI

## ROAD RACE (THE RAINBOW)

- 91.7 \*Dill Mullis, Myrtle Beach, SC

- 447.7 Rupert Young, Sheffield, MA

- 576.6 Eric Clarkton, Missouri City, TX

- 700.1 Michael Hebb, Victoria, Australia

- 1212.4 Michael Martens, Wauusa, WI

## ROBOTRON (Intronix)

- 335,400 \*Baju Shah & Mark Ferris, Deep River,  
 Ontario

## ROBOTTACK (Intronix)

- 36,090 \*Hiram Esparza, Blue Island, IL

## RUN FOR YOUR LIFE (THE RAINBOW)

- 20,000 \*Ryan Devlin, Louisville, KY

## SAILOR MAN (Tom Mix)

- 870,100 \*Alan Drazen, Longwood, FL

- 699,800 Matthew Ramsay, Detroit, MI

- 643,700 Ruth King, Mississauga, Ontario

- 602,000 Aaron Januice, Munstern, CO

- 596,700 Jeff Picketts, Brantford, Ontario

- 299,000 Dan Sobczak, Mesa, AZ

- 238,800 Dave Iverson, Oakville, Ontario

## SANDS OF EGYPT (Radio Shack)

- 77 \*Jeff Hillison, Blacksburg, VA

- 50 John Alkopus, Yonkers, NY

- 40 Bob Dewitt, Blue Island, IL

- 57 Jeff McKay, Travis AFB, CA

- 17 PJ Jayakody, Shelbyville, TN

- 10 Nolan Edward Lee, Sun, LA

## SCARFMAN (Cornsoft)

- 545,700 \*Matthew Ramsay, Detroit, MI

## SEA DRAGON (Adventure International)

- 39,030 \*Brian Wolfgram, Freeland, MI

## SEASTALKER (Infocom)

- 212/50 \*Jeff Hillison, Blacksburg, VA

## SHAMUS (Radio Shack)

- 62,940 \*Jon Blow, San Diego, CA

- 56,000 John Lake, Princeton, IL

- 27,950 Erik Huffman, Rochester, MI

## SHENANIGANS (Mark Data)

- 95 \*Jeff Hillison, Blacksburg, VA

- 95 \*David Kay, Winnipeg, Manitoba  
 N. Wakelin, Mt. Lebanon, PA

- 103 Chris Cope, Central, SC

## SHOOTING GALLERY (Radio Shack)

- 227,840 \*Cliff Farmer, McGregor, TX

- 24,000 Bob Dewitt, Blue Island, IL

- 20,880 David Hart, Salt Lake City, UT

## SKIING (Radio Shack)

- 01.90 \*Scott Cleveland, Fairmount, IN

- 01.00 \*Billy Fairfull, Charleston, SC

## SKRAMBLE (Tom Mix)

- 80,020 \*Brad Houlden, Kenora, Ontario

## SLAY THE MERIUS (Radio Shack)

- 472,667 \*Jim Herbers, Pleasantia, CA

## SNAKER (THE RAINBOW)

- 1/24 \*LuAnne Ashby, Phoenix, AZ

## SOLO POKER (DataSoft)

- 1,100 \*Carol Steker, Moscow, ID  
 710 Eya Huttman, Rochester, MI  
 690 Robert Peterman Jr., Newton, TX

## SPACE AMBUUSH (Computerware)

- 29,400 \*Frank Canepa III, Santurca,  
 Puerto Rico

## SPACE ASSAULT (Radio Shack)

- 19,085 \*Steven Allen, Sharpsburg, MD

- 6,530 Manish Shah, Harrow, England

## SPACE RACE (Spectral Associates)

- 83,422 \*Mark Donahue, Alexandria, VA

## SPEED RACER (Mich Tron)

- 126,750 \*Jack Menzullo, Saginaw, MI

## STARSHIP CHAMELEON (Computerware)

- 66,880 \*Brian Voges, Jasper, IN

## STELLAR LIFE-LINE (Radio Shack)

- 119,030 \*Brian Shabor, Boise, ID

## STORM ARROWS (Spectral Associates)

- 203,850 \*Arnold Snitzer, Los Angeles, CA

## TEMPLE OF ROM (Radio Shack)

- 984,400 \*Sonya Hurst, Richmond, CA

- 889,400 Karl Guillford, Laddon, SC

- 837,600 David Oelhaupf, Calgary, Alberta

- 820,800 Rhea Jarrard, Olympia, WA

- 463,400 Glenn Altrey, Olympia, WA

- 306,400 Michael Wensing, Berwyn, PA

- 254,000 Robin Nicholson I, El Paso, TX

## TIME BANDIT (Mich Tron)

- 1,025,210 \*Terry Moore, St. Catharines, Ontario

- 747,460 Steven Coladonato, Roalyn, PA

- 359,980 Kristopher Staller, Ft. Wayne, IN

- 88,940 Brian Wagner, Lawrence, KS

- 71,430 Rupert Young, Sheffield, MA

- 28,840 Brad Houlden, Kenora, Ontario

## THE TOUCHSTONE (Tom Mix)

- 226,640 \*Kristopher Staller, Ft. Wayne, IN

## TRAILIN' TAIL (THE RAINBOW)

- 273,350 \*Jerry Dill, Grafton, MA

## TRAPFALL (Tom Mix)

- 30,116 \*Kenneth Markal, Houston, TX

- 39,080 Connie Rind, Olathe, MO

- 50,078 Lori Day, Arlington, TX

## TUBE FRENZY (Aardvark)

- 140,280 \*Bucky Baker, Mesasa, IL

## TUT'S TOMB (Mark Data)

- 189,980 \*Nicole Poulot Coors, Mobile, AL

## WHOLETHING RUN (Spectral Associates)

- 54,500 \*Jay Asai, Marlborough, CT

- 43,850 Glen Bildeau, Otterburn Park,  
 Ontario

- 43,350 P.J. Jayakody, Shelbyville, TN

- 30,190 Dan Durga, Flint, MI

- 27,300 Michel Lebrun, Anjou, Quebec

## WILDCATTING (Radio Shack)

- \$30,103,000 \*Gary Mohrson, Tucson, AZ

## WILLY'S WAREHOUSE (Intronix)

- 183,500 \*Alan Morris, Chippewa, MA

## ZAXXON (DataSoft)

- 2,068,900 \*Dave Levora, Oak Forest, IL

- 2,057,600 Chris Oberholtzer, Lexington, MA

- 1,700,000 Biagio Di Lorenzo, Montreal, Quebec

- 1,610,000 James Quadrella, Brooklyn, NY

- 850,500 Eric Gadlage, Jasper, IN

- 123,200 James Mancani, Ravenswood, WV

- 104,700 Douglas Ervine, Burlington, IA

- 89,100 Cory McKay, Montreal, Quebec

- 82,600 Steve Black, Palmdale, CA

- 46,900 Steve Fell, Oshkosh, WI

— Debbie Hartley



# SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

## CAN'T GET NO SATISFACTION

### Scoreboard:

Do you think you can increase the amount of "Scoreboard Pointers," giving a wider variety of help?

Also, how about having more "Scoreboard" records?

Thanks a lot,

Mike Rebbecki  
Somerdale, NJ

**Editor's Note:** The more pointers we get, Mike, the more we're likely to print. C'mon, Scoreboarders, share those secrets.

## POPPING THE RIVETS

### Scoreboard:

For those having trouble "popping the rivets" on *The King*, here's a trick to solve it. When you have popped all the rivets on the left column, get the hammer in the middle and hit as many fireballs as you can. After each fireball is hit, run to the right until the girl on top faces the right. This sends all the fireballs entering the board to the left, where they are trapped. After you hit as many as possible, run to the top right rivet. When you pop the rivet, center your joystick and press the jump button as soon as your man is going to fall. While you are falling, you're also popping the rivets.

Brian Peters  
Philadelphia, PA

## FRAGILE — HANDLE WITH CARE

### Scoreboard:

I have a couple of tips concerning Radio Shack's *Pyramid*.

1) For those having problems setting down the vase, you must get the velvet pillow from the high priest's room. After you have that, get the vase and type RELEASE VASE and it is set safely on top of the velvet pillow.

2) After about 290-310 turns, your lamp starts to run out. You can prevent this by checking your score every once in a while,

and by getting the extra batteries from the vending machine — if you have the gold coins.

3) There's a very quick and easy passage to the entrance of the pyramid. When you get to the area where there is a panel on the wall, type PANEL and you will be at the entrance of the pyramid. To get back just type PANEL again. This makes it easy for you to drop your treasures at the entrance without wasting your turns.

David Hurt  
Salt Lake City, UT

### Scoreboard:

In response to Judd Rossman's letter (June 1985) concerning *Black Sanctum*, you must drop the ash (DROP ASH) and type in a weird message on a certain piece of paper that now might be a statue!

I need help with *Madness and the Minotaur*, *Sands of Egypt*, *Dungeons of Daggorath* and *Dallas Quest*. Any clues or suggestions would be helpful.

Steve Warrick  
Peru, IL

## BRIDGE THE GAP

### Scoreboard:

In response to Ian Loeppky's letter (July 1985), the only thing you need the scepter for is if you want to make a bridge over the bottomless pit. You do not need the scepter for the bird! If you have the scepter while trying to get the bird, it flies away; you must first drop the scepter.

Any way you can, type GO PANEL where you drop the treasures and then you will be in the same hallway.

James Mancari  
Ravenswood, WV

## COCO GAME CLUB OFFER

### Scoreboard:

I'd like to know if any of your readers would be interested in joining a "CoCo Game Club" for both Adventure and arcade-type games. There are no dues or

fees. This will be mainly an information club so we can help each other solve games, as well as meeting new CoCo owners and hearing of their Adventures — through letters and possibly even phone calls.

If any of you are interested, please send one 22 cent stamp to P.O. Box 1308, 90651-1308. I think a club for CoCo game lovers would be great! Thank you.

Bette A. Hatcher  
Norwalk, CA

### Scoreboard:

I have solved *Calixto Island* and I have some hints. The treasure is in the clearing with the idol. Dig twice, get everything in the house and load it in the machine. When you get to the field, unload and put the stuff in the shed. The manual for the machine is in the chest. Trader Jack will only trade the keys and machete for the rug and chest. (The keys open the desk.) Give the natives the costume jewelry.

I also have a few questions. How do you read the microfilm? What's in the pottery and what are the specs for?

Charles Farris  
Shinyeld, the Netherlands

## OLYMPIC QUEST

### Scoreboard:

Is there an Olympic game on disk for the Color Computer?

Jon Sowle  
Vero Beach, FL

**Editor's Note:** I received the following letter, Jon, several days after your letter. Read on.

### Scoreboard:

I would like to inform your readers that there will soon be an Olympic Decathlon game out for the 64K Extended Color Computer. For more information send an SASE to R & A Enterprises, 48 North View Ave., 02920.

Richard Russillo  
Cranston, RI



## ALMOST A SOLUTION

### Scoreboard:

I would like to respond to Tony Cross' letter (August 1985) concerning *Trekboer*. In the interest of "true Adventuring," I can't simply reveal the final portion of the game, but I can give a few hints.

In the underground complex on the garden planet, there is a steel grate. This grate is made of the same metal as the access panels of the "Trekboer" and "Veldboer."

Once past the grate, don't disregard any garbage you may find — it could bridge the gap between a hopeless situation and victory. Be sure, though, that you've left a line of escape or you may be left dangling.

George Caleodis  
Staubenville, OH

door and jump. This will advance you several levels and give you some bonus points and an extra life. If you play long enough, you can get the bonus up extremely high (i.e., 490,000).

Jeff, Kevin, Eric and Jay Raberg  
Winfield, KS

### Scoreboard:

I'm having a lot of trouble staying alive in *Beyond the Crimson Moon*. Does anyone have hints on how to get through safely or other helpful tips?

Tex Kertesz  
Mesa, AZ

### Scoreboard:

Wow! What excellent graphics *Amphibia* has, but four buggies sure go quick. Try changing the value of NS in Line 0 to a higher number for more buggies.

