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GANTELET

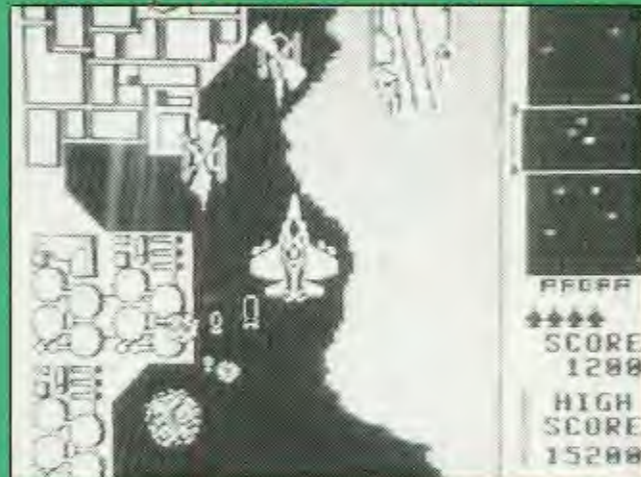


One, two or even three people can play Gantelet at the same time. You and your friends travel through the many levels in search of an exit to the next level. Avoid the Ghosts and other creatures that are out to stop you in your quest. Collect keys to open doors, treasures and magic potions to aid you in your battle. Watch out for hidden traps as you frantically search for the exit to the next level.

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64 k
joystick required \$28.95 U.S.
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joystick required

64 k required: tape or disk \$28.95 U.S. \$38.95 Can.

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Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. Outstanding graphics make this a must for your collection!

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Challenge the computer, or a friend to a Karate match! Use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

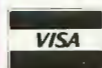
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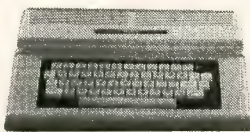
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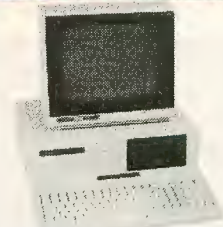
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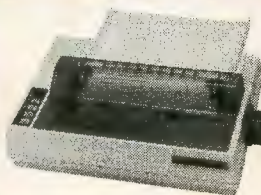
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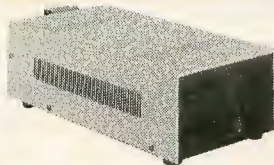
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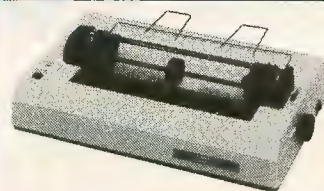
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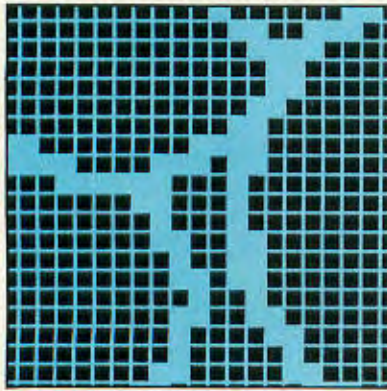
Under The RAINBOW



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NEXT MONTH: As the chill winds of November blow, what better time to retreat to your trusty CoCo and get in touch with our annual Data Communications issue. Online information services are the wave of the future and THE RAINBOW is here with answers and information for all your BBS and telecommunication questions. Plus, we have more games, programs for the home, educational material and information on the Color Computer than is available anywhere else. Look for November's RAINBOW!

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Bill Barden and Richard White will return next month

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The RAINBOW

October 1986

Vol. VI No. 3

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Keep Those Converts A-Comin'

Editor:

Congratulations to the CoCo Community on the arrival of the new Color Computer 3!

As a current non-member of the community (but an interested party), I expect the new CoCo 3 will make quite a few converts. I, for one, have been hesitant to buy a CoCo, despite the many hardware options available for it, and the low cost of OS-9, because of its graphics limitations. But no more! With this latest version, the CoCo rivals the Atari ST in the graphics department, and moves well into the world of serious computers. And at a price of less than \$220, it is easily affordable.

Closely priced competitors will likely feel the pinch. If software developers are quick to react, the CoCo could enjoy fantastic Christmas sales. (A version of *CoCo Max* alone that takes advantage of the higher resolution modes would sell thousands.)

A message for CoCo software developers: You have a tremendous opportunity here — don't let it go to waste!

This is one non-CoCo owner who does not intend to stay that way any longer than necessary!

Lonnie McClure
Memphis, TN

BACK TALK

Editor:

As the owner of Software Corner, a computer store specializing in software and hardware for the CoCo, I was sorry to read the letter in the August 1986 issue [Page 6] of RAINBOW from Bill Vergona. I really feel for Bill, as well as many other programmers, who spend endless hours programming to give the CoCo Community quality software only to have someone steal it. It is not only the giver, but also the receiver, who is breaking the law. I've heard all kinds of excuses from people justifying these acts and not one of them holds water.

I am an independent third party dealer, and these pirates hurt me just as they hurt the programmers. One of my customers made the statement, "I haven't heard of any companies going out of business because

their software is being pirated." Just look at an old issue of THE RAINBOW and see how many of those advertisers are still advertising, and how many dropped out because illegal copies of their software forced them out, and how many of the pirated programs were unjustly criticized because there were no instructions with them.

Thank you for listening, and thanks to all the programmers out there who have gotten the CoCo this far!

Linda Brubaker
Software Corner
Temple, PA

HINTS AND TIPS

Editor:

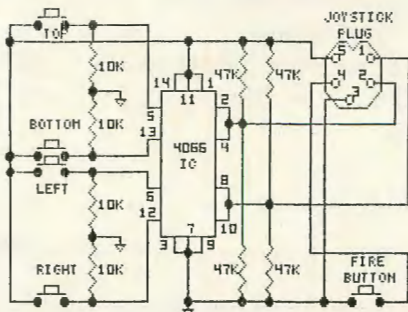
Any readers who are using a JUKI 6100 printer and are interested in adjusting word processing files for printing by a proportional spaced wheel, please write to me at P.O. Box 506, 06410. I have a working program I would like to share and have tested by users.

Joseph P. Laronda
Cheshire, CT

Wireless Joystick, Part Two

Editor:

Here is a schematic to modify an Atari joystick to work with the Color Computer.



I took most of the information from the June 1985 [Page 105] article on the wireless joystick and made small modifications so the circuit can be mounted inside the joystick. I have modified one joystick and it's working fine.

Is there a good program for the CoCo 2 like the *Greeting Card Designer* that has different graphics, letter type and border shape on disk that can be used to fill a complete page? I have a Star SG-10 printer.

Do you have a utility program to keep track of all the programs on a disk, add or modify the list and do a printout when needed? Send information to P.O. Box 46, CFS Senneterre, JOY 2CO.

Andre Bergeron
Nottaway, Quebec

A correction to the referred article appeared on Page 224 in the August 1985 issue.

Please look over the ads that appear in RAINBOW every month. There are several utility programs on the market that will do the job you're looking for.

Peeking at Function Keys

Editor:

For those who have purchased the HJL-57 keyboard and use ADOS, the function keys (F1, F2, F3, F4) do not work. If your keys do work, they can be used for things such as selecting options in menu-type programs.

The keys are monitored by the keyboard rollover table, memory addresses 338-345 (decimal) and can be used through a simple PEEK:

If F1 is pressed, PEEK(341)=191
If F2 is pressed, PEEK(342)=191
If F3 is pressed, PEEK(343)=191
If F4 is pressed, PEEK(344)=191

I hope someone can make use of these keys as I have.

Eric Santanen
Stanhope, NJ

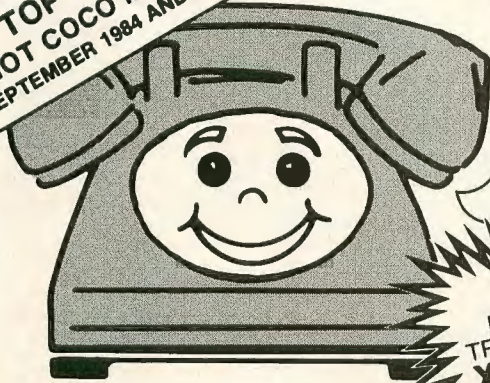
Art Gallery Tid Bits

Editor:

Recently one of the local Radio Shack stores was selling the *Art Gallery ROMpack* for \$5. After opening the package and trying a little bit, I found a few things that some RAINBOW readers may find interesting.

On computers with disk drives and with

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Parker, *HOT CoCo*, 5/85

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the disk controller in the ROM port, after turning the computer on, try this:

- 1) POKE 25,14 : POKE &HE00,0 and press ENTER.
- 2) CLOAD and ENTER with the *Art Gallery* data tape in cassette recorder.
- 3) After receiving the OK prompt, type PCLEAR 4 and press ENTER.
- 4) Write a BASIC line: 10 PMODE 1,1 : SCREEN 1,1 : GOTO 10
- 5) Run this small basic line to see the results.

On cassette based systems, the first step should be: POKE 25,6 : POKE &H600,0 and press ENTER.

With this method, you can save the *Art Gallery* on a disk. Anyone having improvements in this procedure is invited to write me at 1423 N. Cleveland Street, 92667.

*Ashok Basargekar
Orange, CA*

Recognition Requested

Editor:

I just reread Susan Davis' April 1984 [Page 215] article on "Women and the Color Computer," and I agree with the description of the problem, though not necessarily with the solution. The CoCo world seems to be a man's world.

But we, the few women who are active CoCoists, want our share and we want recognition as well. That's why I'm writing this letter: I recently contributed to "KISSable OS-9" (an excellent column) some programs and a patch to a Radio Shack screen dump. I signed my letter with my full name so there would be no doubt about it, I am a woman. Here in Curacao I am considered somewhat an expert on the CoCo.

So, I was very disappointed when, in the July "KISSable OS-9" column [Page 230], my contributions were attributed to a man. It was "he" everywhere my name was mentioned.

Please, RAINBOW, "she." Please correct this error. We women in CoColand are few, but we want recognition, not recipe filing programs. I use my CoCo at work for technical calculations, budgeting and word processing. I use the one at home to write programs and generally explore the CoCo to its limits.

As for software wishes, how about a version of OS-9 *Dynacalc* that is compatible with the O-Pak 85 cpl Hi-Res utility and doesn't eat up all available memory?

*Margo H. Guda
Curacao, Neth. Antilles*

Our apologies! No slight intended at all; that's the way we received the material from the author, and your exotic Caribbean location must have diverted our attention momentarily. Vive la difference!

Margo, you may find the article

on Page 164 particularly interesting.

Wise Shopper

Editor:

I enjoyed myself at RAINBOWfest. I was able to make some particularly good purchases and meet the company people who could help me with the software I use most often, *Dynacalc* and *Pro Color File*. I also use *Telewriter-64* with *Telepatch* and *Wiz Font*. I am a bookkeeper and a cashier, and am teaching my boss about computers with my own setup.

I am a member of the Sacramento Color Computer Club (SCCC) and the Sacramento CoCo Club (SCC). I enjoy both clubs because they have different formats. SCCC plans its monthly meetings around THE RAINBOW theme. The SCC is based around a bulletin board.

*Shelby J. Dunning
Sacramento, CA*

REQUEST HOTLINE

Editor:

I am looking for a tennis Simulation game. Are there any for the CoCo? My address is 241 Stiener Avenue, 83440.

*Jeremy Hackworth
Rexburg, ID*

Swing To the Left, Do-Si-Do

Editor:

I am a square dance caller and wonder if there is anyone who has a program that can be used for choreography of movements. I own a CoCo with two disk drives and a DMP 105 printer. Any help would be appreciated. Write me at 228 Kingsway, L3B 3N9.

*Terry Kallender
Welland, Ontario*

Hilfe, Bitte

Editor:

I recently purchased a Radio Shack DMP 120 printer. This printer has the German alphabet, but it seems no one knows how to use it. I do a lot of corresponding with people in Germany and having access to this capability would help a lot. I would appreciate any assistance. My address is 431 Bass Avenue NE, 98568.

*Arnold D. Samuels
Ocean Shores, WA*

Medical Madness

Editor:

I am knee-deep in trying to track medical expenses, insurance claims, reimbursements, etc. I would like to know if anyone has a disk program for a 64K CoCo 2 that could bring some organization to my medical madness? Write to me at P.O. Box 387, 36559.

*Dave Willette
Montrose, AL*

Custom Adventures

Editor:

I am looking for an Adventure design program for a cassette. If anyone know where I can get one, please write to me at 266 Sheldon Road, 13068.

*Jonathan Wange
Freeville, N.*

Check out "The Adventure Processor" on Page 27 of the August 1986 issue. It may be just what you are looking for.

INFORMATION PLEASE

Editor:

I have tried using the disk expansion utility [June 1986, Page 92], and also the *64 Custom Setup* [May 1986, Page 82]. However, they both need you to transfer the ROM to RAM or the all-RAM mode. How do you do this?

*Ian Boisvie
Burstall, Saskatchewan*

See "Downloads" on Page 234 of the August 1985 issue. Read the answer to Jerome P. Cigna's question.

The "Other" 32K

Editor:

I have an old 64K CoCo. I would like to know if it is possible to get 64K of RAM from BASIC without having to buy the OS 9 operating system. I would appreciate any help you can give.

*David Ardil
Bogota, Colombia*

The CoCo is designed to access only 32K at one time for BASIC programs.

Elementary Education

Editor:

I have a 16K Color Computer 2 and recorder. I am interested in obtaining educational tapes or programs to use for preschooler and third grader. If anyone has any information about such programs, write to me at 808 Villere Street, 39576.

*Dawn Perkin
Waveland, MS*

Check the Computer Island Educational Software ad on Page 154 in the August 1986 issue.

A Sorry State

Editor:

Why can't I find programs for the CoCo that resemble *PrintShop* and *NewsRoom*? There are some very neat and useful programs on the market for other computers. Yes, I have *CoCo Max* and others but nothing that measures up to *PrintShop* which is available for almost everything except the CoCo. It's always the same old

story, it seems. Help! My address is 1206 Via Pavion, 93455.

R.E. Newman
Santa Maria, CA

See "KISSable OS-9," August 1986, Page 201 under the heading, "Good News for Graphics Programmers."

KUDOS

Editor:

I was very pleased when I read "Building July's Rainbow." I was concerned about THE RAINBOW supporting the present CoCo after the new CoCo is introduced. I am relieved to know you will still support the present CoCo. I think that THE RAINBOW is the best!

Christopher Romance
Massapequa Park, NY

Keep on Converting

Editor:

As soon as I got the August 1986 RAINBOW, I started leafing through it as I usually do. Lo and behold I found *Fortune Wheel* [Page 156]. I jumped into my computer seat and started typing away. After a few hours I had the game ready to play. The reason for my excitement was that my whole family loves "Wheel of Fortune." We played *Fortune Wheel* for two and a half hours and loved every minute of it. We decided to play on a regular basis. I want to publicly thank and congratulate Arron Branigan on a job well done. Mr. Branigan, maybe you can find the time to convert the TV game version of "Scrabble" to a CoCo program. I think it would be an excellent game just like *Fortune Wheel*. I hope you keep writing programs and I hope THE RAINBOW keeps publishing them.

Arie Moller
Kensington, MD

Missing Out

Editor:

Why did you make "Scoreboard" a bi-monthly column? I love the pointers. When I get stuck on an Adventure or a game, I have to wait two months for the next "Scoreboard Pointers" to look for help. I wish you would bring it back on a monthly basis.

How about putting the one- and two-liners in the Table of Contents? I am always afraid I missed the most important one-liner in history because they are scattered throughout the magazine. Even though I go cover to cover, there is always the chance of missing one. I think an entire section devoted to each month's one- and two-liners would be a great idea!

Even though THE RAINBOW is the greatest, I think there is always room for improvement.

Brian Biggs
Grove City, OH

CoCo Cats Art

Editor:

This grandfather/granddaughter pair is still very much enjoying learning all the aspects of home computing with the CoCo. Grandfather Jim is an engineer with a local television station and Beth is a 13-year-old student who resides in The Colony, Texas. Our families think we are two CoCo Nuts out of our palm tree but we treat them with the milk of human kindness.

Jim Franklin
Paducah, KY



Soliciting Suggestions

Editor:

I would like to thank the staff at THE RAINBOW for producing such a fine magazine every month. Without it, my computer would just be an expensive paperweight on my desk.

I am in the process of writing a farm accounting and inventory program and would appreciate hearing from farmers with any thoughts and suggestions. Please write to me at R.R. 1, Box 103, 57278.

I would like to hear from anyone with information about the Laser 50 Personal Computer. I acquired one without any instructions. I want to know about getting or making a cassette and printer interface for it. I also want to know if it is still possible to get the 4K memory module for it.

Mike McPeck
Willow Lake, SD

I Can Do It

Editor:

If anyone would like programming done on the Color Computer 2, send me a letter and I'll return it with a questionnaire. Write Fewster Originals, 151 Westwood Manor I, 16001.

John Fugh, Jr.
Butler, PA

The Book of Lists

Editor:

I would like to have a list of all your issues, their subjects and all the games and one-liner programs.

Chad W. Johnson
Orfordville, WI

For a list of available issues and their subject theme see "Back Issue Order Form" on Page 138 of this issue.

For a list of games you'll have to refer to our indexes. They are available in the July 1984, 1985 and 1986 issues.

BULLETIN BOARD SYSTEMS

Editor:

Please list the following California Computer Federation Bay Area Chapter BBSs: Presidio BBS, SysOp Dan Eckert, (415) 567-3287.

Redwood Gator Board, SysOp George Sandufer, (415) 364-6630.

Colorboard of San Francisco, SysOp Brad Ryan, (415) 591-7366.

Vallejo Colorboard, SysOp Woody Stolling, (707) 557-9221.

Los Altos Colorboard, SysOp Bob Webster, (415) 965-7949.

Hal 2001, SysOp Ronnie Van Scherpe, (415) 345-1802.

Dan Eckert
Presidio, CA

● I would like to announce a BBS designed specifically for the Color Computer. It operates at 300/1200 Baud, 24 hours a day, 7 bit word length, even parity and 1 stop bit. Call (818) 786-9052.

Cliff Redding, SysOp
Van Nuys, CA

● I would like to announce the start of The Buck Board BBS. It runs 24 hours a day, seven days a week and offers CoCo support. Baud rates are 300/1200. Call (303) 427-9539.

Lee R. Castens
Westminster, CO

● I would like to inform your readers of a new BBS in the tri-state area called The Angola Connection. We have a small membership of 40 users, but are capable of 100 downloads online at all times. Call (219) 665-3028 anytime at 300 Baud.

Eddie Nast
Angola, IN

● The Indy Color Computer Club sponsors the ICCS Hotline BBS. Baud rates are 300/1200. Call (317) 873-5808.

Kevin S. Jessup, Sr.
Lawrence, IN

● I am happy to announce southeastern Kentucky's only BBS in the Hazard-Perry county area. It is called the Coalminer's BBS. The hours are 11:30 p.m. to 8 a.m. seven days a week. Settings are 300 Baud, full duplex, 7 bits and no parity. Call (606) 439-4209.

*Keith W. Smith
Hazard, KY*

● This is to announce the Exotic Zone BBS. It is up 24 hours a day. Call (301) 969-3083.

*Vallie Ingson
Glen, MD*

● I am happy to announce the new Lin-Wood BBS. Call (603) 745-8811, online 9 p.m. to 7 a.m. seven days a week. This BBS is free access and contains E-mail, downloads, adds, scoreboard and much more.

*David Selby, SysOp
N. Woodstock, NH*

● I would like to announce the Colour Kraft BBS of Rahway. It runs nonstop at 300/1200 Baud, supports a comprehensive CoCo download section and has a large message base. Immediate full system access assured at logon. Call (201) 396-4361 anytime. Voice (201) 381-9047.

*Jay Needham
Rahway, NJ*

● Announcing Matthews Coloring Book BBS. It operates at 300 Baud N, 8, 1, 6 p.m. to 6 a.m., Monday through Friday and 24 hours on the weekend. Call (704) 847-7781. Runs on a 64K CoCo using a Colorama system.

*Tim Bohoslav
Matthews, NC*

● Call The Utopia Network #1 BBS at (614) 622-0565. We are using our own written software. To log on use 300 Baud, full duplex and even parity. We have over 200 programs available for download and several other features. The hours are from 7 p.m. to 6 a.m. every evening.

*Bruce Uher
Coshocton, OH*

● I would like to welcome all to the opening of the Toledo area Colorama BBS serving most of northwest Ohio. We operate at 300 BPS (soon to be 1200) 24 hours a day. Call (419) 877-0556.

*John Kendziora, SysOp
Whitehouse, OH*

● I would like to announce the changing of the phone number for the Fun BBS. The new number is (412) 378-1323. We have upgraded to an RS-232c Pak and added our fourth disk drive to the system. There are many new online games, etc. We have ASCII up/downloading. The system is free. Call today and get a password.

*Robert Chalupa, SysOp
Aliquippa, PA*

● I would like to announce two BBSs which run 24 hours a day.

LABB (Lancaster Area Bulletin Board) uses a TRS-80 Mod #3 computer. All are

welcome, but you must become a full member to access the library of programs. There is a section for CoCo computers. Call (717) 394-1357.

Byte Bucket BBS runs on an Intel computer. There is a section for CoCo users for questions and suggestions. There is also a free library of programs for CoCo users. Call (717) 569-9967.

*Mike Nelson
Lancaster, PA*

● I would like to inform you of a new BBS called St. Elmo's Bar. It runs on a 64K CoCo I with four drives. Call (817) 244-6686. The BBS is up 24 hours a day, seven days a week. Also, I was wondering if anyone knows where I could find a copy of the TBBS programs. Write to me at P.O. Box 26689, 76126.

*Chris Young
Benbrook, TX*

● I would like to announce the reopening of the Flying Fortress BBS. It's now running 24 hours a day, seven days a week at 300/1200 Baud. Call (214) 686-4796.

*Eric Hedstrom
Garland, TX*

● The Salt Lake City CoCo Club is running The Data Warehouse BBS. Call (801) 487-6787 — 24 hours a day, seven days a week, 300 Baud, 7 bits, no parity.

*Dennis Mott
Salt Lake City, UT*

● Announcing a new BBS in Virginia. Call (703) 573-2246, 300 Baud.

*Phillip Taylor
Vienna, VA*

● I would like to announce the Madison Area Tandy Users BBS in the Madison area. The board is up 24 hours a day, seven days a week. There are sections for MS-DOS, TRS-DOS, Model 100/200, buy and sell, and of course, the Color Computer. There is also an up/download section. The board is running at 8-1-N. Call (608) 273-6922.

*Fran Selje
Marshall, WI*

● There is a new BBS in the Kenosha-Paddock Lake area called Uncle Dave's BBS. It runs 24 hours a day, seven days a week. Call (414) 843-4029.

*David Buehn, SysOp
Paddock Lake, WI*

● I would like everyone to know about my BBS. Call (800) 233-7513. Hope to see lots of RAINBOW users on it. To get on, type NEW at the ID prompt and NEW at the password prompt.

*Paul Fielding
Red Deer, Alberta*

● I would like to tell you about CoCoPad, the only CoCo BBS in Saint John. The terminal settings are 300 Baud, 7 bit, even parity and 1 stop bit. Call (506) 652-2654. SysOp is Gord Peterson.

*Steven L. LeBlanc
Saint John, New Brunswick*

● Call The Redbaron BBS at (416) 668-2078, 300/1200 Baud, no parity, 8 bits (or 7 bits) and 1 stop bit. Runs 24 hours a day. The Redbaron has been up for four years. We have SIG sections for the CoCo. When you connect to the board, press ENTER once or twice to activate the board.

*Steven Cavanaugh
Whitby, Ontario*

● Joliette has a new COBBS-BBS for CoCo clubs, E-mail, graphics, Xmodem, up/downloading news. It runs 24 hours a day, seven days a week. All in French. We welcome all CoCo users. Call (514) 753-5655.

*A. Veillette
Joliette, Quebec*

● A new BBS is now running in Riviere-du-Loup. Has 300 Baud, full duplex, 8 bits, parity none, 1 stop bit. This BBS is not only for posted and read messages but there is a big part for information. The BBS is in French! Call voice (418) 862-5074 or BBS (418) 862-9750.

*Erik Gendron
Riviere-du-Loup, Quebec*

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.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

ARTS AND LETTERS

THE RAINBOW

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Mark Ervine
Barrie, Ontario

Envelope of the Month

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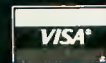
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All Aflutter Over Our New Baby

It seems I've been whirling for a couple of weeks now, what with the new CoCo 3 announcement, getting the "special" issue of THE RAINBOW out and making some last minute changes for RAINBOWfest that will make it *the* place to be this fall.

First of all, a big vote of thanks from me to the people here at Falsoft who have been working very hard to get you all the CoCo 3 news. Jim Reed in Editorial and Heidi Maxedon in Art marshaled their forces and came out with one of the most complete pieces of fast-paced magazine journalism I've ever seen. Sure, we'll be exploring the CoCo 3 for years, but I'm happy we could give everyone a real in-depth report on our newest baby in a minimum amount of time.

Considering there was no real information available until the machine actually showed up in New York on July 30, I think the staff did a heck of a job getting the full report in the mail on August 11. Had not a weekend interfered, I think it would have been a couple of days sooner. I hope you enjoyed our CoCo 3 coverage and look forward to seeing more and more of it in the months ahead.

One place many of you got quick news was through local CoCo clubs. In fact, there has been a small avalanche of club newsletters coming in recently, all featuring the new CoCo 3 and speaking of it in glowing terms.

Frankly, I wondered just where all this information was coming from. At least until this morning when I read the Glenside (Ill.) Color Computer Club news. Said the newsletter: "Members of RAINBOW's Color Computer SIG met on Delphi tonight to discuss the new CoCo." Steve Bjork and Cray Augsburg hosted this exchange — and, for that matter, there was information on the SIG within minutes of the announcement. Sure is nice to have instant communications like that in Delphi. It was one of the service's busiest nights ever and one of the largest conferences ever!

By the way, I phoned in the first bit of news to the Delphi SIG right from the news conference with my portable phone. Bernie Appel, President of Radio Shack, spotted me dictating copy and pointed out my activities to John Roach, Tandy CEO. We exchanged big smiles all around — but I didn't stop talking. UPI training will do that for you.

ARK ROYAL GAMES

NEW!!!!



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BATTLE HYMN The Battle of Gettysburg. Command Lee's army of 39 Divisions, including Stuart's cavalry brigades, and infantry division under the command of such famous names as Johnson, Heth, McLaws, Hood, Early and Pickett. Try to do what the real Confederates couldn't: destroy Mead's army at Gettysburg. New movement and turn structure; form lines, rally, limber and unlimber cannon, back-step, and do your best to outflank the Union line at Culp's Hill, Devil's Den or Big Round top. Historical, with an Ark Royal touch. Available also on the IBM PC (Tandy 1000). Graphics are hi res; game is machine language throughout. **\$29.00**



NEW!!!!

ADVENTURE ISLAND

ADVENTURE ISLAND (32K) Coco, disk only. Your plane has crashed on a deserted island and you must use all of your wits to stay alive. Beautiful half-screen picture graphics take you through jungle and beach in this fun-filled machine language adventure. Comes on two disks. **\$23.00**

Disk only! SAGA-THE SORCERER'S CURSE 32K 100% hi-res, 100% ML graphic adventure. Fantastic!—\$22

Disk only! REDSTAR 32K 100% hi-res 100% ML. Futuristic wargame involving NATO and the WARSAW PACT.—\$25

BARBAROSSA 64K 100% hi-res 100% ML game of the war in Russia 1941-1944. "A Blockbuster," says Hot Coco's Peter Paplaskas. Reviewed Jan. '86 Hot Coco.—\$25 (Tandy 1000)

D-DAY Our second 64K 100% hi-res 100% ML, this one dealing with the Allies invasion of France in 1944. Massive! No review date set yet.—\$25

PHALANX 32K 100% hi-res, 100% ML game of Alexander the Great. No review date set yet.—\$15

COMPANY COMMANDER 32K ML routines. Tactical squad level wargame set in WWII. 12 scenarios, add-on expansion modules. Dec. '85 Rainbow.—\$23 disk or tape

RIVER CROSSING 32K ML routines. A Company Commander add-on module, but you no longer need C/C to play it.—\$23

CINCPAC BATTLE OF MIDWAY 32K 100% hi-res 75% ML. The battle that turned the tide of war. Aug. '85 Rainbow.—\$23

ESCAPE FROM DENNA 32K ML routines. Semigraphic Dungeon adventure game. No review date set yet.—\$15

BATTLE OF THE BULGE 32K Semigraphic wargame. 1 or 2 players. Aug. '85 Rainbow.—\$15

BATTLE FOR TUNIS 32K Semigraphic wargame. 1 or 2 players. Sept. '85 Rainbow.—\$15

ACROSS THE RUBICON 32K Semigraphic wargame. Feb. '84 Rainbow.—\$18

WATERLOO 32K ML routines. Semigraphic wargame. Mar. '84 Rainbow.—\$15

KAMIKAZE 32K Hi-res graphic wargame. Apr. '83 Rainbow.—\$15

BOMBER COMMAND 32K disk, 16K tape. Semigraphic wargame. ML routines. Jan. '84 Rainbow.—\$10

GUADALCANAL 32K Semigraphic wargame. ML routines.—\$15



Prices on all programs include shipping to U.S., APO's, Canada. COD's (USA only) add 3.50. Florida Residents add 5%. All Orders shipped within 24 hours. Programs require Color Computer TM (Tandy Corp.) or TDP System 100 Computer TM (RCA). Many programs soon to be available on MS-DOS systems.

P. O. Box 14806
Jacksonville, FL 32238
(904) 786-8603

Other staff members have worked very hard in setting up some special programs for RAINBOWfest, too. This should be one of our most dynamic shows.

The highlight of the general program will be a round table discussion on the new CoCo 3 featuring four people you will probably never see again on the same stage. Barry Thompson, the CoCo line manager for Tandy, and Mark Siegel, who's in charge of software development, will be joined by two third-party CoCo programmers: Greg Zumwalt and Steve Bjork. Greg and Steve had stories in last month's special issue.

While this is a round table, there will also be plenty of time for questions and answers. It is really going to be *the* session to attend — and we've set a special time so that all the exhibitors and people working the show will be able to be there, too. Plan to attend this one!

Zumwalt is our speaker at the CoCo Community Breakfast Saturday morning, and I think Greg's talk will be a tour de force you will not want to miss! I know few actually have a CoCo 3 in

hand at this time, but I am certain you will be impressed with Greg's windowing demonstration. Expect more good things from him (at RAINBOWfest and in the pages of THE RAINBOW) in the future.

Siegel and Bjork are also giving separate seminars, as will a host of other people, including our own Dale Puckett, Brian Lartz, Bill Turner and George Dorner from the OS-9 Users Group. And, we'll have the great Bill Barden, ever-popular Fred Scerbo and a bunch of others, too. I think it is the best seminar lineup we've ever had.

Why, there's even a new T-shirt design for the show! Be there. I know I will.

Yes, there is a CoCo 3 at THE RAINBOW. (Interesting how many people have asked me.) The biggest difficulty has been in keeping people away from it so we can get a few things together for this and subsequent issues. The more I see of it, the better I like it. Messrs. Thompson, Siegel and all have done a truly superb job on this machine. I find myself sneaking in at night just to play with it a little more.

What impresses me most about the

CoCo 3 is how much it changes so many of the things we have been doing for years. The addition of the 80-character screen width, the colors available for characters and background, and the underline and blinking attributes mean vastly superior displays with programming ease. I've never been able to draw particularly well, but it is easy to see what vast potential the increased resolution and colors will have on almost anything.

And these things are available in plain ol' ordinary BASIC. When you get into the many other things CoCo 3 can do, there is an almost unlimited resource available to us again.

I know most of us looked at Ataris and Amigas and wondered what the CoCo 3 would offer and when. We had the best computer for a long, long time. When you've been on top of the heap, you want to be there some more. It's nice to be better again.

— Lonnie Fall

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RAINBOW

Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character “goes under” what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have “key boxes” to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

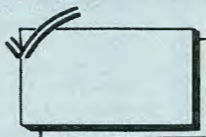
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the “given” names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a “check sum” system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and *SAVE* it for later use, then type in the command *RUN* and press *ENTER*. Once the program has run, type *NEW* and press *ENTER* to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+17B
20 CLEAR 25,X-1
30 X=256*PEEK(35)+17B
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y,W
60 POKE Z,Y:NEXT
70 IF W=7985 THEN B0 ELSE PRINT
  "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to “get” these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of getting an assembly language listing into CoCo is called “hand assembly.” As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an *ORIGIN* statement or an *EQUATE*. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F80.

The Rainbow Seal



The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a “guarantee of satisfaction.” The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

BUILDING OCTOBER'S RAINBOW

Introducing Rainbow On Disk . . .
... with a "hitch" to it!

We would like to remember this as the month we phased in our new RAINBOW ON DISK service with only one hitch. Knock on wood. Yes, beginning with this issue of THE RAINBOW, you can have your choice of RAINBOW ON TAPE or our new RAINBOW ON DISK! With the advent of the CoCo 3 and the new emphasis on OS-9, the time has come to offer a vehicle for OS-9 programs, which, of course, have been unavailable on our tape service.

Enter RAINBOW ON DISK, formatted for both Disk Extended BASIC and the OS-9 operating systems! Yes, both. Thanks to a "flippy," a double-sided disk for single-sided disk drives, we have Disk Extended BASIC on one side of the disk and OS-9 on the other. In fact, because one side of the disk may not always hold all of our Color BASIC, Extended Color BASIC and Disk Extended BASIC material, some months only a portion of a side will be formatted for OS-9 and the rest of that same side formatted to hold the spillover of other programs.

Actually, it isn't that complex to create the disk itself, and we do have experience producing disk services for RAINBOW's sister publications, but we are a bit anxious as to how RAINBOW ON DISK users will receive this newest offering. Therefore, we solicit your comments and suggestions. We fully expect RAINBOW ON DISK to undergo an evolution over the next few months as we get your feedback and incorporate your ideas for improving it.

Certainly, we expect that most of you will use this new service with no problems; but it is almost as certain, given the many systems and configurations and varying levels of expertise among RAINBOW readers, that we will not have anticipated every contingency. For instance, did I tell you about the guy who found it convenient to keep disks on the outside of his filing cabinet — using a refrigerator *magnet* to hold them in place? That's a "don't" we had not even considered!

So, away we go with RAINBOW ON DISK! RAINBOW Contributing Editor Fred Scerbo did the colorful opening graphics. Dan Downard decided on the "flippy" and the formatting arrangement. Kevin Nickols is writing the documentation. Newly-arrived artist Denise Webb is doing the graphic design. Cray Augsburg is creating each month's master disk. And Jutta Kapfhammer is pulling together all the pieces of the package.

Yet, the work of producing this new product only begins there. Others, such as Mark Herndon and Janice Eastburn are involved in the mass-producing and distribution. We expect Fulfillment Services Director Bonnie Frowenfeld and business department staffers Sandy Apple, Monica Wheat, Beverly Bearden, Pat Eaton and Sharon Smith to have their hands full starting new subscriptions, prorating changeover fees and all. Then, there's advertising and promotion. Bookkeeping. Editorial. Typesetting. You get the picture; it involves just about the entire staff here — and, we hope it will involve you, too!

To encourage you to become a charter subscriber to RAINBOW ON DISK, right off the bat we're discounting the price of a year's subscription. While the full nitty-gritty details are in our ad on Page 80, this means, for instance, that the basic U.S. rate of \$99 for a year's subscription to RAINBOW ON DISK is being dropped to only \$90 during this introductory offer period — that's only a little more than a tape subscription, and, during the course of a year, a savings of \$54 over the monthly \$12 single-issue price! Present tape subscribers can change their subscriptions over to disk service, too; details were put inside the tape package when the September issue was shipped.

A final tip: For additional savings on credit card orders, call us toll free at (800) 847-0309 to begin receiving RAINBOW ON DISK with the very first issue. A yearly subscription to RAINBOW ON DISK — we believe you'll enjoy signing up for a full 12-month "hitch."

— Jim Reed

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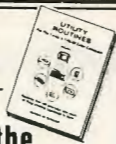
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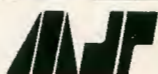
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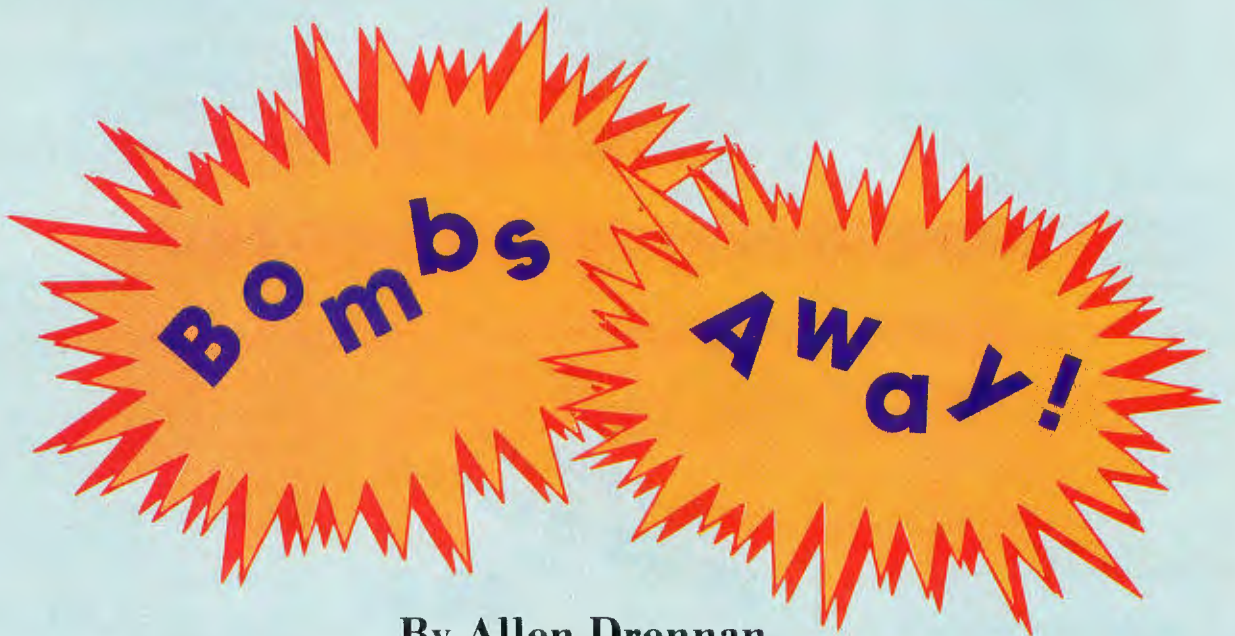
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Skill and a keen intellect are needed to win in combat . . . but an over-eager trigger finger works against you.



By Allen Drennan

Bombs Away is a nuclear war between two opponents. Both sides fire missiles in an attempt to destroy each other. Each player takes his turn by typing the angle (0-90) followed by a comma and the velocity. But be warned: If the velocity is too great, your base falls apart from the stress. If the velocity is too little, the missile blows up your base. A range of zero to 200 works best. Some experimentation is required to determine the best velocity for your computer. As you fire, remember to compensate for wind and terrain.

To win the battle, you must destroy the opponent's base. A game is won when a certain number of battles have been fought. The number of battles to be played is determined at the beginning of each battle. The score and reports it to the players at the beginning of each battle.

The game is simple to use and the prompts are all user friendly. ENTER is used as a toggle switch to go from the text screen to the graphics screen and back again during a player's turn. Bombs Away is written in Extended Color BASIC as a high resolution game. It should run in 16K with no modifications.

(Questions about this program may be directed to the author at 19506-D Industrial Drive, Sonoma, CA 95370, 209-533-8489. Please enclose an SASE when writing.)

Allen Drennan has been programming in many languages for seven years. He is currently a junior at Sonoma High School in Sonoma, California. He programs games and software for himself.