Jim Cockrum  
Martinsville, IN

### Scoreboard:

In *Raaka-Tu*, everyone says "get the poisonous candle to kill the gargoyle." This may be a dumb question, but where's the poisonous candle?

Chris Allbritton  
Little Rock, AR

## DALLAS TIPS

### DEFEATING THE DROIDS

#### Scoreboard:

I have solved *Major Istar*. For those who have this Adventure, take heart. Getting past the security droids can be frustrating, but it isn't difficult. There are two sections of security droids to run through. The second set of droids is faster than the first and their paths are slightly different.

As in other Adventure games, you will have to backtrack in order to obtain the necessary items.

Lastly, you must remember the importance of computers.

Karen L. Jessen  
Cleveland, OH

#### Scoreboard:

I have solved *Dallas Quest* and here are some hints you may find useful.

There are several objects in this Adventure that are useless. These include the apples, the rope and the suspenders.

When you get to the crossroads, go to the "Nest Egg." Remember to get the coconuts. When you get there, bribe the monkey with the tobacco and get the eggs.

After you go back to the tribe, show the monkey the mirror, and to escape from the natives WAVE the RING. When you get to the spider, type HATCH EGGS.

You also wave the ring to get by the elephant. To get by the lion, show him the mirror, too. I'll leave the rest of the Adventure for you to solve.

I am stumped with *Trekboer*. When I enter the underground complex I give the spider the yellow capsule. But when I get to the grating, there is another spider there! What am I supposed to do?

Keith Schuler  
Merritt Island, FL

#### Scoreboard:

I would like to know why the pokes for Tom Mix's *The King*, in April 1985 by Jim Mathues, and in March 1985 by Bill Bernico do not work on my game. If anyone knows why, write to "Scoreboard Pointers."

Chad Parker  
Battle Creek, MI

### BAREFOOTIN'

#### Scoreboard:

I need help on *Shenanigans*. Where do I get the shoes? I can find the clothes, but not the shoes. The bartender just kicks me out!

Mike Kennedy  
Terrace Park, OH

Editor's Note: Look under the bed.

#### Scoreboard:

In conjunction with Mike French's letter (July 1985) concerning *Dungeons of Dagonath*, instead of just putting one item in front of you, try putting a whole bunch of stuff. This way you can really get ahead of the monsters.

Chris Morris  
Colonial Heights, VA

### INCREASING YOUR SCORE

#### Scoreboard:

In *Crystle Castles* there is a way to achieve very high scores. On the first level, there is occasionally an extra door. Go in this

#### Scoreboard:

I have a tip for anybody who owns *Raaka-Tu*. When you have collected all your treasure, try to MOVE the ALTAR.

In *Madness and the Minotaur* when your lamp gets dim, find the urn and FILL LAMP.

In *Bedlam*, try to get the green key with the hook when you are one room away from it.

In *Dallas Quest*, use the shovel as an oar.

John Perepchuk  
Blirstown, NJ

To respond to other readers' inquiries and requests for assistance, reply to Scoreboard Pointers, c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all Scoreboard readers in an upcoming issue.

— Debbie Hartley

## CORRECTIONS

"**Brotan the Blue**" (August 1985, Page 18): Alan Saporta tells us there are three changes that need to be made to his program. Change lines 32 and 34 to read as follows:

```
32 PUT(S,F)-(S+8,Y+1),SP:IFSC>2
  ØØØ AND SC<2Ø5Ø AND GY<1Ø THEN G
  Y=GY+1 ELSE IF SC>5ØØØ AND SC<5Ø
  5Ø AND GY<1Ø THENGY=GY+1
```

```
34 PUT(CD,Y)-(CD+8,Y+1),SP:IFSC
<15ØØØ OR ED=1Ø THEN36 ELSE IF R
P=1 AND ED<>1Ø THEN GOTO35
```

Also, add :ED=1Ø to the end of Line 35.

"**Say 'Hello' To This Directory Helper**" (August 1985, Page 69): Doug Heyza tells us that a minor bug in his program can be fixed by adding this line:

```
B95 P$(N)=""
```

"**The Eye Saver**" (July 1985, Page 124): Norman Wong says at least one reader has had a problem in Line 80 because a space was left out. Line 80 (which is correct as shown in the magazine) should have a space between IFSM<>K and THEN.

"**Operation Freedom**" (August 1985, Page 54): Linda Hartman called to tell us there is a problem with lines 20000 and 20040 (shown on Page 68). The end of Line 20040, which was supposed to be at the very bottom of the left column, ended up within Line 20000 instead. Here are the two lines in their correct form:

```
2ØØØØ C$=CHR$(128):PMODE1,1:PCLS
3:SCREEN1,Ø:COLOR2,3:DRAW"BMØ,12
ØC4R4L2M8,99R66M8Ø,12ØR2L4BM75,9
9E8U12H8L66G8D12F8":PAINT(36,88)
,4,4:PSET(2Ø,18Ø,2):DRAW"BM16,18
3C2F2R4E2M2Ø,187G2D2BM23,19ØU2":
GET(16,18Ø)-(24,19Ø),IK:LINE(16,
18Ø)-(24,19Ø),PRESET,BF
```

```
2ØØ4Ø NEXTZ:PUT(4Ø,111)-(5Ø,12Ø)
,IK:LINE(4Ø,99)-(5Ø,12Ø),PSET,BF
:FORT=5ØTO1ØØSTEP1Ø:PLAY"T"+STR$
(T)+"ABABABA":NEXTT:LINE(5Ø,12Ø)
-(4Ø,99),PRESET,BF:NEXTX
```

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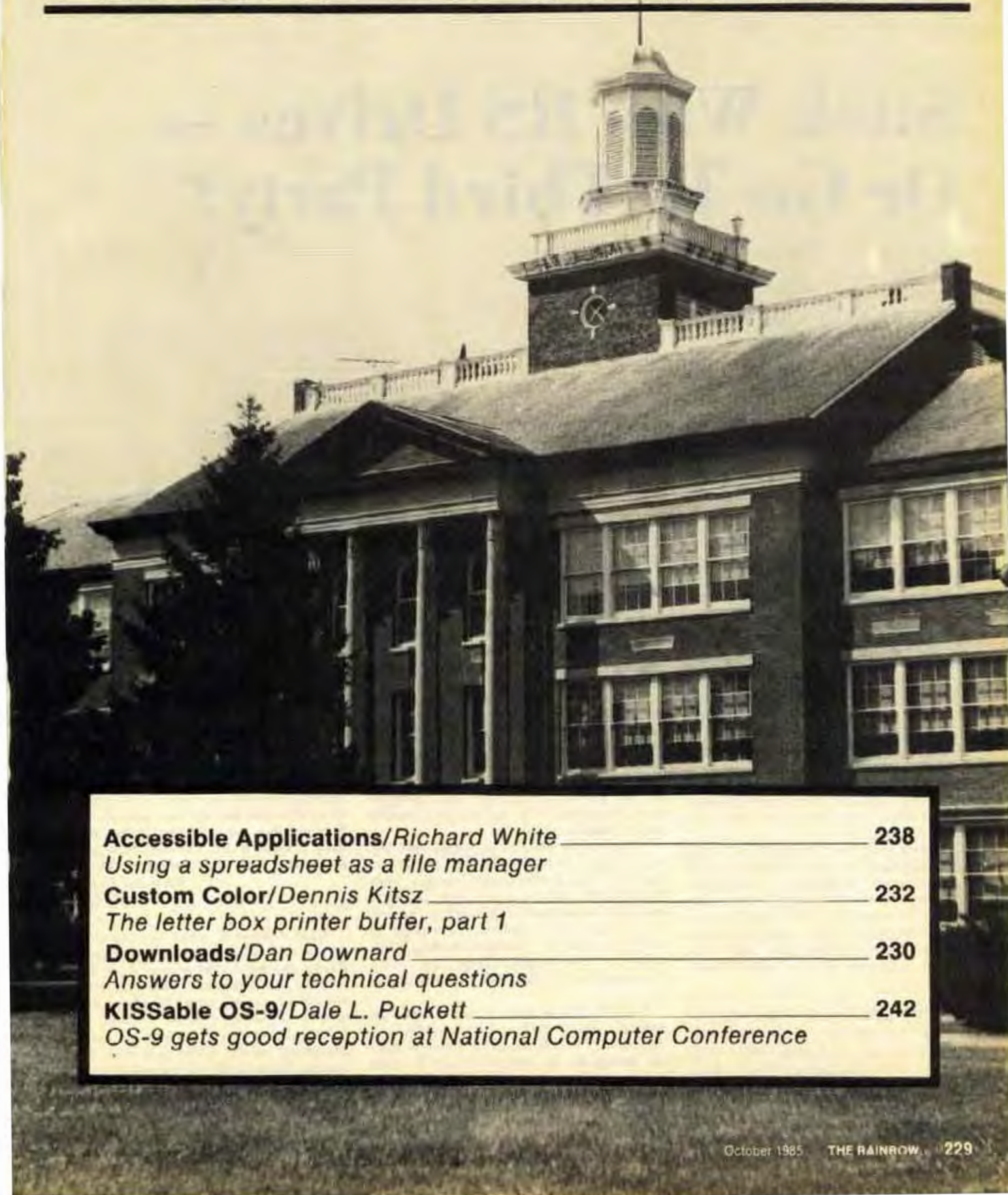
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# Stick With RS Drives — Or Go To Third Party?

By Dan Downard  
Rainbow Technical Editor

• *I have a 16K Extended BASIC CoCo 2. I hope to expand to disk and 64K in the near future. Would it be better to stick with the Radio Shack drives and DOS or buy JDOS? Also, when I POKE 25,6: NEW I get my 14K back, but when I POKE 25,0: NEW I get 16K when I ?MEM. Where does this extra 2K come from?*

Rod Snaith  
Nipawin, Saskatchewan

Rod, the type of drives you buy is relatively independent of the DOS you use. The use of Tandy drives does not preclude the use of a J&M controller and vice versa, you can use a Tandy controller with, let's say, TEAC drives.

The main difference is in the DOS. Tandy has a copyright on Disk Extended Color BASIC. In order to provide a compatible system with their controllers, J&M wrote JDOS. It is compatible with BASIC, but not machine language. Since many programs use direct ROM calls, these calls have different addresses for the two different

systems. Realistically, you have the same potential problem in choosing between Disk BASIC 1.0 and 1.1.

Enter ADOS. ADOS is actually an extension of Disk BASIC; it adds commands. These DOSs are compatible with Disk BASIC and quite a few users are sold on these systems.

As I have said before, the J&M controller is a little more reliable than the Tandy controller from an electrical and mechanical standpoint. Both serve the same purpose — to interface your CoCo to the disk drives. The latest J&M controller allows the use of two ROMs. This solves your problem in DOS compatibility, and you get a parallel printer interface to boot.

I don't think you can go wrong with any combination of controllers and disk drives you buy, but I recommend using a Disk BASIC ROM. All of the pros and cons have not been mentioned, but I bet if you ask 10 different CoCo owners, you will get 10 different opinions. I suggest reading "Getting On The Right Track" by Colin Stearman in the July 1985 RAINBOW (Page 26).

Enough about disk drives, Rod. To answer your other question: Memory locations 25 and 26 tell BASIC where to start the program. If you POKE 25,6 your program will start at \$600, just above the text screen. If you POKE 25,0 your program will start at \$0 and wipe out all of the RAM

variables stored at these locations. If you don't plan on using graphics, POKE 25,6 will give you the maximum amount of usable memory for a non disk system.

## BASIC/ML Combo

• *I would appreciate any information about the locations 360 and 361, which I use to make a nice combination between BASIC and machine language. These addresses are the most and least significant bytes that indicate the start address of my ML routine, which permanently executes itself, even in BASIC. I found this useful tip in the May 1984 RAINBOW, Page 149.*

Normand Defayette  
Hull, Quebec

When Microsoft wrote the BASIC interpreter for Tandy, Normand, they made the ROMs expandable by adding RAM hooks into the ROM routines. Locations 360 and 361 are an address hook that allows the use of BASIC, Extended BASIC or Disk BASIC ROMs for console output. Otherwise, depending on the ROM you have in the system, this address will change to point to the proper routine.