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470	165
620	22
900	1
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1410	204
1580	140
END	108

The listing: BOMBAWAY

```

100 ' BOMBS AWAY
110 '
120 ' ALLEN DRENNAN
130 ' 1986 COLOR CLOUD
140 ' 19506-D INDUSTRIAL DR.
150 ' SONORA, CA. 95370
160 ' (209) 533-3477
170 '
180 DIM H(139):GOTO 1320
190 SCREEN 1,1:FOR I=1 TO 254 ST
EP 2:LINE(I,(H(I/2)+1))-(I,159),
PSET:NEXT
200 RETURN
210 REM
220 REM ** CREATE BASES
230 REM
240 CLS:PCLS:PRINT:PRINT:PRINT:P
RINT:PRINT:PRINT:PRINT"  NUCLE
AR BASES ACTIVE ...":N1=2:FOR I=
1 TO 1000:NEXT I:CLS
250 PMODE 4,1:SCREEN 1,1:PCLS:SC
REEN 1,1:PCLS
260 X1=20+FND(30):X2=80+FND(40):
L(1)=10+FND(X1-10):L(2)=X2+FN D(
120-X2)
270 N=158-FND(58):FOR I=0 TO X1:
H(I)=N:NEXT:N=1:GOSUB 1190
280 N=158-FND(58):FOR I=X2 TO 13
9:H(I)=N:NEXT:N=2:GOSUB 1190
290 FOR KK=1 TO 1000:NEXT KK
300 X3=X1+FND(X2-X1-20)+10:H(X3)
=50+FND(100):N=H(X3)/2:D1=N-H(1)
/2:D2=N-H(139)/2
310 REM
320 REM ** SCOREBOARD
330 REM
340 CLS:PRINT:PRINT"THE SCORE:
";P$(1);:PRINT" =";S(1):PRINT"
";P$(2);:PRINT" =";S(
2)
350 IF S(1)+S(2)=0 THEN 390
360 REM
370 REM ** CREATE ILLUSION
380 REM

```

```

390 A=180:R=180/(X3-X1+1):N=H(1)
+D1
400 FOR I=X1+1 TO X3-1:A=A-R:H(I)
)=COS(A*.0174533)*D1+N:NEXT
410 A=0:R=180/(X2-X3+1):N=H(139)
+D2
420 FOR I=X3+1 TO X2-1:A=A+R:H(I)
)=COS(A*.0174533)*D2+N:NEXT
430 CLS:GOSUB 190
440 REM
450 REM ** DISPLAY WIND FACTOR
460 REM
470 W=FND(100)-50:PRINT:PRINT:PR
INT:PRINT:PRINT:PRINT"  WIND FA
CTOR";:IF W<=0 THEN PRINT W+(W*-
2);"TO THE WEST." ELSE PRINT W;"
TO THE EAST."
480 FOR I=1 TO 1500:NEXT I:CLS:G
OSUB 1230:N=N1
490 N=3-N:S=5*N-4
500 REM
510 REM ** PLAYER PROFILE
520 REM
530 CLS:PRINT"LAST SHOTS :";:FO
R I=0 TO 3:PRINT A(S+4-I);:NEXT:
PRINT
540 PRINT"                ";:FOR I=0
TO 3:PRINT V(S+4-I);:NEXT I:PRI
NT
550 PRINT"FIRING :";
560 IF N=1 THEN PRINT"LEFT" ELS
E PRINT"RIGHT"
570 PRINT"WIND FACTOR";
580 IF W<=0 THEN PRINT W+(W*-2);
"TO THE WEST." ELSE PRINT W;"TO
THE EAST."
590 ANG$="":V$="":PRINT P$(N);
600 LINE INPUT" CALL YOUR SHOT
";YU$:IF YU$="" THEN 690
610 FOR I=1 TO LEN(YU$):IF MID$(

```



```

YU$,I,1)="," THEN 640
620 ANG$=ANG$+(MID$(YU$,I,1))
630 NEXT I
640 FOR I=I+1 TO LEN(YU$):V$=V$+
(MID$(YU$,I,1)):NEXT I
650 ANG=VAL(ANG$):V=VAL(V$):GOTO
740
660 REM
670 REM ** PERFORM TOGGLE
680 REM
690 SCREEN 1,1
700 A$=INKEY$:IF A$=""THEN 730
710 IF A$=CHR$(13) THEN 530
720 GOTO 700
730 GOTO 700
740 CLS:SCREEN 1,1
750 IF V<350 THEN 790
760 PRINT:PRINT"YOUR BASE BLEW A
PART FROM TO MUCH PRESSURE AN
D FORCE.":FOR I=1 TO 1500:NEXT I
770 FOR I=1 TO 1000:NEXT I
780 GOTO 1120
790 GOSUB 1220
800 REM
810 REM ** FIRE MISSILE
820 REM
830 IF N=2 THEN ANG=180-ANG
840 V1=COS(ANG*.0174533)*V:V2=-S
IN(ANG*.0174533)*V
850 MN=L(N):X=L(N)*2:Y=H(MN)
860 IF N=1 THEN X=X+1 ELSE X=X-6
870 X=X-7*(N=2)
880 PSET(X,Y,3):OX=0
890 XO=X:YO=Y
900 X=X+V1/10:V1=V1+(W-V1)/30:IF
X<0 OR X>254 THEN 490
910 Y=Y+V2/10:V2=V2+6
920 IF Y<1 THEN 960
930 IF OX THEN PSET(OX,0,3):OX=0
940 PLAY"T255;O1;1;1"
950 LINE(XO,YO)-(X,Y),PSET:XO=X:
YO=Y:GOTO 970
960 OX=X
970 IF H(X/2)-Y>2 THEN 900
980 Y=H(X/2)+2
990 PSET(X,Y,3)
1000 IF ABS(X/2-L(3-N))<3 THEN 1
080
1010 IF ABS(X/2-L(N))>3 THEN 107
0
1020 PRINT:PRINT " YOU DESTROYED
YOURSELF ";P$(N):FOR I=1 TO 150
0:NEXT I:GOSUB 1720
1030 GOTO 1120
1040 REM
1050 REM ** SOUND EFFECTS
1060 REM
1070 PLAY"T200;O1;V31;8;8;8;V25;

```

```

6;6;6;V20;4;4;4;V15;2;2;2;V10;1;
1;1":CIRCLE(X,Y),2,3:GOTO 490
1080 PLAY"O1;T255;V10;4;4;4;V15;
6;6;6;V20;8;8;8;V25;10;10;10;V31
;12;12;12;V25;10;V20;8;V15;6;V10
;4":GOSUB 1720
1090 WIN=N
1100 FOR KK=1 TO 1000:NEXT KK
1110 N=3-N
1120 S(3-N)=S(3-N)+1:IF S(3-N)+S
(N)=GN THEN 1580
1130 FOR I=1 TO 10:A(I)=0:V(I)=0
:NEXT:N1=3-N1:PCLS:GOTO 260
1140 GOTO 1580
1150 END
1160 REM
1170 REM ** DRAW BASES
1180 REM
1190 X=L(N)*2:Y=H(L(N))-1:FOR I=
-2 TO 3:LINE(X+I,Y+1)-(X+I,Y-2),
PSET:NEXT
1200 LINE(X-4,Y-4)-(X-4,Y-2),PSE
T:LINE(X-3,Y-4)-(X-3,Y-2),PSET:LI
NE(X,Y-4)-(X,Y-2),PSET:LINE(X+1
,Y-4)-(X+1,Y-2),PSET
1210 LINE(X+4,Y-4)-(X+4,Y-2),PSE
T:LINE(X+5,Y-4)-(X+5,Y-2),PSET:R

```

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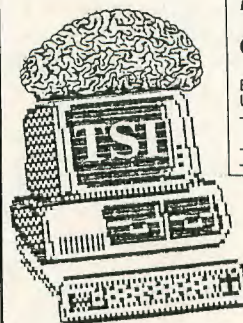
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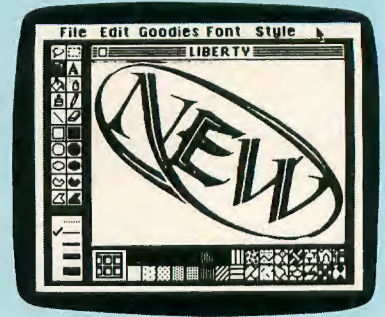
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CoCo Max II TM



You'll use it all the time and love using it.

What is CoCo Max?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



CoCo Max disk system, with Y-cable.

Is CoCo Max for you?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply **pointing** and **clicking** with your mouse or joystick. With **icons** and **pull down menus**, you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The **undo** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

With the **pencil** you can draw free hand lines, then use the **eraser** to make corrections or changes. For straight lines, the convenient **rubber-banding** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The **paint brush**, with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

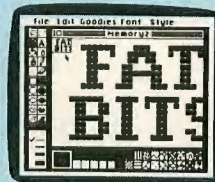
For special effects, the **spray can** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The **Glyphics** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom In!

Control Over Your Work

CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats:

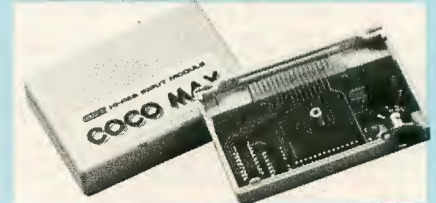
- You can move it around
- Copy it
- Shrink or enlarge it in both directions
- Save it on the electronic **Clipboard**
- Flip it vertically or horizontally
- Rotate it
- Invert it
- Clear it, etc. etc.

All this is done instantly, and you can always **undo** it if you don't like the results.

For detail work, the **fat bits** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible **lasso**.



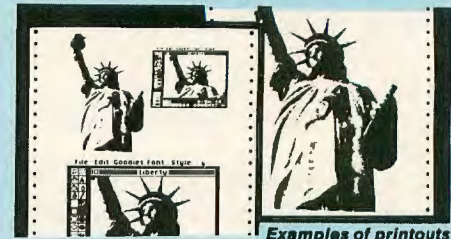
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in **fonts** each with 16 variations. That's over 200 tpestyles!



Examples of printouts

Printing Your Creations

There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers!


```

ETURN
122Ø NN=5*N:FOR J=1 TO 4:K=NN-5+
J:A(K)=A(K+1):V(K)=V(K+1):NEXT:V
(NN)=V:A(NN)=ANG:RETURN
123Ø LINE(142-W,15Ø)-(143+W,15Ø)
,PSET
124Ø SS=-SGN(W)
125Ø FOR I=1 TO 5:Y=15Ø-I:X=14Ø+
W+SS*I
126Ø LINE(X,Y)-(X+1,Y),PSET
127Ø Y=15Ø+I:LINE(X,Y)-(X+1,Y),P
SET:NEXT
128Ø RETURN
129Ø REM
130Ø REM ** MAIN DISPLAY
131Ø REM
132Ø CLS:PRINT:PRINT:PRINT:PRINT
"      ";A$="*** BOMBS AWAY ***
"
133Ø FOR I=1 TO LEN(A$):PRINT MI
D$(A$,I,1);
134Ø POKE&HFF21,&H3C:POKE&HFF21,
&H34:FOR QW=1 TO 3Ø:NEXT QW:NEXT
135Ø PRINT:PRINT:PRINT "      B
Y ALLEN DRENNAN      1
986 COLOR CLOUD"
136Ø FOR I=1 TO 2ØØØ:NEXT I
137Ø CLS:A$="GAME RULES ARE SIMP

```

```

LE":GOSUB 154Ø:PRINT
138Ø PRINT
139Ø A$="BLOW UP YOUR OPPONENT B
Y FIRING AT THE RIGHT ANGLE AND
VELOCITY,":GOSUB 154Ø
140Ø PRINT
141Ø A$="WHILE COMPENSATING FOR
WIND AND TERRAIN. EACH GUNNER M
UST ENTER"
142Ø A$=A$+"THE GUN ANGLE AND SH
ELL POWER.":GOSUB 154Ø
143Ø PRINT:PRINT
144Ø A$="THE ANGLE MUST BE BETWE
EN (Ø-9Ø)":GOSUB 154Ø
145Ø PRINT
146Ø PRINT " PLAYERS NAMES : "
147Ø FOR P=1 TO 2
148Ø PRINT "PLAYER ";P;:LINE INP
UT", ";P$(P):IF LEN(P$(P))>1Ø TH
EN CLS:PRINT "1Ø CHARACTERS ONLY
!":GOTO 146Ø
149Ø NEXT
150Ø DEF FND(X)=RND(X)
151Ø INPUT "HOW MANY BATTLES TO
PLAY ";GN
152Ø IF GN<1 THEN PRINT"PLEASE,
DONT JOKE AROUND!":GOTO 151Ø
153Ø GOTO 24Ø
154Ø FOR I=1 TO LEN(A$):PRINT MI
D$(A$,I,1);
155Ø POKE &HFF21,&H3C:POKE &HFF2
1,&H34:FOR QW=1 TO 3Ø:NEXT QW:NE
XT
156Ø FOR I=1 TO 7ØØ:NEXT I
157Ø RETURN
158Ø CLS
159Ø REM
160Ø REM ** GAME REPORTS
161Ø REM
162Ø PRINT "THE SCORE: ";P$(1);
:PRINT" =";S(1):PRINT P$(2);:PRI
NT" =";S(2)
163Ø IF S(1)>S(2) THEN WI=1
164Ø IF S(1)<S(2) THEN WI=2
165Ø IF S(1)=S(2) THEN 168Ø
166Ø PRINT "WINNER"
167Ø GOTO 17ØØ
168Ø PRINT
169Ø PRINT "A TIE !!!"
170Ø PRINT "BETTER LUCK NEXT TIM
E !!!"
171Ø END
172Ø SCREEN 1,1:FOR RT=1 TO 15
173Ø CIRCLE(X,Y),RT,3,1,.5Ø,Ø
174Ø NEXT RT
175Ø FOR I=1 TO 15ØØ:NEXT I:RETU
RN

```

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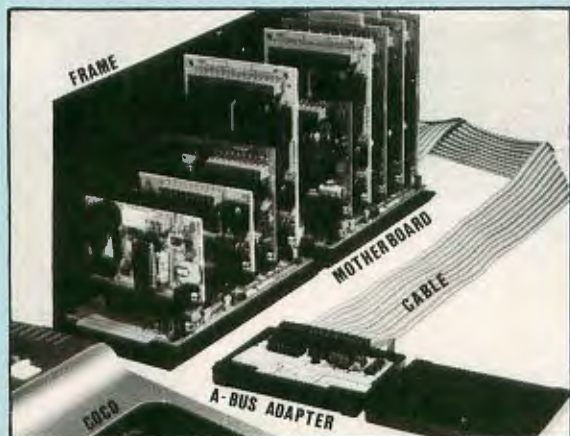
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Will accommodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...\$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

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Relay Card RE-140: \$129

8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

Digital Input Card IN-141: \$49

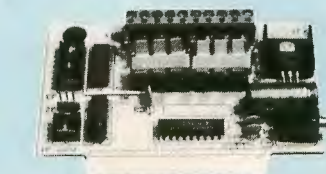
It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

Analog Input Card AD-142: \$119

With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.

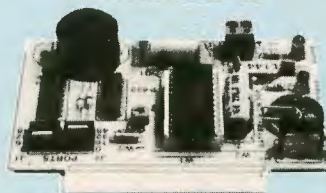
Prototyping Card PR-152: \$15

Protocard is 3 1/2 by 4 1/2 in. and accepts up to 10 IC's.



12 Bit A/D Converter AN-146: \$109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is -5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.



Motor Controller ST-143: \$69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives two stepper motors (12V, bidirectional, 4 phase).

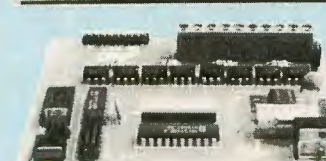
Motor: 48 steps/revolution, 300 steps/second, 1/4" shaft: MO-103...\$15. Power supply: PS-126...\$10

Special Package: the controller card, two stepper motors, and power supply: PA-181...\$99



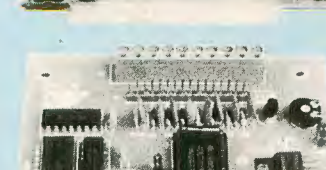
Clock with Alarm CL-144: \$89

It's the most powerful clock/calendar available. The features: ● 5 second/month accuracy. ● Keeps time, date, and alarm for 5 years (even with computer off). ● Can time events down to 1/100 second. ● Periodic "chime". ● Full time and date alarm. ● Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. ● Easy to use.; for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.



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The Goblins'll Getcha if You Don't Watch Out!

By Jean and Al Duerig

October magic casts its spell over a suburban neighborhood in *Halloween*. It is October 31 and you, dressed as a ghost, are the intrepid trick-or-treater determined to get your fair share of Halloween loot. But it won't be easy. Strange and bizarre things happen on the darkest night of the year. As you roam the streets, going from house to house, who knows what you may encounter?

Halloween includes a flying saucer, haunted house, lightning, a dog that may or may not be vicious and an assortment of ghosts and scary sounds.

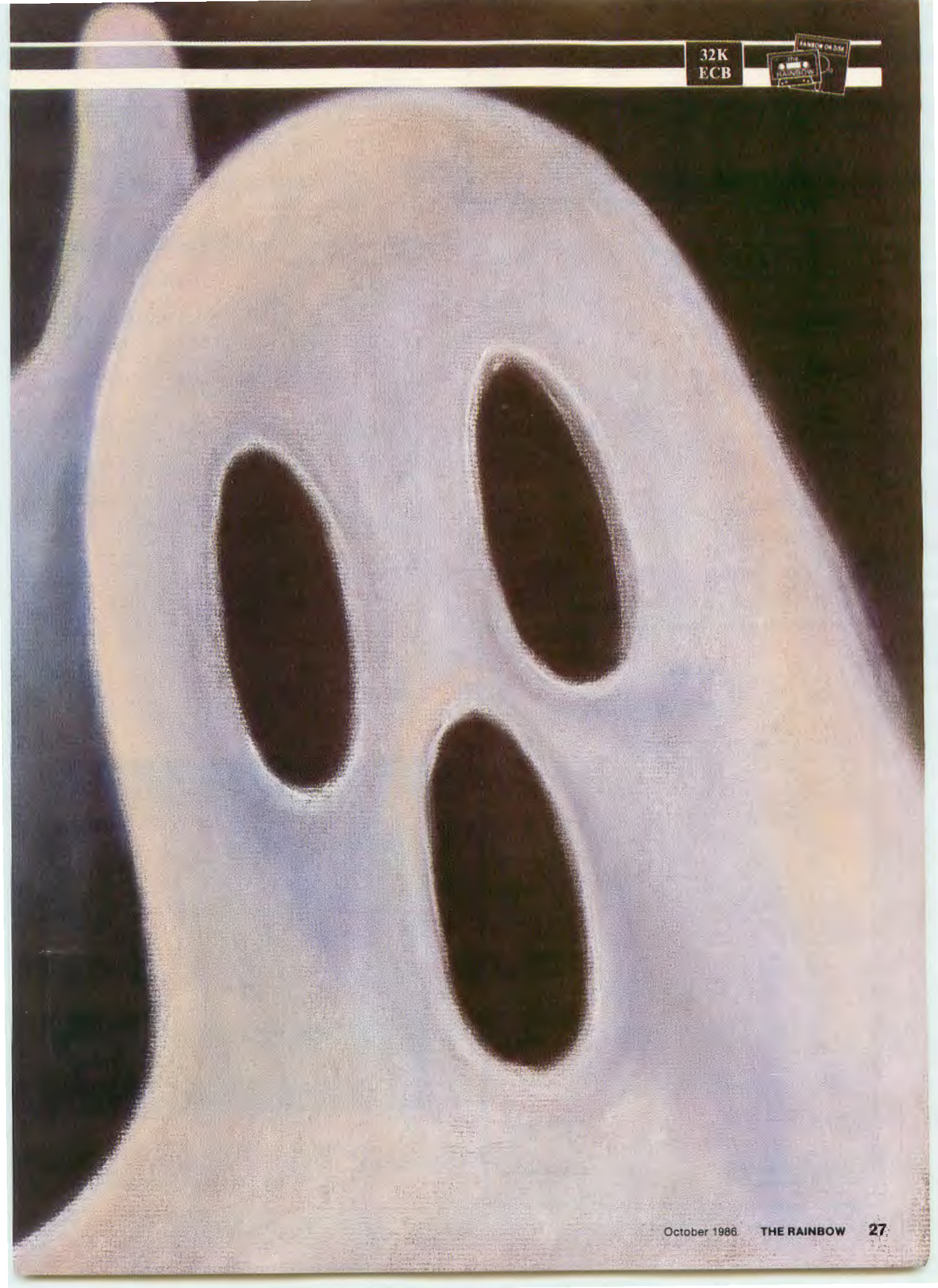
If unsatisfactory treats are received, you are given the option of playing a trick, but don't be too nasty or you may land in jail.

The game is simple for children of all ages, requiring only yes and no answers. It features 10 different graphics screens and requires 32K of memory. Points are accumulated by gathering desirable treats and can be lost for playing tricks or being a scaredy cat. Good luck!

(Questions about this program may be directed to the Duerigs at 203 Pinecrest Drive, Pittsburgh, PA 15237, 412-486-1888. Please enclose an SASE when writing.) □

Jean and Al Duerig are CoCo enthusiasts who have enjoyed so many other games they decided to write their own. Jean is a foreign language teacher and Al is a telephone engineer.

32K
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17	107	2920	219	3785	87
135	57	3007	216	4030	211
540	251	3115	40	4090	48
680	179	3153	144	4232	138
769	101	3240	117	5150	37
781	162	3430	57	5345	251
792	30	3450	112	END	159
812	199	3710	79		

The listing: HALLOWEEN

```

1 CLS:PRINT @ 167,"H A L L O W E
  E N":FOR W=1 TO 1000:NEXTW
2 PRINT:PRINT"      A CHILDREN'S
  ADVENTURE          BY J. AND A.
  DUERIG":FOR W= 1 TO 1200:NEXT W
3 DIM G(23,75)
4 ZZ=1600:XX=0:S=0
5 CLS:PRINT"IT'S HALLOWEEN NIGHT
  AND TIME   FOR YOU TO ROAM THE
  NEIGHBORHOODLOOKING FOR ADVENTUR
  ES, AS WELLAS TRICKS AND TREATS
  ."
6 PRINT"SO PUT ON YOUR GHOST SUI
  T AND   GET READY FOR SIGHTS AND
  SOUNDS LIKE YOU'VE NEVER SEEN O
  R HEARD."
7 PRINT "ALL QUESTIONS ARE ANSWE
  RED BY   (Y) FOR YES AND (N) FOR

```

```

NO.      TO START OVER, PRESS '
BREAK'   AND TYPE 'RUN':PRINT:P
RINT"    WHEN READY TO START, ENTER
'Y'"
8 INPUT Y$: IF Y$="Y" THEN 10 EL
SE 5
10 IF ZZ>1000 THEN 17 ELSE 12
12 QQ=RND(12)
14 ON QQ GOTO 17,17,17,17,3200,3
990,3100,3100,5000,5000,17,3500
17 PMODE 3,1
20 PCLS
30 SCREEN 1,0
35 LINE (0,140)-(255,140),PSET
40 LINE(70,55)-(175,140),PSET,B
45 DRAW"BM64,58;E58;F58"
50 LINE (108,105)-(132,140),PSET
  ,B
60 LINE (84,108)-(97,130),PSET,B
62 LINE(84,119)-(97,119),PSET
65 LINE (147,108)-(161,130),PSET
  ,B
68 LINE(147,119)-(161,119),PSET
70 LINE(84,70)-(97,90),PSET,B
73 LINE(84,80)-(97,80),PSET
75 LINE(147,70)-(161,90),PSET,B
78 LINE(147,80)-(161,80),PSET
80 DRAW"BM83,37;U22;R14;D12"
85 LINE(108,134)-(80,190),PSET
90 LINE(132,134)-(160,190),PSET
95 CIRCLE(113,119),2
110 LINE(27,125)-(36,140),PSET,B
115 LINE(15,125)-(48,125),PSET
120 LINE(15,125)-(32,80),PSET
122 LINE(201,140)-(214,133),PSET

```



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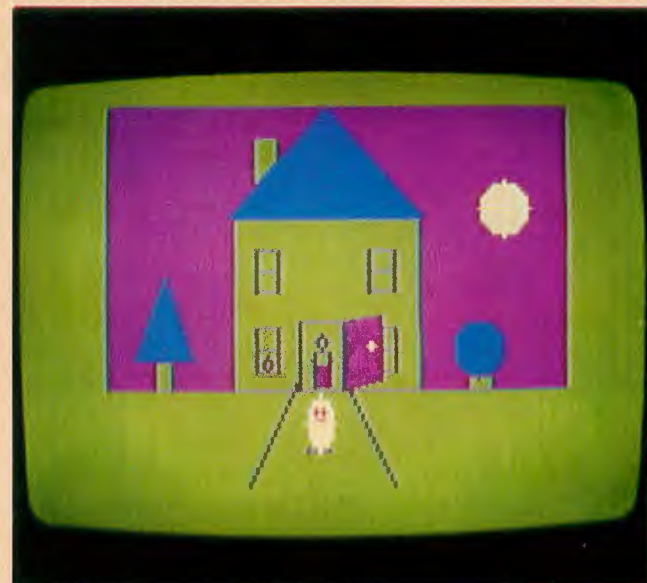
With hi-res character display and window generator. Features an enhanced key board (clicks) and 10 programmable function keys. Allows the user to create multiple windows from basic. Includes menu driven printer setup and auto line numbering. Four function calculator. with memory. The above options can be called anytime while running or writing in BASIC. APPLE PULL YOUR DRAPES. YOU DON'T WANT TO SEE THIS. \$19.95 (disk or tape) includes manual.

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```

,B
123 CIRCLE(207,119),17,.8
124 PAINT (207,119),3,4
125 LINE(32,80)-(48,125),PSET

```

```

130 PAINT(119,132),3,4
135 PAINT(73,53),3,4
140 PAINT(17,123),3,4
144 PAINT(66,60),4,4
149 PAINT(180,60),4,4
155 CIRCLE(220,50),15,2
160 PAINT(220,50),2,2
167 LINE (113,170)-(125,172),PSE
T,B
168 CIRCLE(118,157),9,2.3,2
169 PAINT(118,157),2,2
170 CIRCLE(117,151),2
173 CIRCLE(121,151),2
175 LINE (117,155)-(120,155),PSE
T
176 IF ZZ>200 THEN ZZ=ZZ-200
177 FOR W=1 TO ZZ:NEXT W
179 CLS
180 PRINT @96,"DO YOU WANT TO RI
NG THE DOORBELL"
182 INPUT A$: IF A$="Y" THEN 190
ELSE 1000
190 PRINT @168,"TRICK OR TREAT!"
198 SOUND170,9:SOUND 145,10
200 FOR D=1 TO 800:NEXT D
515 PMODE 3,1
520 PCLS
525 SCREEN 1,0
530 LINE (0,140)-(255,140),PSET
535 LINE(70,55)-(175,140),PSET,B
540 DRAW"BM64,58;E58;F58"
545 LINE (108,105)-(132,140),PSE
T,B
550 LINE (84,108)-(97,130),PSET,
B
555 LINE(84,119)-(97,119),PSET
560 LINE (147,108)-(161,130),PSE
T,B
565 LINE(147,119)-(161,119),PSET
570 LINE(84,70)-(97,90),PSET,B
575 LINE(84,80)-(97,80),PSET
580 LINE(147,70)-(161,90),PSET,B
585 LINE(147,80)-(161,80),PSET
590 DRAW"BM83,37;U22;R14;D12"
595 LINE(108,134)-(80,190),PSET
600 LINE(132,134)-(160,190),PSET
610 LINE(27,125)-(36,140),PSET,B
615 LINE(15,125)-(48,125),PSET
620 LINE(15,125)-(32,80),PSET
625 LINE(201,140)-(214,133),PSET
,B
630 CIRCLE(207,119),17,.8
635 PAINT (207,119),3,4
640 LINE(32,80)-(48,125),PSET
650 PAINT(73,53),3,4
655 PAINT(17,123),3,4
660 PAINT(66,60),4,4
665 PAINT(180,60),4,4
670 CIRCLE(220,50),15,2
675 PAINT(220,50),2,2
680 LINE (113,170)-(125,172),PSE
T,B
685 CIRCLE(118,157),9,2.3,2
690 PAINT(118,157),2,2
695 CIRCLE(117,151),2
700 CIRCLE(121,151),2
705 LINE (117,155)-(120,155),PSE
T
715 LINE(133,105)-(152,102),PSET
720 LINE(152,102)-(152,135),PSET
725 LINE(152,135)-(133,140),PSET
730 PAINT (134,107),4,4
735 PAINT(148,109),4,4
736 PAINT(148,120),4,4
740 CIRCLE(147,117),2,2
745 LINE(108,105)-(132,140),PSET
,B
750 CIRCLE(120,115),5
755 CIRCLE(120,124),7,.7
760 LINE(117,127)-(125,138),PSET
,BF
762 CIRCLE(90,126),5
763 PSET(90,126)
764 PAINT (90,126),2,4
765 FOR W=1 TO ZZ:NEXT W
768 TR$="BECAUSE OF THE INSULT R
ECEIVED AT THIS HOUSE YOU HAVE
THE OPTION TO TRICK. DO YO
U WANT TO TRICK?"
769 H$="DO YOU WANT TO TRICK OR
TREAT AGAIN? "
770 T=RND(12)
773 ON T GOTO 775,777,779,781,78
3,795,797,802,783,5350,5353,5356
775 CLS:PRINT"YOU GOT A NICE LOL
LIPOP WORTH 10POINTS SO YOUR SCO
RE IS
";S+10:S
=S+10
776 PRINT:PRINT H$: INPUT R$: IF
R$="Y" THEN GOSUB 3500 ELSE 100
0
777 CLS:PRINT:PRINT"YOU GOT A DO
LLAR AND CAN ADD 100 POINTS TO Y
OUR SCORE WHICH IS NOW
"
;S+100:S=S+100
778 PRINT:PRINT:PRINT:PRINTH$:IN
PUT R$:IF R$="Y" THEN GOTO 3180E
LSE 1000
779 CLS:PRINT"YOU GOT A CHOCOLAT
E BAR WORTH 20POINTS AND NOW HAV
E A SCORE OF
";S+20:S
=S+20
780 PRINT:PRINT:PRINTH$:INPUT A$

```

```

:IF A$="Y" THEN GOTO 10 ELSE 100
0
781 CLS:PRINT"YOU GOT A COOKIE AND CAN ADD 15 POINTS TO YOUR SCORE. YOUR SCORE IS NOW WORTH ";S+1
5:S=S+15
782 PRINT:PRINT:PRINTH$:INPUT A$:IF A$="Y" THEN GOTO 5000 ELSE 1000
783 CLS:GOTO 3990
784 FOR W=1 TO 700:NEXT W
785 Q=RND(5)
786 ON Q GOTO 790,790,790,787,788
787 S=S-10:PRINT:PRINT"YOU'RE LUCKY THAT THE DOG IS FRIENDLY AND ONLY WANTS ONE OF YOUR COOKIES. THAT COSTS YOU 10 POINTS AND YOUR SCORE IS NOW ";S:GOTO 789
788 S=S+150:PRINT:PRINT"IT'S A VERY FRIENDLY STRAY DOG AND WANTS TO GO HOME WITH YOU. HE'S WORTH 150 POINTS, SO YOUR SCORE IS NOW ";S
789 FOR W=1 TO 1000:NEXT W:PRINT:PRINT H$:INPUT R$:IF R$="Y" THEN 10 ELSE 1000
790 CLS:PRINT:PRINT" THE DOG BIT YOU. ":FOR W=1 TO 1000:NEXT W:PRINT:PRINT"OUCH!":GOTO 799
792 PRINT:PRINT:PRINTH$:INPUT R$:IF R$="Y" THEN 10 ELSE 1000
795 CLS:PRINT"YOU GOT AN APPLE HERE ADD 20 POINTS TO YOUR SCORE. YOUR SCORE IS NOW ";S+20
:S=S+20
796 PRINT:PRINT:PRINTH$:INPUT A$:IF A$="Y" THEN 5000 ELSE 1000

```

```

797 CLS:S=S-20:PRINT:PRINT"YOU GOT AN APPLE AND CAN ADD - UGH!, YOU JUST FOUND A WORM IN THE APPLE SO SUBTRACT 20 POINTS.YOUR SCORE IS NOW ";S
799 FOR W=1 TO 800:NEXT W:PRINT:PRINTTR$:INPUT A$:IF A$="Y" THEN GOSUB 2900 ELSE 10
800 PRINTH$:INPUT A$:IF A$="Y" THEN 10 ELSE 1000
802 PMODE 0,1:PCLS:SCREEN 1,1
803 FOR X=1 TO 4
804 PCLS 1
805 FOR W=1 TO 200:NEXT W
806 PCLS 2
807 FOR W=1 TO 150: NEXT W
808 NEXT X
810 SOUND 1,20
812 CLS:PRINT"THAT WAS LIGHTNING AND YOU'D BETTER GO HOME TILL THIS STORM PASSES OVER. YOU ALSO LOSE 15 POINTS.":S=S-15:PRINT:PRINT"YOUR NEW SCORE IS ";S
815 FOR W=1 TO 1500:NEXT W
816 PRINT @ 360,"TRICK OR TREAT?"
817 INPUT A$:IF A$="Y" THEN 198 ELSE 1000
1000 CLS:PRINT:PRINT:PRINT"GOODNIGHT"
1001 PRINT:PRINT" YOUR FINAL SCORE IS: ";S
1002 END
2900 CLS
2901 RESTORE
2902 PRINT @ 70, "TRICKS YOU CAN DO"
2904 PRINT:PRINT
2906 DATA DUMP GARBAGE,SOAP WINDOWS,CHASE CAT,MAKE FACES,DYNAMITE HOUSE
2908 FOR M=1 TO 5

```

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```

2910 READ T$
2912 PRINT M;:PRINT " "; :PR
INT T$'
2914 NEXT M
2916 PRINT:PRINT:PRINT"CHOOSE A
TRICK BY NUMBER"
2918 INPUT T
2919 FOR W=1 TO 1500:NEXT W
2920 ON T GOTO 3000,3003,2934,29
32,4200
2930 GOTO 2900
2932 CLS:S=S-20:PRINT:PRINT"GHOS
TS CAN'T MAKE FACES SO YOU LOSE
20 POINTS FOR BEING SILLY. YOUR
SCORE IS NOW
";S:GOTO 2945
2934 CLS:PRINT:PRINT"THE CAT WEN
T UP A TREE SO NO CHANGE IN T
HE SCORE."
2945 RETURN
3000 X=RND(3)
3001 ON X GOTO 3002,3004,3004
3002 CLS:PRINT:PRINT:PRINT:PRINT
"YOU LOST YOUR NERVE SO THERE IS
NO CHANGE IN YOUR SCORE. YOUR
SCORE REMAINS ";S:RETURN
3003 CLS:PRINT:PRINT"YOU GOT AWA
Y WITH SOAPING THE WINDOW SO Y
OU MAY ADD 25 POINTS TO YOUR SCO
RE WHICH IS NOW
";
S+25:S=S+25:RETURN
3004 CLS:PRINT:PRINT"YOU GOT CAU
GHT DUMPING GARBAGE CANS AND HA
VE BEEN ARRESTED. IT'S ALL O
VER FOR YOU TONIGHT AND YOUR S
CORE IS ZERO.":FF=0
3005 FOR BB=1 TO 1500: NEXT BB
3006 PMODE 3,1:PCLS:SCREEN 1,0
3007 CIRCLE(125,95),20,2.3,2
3009 PAINT(125,95),2,2
3012 CIRCLE(118,83),2,4
3015 CIRCLE(131,83),2,4

```

```

3017 CIRCLE(125,92),6,4,.75,.5,.
99
3019 LINE (110,130)-(140,132),PS
ET,BF
3022 LINE (40,30)-(210,133),PSET
,B
3025 FOR X=40 TO 210 STEP 17
3030 LINE(X,30)-(X,133),PSET
3031 NEXT X
3032 Z$="BU8;R8;G8;R8;BR4"
3033 O$="U8;R8;D8;L8;BR12"
3036 IF FF=1 THEN 3037 ELSE 3038
3037 DRAW"BM110,150"+Z$+O$+O$
3038 FOR W=1 TO 3500: NEXT W
3039 S=0
3040 U=RND(2)
3045 ON U GOTO 10,1000
3100 PMODE 1,3:PCLS:SCREEN 1,1
3105 CIRCLE(50,50),15
3106 PAINT (143,80),3,4
3107 LINE(100,185)-(180,125),PSE
T,B
3110 LINE-(140,85),PSET 'ROOF
3112 LINE-(100,125),PSET
3115 LINE(110,160)-(125,130),PSE
T,BF
3117 LINE(155,160)-(170,130),PSE
T,BF
3120 LINE (130,130)-(149,185),PS
ET,B
3122 CIRCLE(134,157),2
3125 LINE(160,105)-(160,90),PSET
3127 LINE -(175,90),PSET
3128 LINE-(175,115),PSET
3129 Y=185
3130 FOR X= 1 TO 250 STEP 3
3131 G=RND(12):COLOR 2,4
3132 LINE(X,Y)-(X,Y-G),PSET
3134 NEXT X
3135 X=167:Y=89
3136 SP=0:EP=0
3137 FOR R=1 TO 20 STEP .05

```

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```

3140 EP=EP+.02:IF EP>.5 THEN EP=
0
3143 CIRCLE(X+R,Y-R),R,4,1,SP,EP
3145 NEXT R
3146 FOR W=1 TO 600:NEXT W
3147 CLS:PRINT"AN ECCENTRIC OLD
MAN LIVES HERE AND HAS A FIRE IN
HIS FIREPLACE. THE SMOKE LOOKS
LIKE A GHOST."
3148 PRINT:PRINT"DO YOU DARE TO
TRICK OR TREAT HERE?"
3150 INPUT A$: IF A$="Y" THEN 31
53 ELSE 3157
3153 X=RND(2):ON X GOTO 3155,315
6
3155 CLS:PRINT:PRINT"THE OLD MAN
IS REALLY AN ESCAPEDCONVICT AND
HE TOOK AWAY ALL YOUR GOODIE
S.YOUR SCORE IS ZERO":S=0:PRINT:
GOTO 3158
3156 CLS:PRINT"HE IS REALLY A NI
CE FRIENDLY FELLOW SO YOU GET
25 POINTS FOR BEING BRAVE AND 1
0 EXTRA POINTS FOR SHARING YOUR
CANDY WITH HIM":S=S+35:PRINT:PRI
NT"YOUR SCORE IS NOW ";S:PRINT:G
OTO 3158
3157 CLS:PRINT:PRINT"YOU LOST YO
UR NERVE SO YOU LOSE 25 POINTS F
OR BEING A SCAIRDY CAT ": S=S-
25: PRINT"YOUR SCORE IS NOW ";S:
GOTO 3158
3158 FOR W=1 TO 700:NEXT W:PRINT
:PRINTH$:INPUT A$:IF A$="Y" THEN
10 ELSE 1000
3180 D=RND(3)
3182 CLS
3185 ON D GOTO 17,3200,3200
3200 IF XX=2 THEN 10
3202 PMODE 3,1:PCLS
3205 SCREEN 1,0
3210 SS=190
3230 CIRCLE(20,150),12,,4,.4,.1
3240 LINE (10,174)-(30,174),PSET
3250 PAINT (20,150),2,4
3260 DRAW "BM155,180;E30;U70;E3;
U30;H20;H5;L15;H5;L15;H5;L20"
3270 DRAW"BM255,180;H30;U70;H3;U
30;E20;U5;E10"
3280 CIRCLE(24,130),2
3290 CIRCLE(18,130),2
3300 LINE (18,135)-(22,135),PSET
3310 FOR X=1 TO 255 STEP 3
3320 Y=RND(10)
3330 COLOR 4,3
3340 LINE(X,180)-(X,180-Y),PSET
3350 NEXT X
3370 GET (9,175)-(32,100),G,G
3380 FOR T=1 TO 11
3390 X=RND(140)
3400 Y=RND(150)
3410 PUT(X,Y)-(X+23,Y+75),G,PSET
3415 SOUND SS,3:SS=SS+2
3420 NEXT T
3423 FOR W=1 TO 1200:NEXT W
3424 CLS
3425 PRINT:PRINT"YOU ARE IN THE
WOODS AND GHOSTS ARE POPPING UP
EVERYWHERE BUT YOU MUST CROSS.
":PRINT
3426 FOR W=1 TO 2000:NEXT W
3427 X=RND(4)
3430 ON X GOTO 3431,3433,3432,34
41
3431 PRINT"YOU FAINTED AND CANNO
T CONTINUE.ALL SCORE IS LOST AND
YOU MUST GO HOME.":S=0:GOTO 34
45
3432 PRINT"THE GHOSTS WERE ABOUT
TO GET YOUBUT A FLYING SAUCER S
UDDENLY LANDED AND SCARED THE
M AWAY":FOR W=1 TO 2673:NEXT W:G
OTO 3500
3433 PRINT"YOU SCREAMED A LOT BU
T HAVE STAGGERED OUT OF THE
WOODS.NEXT TIME BE MORE BRAVE BU
T YOU GET 25 POINTS FOR THE EFF
ORT": S=S+25:PRINT"YOUR SCORE IS
";S
3435 FOR V=1 TO 3
3436 SOUND 211,15
3437 FOR Z=1 TO 180:NEXT Z
3438 NEXT V
3439 GOTO 3445
3440 FOR V=1 TO 3
3441 PRINT"YOU ARE VERY BRAVE AN
D MADE IT TO THE OTHER SIDE WIT
H 50 EXTRA POINTS":S=S+50:PRINT"
YOUR SCORE IS";S:GOTO 3445
3442 FOR Z=1 TO 200:NEXT Z
3443 NEXT V
3445 FOR W=1 TO 2400:NEXT W
3448 XX=XX+1
3450 GOTO 10
3500 PMODE 1,3
3510 PCLS
3520 SCREEN 1,1
3530 CIRCLE(120,150),40,,3.5,0.5
,.75
3540 CIRCLE(120,150),40,,3.5,.75
,0
3550 DRAW"BM80,150;R26;U30;R26;D
30;R26;L56"
3560 CIRCLE(110,134),2
3570 CIRCLE(97,90),5
3580 CIRCLE(112,90),5
3590 CIRCLE(127,90),5
3600 CIRCLE(142,90),5

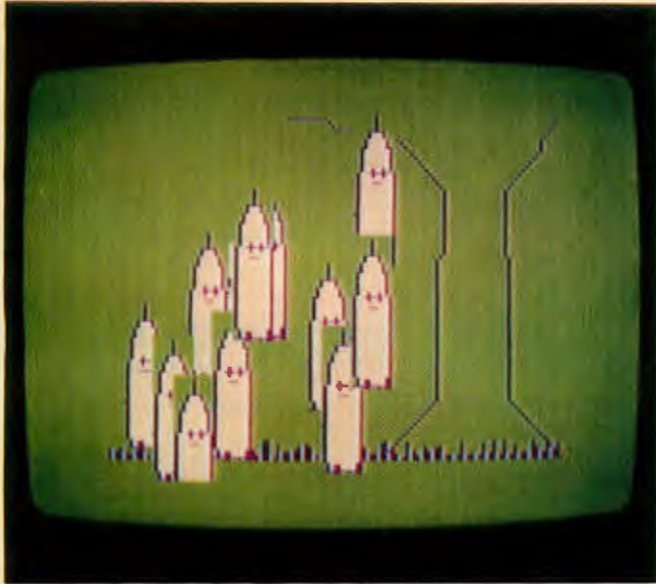
```



```

3610 PAINT(125,140),7,8
3620 LINE(149,58)-(181,31),PSET
3630 LINE(93,58)-(64,31),PSET
3640 DRAW"BM158,38;E15;F15;G15;H
15;E8;F15"
3650 DRAW"BM86,36;H15;G15;F15;E1
5;H8;G15"
3660 DRAW "BM120,15;U12;NR12;NL1
2;ND12;NE12;NF12;NG12;NH12"

```



```

3670 CIRCLE(120,140),95,,0.45 ,.
83,.68
3680 PAINT(125,110),6,8
3690 FOR T=1 TO 10
3700 PAINT (97,90),8,8:PAINT(112
,90),8,8
3710 PAINT(127,90),8,8:PAINT(142
,90),8,8
3730 PRESET(97,90):PRESET(112,90
)
3740 PRESET(127,90)
3750 PRESET (142,90):PRESET(110,
134)
3754 SOUND 100,4
3760 FOR W=1 TO 100:NEXT W
3770 NEXT T
3772 Z$="D2G1BE1BU2BR12"
3773 O$="U8R6D8L6BR12"
3778 CLS:PRINT"THIS IS A FLYING
SAUCER WHICH HAS LANDED ON YOU
R STREET. DO YOU WANT TO TRICK
OR TREAT HERE?"
3779 INPUT A$:IF A$="Y" THEN 378
2 ELSE 10
3780 GOTO 3780
3782 X=RND(3): ON X GOTO 3783,37
85,3787
3783 PRINT"YOU FOUND THEM FRIEND
LY AND THEY GAVE YOU A MARS BAR P
LUS 30 POINTS": S=S+30: PRIN
T"YOUR SCORE IS ";S:PRINT

```

```

3784 FOR W=1 TO 1500:NEXT W:PRIN
T H$:INPUT A$:IF A$="Y" THEN 10
ELSE 1000
3785 PRINT"THIS IS A TRICK ON YO
U TO CAPTURE A HUMAN SPECI
MEN FOR THEMARTIAN ZOO SO THE G
AME IS OVER FOR YOU":FOR W=1
TO 1500:NEXTW:FF=1:GOTO 3006
3787 PRINT"THEY TRIED TO CAPTURE
YOU BUT YOU WERE TOO SMART FO
R THEM AND ESCAPED. YOU GET 40
POINTS FOR YOUR CLEVERNESS.":S=S
+10:PRINT"YOUR SCORE IS ";S
3788 FOR W=1 TO 1500:NEXT W:PRIN
T:PRINTH$:INPUT A$:IF A$="Y" THE
N 10 ELSE 1000
3990 CLS:PRINT @133,"BEWARE OF T
HE DOG!!!"
3992 FOR W=1 TO 1100:NEXT W
4000 PMODE 0,1
4001 JJ=0
4002 PCLS
4004 SCREEN 1,0
4006 LINE(10,50)-(60,58),PSET
4008 LINE-(75,30),PSET
4010 LINE-(85,55),PSET
4012 LINE-(120,75),PSET
4014 LINE-(165,75),PSET
4016 LINE-(210,80),PSET
4018 LINE-(240,69),PSET
4020 LINE-(225,55),PSET
4022 LINE-(250,73),PSET
4024 LINE-(225,100),PSET
4026 LINE-(220,160),PSET
4028 LINE-(210,160),PSET
4030 LINE-(200,120),PSET
4032 LINE(10,50)-(10,57),PSET
4034 LINE-(55,80),PSET
4036 LINE-(20,95),PSET
4038 CIRCLE(77,70),4
4040 LINE-(20,100),PSET
4042 LINE-(60,95),PSET
4044 LINE-(90,110),PSET
4046 LINE-(85,160),PSET
4048 LINE-(105,160),PSET
4050 LINE-(110,117),PSET
4052 LINE(106,158)-(120,157),PSE
T
4054 LINE-(127,120),PSET
4056 LINE-(167,125),PSET
4058 LINE-(187,120),PSET
4060 LINE-(197,158),PSET
4062 LINE-(209,158),PSET
4064 PMODE 0,2:PCLS
4066 LINE (10,80)-(60,58),PSET
4068 LINE-(75,30),PSET
4070 LINE-(85,55),PSET
4072 LINE-(120,75),PSET
4074 LINE-(165,75),PSET

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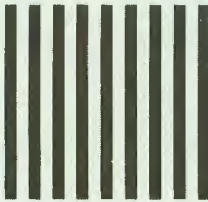
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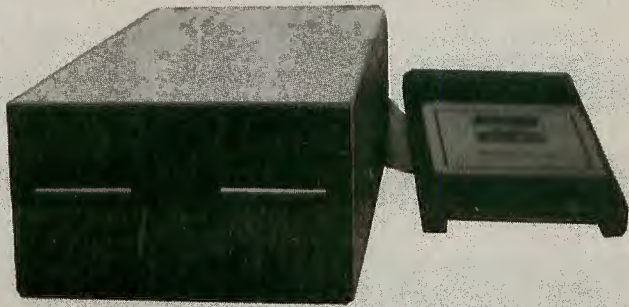
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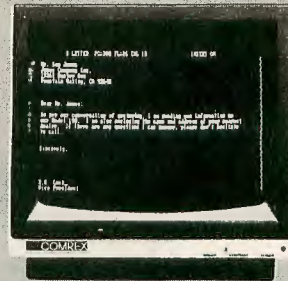
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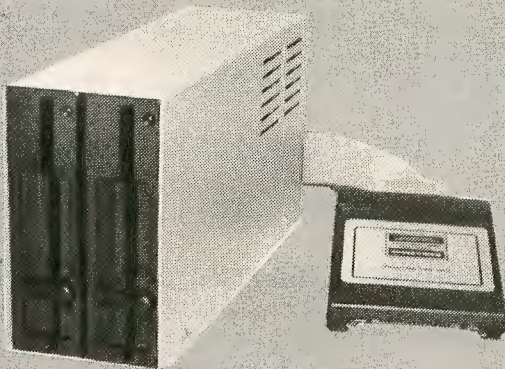
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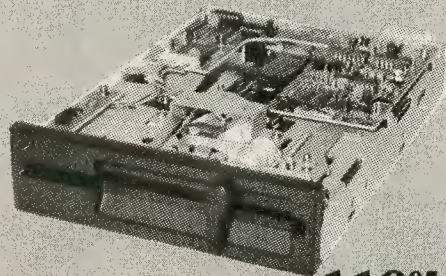
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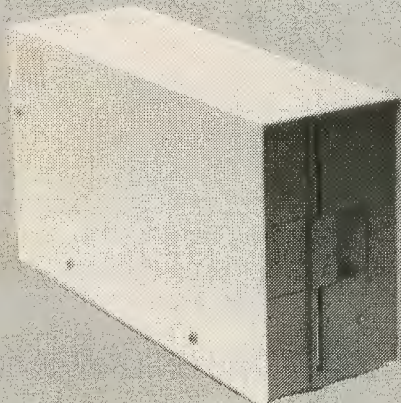
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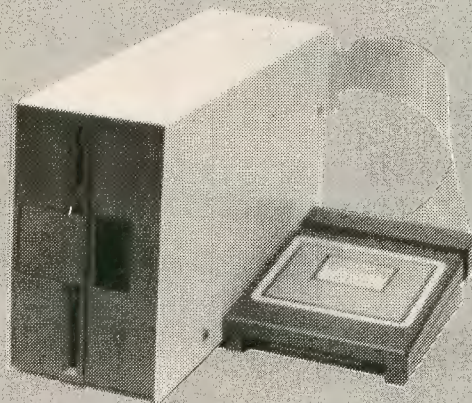
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4076 LINE-(210,80),PSET
4078 LINE-(230,69),PSET
4080 LINE-(255,55),PSET
4082 LINE-(250,73),PSET
4084 LINE-(225,100),PSET
4086 LINE-(220,160),PSET
4088 LINE-(210,160),PSET
4090 LINE (10,81)-(15,89),PSET
4092 LINE -(65,96),PSET
4094 LINE-(90,110),PSET
4096 LINE-(85,160),PSET
4098 LINE -(105,160),PSET
4100 LINE-(110,117),PSET
4102 LINE(106,158)-(120,157),PSE
T
4104 LINE-(127,120),PSET
4106 LINE-(167,125),PSET
4108 LINE-(187,120),PSET
4110 LINE-(197,158),PSET
4112 LINE-(209,158),PSET
4114 LINE-(197,120),PSET
4116 CIRCLE(77,70),4
4118 LINE(17,85)-(42,81),PSET
4120 FOR P=1 TO 2
4122 PMODE 0,P
4124 SCREEN 1,0
4126 FOR W=1 TO 200: NEXT W
4128 NEXT P
4129 JJ=JJ+1
4130 IF JJ<>7 THEN 4120
4150 GOTO 784
4200 PMODE 4,1
4202 PCLS
4204 SCREEN 1,1
4226 CLS
4230 PRINT@237, "BOOM"
4232 SOUND 1,30
4234 PMODE 4,1
4236 SCREEN 1,0
4238 FOR I=2 TO 200 STEP 2
4240 CIRCLE (128,96),I
4242 NEXT I
4258 CLS:PRINT:PRINT"SETTING OFF
DYNAMITE IS A BIT MUCH. YOU A
RE GOING TO JAIL AND YOUR SCORE
IS ZERO":FF=0:S=0
4260 GOTO 3005
5000 PMODE 3,1
5010 PCLS
5020 SCREEN 1,0
5030 LINE(0,170)-(255,170),PSET
5040 LINE(5,170)-(75,35),PSET, B
5050 CIRCLE(65,100),4
5060 LINE(20,50)-(30,65),PSET,B
5070 LINE(105,144)-(245,41),PSET
,B
5080 PAINT (45,65),3,4
5090 LINE(110,140)-(240,45),PSET
,B

```

```

5100 CIRCLE(175,115),27
5110 PAINT (175,50),2,4
5120 CIRCLE(165,107),5
5130 CIRCLE (185,107),5
5140 DRAW"BM172,116;E3;F3;L4"
5150 CIRCLE(174,126),8,,0.5,0,0.
5
5160 CIRCLE(174,125),8,,0.5,0,0.
5
5170 LINE(175,91)-(180,75),PSET
5180 LINE(176,91)-(181,75),PSET
5190 LINE(174,91)-(179,75),PSET
5200 CIRCLE(220,45),25,,2,.25,.5
5210 LINE(220,95)-(210,140),PSET
5220 LINE(220,95)-(240,90),PSET
5230 CIRCLE(130,45),25,,2,0,.25
5240 LINE (128,90)-(140,138),PSE
T
5250 LINE(128,90)-(112,87),PSET
5260 FOR X=1 TO 10
5270 PAINT(165,107),4,4:PAINT(18
5,107),4,4
5280 PRESET(164,107):PRESET (185
,107)
5290 PRESET(163,107):PRESET(185,
107)
5300 PRESET(164,108):PRESET(185,
108)
5310 PRESET(164,106):PRESET(185,
106)
5320 FOR W=1 TO 300:NEXT W
5330 NEXT X
5340 CLS:PRINT @96 ,"DO YOU WANT
TO RING THE DOORBELL?"
5342 INPUT A$:IF A$="Y" THEN 534
4ELSE 1000
5344 SOUND 170,9:SOUND 145,10
5345 GOTO 770
5350 CLS:PRINT:PRINT"YOU GOT A P
OPSICLE BUT IT MELTEDAND MESSED
UP ALL THE OTHER GOODTHINGS"
5351 PRINT:PRINT"YOU LOSE 30 POI
NTS":S=S-30:PRINT:PRINT"YOUR SCO
RE IS ";S:FOR W=1 TO 1500:NEXT W
:PRINT H$
5352 INPUT A$:IF A$="Y" THEN 10
ELSE 1000
5353 S=S+35:CLS:PRINT:PRINT"YOU
GOT A POPCORN BALL WORTH 35 POIN
TS SO YOUR SCORE IS NOW
";S:FOR W=1 TO 1500:NEXT W
:PRINT:PRINT H$
5354 GOTO 5352
5356 S=S+45:CLS:PRINT:PRINT"YOU
GOT A BAG OF CANDY CORN WORT
H 45 POINTS SO YOUR SCORE IS
";S:FOR W=1 TO 1400:NEXT
W:PRINT:PRINT H$
5357 GOTO 5352

```



The Power of the Palette: Graphics on the Color Computer 3

By Rick Adams and Dale Lear

We're all excited that the increased resolution and number of colors of the Color Computer 3 graphics display produces more spectacular and colorful graphics. But there are other implications to the method of graphics support provided by the new Graphics Interrupt Memory Enhancer (GIME) chip that are even more astounding.

With the previous SAM/VDG chips in the Color Computer 1 and 2, a maximum of four colors was available, chosen from one of two available sets of four specific colors — no exchanges or substitutions allowed. With the GIME chip, all the rules of color selection for graphics display have changed. You may display up to 16 colors out of a palette that contains your own color set chosen from a total of 64 possible colors.

Thus, Color Computer 3 software utilizes more high resolution displays with many more colors than we've seen

Rick Adams is a systems programmer for a company that develops 68000-based systems software. In addition to writing games, he likes science fiction and is the author of Radio Shack's Temple of ROM. Rick lives in Rohnert Park, California.

Dale Lear owns Dale Lear Software and makes his living developing programs for the Color Computer. He has authored games and other software such as Double Back, Baseball, TSEDIT, TSWORD and D.L. LOGO. Dale, his wife Laurel and their six children live in Petaluma, California.

previously. The edges of objects on the screen are smoother, too. The ability to choose your own color set leads to a less cartoon-like representation of objects on the display, with less dependence on hacker tricks like color "aliasing" (artifacts) to generate more appropriate colors.

Less obvious, but very important to note, is the fact that this palette scheme of specifying color sets enables us to use a completely new form of computer animation. Presently, there are two major methods of animating Color Computer graphics: the screen-flip technique and the draw-redraw technique. Screen-flip involves keeping two copies of the screen, drawing one of them while the other is being displayed, then reversing the process. Draw-redraw simply means that you use one screen which is displayed all the time; your spaceship (or whatever) is erased at its previous position, and redrawn at its new position. But now we also may use a third method, called the palette-switching method: Display the entire screen, including objects drawn in various colors, and then change the values of the colors set in the palette after they are drawn.

If you change the red in your palette to blue, then all of the objects previously displayed in red will *instantaneously* change to blue — just like magic! With a little trickery, this technique can be used to make portions of the screen flash, or pulse on and off in various colors. Objects may be instantly changed to the background color (making them disappear), or changed from the background color to a visible color,

making them seem to appear out of nowhere. A bird could be made to flap its wings by making the up position of the wings visible, then making the up position disappear and making the down position of the wings visible. So here is another major new graphics animation technique available to the Color Computer 3 user. No longer are we held to merely four colors. We're only limited to 16 colors at a time . . . or are we?

Another new piece of hardware in the CoCo 3, the programmable interrupt timer, enables us to use yet another new technique to provide up to 64 colors on the screen at a time! Using this technique, the programmable interrupt timer is set to interrupt the computer four times during every screen redraw. At the top of the screen, the interrupt routine sets the palette with 16 colors. One-quarter of the way down the screen, the timer interrupts again. Sixteen *other* colors are put into the palette, and so on. In effect, one 16-color palette is active for the first one-quarter of the screen, another palette is active for the next quarter screen, and so on.

Sure, it's one of those nasty hacker tricks, and the normal BASIC user isn't going to want to bother with it. But software developers just love this kind of thing, and you can expect them to use it to their advantage.

So, if you see some software come out that uses 64 colors at once, don't scratch your head and say "that's impossible." You'll be able to say, "Hey, I know how they did that; I read about it in THE RAINBOW!"

Rainbow Tunnel

The *Rainbow Tunnel* is a short BASIC program that demonstrates the range of colors available on the Color Computer 3, while at the same time showing an interesting use of the PALETTE command to provide animation.

Lines 90 through 140 set the high speed mode, and tell BASIC to go to the end of the program at Line 640 if the BREAK key is pressed. The high-speed POKE is *guaranteed* to work on the Color Computer 3. And the new ON BRK command is a welcome addition.

Lines 160 through 250 load the graphics palette with a set of colors that closely approximate the spectrum from red to purple — a rainbow, in other words. The color codes used appear in the DATA statement at Line 200. Lines 270 through 360 create, and then paint, a series of concentric circles. The circles are painted with the colors of the rainbow. In lines 380 through 440, the concentric circles that formed the borders for the PAINT command are drawn again in colors that match the painted regions near them, rather than in colors that were appropriate to use for a paint border.

So far, we have a brilliant, multicolored display on the screen, but where is the animation? Have patience. When the program gets down to Line 490, the

magic begins. The loop at Line 490 looks pretty simple, so check the subroutine at lines 520 through 580. The palette colors are changed in such a way that each concentric circle appears to move one position outward, thus giving the illusion that you are traveling down a brightly-colored "rainbow tunnel." But actually, nothing is moving at all! The color assignments, specified by the palette values, are moving, not the actual display data. This effect would be even more spectacular from assembly language, in which a considerable delay would have to be put in the loop so that the display would not look like a blur!

Finally, we come to the end routine at lines 600 through 650. The PALETTE RGB command sets the colors back to their defaults. Otherwise, when we press BREAK, the screen might be in a color set so weird we couldn't read it.

When we watched this program run for the first time, there was a long silence, followed by this conversation:

Dale: "You *couldn't* do that before on a Color Computer!"

Rick: "You couldn't even do it *badly!*"

Who's Waggin' the Wheel?

Wagon Wheel is a short BASIC program that demonstrates a new anima-

tion technique that was unavailable to the color computer world until the CoCo 3.

Lines 120 through 150 perform a few set-up calls, including some new features.

Lines 200 through 350 draw a wheel with spokes. The spokes, however, are drawn in a very special way. Fourteen groups of equally spaced spokes are each assigned a different color (on a palette register).

As you watch the spokes being drawn, they look colorful. However, they look a little close together, and they certainly don't appear to be moving!

Now the magic begins. Lines 420 through 440 set the 14 palette registers assigned to the spokes, all to white (the background color). What happens? All the spokes disappear.

Now we get to lines 510 through 560. By setting only one of the 14 palette registers assigned to the spokes to black, every 14th spoke appears. By constantly cycling through the 14 registers setting only one at a time to black, the wheel now appears to turn.

Of course, nothing is really moving. No drawing is being done at all. The palette values are changing, causing the illusion of animation. □

Listing 1: TUNNEL

```
10 *****
20 '* "RAINBOW TUNNEL" *
30 '* DEMO TO SHOW USE *
40 '* OF PALETTE REGISTERS *
50 '* TO SIMULATE MOTION *
60 '*BY RICK ADAMS & DALE LEAR*
70 *****
80 '
90 *****
100 ' SET HIGH SPEED
110 *****
120 POKE &HFFD9,0
130 DIM CC(32)
140 ONBREAK GOTO 640
150 '
160 *****
170 ' SET UP COLORS
180 *****
190 HSCREEN 2
200 DATA 49,50,51,52,53,22,23,24
,55,56,57,58,59,60,61,62
210 FOR I=0 TO 15
220 READ CC(I)
230 CC(I+16)=CC(I)
240 NEXT I
250 GOSUB 560
260 '
270 *****
280 ' PAINT CIRCLES
290 *****
300 FOR I=0 TO 19
310 R=8+I*8
320 C=I AND 15
330 HCIRCLE(160,96),R,1
340 HPAINT (156+R,96),C,1
350 HPAINT (164-R,96),C,1
360 NEXT I
370 '
380 *****
390 ' PAINT THE LINES
400 ' BETWEEN CIRCLES
410 *****
420 FOR I=0 TO 19
430 HCIRCLE(160,96),8+I*8,I AND
15
440 NEXT I
450 '
460 *****
470 ' LOOP
480 *****
490 GOSUB 560
500 GOTO 490
```


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```

51Ø '
52Ø '*****
53Ø ' SUBROUTINE TO
54Ø ' CHANGE PALETTE
55Ø '*****
56Ø FOR I=Ø TO 15:PALETTE I,CC(I
+K):NEXT I
57Ø K=(K-1)AND 15

```

```

58Ø RETURN
59Ø '
60Ø '*****
61Ø ' RESET PALETTE
62Ø ' ON BREAK
63Ø '*****
64Ø PALETTE RGB
65Ø STOP

```

Listing 2: WHEEL

```

1Ø '*****
2Ø '* "WAGON WHEEL" *
3Ø '* DEMO TO SHOW USE *
4Ø '* OF PALETTE REGISTERS *
5Ø '* IN ANIMATION *
6Ø '*BY RICK ADAMS & DALE LEAR*
7Ø '*****
8Ø '
9Ø '*****
10Ø ' SET UP
11Ø '*****
12Ø POKE &HFFD9,Ø
13Ø HSCREEN 2
14Ø HCLS(1)
15Ø PALETTE Ø,24

```

```

16Ø '
17Ø '*****
18Ø ' DRAW OUTSIDE OF WHEEL
19Ø '*****
20Ø HCIRCLE (16Ø,96),9Ø,Ø
21Ø HPAINT (Ø,Ø),Ø,Ø
22Ø '
23Ø '*****
24Ø ' DRAW SPOKES
25Ø K=14*8
26Ø '*****
27Ø FOR I=Ø TO K-1
28Ø X=9Ø*SIN(I*3.14/K)
29Ø Y=9Ø*COS(I*3.12/K)
30Ø HCOLOR 2+14*(I/14-INT(I/14))
,1
31Ø HLINE (16Ø+X,96+Y)-(16Ø-X,96
-Y),PSET
32Ø NEXT I
33Ø FOR I=1 TO 3Ø
34Ø HCIRCLE (16Ø,96),I,Ø
35Ø NEXT I
36Ø '
37Ø '*****
38Ø ' SET ALL PALETTE
39Ø ' COLORS TO WHITE
40Ø ' EXCEPT ONE
41Ø '*****
42Ø FOR I=1 TO 15
43Ø PALETTE I,255
44Ø NEXT I
45Ø '
46Ø '*****
47Ø ' ROTATE WHEEL BY SETTING
48Ø ' ONE PALETTE REGISTER
49Ø ' AT A TIME T BLACK
50Ø '*****
51Ø K=2
52Ø KK=K+1
53Ø IF KK=16 THEN KK=2
54Ø PALETTE K,255:PALETTE KK,Ø
55Ø K=KK
56Ø GOTO 52Ø
57Ø '
58Ø '*****
59Ø ' RESTORE PALETTE ON BREAK
60Ø '*****
61Ø PALETTE RGB
62Ø STOP

```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be very short.

Send your entry (preferably on cassette) to:

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by BJ Chambless

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by Scott Cabit

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RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has a **special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send \$20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged \$3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy **RAINBOW ON TAPE** — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a \$24.95 value — and a free hour of connect time — a \$7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this \$32.15 value as a **free bonus!**

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our \$31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only \$29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* (\$21.95) and a total of three hours of connect time (\$21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:
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(617) 491-3393

DELPHI

TYPE: GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Uninet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Uninet or Tymnet. Canadian residents using Datapac will be charged an additional \$12 (U.S.) per hour.

On Uninet: Call (800) 821-5340 to get the Uninet number for your area. After you call the appropriate number for your own area and make connection, you'll see a prompt of "L?" Press ENTER, the period key (.) and ENTER again. At the "service:" prompt, type GVC (for General Videotex Corporation) and ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type DELPHI and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type SET 2:1, 3:126 and press ENTER. Now type p 1 3106, DELPHI; and press ENTER. Delphi's new rates indicate an additional \$12 hourly surcharge for evening use of Datapac, which means a total of \$18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Uninet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Uninet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type RAINBOWSUB and press

ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type RAINBOWORDER and press ENTER. At the "PASSWORD:" prompt, type SENDSUB and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press ENTER and start over. Remember that at any point, when you're on Delphi, you can type HELP to get help on how to use the system. To get off the system just type BYE.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: GROUP COCO

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in GROUP COCO and **join us on the CoCo SIG!**



Stretch, reduce and enlarge your drawing creations

The Shifting, Reducing, Stretching, Enlarging Transfiguration Band



By Ronald T. Ropson

For those of you who love playing with graphics, here's a simple, short and almost infinitely versatile program.

Using *Zoom-Stretch* you can change a small image to a larger image or vice versa. But you can also stretch or squeeze the image like Silly Putty. Does that sound like what you've been waiting for? Well, start typing.

Listing 1 shows the main program in a simple menu format. It is self prompting and uses eight graphics pages. The original rectangle will be taken from the image in PMODE 4, 1 and OR-ed with the image in PMODE 4, 5 (within the rectangle specified).

First, draw or load the original image

Ron Ropson lives in Green Bay, Wisconsin and is a fabrication manager for a plastics shop. He has independently studied machine language and hopes to make a career of programming and/or photography.

to PMODE 4, 1. Determine what part of that image you would like to transfer to the destination screen using the top left (X1,Y1) and bottom right (X2,Y2) coordinates (they must be entered in that order). Next, determine where and what size the end result will be on the destination screen in the same manner (X3,Y3) (X4,Y4).

Load and run *Zoom-Stretch*. When the menu appears, you may want to clear the destination screen (unless you are adding to what's already there). Next enter *Zoom-Stretch* Mode 1. The computer asks for the origin and destination coordinates. Enter them as instructed and watch the CoCo do its work. Press any key to return to the menu. It's as simple as that.

To help you understand how it works and to show some examples of the variety of possibilities of this program, I have included three modifications which use *Zoom-Stretch* to create interesting graphics effects.

Listing 2 is a modification which draws a flower on the origin screen

(PMODE 4, 1) and deposits 12 flowers of various sizes onto the destination screen (PMODE 4, 5) to produce a pretty flowered pattern on the screen. Add these lines to the original program as shown. When run, this starts producing the flower pattern, then returns to the menu. Enter, save, then run it and see it do its stuff.

Listing 3 is another modification to Listing 1. This one draws five-pointed stars of decreasing size on the destination screen from one star drawn on the origin screen.

Listing 4, another modification, draws the word "RAINBOW" on the origin screen and stretches and squeezes the letters onto the destination screen. This illustrates the Silly Putty effect.

If you like to work with machine language, run *Zoom-Stretch* and save the machine language to shorten the program. The ML routine is fully position independent. The value of PC and the cleared memory area must be changed to accommodate the new position.

Run the program and enter CSAVEM "ZOOM/ML", PC+16, PC+186, PC+26. Delete the data statements and change Line 15 to read 15 CLOADM "ZOOM/ML". If you have a disk system, change CSAVEM to SAVEM and CLOADM to LOADM. If you don't understand machine lan-

guage, don't worry. Just type in the program as it is and don't change anything.

Does this give you ideas or new possibilities? Maybe you can load the latest drawings of your friends and stretch them a bit. How about wall-

paper patterns with more variety? You are limited only by your imagination and 49,152 pixels. Have fun!

(Questions may be directed to the author at 1223 Michaline Drive, Green Bay, WI 54304, 414-499-2195. Please enclose an SASE when writing.) □

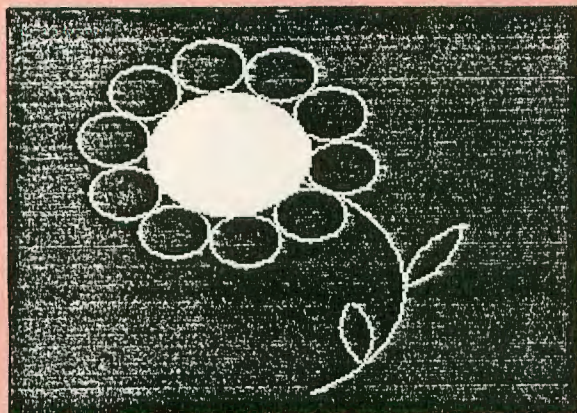


Figure 1: Origin Screen

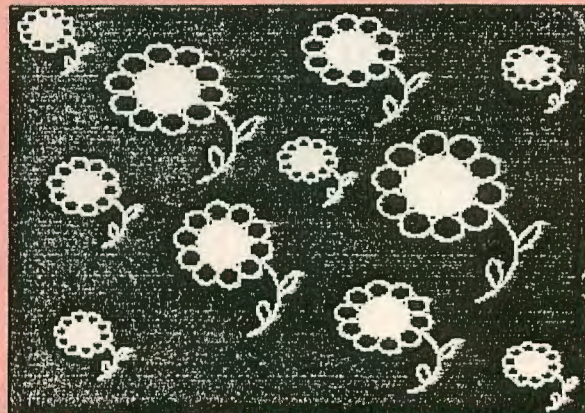


Figure 2: Destination Screen

Listing 1: ZOOM1

```

Ø 'ZOOM/STRETCH,1985 BY RON ROPS
ON
5 PCLEAR8: PMODE4,5: CLEAR2ØØ, &H7F
ØØ
1Ø PC=&H7FØ1
15 FORA=PC+16 TO PC+186: READB$: P
OKEA, VAL("&H"+B$): NEXTA
2Ø DATA 8Ø,4Ø,2Ø,1Ø,8,4,2,1,Ø,Ø,
31,8C,F3,5F,B6,Ø,19,83,18,Ø,1F,3
,83,18,Ø,1F,1,A6,32,C6,2Ø,3D,3Ø,
8B,A6,3E,A7,3A,C6,2Ø,3D,33,CB,A6
,3Ø,E6,3C,E7,38,ED,28,8D,28,A6,3
E,A1,3A,27,F,8D,2Ø,A6,3E,A1,3F,2
7
25 DATA 67,6C,3E,33,C8,2Ø,2Ø,EB,
A6,32,A1,33,27,5A,6C,32,3Ø,88,2Ø
,EC,36,E3,3A,ED,3A,2Ø,D6,5F,A6,2
8,A7,3Ø,A6,29,A7,3C,ED,38,8D,22,
A6,3C,A1,38,27,C,8D,1A,A6,3C,A1
3Ø DATA 3D,27,32,6C,3C,2Ø,EE,A6,
3Ø,A1,31,27,28,6C,3Ø,EC,34,E3,38
,ED,38,2Ø,DC,A6,3Ø,1F,89,44,44,4
4,C4,7,E6,A5,E4,86,27,F,A6,3C,1F
,89,44,44,44,C4,7,E6,A5,EA,C6,E7
,C6,39
45 GOTO1ØØ
5Ø A$=INKEY$: IFA$="" THEN5ØELSERE
TURN
1ØØ CLS: PRINT@13, "MENUE", "<1> ZO
OM/STRETCH", "<2> CLEAR DEST. SCR
EEN", "<3> VIEW ORIGIN SCREEN", "<
4> VIEW DESTINATION SCREEN", "<5>
TRANSFER DEST TO ORIG": INPUTA: O
NA GOSUB2ØØ, 3ØØ, 4ØØ, 5ØØ, 6ØØ
11Ø GOSUB5Ø: GOTO1ØØ

```

```

2ØØ CLS: INPUT"ORIGINAL RECTANGLE
: X1,Y1,X2,Y2"; X1,Y1,X2,Y2
21Ø IFX1>255ORY1>191ORX2>255ORY2
>191 THEN2ØØ
22Ø INPUT"DESTINATION RECTANGLE:
X1,Y1,X2,Y2"; X3,Y3,X4,Y4
23Ø IFX3>255ORY3>191ORX4>255ORY4
>191 THEN22Ø
24Ø RH=(X4-X3)/(X2-X1): H2=(RH-IN
T(RH))*256: RV=(Y4-Y3)/(Y2-Y1): V2
=(RV-INT(RV))*256
25Ø POKEPC,X1: POKEPC+1,X2: POKEPC
+2,Y1: POKEPC+3,Y2: POKEPC+4,RH: PO
KEPC+5,H2: POKEPC+6,RV: POKEPC+7,V
2: POKEPC+12,X3: POKEPC+13,X4: POKE
PC+14,Y3: POKEPC+15,Y4
26Ø PMODE4,5: SCREEN1,1: EXEC(PC+2
6): RETURN
3ØØ PMODE4,5: SCREEN1,1: PCLSØ: RET
URN
4ØØ PMODE4,1: SCREEN1,1: RETURN
5ØØ PMODE4,5: SCREEN1,1: RETURN
6ØØ PMODE4,1: SCREEN1,1: FORA=1TO4
: PCOPY (A+4) TO (A): NEXTA: GOTO4Ø
Ø

```

Listing 2: ZOOM2

```

45 GOSUB2ØØØ: GOTO1ØØ
2ØØØ GOSUB4ØØ: PCLSØ
2ØØ5 'DRAW FLOWER
2Ø1Ø CIRCLE(1ØØ,7Ø),36,,.75: PAI
NT(1ØØ,7Ø),1,1
2Ø2Ø FORT=.15TO6.29STEP.6283: X=5
Ø*SIN(T)+1ØØ: Y=37.5*COS(T)+7Ø: CI
RCLE(X,Y),16,,.75: NEXTT

```

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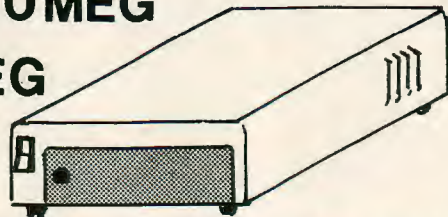
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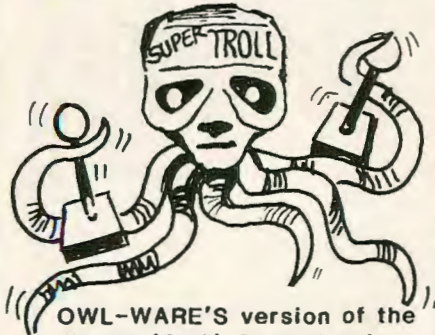
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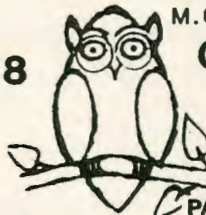
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```

2030 CIRCLE(110,128),66,,.75,.75
,.2
2040 CIRCLE(215,128),40,,.75,.5,
.7
2050 CIRCLE(160,101),40,,.75,0,.
2
2060 CIRCLE(132,150),30,,.75,.88
,.08
2070 CIRCLE(177,145),30,,.75,.38
,.58
2090 'COPY FLOWERS TO SCREEN
2100 GOSUB3000:FORA=1TO12:X1=0:Y1
=0:X2=255:Y2=191:READX3,Y3,X4,Y4
:GOSUB240:NEXTA:GOSUB50:RETURN
2110 DATA0,0,48,36,32,12,132,87,
118,0,198,60,208,16,255,52,12,64
,72,112,144,48,255,140,112,56,16
0,92,64,80,144,152,16,132,64,168
,132,116,212,176,208,144,255,180
,84,156,132,191

```

Listing 3: ZOOM3

```

45 GOSUB3000:GOTO100
3000 GOSUB400:PCLS0'5STAR
3010 C=1:X=128:Y=5:FORT=0TO6.3ST
EP.6283:A=X:B=Y:X=128-SIN(T)*121
*C:Y=96-COS(T)*91*C

```

```

3020 IFC=1THENC=.39ELSEC=1
3030 LINE(A,B)-(X,Y),PSET:NEXTT
3040 GOSUB300:FORA=0TO100STEP25:
X1=0:Y1=0:X2=255:Y2=191:X3=A:Y3=
A*.75:X4=255-X3:Y4=191-Y3:GOSUB2
40:NEXTA:GOSUB50:RETURN

```

Listing 4: ZOOM4

```

45 GOSUB4000:GOTO100
4000 GOSUB400:PCLS0'RAINBOW
4010 DRAW"BM32,106U20R10D10L10F1
0BR12U20R10D10NL10D10BR12R5NR5U2
0L5R10BR12ND20F20U20BR12ND20R10D
8G2L8R8F2D8L10"
4020 CIRCLE(162,96),11
4030 LINE(182,86)-(192,106),PSET
:LINE-(202,86),PSET:LINE-(212,10
6),PSET:LINE-(222,86),PSET
4040 GOSUB300:FORA=1TO11:X1=16:Y
1=85:X2=240:Y2=107:READX3,Y3,X4,
Y4:GOSUB240:NEXTA:GOSUB50:RETURN
4050 DATA0,10,255,18,0,30,255,90
,0,100,128,120,128,100,255,120,0
,130,85,160,85,130,160,160,160,1
30,255,160,0,170,64,180,64,170,1
28,180,128,170,192,180,192,170,2
55,180

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Whose face will you draw? With *Draw Face*, you can draw your friends, a clown, a vampire, a baby and any other face you can imagine. It's easy.

Using single-key selections, choose face shape, ears, hairstyle, eyes, eyebrows, mouth, nose, accessories and other features such as beard, glasses, or vampire cape. To make a selection, press the letter for the option wanted.

To help you, a box in the upper right-hand corner tells which feature you need to choose. If you cannot remember the options, pressing the slash (/) brings up a list of the letters to use and a brief description (see Figure).

Menu Options

Shape

- B - Baby
- C - Cadaverous
- L - Long
- O - Oval
- R - Round
- S - Square

Ears

- B - Big
- E - Normal ears
- L - Little
- N - No ears
- S - Pointy

Hair

- A - Afro
- B - Boy's
- C - Curly
- D - Dutch boy
- H - Hair
- I - Curly infant
- L - Long
- M - Middle part
- N - No hair
- O - Old fringe
- P - Pony tail
- R - Red fringe
- S - Girl's short
- W - Widow's peak

Eyes

- B - Big
- C - Closed
- E - Open eyes
- I - Little
- L - Eyes with
lashes
- M - Mad
- O - Sleepy open
- S - Surprised
- T - Tired

Eyebrows

- A - Arched
- B - Bushy
- C - Clown
- I - Infant
- M - Mad
- N - None
- Q - Quizzical
- S - Surprised
- T - Tilted

Mouth

- B - Big
- C - Clown
- H - Happy
- I - Infant rosebud
- L - Lipstick
- M - Straight mouth
- O - Open
- S - Sad
- T - Teeth
- V - Vampire

Nose

- C - Clown
- I - Infant
- N - Narrow
- P - Pug
- S - Straight
- W - Wide

Accessories

- B - Beard
- C - Cheeks
- E - Earrings
- F - Frown
- G - Glasses
- H - Hat
- M - Mustache
- N - Neckline
- R - Hair bow
- S - Shirt
- T - Bow tie
- V - Vampire's cape

Ann Mayeux takes time from the computer to care for her two small boys and husband. She has a degree in psychology and taught herself programming from the CoCo manual and THE RAINBOW. Ann writes Adventure games and programs for her sons.