By changing this address to the start of a program, after loading the program it will

*(Dan Downard is an electrical engineer and has been involved in electronics for 25 years through ham radio [K4KWT]. His interest in computers began about six years ago and he has built several 68XX systems.)*

automatically execute. Actually, the microprocessor is going to output something to the screen, but after all, microprocessors are not as smart as the people using them, are they?

### Type Trouble?

• I am writing a program that uses disk I/O from machine language. I noticed in the December 1983 RAINBOW on Page 329, there is a ROM subroutine for the LONDM command at \$CEE5. I have tried to use this subroutine, but I cannot get it to work. I set the filename in \$94C (see Page 325 of this issue) and the file type in \$957. Are there more parameters to set? What is the problem? Help!

Also, at \$C8A4 (on Page 329) it says the filename should be set into \$957, which is listed as the file type, not the filename. Is this a typographical error or what? Also, \$EB is to be set with the default drive number, but is listed on Page 324 as being in the middle of the PLAY command section. Is this a typographical error, too?

Kevin Roberts  
Fairview, OK

The first thing to be clarified, Kevin, is that this address is only valid for Disk BASIC 1.0. The corresponding address for Disk BASIC 1.1 is \$CFCl.

These entry points assume a LOADM command has been encountered in a BASIC line and scan the rest of the BASIC buffer for the filename, extension and offset. You don't want to use these entry points for a machine language program.

Actually, it is a little complicated to simulate the LOADM command from an ML program, as eventually the information to load the program is stored on the stack.

I suggest obtaining a copy of the September 1983 RAINBOW: Read the "Superpatch for EDTASM+" article by Roger Schrag. It adds a LOADM command to EDTASM+ and gives a good example of what you want to accomplish. Sorry, we don't have any more back issues, but maybe you can borrow one from a friend.

### Passing Parameters

• We interface our Apple IIe (with serial card) to hospital lab instruments with an RS-232 port, matching the instrument transmission parameters (Baud rate, start/stop bits and parity) and manipulating the transmitted data using Applesoft BASIC control commands. For these applications, it is essential that sorting, reformatting and storing-to-disk operations on transmitted data occur under BASIC control without any operator interaction once the program is started. Are there any hardware/software products which will do the same on a CoCo? My impression is that most machine

language modem software is not designed for linking to BASIC and thus would not be applicable.

Ronald G. Haas  
Marshfield, WI

You are correct, Ronald, as far as Disk BASIC is concerned. There are no provisions to allow remote data from the RS-232 port. A few remote terminal drivers have been written that allow remote input into BASIC programs, but it would be a major problem to match the instrument transmission parameters.

Nothing's impossible with the CoCo. Even though I've not seen an example, I'm sure a BASIC09 program can accomplish the task. What you are really interested in is the passing of parameters between procedures and remote I/O; both are possible with BASIC09. I would suggest using the RS-232 Communications Pak for your serial I/O. OS-9 Version 1.01 supports this device, and I think it would be a lot more reliable for your use than the standard serial I/O port.

### Magical POKES

• While reading your department and others in THE RAINBOW, I saw many little POKES here and there that make the CoCo do almost magical things. Do you know where I can get a list of some of these POKES and how do the programmers find them? Also, if anyone is trying to get RAMs from Radio Shack — give up! They won't sell them because everyone is doing their own upgrade.

One more thing. My CoCo is a 16K; can I just stick eight 64K chips for more memory or do I have to do more than that?

Doug Wright  
Scarborough, Ontario

Doug, try obtaining a copy of 500 Pokes. Peeks 'N Execs. One source is Spectrum Projects.

As far as memory upgrades are concerned, you have to do a little more than install eight memory chips, such as move a few jumpers. Most of the time, the company that sells the chips will provide the installation instructions. Check our RAINBOW ads.

### Zapping Granules Back

• I have a 64K Color Computer 2 with a disk drive, cassette recorder and a DMP-110 printer. A few days ago I was working with my CoCo with a program I made. In three consecutive days, I saved, loaded and killed the program many times. On the third day I found the computer erased about 95 percent of all the programs on the disk. The total of granules occupied, shown next to each program, is eight (there are eight programs occupying one granule each now; before, each program occupied about three to five granules each). When I asked for

granules free in the disk, the computer showed me there were 40 granules free. What happened with the other 20 granules not shown? I made three backups with different disks and they all gave me the same results. Can you explain what happened with the programs? If the corrections are with a machine language program, can you give me the program? I know nothing about machine language programs.

Carlos Santiago  
Mayaguez, Puerto Rico

The problem you mention is the most common type of disk failure, Carlos. Most likely, your programs are still on the disk; you just destroyed the directory.

To restore the lost programs you must understand how the directory information is organized. This information is in the rear section of your Disk BASIC manual, but we'll summarize it.

Track 17, Sector 2 contains the granule allocation table for the entire disk. Starting with byte one, each of the first 68 bytes, one for each granule, form a table that tells Disk BASIC if any information is on that granule. By the way, the granules are numbered zero to 67 (\$43). Granules that are available are noted by a \$FF. If the number is less than \$43, it points to the next granule in that particular file. If the number is between \$C0 and \$C9, this is the last granule of the file, the last number indicating the number of sectors in the last granule.

Track 17, Sector 3 is the start of the directory. Each file occupies 32 bytes, but only 16 bytes are used. The first 16 bytes indicate the following:

|                |                                |
|----------------|--------------------------------|
| Bytes \$0-\$10 | Filename and extension         |
| Byte \$11      | File type                      |
| Byte \$12      | ASCII flag                     |
| Byte \$13      | First granule of the file      |
| Byte \$14-\$15 | Number of bytes in last sector |

I would guess that you destroyed the directory information, Carlos, and the granule allocation table was left intact. That's where your missing granules are and, with a little "zapping," they can be restored.

One other necessity is a "disk zapping" program. I use VIP ZAP, obtainable from your local Radio Shack store by express order. The manual gives a complete description of how to zap, or restore, damaged files or directory information.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

## CUSTOM COLOR

# The Letter Box Printer Buffer Part 1

*In Dennis Kitz's premier article, he begins the first in a series on a cost-efficient way to build a printer buffer.*

By Dennis Kitz  
Rainbow Contributing Editor

**Q**uick! Raise your hand if you've heard of a 6803! No, it's not the microprocessor in the MC-10 (that's a 6803E). The 6803 is a close cousin, a microcomputer on a chip. It's the heart of a 64K printer buffer — I call it "The Letter Box" — for your Color Computer.

This is the first part of a series on building a printer buffer. I'll answer these questions: What is a buffer? Why do you need one? Why use a microprocessor for just one job? What makes the 6803 microprocessor a good choice for this job? Can the buffer perform other useful functions?

This project has been a long time in speculation. My friends often say, "You've been talking about a printer buffer for months. When will it be done?" I've told them, "I want it cheap, cheap, cheap! If I wanted it expensive, I could have it designed by next week."

## What is a Buffer?

Shortly after using a computer

*(Dennis Bathory Kitz is a composer, software author and an electronic designer. His computer career began in 1977 after paying his dues as a librarian, truck driver and graphics designer.)*

printer, you begin to realize that — compared to the computers themselves — printers are slow mechanical devices. Even the fastest dot-matrix printers seem to take forever to print a program listing. And slow printers are . . . s-l-o-w! You can catch three innings of the World Series and do two loads of wash while waiting for inexpensive "letter quality" daisy wheels, such as Olivetti or Brother, to print a long article.

A printer buffer acts as an electronic waiting room. It's a place for information to sit after the computer sends it to be printed, and before the printer is able to look at it.

Most printers have some kind of built-in memory buffer, but it seldom holds more than one line (256 characters). Newer units offer buffers of 1,024 to 4,096 characters, but even these fill up rapidly.

Some sophisticated Color Computer setups with disk drives and high-level operating systems have so-called virtual buffers, also known as spoolers, reserved on several disk tracks. The operating system fools the computer into "printing" to the disk (spooling). The operating system later extracts the information from the disk whenever the printer needs more to print (despool-

ing). (A box of burnt resistors to the first person who can recall the origin of the term "spool." Hint: It's an acronym.)

Those of us without the pleasure of an expanded disk system and tiny buffers in our printers need something else. The Letter Box is a smart buffer that holds a whopping 63,232 characters and plugs into the computer's printer jack. Best of all, you can build The Letter Box for under \$100.

## Why a Microprocessor?

A printer buffer appears to be a simple thing. You transmit a series of characters, it receives and stores them, and transmits them to the printer when necessary. So, why use a microprocessor? Partly to reduce the amount of hardware, but, better yet, for bells and whistles!

With a microprocessor (MPU) in control, you can program the buffer to act "smart" and do other things: print a test routine of all the printer's characters; stop (or not) after a designated number of text lines; stop (or not) after every form feed; stop (or not) after two carriage returns (a paragraph); create a "translation table" for a laser printer or typesetting machine; know



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## XTERM

XTERM is a full featured OS-9 communications program that takes full advantage of the power of OS-9. It works with the normal text screen, XSCREEN, or the Wordpak 80 column board.

XTERM is menu oriented for ease of use, it is simple to use even for the novice OS-9 user. And yet, XTERM is powerful enough for the expert OS-9 user.

Some of the features of XTERM include: full upload and download support with remote buffer operation; supports XON/XOFF protocol, 110/300/600/1200 baud, 5/6/7/8 bits, even/odd/no parity, full or half duplex; able to execute an OS-9 shell command from within XTERM.

XTERM works with a Color Computer using the standard serial interface, but also will work with a hardware serial port. Also, if you are using a hardware parallel printer port, you can print data to the printer as it is received.

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XMENU is a system that creates a menu-driven environment for the Color Computer using OS-9. OS-9 now becomes easy-to-use with command selections made from menus. Menus are included to access OS-9 commands. An easy-to-use utility is provided that allows for the creation and maintenance of menus.

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Some of the formatting features of XWORD include: proportional spacing supported; perfectly aligned hanging indents and columns, even when using proportional characters; full printer control with control of character size, emphasized, italics, overstrike, underlining (with or without spaces), super and sub-scripts; up to 10 header/footers; page numbering in decimal or Roman numerals; margins and headers can be set differently for even and odd pages; automatically reads printer initialization file to define XWORD for your printer (many included, and easy to write or modify your own). Many more features.

**XWORD \$79.95**

## XMERGE

XMERGE gives XWORD powerful mail merge capabilities. With it you are able to merge in data from a data file or from the keyboard to get professional looking results.

**XMERGE 29.95**



## XDIR & XCAL

A package of two powerful utilities you won't want to be without. XDIR is an OS-9 directory program that prints full hierarchical directories. The directory does full sorting and has complete pattern matching, including wildcard and character classes.

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when to use the left and right quotation marks; substitute European quotation marks in foreign texts; and do automatic page numbering or page heading.

You can use a smart printer buffer to make up for the limitations of your word processor, or to prepare nice-looking listings in BASIC or assembly language.

#### What Else?

As they say in those late-night TV ads, "But that's not all!" The Letter Box is actually a 64K computer that uses the versatile 6803 microcomputer. Because it has serial input and output, this device can act as the nerve center for a laboratory control system, receiving and logging data, while your Color Computer is free to perform other tasks. If you're willing, you can turn The Letter Box around and use it as a kind of modem buffer when downloading long programs or texts. You'll have to let your imagination run free.

#### Why the 6803?

My goal in designing The Letter Box was to stuff the greatest number of features into the smallest number of parts for the least amount of dollars. With 64K DRAM (Dynamic Random-Access Memory) prices spiraling downward, these chips were the logical choice for a large buffer. Even cheaper (free!) are 16K DRAMs pulled out of Color Computer 2s that have been upgraded to 64K.

The buffer's operating system would have to be in some kind of EPROM (Erasable, Programmable, Read-Only Memory), and some "glue chips" would be needed. (Glue chip is a clever "techie" term for those miscellaneous integrated circuits that keep a computer's processor, memory and input/output all held together.)