Next to your Tandy® or



nothing beats a

High-quality printers—at hard-to-beat prices!

Now that you have the home or office computer you wanted, get the printer you need. A Tandy printer!

Tandy printers are designed to give you exceptional print quality, graphics and high performance—all at affordable prices. Your nearby Radio Shack Computer Center has a complete line of printers, from high-speed dot matrix to letter-quality daisy wheels. There's sure to be one that will suit your particular printing requirements—and budget—to a tee.

Budget-priced high performer

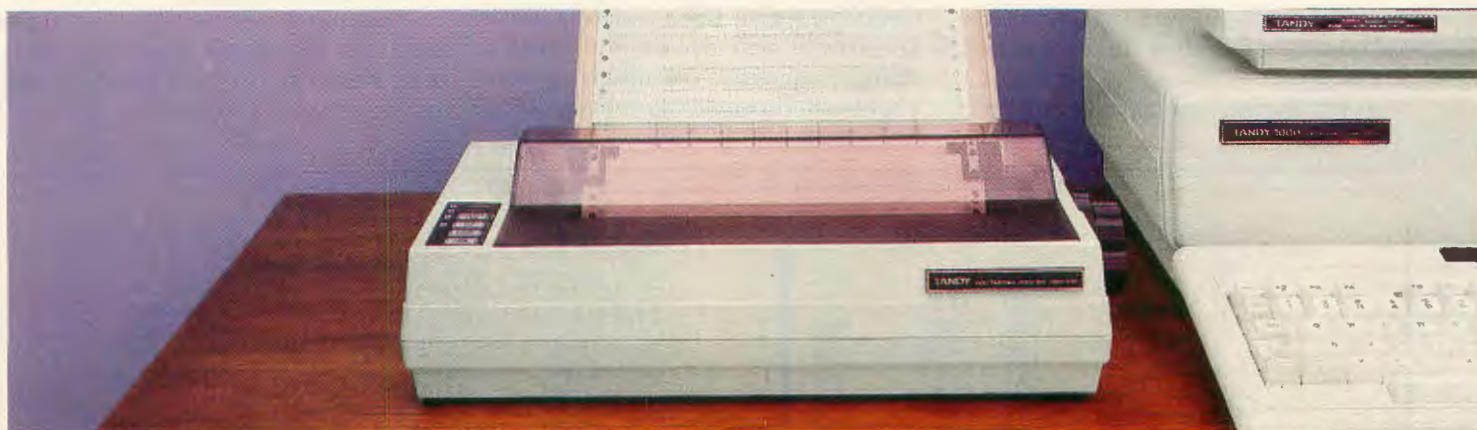
The DMP 105 (26-1276, \$199.95) is the low-cost solution for data-processing and general-purpose use. The DMP 105 features a bidirectional head that prints 80 characters per line at 43 lines per minute (10 cpi). Elongated and condensed modes are also available. Prints up to 80 characters per second. Parallel and Color Computer-compatible serial interfaces.

Triple-mode “personal printer”

The low-cost, versatile DMP 130 (26-1280, \$349.95)

features word-processing and data-processing, as well as dot-addressable graphics modes. You can choose from four character styles: standard or italic cursive, in draft or correspondence modes. The DMP 130 supports super/subscripts, double-width, bold, double-strike and micro-fonts. The bidirectional, logic-seeking print head prints original, plus two copies on 4" to 10" fanfold paper or single sheets. Prints up to 100 characters per second. Built-in tractor. Parallel and Color Computer-compatible serial interfaces. IBM® PC compatible.

PC-compatible computer,



Tandy printer.

Low-cost business printer

The DMP 430 (26-1277, \$699.00) is a dot-matrix printer with an 18-wire print head that delivers superior correspondence fonts in a single pass. Prints 10, 12, or 16.7 cpi, plus elongated, standard, elite and condensed. You can also get micro, italic and double-high fonts. Prints original, plus two copies at 180 characters per second. IBM PC compatible.

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fast printing means no long and costly delays for reports. Supports elongated, double-high, bold, underline, super/subscripts, italics and double-strike modes, plus bit-image graphics. Prints up to 380 characters per second. Features a true pin-driven tractor—not sprocket. Prints original, plus up to six copies. Parallel interface only. IBM PC compatible.

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After your picture is the way you want it, press the '@' key and type in a name across the bottom of the screen. If the name is five or six characters long, it will be centered. Push the left-arrow key to allow for more letters. A tone sounds when the left margin is reached. Pressing the '@' key erases the name.

You can clear the screen at any time,

and once ears are selected, the features can be changed by pushing the up-arrow. Repeatedly pressing the up-arrow erases previous features in turn, except the face shape. Accessories cannot be erased, but if you have started accessories and decide you want to change a feature, the up-arrow takes you back through. After typing the

name, the up-arrow takes you back to accessories, although the box in the corner does not reappear.

After enjoying your picture, clear the screen and begin again.

(Questions may be directed to the author at 874 Maine Road, Key West, FL 33040, 305-296-6019. Please enclose an SASE when writing.) □

150	.....161	1640	.....153
260	.....169	1810	.....94
420	.....49	1960	.....162
560	.....189	2120	.....213
770	.....64	2260	.....105
930	.....154	2460	.....227
1040	.....103	2570	.....142
1130	.....122	2690	.....30
1340	.....213	2770	.....194
1450	.....191	END	.....14

The listing: DRAWFACE

```

1Ø ' DRAW A FACE
2Ø ' BY ANN B. MAYEUX
3Ø ' KEY WEST, FL
4Ø Z$=" " :U$=" " <^> TO CH
ANGE " :Y$=" " <CLEAR> TO CLEAR
SCREEN"
5Ø '*SHAPE
6Ø PMODE3,1:PCLS:SCREEN1,1:MG$="
BM5,ØR245D19ØL245U19ØR2ØØD4ØR45"
:DRAWMG$
7Ø DRAW"BM2Ø,2ØU1ØR5F2D6G2L5BR13
U1ØR6F2DG2L6R5F3D2BR6U6E4F4DNL8D
5BR7NU1ØE4NUF4NU1ØBR2ØU6E4F4DNL8
D5BR2ØU1ØNR7D5NR5D5BR13U6E4F4DNL
8D5BR15BU2G2L4H2U6E2R4NF2BR9NR7D
5NR5D5R7":GOTO9Ø
8Ø LINE(2Ø9,3)-(248,38),PRESET,B
F:RETURN
9Ø DRAW"BM21Ø,9R3U3L3U3R3;BR4D6U
3R4U3D6;BR4U4E2F2DNL4D3;BR4U6R4D
3L4D3;BR8U6R3BD3L3D3R3":CIRCLE(2
26,2Ø),1Ø,,.8,.41,.1:DRAW"BM218,
24F3D4F3R5E3U4E2U"
1ØØ A$=INKEY$:IFA$=""THEN1ØØ ELS
E LINE(1Ø,1Ø)-(2ØØ,3Ø),PRESET,BF
11Ø IFA$="C"THENF=1:GOTO23Ø
12Ø IFA$="O"THENF=2:GOTO27Ø
13Ø IFA$="L"THENF=3:GOTO24Ø
14Ø IFA$="R"THENF=4:GOTO25Ø
15Ø IFA$="S"THENF=5:GOTO26Ø
16Ø IFA$="B"THENF=6:GOTO22Ø
17Ø IFA$="/"THEN2ØØ
18Ø GOTO1ØØ
19Ø ON F GOTO23Ø,27Ø,24Ø,25Ø,26Ø

```

```

,22Ø
2ØØ CLS:SCREENØ,Ø:PRINTØ74,"SHAP
E":PRINT:PRINTZ$+"<B> BABY":PRIN
TZ$+"<C> CADAVEROUS":PRINTZ$+"<L
> LONG":PRINTZ$+"<O> OVAL":PRINT
Z$+"<R> ROUND":PRINTZ$+"<S> SQUA
RE"
21Ø IFINKEY$=""THEN21Ø ELSESCREE
N1,1:GOTO1ØØ
22Ø CIRCLE(121,73),49,,.8,.42,.1
:CIRCLE(96,1Ø6),21,,1,.32,.61:CI
RCLE(146,1Ø6),21,,1,.89,.2:CIRCL
E(121,123),19,,1,.13,.37:DRAW"BM
9Ø,124M11Ø,135BR22M153,123":GOTO
29Ø
23Ø CIRCLE(12Ø,76),47,,1,.4,.12:
DRAW"BM87,1Ø2D2ØF2ØR28E2ØU2Ø":GO
TO29Ø
24Ø CIRCLE(12Ø,85),43,,1.5,.95,.
6:CIRCLE(12Ø,67),41,,1,.5,Ø:GOTO
29Ø
25Ø CIRCLE(12Ø,82),51,,1,.3,.2:C
IRCLE(122,119),2Ø,,1,.1,.41:GOTO
29Ø
26Ø CIRCLE(12Ø,6Ø),47,,.65,.48,.
Ø2:CIRCLE(12Ø,12Ø),35,,.6,Ø,.5:D
RAW"BM167,62M154,12ØBL68M74,62":
GOTO29Ø
27Ø CIRCLE(12Ø,8Ø),48,,1.1,.45,.
Ø5:CIRCLE(12Ø,119),3Ø,,.9,.1,.4:
DRAW"BM167,94M143,136BL45M74,94"
28Ø '*EARS
29Ø GOSUB8Ø:DRAW"C8BM215,17U6R4B
D3L4D3R4;BR4U6R3D3NL3D3;BR4U6R4D
3L4RF3;BR4R3U3L3U3R3BM232,27E2RF
2D3G2LH2BL11G2LH2U3E2RF2"
3ØØ R$="R2E2R3F2D14G4L3H4":L$="G
4L3H4U14E2R3F2R2":B$="R2E3R4F5D1
4G4L7H6U2":I$="D2G6L7H4U14E5R5F3
R2"
31Ø S$="R5E1ØD25G8L4H8":P$="G8L4
H8U25F1ØR5":RB$="RE3R4F3D8G3L4H3
":LB$="LH3L4G3D8F3R4E3"
32Ø IFQ=1THENIFE=ØTHEN63ØELSE ON
E GOTO44Ø,53Ø,58Ø,49Ø
33Ø Q=Ø:A$=INKEY$
34Ø IFA$="E"THENE=1:GOTO44Ø
35Ø IFA$="S"THENE=2:GOTO53Ø

```

```

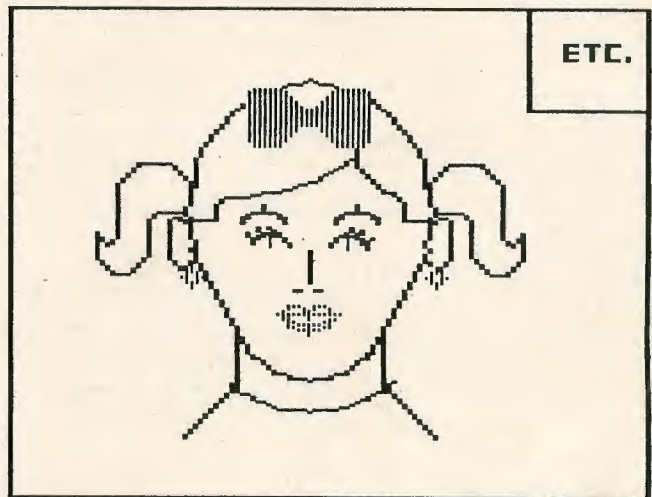
36Ø IFA$="B"THENE=3:GOTO58Ø
37Ø IFA$="L"THENE=4:GOTO49Ø
38Ø IFA$="N"THEN63Ø
39Ø IFA$=CHR$(12)THENRUN
40Ø IFA$="/"THEN42Ø
41Ø GOTO33Ø
42Ø CLS:SCREENØ,Ø:PRINT@74,"EARS
":PRINT:PRINTZ$+"<B> BIG":PRINTZ
$+"<E> NORMAL":PRINTZ$+"<L> LITT
LE":PRINTZ$+"<N> NONE":PRINTZ$+"
<S> POINTY SPOCK":PRINT@448,Y$
43Ø IFINKEY$=""THEN43Ø ELSESCREE
N1,1:GOTO33Ø
44Ø IFF=1ORF=6THENDRAW"BM164,83X
R$;BL83XL$;"
45Ø IFF=2THENDRAW"BM166,84XR$;BL
87XL$;"
46Ø IFF=3ORF=5THENDRAW"BM161,85X
R$;BL77XL$;"
47Ø IFF=4THENDRAW"BM169,82XR$;BL
93XL$;"
48Ø IFQ=2THEN29ØELSE63Ø
49Ø IFF=1ORF=2ORF=6THENDRAW"BM78
,87XLB$;BM163,87XRB$;"
50Ø IFF=3ORF=5THENDRAW"BM81,9ØXL
B$;BM159,9ØXRB$;"
51Ø IFF=4THENDRAW"BM75,9ØXLB$;BM
165,9ØXRB$;"
52Ø IFQ=2THEN29ØELSE63Ø
53Ø IFF=1ORF=5THENDRAW"BM162,86X
S$;BL73XP$;"
54Ø IFF=2ORF=6THENDRAW"BM165,84X
S$;BL79XP$;"
55Ø IFF=3THENDRAW"BM162,83XS$;BL
73XP$;"
56Ø IFF=4THENDRAW"BM169,8ØXS$;BL
87XP$;"
57Ø IFQ=2THEN29ØELSE63Ø
58Ø IFF=1ORF=6THENDRAW"BM164,83X
B$;BL8ØXI$;"
59Ø IFF=2THENDRAW"BM166,85XB$;BL
86XI$;"
60Ø IFF=3ORF=5THENDRAW"BM161,87X
B$;BL75XI$;"
61Ø IFF=4THENDRAW"BM169,82XB$;BL
9ØXI$;"
62Ø IFQ=2THEN29Ø
63Ø IFF=4THEN64ØELSEDRAW"BM149,1
27D2ØF2ØBL97E2ØU2Ø":GOTO65Ø
64Ø DRAW"BM15Ø,121D15F2ØBL1ØØE2Ø
U15"
65Ø GOSUB8Ø:DRAW"BM216,16U6D3R4U
3D6BR4U6R4D3NL4D3BR4NU6BR4U6R4D3
L4RF3;BM218,3ØU6E3R12F3D6L2U2H2L
1ØG2D2L2"
66Ø '*HAIR
67Ø A$=INKEY$
68Ø IFA$="A"THEN1Ø2Ø
69Ø IFA$="B"THEN94Ø

```

```

70Ø IFA$="C"THEN1Ø8Ø
71Ø IFA$="D"THEN113Ø
72Ø IFA$="H"THEN1Ø6Ø
73Ø IFA$="I"THEN98Ø
74Ø IFA$="L"THEN1Ø4Ø
75Ø IFA$="M"THEN1Ø1Ø
76Ø IFA$="N"THENB=1:GOTO115Ø
77Ø IFA$="O"THEN111Ø
78Ø IFA$="P"THEN92Ø
79Ø IFA$="R"THEN112Ø
80Ø IFA$="S"THEN99Ø
81Ø IFA$="W"THEN97Ø
82Ø IFA$="/"THEN86Ø
83Ø IFA$=CHR$(12)THENRUN
84Ø IFA$=CHR$(94)THEN89Ø
85Ø GOTO67Ø

```



```

86Ø CLS:SCREENØ,Ø:PRINT@74,"HAIR
":PRINT:PRINT"<A> AFRO <L
> LONG <B> BOYS <M
> MIDDLE PART <C> CURLY <N
> NONE <D> DUTCH BOY <O
> OLD FRINGE <H> STRAIGHT <P
> PONY TAIL"
87Ø PRINT"<I> INFANT <R> RE
D FRINGE <S> SHORT GIRLS <W> WI
DOW'S PEAK":PRINT@416,U$+"EARS":
PRINTY$
88Ø IFINKEY$=""THEN88ØELSESCREEN
1,1:GOTO67Ø
89Ø DRAW"C5M+Ø,Ø":Q=2:ON E GOTO4
4Ø,53Ø,58Ø,49Ø
90Ø GOTO33Ø
91Ø IFINKEY$=""THEN91Ø ELSESCREE
N1,1:GOTO67Ø
92Ø P$="E9R12F9D2ØF3E5D1ØG6L7H7U
13H4L8":O$="H9L12G9D2ØG3H5D1ØF6R
7E7U13E4R8"
93Ø IFF=3ORF=5THENDRAW"BM16Ø,74X

```

```

P$;BL85BU1ØXØ$;"ELSEDRAW"BM165,7
ØXP$;BL95BU1ØXØ$;"
94Ø CIRCLE(96,6),68,,1,.15,.25:D
RAW"BM163,83L6U6H5L3H1ØU8BD2ØBL4
5L6G3D6L6"
95Ø IFF=2ØRF=4THENDRAW"BM169,83L
9BL8ØL9"
96Ø GOTO115Ø
97Ø DRAW"BM163,83L5U13H12L11G15H
15L11G12D13L5":GOTO95Ø
98Ø HR$="R8F4D4G3R8E4U5H3":DRAW"
BM75,86F3R7E2U4GL3H3U3E7R3XHR$;X
HR$;XHR$;R9F5D1ØG2L3H2D4F3R5E6":
GOTO95Ø
99Ø CIRCLE(9Ø,94),1Ø,,2,.2,.65:C
IRCLE(15Ø,94),1Ø,,2,.85,.4:DRAW"
BM7Ø,1Ø8E9BR8ØF9"
1ØØØ CIRCLE(8Ø,1Ø8),13,,.9,Ø,.55
:CIRCLE(16Ø,1Ø8),13,,.9,.95,.5:G
OTO94Ø
1Ø1Ø CIRCLE(92,34),33,,1,.1,.35:
CIRCLE(145,32),33,,1,.15,.4:GOTO
115Ø
1Ø2Ø B=1:FORH=98TO146STEP6:CIRCL
E(H,41),8:CIRCLE(H,36),8:NEXTH:F
ORH=1Ø8TO132STEP6:CIRCLE(H,5Ø),8
:NEXTH
1Ø3Ø CIRCLE(88,43),8:CIRCLE(152,
43),8:CIRCLE(85,48),8:CIRCLE(156
,48),8:FORV=53TO7ØSTEP5:CIRCLE(8
Ø,V),8:CIRCLE(162,V),8:NEXTV:GOT
O115Ø:REMCIRCLE(81,58),8:CIRCLE(
161,58),8:GOTO76Ø
1Ø4Ø CIRCLE(4Ø,139),22,,1.2,Ø,.3
:CIRCLE(2ØØ,139),22,,1.2,.2,.5
1Ø5Ø CIRCLE(12Ø,1Ø5),66,,1.4,.45
,.Ø7:DRAW"BM2Ø6,162G5L3ØBL99L3ØH
5":GOTO94Ø
1Ø6Ø CIRCLE(122,112),7Ø,,.5,.65,
.85:IFF=1THENDRAW"BM166,84L6"
1Ø7Ø GOTO95Ø
1Ø8Ø B=1:FORH=91TO152STEP8:FORV=
37TO54STEP8:CIRCLE(H,V),11:NEXTV
:NEXTH:FORH=1ØØTO14ØSTEP8:CIRCLE
(H,3Ø),11,,1,.5,Ø:NEXTH
1Ø9Ø CIRCLE(88,62),11:CIRCLE(151
,62),11:CIRCLE(96,62),8:CIRCLE(1
43,62),8
11ØØ FORV=5ØTO1Ø5STEP8:CIRCLE(79
,V),11:CIRCLE(16Ø,V),1Ø:NEXTV:FO
RV=69TO99STEP8:CIRCLE(72,V),12:C
IRCLE(169,V),12:NEXTV:GOTO115Ø
111Ø B=1:DRAW"BM164,85L9H4U4E4R9
BL85R9F4D4G4L9":GOTO115Ø
112Ø B=1:FORH=73TO9ØSTEP5:FORV=7
ØTO75STEP3:CIRCLE(H,V),7:CIRCLE(
24Ø-H,V),7:NEXTV:NEXTH:CIRCLE(8Ø
,65),7:CIRCLE(16Ø,65),7:GOTO115Ø
113Ø IFF=4THENDRAW"BM74,73F5R79E

```

```

9"ELSEDRAW"BM77,73F5R73E9"
114Ø '*EYES
115Ø GOSUB8Ø:DRAW"BM215,16U6R3BD
3L3D3R3BR8U3NH3E3BR4D6R3BU3L3U3R
3BR7L3D3R3D3L3;BM216,29E3R3F3BR6
E3R3F3BL4C6UBL13DC8"
116Ø A$=INKEY$
117Ø IFA$="B"THEN14ØØ
118Ø IFA$="C"THEN139Ø
119Ø IFA$="E"THEN137Ø
12ØØ IFA$="I"THEN138Ø
121Ø IFA$="L"THEN136Ø
122Ø IFA$="M"THEN134Ø
123Ø IFA$="O"THEN141Ø
124Ø IFA$="S"THEN142Ø
125Ø IFA$="T"THEN135Ø
126Ø IFA$=CHR$(12) THENRUN
127Ø IFA$="/"THEN13ØØ
128Ø IFA$=CHR$(94) THEN133Ø
129Ø GOTO116Ø
13ØØ CLS:SCREENØ,Ø:PRINT@42,"EYE
S":PRINT:PRINTZ$+"<B> BIG":PRINT
Z$+"<C> CLOSED":PRINTZ$+"<E> OPE
N":PRINTZ$+"<I> LITTLE":PRINTZ$+
"<L> EYES WITH LASHES":PRINTZ$+
"<M> MAD":PRINTZ$+"<O> SLEEPY OPE
N":PRINTZ$+"<S> SURPRISED":PRINT
Z$+"<T> TIRED"
131Ø PRINT@416,U$+"HAIR":PRINTY$
132Ø IFINKEY$=""THEN132Ø ELSESCR
EEN1,1:GOTO116Ø
133Ø PCLS:DRAWMG$:Q=1:GOTO19Ø
134Ø DRAW"BM97,89R7C6D6U6C8F6BR2
ØE6C6D6U6C8R7":GOTO145Ø
135Ø V$="FR9EBG3NL6BE3":DRAW"C6B
M99,95XV$;BR21XV$;C8":GOTO141Ø
136Ø DRAW"BM96,88F3E2R2H3F3R5H3B
R32G3R5E2G3R3F2E2"
137Ø E$="E4R3C6D5U5C8R3F5":DRAW"
BM98,92XE$;BR15XE$;":GOTO145Ø
138Ø E$="E3R2C6D5HU2R2D2LU4R3C8F
3G2L6H2":DRAW"BM98,93XE$;BR3ØXE$
;":GOTO145Ø
139Ø CIRCLE(1Ø2,89),13,,.7,.1,.4
:CIRCLE(138,89),13,,.7,.1,.4:GOT
O145Ø
14ØØ B$="H3U5E3R3F3D5G3L3C6U2H1U
2E1R2F1D2G1L2C8D2":DRAW"BM1Ø2,97
XB$;BR34XB$;":GOTO145Ø
141Ø CIRCLE(1Ø4,91),5:CIRCLE(136
,91),5:CIRCLE(1Ø4,91),3,6:CIRCLE
(136,91),3,6:CIRCLE(1Ø4,97),13,,
.8,.6,.9:CIRCLE(136,97),13,,.8,.
6,.9:GOTO145Ø
142Ø CIRCLE(1Ø4,91),5,6:CIRCLE(1
36,91),5,6:CIRCLE(1Ø4,91),2,7:CI
RCLE(136,91),2,7
143Ø CIRCLE(1Ø4,92),9,,1,.5,Ø:CI
RCLE(136,92),9,,1,.5,Ø

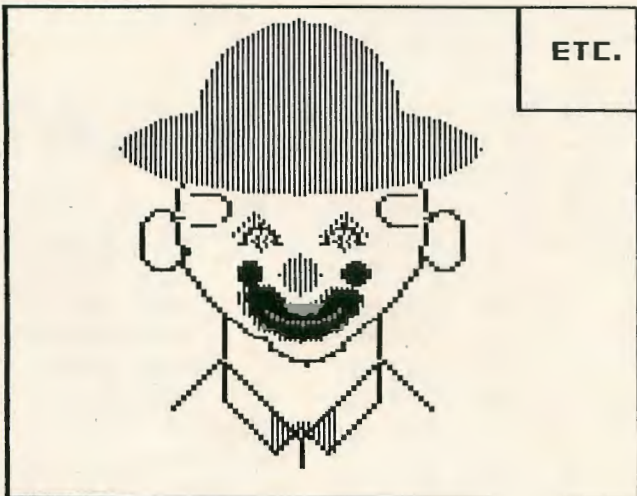
```



```

144Ø '*EYEBROWS
145Ø GOSUB8Ø: DRAW"C8BM213,19U8R2
F2G2NLF2G2L2BR8U8R3FD2GL3RF3DBR4
U8R4D8L4BR8BU8D6F2E2NU3F2E2U6BM2
18,29E2R3FBR6ER3F2"
146Ø Q=Ø: DRAW"C8": A$=INKEY$
147Ø IFA$=CHR$(12) THEN RUN
148Ø IFA$="B" THEN Y=1: GOTO17ØØ
149Ø IFA$="S" THEN Y=2: GOTO166Ø
150Ø IFA$="I" THEN Y=8: GOTO167Ø
151Ø IFA$="M" THEN Y=3: GOTO169Ø
152Ø IFA$="N" THEN Y=9: GOTO173Ø
153Ø IFA$="Q" THEN Y=4: GOTO171Ø
154Ø IFA$="A" THEN Y=5: GOTO168Ø
155Ø IFA$="T" THEN Y=6: GOTO164Ø
156Ø IFA$="C" THEN Y=7: GOTO165Ø
157Ø IFA$=CHR$(94) THEN 163Ø
158Ø IFA$="/" THEN 16ØØ
159Ø GOTO146Ø
160Ø CLS: SCREENØ, Ø: PRINT@42, "EYE
BROWS": PRINT: PRINTZ$+"<A> ARCHED
": PRINTZ$+"<B> BUSHY": PRINTZ$+"<
C> CLOWN": PRINTZ$+"<I> INFANT": P
RINTZ$+"<M> MAD": PRINTZ$+"<N> NO
NE": PRINTZ$+"<Q> QUIZZICAL": PRIN
TZ$+"<S> SURPRISED": PRINTZ$+"<T>
TILTED"
161Ø PRINT@416, U$+"EYES": PRINTY$

```



```

162Ø IFINKEY$="" THEN 162Ø ELSE SCRE
EN1,1: GOTO146Ø
163Ø LINE(88,84)-(15Ø,99), PRESET
,BF: GOTO115Ø
164Ø DRAW"BM9Ø,9ØE8R5BR33R5F8": G
OTO173Ø
165Ø DRAW"C7BM94,89E9ND5F9BR17E9
ND5F9C8": GOTO173Ø
166Ø CIRCLE(1Ø2,9Ø),12,,1.1,.6,,
9: CIRCLE(138,9Ø),12,,1.1,.6,.9: G
OTO173Ø
167Ø DRAW"BM98,85R11BR2ØR11": GOT
O173Ø
168Ø DRAW"BM94,9ØE7R8F3BR17E3R8F

```

```

7": GOTO173Ø
169Ø DRAW"BM1ØØ,81R7F9BR9E9R7": G
OTO173Ø
170Ø DRAW"BM94,87E4R17FL18GR17BR
12R17HL18ER17F4": GOTO173Ø
171Ø DRAW"BM94,82E4R11F3BD5BR17E
3R13F4": GOTO173Ø
172Ø '*MOUTH
173Ø IFQ=2 THEN 145Ø ELSE GOSUB8Ø: DR
AW"BM2Ø9,17U6F2E2D6BR4U6R4D6L4BR
8NU6R4U6BR4R4L2D6BR6U6D3R4U3D6;B
M223,28F3NR6FR4E4"
174Ø A$=INKEY$
175Ø IFA$="B" THEN 2ØØØ
176Ø IFA$="C" THEN 196Ø
177Ø IFA$="H" THEN 197Ø
178Ø IFA$="I" THEN 198Ø
179Ø IFA$="L" THEN 2Ø3Ø
180Ø IFA$="M" THEN 195Ø
181Ø IFA$="O" THEN 2Ø1Ø
182Ø IFA$="S" THEN 199Ø
183Ø IFA$="T" THEN 2Ø2Ø
184Ø IFA$="V" THEN 194Ø
185Ø IFA$=CHR$(12) THEN RUN
186Ø IFA$="/" THEN 189Ø
187Ø IFA$=CHR$(94) THEN 192Ø
188Ø GOTO174Ø
189Ø CLS: SCREENØ, Ø: PRINT@42, "MOU
TH": PRINT: PRINTZ$+"<B> BIG": PRIN
TZ$+"<C> CLOWN": PRINTZ$+"<H> HAP
PY": PRINTZ$+"<I> INFANT": PRINTZ$
+"<L> LIPSTICK": PRINTZ$+"<M> STR
AIGHT"
190Ø PRINTZ$+"<O> OPEN": PRINTZ$+
"<S> SAD/MAD": PRINTZ$+"<T> TEETH
": PRINTZ$+"<V> VAMPIRE": PRINT@41
6, U$+"EYEBROWS": PRINTY$
191Ø IFINKEY$="" THEN 191Ø ELSE SCRE
EN1,1: GOTO174Ø
192Ø Q=2: DRAW"C5": ON Y GOTO17ØØ,
166Ø,169Ø,171Ø,168Ø,164Ø,193Ø,16
7Ø,145Ø
193Ø IFY=7 THEN DRAW"BM94,89E9ND5F
9BR17E9ND5F9": GOTO145Ø ELSE GOTO14
5Ø
194Ø DRAW"C7BM1Ø7,12ØR26L5D7H2U5
L12D5G2U7C8": GOTO2Ø6Ø
195Ø DRAW"C7BM11Ø,118R2ØBG3L12C8
": GOTO2Ø6Ø
196Ø CIRCLE(12Ø,114),24,7,.7,.Ø1
,.49: CIRCLE(12Ø,113),9,7,.7,.Ø5,
.45: DRAW"C7BM96,115U3E4R9F5BR14E
4R9F4D3C8": PAINT(12Ø,129),8,7
197Ø CIRCLE(12Ø,115),16,7,.5,.Ø5
,.45: GOTO2Ø6Ø
198Ø DRAW"C7BM112,121RE3UERF2E2R
FDF3NRG3L8H3BR6R3C8": GOTO2Ø6Ø
199Ø CIRCLE(12Ø,12Ø),13,7,.3,.5,
.99: GOTO2Ø6Ø

```

```

2000 DRAW"C7BM107,120E5R16F5G4L1
8H4R26C8":GOTO2060
2010 CIRCLE(120,119),8,7:GOTO2060
2020 DRAW"C7BM105,118F9R12E9L30R
10C8D4R5U4D4R5U4":GOTO2060
2030 CIRCLE(121,119),11,7,.5,.08
,.47:CIRCLE(121,119),13,7,.7,.08
,.47
2040 DRAW"C7BM108,119R10F2E2R10L
2H3L4G3H3L4G3L2C8"
2050 '*NOSE
2060 GOSUB80:DRAW"BM213,15U6F6U6
BR4R4D6L4U6BR12L4D3R4D3L4BR8U6R3
BD3L3D3R3BM227,27D4G2R6H2U4"
2070 A$=INKEY$
2080 IFA$=CHR$(12) THENRUN
2090 IFA$="S" THEN2210
2100 IFA$="W" THEN2200

```



```

2110 IFA$="C" THEN2230
2120 IFA$="I" THEN PSET(117,109):
PSET(123,109):GOTO2260
2130 IFA$="N" THEN2240
2140 IFA$="P" THEN2220
2150 IFA$="/" THEN2180
2160 IFA$=CHR$(94) THENPAINT(120,
125),5,5:LINE(105,110)-(135,127)
,PRESSET,BF:GOTO1730
2170 GOTO2070
2180 CLS:SCREEN0,0:PRINT@74,"NOS
E":PRINT:PRINTZ$+"<C> CLOWN":PRI
NTZ$+"<I> INFANT":PRINTZ$+"<N> N
ARROW":PRINTZ$+"<P> PUG":PRINTZ$
+"<S> STRAIGHT":PRINTZ$+"<W> WID
E":PRINT@416,U$+"MOUTH":PRINTY$
2190 IFINKEY$="" THEN2190 ELSESCR
EEN1,1:GOTO2070
2200 DRAW"BM112,110U2E2R2FNU4BE2

```

```

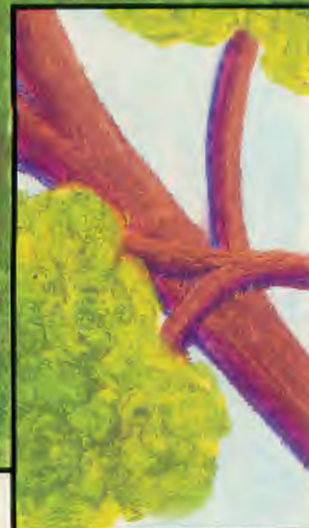
R5BF2NU4ER2F2D2BL5LBL7L":GOTO226
0
2210 DRAW"BM120,95D12BF3R2BL8L2"
:GOTO2260
2220 DRAW"BM124,107F3BL4LBL4LBL3
E3":GOTO2260
2230 CIRCLE(120,104),8,7:PAINT(1
20,105),7,7:GOTO2260
2240 DRAW"BM118,95D10G2D4E1R1F1R
2E1R1F1U4H2U10"
2250 '*ETC.
2260 GOSUB80:DRAW"BM218,20U6R4BD
3L4D3R4BR6U6L2R4BR4NR4D6R4BR4RUL
"
2270 A$=INKEY$
2280 IFA$="B" THEN2500
2290 IFA$="C" THEN2480
2300 IFA$="E" THEN2580
2310 IFA$="H" THEN2490
2320 IFA$="S" THEN2520
2330 IFA$="R" THEN2530
2340 IFA$="G" THEN2540
2350 IFA$="M" THEN2550
2360 IFA$="N" THEN2560
2370 IFA$="F" THEN2590
2380 IFA$="T" THEN2600
2390 IFA$="V" THEN2610
2400 IFA$=CHR$(12) THENRUN
2410 IFA$="@ " THEN2620
2420 IFA$="/" THEN2450
2430 IFA$=CHR$(94) THENLINE(110,1
12)-(130,95),PRESSET,BF:GOTO2060
2440 GOTO2270
2450 CLS:SCREEN0,0:PRINT@10,"ACC
ESSORIES":PRINT:PRINT" <B> BEARD
<M> MUSTACHE <C> CHEEK
<N> NECKLINE <E> EARRI
NGS <R> HAIR BOW <F> FROWN
<S> SHIRT <G> GLASS
ES <T> TIE <H> HAT
<V> VAMPIRE CAPE"
2460 PRINT@384,U$+"NOSE":PRINT"<
@> STOP DRAWING AND ENTER NAME "
+Y$
2470 IFINKEY$="" THEN2470 ELSE SC
REEN1,1:GOTO2270
2480 DRAW"BM96,105U3E3R3F3D3G3L3
H3BR41U3E3R3F3D3G3L3H3":PAINT(99
,105),8,8:PAINT(145,105),8,8:GOT
O2270
2490 B=1:CIRCLE(120,55),70,7,.26
,.8,.7:CIRCLE(120,45),40,7,1,.45
,.05:PAINT(120,50),7,7:GOTO2270
2500 BD$="BM86,76D33F22R24E22U33
R9D45G30L25H30U45R9":IFB=1 THEN25
10 ELSEPAINT(124,54),8,8:REM

```

BEARD

```
251Ø DRAW"C7XBD$;C8":PAINT(12Ø,1
4Ø),8,7:DRAWBD$:GOTO227Ø
252Ø DRAW"BMØ9,138F3ØD1ØU1ØE3ØD1
5G2ØH1ØG1ØH2ØU15":GOTO227Ø
253Ø B=1:DRAW"C6BM116,4ØH8L1ØG2D
18F2R1ØE8R6F8R1ØE2U18H2L1ØG8L6C8
":PAINT(116,43),6,6:GOTO227Ø
254Ø CIRCLE(1Ø2,91),14,7,.7:CIRC
LE(138,91),14,7,.7:DRAW"C7BM79,8
ØF1ØBR27R1ØBR27E1ØC8":GOTO227Ø
255Ø DRAW"BM98,118E6R32F6H6L4G1L
18H1":GOTO227Ø:REM**MUSTACHE**
256Ø IFF=4THENCIRCLE(12Ø,12Ø),4Ø
,,.7,.1,.4ELSECIRCLE(12Ø,13Ø),4Ø
,,.7,.1,.4
257Ø GOTO227Ø
258Ø CIRCLE(75,1Ø5),5,6:CIRCLE(1
69,1Ø5),5,6:GOTO227Ø
259Ø DRAW"BM118,82D5BR5U5":GOTO2
27Ø
260Ø DRAW"BM1Ø8,156C6RF7E2R4F2E7
RD16LH7G2L4H2G7LU16C8":PAINT(12Ø
,163),6,6:GOTO227Ø
261Ø DRAW"C7BM47,167E25H15R3ØM97
,152G15L35BR149H25E15L3ØM144,152
F15R35C8":PAINT(82,157),7,7:PAIN
T(148,152),7,7:FORH=99TO145STEP7
:CIRCLE(H,152),4:NEXTH:GOTO227Ø
262Ø LINE(2ØØ,1)-(249,5Ø),PRESET
,BF:LINE(6,185)-(245,17Ø),PRESET
,BF
263Ø DRAW"C5BMØ,185BR85C6":L=85
264Ø IFL<1ØTHENL=1Ø:SOUND15,1:DR
AW"BM1Ø,185"ELSEIFL>24ØTHENSOUND
1,1:GOTO282Ø
265Ø A$=INKEY$:IFA$=""THEN265Ø
266Ø IFA$="@ "THEN262Ø
267Ø IFA$="^"THENDRAW"C8":GOTO22
7Ø
268Ø IFA$="A"THENDRAW"M+Ø,ØU1ØE4
F4D3NL8D7BR9"ELSEIFA$="B"THENDRA
W"M+Ø,ØU14R5F2D2G2L5R6F2D4G2L5BR
16"
269Ø IFA$="C"THENDRAW"BM+3,ØH3U8
E3R2F3BD8G3L2BR13"ELSEIFA$="D"TH
ENDRAW"M+Ø,ØU14R5F3D8G3L5BR17"
270Ø IFA$="E"THENDRAW"M+Ø,ØU14R8
BD7BL2L6D7R8BR8"ELSEIFA$="Y"THEN
DRAW"BM+4,ØU7H4U3BR8D3G4D7BR12"
271Ø IFA$="V"THENDRAW"BM+Ø,-14D1
ØF4E4U1ØBD14BR8"ELSEIFA$="I"THEN
DRAW"M+Ø,ØR2U14L2R4BD14L2BR9":L=
L-4
```

```
272Ø IFA$="M"THENDRAW"M+Ø,ØU14F5
E5D14BR8":L=L+2ELSEIFA$="O"THEND
RAW"BM+3,ØH3U8E3R2F3D8G3L2BR13"
273Ø IFA$="L"THENDRAW"NU14R8BR8"
ELSEIFA$="N"THENDRAW"U14M+8,14NU
14BR6"ELSEIFA$="R"THENDRAW"M+Ø,Ø
U14R6F2D3G2NL6F2D5BR8"
274Ø IFA$="Z"THENDRAW"M+Ø,ØBU14R
8D3G8D3R8BR8"ELSEIFA$="T"THENDRA
W"BM+4,ØU14L4R8BD14BR8"ELSEIFA$=
"H"THENDRAW"M+Ø,ØU14D7R8U7D14BR8
"
275Ø IFA$="F"THENDRAW"M+Ø,ØU14R8
BD7BL2L6D7BR16"ELSEIFA$="G"THEND
RAW"BM+2,ØH2U1ØE2R4F2BD6NL3D4G2L
4BR14"
276Ø IFA$="J"THENDRAW"BM+3,ØNH3R
2E3U11BD14BR8"ELSEIFA$="K"THENDR
AW"M+Ø,ØU14BR8G8E4F4D6BR8"ELSEIF
A$="P"THENDRAW"M+Ø,ØU14R4F3D3G3L
4D5BR16"
277Ø IFA$="Q"THENDRAW"BM+3,ØH3U8
E3R3F3D8G3L3R2BU4F4BR8"ELSEIFA$=
"S"THENDRAW"BM+Ø,-3F3R2E3U2H3L2H
2U2E2R3F3BD11BR8"
278Ø IFA$="U"THENDRAW"BM+Ø,-14D1
1F3R3E3U11BD14BR8"ELSEIFA$="W"TH
ENL=L+2:DRAW"BM+Ø,-14D14E5F5NU14
BR8"ELSEIFA$="X"THENDRAW"M+8,-14
BL8M+8,14BR8"
279Ø IFA$=CHR$(8)THENDRAW"BM+Ø,Ø
BL17":L=L-32ELSEIFA$=CHR$(32)THE
NDRAW"BM+Ø,ØBR17"ELSEIFA$=CHR$(1
2)THENRUN
280Ø IFA$="."THENDRAW"BM-2,ØRULD
BR8"ELSEIFA$="/ "THEN286Ø
281Ø L=L+16:GOTO264Ø
282Ø A$=INKEY$
283Ø IFA$="@ "THEN262Ø
284Ø IFA$=CHR$(12)THENRUN
285Ø GOTO282Ø
286Ø CLS:SCREENØ,Ø:PRINT@42,"ENT
ER NAME":PRINT:PRINT" IF THE NAM
E IS 4 OR 5 LETTERS LONG, JUST
TYPE IT IN. IF IT IS LONGER, HIT
LEFT ARROW ONCE FOR EACH TWO LE
TTERS MORE THAN 5."
287Ø PRINT:PRINT"<SPACE BAR> WIL
L ENTER A SPACE.":PRINT"<^> WIL
L TAKE YOU BACK TO ACCESSOR
IES.":PRINTY$
288Ø IFINKEY$=""THEN288ØELSESCRE
EN1,1:GOTO265Ø
```



CoCoDraw Concoctions

By Darin Herr

Use this high resolution graphics editor and let your imagination run wild!