The biggest obstacle in building a cheap buffer is finding an inexpensive technique to perform serial input and output, the method the Color Computer uses to communicate with compatible printers. The Color Computer transmits, and printers expect to receive, a stream of characters sent at 600 Baud (bits per second). I wanted the Color Computer to quickly transmit and fill the buffer, then return to the program work. The printer could then accept information from the buffer at the usual 600 Baud pace.

My first option seemed to be to use some sort of traditional UART (Universal, Asynchronous Receiver-Transmitter) to perform the task — at

least until I took a good look at the 6801/6803 microprocessor family. I got the hint by tinkering with Radio Shack's Micro Color Computer, the MC-10, which contains a 6803E microprocessor. Although the MC-10 was a marketing flop, I had always been impressed by its speed, features and the number of commands and options that had been crammed into its Microcolor BASIC operating system.

timer and as an SCI (Serial Communications Interface). The SCI is the key to the functioning of The Letter Box.

The 6803 also has an internal 128-byte RAM. With its option for battery backup, this RAM can be very handy for lab or industrial control. This project won't use the backup feature, however.

The 6803 has the usual address lines 8 through 15. An important consider-

---

***"The biggest obstacle in building a cheap buffer is finding an inexpensive technique to perform serial input and output, the method the Color Computer uses to communicate with compatible printers."***

---

But what really caught my attention was the 6803's built-in serial input/output system. Depending on the choice of crystal frequency and the sequence of internal commands, the 6803 can be made to transmit and receive serial data at 150, 300, 600, 1200, 4800, 9600, 38400 and 76800 Baud.

Since the 6803 cost less than \$10, my solution seemed at hand — almost. Some questions remained: Could the 6803 switch between Bauds (say, between 600 and 4800) "on the fly"? Could the 6803 be set up to perform the memory refresh necessary for DRAMs? If it could refresh DRAMs, would the number of glue chips grow too complex and expensive? And, finally, could a parallel printer port be squeezed into the design with no additional parts?

#### A Closer Look

To answer these questions, a closer look at the 6803 is needed. Among other connections, the 6803 has pins for Vcc (+5 volt power), Vss (ground), Xtal and Extal (crystal or master clock inputs), 'E' (enable signal used to synchronize with memory or peripherals, one-quarter the master clock frequency), NMI (Non-Maskable Interrupt), IRQ (Interrupt Request) and RES (reset). We'll describe how all of these are used during the theory and construction part of this series.

One of the 6803's attractive features is that it has two input/output ports. Port 1 is a complete eight-bit parallel port (maybe for that parallel printer option?); Port 2 is a specialized five-bit port. It can be used as an ordinary parallel port, but is also usable as a

ation in using the 6803 is the multiplexed data/low-address bus. Because the number of external connections is limited to 40 pins, the designers had to squeeze the eight data lines (D0-D7) and eight low-address lines (A0-A7) onto the same connections. The AS signal (Address Strobe) is used to let the circuit know when the address lines are changing to data lines.

The whole process of multiplexing and de-multiplexing is at first a mysterious one, and there are two major instances of it in this project: with the 6803 microprocessor (squeezing eight data and eight address lines together), and with the dynamic memory (squeezing 16 address lines onto eight pins). More about that later.

#### How Do You Start?

This project involves building a computer. How do you even start thinking about that? It's overwhelming.

Some of the thinking is done simply by acknowledging what you need to do — have cheap memory, a serial interface, a simple operating system, low parts count and low cost. And part of that work is done since the type of memory (64K DRAMs) and the microprocessor (6803) have been chosen to fill the essential needs. Now what?

What about memory refresh? What is it, and how is it accomplished? By now you've probably heard the analogy that dynamic memory is like a tire with a slow leak — it needs a burst of air every so often to keep it inflated. The technical characteristics of this kind of memory are such that 256 contiguous memory locations have to be read or pulsed at least every 1/500th of a second

to keep the stored information reliable. Memory manufacturers specify several patterns for reading or pulsing.

Turn first to a familiar example: The Color Computer uses DRAM, but its refresh is performed by a sophisticated memory-management circuit, the Syn-

chronous Address Multiplexer (SAM). The SAM mediates between the microprocessor (MPU) and its memory, shoots information to the video display when needed, controls a number of input/output functions and monitors the computer's memory map; it uses its free time to refresh the DRAM. For a printer buffer, that might be overdoing it. Also, the SAM is expensive (\$20 or so) and incompatible with the 6803.

One of the other often-used options is the refresh counter. This is a group of integrated circuits tied to the MPU

and its master clock in such a way that when the MPU isn't using the memory, a refresh address and appropriate pulse are provided.

But refresh counters mean more hardware, and more expense! If refreshing memory means reading 256 consecutive addresses, why not do it the old-fashioned way? That is, why not have the MPU simply read 256 consecutive bytes every two milliseconds (ms)? Here's where the 6803 has an advantage: its built-in timer and interrupt system. By calculating the operating frequency of the 6803, it can be determined how long the internal timer must count before it's time to interrupt the MPU's normal operation and make it perform another memory refresh. Table 1 shows that process in 6803 talk.

No extra hardware! Cheap, cheap, cheap! A silly idea, you say? There is a very famous and highly regarded personal computer (I'll let you guess which one) that uses precisely this technique of "software refresh."

Next time: timing, multiplexing, demultiplexing and a start on building the circuit. □

*"The whole process of multiplexing and demultiplexing is at first a mysterious one, and there are two major instances of it in this project: with the 6803 microprocessor . . . and with the dynamic memory . . ."*

chronous Address Multiplexer (SAM). The SAM mediates between the microprocessor (MPU) and its memory, shoots information to the video display when needed, controls a number of input/output functions and monitors the computer's memory map; it uses its

and its master clock in such a way that when the MPU isn't using the memory, a refresh address and appropriate pulse are provided.

But refresh counters mean more hardware, and more expense! If refreshing memory means reading 256 consec-

**Table 1**  
**A Software Refresh Scheme**  
**for the 6803**

| RAM:                                      | Instruction:   | Comment:                      | Cycles:  |
|-------------------------------------------|----------------|-------------------------------|----------|
| NNNN                                      | Interrupt IRQ2 | *Output comp. > RAM vector    | (1 x 12) |
| XX00                                      | LDD <\$000B    | *Get old output comp. value   | (1 x 4)  |
| XX02                                      | ADDD #OFFSET   | *Add next interrupt time      | (1 x 4)  |
| XX05                                      | STD <\$000B    | *Place new out. comp. value   | (1 x 4)  |
| XX07                                      | LDD #\$0000    | *\$XX07,8,9 (fetch/read/read) | (1 x 3)  |
| XX0A                                      | LDD #\$0000    | *\$XX0A,B,C (fetch/read/read) | (1 x 3)  |
| ...                                       | LDD #\$0000    | *\$XX0D,E,F - SXX79,A,B       | (37x 3)  |
| XX7C                                      | LDD #\$0000    | *\$XX7C,D,E (fetch/read/read) | (1 x 3)  |
| XX7F                                      | RTI            | *Return from the interrupt    | (1 x 10) |
| Total MPU cycles in refresh routine       |                |                               | 154      |
| Total MPU cycles in 2 milliseconds        |                |                               |          |
| @ 2.4576 MHz master clock                 |                |                               | 1228.8   |
| Refresh overhead taken from MPU operation |                |                               | 12.5%    |

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# Using A Spreadsheet As A File Manager

By Richard A. White  
Rainbow Contributing Editor

**A**h! You noticed the new title for the column. After a few weeks of discussion around THE RAINBOW offices, "Accessible Applications" surfaced. I rather like it for what it communicates in two words. The power of the computer should be accessible to the user. I think that means easy to use.

How easy? Easy enough to start simply and do something worthwhile, then, step by step, learn the harder tasks. The second requirement is that it be fairly easy to remember how to use the application. Spreadsheets typically meet these requirements. Other applications don't necessarily.

A powerful file program may let you define simple record structures, enter data, save it, reload it and review it. When it comes to printing that data in a nicely formatted report, the new user runs into a wall in the learning curve. There is a lot of complexity in describing to a computer just what is wanted.

*(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS database management program.)*

Spreadsheets come off well in the printing area, since "What You See Is What You Get" — WYSIWYG for short. As long as your work looks good on the screen, it should look good printed.

On the other hand, learning the complexities of one of the CoCo file programs can be a lot simpler than trying to write a program in BASIC to do the same thing.

There are differences between programs of the same type, too. A fairly simple file manager like *TIMS* is very easy to use for small databases, but it will not open four disk files and draw selected data out of each to generate a report. For this you need something like *Elite\*File*, which has some horsepower, and you need to figure out how to use it.

The word processor, even a simple one, can vastly increase one's productivity. Frankly, I would not even try to write this column without a word processor. I here never was any love lost between me and the typewriter.

And, we are dealing with applications. These are computer tools to get work done. I have named three types. They handle the bulk of the work that

is done on computers, but there are others: accounting software, telecommunications, inventory management, ordering, shipping, billing and so on. There are separate software packages for each of these applications. Some, however, can be done with a spreadsheet or a file manager. Indeed, a spreadsheet or file manager does nothing until the user programs an application into it. They can be considered a higher order language in their own right whose purpose is to help the user access the computer.

RAINBOW Managing Editor Jim Reed tried the loan payment template in my June column and immediately found some problems with two equations. In one case, the letter 'H' had been substituted for an up arrow and the following open parenthesis had been dropped. In the other case, the up arrow was again dropped and the letter 'C' which immediately followed had been printed in lowercase. It smells like a machine problem. Somewhere, some software is thinking the up arrow is signaling that a control code is following and we are on that trail.

A question that Jim had was how did I replicate the part that calculates

the individual loan payments for each month the loan is outstanding. To refresh memories, a portion of the spreadsheet showing only two months is shown in Figure 1.

The objective was to copy the A14 . . . D16 down the spreadsheet starting

saved keystrokes in the exact series the number of times you specify.

How does this help? Say I were to replicate range A14 . . . D14 to A17 and then moved the cursor to cell A17. If I had pressed BREAK just before starting the keystroke sequence, I could

function works from the left-most character in each name comparing characters with the next name until a mismatch is found. A swap occurs according to fixed rules.

First sorting can arrange the records in ascending order, where the smallest is first, or in descending order, where the smallest is last. OK for numbers, but which is smaller, 'A' or 'B'?

In the back of your *Getting Started With Color BASIC* manual (remember it?) is a table of ASCII values. All the characters you can type from the keyboard, and then some, are shown with a number assigned to each. That number is the ASCII value and it's that number that CoCo uses to decide if 'A' is larger than 'B'. A's ASCII value is 66 while B's is 67, so the computer thinks 'B' is bigger and you aren't going to change its mind.

Let's check out the rats in ASCII's woodpile. Here is a file of names of computer books on my shelf sorted in ascending order.

#### Programming the Z80

1-2-3 A to Z

BASIC09 Tourguide

Introduction to Pascal

The C Programming Language

Computers for Technicians

A record with a leading space always sorts to the top of an ascending sort. You may not notice the space and wonder how a record got so out of order. That's how *Programming the Z80* got to the top.

Numbers have lower ASCII values than letters so 1-2-3 A to Z is just where it should be. By the way, the order of numbers is 0123456789. If you enter dates like 7/4/85 and 10/12/85, month 10 will sort before month 7. This is why you see computer-produced dates like 07/04/85. The leading '0' sorts ahead of '1' and puts July before October.

Finally, lowercase letters sort after all uppercase letters. There are some punctuation and special characters before the numerals and some after, but all sort before the alphabet.

The album file only contains the names of the albums. These are only in Column A. Each row is a record and each has only one field in use, the Column A cells. Let's call Column A the NAME field.

There is other data that is associated with each album such as performers,

Figure 1.

|                    | A      | B     | C         | D           |
|--------------------|--------|-------|-----------|-------------|
| 11-MONTH           |        | 1     |           |             |
| 12-START PRINCIPAL | B2     |       | INTEREST  | B12*(B3/12) |
| 13-PRINCIPAL PYMT  | B5-D12 |       | PRINCIPAL | B12-B13     |
| 14-MONTH           |        | B11+1 |           |             |
| 15-START PRINCIPAL | D13    |       | INTEREST  | B15*(B3/12) |
| 16-PRINCIPAL PYMT  | B5-D15 |       | PRINCIPAL | B15-B16     |

in cell A17. *Elite\*Calc* simply lets you copy the range to A17. You need to tell *Elite* whether or not to change the cell addresses. Since B3, the interest rate, and B5, the payment per month, are referenced for each month's calculation they should not be changed, while all the others must be. Next, you copy two months' worth at a time, then four, etc.