CoCoDraw is a user-friendly, high resolution (PMODE 4) graphics editor. It has the usual LINE, CIRCLE, BDX, etc., functions, plus a full character set (for adding text to pictures), an UNDO command and even a Magnify mode for detailed editing. CoCoDraw requires 32K, Extended BASIC and one joystick (a mouse or touchpad should also work). As listed, it requires a disk drive, but it also works with a cassette system using the modifications listed at the end of this article. A printer is optional.

Type in both listings (CoCoDraw and MenuGen) exactly as they appear and save them to disk. (Do not add any extra spaces to CoCoDraw, as it hardly fits in the available memory as it is!) Lines 10000 and 12000 to 12080 are the same in both programs, so you do not have to type them in twice.

Run MenuGen first. This program generates a file (MENUS.SYS) which is loaded and used every time CoCoDraw is run. Make sure that each disk with CoCoDraw on it also contains MENUS.SYS. Now run CoCoDraw, and you are ready to start.

When CoCoDraw is run, it initializes itself and asks if you want to use the speed up POKE (POKE 65495,0). Move the joystick left or right to select "yes" or "no" and press the button on the joystick when the one wanted is underlined.

The main menu is on the top quarter of the screen. The rest of the screen is the editing area. A little pointer should be blinking somewhere on the screen. In the upper-left section of the menu are 14 boxes, each containing an icon (a little picture symbolizing what it does).

Darin Herr is a sophomore at Lancaster Mennonite High School in Ephrata, Pennsylvania and a self-taught programmer. Besides computing, he enjoys tennis, biking and stamp collecting.

These are called tools and are what you use to create the picture.

To the right of the tools are two larger boxes labeled "Color" and "Background." These show the current foreground and background colors (or patterns). Below the tools and colors are four words: File, Size, Misc and Undo. Each of these (except Undo) triggers a pull-down menu that allows you to do things like save, load and print pictures.

The pointer can be moved around the screen using the right joystick. However, because the joystick's resolution is smaller than the screen's, the pointer can only be positioned to the nearest four dots horizontally and three dots vertically. To compensate for this, the arrow keys can be used to move the pointer as many as three dots to the right of the joystick position and two dots below it. This is limited, but with some practice you should be able to place the pointer on any dot on the screen. When part of the pointer is off the right side of the screen, it becomes distorted. When this happens, the upper-left corner of the distortion is the current point.

To select a command from the main menu, simply position the tip of the pointer over the desired option and press the joystick button.

The Tools

When a tool is selected, its icon changes colors to let you know what you are working with. Here is how to use each tool:

Draw (pencil with point down) — Leaves a line after the pointer when the button is held down.

Erase (pencil with eraser down) — When this is selected, the pointer changes to a block eight by eight dots in size. Whenever the button is pressed, the area behind the block changes to the background color. The eraser can be made smaller using the Size pull-down menu. More on that later.



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- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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Box (the empty square) — Move the pointer to one corner of the box, then press and hold the button down while moving the opposite corner of the box. When you like it, release the button.

Circle — Position the pointer where you want the center of the circle to be, then hold the button down while adjusting the radius. To adjust the radius, put the joystick in the center vertically and move it left or right to roughly get the radius. Now, keeping the joystick at the

works the same as Box, but when done, the box becomes solid.

Get — This is used to get an area of the screen (up to 64 by 64 dots) to be used later with PUT. Move the pointer to the upper-left corner of the area to be gotten, then press and hold the button down. Now move the bottom-right corner until you have the size you want, and release the button.

Put — This puts what you got using GET. Move the block that you got around the screen, and whenever you press the button it will be put there. You can hold the button down while moving the joystick for some interesting results. There are five PUT modes to choose from: Set, Reset, And, Or and Not. Set puts it exactly as it was gotten; Reset reverses the original colors; And puts it without erasing what is already there; Or puts it, showing what was gotten only where there is something under it. (And and Or are reversed when

Up Arrow — Actually, the editing area you see is just 75 percent of the entire picture. By clicking the Up Arrow you see the top 75 percent of the picture.

Down Arrow — Shows the bottom 75 percent of the picture.

Color — In the Color box is a block showing the current color, as well a little design to show how it will look when used on diagonal lines. To change color, move the pointer anywhere in the Color box and click. A new screen appears with a selection of 256 colors and patterns. To select a color, move the flashing box over the color wanted and click. If you would rather leave the color the way it was, press the space bar (even while the screen is being drawn) and you will return to the main menu.

Background — Works the same as Color, but changes the background color, which is used when erasing and when clearing the screen.

Pull-Down Menus

To use the pull-down menus, move the pointer over the word File, Size, or Misc and hold the button down. Another menu appears below it. Move the joystick up and down until the selection you want is highlighted, then let the button up.

The File menu includes the following:
Disk Load/Save — You are asked for a filename, and then asked if it is OK. If not, you return to the main menu. No error trapping is used in the disk I/O, so if you get some type of error, just type GOTO 700 and press ENTER to return to the main menu.

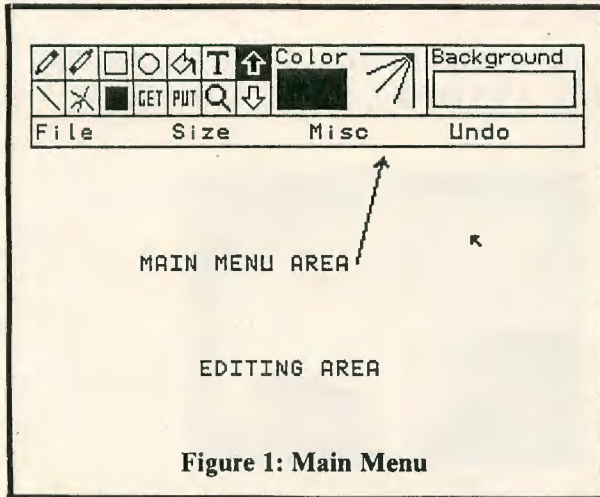


Figure 1: Main Menu

same place horizontally, move it up or down to make fine adjustments. Release the button when you have the desired radius.

Paint (a paint can pouring paint) — Move the pointer to where you want to pour the paint and click the button. You can fill in either black or green areas.

Text (a capital 'T') — Move the pointer to where you want the first character to be and click the button. A blinking cursor appears and you may type any letter (upper- or lowercase), number or symbol on the keyboard. Press ENTER to exit this mode. The foreground color should be a solid color (not a pattern) while typing because anything else will be unreadable.

Line — Move the pointer to one end of the line, then hold the button down while moving the other end. Release the button when you like it.

Ray (several lines coming from the same point) — Move the pointer to the center point and click the button (do not hold it down). Move the end of the first ray to where you want it and click again. Do the same for as many rays as you want, but when doing the last one, hold the button down until you hear beeping (about two seconds). Now you can start another set of rays or select another option.

Solid Box (the solid square) — This

using green or buff on black.) Not reverses the colors in an area the same size as the area that was gotten. What was in the area that was gotten has no effect on this mode. How to change the PUT Mode will be described later.

Magnify (a magnifying glass) — When this option is selected, a 16-by-16 dot box appears, replacing the pointer. Move this box over the area you want magnified, then click the button. A new screen appears showing the area selected magnified eight times. To make changes to the original, move the pointer over the magnified dot you want to change and click the button. Its color will be inversed, as well as the corresponding dot in the Now box, to see how the change looks in actual size. If you make some changes, but then decide you liked the original better, move the pointer over the box marked Cancel, click, and the screen will be changed back to the original. When satisfied with your changes, move the pointer over the box marked Done and click. This will take you back to the main menu with the change made.

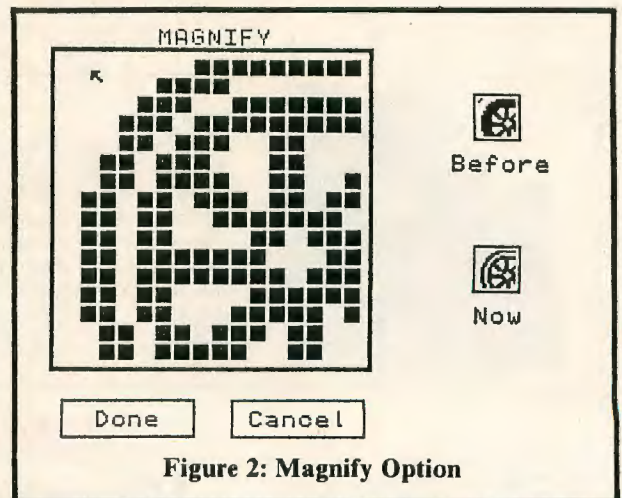


Figure 2: Magnify Option

Disk Dir — You are asked for the drive number, and the directory of the disk in that drive is shown. Press the SHIFT and '@' keys together to pause the display, and click the joystick button to return to the main menu.

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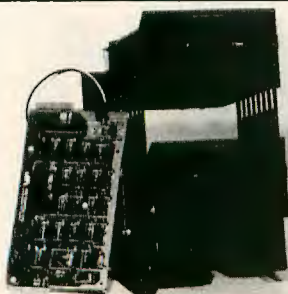
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Tape Load/Save — Same as disk. When saving, make sure the tape recorder is set to Record before saving because recording starts right away.

Screen Dump — I have included a routine that does a double-size screen dump to the Epson RX-80. Make sure the printer is online and the proper Baud rate has been set before saying the printer is ready.

The Size menu is used to change the eraser size. Just select the size you want (8 by 8, 4 by 4, or 1 by 1) and click. The Misc menu includes:

Clear Screen — Clears the screen, but only the editing area being seen. To clear the whole picture, you must clear the top 75 percent, click the Down Arrow, and clear the bottom 75 percent.

Show Picture — This shows the

whole picture at one time. Click again to get back to the main menu.

Color Set — Toggles the color set between green/black and buff/black. Use buff to get artifact colors. Green is the default.

Put Modes — Used to change the PUT mode.

Undo has no menu, it simply undoes the last operation.

TABLE 1: Line Description of CoCoDraw

Initialization

1-3 Clear eight graphics pages; print title screen; (the apparently unnecessary GOTOs here are to get around the PCLEAR bug in older versions of Extended BASIC)
 5 Dimensions and defines variables (see variables list)
 8 Reads data for the screen dump routine
 10 Sets graphics mode; clears screen
 20 Loads screen containing the menus
 600 Gets the menus into arrays

Check for Selection From Main Menu

700 Copies picture to editing area
 710 Puts Main Menu; switches to graphics screen
 720 Asks if you want to use the speed-up POKE
 730-780 Read joystick; check which option was selected from main menu and branch to that routine

Pull-Down Menu Routines

1000-1900 File Menu routines
 (1700-1710 Screen dump routine)
 2000-2010 Size Menu routine
 2500-2560 Misc Menu routine
 3000 Undo routine

Color and Background

3500 Draws color selection screen
 3510-3530 Select color/pattern using joystick

Tools

4000 Draw
 4200 Erase
 4400 Box and Box Fill
 4600 Circle
 4800 Paint
 5000 Text
 5200 Up Arrow
 5400 Line
 5600 Ray
 5800 GET
 6000 PUT
 6200 Magnify
 6400 Down Arrow

Subroutines

8000 Copies from picture to editing area
 8200 Copies from editing area to picture
 8500 Puts main menu and fills in colors in main menu
 8800 Selects item from pull-down menus
 9000 Draws pointer and waits for you to press the button
 9200 Like 9400 unless you're in the main menu (see article)
 9400 Reads joystick and returns
 9500 Checks which arrow key was pressed
 9800 Selects Yes or No using the joystick
 10000 Prints a text string on the graphics screen
 11000 Inputs a text string from the keyboard

Data for Character Set (in ASCII Order)

12000 'space' to '-'
 12010 '.' to '9'
 12020 ':' to '@'
 12030 'A' to 'M'
 12040 'N' to 'Z'
 12050 ASCII 91 to ASCII 96
 12060 'a' to 'k'
 12070 'l' to 'w'
 12080 'x' to 'z'
 13000 Data for screen dump routine

Variables

Numeric
 CS = Color set
 FC = Foreground color
 BC = Background color
 ES = Eraser size l
 PM = PUT Mode
 P = Used to copy pages, POKE value, etc.
 LE = Max length of input
 PN = Page number
 FB = Firebutton status
 X,Y,XX,YY,X1,Y1=scrn. loc.
 S = Menu selection
 A = Misc. variable
 N = Number of options in pull-down menu l

String

SS\$ = String to be printed in print routine (10000)
 SP\$ = 'Y' if speed-up poke is allowed and 'N' if not
 EX\$ = Used as an extension to print routine (see article)
 IS\$ = Inkey\$
 IN\$ = String that was typed in input routine (11000)
 FIS\$ = Filename

Arrays

ME = Main Menu (GP) (GP = GET/PUT array)
 FI = File Menu (GP)
 SI = Size Menu (GP)
 MI = Misc Menu (GP)
 GP = GET and PUT (GP)
 AR = Pointer (GP)
 A = Misc. Array (GP) (Used mainly in joystick input routine)
 CH\$ = Draws strings for character set
 D = Used in screen dump routine



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If It Doesn't Work

If parts of the main menu or pull-down menus are messed up, the problem is probably in the *MenuGen* program. Try proofreading the part of *MenuGen* corresponding to the menu where the problem is.

Any other problems are most likely in *CoCoDraw*. Look up the section that doesn't work in the line-by-line description and proofread those lines.

How it works

CoCoDraw uses all eight graphics pages. Pages one to four hold the actual picture, Page five is the main menu, and pages six to eight are the editing area. When *CoCoDraw* is run, it first initializes itself by defining the variables, loading the screen containing main menu and the pull-down menus (*MENU.SYS*) and getting them into arrays. Then it *PCOPYs* from the picture to the editing area, puts the main menu on the screen, and goes to a subroutine starting at Line 9000 which allows you to move the pointer around using the joystick until you click the button.

Next, in lines 740 to 780 it checks to see if you were in the menu area when you clicked, and if so, it branches to the routine selected. That routine then takes control until another option is selected from the main menu. The program is very structured, so it should not be too difficult to follow. Here is a list of the major subroutines and how

they are used:

8000 — Copies pages one to three to the editing area if *PN*=1 or pages two to four to the editing area if *PN*=2. Used in Undo and in most of the tools, such as in Line to erase the line you are making as you move it around. Also used to erase a pull-down menu and several other places as well.

of items in the menu minus one) and 'XX' (the 'X' value of where you want the menu to be). It gives you 'S' (the number of the item selected, with one being at the top).

9000 — Allows you to move the pointer around the screen using the joystick. Returns when you click the button. Gives you 'X' and 'Y', the screen

“Actually, the editing area you see is just 75 percent of the entire picture. By clicking the Up Arrow you see the top 75 percent of the picture.”

8200 — Copies the editing area to pages one to three if *PN*=1 or to pages two to four if *PN*=2. Opposite of 8000.

8500 — Puts the main menu on the screen and fills in the Color and Background boxes.

8800 — This is the routine that allows you to select an option from a pull-down menu. Returns when you click the button. You must give it 'N' (the number

location of the pointer when the button was clicked. It gets 'X' using *JOYSTK(0)*4+XO*. (*XO* is used to allow more detailed movement using the arrow keys on the keyboard.) *Y=JOYSTK(1)*3YO*.

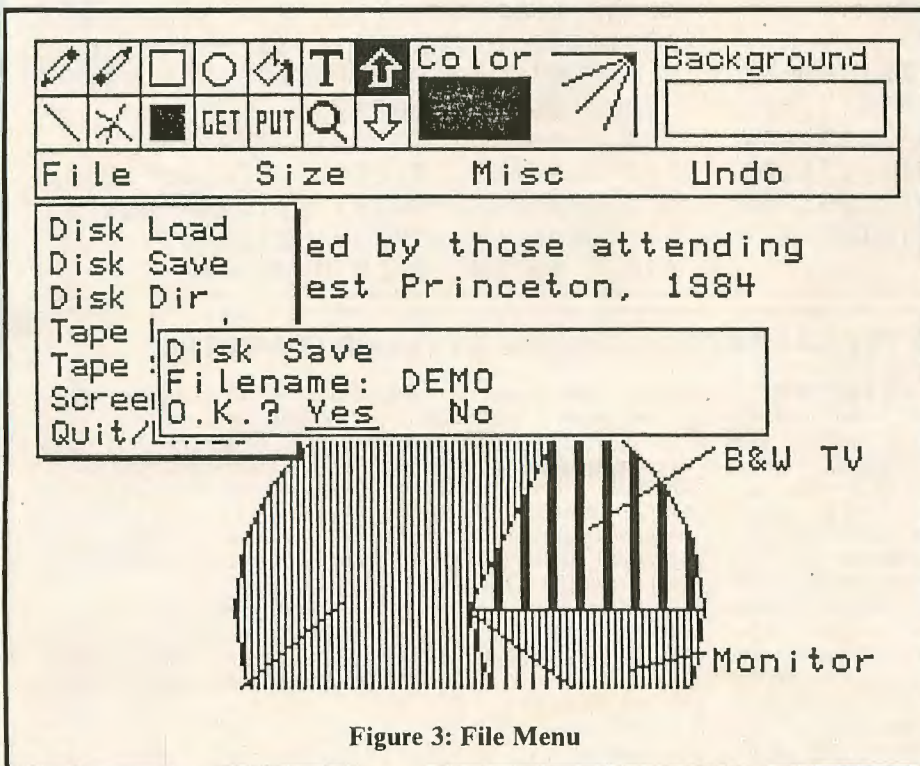
9200 — Checks the location of the joystick and the status of the button and returns immediately *only* if the position is in the editing area. If the position is in the main menu, it draws the pointer until you press the button or move into the editing area. If you press the button, it goes to Line 740 which checks what was selected and branches to it. If you move into the editing area, it returns.

9400 — Checks the location of the joystick and the status of the button. Returns immediately. Gives you 'X' and 'Y' (the screen location of the joystick), and 'FB', which equals 254 (&HFE) if the button is pressed.

9500 — Used by 9400. Checks which arrow key is pressed and changes *XO* (*X*-offset) and *YO* (*Y*-offset) accordingly. Returns immediately.

9800 — Prints *Yes* and *No* on the screen starting at location 'X,Y' and lets you use the joystick to select one. Returns when button is pressed. If *A*<32 then the answer is *yes*.

10000 — Draws *SS* starting at the current *DRAW* location, where *SS* equals any string of text you want printed on the graphics screen. It can also use the variable *EX\$*. *EX\$* equals any *DRAW* string you want inserted between each



character. It is used in this program as BL1 to put less space between each character. Under normal use, EX\$ equals the null string ("").

11000 — This is the input routine used in entering the filename for saving and loading and for adding text to your picture. You give it 'X' and 'Y', the screen location to start at; LE, the maximum length of the string to be input; and KE\$, which limits which keys will be accepted. If you want all keys to be accepted, make KE\$ equal to "ALL." If you want just 'Y' and 'N' allowed, make KE\$ equal to "YyNn." It gives you INS\$, the string that was input. Returns when ENTER is pressed.

See Table 1 for a line-by-line description and a variable list.

Modifications

To make this program work on a non-disk system:

A. Change Line 1000 to:

```
1000 GOSUBB200:PUT(0,4B)-(79,1
23),FI:XX=0:N=6:GOSUBBB00:PO
KE65494,0:IFS=7THEN1900ELSEIF
S<4THEN700
```

B. Change Line 1100 to:

```
1100 CSAVEMFI$,1536,7679,44539
```

C. Delete Line 20

D. Take lines 40 to 520 from *MenuGen* and insert them into *CoCoDraw*. (You can do this because you have about 2K more memory than disk systems.)

E. To use, just CLOAD and run.

If you do not have a printer, add GOTO 700:REM to Line 1690. If you want to

use another screen dump routine, delete lines 8, 1700, 1710 and 13000, and put your routine in lines 1700 to 1899. Remember to add a GOTO 700 at the end of the routine so the program will return to the main menu when the printing is done. Check back issues of THE RAINBOW for screen dump programs for other printers.

Special thanks to Daryl Hoover, who let me use his printer (an Epson RX-80) to write the screen dump routine included with this program.

If you have any questions or comments about *CoCoDraw*, I would like to here from you at Rt. #2, Box 223 Ephrata, PA 17522. Please include an SASE if you want a return reply. □

130	.....	236
400	.....	130
10000	....	189
12030	....	226
END	.....	.87

Listing 1: MENUGEN

```
0 ' MENUGEN, BY DARIN HERR
1 ' FOR USE WITH COCODRAW V1.1
2 GOTO 8
5 PCLEAR8:DIMCH$(90):FORA=0TO90:
READCH$(A):NEXT:GOTO10
8 PCLEAR8:GOTO5
10 PMODE4,5:COLOR0,1:PCLS:SCREEN
1,0
40 ' ** THE POINTER **
50 DRAW"BM0,124R3G3U3F4"
90 ' ** THE MAIN MENU **
100 LINE(0,0)-(255,46),PSET,B:FOR
RX=0TO112STEP16:LINE(X,0)-(X,32)
,PSET:NEXT:LINE(115,11)-(147,29)
,PSET,B:LINE(187,12)-(251,28),PS
ET,B:LINE(184,0)-(184,32),PSET:L
INE(0,16)-(112,16),PSET:LINE(0,3
2)-(255,32),PSET
```

```
110 DRAW"BM11,2G8D3LUR2UDRE8HL2D
R2DL2;BM20,13E8U3RDL2DULG8FR2UL2
UR2;BM35,3R10D10L10U10;BM54,4R3F
3D3G3L3H3U3E3;BM71,4G5F4E5RD4FU6
LULDLH2D2U5;BM83,5U2R9D2HL3D8FL3
EU8L4;BM104,3G5R3D5R4U5R3H5"
120 DRAW"BM3,19F10;BM24,24;M27,1
9;BM24,24;F5H5;M22,30;BM24,24;M1
9,28;BM24,24;M19,21;BM53,21L2D6R
2U2BU4BR4L2D3R2L2D3R2BR3U6LR2;BM
67,24R2U3L2D6BR4BU6D6R2U6BR2R2LD
6;BM85,18R3F3D3GDF3DH4GL3H3U3E2R
4F2D3G2L3H2U3E1;BM102,19D5L3F5E5
L3U5L3"
130 LINE(35,19)-(45,29),PSET,BF
140 DRAW"BM3,36":S$="File":GOSUB
100000:DRAW"BM67,36":S$="Size":GO
SUB100000:DRAW"BM131,36":S$="Misc
":GOSUB100000:DRAW"BM195,36":S$="
Undo":GOSUB100000
190 ' ** THE COLOR BOXES **
200 DRAW"BM115,2":S$="Color":GOS
UB100000:DRAW"BM187,2":EX$="BL1":
S$="Background":GOSUB100000
290 ' ** THE FILE MENU **
```

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```

300 LINE(0,48)-(78,122),PSET,B:L
INE(2,123)-(79,123),PSET:LINE-(7
9,50),PSET
310 EX$="BL1":DRAW"BM5,52":S$="D
isk Load":GOSUB10000:DRAW"BM5,62
":S$="Disk Save":GOSUB10000:DRAW
"BM5,72":S$="Disk Dir":GOSUB1000
0:DRAW"BM5,82":S$="Tape Load":GO
SUB10000:DRAW"BM5,92":S$="Tape S
ave":GOSUB10000
320 DRAW"BM5,102":S$="Screen Dum
p":GOSUB10000:DRAW"BM5,112":EX$=
"BL1":S$="Quit/BASIC":GOSUB10000
390 ' ** THE SIZE MENU **
400 LINE(80,48)-(158,92),PSET,B:
LINE(82,93)-(159,93),PSET:LINE-(
159,50),PSET
410 DRAW"BM85,52":S$="Eraser Siz
e":GOSUB10000:DRAW"BM85,62":S$="
1 x 1":GOSUB10000:DRAW"BM85,72
":S$="4 x 4":GOSUB10000:DRAW"BM
85,82":S$="> 8 x 8":GOSUB10000
490 ' ** THE MISC MENU **
500 LINE(160,48)-(238,142),PSET,
B:LINE(162,143)-(239,143),PSET:L
INE-(239,50),PSET
510 DRAW"BM165,52":S$="Clear Scr
een":GOSUB10000:DRAW"BM165,62":S
$="Show Picture":GOSUB10000:DRAW
"BM165,72":S$="Color Set":GOSUB1
0000:DRAW"BM165,82":S$="PUT Mode
":GOSUB10000:DRAW"BM165,92":S$="
> Set":GOSUB10000:DRAW"BM165,102
":S$="Reset":GOSUB10000
520 DRAW"BM165,112":S$="And":G
OSUB10000:DRAW"BM165,122":S$="
Or":GOSUB10000:DRAW"BM165,132":S
$="Not":GOSUB10000:EX$=""
600 EXEC44539:INPUT"PRESS [ENTER
] WHEN READY TO SAVE";A$:SAVEM"
M
ENUS.SYS",9728,14333,44539
610 END
9990 ' ** HI-RES PRINT ROUTINE *

```

```

*
10000 FORA=1TOLEN(S$):DRAWCH$(AS
C(MID$(S$,A,1))-32)+EX$:NEXT:RET
URN
11990 ' ** CHARACTER DATA **
12000 DATA BR7,BR2D4BD2D0BU6BR5,
BRDBR2UBR4,BD2R4HD4EL4FU4BUBR6,B
R4BDL4D2R4D2L4R2DU6BR5,DRUBR3DG4
DBR3URDBU6BR3,BRRFG3DFRE2BD2H4UB
UBR7,BRDRUBR5,BR3G2D2F2BU6BR4,BR
F2D2G2BU6BR6,BD3R4BD2H4BD4E4BUBR
3,BD3R4BG2U4BUBR5,BD6BR2GBU7BR6,
BD3R4BU3BR3
12010 DATA BD6BR2R0BU6BR5,BD6UE4
UBR3,BDD4FR2EU4HL2BD3BRR0BE3BR2,
BR2D6RL2BU5EBR5,BDER2FDG4R4BU6BR
3,BDER2FDGL2R2FDGL2HBE5BR2,D3R4L
D3U6BR4,R4L4D3R4D3L4BE6BR,BDD4FR
2EUHL2BU3R2FBEBR2,DUR4D2G3DBE6,B
DDFR2FDGL2HUER2EUHL2BR6,BRR2FD4G
L2HBU4DFR3BE3
12020 DATA BD3BR2D0BD3U0BU6BR5,B
D3BR2D0BD3GBU7BR6,BR3G3F3BU6BR4,
BD2R4BD2L4BE4BR3,BRF3G3BE6,BD2UE
R2FD2L2DBD2U0BU6BR5,R4D4L2U2R2BD
4L4U6BR7
12030 DATA BDD5U2R4D2U5HL2BR6,D6
R3EUHL2R2EUHL2BR6,BDD4FR2EBU4HL2
BR6,D6R2E2U2H2LBR6,D3R3L3D3R4BU6
L4BR7,D6U3R3L3U3R4BR3,BDD4FR2EU2
L2R2BU2HL2BR6,D6U3R4D3U6BR3,R4L2
D6L2R4BU6BR3,BD4DFR2EU5BR3,D6U3R
F3H3E3BR3,D6R4BU6BR3,D6U5RFDUERD
5U6BR3
12040 DATA D6U5RFD2F2U6BR3,BDD4F
R2EU4HL2BR6,D6U3R3EUHL2BR6,BDD4F
REHF2HEU3HL2BR6,D6U4F4H3R2EUHL2B
R6,BDDFR2FDGL2HBE4HL2BR6,R2D6U6R
2BR3,D6R4U6BR3,D3FDFEUEU3BR3,D5F
EUDFEU5BR3,DF4DBL4UE4UBR3,DFDFD2
U2EUEUBR3,R4DG4DR4BU6BR3
12050 DATA BRR2L2D6R2BU6BR4,BD8L
R6BU8BR2,BRR2D6L2BE6,BD2E2D6U6F2

```

Two-Liner Contest Winner . . .

Hit the white balloons with your arrows, but don't waste arrows because each shot creates a dangerous black balloon which you must avoid. Use the right joystick and firebutton.

The listing:

```

0 IFA=0THENCLS:PRINT"SCORE : "S:F
ORI=1TO50:PRINT@RND(30)+RND(9)*3
2,"O";:NEXT:A=1:GOTOELSEPRINT@44
8,TAB(JOYSTK(0)*.47)"<^>
";:IF(PEEK(652
80)AND1)=0 THENPRINT@RND(224)+31
,"o";:GOTOELSE0

```

```

1 FORI=417+INT(PEEK(346)*.47)TO3
2STEP-32:IFPEEK(1024+I)=79THENPR
INT@I,"X";:PRINT@I+32," ";:PLAY"
T99AB":S=S+10:PRINT@8,S:IFINT(S/
300)=S/300THENA=0:GOTOELSE0ELSEI
FPEEK(1024+I)=15THENPLAY"T2BAG"E
LSEPRINT@I,"^";:PRINT@I+32," ";:
NEXT:PRINT@I+32," ";:GOTO

```

Vick Mishra
Newington, CT

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

```

BU2BR3 ,BL7 ,BR7
12060 DATA BD2R3FD3L3HER3BU4BR3 ,
D6R3EU2HL2BU2BR6 ,BD3D2FR2EBU2HL2
BU2BR6 ,BD3D2FR3U4L3R3U2BR3 ,BD3DR
4UHL2GD2FR3BU6BR3 ,BD3R3L2D3U5ERF
BEBR2 ,BD3D2FR3DGL3BR4BUU5L3R3BU2
BR3 ,D6U4R3FD3BU6BR3 ,BDBR2D0BD2D3
BU6BR5 ,BD7FR2EU4BU2U0BUBR3 ,D6U3F
3H2E2BU2BR4
12070 DATA BR2D6RBU6BR4 ,BD2D4U4R

```

```

2D4U4RFD3BU6BR3 ,BD2D4U4R3FD3BU6B
R3 ,BD3D2FR2EU2HL2BU2BR6 ,BD2D6U2R
3EU2HL2BU2BR6 ,BD3D2FR3D2U6L3BU2B
R6 ,BD2D4U2E2R2BU2BR3 ,BD3FR2FGL3B
E4L3BU2BR6 ,BD2R2LU2D5FEUBU5BR4 ,BD
2D3FR2EU3BU2BR3 ,BD2DFDFEUEUBU2BR
3 ,BD2D3FEUDFEU3BU2BR3
12080 DATA BD2F4H2G2E4BU2BR3 ,BD2
DFDFG2E3UEUBU2BR3 ,BD2R4G4R4BU6BR
3

```

730	.....33	5200	.....97	9520	.....8
1030	.....159	6000	.....150	11020	.....128
1900	.....79	6240	.....137	12010	.....86
3000	.....224	6290	.....246	12050	.....170
4230	.....116	8830	.....119	END	.....181

Listing 2: COCODRAW

```

0 'COCODRAW V1.1 BY DARIN HERR
1 GOTO3
2 CLS:PRINT@108,"COCODRAW":PRINT
@142,"V1.1":PRINT@207,"BY":PRINT
@235,"DARIN HERR":PRINT@270,"198
6":PRINT@449,"INITIALIZING-ONE M
OMENT PLEASE":GOTO5
3 PCLEAR8:GOTO2
5 DIM A(102),AR(1),ME(307),FI(15
1),SI(92),MI(191),GP(102),CH$(90
):FORA=0TO90:READCH$(A):NEXT:BC=
3:ES=7:PN=1:PM=1:LE=40
8 DIMD(15):FORA=0TO15:READD(A):N
EXT
10 PMODE4,5:COLOR0,1:PCLS
20 LOADM"MENU.SYS"
600 GET(0,124)-(4,128),AR,G:GET(
0,0)-(255,47),ME:GET(0,48)-(79,1
23),FI:GET(80,48)-(159,93),SI:GE
T(160,48)-(239,143),MI
700 GOSUB8000
710 GOSUB8500:SCREEN1,CS
720 IFSP$=""THENLINE(56,84)-(197
,117),PRESET,BF:LINE(57,85)-(196
,116),PSET,B:DRAW"BM64,88":S$="D
o you want to use":GOSUB10000:DR
AW"BM64,97":S$="the Speed-Up POK
E?":GOSUB10000:X=101:Y=106:GOSUB
9800:IFA<32THENSP$="Y":GOTO1110E
LSESP$="N":GOSUB8000
730 GOSUB 9000
740 PLAY"O3T16C":IFY>47THEN730
750 IFY>32THENS=INT(X/64)+1:ONS
GOTO1000,2000,2500,3000
760 IFX>111THENS=X:GOTO3500
770 X=INT(X/16)*16:Y=INT(Y/16)*1
6:S=(X/16+1)+7*Y/16:IFS=7ORS=14T
HEN780ELSEPUT(X+1,Y+1)-(X+15,Y+1
5),A,NOT

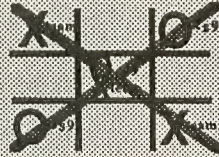
```

```

780 ONS GOTO4000,4200,4400,4600,
4800,5000,5200,5400,5600,4400,58
00,6000,6200,6400
1000 GOSUB8200:PUT(0,48)-(79,123
),FI:XX=0:N=6:GOSUB8800:POKE6549
4,0:IFS=7THEN1900ELSEIFS=3THENGO
SUB8000:CLS:INPUT"DRIVE #";P:IFP
>3THEN700ELSEDIRP:FORA=1TO2STEP0
:IF(PEEK(&HFF00)OR&H80)<>&HFE TH
ENNEXTEELSE700
1010 POKE178,0:POKE179,3:LINE(36
,84)-(217,117),PRESET,BF:LINE(37
,85)-(216,116),PSET,B:IFS=6THEN1
690ELSEIFS<3THENS$="Disk"ELSES$=
"Tape"
1020 IFS=1ORS=4THENS$=S$+" Load"
ELSES$=S$+" Save"
1030 DRAW"BM40,88":GOSUB10000:DR
AW"BM40,97":S$="Filename":GOSUB
10000:IFS<3THENLE=14ELSELE=8
1040 X=110:Y=97:KE$="ALL":GOSUB1
0000:FI$=IN$
1050 DRAW"BM40,106":S$="O.K.?:G
OSUB10000:X=82:Y=106:GOSUB9800:I
FA>31THEN1110
1060 IFS>3THEN1090
1070 IFS=1THENLOADMFI$ELSES$AVEMF
I$,3584,9727,44539
1080 GOTO1110
1090 IF S=4 THEN PMODE4,1:SCREEN
1,CS:CLOADMFI$:PMODE4,5:SCREEN1,
CS:GOTO1110
1100 CSAVEMFI$,3584,9727,44539
1110 GOSUB8000:IFSP$="Y"THENPOKE
65495,0
1120 GOTO730
1690 S$="Screen Dump":DRAW"BM87,
88":GOSUB10000:S$="Is printer re
ady?":DRAW"BM67,97":GOSUB10000:X
=99:Y=106:GOSUB9800:IFA>31THEN11
10
1700 PRINT#-2,CHR$(27)"@CHR$(27
)"A"CHR$(8):S$=CHR$(27)+"K"+CHR$(
128)+CHR$(1):FORA=1536TO1567:FO
RX=1TO2:PRINT#-2,S$;:FORB=191TO0
STEP-1:P=NOT(PEEK(A+32*B)):IFX=1
THENC=(P AND240)/16ELSEC=P AND15

```


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```

1710 PRINT#-2,CHR$(D(C));CHR$(D(C));:NEXTB:PRINT#-2,CHR$(0):NEXT X,A:GOTO700
1900 GOSUB8000:CLS:PRINT"TYPE 'CONT [ENTER]' TO RESTART PROGRAM":PRINT:STOP:GOTO700
2000 GOSUB8200:PUT(64,48)-(143,93),SI:XX=64:N=3:GOSUB8800:IFS=1THENGOSUB8000:GOTO730
2010 POKE178,0:POKE179,3:LINE(69,62)-(74,89),PRESET,BF:DRAW"BM69","+STR$(S*10+42)+CH$(30):GET(64,48)-(143,93),SI:S=S-2:ES=S*4-SGN(S):GOTO700
2500 GOSUB8200:PUT(128,48)-(207,143),MI:XX=128:N=8:GOSUB8800:IFS<5THENONS GOTO2510,2520,2540,2550ELSE2560
2510 GOSUB8000:LINE(0,48)-(255,191),PRESET,BF:GOTO730
2520 GOSUB8000:Pmode4,1:SCREEN1,CS
2530 GOSUB9400:IFFB<>&HFE THEN2530ELSEPmode4,5:GOTO700
2540 CS=ABS(CS-1):SCREEN1,CS:GOSUB8000:GOTO730
2550 GOSUB8000:GOTO730
2560 POKE178,0:POKE179,3:LINE(133,92)-(138,139),PRESET,BF:DRAW"BM133","+STR$(S*10+42)+CH$(30):PM=S-4:GET(128,48)-(207,143),MI:GOSUB8000:GOTO700
3000 GOSUB8000:GOTO730
3500 GOSUB8200:PCLS:FOR Y=3 TO 191 STEP 12:FOR X=3 TO 256 STEP 16:A=(Y-3)/12*16+(X-3)/16:POKE178,A:LINE(X,Y)-(X+7,Y+6),PSET,BF:IF INKEY$<>" THEN700ELSENEXT X,Y:IF BC=0 THEN POKE178,3 ELSE POKE178,0
3510 X=INT(JOYSTK(0)/4)*16+2:Y=INT(JOYSTK(1)/4)*12+2:LINE(X,Y)-(X+9,Y+8),PSET,B:LINE(X,Y)-(X+9,Y+8),PRESET,B:FB=PEEK(&HFF00)OR&H80:IS=INKEY$:IFFB<>&HFE AND IS="" THEN3510
3520 A=(Y-2)/12*16+(X-2)/16:IFI$<>" THEN700ELSEIFS<184 THENFC=A ELSEBC=A
3530 GOTO700
4000 GOSUB9000:IFY<48 THENGOSUB8500:GOTO740ELSEGOSUB8200:LINE(X,Y)-(X,Y),PRESET
4010 GOSUB9400:LINE-(X,Y),PSET:IFFB=&HFE THEN4010ELSE4000
4200 GOSUB 8200:IFBC=0 THENPOKE178,3ELSEPOKE178,0
4210 GOSUB9200:IFX>255-ES THENX=255-ES
4220 IFY>191-ES THENY=191-ES

```

```

4230 GET(X,Y)-(X+ES,Y+ES),A,G:LINE(X,Y)-(X+ES,Y+ES),PSET,BF:LINE(X,Y)-(X+ES,Y+ES),PRESET,BF:IFFB<>&HFE THENPUT(X,Y)-(X+ES,Y+ES),A,PSET
4240 GOTO4210
4400 GOSUB9000:XX=X:YY=Y:IFY<48 THENGOSUB8500:GOTO740ELSEGOSUB8200
4410 GOSUB9400:LINE(XX,YY)-(X,Y),PRESET,B:LINE-(XX,YY),PSET,B:IF FB=&HFE THENGOSUB8000:GOTO4410ELSEIFS>7 THENLINE(XX,YY)-(X,Y),PSET,BF
4420 GOTO4400
4600 GOSUB9000:XX=X:YY=Y:IFY<48 THENGOSUB8500:GOTO740ELSEGOSUB8200
4610 GOSUB9400:CIRCLE(XX,YY),ABS(X+Y/12-8):IFFB=&HFE THENGOSUB8000:GOTO4610ELSE4600
4800 GOSUB9000:IFY<48 THENGOSUB8500:GOTO740ELSEIFPOINT(X,Y)=0 THENNC=1ELSEC=0
4810 GOSUB8200:PAINT(X,Y),,C:GOTO4800
5000 KE$="ALL":LE=36
5010 GOSUB9000:IFY<48 THENPUT(81,1)-(95,15),A,NOT:GOTO740ELSEIFX=0 THENX=1
5020 GOSUB8200:GOSUB11000:GOTO5010
5200 IFPN=1 THEN730ELSEPUT(97,1)-(111,15),A,NOT:PUT(97,17)-(111,31),A,NOT:GOSUB8200:PN=1:GOSUB8000:GOTO730
5400 GOSUB9000:IFY<48 THENGOSUB8500:GOTO740ELSEGOSUB8200:XX=X:YY=Y
5410 GOSUB8000:GOSUB9400:LINE(XX,YY)-(X,Y),PSET:IFFB=&HFE THEN5410ELSE5400
5600 GOSUB9000:IFY<48 THENGOSUB8500:GOTO740ELSEXX=X:YY=Y:GOSUB8200
5610 GOSUB9400:LINE(XX,YY)-(X,Y),PSET:IFFB=&HFE THENA=0:GOTO5620ELSEGOSUB8000:GOTO5610
5620 A=A+1:GOSUB9400:IFFB=&HFE AND A<1 THEN5620ELSEIFA<1 THENGOSUB8200:GOTO5610ELSE5630
5630 PLAY"C":GOSUB9400:IFFB=&HFE THEN5630ELSE5600
5800 GOSUB9000:IFY<48 THENPUT(49,17)-(63,31),A,NOT:GOTO740ELSEGOSUB8200:XX=X:YY=Y
5810 X=JOYSTK(0):Y=JOYSTK(1):IFX+X>255 THENX=255-XX
5820 IFYY+Y>191 THENY=191-YY

```

```

5830 LINE (XX,YY) - (XX+X,YY+Y) , PRE
SET, B:LINE - (XX,YY) , PSET, B:FB=PEE
K (&HFF00) OR &H80:GOSUB 8000:IFFB=&
HFE THEN 5810 ELSE GET (XX,YY) - (XX+X
,YY+Y) , GP, G:FORA=1 TO 4:PUT (XX,YY)
- (XX+X,YY+Y) , GP, NOT: NEXT: PUT (49
,17) - (63,31) , A, NOT:GX=X:GY=Y:GOTO
730
6000 GOSUB 8200
6010 GOSUB 9200:IFX+GX>255 THEN X=2
55-GX
6020 GET (X,Y) - (X+GX,Y+GY) , A, G:ON
PM GOSUB 6040, 6050, 6060, 6070, 6080
:IFFB<>&HFE THEN PUT (X,Y) - (X+GX,Y
+GY) , A, PSET
6030 GOTO 6010
6040 PUT (X,Y) - (X+GX,Y+GY) , GP, PSE
T:RETURN
6050 PUT (X,Y) - (X+GX,Y+GY) , GP, PRE
SET:RETURN
6060 PUT (X,Y) - (X+GX,Y+GY) , GP, AND
:RETURN
6070 PUT (X,Y) - (X+GX,Y+GY) , GP, OR:
RETURN
6080 PUT (X,Y) - (X+GX,Y+GY) , GP, NOT
:RETURN
6200 POKE 178,0:POKE 179,3
6210 GOSUB 9200:IFX>240 THEN X=240

```

```

6220 IFY>176 THEN Y=176
6230 GET (X,Y) - (X+15,Y+15) , A, G:LI
NE (X,Y) - (X+15,Y+15) , PRESET, B:LIN
E (X,Y) - (X+15,Y+15) , PSET, B:PUT (X
,Y) - (X+15,Y+15) , A, PSET:IFFB<>&HFE
THEN 6210 ELSE GOSUB 8200:X1=X:Y1=Y
6240 SCREEN,0:PCLS:LINE (12,12) - (
146,146) , PSET, B:LINE (11,11) - (147
,147) , PSET, B:LINE (16,160) - (72,17
6) , PSET, B:LINE (88,160) - (144,176)
, PSET, B:LINE (190,30) - (209,49) , PS
ET, B:LINE (190,94) - (209,113) , PSET
, B:LINE (0,0) - (255,191) , PSET, B:LI
NE (1,1) - (254,190) , PSET, B
6250 DRAW "BM57,3":S$="MAGNIFY":G
OSUB 10000:DRAW "BM31,165":S$="Don
e":GOSUB 10000:DRAW "BM96,165":S$="
Cancel":GOSUB 10000:DRAW "BM181,5
6":S$="Before":GOSUB 10000:DRAW "B
M191,120":S$="Now":GOSUB 10000
6260 PUT (192,32) - (207,47) , A, PSET
:PUT (192,96) - (207,111) , A, PSET:FO
RY=32 TO 47:YY=(Y-32)*8+16:FORX=19
2 TO 207:XX=(X-192)*8+16:IF PPOINT (
X,Y)=0 THEN LINE (XX,YY) - (XX+6,YY+6
) , PSET, BF ELSE LINE (XX,YY) - (XX+6
,YY+6) , PRESET, BF
6270 NEXT X,Y

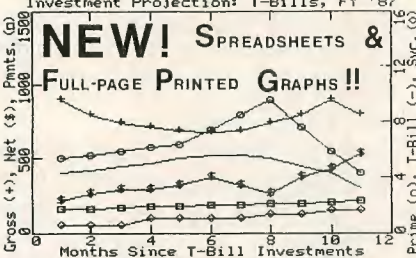
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```

6280 GOSUB9000:IFX>142ORX<16ORY<
16ORY>176THEN6280ELSEIFY<144THEN
X=INT((X-16)/8):Y=INT((Y-16)/8):
XX=X*8+16:YY=Y*8+16:PUT(XX,YY)-(
XX+6,YY+6),A,NOT:PUT(X+192,Y+96)
-(X+192,Y+96),A,NOT:GOTO6280
6290 IFY<160ORY>176OR(X>93ANDX<8
8)THEN6280ELSEIFX>87THENGET(192,
32)-(207,47),A,G:PUT(192,96)-(20
7,111),A,PSET:GOTO6260ELSEGET(19
2,96)-(207,111),A,G:GOSUB8500:GO
SUB8000:PUT(X1,Y1)-(X1+15,Y1+15)
,A,PSET:X=80:Y=16:GOTO770
6400 IFPN=2THEN730ELSEPUT(97,1)-
(111,15),A,NOT:PUT(97,17)-(111,3
1),A,NOT:GOSUB8200:PN=2:GOSUB800
0:GOTO730
8000 FORP=PN TOPN+2:PCOPY TOP+6
-PN:NEXT:RETURN
8200 FORP=6TO8:PCOPY TOP-6+PN:N
EXT:RETURN
8500 PUT(0,0)-(255,47),ME:POKE17
8,FC:POKE179,BC:LINE(116,12)-(14
6,28),PSET,BF:DRAW"BM178,4NL24NG
17ND24M157,13M178,4M169,26":LINE
(188,13)-(250,27),PRESET,BF:IFPN
=1THENPUT(97,1)-(111,15),A,NOT:R
ETURNELSEPUT(97,17)-(111,31),A,N
OT:RETURN
8800 GOSUB9400:S=INT(Y/3/(63/N))
:GOTO8830
8810 GOSUB9400:S=INT(Y/3/(63/N))
:IFFB<>&HFE THENS=S+1:PUT(XX+2,P
*10+51)-(XX+76,P*10+60),A,NOT:RE
TURNELSEIFS=P THEN8810
8820 PUT(XX+2,P*10+51)-(XX+76,P*
10+60),A,NOT
8830 PUT(XX+2,S*10+51)-(XX+76,S*
10+60),A,NOT:P=S:GOTO8810
9000 GOSUB9400:GOTO9020
9010 GOSUB9400:PUT(XX,YY)-(XX+4,
YY+4),A,PSET:IFFB=&HFE THENRETUR
N
9020 GET(X,Y)-(X+4,Y+4),A,G:IFPP
OINT(X,Y)>0THENPUT(X,Y)-(X+4,Y+4
),AR,PSET ELSEPUT(X,Y)-(X+4,Y+4
),AR,PRESET
9030 XX=X:YY=Y:GOTO9010
9200 GOSUB9400:IFY>47THENRETURNE
LSE9220
9210 GOSUB9400:PUT(XX,YY)-(XX+4,
YY+4),A,PSET:IFY>47THENRETURN
9220 GET(X,Y)-(X+4,Y+4),A,G:IFPP
OINT(X,Y)>0THENPUT(X,Y)-(X+4,Y+4
),AR,PSET ELSE PUT(X,Y)-(X+4,Y+4
),AR,PRESET
9230 IFFB=&HFE THENPUT(X,Y)-(X+4
,Y+4),A,PSET:GOSUB8500:GOTO740EL
SEX=X:YY=Y:GOTO9210

```

```

9400 IFPEEK(&H155)+PEEK(&H156)+P
EEK(&H157)+PEEK(&H158)<&H3F8 THE
NGOSUB9500
9410 X=JOYSTK(0)*4+XO:Y=JOYSTK(1
)*3+YO:FB=PEEK(&HFF00)OR&H80:RET
URN
9500 IF(PEEK(341)=247ORPEEK(341)
=246)ANDYO>0THENYO=YO-1
9510 IF(PEEK(342)=247ORPEEK(342)
=246)ANDYO<2THENYO=YO+1
9520 IF(PEEK(343)=247ORPEEK(343)
=246)ANDXO>0THENXO=XO-1
9530 IF(PEEK(344)=247ORPEEK(344)
=246)ANDXO<3THENXO=XO+1
9540 FB=PEEK(&HFF00)OR&H80:IFFB=
&HFE THENP=254ELSEP=255
9550 FORA=&H155 TO&H158:POKEA,P:
NEXT:RETURN
9800 DRAW"BM"+STR$(X)+", "+STR$(Y
):S$="Yes No":GOSUB10000
9810 A=JOYSTK(0):IFA<32THENPOKE1
78,0:POKE179,3ELSEPOKE178,3:POKE
179,0
9820 LINE(X-1,Y+8)-(X+20,Y+8),PS
ET:LINE(X+40,Y+8)-(X+55,Y+8),PRE
SET:IF(PEEK(&HFF00)OR&H80)=&HFE
THENPOKE178,FC:POKE179,BC:RETURN
ELSE9810
10000 FORA=1TOLEN(S$):DRAWCH$(AS
C(MID$(S$,A,1))-32)+EX$:NEXT:RET
URN
11000 DRAW"BM"+STR$(X)+", "+STR$(
Y)+"LD8RU8RD8RU8RD8RU8RD8U8L5":G
ET(X-1,Y)-(X+5,Y+8),A,G:IN$=INKE
Y$
11010 IN$=INKEY$:IFIN$=""ANDCO<1
0THENCO=CO+1:GOTO11010ELSEIFIN$=
""THENPUT(X-1,Y)-(X+5,Y+8),A,NOT
:CO=0:GOTO11010
11020 IFIN$=CHR$(8)THENIFLEN(DE$
)=0THEN11010ELSEPUT(X-1,Y)-(X+5,
Y+8),A,PRESET:X=X-7:DE$=LEFT$(DE
$,LEN(DE$)-1):DRAW"BL7":PUT(X-1,
Y)-(X+5,Y+8),A,PSET:GOTO11010
11030 IFIN$=CHR$(13)THENPUT(X-1,
Y)-(X+5,Y+8),A,PRESET:IN$=DE$:DE
$="":RETURN
11040 IFASC(IN$)<31ORLEN(DE$)=LE
ORIN$=CHR$(95)ORX>242 THEN11010
11050 IFKE$<>"ALL"THENIFINSTR(KE
$,IN$)=0THENSOUND1,1:GOTO11010
11060 PUT(X-1,Y)-(X+5,Y+8),A,PRE
SET:DRAWCH$(ASC(IN$)-32):DE$=DE$
+IN$:X=X+7:PUT(X-1,Y)-(X+5,Y+8),
A,PSET:GOTO11010
12000 DATA BR7,BR2D4BD2D0BU6BR5,
BRDBR2UBR4,BD2R4HD4EL4FU4BUBR6,B
R4BDL4D2R4D2L4R2DU6BR5,DRUBR3DG4
DBR3URDBU6BR3,BRRFG3DFRE2BD2H4UB

```



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UBR7, BRDRUBR5, BR3G2D2F2BU6BR4, BR
 F2D2G2BU6BR6, BD3R4BD2H4BD4E4BUBR
 3, BD3R4BG2U4BUBR5, BD6BR2GBU7BR6,
 BD3R4BU3BR3
 12010 DATA BD6BR2R0BU6BR5, BD6UE4
 UBR3, BDD4FR2EU4HL2BD3BRR0BE3BR2,
 BR2D6RL2BU5EBR5, BDER2FDG4R4BU6BR
 3, BDER2FDGL2R2FDGL2HBE5BR2, D3R4L
 D3U6BR4, R4L4D3R4D3L4BE6BR, BDD4FR
 2EUHL2BU3R2FBEBR2, DUR4D2G3DBE6, B
 DDFR2FDGL2HUER2EUHL2BR6, BRR2FD4G
 L2HBU4DFR3BE3
 12020 DATA BD3BR2D0BD3U0BU6BR5, B
 D3BR2D0BD3GBU7BR6, BR3G3F3BU6BR4,
 BD2R4BD2L4BE4BR3, BRF3G3BE6, BD2UE
 R2FD2L2DBD2U0BU6BR5, R4D4L2U2R2BD
 4L4U6BR7
 12030 DATA BDD5U2R4D2U5HL2BR6, D6
 R3EUHL2R2EUHL2BR6, BDD4FR2EBU4HL2
 BR6, D6R2E2U2H2LBR6, D3R3L3D3R4BU6
 L4BR7, D6U3R3L3U3R4BR3, BDD4FR2EU2
 L2R2BU2HL2BR6, D6U3R4D3U6BR3, R4L2
 D6L2R4BU6BR3, BD4DFR2EU5BR3, D6U3R
 F3H3E3BR3, D6R4BU6BR3, D6U5RFDUERD
 5U6BR3
 12040 DATA D6U5RFD2F2U6BR3, BDD4F
 R2EU4HL2BR6, D6U3R3EUHL2BR6, BDD4F
 REHF2HEU3HL2BR6, D6U4F4H3R2EUHL2B

R6, BDDFR2FDGL2HBE4HL2BR6, R2D6U6R
 2BR3, D6R4U6BR3, D3FDFEUEU3BR3, D5F
 EUDFEU5BR3, DF4DBL4UE4UBR3, DFDFD2
 U2EUEUBR3, R4DG4DR4BU6BR3
 12050 DATA BRR2L2D6R2BU6BR4, BD8L
 R6BU8BR2, BRR2D6L2BE6, BD2E2D6U6F2
 BU2BR3, BL7, BR7
 12060 DATA BD2R3FD3L3HER3BU4BR3,
 D6R3EU2HL2BU2BR6, BD3D2FR2EBU2HL2
 BU2BR6, BD3D2FR3U4L3R3U2BR3, BD3DR
 4UHL2GD2FR3BU6BR3, BD3R3L2D3U5ERF
 BEBR2, BD3D2FR3DGL3BR4BU5L3R3BU2
 BR3, D6U4R3FD3BU6BR3, BDBR2D0BD2D3
 BU6BR5, BD7FR2EU4BU2U0BUBR3, D6U3F
 3H2E2BU2BR4
 12070 DATA BR2D6RBU6BR4, BD2D4U4R
 2D4U4RFD3BU6BR3, BD2D4U4R3FD3BU6B
 R3, BD3D2FR2EU2HL2BU2BR6, BD2D6U2R
 3EU2HL2BU2BR6, BD3D2FR3D2U6L3BU2B
 R6, BD2D4U2E2R2BU2BR3, BD3FR2FGL3B
 E4L3BU2BR6, BD2R2LU2D5FEU5BR4, BD
 2D3FR2EU3BU2BR3, BD2DFDFEUEUBU2BR
 3, BD2D3FEUDFEU3BU2BR3
 12080 DATA BD2F4H2G2E4BU2BR3, BD2
 DFDFG2E3UEUBU2BR3, BD2R4G4R4BU6BR
 3
 13000 DATA 0, 3, 12, 15, 48, 51, 60, 63,
 192, 195, 204, 207, 240, 243, 252, 255 ☺

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Learning How To Function in Basic

By Joseph Kolar
Rainbow Contributing Editor

Last month, we used the MID\$ and LEN functions on the inverse, black screen, but we didn't hurt ourselves explaining them in detail.

To make amends, we shall repair this neglect and work with LEN, LEFT\$ and RIGHT\$. We are going to use the MID\$ that complements LEFT\$ and RIGHT\$. Keep in mind that there is another form of MID\$ (a statement as opposed to a function).

We'll toy around with the regular green screen and create some interesting effects that may be of use in your programming future.

The first order of business is to give an overview of LEN, LEFT\$, RIGHT\$ and MID\$. Look at Listing 1. Key in lines 10, 20 and 100. The meat is in Line 20. We plan to display a title on the text screen — a centered name and address heading.

The entire text was enclosed, within quote marks, in one long string of letters, numerals and blank spaces. The string-out line was assigned a name, string variable A\$. The three lines of the title were scrambled and blank spaces

separating the lines were omitted by personal choice.

Key in Line 30. L is the variable assigned to LEN(A\$), the length or number of characters/spaces in the string A\$.

It was chosen to display this value to achieve a dual purpose. First, to locate it in the center of the screen as a centering guide. The two-digit value begins on the 15th space. (Remember the first line is 0, not 1.) Secondly, I was curious to know how many characters/spaces there were in A\$.

The top line of desired text is buried in the middle of string A\$, so we may as well fetch it, using MID\$ as our appropriate tool.

Key in Line 40. Picking a location on the second row, I unimaginatively chose 32 at the left margin. Later, it would be centered. MID\$, the target text, was the first of three values to be enclosed within parentheses. Counting from the first character in the string until reaching J (the beginning of the segment of text to be plucked out of A\$), gave the second value to be added to A\$, and separated from it by a comma. Next, counting from the first letter J, the number of characters/spaces to be included (totaling 12), became the third value, again separated from the second

value by a comma. Don't forget to tack on the closing parenthesis.

Now run it. Notice that it lines up along the left margin.

The address is next and, since it is at the right end of string A\$, it is a candidate for RIGHT\$. Key in Line 50. The locating value, 64, was chosen, although any reasonable value near the left margin would have been fine, say from 64 through 70. RIGHT\$ contains two items enclosed within parentheses. The first is the target string, A\$. Since all of the characters/spaces at the right end of the string would be utilized to create the second line of text, the total number of characters/spaces making up the second entry would be found by counting backwards, beginning with T, up to and including one. If you prefer, count from one to T, but it would be best to work from right to left. The value is separated by a comma from A\$. In other words, the last 21 characters/spaces will be displayed on the row. Run this.

Now, since the balance of our text appears at the beginning of Line 20, the LEFT\$ was called upon for help. Key in Line 60. A value of 96 was chosen as the trial location of the third row. LEFT\$ is used about the same as RIGHT\$, except it works from the left end, or beginning, of A\$. The number of letters to be

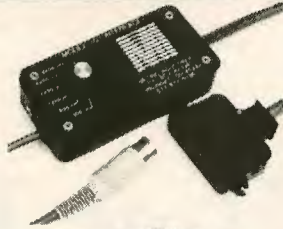
Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

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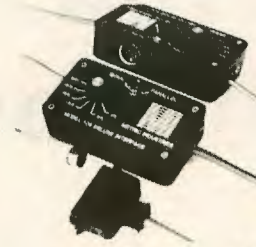
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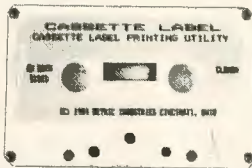
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included in this row were tallied, from I through zero and this total, 19, became the other value included in LEFT\$. If you look at the number of characters/spaces used in the last items in MID\$ and RIGHT\$, and subtract the total from L, you can see that every character/space in A\$ was accounted for. This doesn't always follow if you have unnecessary spaces or unused characters in the string. Again, run your work.

Take a few minutes and adjust the lines to center them. Take a moment to change the 52-33 in Line 60 to 19, since the point has been made.

Key in lines 70 and 80. Line 70 waits for any key to be pressed and then Line 80 zaps the top row and in the process says goodbye to 52.

Ordinarily, having no further use for Line 30, it could be deleted — but then there goes the tutorial! Of course, Line 30 could be masked with a REM marker, but that too alters the listing.

Look at lines 40 through 60. Are your PRINT@ values 46, 69, 102, respectively? They need not be exactly the same. So long as the title appears reasonably well-centered to you, that is what counts.

Who wants to practice? Using MID\$, how would you put on lines 50 and 60? Better still, put your name and address into a single long string and make a nicely centered heading to demonstrate your grasp of the functions.

If you plan to use the material in string A\$ more than once, you could assign a variable to the substrings in lines 40, 50 and 60. They will be ready for instant use elsewhere in your program. Insert and run the following:

```
35 A1$=MID$(A$,20,12):A2$=RIGHT$(A$,21):A3$=LEFT$(A$,19)
90 PRINT@170,A1$:PRINT@197,A2$:PRINT@230,A3$
```

Naturally, you could then substitute the three variables, A1\$, A2\$ and A3\$ for the function statements they represent in lines 40, 50 and 60, respectively. At that point, A\$ becomes a dinosaur.

Key in Listing 2 and run it to get an overview. You will note that the text was printed one complete word at a time, repeated monotonously to the screen. The original objective was to afford you practice using LEFT\$, RIGHT\$ and MID\$, the idea being to figure out many different ways to accomplish the mission. Seven examples were sufficient to create the text panel to keep the tutorial short and succinct. No doubt, you will

able to find other techniques to get the job done. I can think of about 20 variations on this theme. The acid test is your ability to display what you intended in the manner intended by drawing upon CoCo's versatility.

List lines 5 to 50. A word about the CLEAR 500. If you masked it with a REM, you would have quickly determined that the program works OK. Masked or not, CoCo already cleared 500 memory locations. Change Line 5 to CLEAR0 and run it. Again, change Line 5 to CLEAR1 and run. Repeat this through CLEAR4. An OS Error (out of string space) in Line 30 message appears, because there are five letters in each string of D\$ used. Change Line 5 to CLEAR5. The program is in good shape because, coincidentally, every string is composed of five letters.

Restore Line 5 to CLEAR 500, if you like. On power up, CoCo automatically reserves 200 string spaces.

Whenever working with strings, it is good practice to CLEAR 500. If you work with many strings or lengthy strings up to about 255 characters/spaces, CoCo may have no places allocated to store them. It cries for guidance with an OS message. Don't panic! Increase the CLEAR 500 to CLEAR 600 and run. If it still isn't enough space, try a larger figure, until CoCo has enough memory reserved to handle the load you thrust upon it. You will see an example of this in the third tutorial of this series.

Now, let us return to lines 5 through 50. In Line 30, we decided to print BETTY using LEFT\$ to pick out of string D\$ the first five letters and print them beginning at location eight. Since I am lazy, I used the old reliable semicolon ploy to allow me to butt up the next segment without taxing my brain figuring out PRINT@ locations. A small pause fetched from a GOSUB routine allows time to digest the display momentarily. Then, using MID\$, from the same string, beginning with the sixth character/space and going up to and including the 10th character/space, ANN was appended to BETTY, followed by a semicolon and another pause. Finally, utilizing RIGHT\$, the balance of the letters were put on to complete the name followed by a pause of longer duration.

You could have broken up D\$ to use the first six characters/spaces in Line 30 and four characters/spaces in Line 40 and still maintain the integrity of the three segment plan of attack. Only one problem. If you left Line 5 at CLEAR5, you got the OS message because there

are six characters/spaces in Line 30. OK. Make sure Line 5 reads CLEAR 500. Now run. Can you pick up the error? Failure to change the starting letter in Line 40 from six to seven generated the problem.

Can you break up D\$ into some other groups without destroying the presentation, using the same functions? Now is a good time to work something out and become more familiar with the three functions.

Your fertile mind tells you that this is a lot of work to put three equal segments on the screen. True, true.

List lines 70 to 100. To save all the fuss of counting and using LEFT\$, etc., in Line 70, we prefabricated the three building blocks and assigned them to separate string variables. Still being naturally lazy, to locate the starting position of the second row of text, it was simple to add 32 to the PRINT@ location usurped from Line 30. In lines 80 to 100, each name was placed exactly as in lines 30 through 50, but with less effort. List Line 100 to compare. Run this. If you were a glutton for punishment, you could revise the strings in Line 70 without altering the presentation in this part of the tutorial. Be careful: The following presentations may get thrown out of kilter.

List lines 120 to 150. Here PRINTTAB was used to get the same results. Note the necessity of the semicolon. If you don't know what will happen when you run without it, pull out the semicolon and run it.

I can't stand that last line at the bottom of the panel. Find the correct program line and edit to center it!

List lines 160 to 180. To place the text in the correct spaces on the next row, without the semicolon ploy, each string must be located individually. OK, now run. Too much calculating! Better that CoCo does the work as in the previous presentation.

In order to return to the subject at hand and clown around with LEFT\$, etc., list lines 200 to 220 and see how only MID\$ was used to work out the same arrangement. List lines 240 to 300 to see LEFT\$ and then RIGHT\$ carry the entire load to put on all three segments. Run your work.

Since each of the groups has five characters/spaces, you could use MID\$, RIGHT\$ and/or LEFT\$ interchangeably (not their contents) and get the same results. It is no big deal to use the entire contents of a string when all are the same length.

For practice, in Line 70, add a space to A\$, strip off both spaces from B\$ and add a leading space to C\$. Run.

CoCo is upset! Help CoCo straighten out this mess. First off, compare the distorted lines with the program lines concerned and point out and explain the whys and wherefores of the resultant boo-boos to yourself. Then make the required corrections.

*“. . . ideas began
to perk in my
noodle . . .”*

Look how valuable those GOSUB routines are. The short one was used 14 times and the longer one was used seven times.

List lines 320 on. In the third tutorial, we will work on presenting text, using LEFT\$, and who knows what else, a letter at a time, in a very attractive, readable manner. Lines 320 and 330 were just plopped onto the screen. Patience — you'll like it!

You may wonder, what value is all this nonsense to me? It is important for a newcomer to become familiar with all the functions, statements and so forth. Knowing all the nuances of CoCo's features allows you a broad option of possibilities when composing a program. The more ways you know to do a job, the more alternatives are available for your creations.

The educational language program you learned how to create and use recently would have been impossible to create without knowing what CoCo could do with LEFT\$, MID\$ and RIGHT\$. Knowing what is possible affords you the choice of following many pathways to a fruitful conclusion.

In fact, in fooling around with these tutorials, ideas began to perk in my noodle and aided me to move from dead center to further enlarge and modify that program.

Notice how in lines 320 and 330 we continue to employ the invisible vertical line gambit to format our text. The point to be emphasized is that what you learn in these tutorials becomes a part of your computing skills and can hereinafter be called forth on demand to create some goodie that is near and dear to your heart. □

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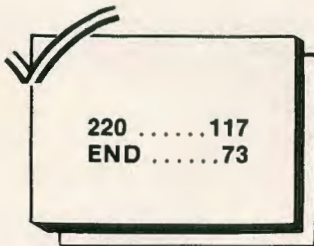
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Listing 1: STRINGS1

```

Ø '<LISTING1>
1Ø CLS
2Ø A$="INVERNESS, FL,3265ØJOSEPH
  KOLAR17Ø9 DICKINSON STREET"
3Ø L=LEN(A$):PRINT@14,L;
4Ø PRINT@32,MID$(A$,2Ø,12)
5Ø PRINT@64,RIGHT$(A$,21)
6Ø PRINT@96,LEFT$(A$,52-33)
7Ø EXEC44539
8Ø PRINT@Ø,""
1ØØ GOTO1ØØ
  
```



```

24Ø PRINT@8+16Ø,RIGHT$(A$,5):GOS
UB5ØØ
25Ø PRINT@13+16Ø,RIGHT$(B$,5):GO
SUB5ØØ
26Ø PRINT@18+16Ø,RIGHT$(C$,5):GO
SUB6ØØ
27Ø '***
28Ø PRINT@8+192,LEFT$(A$,5);:GOS
UB5ØØ
29Ø PRINT@13+192,LEFT$(B$,5);:GO
SUB5ØØ
30Ø PRINT@18+192,LEFT$(C$,5):GOS
UB6ØØ
31Ø '***
32Ø PRINT:PRINT" USING THE THRE
E VARIABLES, A$;B$;C$; YOU CAN C
ENTER THE NAME, WITH PREGNANT PA
USES BETWEEN VARIABLES, USING
A VARIETY OF TECHNIQUES.
33Ø PRINT:PRINT" SOME ARE A WAS
TE OF TIME!"
34Ø GOTO 34Ø
5ØØ FOR Z=1TO2ØØ:NEXT:RETURN
6ØØ FORZ=1TO5ØØ:NEXT:RETURN
  
```

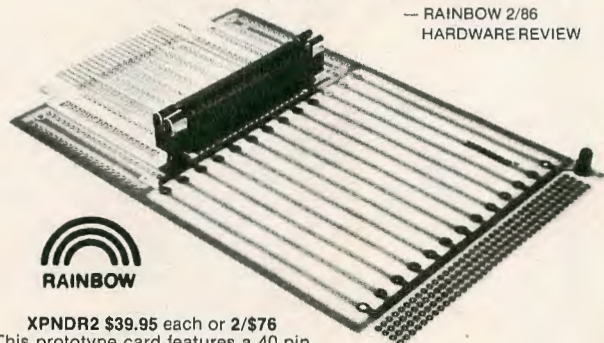
Listing 2: STRINGS2

```

Ø '<LISTING2>
5 CLEAR 5ØØ
1Ø CLS
2Ø D$="BETTY ANN WHITE"
3Ø PRINT@8,LEFT$(D$,5);:GOSUB5ØØ
4Ø PRINT MID$(D$,6,5);:GOSUB5ØØ
5Ø PRINTRIGHT$(D$,5):GOSUB6ØØ
6Ø '***
7Ø A$="BETTY":B$=" ANN ":C$="WHI
TE"
8Ø PRINT@8+32,A$;:GOSUB5ØØ
9Ø PRINT B$;:GOSUB5ØØ
1ØØ PRINT C$:GOSUB6ØØ
11Ø '***
12Ø PRINTTAB(8)A$;:GOSUB5ØØ
13Ø PRINTTAB(13)B$;:GOSUB5ØØ
14Ø PRINTTAB(17)C$:GOSUB6ØØ
15Ø '***
16Ø PRINT@8+96,A$:GOSUB5ØØ
17Ø PRINT@13+96,B$:GOSUB5ØØ
18Ø PRINT@18+96,C$:GOSUB6ØØ
19Ø '***
2ØØ PRINT@8+128,MID$(A$,1,5);:GO
SUB5ØØ
21Ø PRINT@13+128,MID$(B$,1,5);:G
OSUB5ØØ
22Ø PRINT@18+128,MID$(C$,1,5):GO
SUB6ØØ
23Ø '***
  
```

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— RAINBOW 2/86
HARDWARE REVIEW



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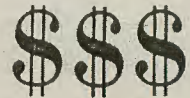
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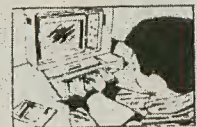
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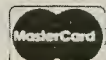
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The RAINBOWfest Reporter

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CoCo fans find bargains at Chicago RAINBOWfest



Our fourth Chicago RAINBOWfest (our 11th show) was once again at the Hyatt-Regency Woodfield, May 23-25. Our next show is in Princeton, New Jersey, Oct. 17-19, and promises to be a coming-out party for the new CoCo 3.

Braving the heat and sun of Memorial Day weekend, thousands of eager CoCophiles swarmed into the Hyatt-Regency Woodfield, just outside of Chicago, for the eleventh RAINBOWfest.

There were bargains galore. Radio Shack led the way with items like their CGP-115 printers for only \$150 and new FD-500 slimline Drive 0 packages for the incredibly low price of \$149.

All manner of manufacturers and celebrities were there, with news of new CoCo products and interesting, informative seminars to answer questions. Of course, there was the CoCo Community Breakfast, all the news on the rapidly growing OS-9 Users Group, and above all else, bargains, bargains, bargains.

The tone of this RAINBOWfest was one of exuberant support. Although there were more attendees than at the previous show, the exhibition hall was larger, so many people thought fewer people had attended. Said Lonnie Falk, publisher of THE RAINBOW, "We're going back to a smaller room next year. I thought a bigger room was what everybody wanted, but we got it and now people are complaining more. Next year we'll go back to the original size."

Excitement ran high about the new CoCo. Unfortunately, no detailed information was available. Special CoCo Community Breakfast guest speaker Steve Bjork said that, because he was under non-disclosure agreements with Tandy, he could really only talk about what he would like to see in such a new machine. Bjork also spoke about the power of the OS-9 operating system, and about the surfacing industry based around CDI (Compact Disk Interface) ROM technology.

[Editor's Note: Steve will be joining independent programmer Greg Zumwalt and Tandy's Barry Thompson and Mark Siegel, both key figures in the CoCo 3's development, in a special roundtable discussion of the Color Computer 3 at our Princeton RAINBOWfest, October 18.]

RAINBOW publisher speaks of loyalty, bright future

RAINBOW's Lonnie Falk spoke to a full crowd of excited CoCo and RAINBOW fans about the seriousness of the Color Computer, the strength of the machine because of its huge user base, and the tremendous loyalty from third-party manufacturers. Falk, who built Falsoft, Inc. and THE RAINBOW around his initial love for the Color Computer, expressed optimism about a bright future for CoCo owners. "Radio Shack is a smart company. They know they've got a strong product and equally strong support in the CoCo."

Falk said THE RAINBOW would go on serving the CoCo community without fail. "This machine has a bright future," said Falk, "and we will be a part of that future."



Cecil "Jeff" Houk, a music programmer for Speech Systems, appears ready to direct a CoCo symphony.

Speech Systems music, music, music

If you weren't at the Speech Systems booth, you might never believe what our powerful little CoCo can really do. Amid the din of fully synthesized orchestras conducted by the MIDI interface, people trying the piano keyboard for the CoCo, the Stereopack, Musica II and Supervoice, Rich Parry, owner of Speech Systems

and developer of the highly acclaimed EARS Speech Recognition interface, ran back and forth as quickly as he could answering questions and helping customers. "I can't believe the turnout," said Parry, quite out of breath. "With the discount prices, we may be sold out of everything by Saturday night!"

Free seminars draw hundreds

The Speech Systems Experimental Traveling Synthesized Band, with Rich Parry, was by far the most popular free seminar of the Chicago RAINBOWfest. Over 300 eager fans tried to cram into the seminar room, but little more than half of that number were able to fit inside.

Author Dale Puckett, former OS-9 Users Group President and well-known OS-9 speaker, gave two well-attended seminars, one an introduction to OS-9 and the other an introduction to BASIC09.

Other seminars included Dick White's Spreadsheet Applications, Tim Jenison of Colorware speaking on the Secrets of *CoCo Max*, and Dan Downard in two seminars for beginners. Jim

Reed, THE RAINBOW's managing editor, and Danny Humphress, managing editor of PCM, held a seminar on writing programs and articles for publication in magazines. PCM is another Falsoft publication for Tandy's portable and MS-DOS computers.

There were also seminars on buying a machine to fit your needs, user interfaces and file transfers between the CoCo and MS-DOS machines.

All of the seminars were interesting and well-received, giving those in attendance a chance to meet many of the CoCo community celebrities and to have their questions answered on a more personal basis.

**See You at
RAINBOWfest Princeton
October 17-19**



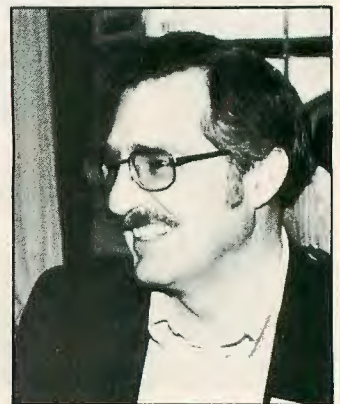
Mike Ward (left) goes through the motions of getting a CoCo online.



Breakfast speaker Steve Bjork, president of SRB Software (right), tells a fish story to Brian Lantz, president of the OS-9 Users Group.

CompuServe online from RAINBOWfest

CompuServe's CoCo Special Interest Group manager Wayne Day gave a comprehensive demonstration of the SIG's online database for Tandy users. In addition, free time was being raffled off hourly during the entire show. Mike Ward, author of the *Mikeyterm* communications program for the CoCo, was on hand, too.



THE RAINBOW's Dr. Michael Plog is soon to release his new CoCo statistics book.

Radio Shack wheels and deals

Occupying a large exhibit space at the show, Tandy/Radio Shack dealers were selling everything they had at unbelievably low prices. The 64K Color Computer 2 was being sold for \$99 and FD-500 Drive 0s for \$149. Model 100 portable computers were going for only \$250, with some lucky people buying several at a time for an astounding \$150

apiece. CCR-81s went for \$29.95 and the list goes on and on. In addition, hundreds of popular software items were sold at more than 60 percent off. The most popular item there, according to a Radio Shack dealer, was the CGP-115 color ink-jet printer. It sold out within minutes of the show's opening on Friday evening at a low \$150.



Saturday is always the busiest day at our RAINBOWfests. In Chicago, the Radio Shack booth offered huge discounts.

Disto is in control with super controller

Tony "Turn of the Screw" DiStefano, a RAINBOW contributing editor, was manning the Disto booth with its fascinating and ingenious new four-DOS controller with internal expansion port. Also on display at Disto were the 80-column card with real-time clock and parallel printer port, the MPROM programmer for EPROMS, and the Super RAMDisk 256/512K. They also offered their C-DOS operating system, which substantially upgrades Extended Color BASIC and adds drivers for Disto's display, printer and controller devices.



Microcom's Kishore Santwani (left) and Gary Jes answered questions about their books and utility software.

A bang-up time with DynaCalc

Dennis Derringer, well-known author of the *Pro-Color Series*, was on hand to demonstrate his line of products. Attendees at RAINBOWfest also saw the introduction of two new products from Derringer Software: *Summary*, for summarizing spreadsheets, and *Max Edit*, a program to design and edit *CoCo Max* fonts. "It's a little bit of a dilemma," said Dennis. "I am also

selling a three-disk set of fonts for *CoCo Max*, and they are doing very well. They appeal to people who want more text fonts, but don't have time to design them." Dennis was offering a substantial discount on all his products, and business was booming.

Sharing the booth with Derringer Software was Joe Turner from Computer Systems Center, producers of *Dynacalc*. While

Joe could not sell the products himself, Radio Shack was offering them at discounted prices. "I can only promote them," said Joe. "I can't sell them. But I can send you right over to Radio Shack and they'll take care of you." Because of the strong interest in OS-9 at this RAINBOWfest, the OS-9 version of *Dynacalc* was doing very well.

Hot new games, graphics, upgrades and more

Many other products were either introduced or displayed at the Chicago RAINBOWfest. All of them are top-quality items, and all were offered at special show rates.

From Diecom products of Canada came several new products: *Gantelet*, *F-16 Assault* and *Karate*. Along with several other titles, these products have outstanding graphics and action. And imagine, the author is only 19 years old!

Four Star Software offered *PenPal 2.0*, with some nice new features, at a special show price, along with several games and new OS-9 utilities packages.

Michtron came out in full force with a range of products and the introduction of a new game, *BYO Pinball*, which rivals the MS-DOS version of the program in detail and action. Along with this piece of new software were other hits from Michtron, such as *Speed Racer*, *Rommel 3-D* and more.

Howard Medical impressed the RAINBOWfest crowd with their 80-column, dot-addressable graphics printer, the Howard 80.

Saguaro Software introduces new Adventures

Saguaro Software was on hand with special prices and several new products, including the *Andrea CoCo* graphics Adventure, a new Adventure from Scott Cabit called *Adventure in Mythology*, and a sneak preview of a graphics Adventure called *White Fire of Eternity* that is scheduled to be released soon. Along with these pieces, Saguaro was selling the new Bob van der Poel *Teletwriter-64 Character Set Editor*.