Life is not so simple with *DynaCalc* or *VIP Calc*. They provide only a replicate function that allows you to replicate one cell to a row or column of cells. That's not what we want. Replicate can also copy a row of cells to other rows. That's closer, and we will have to settle for that in some way.

In *VIP Calc* you would replicate range A14 . . . D14 to A17. Next replicate A15 . . . D15 to A18 and finally A16 . . . D16 to A19. That handles one month. Repeat the process till you have replicated all the months you need. Jim couldn't quite imagine me doing that for a range of 36 months.

I can't imagine doing that either, but he caught me cold months after I made the spreadsheet and I could not immediately remember how I did do it. The answer is a command in *DynaCalc* called "Keysaver." Properly used, it is better called "Lifesaver."

I try to deal mainly with functions that are common to most of the CoCo spreadsheets. There are times like this where rules must be broken. Many *DynaCalc* owners need to understand it.

Simply stated, *DynaCalc* remembers all the keys you press after pressing the BREAK key. There is probably a limit, but I haven't reached it yet. After you have completed a series of command keystrokes, press '/' and 'K'. *DynaCalc* asks "times?" Type a number and press ENTER. *DynaCalc* then performs the

now enter /K1. *DynaCalc* would start at A17 (that's where the cursor was), call Replicate, define the start range, A17 . . . D17, define the target cell, A20, respond to the Same-Relative questions for each equation and move down to cell A20 at the end. Wow!

But, I needed more than one more replication; I needed 33. So I used /K33 and sat back to watch the screen dance. Ranges A15 . . . D15 and A16 . . . D16 were handled the same way and the whole spreadsheet was done over a period of several minutes. Other Keysaver uses include inserting or deleting bunches of rows or columns. You could change the format on all the cells in a row or column without disturbing the data or equations in the cells.

Keysaver isn't perfect. I have had infrequent problems with arrow key movements, but arrow key movements at the end of a keystroke sequence seems to work all right.

Moving onto the title topic, a spreadsheet makes a simple but effective file manager, so let's discuss some basic concepts of file management. A file is a collection of records. This brings to mind phonograph records, and you might have quite a few. You could make a file of the titles of all the albums. Widen Column A to 20 or 25 characters and type in the names into cells down the column.

OK, they are out of any logical order so there needs to be some sorting out. Spreadsheets sort by exchanging columns or rows. Everything in the row or column is swapped with the next. This is not a mindless swapping — the spreadsheet looks within a range you give it and does the sorting according to the contents of the cells in the range. At this point, to sort the album file, you would use a range in Column A to include all the titles. The sort



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publisher, type of music, date of publication, your rating of the performance and playing time, to name a few. A column could be devoted to each of these data types with the particular data entered in the proper column in the row with the title to which it pertains. Again, each row is a record that now would have a number of fields of data. You have done this sort of list on paper before, but you were probably not thinking in terms of records and fields when you did.

Now your sorting options become broader and you can do a number of sorts on the file. First, let's sort the whole file by type of music. Call the sort again and give the range for the column containing the music type data and include all the rows in use.

With that sort made, you might want the hard rock-type music sorted by performer. All hard rock albums should now be in one group in the spreadsheet. Sort using the performer column, but limit the range to only those rows that include the hard rock entries. You could have sorted hard rock by title or even year of publication as well.

Which way should the file be stored, on tape or disk? It's something to think about. If you have spent some time making multiple sorts, think about storing the file that way. You can always load it and resort it if it needs to be arranged differently for a specific purpose. You can even save it sorted in a number of ways to different separate files, but keep in mind that when updating time comes, you will have to update multiple files.

Don't forget the columns; they can be sorted as well without jeopardizing the integrity of the information in a record. The fields will just be in a different order in a record.

*DynaCalc* has a Locate Label function called by  $\wedge$ L. *DynaCalc* then asks for a string to search for. This string is just a sequence of characters and need not be a full title or name. Using my book list, I might search for C and get four books reported. If I gave the program C only, *The C Programming Language* would be found. This provides a fairly powerful and useful search capability. Even the famous *Lotus 1-2-3* on an IBM PC cannot do this so easily.

But, the search superstar has to be *VIP Calc*. With its Locate command, you can find values, labels or the result of a formula. You can mask a string

search so *VIP Calc* will ignore case. You can even have wild card characters if you don't quite know the right spelling. This combined with *VIP's* large data buffer makes the program a good candidate if you have some spreadsheet file work and would prefer to learn just one program.

If WYSIWYG (What You See Is What You Get) is a strength in a spreadsheet, it is a real weakness in a file manager. It very much limits how you can print a file. For example, mailing labels are out with the whole record on one line. You could save the records out to disk as an ASCII file and use a BASIC program to read and rearrange each record, then print it to a mailing label. If you are only going to print the list one way, the task is not particularly hard if you know BASIC. If, however, you are a user and not a programmer, it's another matter.

You can sort the columns or move the columns to get a number of fields adjacent and print those fields and not others. Say you were selecting music to play on some program and wanted to use playing time as an important selection criteria. Sort the file on the playing-time column, then group the name, performer and playing-time fields next to each other and print these fields only. This printout would be highly useful in developing the program and give just the information you needed.

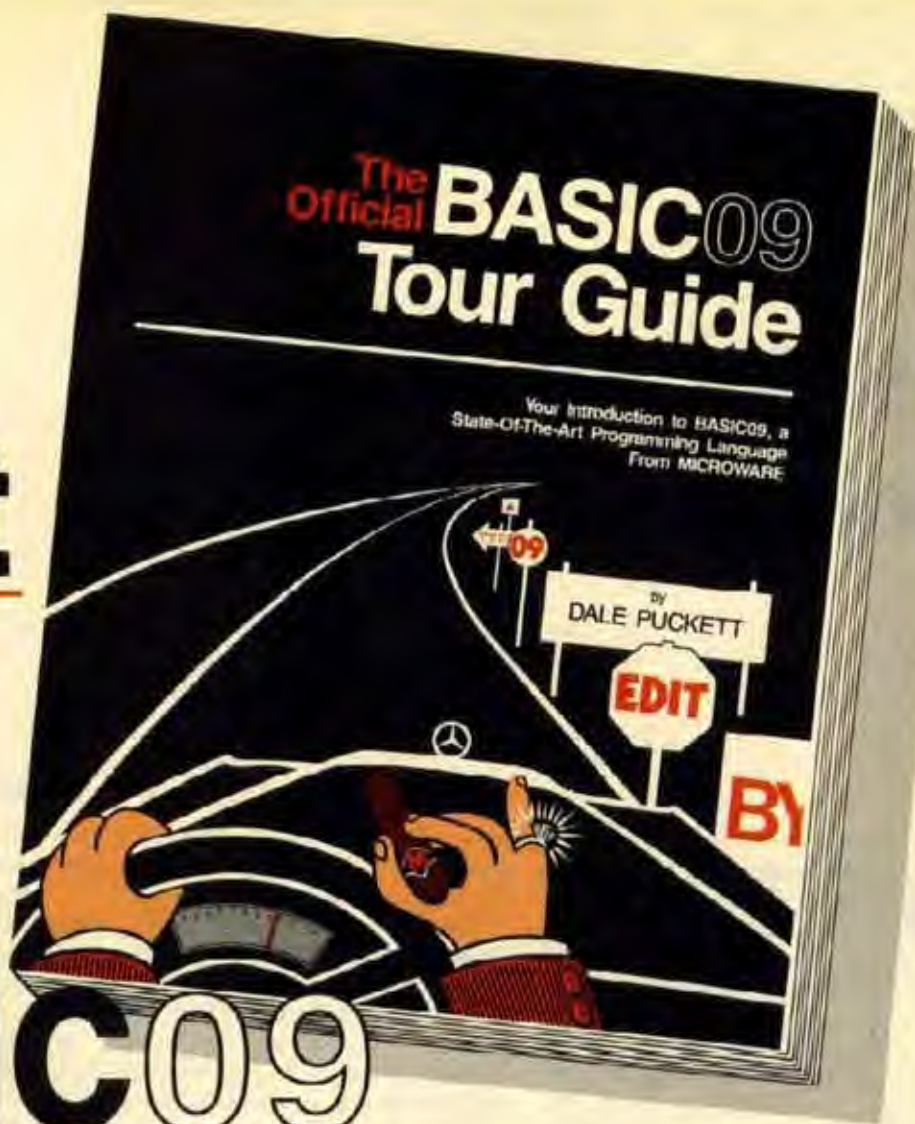
These are rather simple types of printing. That they meet many users' needs is the remarkable thing about a spreadsheet.

Earlier, I mentioned that a BASIC program could be written to print mailing labels using data from an ASCII file of records from a spreadsheet. This approach was somewhat common a few years ago when more users were also programmers and the software available was simpler than today. Programmers would set up a user with an application on a file manager like *Profile* on a Model II, 12 or 16, then write a number of BASIC programs to use files from *Profile* to generate customized reports and other printouts.

The mailing list is a natural and the same customized output could be sent to a file and used with a mail merge program to prepare customized form letters. Next month, we will try to have a BASIC program to do at least the first task for you. ☺



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## KISSable OS-9

# OS-9 Gets Good Reception At NCC

By Dale L. Puckett  
Rainbow Contributing Editor

**O**S-9 fans attending NCC — the National Computer Conference in Chicago during mid-July were greeted with good news. First, OS-9 went over extremely well at the show.

"The awareness was much better at NCC this year," said Frank Hogg, president of FHL in Syracuse. "In the past when you mentioned OS-9, you were usually met with a blank stare. This year, people knew what you were talking about and many of them were excited about it."

Hogg set up his "QT" in the Microware booth and was dazzling the crowd with the multi-user system that fits in a space the size of a Kleenex box. He also announced his new "QT Plus" at NCC. QT Plus features a 68000 running at 10 MHz, a 16-bit data bus, 512K RAM standard and up to 128K of ROM. It also supports four floppy disks, is expandable to one megabyte

and uses a multilevel interrupt structure for improved I/O performance.

Sometime in the near future Hogg plans to offer a QT that features a new single board computer from GIMIX. This product will use a 68020 and come standard with two megabytes of memory. Hold on to your hat; the sky's the limit in this new 68K ballgame.

Hogg passed along two additional tidbits we thought you would enjoy. He reports that a new one-megabit chip — yes, you read it right, one million bits on a memory chip — is due to be released by Hitachi very soon. We may need Level II OS-9 on the Color Computer sooner than we thought. And finally, AT&T, the company that brought us UNIX, reached out and bought a QT from FHL.

## New Graphics Drivers Announced at NCC

The really big news from Des Moines came in a joint announcement from Microware, Hitachi and Graphic Software Systems. The three firms joined forces to develop a complete set of graphics support modules for Hitachi's new ACRTC device — the HD63484. The new drivers conform to the proposed ANSI/ISO Virtual Device Interface (VDI) standard and give software developers a way to write portable graphics-oriented applications soft-

ware. The standard itself was selected by both IBM and AT&T as the *de facto* standard graphics development environment for PCs. Now, it's available on OS-9.

"We have achieved an incredible level of integration of all the hardware and software pieces an OEM needs to build a state-of-the-art graphics system," said Ken Kaplan, president of Microware Systems Corporation. "Hitachi and Microware can now offer a total solution to manufacturers of personal computers, CAD/CAM systems, graphics work stations and similar products."

The drivers let programmers mix graphics images with text data displayed in multiple fonts. The software itself can be developed using Microware's C compiler running on a 68000-based development system or a large DEC VAX time-sharing system. BASIC, PASCAL and assembler programming languages with graphics capabilities are also available.