RAINBOW's development coordinator Ira Barsky makes notes for future shows.

Free pictures for CoCo MAX II

Tim Jenison of Colorware was selling *CoCo Max II* for a special price of only \$69. With each purchase he was including a free disk full of *CoCo Max* images. The new *CoCo Max II* has 14

fonts, dynamic two-dimensional shrink and stretch, supports multiple drives, and is, on the whole, incredible to behold. Upgrades from *CoCo Max I* were available for \$20.

Special packages from T&D Software

T&D Subscription Software was on hand with nearly 50 tape and disk packages from its monthly subscription software service. Not only were they offering reduced prices on their monthly program disks, but they had also put together special packages at discounted prices.



RAINBOW reviewer A. Buddy Hogan (left) makes a purchase from John Ross.



First-time exhibitor Synercon displays powerful options

Synercon, Inc., a new exhibitor at RAINBOWfest, was offering a 256K external plug-in memory expansion board, as well as a 1-megabyte board that the OS-9 people were thrilled to see. They were also offering a five-meg hard drive, a 20-meg drive, and their new operating system, SDOS, along with the *SD BASIC Compiler*, a true BASIC compiler. Bundled with the compiler was a two-pass assembler, 6809 debugger and text editor.

Synercon's Richard Gros goes over a printout with pharmacist David J. Bialka and Mrs. Bialka.



Dennis Derringer of Derringer Software (seated) demonstrates his popular 3Pro-Color-File.



Ross Litton of Howard Medical fields a question.

Great discounts from Prickly-Pear

Prickly-Pear Software, sharing the booth with Saguario, featured several excellent utilities, as well as the highly acclaimed *To Preserve Quandic* and its new *Hall of the King*, a two-disk graphics Adventure.

OS-9 Users Group a star attraction

Brian Lantz, president of the OS-9 Users Group, together with Bruce N. Warner, editor of the *MOTD* newsletter, and several well-known OS-9 Users Group personalities, were very pleased with the turnout and said that many OS-9 enthusiasts had joined the group. The OS-9 Users

Group offered membership, buttons, T-shirts and raffle tickets for software. Tickets for the OS-9 Users Group Breakfast on Sunday morning were available, too. Keynote speaker Dr. James W. Moore, Jr., of Microware, spoke on current issues and trends with the OS-9 operating system.

Delphi surges ahead

John Gibney, national sales director for Delphi, was very enthusiastic about signing people up right from RAINBOWfest to join in the already large and fast-growing family of users on Delphi.

RAINBOW Magazine runs the CoCo SIG on Delphi, providing the community with instant communication, online shopping services and a host of other valuable features. "When people become aware of the capabilities of a

service like Delphi, and the low cost, it's like discovering a whole new world," said Gibney.

One of the best features of Delphi is the instant communications capabilities it gives users, whether participating in forums, buying software, or just getting a question answered by an author or editor from RAINBOW. The CoCo SIG is just one aspect of Delphi, and John encourages users to discover Delphi's full potential.

Sofco's hardware priced right

Sofco Computer Supply Company, of Downer's Grove, Illinois, had quite a few show specials to offer, including DEC dual drives at special RAINBOWfest prices. Among their other offerings were labels, cases, binders, drive-cleaning kits, hardware tool kits, and Samsung color and monochrome monitors. According to Charles W. Schneider, who ran the booth at the show, sales were brisk and he was dropping prices on equipment about once an hour to give show goers the best bargains possible.



If you're tall enough to reach the arrow keys, it's game time!



David Dies of Diecom Products was one of the Canadian exhibitors.

J&M's Albuquerque express

J & M Systems, Ltd., of New Mexico, are always regulars at every RAINBOWfest. At the Chicago show, they had great deals on many of their products, including their original JFD disk controller, "slightly defective" drive controllers, their famous *Memory Minder* drive alignment and testing program, and hard drives.

Alpha Products comes to CoCo

New to the Color Computer market is Alpha Products of Woodhaven, New York. Alpha Products has long been a manufacturer of peripheral products for the other Radio Shack TRS-80 computers. Alpha's main product is the Amazing A-Bus, an expansion chassis and mother-

board assembly which allows the interfacing of many different cards, or even additional motherboards, to the Color Computer. Some of the devices supported and supplied by Alpha are the digital and analog input cards, a motor controller, clock with alarm and voice synthesizer.

Tom Mix Software brings on the games

Tom Mix Software was on hand with some real greats, like its *P51-D Mustang Attack* flight Simulation, *Approach Controller Simulation*, and several new releases, such as *Martian*

Crypt and the *Misadventures of Eddie*. Especially popular was the new joystick-controlled, animated graphics Adventure, *Maui Vice*, which sold out by the end of the show.



Zytek's Jim O'Keef (right) appears dressed for *Adventure* as he discusses *Plateau of the Past* with two RAINBOWfesters.

Zytek shows unique map window programming

Zytek, of Blue Island, Illinois, was on hand displaying their new Adventure, *Plateau of the Past*. It uses the unique map window programming and is a thrilling new entry into the Adventure

market for the CoCo. Driven by a special price and a special three-free-disk incentive to the first 50 customers, this program, too, was among those that sold out before the end of the show.



Tom and Gisele Mix find a moment's respite from duty in the exhibit hall.

Derringer Software.

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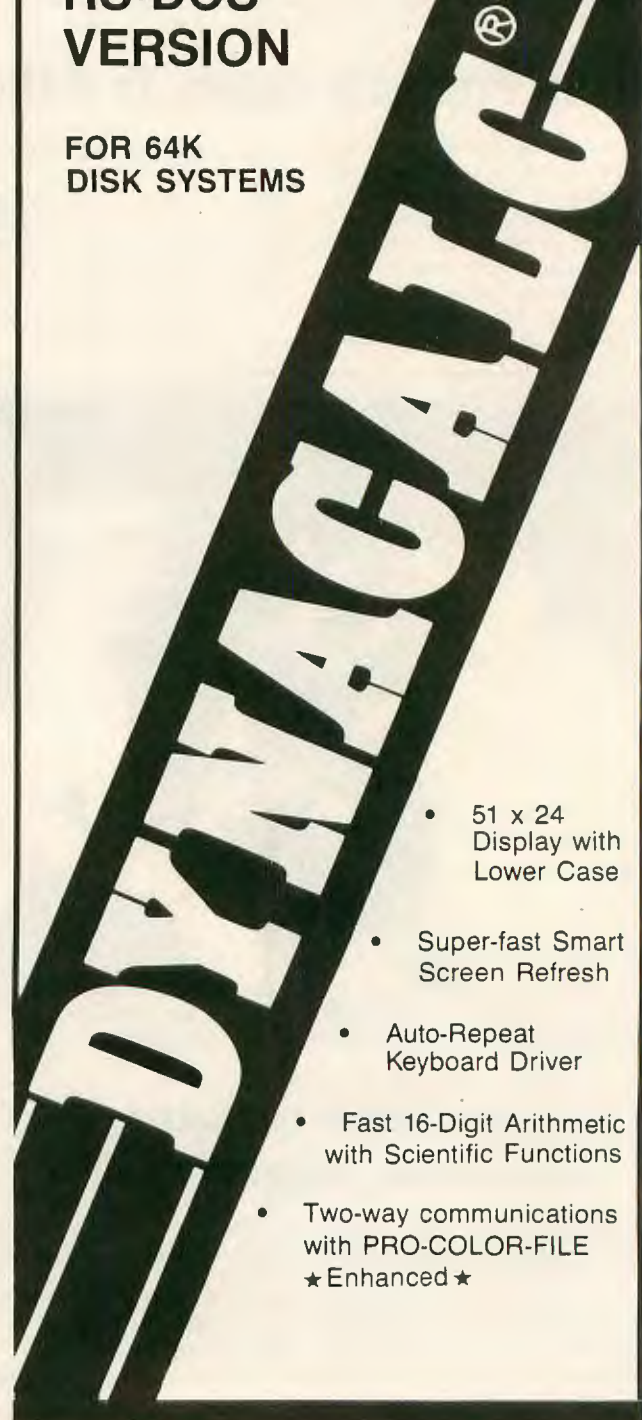
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Inside the CoCo 3

By Marty Goodman
Rainbow Contributing Editor

This is a collection of observations made after examining the insides of a Color Computer 3 and comparing its ROM to that of a CoCo 2.

ROM Addressing

The CoCo 3 has a 32K by 8-bit ROM. The lower 16K of this ROM contain code that is *nearly* the same as that in the 16K of Color BASIC and Extended Color BASIC, with the following changes:

The copyright message in the Extended BASIC part of the ROM is altered, as is the version number in the Color BASIC ROM.

The part of Extended BASIC that formerly contained code for the `LOAD` command is now completely different.

The startup sequence in Color BASIC, including the RAM chip selector and memory size checker, as well as the warm/cold start reset sequence code, is all rewritten.

The keyboard routine in Color BASIC has been rewritten (possibly to allow use of the keyboard interrupt,

which would considerably speed the execution of Color BASIC).

The vectors set at the end of the Color BASIC ROM are now all pointing in different places.

Apart from these relatively minor changes, there exists a complete image of the Color BASIC and Extended BASIC ROMs in the lower part of the 32K by 8-bit ROM.

The GIME chip supports three modes for addressing ROM in the CoCo 3. In one of these modes, only the lower 16K of ROM is addressed internally, and the remaining 16K of addressable ROM is looked for on the cartridge port. In this mode, the ROM in the CoCo 3 should be able to be made to closely emulate the appearance of the ROMs in a CoCo 2. In fact, even programs that use undocumented calls to the ROM should not be compromised on the CoCo. The two low-order bits of \$FF90 control the mapping of the available CoCo 3 ROM memory. Note that the CoCo 3 can, via those bits, be made to address a full 32K of ROM on a ROM pack, allowing it to support up to 64K total of ROM in the system.

RAM Upgrades

The CoCo 3 is delivered as a 128K machine, with expansion to 512K of memory via a plug-in board. The 128K unit has four 18-pin, 4-bit wide by 64K 4464-type DRAM chips. The 512K add-on board is inserted after *removing* the four 4464 chips, and that board has on it sixteen 1-bit by 256K 41256 DRAMs. Presently the add-on board is the only

option for expanding the addressable memory of the CoCo 3.

The board is easy to duplicate, and it is likely that third-party suppliers will soon be carrying versions of it, probably priced somewhat below Tandy's \$150 price. In theory, a sensible way to upgrade the CoCo 3 would be to replace the four 4464 DRAMs with four 4-bit wide by 256K 1-megabit DRAMs. But that sort of chip is barely on the drawing board, and its production and sale at less than astronomical prices is not likely to occur soon.

Such a 4-bit wide by 256K chip is quite different from the 1-bit wide by 1-megabit chips that are already being sold in the \$50 per chip price range. The 1-bit wide by 1-megabit chips should soon be an economic reality. But a 4-bit wide by 1-megabit chip will, as I stated, be a long time coming.

The RAM is arranged so a 16-bit wide data bus is available to the video circuitry. This allows data to be put on the screen much faster than on the old CoCo 2, providing for higher resolution and more colors in the CoCo 3 display.

RAM Addressing

The GIME chip supports a complex and powerful memory manager far more sophisticated than the crude bank switching arrangements used in CoCo 2 RAM upgrades such as Thunder RAM and the J&R Banker. The memory manager allows you to take any group of eight 8K segments in the full 512K address space and map them into the 64K of available memory directly addressable by the 6809. The old CoCo 2

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

memory upgrades could move memory around only in clumsy 32 or 64K blocks and were far more limited in how they could shuffle such blocks. The control addresses for the memory manager are in the \$FFA0 to \$FFAF address range.

This sophisticated memory management is what allows the CoCo 3 to run OS-9 Level II. Writers of dedicated applications for the CoCo 3 also find this powerful memory manager allows them to easily and quickly address the half-megabyte of the CoCo 3 without disrupting programs running in part of the 6809's address space. The CoCo 3 could become an attractive machine for scientific and industrial tasks because of its low price and high performance.

When it boots up, the CoCo 3 reserves memory at \$FE00 through \$FEFF for special system functions, including interrupt handling. The GIME hardware is set up to hold the top 256 bytes of addressable RAM (located just below the control I/O ports of \$FF00 through \$FFFF) constant through all memory manager address changes. This hardware feature is necessary to implement OS-9 Level II.

But the need to keep memory in this area constant will be the single most common cause of incompatibilities between CoCo 2 Disk BASIC software and the CoCo 3. It may be possible, using a switch at Bit 3 of \$FF90, to turn off that reservation of those top 256 bytes and, via other manipulations, to more closely emulate the old CoCo 2 environment. Alternatively, it may prove easier for many software makers to do the minor rewrite needed to leave that address area alone. In many cases, this may be all the change needed to make "incompatible" CoCo 2 software run on the CoCo 3.

Emulation of Old SAM Functions

VDG related functions — Addresses \$FFC0 through \$FFD3 function on the GIME in exactly the same way they did on the old SAM, providing for total emulation of all documented old SAM/VDG functions.

Memory related functions — Addresses \$FFD4 and \$FFD5 (the page switcher) are supported on the GIME chip. The RAM/ROM switcher at \$FFDE and \$FFDF that switches 32K of ROM with 32K of RAM is supported too. Thus, many Disk BASIC programs that run in a "96K" environment on the CoCo 2 will still work on the CoCo 3.

Both *Graphicom* and *WEFAX* appear to work properly on the CoCo 3. These are examples of Disk BASIC 96K programs that use only documented calls to ROM vectors and do not mess with the top 256 bytes of available RAM.

"The GIME chip supports three modes for addressing ROM in the CoCo 3."

Not surprisingly, \$FFDA through \$FFDD ports on the old SAM set up for 4K, 16K or 64K of memory using the old CoCo and CoCo 2 chip arrangement, are *not* supported on the GIME chip. No great loss here, except to insiders who used the SHIFT/BREAK/Reset technique to make RAM snapshots.

Clock control — The CoCo 3 uses a primary crystal that works at *twice* the speed of that used in the CoCo 2. This is an 8X colorburst crystal: 28.63636 MHz. The old speed up POKE at \$FFD6 and \$FFD7 that would make the CPU address the ROM at twice normal speed (but still address RAM at its normal speed) is *not* supported on the CoCo 3.

But before you get alarmed, rest assured that when Tandy took that away, they gave us something *much* better: The port at \$FFD8 and \$FFD9 on the old CoCo caused the ROM and RAM to be addressed at double speed, but terminated RAM refresh and completely destroyed the old CoCo and CoCo 2's video display. However, on the CoCo 3, this "super high speed" POKE is now *fully* supported, the RAM memory *is* refreshed and the video display is unaffected. This means you can properly run your Disk BASIC programs at full double speed on the CoCo 3, though you may have to drop back to normal speed during such functions as cassette and disk I/O and sound generation.

Video Display of Text

I have experimented with displaying

the CoCo 3's video on quality amber monochrome monitors. Initially, at power up, the display had the ugly vertical stripe distortion that is typical when you put a color signal on a monochrome monitor.

Although the GIME supports turning off the color signal via a port (Bit 4 of \$FF98), poking under BASIC to this port was of limited value because the port is reset each time a new BASIC print statement is executed. Later on, we may find an easy way to properly shut off the color when in BASIC.

But, for now, by properly altering the foreground and background colors using the sophisticated palette control of the CoCo 3, we can make the CoCo 3 produce a credible image on a monochrome monitor. Even in the 80-column display mode, the image is quite readable. Somewhat to my disappointment, although the 80-column set was not all that bad, I found its sharpness and crispness somewhat inferior to that of my PBJ Word Pak I 80-column card, and far inferior to that of my IBM PC clone. But part of this may have been due to a badly adjusted monitor, and part to my not having sufficient time to play with the color set. Both black letters on light background *and* light letters on black background can easily be produced. Underlining is supported. The character font is the same as that of the T1 VDG chip.

Buying a composite video monochrome monitor (in the \$60 to \$120 price range) allows you to take advantage of the 80-column display of the CoCo 3. A color composite monitor *will not* support the 80-column display. If you want both 80-column display of text *and* full color capability, your only option is an RGB analog monitor. Tandy wants \$300 for its CM-8. This is something of a bargain, actually, since Magnavox and Sony, who also make CoCo 3-compatible RGB analog monitors, want at least \$70 more, though their products are more flexible and support other signal protocols as well.

Via the GIME video hardware, one can generate 32-, 40-, 64- and 80-column text screens, although, on a color TV, only the 32-column works well at all. The 40-column display will often be cut off by the overscan found on most commercial color TVs.

Add-on Hardware Addressing

The GIME uses lots of address space not used before by the SAM chip. It does leave open address ports between

\$\$FF60 through \$\$FF7F for use by Radio Shack and third-party developers.

Of these, \$\$FF7F is used by the Multipak, \$\$FF68 through \$\$FF6F are typically used by the RS-232 Pak card and the Tandy Modem card (or PBJ 2SP card). \$\$FF7D and \$\$FF7E are used by the Tandy Speech Sound pak if they are in the system. Other devices addressed in this legal range are Ears, third-party voice packs and the Stereo Pak from Speech Sound. All of these should work just fine on the CoCo 3.

But woe to the manufacturer who did not heed the warnings given by Tandy to not use addresses outside of that range! Sadly, *CoCo Max* is one such; it will not work on the CoCo 3 in its present form. Hopefully, new *CoCo Max* hardware will be made that fixes this problem.

Among those pieces of hardware that will mess up the GIME chip and are therefore somewhat incompatible with the CoCo 3 is Radio Shack's Multipak Interface. Yes, there is a bug in the PAL chip in both the old and new Multipak interface that lets the port at \$\$FF7F ghost to \$\$FF9F. This conflicts with a "Horizontal Offset Register" in the

CoCo 3's GIME. I have been told by an informed source that the problem only occurs in 512K CoCo 3s, and that a fix in the form of a new PAL chip will be provided by Tandy.

It has been rumored that this fix for the Multipak will cost \$6, regardless of whether you have an old or new Multipak. This is a reasonable price for such a fix. This fix is not yet available at your service centers or at National Parts, but should be ready by the time 512K CoCo 3s reach your stores.

Compatibility

In some preliminary testing, I found that *Telepatched Telewriter* and *Mikey-term*, two popular applications, both crash when booted on the CoCo 3. At present I am not sure of the exact reason or how to fix these. But fixes for both should be forthcoming. It certainly is true that many popular CoCo 3 Disk BASIC standbys will not work on the CoCo 3. But it is equally clear that Tandy bent over backward to try to preserve compatibility for both their own and for third-party software. Unfortunately, in many cases, their best efforts were not good enough. But the

CoCo 3 is so nearly CoCo 2 compatible that it should not be very hard to fix existing CoCo 2 favorites to run on the CoCo 3. My one major criticism of Tandy in this regard is that they should have warned us long ago to stay out of the \$\$FE00 through \$\$FEFF region much as they did clearly warn us not to use undocumented vectors.

Conclusion

Hopefully there will soon be new software taking advantage of the CoCo 3's vastly improved video display, RS-232 and memory capability, which will make the issue of CoCo 2 incompatibility under Disk BASIC less of a concern.

Special Note of Thanks:

I would like to give special thanks to Tandy Corporation for giving permission to developers who had CoCo 3s to allow me to examine them and their documentation after the CoCo 3 was officially released. Without the kind cooperation of Tandy Corp, Steve Bjork and Dale Lear, it would be impossible for me to get this information out to the CoCo Community as early as this.

CORRECTIONS

"A Recipe to Fix CoCo Fried Chips" (August 1986, Page 24): Marty Goodman has written to clarify and update some statements he made in that article. Marty had implied that J&M Systems might be reluctant to provide schematics for its disk controllers. This was based on Marty's past experience. However, more recently Marty has been informed by Richard Allen of J&M Systems that schematics for both of their disk controllers are available for \$5 each from J&M. Marty extends his apologies for implying otherwise.

"Which Nym is Witch?" (August 1986, Page 40): Brien Dick tells us we need to insert the following line into his *Nymatch* program:

```
1475 DATA BUY,5,BYE,5
```

"The Old Switcheroo" (August 1986, Page 108): In Figure 4 on Page 112, there is an extra reference to Pin 5. Please disregard the reference to Pin 5 that appears to the left of J1, J2 and J3 in the middle of the figure.

"What's Inside a Mouse?" (August 1986, Page 180): Due to a paste-up error, the lines in Listing 2 are not in order. Lines 10100-15000 from the second column on Page 184 should be placed just after Line 10000 in the first column. We apologize for any inconvenience this has caused.

"Wishing Well: Achieving Arcade Game Speed in BASIC" (July 1986, Page 98): Joel DeYoung has found if you make a high score it is not recognized until another game has been played. His solution is to change the following lines:

```
56 IF NS>TS THEN TS=NS
57 PRINT@71,"HIGH SCORE";TS:PRIN
T@135,"YOUR SCORE";NS
```

This should solve the problem. It is the same as switching lines 56 and 57 around.

"Outfox Those Narrow Printers With Rotate" (May 1986, Page 120): The filename in Line 250 of Listing 3 on Page 126 should be changed from *RSDWS* to *RSIDWS*.

"Who Will Survive the Castle of Doom?" (June 1986, Page 26): Scott Halfman writes to tell of some corrections that need to be made to his *Castle* program. The dimension statement in Line 10 needs to be changed to `DIMG(6,2)`. Also, insert the following at the beginning of Line 15:

```
SC$="0":
```

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG prompt and INFO at the Topic? prompt.

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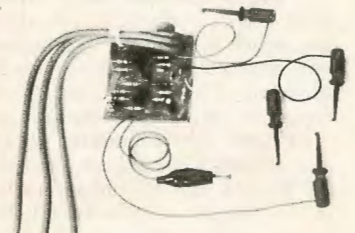
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A look at the internal hardware

Dissecting the CoCo 3

By Cray Augsburg
Rainbow Technical Assistant

The following is a list and brief description of the major components and areas on the Color Computer 3 circuit board.

A) Transformer Assembly — This transformer has the same specifications as the one used in the CoCo 2. As in previous designs, the Color Computer 3 draws power from the wall as long as it is connected to an outlet. The amount of power it draws, however, is small when the machine is not turned on.

B) Power Switch — When turned on, allows current to flow to the Color Computer 3's logic circuitry.

C and D) Left and Right Joystick Connectors — Close examination reveals that the sixth pin, which was unused in previous designs, is now connected. This, along with the enhanced software, allows the Color Computer 3 to recognize both buttons on a Deluxe Joystick.

E) Serial I/O Connector — This four-pin jack accepts Radio Shack's de facto standard for RS-232 devices. Enhancements elsewhere in the machine allow more reliable operation at much higher speeds than on previous CoCos.

F) Cassette Port — This five-pin connector allows you to hook a cassette recorder to the Color Computer 3.

G) RF Modulator — This unit changes the video signal so the Color Computer 3 can drive a television display. This circuit was present on all older CoCos and most CoCo 2s.

H) RF Channel Select — For selecting whether the TV display receives the Color Computer's output on VHF channel 3 or 4.

I) Composite Video Output — This RCA phono jack supplies a composite signal for driving a composite color monitor. The Color Computer 3 is not set up to drive a monochrome monitor when you take it out of the box.

J) Audio Output — This RCA phono jack supplies a line-level audio output. It may be connected to the monitor's audio-in jack or to an external amplifier. It will operate even if you are using a TV or an RGB monitor for the display device.

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

K) Reset — As always, this switch does not destroy memory contents, but causes the computer to stop execution of a currently running program. However, if you have used POKEs or machine-language routines to alter the BASIC routines, they will be changed back to normal by the use of the Reset button.

L) RAM Area — The Color Computer 3 (128K version) contains four 41464 RAM chips. These chips are 64K by 4-bit, dynamic RAM chips. These chips are removed when the machine is upgraded to its limit of 512K RAM.

M) Microprocessor — The Color Computer 3 uses the Motorola 68B09E microprocessor. This 40-pin MPU is designed for reliable operation up to 2 MHz and, as with previous CoCos, gets its clock signal from an external source.

N) ROM Port — This 40-pin cartridge/expansion port accepts existing ROM Paks or the MultiPak Interface. If you intend to use a MultiPak Interface with the new machine, you need to get the MPI fixed at your Radio Shack Service Center first. Apparently, there was a bug in the PAL chip on the MPI. The fix is expected to cost \$6 plus installation charges.

O) Memory Expansion Connectors — These three 12-pin header connectors are designed to receive the 512K RAM upgrade board. The 512K upgrade consists of a satellite board containing 16 256K by 1-bit dynamic RAM chips.

P) Keyboard Connector — The Color Computer 3 uses the same clear Mylar cable for its keyboard connection as the 'F' board and later CoCos used.

Q) Power Supply Circuitry — This is where the incoming power, after being stepped down by the transformer, is rectified, regulated and filtered. This section supplies +/-5 volts regulated, and an unregulated 12 volts.

R) 68B21 PIA — Used to drive portions of the video as well as the cassette and sound circuitry of the Color Computer 3.

S) 68B22 PIA — This open-collector device drives the Color Computer 3's keyboard.

T) Clock Crystal — Unlike its predecessors, which used a clock crystal of frequency 14.31818 MHz, the Color Computer 3 uses a crystal with a frequency of 28.63636 MHz. This, combined with the new circuitry in the machine, allows much faster operation.

U) The GIME — This flat-pack is a revolutionary design from Tandy. The GIME (for

Graphics, Interrupt, Memory Enhancement) combines the functions of the 6847 (VDG) and the 6883 (SAM) from previous CoCos. In addition to supplying bipolar RAM for faster video action, the GIME manages the extended memory of the Color Computer 3 despite the fact that the 68B09E can directly address only 64K of memory. The GIME can be looked at as the "hardware handler" of the Color Computer 3 as the 68B09E is looked at as the "software handler." It is the coolest-running chip in the Color Computer 3.

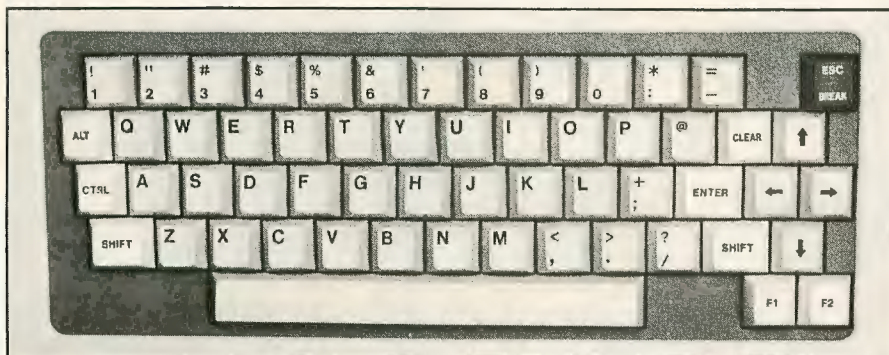
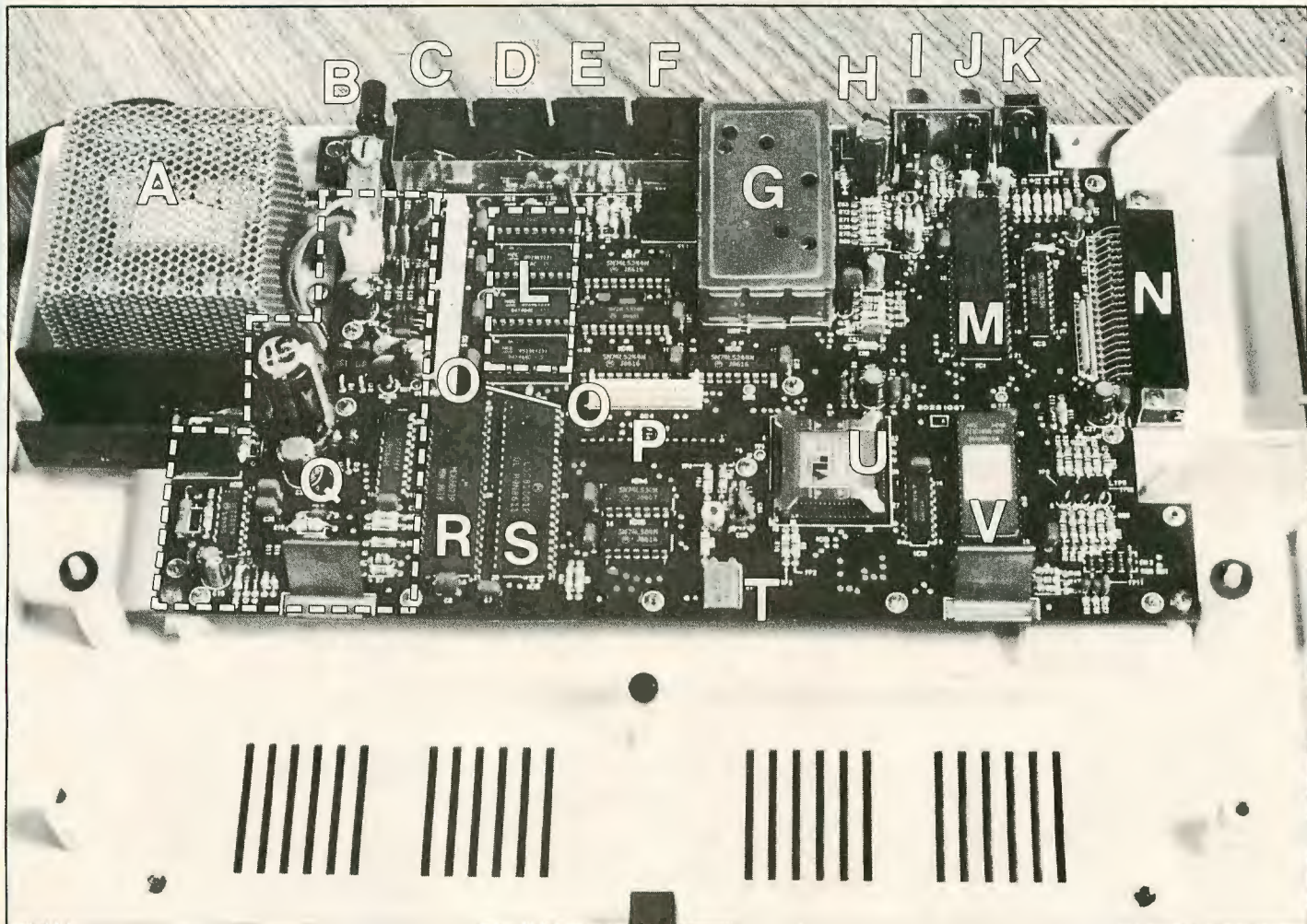
V) ROM — This 32K by 8-bit ROM contains Microsoft Extended BASIC and the overlay enhancements produced by Microware for Tandy. All Color Computer 3s come with this Enhanced Extended BASIC.

** Not shown in these pictures is the RGB monitor connector on the bottom of the new Color Computer. It is a 10-pin header connector unlike the DB9 connectors used by other manufacturers. However, only nine slots on the monitor connector are used and one pin is blocked to eliminate the possibility of plugging the monitor in backwards. For more information about the differences between color composite and RGB, refer to Ed Ellers' article on Page 27 of the September 1986 issue.

Some Observations

Many people have expressed concern about whether the Color Computer 3 supports artifact colors. The new machine does support artifact colors when used with a television or color composite monitor (an RGB monitor will produce the image, but only in black and white). However, in the past the color set chosen by the computer has been random and was selected by repeatedly pressing Reset. This was not a very reliable method. The Color Computer 3 powers up in the same configuration every time it is turned on. To change to the alternate set, hold down the F1 key and press Reset one time. The computer will switch to the alternate set. To switch back, just press Reset one time.

The Color Computer 3 is designed to operate at 0.894 or 1.788 MHz. When turned on, the machine is set to run at 0.894 MHz. However, since the new machine is always operating from RAM (contents of ROM are copied and overlaid in RAM on power-up), the RAM speed-up POKe will work. Just POKe 65497,0 to use the 1.788 MHz clock speed. Type POKe 65496,0 to go back to 0.894 MHz. □



Above: A view of the Color Computer 3's circuit board as seen when looking from the front of the computer. The keyboard has been removed and the RGB monitor jack is mounted beneath the board on the right-hand side.

Left: A view of the Color Computer 3's keyboard. The two function keys are on the bottom-right, while the CONTROL and ALT keys are on the left side.

Right: The back of the Color Computer 3. All letter designations coincide with those in the circuit board view as well as those in the text.





1:10	Kevin Gallagher, Santa Monica, CA
1:13	Anthony Perez, Westminster, CA
1:13	Chris Wright, Frederickton, New Brunswick
SLAY THE NERIUS (Radio Shack)	
480,671	★Jason Munson, Tucson, AZ
294,808	Joyce Walcott, Mt. Clemens, MI
217,195	Christian Keyes, Stroud, Ontario
57,764	Maurice MacGarvey, Dawson Creek, British Columbia
SPACE SHUTTLE SIMULATOR (Tom Mix)	
560	★Robert Helfers, Sparta, IL
SPEED RACER (Mich Tron)	
145,400	★Brian King, Orlando, FL
142,720	Erik Huffman, Rochester Hills, MI
142,310	Kevin Cornell, Greentown, IN
142,100	Chris Harrison, Brooks, KY
139,210	Alan Drazen, Longwood, FL
92,360	Eddie Lawrence, Pasadena, Newfoundland
86,880	Steve Nudelman, Brooklyn, NY
SPIDERCIDE (Radio Shack)	
1,740	★Joel DeYoung, Manson, Manitoba
1,730	Jason Munson, Tucson, AZ
1,540	Blake Cadmus, Reading, PA
STAR BLAZE (Radio Shack)	
8,750	★Jon Larson, Seligman, AZ
8,750	★Kent Pirkle, Cumming, GA
8,400	John Guptill, Columbia, MO
8,200	Chris Coleman, Meriden, CT

8,100	Curtis Frazier Jr., Enterprise, AL
7,300	Chris Tripp, Goldsboro, NC
6,500	Jason Munson, Tucson, AZ
5,400	Mark Herpst, San Diego, CA
STARLORD (THE RAINBOW, 8/86)	
46,440	★Talib Khan, Bronx, NY
STELLAR LIFE-LINE (Radio Shack)	
347,420	★Steven Smith, Matthews, NC
78,600	Don Johnson, Winnipeg, Manitoba
58,580	Stefan Mecay, Austin, TX
37,550	Michelle Wyner, Bloomfield, MI
29,500	Shane Thompson, Cape Girardeau, MO
STORM (Computerware)	
4,305	★Rodrigo Maldonado, Whittier, CA
SUPER ROOTER (THE RAINBOW, 5/86)	
7,360	★Robert Shymanski, Superior, MT
TEMPLE OF ROM (Radio Shack)	
1,422,400	★Timothy Bishop, Jacksonville, FL
959,400	Sonya Hurst, Richmond, CA
938,800	Christopher Romance, Massapequa Park, NY
219,300	Maurice MacGarvey, Dawson Creek, British Columbia
207,800	Jeanine Mason, Spencer, MA
130,700	Paul Mason, Spencer, MA
109,700	Eddy Learnard, Williston Park, NY
10-METER PLATFORM DIVING (THE RAINBOW, 9/85)	
262	★Brian Matherne, Gretna, LA
TO PRESERVE QUANDIC (Prickly-Pear)	
67	★Jeff Hillison, Blacksburg, VA

TREKBOER (Mark Data)	
142	★Joshua Henderson, Amherst, OH
VARLOC (Radio Shack)	
1,850	★Michael Bataion, Ninole, HI
THE VORTEX FACTOR (Mark Data)	
80	★Bernard Fritz, Diamond Springs, CA
WILDCATTING (Radio Shack)	
300,741	★Jason Munson, Tucson, AZ
ZAXXON (Datasoft)	
2,061,000	★Byron Alford, Raytown, MO
1,300,500	Dan Brown, Pittsford, NY
253,400	Bob Dewitt, Blue Island, IL
159,500	Thomas Mayor, Brooklyn, NY
132,300	Roy Geoo, Hot Springs, AR
108,200	Tracy Nahas, New London, CT
97,500	Christopher Conley, North Attleboro, MA
85,400	Douglas Shymanski, Priest River, ID
82,600	Tina Helfers, Sparta, IL
62,500	Walter Hearne, Pensacola, FL
47,200	David Anderson, Midlothian, VA
ZONX (THE RAINBOW, 10/85)	
21,100	★Phillip Johnson, Scottsville, VA
14,300	Dale Taylor, Chattanooga, TN
13,600	Michael Etchason, Sauk Rapids, MN
6,600	Roy Geoo, Hot Springs, AR
6,300	Jeffrey Long, Butler, PA
5,300	Jason Maxwell, Manchester, TN

— 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.

FEEDBACK

Scoreboard:

In response to Eric Crichlow's letter (August 1986) regarding *Trekboer*, there is no second spider. If you don't do away with the first spider, it will regain consciousness and you won't get a second chance to do away with it. To get rid of it for good, FEED SPID, CAPS, E, S, N, W, GET SPID, E, S, GO DOOR, P SPID, G PLAN, GO DOOR and PRES RED. You'll have to take it from there.

Can anyone help me? I'm stuck in the game *Raiders*, by Prism Software. What do you say to the lady in the airport to make her give you the canteen? I hope someone out there will be able to help me! Write to the "Scoreboard."

Bette A. Hatcher
Norwalk, CA

Scoreboard:

In response to Mr. Cotton's letter (August 1986), concerning *Trekboer*, when you're at the bridge on Alton, go east and tie the rope to the tree. Then go back to the bridge (make sure you have the capsule and the amulet) and cross it. When you're on the bridge, go north. You'll figure it out from there.

Wilfred Arndt
Ambler, PA

Scoreboard:

In response to Arne Peterson's letter (August 1986) and my own (July 1986) about *Dallas Quest*, to get the cannibals to

let you pass at the cave entrance, you must do something with the ring.

I need help with *Pitfall II*. Send any help to the "Scoreboard."

Rodrigo Maldonado
Whittier, CA

CORRECTION

Scoreboard:

I had a letter published in the "Scoreboard Pointers" section (July 1986) entitled "Fighting Keys." The keys were misprinted. The '2' key should be the 'Z' key and the '1' should be the '/' (slash key).

John Licata
Richton Park, IL

Editor's Note: Thank you, John, for pointing out the errors in your letter. Once again, we must impress the importance of printing legibly (or perhaps even typing) when submitting scores, and especially pointers.

STAYIN' ALIVE

Scoreboard:

I have a few hints for the game *Robot-tack*. First of all, it is much better if you

play using two people; one controlling the movement, the other controlling the firing.

Secondly, I found that it is best to move out of the way of the robots, then, holding down the button for rapid fire, blow a path through the robots so that you may save a few humans. This method may not score as many points (due to the fact that you usually don't have time to get all the humans before the screen clears and you go to the next level), but I have found you stay alive longer. Using this method with a friend, we successfully made it up to Level 89!

Scott Enman
Belle-Mead, NJ

KEEP MOVING

Scoreboard:

I have a few tips for the game *Lunar-Rover Patrol*. When being bombarded from the air, keep moving, slow down and speed up. If you are about to be hit with a diagonal shot from the upper-left of the screen, speed up and jump — it may miss you. Shoot the ones that drop straight down on you and dodge the others.

In the boulder section, keep firing and slow down gradually. Keep the joystick to the left, jumping over or shooting the small boulders and shooting the big ones.

Jerry Rossano
Manassas, VA



HIT 'EM FROM BEHIND

Scoreboard:

I have a tip for *Shock Trooper* players. Before you leave the first stage, wait for the robots at the top of the screen *behind* where they appear. When they appear, shoot left and when they turn around grab yourself 500 points! I have gotten up to 2,000 points by doing this.

Bernard Florence
Croydon, Australia

RIGHT COMBINATION

Scoreboard:

Many people seem to have trouble with *Madness and the Minotaur*, including me. I cannot find the solution to the Scorpion, therefore I haven't been able to beat it after most three years. However, I feel qualified to give a few tips.

Most important, be sure to save the game on tape before making the first move, and again every time you make progress. The game changes each time you start over from the beginning.

Believe the instruction manual. All 256 rooms are accessible and the first spell really is automatic when you get the right combination of objects (i.e., Food and Mushroom).

Kill the Sprite ASAP to stop it from

moving things around where you can't find them anymore.

Drop unneeded items for landmarks when exploring the maze.

John W. Meredith
Enterprise, AL

VINES SUBLIME

Scoreboard:

I have some advice for beginning *Raaka-Tu* players. To get the gold coin, the guards have to go left. To make them march left, go to the vines and climb them. You should fall and the guards will kill you. Now, when you start again, go west, south and west. Then, get the coin and go north to the vines; climb them. You should fall through the roof and land in the temple.