The HD63484 is a bit-mapped controller that contains three on-board processors. It operates at a clock speed of 10 megahertz, draws at a 400 nanosecond per dot rate and creates images of up to 4,096-by-4,096 pixels. The hardware itself can draw dots, lines, rectangles, polylines, polygons, circles and ellipses. It can also paint, fill and copy objects in 65,536 different colors.

*(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He is the author of The Official BASIC09 Tour Guide, published by Microware and The Official Rainbow Guide to OS-9, published through the Rainbow Bookshelf. He serves on the InfoWorld Software Review Board and is a chief warrant officer in the U.S. Coast Guard.)*

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## Multi-User!

Frank Hogg Laboratory announces their Quad Terminal (QT) series of multi-user computer systems, designed to run Microware's new OS-9/68000 operating system. The QT offers 32 bit processor power in a compact integrated package that requires only a terminal to operate.

The QT hardware features: 68008 processor running at 8 Mhz, 128K bytes expandable to 512K bytes, an interval timer for time sharing, 4 serial ports with selectable baud rates from 300 to 19,200, 2 centronics compatible parallel printer ports. Supports 2 double sided double density 96 tpi floppy disk drives and a SCSI (SASI) bus interface for Winchester disk drives. The QT is available as a single floppy (1), a dual floppy (2) or as a single floppy and a 10 or 20 megabyte hard disk (HD). Size 5 1/2 high, 11 1/2 deep, 9 1/2 wide. Can be mounted vertically or horizontally.

## Software Included!

**SOFTWARE** included is OS-9/68000, the 68000 version of the proven OS-9 operating System that is both disk and file compatible with standard and Color computer versions of OS-9. Basic09 is the 68000 version and is source compatible with the 6809 version. DynaCalc is the 68000 version of the proven 6809 spreadsheet. Stylograph is the 68000 version of the popular 6809 word processor. Mail merge and speller are the 68000 versions of those programs. Programming tools included are a relocating macro assembler with linkage editor, screen and line editors, and an interactive debugger. The software has a retail value in excess of \$2000 and is **INCLUDED free!** Programming languages available and under development include C, Pascal, Fortran and Sculptor. OS-9 is a **TRADEMARK** of Microware.

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**Note:** The QT can hold 2 half height drives internally (floppy or hard). Provision has been made for hooking up external floppy drives. This allows using large capacity full height hard disk drives in the QT case with floppy drives in another case. You can boot from the hard disk so floppys would only be necessary for program transfers and backup. Removable hard drives are also available. Call or write for complete specifications and prices.

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#### Fourth Annual Microware Seminar Set for November 1-4

Speaking of Microware, don't forget to make your reservations for the Fourth Annual Microware Seminar. It gets bigger and better every year. As Jeanne Kaplan said in a flyer mailed recently, "OS-9 is emerging from its 'underground classic' status and establishing itself as a new industry standard." And just think, you knew it would all along — ever since you fired it up on your CoCo.

I highly recommend this seminar for anyone interested in exploring the inner workings of OS-9 and improving their programming skills. The titles for the planned sessions alone will make your mouth water. Here are just a few: C Tricks and Treats; Everyday OS-9 with a tutorial on the OS-9 Shell and utility commands; 6809 Technical Topics, with a demonstration that shows how to install customized drivers and related modules; 68000 Technical Topics with demonstrations showing how to adapt OS-9 to custom I/O devices and install it on new systems; Introducing NFM, a demonstration of the new OS-9 networking package; Graphics, an introduction of the new ANSI Virtual Device Interface and Graphics Kernel System running on OS-9; and finally, CoCo Special Interests, featuring news, tricks and treats for Color Computer OS-9 users.

The registration fee for the seminar is \$150. For further information, contact Jeanne Kaplan at Microware, 1866 N.W. 114th Street, Des Moines, Iowa 50322, or call her at (515) 224-1929.

#### Users Group to Meet at Princeton RAINBOWfest

OS-9 Users Group members will have a chance to get together for a short meeting at RAINBOWfest Princeton, thanks to Marianne Booth, RAINBOWfest coordinator. She arranged for the group to use one of the large meeting rooms immediately following the last seminar Saturday. We'll have the room for at least an hour — maybe longer. If we're lucky, we may even know the results of the election and be able to introduce you to the new officers.

Speaking of the new officers, Brian Lantz of Tampa, Fla., the author of several popular OS-9 programs for the Color Computer, surrounded himself with an impressive slate and ran for president in the group's election in September. William W. Turner III, a

senior systems programmer for telecommunications support with GTE Data Services in Tampa, ran for vice president, and Steve Odneal, director of Microprocessor Management Systems at a Kansas City Bank, ran for secretary. Brian was still trying to find a candidate for treasurer when this column went to press. However, George Dorner, the incumbent and a dean at Harper College in Rolling Meadows, Ill., promised Brian he would run if there were no other candidates.

The group now has more than 800 members around the nation and has distributed more than 1,000 disks from its 37-disk software library.

#### Good Reviews

I've heard good comments about several of the programs we've highlighted in this column during the summer. George Dorner, OS-9 Users Group treasurer, reports in Issue Number Eight of *MOTD*, that *XCom9* — OS-9's first "freeware" program — is a real bargain.

"*XCom9*'s major advantage is its XMODEM protocol for uploading and downloading files," Dorner said. "Other notable features include an ASCII mode which strips parity, tabs and other bothersome characters. You have complete control over most of the program's parameters and can even send a break with the 6850 ACIA."

Dorner reports that *XCom9* sports built-in help messages and says the documentation is excellent. Chuck Buche and Jeff Rhodes, CoCo owners in the Chicago area OS-9 Users Group, also reported excellent performance when using the program to transfer files from a UNIX system and CompuServe. They were using the device /T2, which works with the ACIA Pak drivers in Version 1.01, and had *Word-Pak* installed. You may download the program from the DL4 database in the OS-9 SIG or obtain it for the cost of duplication from author Greg Morse, Morse SoftCode, 10871 Roseland Gate, Richmond, British Columbia, Canada V7A 2R1. It will also be available from the OS-9 Users Group Software Exchange Library in the near future. If you like *XCom9* and use it, a \$20 donation is appropriate.

Dorner also had many good things to say about Steve Odneal's *Kansas City BASIC* for OS-9. Odneal was one of the first programmers to bring the FLEX operating system to the Color Computer. He started with *Santa*

*Barbara Tiny BASIC*, which was published in Dr. Dobbs' journal several years ago, and added many enhancements. Quoting Dorner, "*KCB* looks a lot like a pretty vanilla Microsoft BASIC or Extended Color BASIC. Odneal has added PEEK, POKE, dynamic allocation of variables and string space, disk access, tokenized storage, most string functions, expandable storage space, and Shell commands from a command line or program to *Santa Barbara BASIC*."

Yet, the most important value of Odneal's *Kansas City BASIC* is the educational opportunity it presents. For \$25 you get both a 23-page manual and documented source code. If you've always wondered how a BASIC interpreter worked, *Kansas City BASIC* gives you a chance to find out. And, Odneal is looking for user-developed extensions to his interpreter and promises to put the best of them into future releases. You can get *Kansas City BASIC* from Steve Odneal, 8609 East 73 Terrace, Kansas City, MO 64133.

The *OS-9 Solution*, written by Jeff Francis and distributed by Bob Roscn at Spectrum Projects, Inc. (P.O. Box 21272, Woodhaven, NY 11421), also received a good review from Dorner. Generally, Dorner's review came to the same conclusion as our report in August. However, he made a strong plea for a Level II version. Again, we quote Dorner: "... it might be very useful to everyone if memory were more plentiful ... like on a Level II system. It is a significant program since it is the first such front-end utility. I hope it prospers, grows and becomes even more useful."

Are you reading, Jeff? Are you reading in Fort Worth?

#### Using Tandy 'C' with One Disk Drive

We received some useful information for those wanting to run the Color Computer C compiler with one disk drive from Jonathan R. Guthrie of Westerville, Ohio. It seems I got his attention in my C tutorial when I said you must have two disk drives to compile C programs. He had been getting the job done with one disk drive for more than six months. Most importantly, he was nice enough to share the information with us. Here goes:

"The problem is two-fold. First, two of the modules that make up the compiler — specifically C.PREP and C.LINK — expect to find certain data

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files on /D1. And second, the blamed thing is just too darn big to fit on one 40-track in my case — floppy disk drive.

"The first problem is the easiest to solve. I redefined the physical device that is associated with the logical device /D1. I did this using DEBUG to change the right byte in the device descriptor. I installed the procedure file below in my start-up file to do the job. Later, I made the changes and used OS9-Gen to create a new boot file with the modification "built in." Here is the procedure.

```
DEBUG
| D1
.<SPACEBAR> . | 13
=0
Q
```

"The second problem has a simple solution — if the thing will not fit on one disk, put it on two. Unfortunately, that approach is rather hard to implement because you need to copy a lot of files. But, after you have moved your files onto two disks, you need only use the "-A" switch on the CC1 command line to divide the compilation process into two equal halves.

"You must put the file you want to compile on the first disk and — after changing your current data and execution directories to the new disk, type:

```
CC1 filename.c -A
```

"After the file has been compiled halfway, you will get the OS9 prompt back. If you do a directory at this point you will find a new file named "filename.A" in your data directory. Copy this file onto the second disk; change your current data and execution directories over to this directory and type:

```
CC1 filename.A
```

"When the compiler returns the OS9 prompt again, you will find your compiled program in your current execution directory. That's it. Good luck and happy computing."

Thank you, Jonathan, for sharing this information with our readers.

Here are the directory listings on the two disks Jonathan uses to compile C programs. First on disk number one:

```
directory of /d0
CMDS      DEFS      c.com

directory of /d0/CMDS
CC1       C.PREP    C.PASS1   C. PASS2
COPY     DEL       DIR       ECHO
LIST

directory of /d0/defs
ERRNO.H  STDIO.H   CTYPE.H   DIRECT.H
MODES.H  MODULE.H OS9.H     OS9DEFS.A
SETJMP.H SGSTAT.H SIGNAL.H   TIME.H

Here is a listing of the files on disk number two,
directory of /d0 CMDS LIB

directory of /d0/cmds
CC1       C.OPT     C.ASM     C.LINK
COPY     DEL       DIR       ECHO
LIST     PROG     KCPROG    hello
PROG2    MALE

directory of /d0/lib
CSTART.R CLIB.L
```

Bruce A. Williamson had a similar problem and came up with yet another solution, a BASIC09 program. We'll also share it here.

Bruce owned 80-track drives and wanted the option of using either /d0 or /d1 while he was compiling his C programs. His solution was a "brute force" BASIC09 program named cc3. In his words, "It may not be the best example of BASIC09 programming or may not suit everyone's needs, but it is very easy to modify. One possibility I've already considered is to add a chain command at the end to chain to the .com file."

Bruce's program requires that C.PREP be patched and renamed D.PREP. He shows you how to do it in the listing named *cDiff*. Although he would not have had to rename his LIB and DEFS directories, he did so because he did not want to merge directories on /d0. If you do not rename your directories, you will need to change the appropriate lines in the program and patch C.PREP (see Listing named *cDiff1*. He is presently rewriting cc3 in C and plans to make it available in an OS-9 database.

### Three Prime Number Programs without GOTOs

We really woke up the sleeping giant when we published the challenge to rewrite the prime-number generating program without line numbers. This month, we'll show you several versions

and share some of the dialog we received.

Our first listing was submitted by Kevin Cantwell, of the Washington State Department of Licensing. Kevin has a degree in mathematics, lives in Olympia, Wash., and has worked as a programmer for both the United States Air Force and the National Oceanic and Atmospheric Administration. He writes:

"I changed some of the logic to correspond to the apparent design attempt of the program . . . since for the version printed the 'XXXX is a prime number!' message and the last prime divisor would not be printed. The listing, *Primes2*, corrects this problem and eliminates all GOTOs. It is a bit slower and takes just under three minutes to discover that 44449 is a prime number.

"It may be worthwhile to point out that the real use of the *Primes* and *Primes2* programs are to find the prime divisors of a number, rather than to find primes. If you simply need to find out whether a number is a prime, the second program, *QPrimes*, will check it much faster. This program economizes in two ways: It stops when the first divisor is found, and it makes use of the fact that a composite or non-prime — number must have one divisor smaller than the number's square root."

Our next challenger was Steve Goldberg of Bethpage, N.Y. He got rid of the GOTOs in the original listing by using the WHILE . . . ENDWHILE,

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REPEAT . . . UNTIL and the LOOP . . . ENDOOP constructs of BASIC09. His procedure is named "primes."

H. Bruce Phillips of Bolingbrook, Ill., also contributed a solution that eliminated the GOTO statements in the original. His program demonstrates how to run a procedure from another procedure and he uses a procedure named "runprimes3" to run his main program named *primes3*. Bruce writes:

"I made one important change. If 'N' is the integer to be factored, then Joel Sherman's maximum trial divisor is  $N/2$ . However, it need only be  $\text{SQRT}(N)$ . If a trial divisor greater than  $\text{SQRT}(N)$  is used, then the resulting quotient would be less than  $\text{SQRT}(N)$  and would have been tried previously. This results in a large savings at run time. For example, my program finds the number 44449 is prime in less than two seconds, compared with the two and a half minutes it takes Sherman's program. The eight-digit number, 12345678, factors in about 15 seconds and the number 87654321 takes about 22 seconds to factor. I also removed the recursions from Sherman's Procedure Prime. They were not needed and merely used up memory."

#### A Tip for Hard Disk Users

Greg Law sent us a note with a tip for people attempting to install a patch that lets you use the OS-9 *DCheck* utility with a hard disk. The patch is one of a group written by Sandy Trevor and stored in a file named *HARD.PAT* in one of the OS-9 SIG's databases. It seems the patches for *DCheck* are for OS-9 Version 1.00.00. Here are the offsets for Version 1.01.00.

| Offset | Old | New |
|--------|-----|-----|
| 13E0   | 44  | 48  |
| 27C3   | F4  | A9  |
| 27C4   | D5  | A2  |
| 27C5   | DD  | CD  |

Essentially, the patch changes the 'D' in /D0 to an 'H' and makes it read /H0. Then, it corrects the CRC bytes in the file so OS-9 can load and execute it.

#### More about Kermit

Mark Sunderlin in Winchester, Va., sent us a note with more information about the *Kermit* communications protocol after we mentioned it several columns back. *Kermit*, a program copyrighted by the trustees of Columbia University in New York City, is available in the CoCo SIG on CompuServe.

If anyone knows of an OS-9 implementation, please let us know and we'll pass the word in this column.

You may also order computer tapes of the *Kermit* program (not cassette) direct from Columbia University. However, since they are not set up to distribute free software on the scale required for a project such as this, you must pay them their cost for media, printing, postage, labor, etc. They would like a \$100 donation for the complete package; \$5 for a printed document such as the *Kermit Users Guide* or the *Kermit Protocol Manual*.

Their code is available for the

following systems: TOPS-10, TOPS-20, IBM VM/CMS and also on a standard ASCII tape with ANSI Label, Format 'D'. Write: Columbia University Center for Computing Activities, 7th Floor, Watson Laboratory, 612 West 115th Street, New York, NY 10025.

*Kermit* is not necessarily better than many other terminal-oriented file transfer protocols — XMODEM for example — but it is free, well-documented and has been implemented compatibly on a number of microcomputers and mainframes. Most *Kermit* implementations also let you send files in groups with a single command.

#### Listing 1:

```

PROCEDURE cc5
0000 REM cc5
0005 REM author Bruce A Williamson
0022 REM permission granted to publish in Rainbow magazine
0057 DIM inpath$,outpath$,outlin$:STRING(12#)
0068 DIM libdriv$,option$,ext$:STRING
007A DIM outp,pointer:INTEGER
0085 DIM whichdriv,nopt,noasm,nolink,nocomp:BOOLEAN
0090 PRINT "This program generates a c.com file"
009C PRINT "which will perform the prep and link operation"
00F5 PRINT "on /d# or /dl."
0107 PRINT "The required inputs are the c source file name"
0139 PRINT "and the drive on which the c library is located."
016D PRINT "The LIB directory must be renamed CLIB"
0197 PRINT "on drive # and the DEFS# must be GEFS on drive #."
01GG PRINT "You also MUST have a version of c-prep which is patched"
0209 PRINT "for /d#/GEFS and renamed d.prep"
022C PRINT
022E PRINT "This program allows three options "
0254 PRINT "The options are O=skip optimizer A= stop before assembly"
029# PRINT "and L= stop before linking."
02AF PRINT "Commas are not needed in the options but may be included."
02EC PRINT "Valid filename suffixes are .c .a and .r"
031# PRINT "Suffixes have priority over the options in case of conflict"
0357 PRINT "Multiple source files are not allowed"
038# whichdriv=FALSE
0386 nopt=FALSE
038C noasm=FALSE
0392 nolink=FALSE
0398 nocomp=FALSE
039E INPUT "What is the sourcefile pathname ",inpath$
03C6 INPUT "Which drive is the LIB directory include the slash",
libdriv$
040# INPUT "options",option$
040F IF libdriv$="/d#" THEN
041E whichdriv=TRUE
0424 ENDIF
0426 pointer=SUBSTR("O",option$)
0432 IF pointer<># THEN
043E nopt=TRUE
0444 ENDIF
0446 pointer=SUBSTR("A",option$)
0452 IF pointer<># THEN
045E noasm=TRUE
0464 ENDIF
0466 pointer=SUBSTR("L",option$)
0472 IF pointer<># THEN
047E nolink=TRUE
0484 ENDIF
0486 pointer=SUBSTR(".",inpath$)
0492 ext%=RIGHT$(inpath$,1)
049D inpath%=LEFT$(inpath$,pointer-1)
04AC IF ext%="a" THEN
04B9 noasm=FALSE
04BF nocomp=TRUE

```



```

04C5 nopt=TRUE
04CB ENDIF
04CD IF ext$="r" THEN
04DA nocomp=TRUE
04E0 nopt=TRUE
04E6 noasm=TRUE
04EC nolink=FALSE
04F2 ENDIF
04F4 outpath$=inpath$+".com"
0503 CREATE #outp,outpath$:WRITE
050F outlin$="echo "+inpath$+"."+ext$+" "
052C WRITE #outp,outlin$
0536 IF ext$="a" THEN
0543 outlin$="copy "+inpath$+"."+ext$+" temp.a"
0565 WRITE #outp,outlin$
056F ENDIF
0571 IF ext$="r" THEN
057E outlin$="copy "+inpath$+"."+ext$+" temp.r"
05A0 WRITE #outp,outlin$
05AA ENDIF
05AC IF nocomp=FALSE THEN
05B7 outlin$="-x"
05C0 WRITE #outp,outlin$
05CA IF whichdrv=TRUE THEN
05D5 outlin$="d prep "+inpath$+".c >temp.m"
05F4 ELSE
05F0 outlin$="C.PREP "+inpath$+".c >temp.m"
0617 ENDIF
0619 WRITE #outp,outlin$
0623 outlin$="-x"
062B WRITE #outp,outlin$
0635 outlin$="echo c.pass1"
0648 WRITE #outp,outlin$
0652 outlin$="C.PASS1 temp.m -o=temp.1"
0671 WRITE #outp,outlin$
067B outlin$="del temp.m"
069C WRITE #outp,outlin$
0696 outlin$="echo c.pass2"
06A9 WRITE #outp,outlin$

```

## SDISK Sports New IBM PC Disk Transfer Program

I haven't heard from D. P. Johnson for more than a year now, but from what I've been reading, the author of *SDISK* is staying busy. He has a new package named *PC-XFER* available (\$45, 7655 S.W. Cedarcrest St., Portland, OR 97223, 503-244-8152) that you will find handy if you work with an IBM or clone at the office and need to carry text files home to your Color Computer.

Johnson's *PCRead* utility can read a file from an IBM PC single-sided disk of up to 40 tracks. The only restriction is the file you are copying off the IBM disk must be in the root directory. Conversely, his *PCWrite* utility writes a file into the root directory of an IBM disk so you can carry work you did at home back to the office.

The *PCFormat* utility will format a standard IBM single-sided disk. *PCDelete* will delete a file from an IBM disk. In addition to the IBM unique utilities, Johnson's *PC-XFER* package gives you utilities that read and write data from or to a standard 35-track Radio Shack

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disk. They use OS-9's standard input/output paths.

Johnson also throws in two utilities named *addlf* and *stripf*. The first adds line feeds behind every carriage return in the file. The latter does just the opposite. You'll find these two utilities handy if you transfer a lot of files between different computers because no two word processors write a file the same way. I use one of the generic transliterate utilities to do the job, but a dedicated utility would come in handy.

And while we're speaking of new software products from the Pacific Northwest, I hear that we can expect to see a full-blown relational database application language from a company named Clearbrook Software Group, Inc. (P. O. Box 8000-499, Sumas, WA 98295). Their package is named *Solomon IMS*. It reportedly features relational file access using a LINK command; multifield keys; text, integer, BCD and Date field and variable types; up to 16 files open at one time; field and record sizes limited only by your memory and OS-9; and an interactive programming environment.

```

0683  outlin$="C.PASS1 temp.1 -o-temp.a"
06D2  WRITE #outp,outlin$
06DC  outlin$="del temp.1"
06ED  WRITE #ourp,outlin$
06F7  ENDIF
06F9  IF nopt=FALSE THEN
0794  outlin$="echo c.opt"
0715  WRITE #outp,outlin$
071F  outlin$="C.OPT temp.a temp.o"
07D9  WRITE #outp,outlin$
0743  outlin$="del temp.a"
0754  WRITE #outp,outlin$
075E  ELSE
0762  ENDIF
0764  IF noasm=TRUE THEN
076F  ELSE
0773  outlin$="echo c.asm"
0784  WRITE #ourp,outlin$
078E  outlin$="C.ASM temp.o -o-temp.r"
07AB  WRITE #ourp,outlin$
07B3  outlin$="del temp.o"
07C6  WRITE #outp,outlin$
07D9  ENDIF
07D2  IF nolink=TRUE THEN
07DD  outlin$="rename temp.r "+inpath$+".r"
07F8  WRITE #outp,outlin$
0893  ELSE
0899  outlin$="echo c.link"
0812  WRITE #outp,outlin$
0825  IF whichdir=TRUE THEN
0839  outlin$="C.LINK /d9/CLIB/cstart.r temp.r -o-"+inpath$+" -l-/d9/CLIB/clib.l"
0874  ELSE
0878  outlin$="C.LINK /d1/LIB/cstart.r temp.r -o-"+inpath$+" -l-/d1/LIB/clib.l"
088A  ENDIF
088C  WRITE #outp,outlin$
0896  outlin$="del temp.r"
08D7  WRITE #ourp,outlin$
09E1  ENDIF
09E3  IF CLOSE #outp
09EC  END

```

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T. "Wink" Wingender, a retired master chief radioman at Coast Guard Headquarters who works with Quick Label inventor Lee Scott, brought a package in for me to try one day last month. They've got a great idea! Different Quick Label kits are available for your floppy disks, audio or data cassettes, and Beta or VHS video cassettes.

### Listing 2:

```

PROCEDURE primes2
0000 DIM trial,number,factor:REAL
0001 PRINT
0002 INPUT "Number? ",number
0003 IF number<1 OR number<>INT(number) THEN
0004 PRINT "Must be a POSITIVE INTEGER!";
0005 RUN primes2
0006 ENDIF
0007
0008 PRINT
0009 PRINT "**** Finding PRIME factors ****"
0010 trial:=2
0011 factor:=number
0012 LOOP
0013 IF factor/trial=INT(factor/trial) AND trial<number THEN
0014 PRINT trial;
0015 factor:=factor/trial
0016 ELSE
0017 IF trial<factor AND trial<number/2 THEN
0018 IF trial<3 THEN
0019 trial:=trial+1
0020 ELSE
0021 trial:=trial+2
0022 ENDIF
0023 ELSE
0024 IF trial>factor/2 THEN
0025 IF number=trial THEN
0026 PRINT number; " is a PRIME number!";
0027 RUN primes2
0028 ELSE
0029 PRINT
0030 RUN primes2
0031 ENDIF
0032 ENDIF
0033 ENDIF
0034 ENDIF
0035 ENDIF
0036 ENDIF
0037 ENDIF
0038 ENDIF
0039 ENDIF
0040 ENDIF
0041 ENDIF
0042 ENDIF
0043 ENDIF
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0195 ENDIF
0196 ENDIF
0197 ENDIF
0198 ENDIF
0199 ENDIF
0200 ENDIF

```

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#### Any Ham Radio Programs Available?

Richard I. King, Jr., WB9RIG (hangs out around 3.907 MHz between 7 - 9 p.m., daily), P. O. Box 236, St. Bernice, Ind., has a question for fellow hams. Are there any OS-9 or BASIC09 programs for ham radio use? King is looking for log programs, as well as RTTY or CW simulators. If you know of any, let us know and we'll pass the word in this column.

#### How to Register Your Radio Shack Software

Here's a tip that comes in handy at RAINBOWfest and other computer shows. Instead of taking the time to fill out all those registration forms by hand, bring a number of those handy stick-on address labels to the show with you. Then when you want to register for the door prize at a booth, you can slap on a sticker instead of wasting the time to write your complete name, address and phone number.

I often carry this timesaving strategy one step further and use the stick-on address labels when I fill out software registration forms and warranty applications. However, it backfired the last time I sent one of those handy software registration postcards back to Tandy in Fort Worth. Usually, they have the

#### Listing 3:

```

PROCEDURE QPrime
0000 DIM trial, end_trial:INTEGER: number:REAL
0011 PRINT
0013 INPUT "Number to test: ", number
0020 end_trial:=INT(SQRT(number))
0030 IF MOD(number,2)=0 THEN
0040 PRINT number; " is not a prime number, divisor=2"
0060 RUN QPrime
0070 ENDIF
0075 FOR trial=3 TO end_trial STEP 2
0080 IF MOD(number,trial)=0 THEN
0090 PRINT number; " is not a prime number, divisor="; trial
0095 RUN QPrime
0100 ENDIF
0105 NEXT trial
0110 PRINT number; "is a prime number"
0120 RUN QPrime
0130 END
  
```

#### Listing 4:

```

PROCEDURE primes
0000 DIM trial, number, factor:REAL
0005 DIM clearscreen:STRING[1]
0010 clearscreen:=CHR$(12) \>(* Match code with your terminal here *)
0015 PRINT clearscreen
0020 PRINT "P R I M E S . . ."
0025 PRINT "ADAPTED FOR BASIC09 BY JOEL SHERMAN"
0030 PRINT "RE-ADAPTED FOR BASIC09 BY STEVE GOLDBERG"
0035 PRINT
0040 PRINT "To exit PRIMES, enter 0 as our choice of number."
0045 LOOP
0050 LOOP
0055 PRINT \ PRINT
0060 INPUT "Enter a number: ", number
0065 IF number=0 THEN
0070 PRINT clearscreen
0075 END
0080 ENDIF
0085 EXITIF number>0 AND number=INT(number) THEN
0090 ENDEXIT
0095 PRINT
0100 PRINT "Must be a Positive Integer!"
0105 ENDOOP
0110 PRINT
0115 trial:=2
0120 factor:=number
0125 REPEAT
0130 WHILE factor/trial=INT(factor/trial) AND trial<number DO
0135 PRINT trial;
0140 factor=factor/trial
0145 ENDWHILE
0150 IF trial<3 THEN
0155 trial=trial+1
0160 ELSE
0165 trial=trial+2
0170 ENDIF
0175
0180 PRINT trial;
0185 factor=factor/trial
0190 ENDWHILE
0195 IF trial<3 THEN
0200 trial=trial+1
0205 ELSE
0210 trial=trial+2
0215 ENDIF
  
```

## OS-9™ SOFTWARE/HARDWARE

**SDISK**—Standard disk driver module allows the use of 35, 40, or 80 track double sided drives with COCO OS-9 plus you can read/write/format the OS-9 formats used by other OS-9 systems. **\$29.95**

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**FILTER KIT #1**—Eleven "wild card" utilities plus disk sector edit program. **\$29.95**

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**HACKER'S KIT #1**—Disassembler+others. **\$24.95**

**PC-XFER UTILITIES**—Utilities to read/write and format MS-DOS™ diskettes on CoCo under OS-9. **\$45.00**

**SKIO**—hi res screen driver for 24 x 51 display; does key click, auto repeat, boldface, italics; supports upgraded keyboards and mouse. With screen dump and other useful programs. **\$29.95**

**CCRD 512K Byte RAM DISK CARTRIDGE**—Requires RS Multi-pak interface, used with driver software below provides 1/2 MB OS-9 RAM disk. **\$298.00**

**CCRDV OS-9 Driver software for CCRD**—**\$20.00**

All disk prices are for CoCo OS-9 format; for other formats, specify and add \$2.00 each. Order prepaid or COD, VISA/MC accepted, add \$1.50 S&H for software, \$5.00 for CCRD; actual charges added for COD.

**D.P. Johnson, 7655 S.W. Cedarcrest St.  
Portland, OR 97223 (503) 244-8152**

(For best service call between 9-11 AM Pacific Time.)

OS-9 is a trademark of Microware and Motorola Inc.  
MS-DOS is a trademark of Microsoft, Inc.

```

01D7 UNTIL trial>factor OR trial>number/2
01EF -IF number=factor THEN
01FC PRINT number; " is a PRIME number!"
0217 ELSE
021B PRINT \ PRINT
021F PRINT number; " is not a prime number!"
023E ENDF
0240 ENDLOOP

```

### Listing 5:

```

PROCEDURE runprimes3
0000 DIM number:REAL
0007 PRINT CHR$(12) \>(* clear the screen *)
0022 LOOP
0024 PRINT
0026 LOOP
0028 INPUT " number? ",number
0039 EXITIF number>1 AND number=INT(number) THEN
004F ENDEXIT
0053 PRINT "Must be a positive integer"
0071 PRINT "greater than 1!"
0084 ENDLOOP
0088 RUN primes3(number)
0092 ENDLOOP
0096 END
PROCEDURE primes3
0000 PARAM number:REAL
0007 DIM trial,factor,quotient,root:REAL
001A
001B root:=INT(SQRT(number))
0025 factor:=number
002D trial:=2
0035 REPEAT
0037 LOOP
0039 quotient:=factor/trial
0045 EXITIF quotient<=INT(quotient) THEN
0053 ENDEXIT
0057 PRINT trial; " ";
0061 factor:=quotient
0069 ENDLOOP
006D
006E IF trial=2 THEN
007B trial:=3
0083 ELSE
0087 trial:=trial+2
0093 ENDF
0095 UNTIL trial>root OR trial>factor
00A9
00AA IF factor=number OR number=2 THEN
00B7 PRINT " --- prime number!"
00D5 ELSE
00D9 IF factor<=1 THEN
00E6 PRINT factor
00F8 ELSE
00EF PRINT
00F1 ENDF
00F3 ENDF
00F5 END

```

### Listing Diff

|             |       |                  |          |
|-------------|-------|------------------|----------|
| Differences |       | Bytes compared:  | 000027AC |
| byte #1 #2  |       | Bytes different: | 00000005 |
| -----       | ---   |                  |          |
| 0000000D    | 63 64 |                  |          |
| 0000135D    | 31 30 |                  |          |
| 00001369    | 64 63 |                  |          |
| 000027A9    | 2A 8F |                  |          |
| 000027AA    | E9 D5 |                  |          |
| 000027AB    | AD 77 |                  |          |

### Listing Diff1

|                  |          |
|------------------|----------|
| Bytes compared:  | 000027AC |
| Bytes different: | 00000005 |
| Differences      |          |
| byte #1 #2       |          |
| -----            | ---      |
| 0000000D         | 63 64    |
| 0000135D         | 31 30    |
| 000027A9         | 2A A7    |
| 000027AA         | E9 D6    |
| 000027AB         | AD FD    |

catalog number of the software you are registering and the version number already pre-stamped on the cards. Big companies usually know how to save time, too!

As it happened, this particular card didn't have the Catalog Number stamped on the card. In my haste to slap on the stick-on label and get the card in the mail, I didn't notice the missing number. As a result, I got a nice letter from Norma Alexander in the Software Registration Department at Tandy. She explained how to register software when you lose the registration card or it is missing from your manual. I thought I should share the three methods with you. They are:

- 1) Send a copy of the receipt showing the original purchase with the stock number indicated.
- 2) Send the original title page from the software manual. It will be returned to you.
- 3) Ask for written verification at the store where you purchased the item.

Be sure to include the stock number and version number for each item you are registering. If you have any problems or questions about software registration, you may write Norma in care of the Software Registration Department, P.O. Box 2910, Fort Worth, TX 76113-2910, or you may call her at (817) 870-0407.

### Next Month — A DynaCalc Tutorial

In the November issue we hope to present a tutorial on *DynaCalc*. We've been talking about the need for application programs long enough — it's time to show off an excellent one. Joe Turner at Computer Systems Center in Chesterfield, Mo., has given us a few tips and is letting us use some sample spreadsheets available to the SS-50 crowd but not the CoCo owner.

We'll list several procedure files that extend the width of the original CoCo OS-9 DIR and MDIR utilities. The procedure files show how you can actually accomplish some programming tasks with the powerful OS-9 utility command set — right from the operating system command prompt. They were contributed by Donald L. McGarry of Northport, N.Y. We'll also give you our first reaction to three new programs — the *OS-9 CBug Debugger*, the *OS-9 Text Formatter* and the *OS-9 Macro Assembler* — that just arrived from Computerware in Encinitas, Calif. Till then, happy hacking! ☺

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Three menu options are reserved for the most frequently used printout sizes: 1x (quarter page), 2x (half page), and 3x (full page). The 1x and 2x printouts are right-side-up on the paper, the 3x printout is rotated 90 degrees. The user can select a positive or negative image, lines of color interpretation (colors reproduced with user definable grey scale) and which PMODE the graphic-to-be-printed is usually displayed in.

### GREETING CARDS

The greeting card option allows the user to custom design greeting cards using both text and graphics. There are two card styles available, along with a built-in "mini-typesetter" (10 different size of text, characters may be rotated, mirrored, inverted, and much more).

### SPECIAL EFFECTS

The special effects option allows the user to directly control the printing directives, ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS, NEG IMAGE, and more! With these, the user can print multi-page banners, change the grey levels used in color printing, rotate printouts 90, 180, or 270 degrees, stretch printouts horizontally or vertically, zoom in on small areas, superimpose vertical and/or horizontal grid lines with printouts for measurements and gridding, and much much more.

# PRETTY GRAPHICS SO WHAT!



Now that you have created a library of PRETTY graphics, what can you do with them? How about printing cards, labels, and giant posters! **HARDCOPY** is more than just a screen print utility, compare these features with any other graphic dump program on the market.

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- BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports lines in all 4 GRAPHICOM display modes!

**HARDCOPY**\* requires a 64K Color Computer or Color Computer II, and at least one disk drive. It supports 1 to 4 disk drives, keyboard or joystick input, COLOR (grey scale) or B/W (hi res) operation, 4 screen display modes.

\* Due to hardware differences, some features may function differently on certain printers.

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| Gemini 10X   | Cat. No. 174WD | Epson FX-80 | Cat. No. 173WD  |
| Gemini SG-10 | Cat. No. 174WD | DMP-200     | Cat. No. 175 WD |

### LABELS

The label printing option allows the user to create custom mailing or disk labels with professional looking results. Just load a graphic image from disk, position the proportional label window over the area to be printed. Uses standard 1/2 x 3 1/2" tractor feed adhesive labels. Prints 1-99 labels at a time.

### POSTERS

The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster. Both hi-res and color printing are supported, sizes range from poster-size to mural-size to full-board-size!

### DISK ACCESS

The disk option provides the user with access to standard 6K images, GRAPHICOM and GRAPHICOM PART II files, and COCO MAX files too. GALLERY function allows viewing of all pictures on a disk. Supports 1 to 4 disk drive systems.

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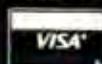
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