If you fall from the vines, don't worry. The guards will always go left when you are killed at the north wall.

Dawn Daniels
San Antonio, TX

PRAY FOR HELP

Scoreboard:

Here are some tips for *Zork I*. In the loud room, type ECHO.

Pray at the Altar — this will help more than you expect.

You should put all your treasures in the trophy case.

If you have trouble turning the bolt on the dam, try pressing some of the buttons in the maintenance room.

Does anybody know what to do with the magic gunk?

Frank Heezen
Poquoson, VA

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.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

— Debbie Hartley

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ENGINEERING

Use this technique to track down FC Errors

Don't String Me Along

By Ellen and
George Aftamonow

Most computers don't hesitate to tell us where we went wrong and what sort of mistake we made this time. We are all too familiar with SN Error in 100, TM Error in 250, etc. In each case, one simply looks at the given line number and corrects it.

However, this is not necessarily the case with the FC (function call) Error. All too often an examination of FC Error shows that the given line number has no error in it at all. Many people then sit down and pen a letter to the author or the magazine to proclaim that the program does not work. But, before we're so quick to blame the program, we should do a little detective work.

The Aftamonows are self-taught programmers living in Milford, Connecticut. Ellen holds a degree in math and concentrates on the structure of the program, while George creates and designs graphics.

When you get an FC Error message, first check the given line. If the line is correct, then the most likely suspect is a previously defined string. For instance:

```
100 I$ (1) = "U8BR3R2ND8R2BD8"
110 W$ = "BR5L2NU5L2HU7BR6D7GBR4"
120 O$ = "U8R4D8NL4BR2"
130 R$ = "U8R4FD2GL2F4BR2"
140 K$ = "U8BD4NE4F4BR2"
150 S$ = "BRNHR4EU2HL4HU2ER4BR4BD8"
160 PL$ = "T200L10004AAABBBCCC"
170 PMODE3, 1: SCREEN1, 1: PCLS
180 DRAW "BM70, 100S8XI$(1); BR8XW$;
XO$; XR$; XK$; XS$; ": PLAYPL$
190 FORX=1TO500:NEXTX
```

In this example, if the CoCo greets us with an FC Error in 180 and Line 180 lists correctly, we should backtrack to lines 100 through 160, where we first defined the various strings. All Line 180 does is execute the strings that appear in lines 100 through 160. So it stands to reason that if a string was defined wrong, Line 180 cannot be executed, thus the FC Error.

The easiest way to pick out the culprit is to insert a quote and REM (" ") after a suspect string, using the edit mode. Thus, Line 180 becomes:

```
180 DRAW "BM70, 100S8XI$(1); " BR8XW$;
XO$; XR$; XK$; XS$; ": PLAYPL$
```

If the program reaches Line 190, then the error was not in I\$(1) in Line 100. So delete the " " and insert them after the next string.

```
180 DRAW "BM70, 100S8XI$(1); BR8XW$;
" XO$; XR$; XK$; XS$; ": PLAYPL$
```

Continue in this manner until you get the FC Error. You will then know which string has the error and you can look for an error in the line where the string is defined. Often times it is the letter 'I' which should have been number one, the letter 'O' which should have been number zero, or the letter 'B' which should have been number eight. So when you see an FC Error, don't let it string you along.

(Questions about this technique may be directed to the authors at 46 Howe Street, Milford, CT 06460, 203-878-3602. Please enclose an SASE when writing.)



A Greedy Man's Comeuppance is the

Double Whammy Double Whammy



By Bill Bernico



I would like to share my first game with the rest of the readers. It's called *Whammy*, and it's based on the old dice game, Skunk.

The object of *Whammy* is to acquire a preset number of points before your opponent does. Each player takes turns rolling the dice. You may roll as many times as you like, provided you don't roll a one, which in this game is represented by a 'W' (for *Whammy*).

With each roll, you accumulate the number of points made on that roll. If you choose not to roll again, you keep the points accumulated during that turn. Roll a one (W) and you lose all the points from that turn and the dice are passed to the next player. If you roll two ones (Ws), it's a double whammy and you lose all the points you have earned throughout the game. That's especially aggravating near the end when you have more to lose.

There's some skill required to know when to stop and pass the turn to someone else, but this game has the one element that is essential to a good game — greed. The temptation to roll just one more time when you're behind makes for some excitement during the game.

One last note on the screen presentation used. It contains the statement `POKE 355,60:SCREEN 0,1` to turn the screen a shade of orange when a whammy is hit. Simply follow the next direction on the screen and press `ENTER` to continue. The screen will return to normal. If you should press the `BREAK` key while the screen is orange, the program will hang up. Just press the Reset button, type `POKE 359,126` and press `ENTER`. It won't show up on the screen, but the fix will be made and you'll see the green screen with the `OK` prompt once again.

(Questions about this program may be directed to Mr. Bernico at 708 Michigan Avenue, Sheboygan, WI 53081, 414-459-7350. Please enclose an SASE when writing.) □

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, Wisconsin.

150	.....100	600	.....163
280	.....218	700	.....174
480	.....121	END	.....59

The listing: WHAMMY

```

10 ' THE GAME OF WHAMMY
20 ' BY BILL BERNICO
30 ' 708 MICHIGAN AVE.
40 ' SHEBOYGAN, WI 53081
50 ' (414) 459-7350
60 '
70 D=0:E=0:F=0:G=0:H=0:I=0:J=0:K
=0:L=0:Z=43345
80 C$=CHR$(170):D$=CHR$(165):E$=
CHR$(172):F$=CHR$(163):Y$=CHR$(1
59):R$=CHR$(191):L$=CHR$(175)
90 CLS:PRINT@136,"THE GAME OF wh
ammy
100 PRINT@201,"BY BILL BERNICO
110 PRINT@0,STRING$(32,223);:PRI
NT@480,STRING$(31,223);:POKE1535
,223:FORX=32TO448STEP32:PRINT@X,
CHR$(223);:NEXT
120 FOR X=31 TO479STEP32:PRINT@X
,CHR$(223);:NEXT:PRINT@33,STRING
$(30,207);:PRINT@449,STRING$(30,
207);
130 FORX=65TO417STEP32:PRINT@X,C
HR$(207);:NEXT:FORX=94 TO 478 ST
EP32:PRINT@X,CHR$(207);:NEXT
140 PRINT@66,STRING$(28,239);:PR
INT@418,STRING$(28,239);:FORX=98
TO386STEP32:PRINT@X,CHR$(239);:N
EXT
150 FORX=125TO413STEP32:PRINT@X,
CHR$(239);:NEXTX:SOUND89,3:SOUND
109,3:SOUND125,3:SOUND109,3:FORX
=1TO120:NEXT:SOUND125,3:SOUND89,
3:FORX=1TO200:NEXT:SOUND175,2
160 PRINT@358,"HIT ANY KEY TO BE
GIN";:EXEC44539
170 CLS:PRINT"NUMBER OF PLAYERS
(1-4)";:FOR X=1024 TO 1046:POKE
X,PEEK(X)-64:PLAY"O5T60B":EXEC Z
:NEXT X:INPUT F
180 IF F<1 OR F>4 THEN 170
190 PRINT@32,STRING$(32,150);
200 FOR G=1 TO F
210 PRINT:PLAY"O5T60B":EXEC Z:PL
AY"O4B":EXEC Z:PLAY"O5B":EXEC Z:
PLAY"O4B
220 PRINT"PLAYER #";G;:INPUT A$(
G):NEXT G
230 H=RND(F)
240 PRINT@384,"POINTS NEEDED TO
WIN";:FOR X=1408 TO 1427:POKEX,P
EEK(X)-64:PLAY"O5T60B":EXEC Z:NE

```

```

XT:INPUT L
250 CLS:GOSUB 790
260 IF F>2 THEN PRINT@64,STRING$
(32,191);
270 IF F<3 THEN PRINT@32,STRING$
(64,191);
280 PRINT@96,R$;R$;A$(H) "'S TURN
";STRING$(28,191);
290 PRINT@118,"goal"L;
300 PRINT@128,STRING$(32,191);
310 I=RND(6):J=RND(6):K=I+J
320 PRINT@160,STRING$(96,175);
330 PRINT@194,"your roll";:PRINT
@205,I;:PRINT@211,J;:PRINT@219,K
;:POKE1222,32:POKE1233,43:POKE12
39,61
340 PRINT@172,C$;F$;F$;F$;D$;
350 PRINT@204,C$;L$;:PRINT@207,L
$;D$;
360 PRINT@236,C$;E$;E$;E$;D$;
370 PRINT@178,C$;F$;F$;F$;D$;
380 PRINT@210,C$;L$;:PRINT@213,L
$;D$;
390 PRINT@242,C$;E$;E$;E$;D$;
400 PRINT@185,STRING$(7,175);
410 PRINT@249,STRING$(7,175);
420 PRINT@256,STRING$(32,255);
430 PRINT@288,STRING$(32,159);
440 PRINT@352,STRING$(32,159);
450 PRINT@416,STRING$(32,159);ST
RING$(32,255);
460 IF PEEK(1230)=113 THEN POKE
1230,23
470 IF PEEK(1236)=113 THEN POKE
1236,23
480 IF I=1 AND J=1 THEN PRINT@28
8,STRING$(160,159);:SOUND 1,14:S
OUND 34,4:SOUND 44,2:FOR X=1 TO
340:NEXT X:SOUND 1,9:GOTO600
490 IF I=1 OR J=1 THEN PRINT@288
,STRING$(160,159);:FOR X=1 TO 50
:PLAY"O1T60":EXEC Z:NEXT X:GOTO6
10
500 E=E+K:D(H)=D(H)+K
510 IF D(H)=>L THEN 710
520 PRINT@320,E;"points";Y$;"thi
s";Y$;"turn";STRING$(16,159);:PO
KE1344,159:IF PEEK(1346)=96THEN
POKE1346,159
530 GOSUB 790
540 PRINT@384,D(H);"total";Y$"po
ints";STRING$(20,159);:POKE1408,
159:IF PEEK(1410)=96THEN POKE 14
10,159
550 PRINT@487,"ROLL AGAIN (Y/N)?
";:FOR X=1510 TO 1528:POKE X,PEE
K(X)-64:PLAY"O3T60F":EXEC Z:NEXT
560 B$=INKEY$:IF B$=""THEN 560
570 IF B$="Y"THEN 250

```



```

58Ø IF B$="N"THEN 62Ø
59Ø GOTO56Ø
60Ø PRINT@32Ø,STRING$(8,159);"do
uble";Y$;"whammy";STRING$(3Ø,159
);:PRINT@384,STRING$(4,159);"you
";Y$;"lose";Y$;"all";Y$;"your";Y
$;"points";STRING$(2Ø,159);:D(H)
=Ø:GOTO 62Ø
61Ø PRINT@288,STRING$(44,159);:P
RINT@332,"whammy";STRING$(47,159
);:PRINT@385,"you";Y$;"lose";Y$;
"all";Y$;"points";Y$;"this";Y$"t
urn";STRING$(34,159);STRING$(32,
255);:D(H)=D(H)-E
62Ø H=H+1:E=Ø
63Ø IF H>F THEN H=1
64Ø GOSUB 65Ø:GOTO 25Ø
65Ø PRINT@485,"HIT <ENTER> TO CO
NTINUE";:FOR X=15Ø4 TO 1535:POKE
X,PEEK(X)-64:EXEC43345:NEXT X
66Ø IF I=1 AND J=1 THEN GOSUB 84
Ø
67Ø IF I=1 OR J=1 THEN GOSUB 85Ø
68Ø IF INKEY$<>CHR$(13)THEN 68Ø
69Ø POKE 359,126
70Ø RETURN
71Ø PRINT@32Ø,STRING$(32,159);A$

```

```

(H);Y$;"wins";Y$;"with";Y$;D(H);
Y$;"points";STRING$(63,159);
72Ø PLAY"T6ØØ1CDEFGABO2CDEFGABO3
CDEFGABO4CDEFGABO5CDEFGAB
73Ø GOSUB 79Ø
74Ø PRINT@487,"PLAY AGAIN (Y/N)?
";:FOR X=151Ø TO 1528:POKE X,PEE
K(X)-64:PLAY"O5T6ØB":EXEC Z:NEXT
75Ø C$=INKEY$:IF C$=""THEN 75Ø
76Ø IF C$="N"THEN CLS:LIST-5Ø:EN
D
77Ø IF C$="Y"THEN RUN
78Ø GOTO 75Ø
79Ø PRINT@Ø,A$(1);D(1)
80Ø IF F=>2 THEN PRINT@16,A$(2);
D(2)
81Ø IF F=>3 THEN PRINT@32,A$(3);
D(3)
82Ø IF F=>4 THEN PRINT@48,A$(4);
D(4)
83Ø RETURN
84Ø FORX=1TO5:POKE359,6Ø:SCREENØ
,1:PLAY"O4T6ØF":FORY=1TO1ØØ:NEXT
Y:POKE359,126:SCREENØ,Ø:PLAY"O3T
6ØF":FORY=1TO1ØØ:NEXTY:NEXTX:RET
URN
85Ø POKE 359,6Ø:SCREENØ,1:RETURN

```

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Getting to the Details of the CoCo 3

By Marty Goodman

Q. I hear the new CoCo 3 will have an RGB output. Does this mean I can use the same RGB monitor I now use on my IBM PC?

A. No. The new CoCo 3 does have an RGB output, but it is an RGB analog output, not the RGBI-type signal protocol used for most standard IBM PC color displays. The RGBI used by the IBM systems is characterized by its signals at TTL levels (five volts or zero volts — nothing in between). It allows for a maximum of 14 colors plus black. RGB analog allows for a great many more colors and, as such, is a superior protocol. It may be possible to modify many RGBI-type monitors to accept RGB analog signals by merely removing a chip or two inside the monitor and properly biasing the bases of the R, G, B and synch input transistors. But apart from such hacker manipulations, to fully appreciate the impressive color graphics capability of the CoCo 3 you will have to either buy the \$300 CM-8 monitor from Tandy, or use one of the few other RGB analog capable

monitors. Both Magnavox and Sony make a few monitors that are RGB analog capable. There are two minor variants of RGB analog. One is the kind used by the CoCo 3, where the R, G and B signals are separate and there are separate synch signals. The other is the protocol used by the Amiga computer, where the synch signal information is tacked on to the Green luminance line.

Q. I know the CoCo 3 features much improved graphics resolution. But the CoCo 3's joystick inputs are of the same zero-to-63 low resolution as those of the old CoCo 2. How can I achieve smooth positioning of a cursor or character on the CoCo 3 screen using the joystick? Will the CoCo Max Hi-Res joystick help?

A. Currently, the only way to get Hi-Res joystick control on a CoCo 3 involves one of several programming tricks: for instance, using a fine control box (like that used by *Graphicom*) or using the analog joystick as a time-controlled, four-switch joystick via a software emulation of such an Atari-type joystick. *CoCo Max's* Hi-Res joystick hardware (and the program itself) will not work on the CoCo 3 due to the hardware using a port address that conflicts with assigned addresses used by the GIME chip in the CoCo 3. But it has been rumored that a low-cost adaptor will soon be available. It will plug in between the joystick ports and computer (on both the CoCo 2 and 3) and will greatly increase the available resolution of the

joysticks. Keep an eye on new products from Tandy; help is on the way.

Q. I am told by Tandy that all of their hardware for the CoCo 2 will be compatible with the CoCo 3. Is this so? What about hardware and software from non-Tandy sources?

A. To the best of my knowledge, all Tandy hardware for the CoCo (Multipak, Disk controller, RS-232 Pak, Hard Disk Controller, Speech Sound Pak, and such) is fully compatible with the CoCo 3. Similarly, all third party disk controllers (those from J&M systems, HDS and Disto) should also work fine with the CoCo 3. But in order for them to work with the CoCo 3, they need to have an unmodified version of Disk BASIC 1.1. The PBJ 2SP pack is also fully compatible with the CoCo 3, as is the Disto RAM disk card. The 80-column card from PBJ will probably *not* work on the CoCo 3, although it is not needed due to the 80-column capability of the CoCo 3.

CoCo Max will not work in its current form on the CoCo 3, in part because of hardware conflicts. But it will very likely be re-released in a CoCo 3 compatible version.

Due to differences in the handling of memory on the CoCo 3, much other well-known CoCo 2 software (*Telewriter, VIP Writer, Mikeyterm, Graphicom, Color Com E, etc.*) will *not* work in their original forms on the CoCo 3. However, patches for these and other popular CoCo 2 programs will most likely appear soon.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

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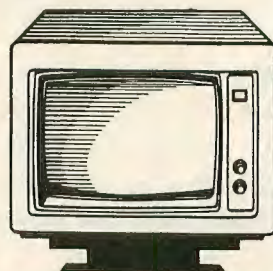
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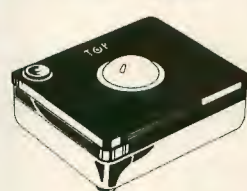
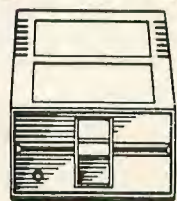
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By Helene LaBonville

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32K
ECB

The listing: PUMPKIN

```

0 ' TALKING PUMPKIN BY HM LaBONV
  ILLE
1 ' ADAPTATION OF DAVE HOOPER'S
2 ' DRAWING FROM THE RAINBOW
    
```



```

3 ' OCTOBER 1982 (PAGE 104)
4 ' AND MIKE KELLER'S ARTICLE
5 ' FROM 80-MICRO (OCT82 PAGE104
  )
6 GOTO8
7 GOTO9
8 PCLEAR8:Pmode4:PCLS:GOTO7
9 Pmode3,1
10 ' DRAW PUMPKIN
11 ' LINES 10-80 ARE IDENTICAL T
  O HOOPER'S LINES 10-85
15 CIRCLE(128,96),90,7
20 PAINT(128,96),7,7
    
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PO BOX 264
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```

25 CIRCLE(128,96),45,1,2
30 CIRCLE(128,96),30,1,3
35 CIRCLE(128,96),58,1,1.6
40 CIRCLE(128,96),80,1,1.1
45 CIRCLE(128,96),10,1,9
50 ' EYES-NOSE
55 DRAW"C8;BM68,68E16F16L32"
60 PAINT(84,64),0,8
65 DRAW"C8;BM156,68E16F16L32"
70 PAINT(172,64),8,8
75 DRAW"C8;BM112,92E16F16L32"
80 PAINT(128,88),8,8
85 ' COPY BODY, EYES AND MOUTH T
O PAGES 5 TO 8
90 PCOPY1TO5:PCOPY2TO6:PCOPY3TO7
:PCOPY4TO8
95 ' CLOSED MOUTH
100 CIRCLE(128,96),52,8,1,0,.5
105 CIRCLE(128,59),77,8,1,.160,.
35
110 PAINT(128,142),8,8
115 DRAW"C7;BM92,122D8R8U5"
120 PAINT(96,126),7,7
125 DRAW"C3;BM124,6U4R8D4L8"
130 PAINT(128,4),3,3
135 DRAW"C7;BM165,120D10L8U7"
140 PAINT(161,128),7,7
145 DRAW"C7;BM120,148U8R16D9L16U
1"
150 PAINT(128,144),7,7
155 PMODE3,5
160 ' OPEN MOUTH
161 ' LINES 165-215 ARE IDENTICA
L TO HOOPER'S LINES 90-135
165 CIRCLE(128,96),52,8,1,0,.5
170 CIRCLE(128,21),91,8,1,.160,.
35
175 PAINT(126,124),8,8
180 DRAW"C7;BM88,100D8R8U5"
185 PAINT(92,104),7,7
190 DRAW"C3;BM124,6U4R8D4L8"
195 PAINT(128,4),3,3
200 DRAW"C7;BM164,100D10L8U7"
205 PAINT(160,104),7,7
210 DRAW"C7;BM120,148U8R16D9L16U
1"
215 PAINT(128,144),7,7
220 AUDIOON
225 ' DISPLAY CLOSED-MOUTHED PUM
PKIN
230 PMODE4,1:SCREEN1,1
235 FORX=1TO50:NEXT
240 ' OPEN MOUTH IF JOYSTICK BUT
TON PRESSED
245 IF PEEK(339)=255THEN245
250 PMODE4,5:SCREEN1,1
255 FORX=1TO100:NEXT
260 GOTO230

```

Colors of the Spectrum

By Bill Bernico

You've probably seen ROY G. BIV mentioned before in THE RAINBOW. For those of you who do not know, ROY G. BIV represents the six primary and secondary colors of the spectrum that make up a rainbow: Red, Orange, Yellow, Green, Blue, Indigo and Violet.

The following program demonstrates the combining of any two of the primary colors (red, yellow, blue) to make a secondary color (green, orange, violet). Just answer the computer's prompts.

16K
ECB

The listing: SPECTRUM

```

10 'SPECTRUM
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 'IDEA BY DAVID POLONSKY
70 '
80 R$=CHR$(191):Y$=CHR$(159):B$=
CHR$(175):BL$=CHR$(128)
90 CLS0:PRINT@71,"RED";:PRINT@76
,"YELLOW";:PRINT@84,"BLUE";
100 PRINT@102,STRING$(5,191);STR
ING$(8,159);STRING$(6,175);
110 PRINT@165,"CHOOSE ANY TWO OF
THESE";:PRINT@197,"COLORS TO SE
E WHAT COLOR";:PRINT@229,"THEY M
AKE WHEN COMBINED.";
120 PRINT@323,"CHOICE 1 (R,Y,B):
";:INPUT C$(1):SOUND191,1
130 PRINT@387,"CHOICE 2 (R,Y,B):
";:INPUT C$(2):SOUND150,1
140 IF C$(1)=C$(2)THEN 90
150 IF C$(1)="R"AND C$(2)="B"THE
N C$(3)=CHR$(239):GOTO210
160 IF C$(1)="R"AND C$(2)="Y"THE
N C$(3)=CHR$(255):GOTO210
170 IF C$(1)="Y"AND C$(2)="R"THE
N C$(3)=CHR$(255):GOTO210
180 IF C$(1)="Y"AND C$(2)="B"THE
N C$(3)=CHR$(143):GOTO210
190 IF C$(1)="B"AND C$(2)="R"THE
N C$(3)=CHR$(239):GOTO210
200 IF C$(1)="B"AND C$(2)="Y"THE
N C$(3)=CHR$(143):GOTO210
210 PRINT@344,BL$+BL$+BL$+C$(3)+
C$(3)+C$(3)+C$(3);:PRINT@3

```

```

77,"="+BL$+C$(3)+C$(3)+C$(3)+C$(
3)+C$(3);:PRINT@408,BL$+BL$+BL$+
C$(3)+C$(3)+C$(3)+C$(3)+C$(3);
220 GOSUB 230:GOTO 90
230 PRINT@484,"HIT ANY KEY TO CO
NTINUE";:EXEC44539:RETURN

```

```

280 DATA 42,124,1,1,125,5,53,53,
53,53,5,125,1,1,124,999
290 DATA 0,127,64,67,69,74,85,90
,85,90,85,90,85,74,69,67,64,64,6
5,65,65,65,65,89,89,89,88,88,67,
69,74,85,90,85,90,85,90,85,74,69
,67,64,127,999

```

The Boogie Box

By Michael Berenz



This program prints a very small version of a jam box on any Radio Shack dot-matrix printer.

The listing: RAD10

4K

```

10 REM *****
20 REM *          RADIO          *
25 REM * BY MIKE BERENZ *
30 REM *****
40 PRINT#-2,CHR$(18)
50 PRINT#-2,CHR$(128);CHR$(224);
CHR$(184);
60 FOR A=1 TO 38
70 PRINT#-2,CHR$(168);
80 NEXT A
90 PRINT#-2,CHR$(184);CHR$(224)
100 READ B:IF B=999 THEN PRINT#-
2,"":GOTO 130
110 PRINT#-2,CHR$(128+B);
120 GOTO 100
130 PRINT#-2,CHR$(128);CHR$(255)
;CHR$(128);CHR$(252);
140 FOR C=1 TO 5
150 PRINT#-2,CHR$(170);CHR$(213)
;
160 NEXT C
170 READ D:IF D=999 THEN 200
180 PRINT#-2,CHR$(128+D);
190 GOTO 170
200 FOR E=1 TO 5
210 PRINT#-2,CHR$(170);CHR$(213)
;
220 NEXT E
230 PRINT#-2,CHR$(170);CHR$(252)
;CHR$(128);CHR$(255)
240 READ F:IF F=999 THEN PRINT#-
2,CHR$(30):END
250 PRINT#-2,CHR$(F+128);
260 GOTO 240
270 DATA 0,127,0,48,48,0,79,77,7
3,79,73,77,75,13,9,15,73,77,75,7
7,73,79,73,77,75,77,73,79,9,13,1
1,79,64,64,70,79,79,70,0,48,48,0
,127,999

```

Space Attack

By Patrick J. Benway

This short program uses the BASIC commands of CIRCLE, LINE and PSET-PRESET to demonstrate a space city raid.

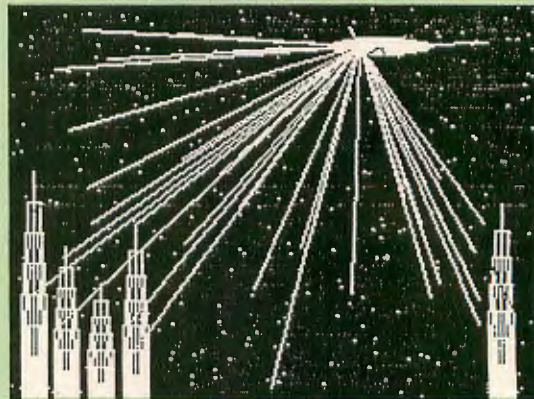
The listing: RAID

16K
ECB

```

10 CLS:PRINT@196,"---SPACE-CITY
(RAID!)---":FORJ=1TO255STEP3:SOU
NDJ,1:NEXT
20 PMODE4:PCLS:SCREEN1,1:FORJ=1T
O300:PSET(RND(255),RND(191)):NEX
T
30 FORJ=1TO7:CIRCLE(12,185),J,,1

```



```

5:CIRCLE(28,187),J,,10:CIRCLE(45
,195),J,,8:CIRCLE(62,225),J,,12:
CIRCLE(238,187),J,,13:NEXT:SOUND
255,50
40 FORJ=1TO25:CIRCLE(180,20),J,,
.200:NEXT:SOUND1,50:SOUND150,8:S
OUND50,1:LINE(180,20)-(30,120),P
SET:LINE(180,20)-(30,120),PRESET
:SOUND1,50:SOUND150,8:SOUND50,1:
LINE(180,20)-(245,150),PSET:LINE
(180,20)-(245,150),PRESET:SOUND1
,50
50 SOUND200,20:LINE(10,100)-(170
,20),PSET:LINE(10,100)-(170,20),
PRESET
60 FORJ=1TO100:A=RND(255):B=RND(
191):LINE(170,20)-(A,B),PSET:NEX
T

```

Princeton

Oct. 17-19

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RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer. Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's the next best thing to receiving the latest issue of THE RAINBOW in your mailbox!

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

The Hyatt Regency Princeton offers special rates (\$79, single or double room) for RAINBOWfest. **The show opens Friday evening** with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. **A special Saturday evening round table** examining the new CoCo 3 (6:30 p.m.) is sure to be a highlight. 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 reservation form so you can get your special room rate.

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- Special round table at 6:30 p.m.

Sunday

- Exhibits open from 11 a.m. to 4 p.m.

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CoCo Community Breakfast

Greg Zumwalt — CoCo 3 Programmer

Our keynote speaker for the traditional CoCo Community Breakfast is Greg Zumwalt, one of the early CoCo specialists who has created everything from flight simulators to computer games. An independent programmer and computer designer, Greg is one of the select few writing Tandy software for the new Color Computer 3. He owns ZCT Software, of Tulsa, Okla., and also writes software for business applications in such areas as aviation, the oil industry and the medical field.

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*Get
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Optimum Animation

By Steven R. Polsz

Have you ever designed a program using animation graphics only to find, after long hours of work, that the graphics were too elaborate and they ate up so much memory there wasn't enough room for the entire program? Have you had to settle for spaceships that look like little crosses rather than the beautiful graphics display you wanted? Perhaps your explosions had to be a series of blinking colors instead of the real thing? If you have tried any extensive animation or game design, this or some similar difficulty has probably clouded your efforts. But there is a solution to this problem — a solution that frees at least 95 percent of the memory previously reserved for graphics storage.

Let us first consider the process of creating the animation scenes: the GET statement. The usual syntax of this statement is `GET (X1,Y1)-(X2,Y2),A`

Steve Polsz lives in Philadelphia and is a free-lance programmer, writer and artist. The discovery of optimum animation is due to his impatient 3-year-old, Adam, and an undiscovered typo.

where X1,Y1 are the upper-left corner coordinates and X2,Y2 are the lower-right corner coordinates of the graphics scene to be stored. The variable 'A' is the target array where the scene is stored. This array is dimensioned to match graphics scene point to array member, in a one-to-one correspondence.

Thus, the number of members in the target array is the same as the number of points in the animation scene. If we create two animation scenes that are 8 by 16 points in size, we need two 8-by-16 arrays to store them. Each of these arrays contains 128 members, and each array member consists of five bytes — a total of 1280 bytes. This is slightly less than 300 bytes short of one graphics page.

Yet if we use `PMODE 0`, the entire graphics screen (128 by 96 points) is stored on this very same page. By using the GET statement, the equivalent of two rows of the video screen is stored in the identical space utilized by the computer to store the entire screen. It seems that the GET statement is very inefficient. Then again, is it?

Our next step is to examine the actual contents of the array 'A' after the

graphics scene has been stored in it. The following short program does just that:

```

10 PMODE1,1:SCREEN1,0:COLOR
4,3:P CLS
30 DRAW"SB C1 BM 2,6 UER3F
2DRUHR 2ER3FD BM4,4 C4 R3FBR3ER3"
50 DIM A(15,5):GET(0,0)-(30,10),
A:PUT(32,32)-(62,42),A
70 GOSUB210
90 FORJ=0TO5
110 FORI=0TO15
130 PRINTI;J;A(I,J)
150 NEXTI
170 GOSUB210
190 NEXTJ
210 A$=""
230 A$=INKEY$
250 IFA$="" THEN 230 ELSE RETURN

```

Lines 10 through 50 create the spaceship graphics scene shown in the Figure, then reproduces it elsewhere on the screen by use of the PUT statement. This scene is 16 by six, therefore the associated array consists of 480 bytes — slightly more than one-fourth of one graphics page.

By pressing any key, the contents of the array 'A' are displayed, one screenful at a time. To view the next screenful, push any key.

The first two numbers are the indices of the array member, the third, its value. As you can see, the great majority of

these values is zero. The non-zero members are as follows:

```

A(0,0) -2.932031 E+12
A(1,0) -1.88127596 E-36
A(2,0) -9.12340439 E-35
A(3,0) -1.14532461 E+10
A(4,0) -2.93203083 E+12

```

How should we interpret this? The first five members of 'A' are non-zero and distinct, while the remaining cells of 'A' are empty.

According to the Extended BASIC manual, the GET statement transfers the animation scene pointwise in a one-to-one mapping into the array 'A'. Therefore, we should expect, for example, the point (0,0) to be coded into A(0,0), the point (2,0) into A(1,0), and so forth until point (30,10) is mapped into A(15,5). Obviously this cannot be the case. If it were, A(0,0) through A(4,0) would be identical and none of the members of 'A' would have a zero value.

The logical assumption is that the entire graphics scene is coded into the first five members of 'A'. Let us add the following lines to our program:

```

60 DIM B(4): GET(0,0)-(30,10),
B: PUT(64,32)-(94,42),B

```

Replace lines 90 through 130 with:

```

90 FOR I=0 TO 4
110 PRINT A(I,0); B(I)

```

Delete Line 190 and run the program.

The original spaceship appears in the upper-left corner along with two duplicates. Examine the two closely; you will find them to be identical. Push any key and the screen displays the values of A(0,0) through A(4,0) with its counter-

part from the array 'B' next to it. As you see, these too are identical.

So the two-dimensional array supposedly required for the GET/PUT statement pair can be replaced by a one-dimensional array of considerably shorter length. But how can we determine the minimum size of this array?

This answer may be deduced from the information found in the BASIC manual *Getting Started with Color BASIC*. Pages 264 to 266 detail the computer's method of storing graphics information (see Table 1).

Table 1

Graphics 2R is the same as PMODE 0
Graphics 3C is the same as PMODE 1
Graphics 3R is the same as PMODE 2
Graphics 6C is the same as PMODE 3
Graphics 6R is the same as PMODE 4

As we can see from the table, there are eight points of graphics display per byte for even-numbered PMODES, and four points per byte for odd-numbered PMODES.

Taking all this into consideration, the 96 points of the spaceship graphics in PMODE 1 can be contained in 24 bytes of information. Since each member of an array contains five bytes, this scene can be fitted into an array of length five.

The GET parameters define exactly how the scene is fitted into the target array. If either more or less than five bytes are used in any row of the graphics scene, there will be a "wrap around" so that each member of the target array will be filled before the next one is written into.

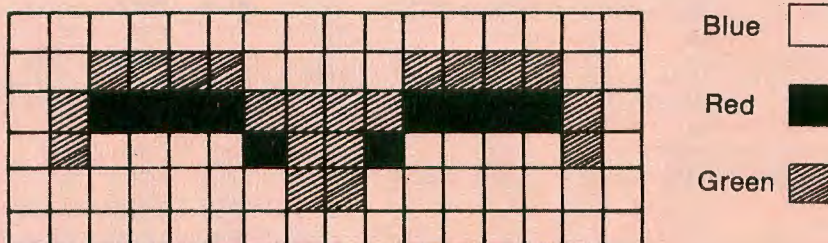
The PUT statement reverses this process, translating the scene within the confines of its parameters. Any trailing members of the information array have a zero value and are ignored.

Therefore, to most efficiently use the GET/PUT statement pair, count the number of graphics points used in the scene and divide this number by 20, if in an odd PMODE, or 40, if in an even PMODE, then subtract one.

The result is the necessary length of a one-dimensional array needed to store the scene. As you see, by use of this method, the array space is drastically reduced — a total of at least 95 percent over the usual method.

(Questions about this program may be directed to the author at 6739 Regent Street, Philadelphia, PA 19142, 215-727-7562. Please enclose an SASE when writing.)

Figure 1: Spaceship in PMODE 1



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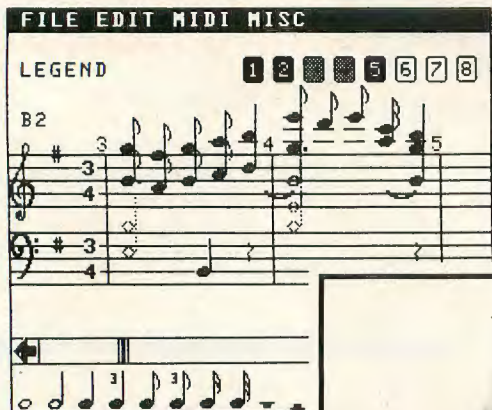
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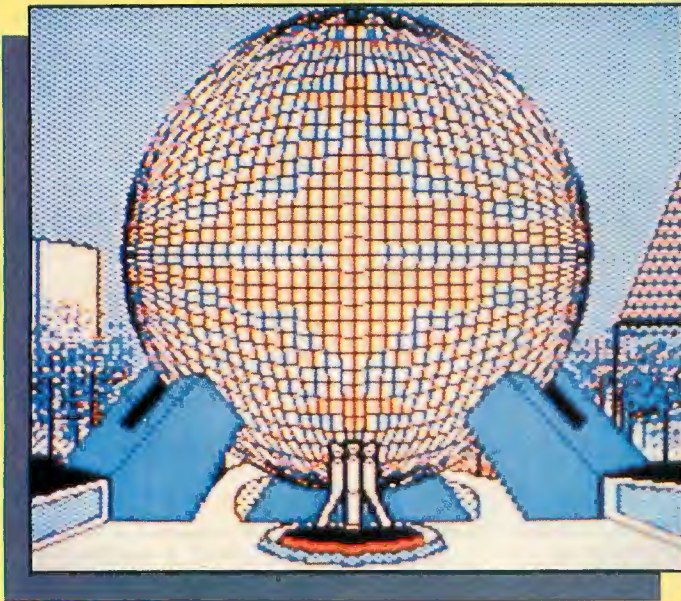
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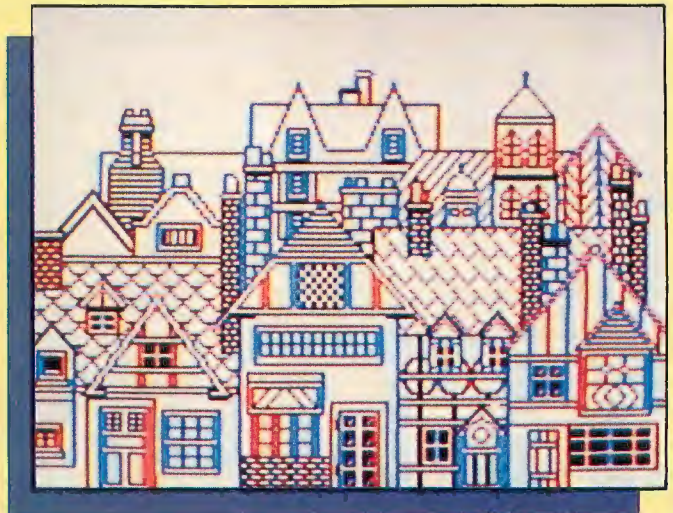
Spaceship Earth Steve Warrick

Steve, who lives in Peru, Illinois, opens the gallery with this graphic rendition of Spaceship Earth, which dominates the entrance to Epcot Center. Steve used *CoCo Max* for his work of art.

Co Covilla Edwin Hathaway

From his home in Glendale Heights, Illinois, Edwin created this vibrant European community with the use of *CoCo Max*.

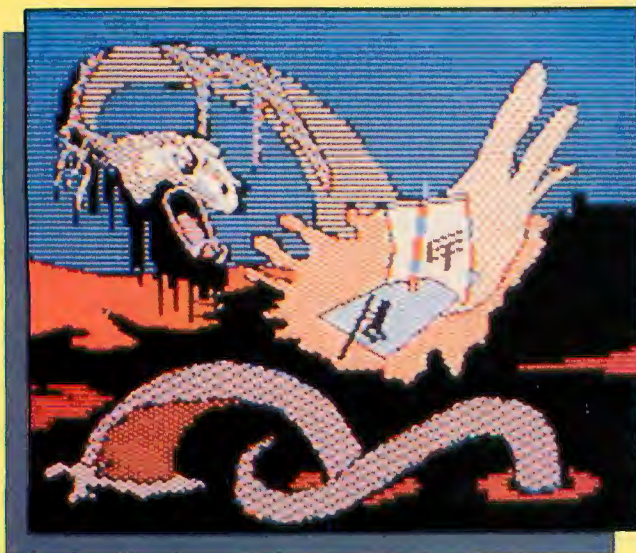
2nd
PRIZE



3rd
PRIZE

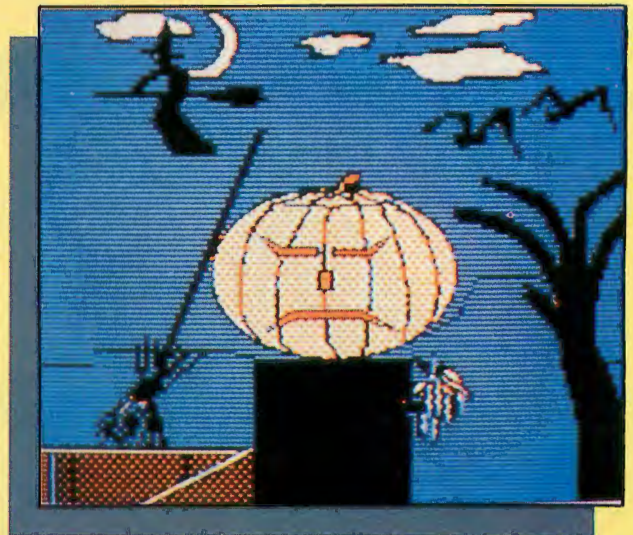
Serpent Charlie Fulp

Sailing within the coils of a sea snake, Charlie, who lives in South Boston, Virginia, used *CoCo Max* to create this viperous pictorial.



Halloween
George Aloia

George, of Margate, Florida, used *CoCo Max* to bewitch the gallery with a Halloween treat.



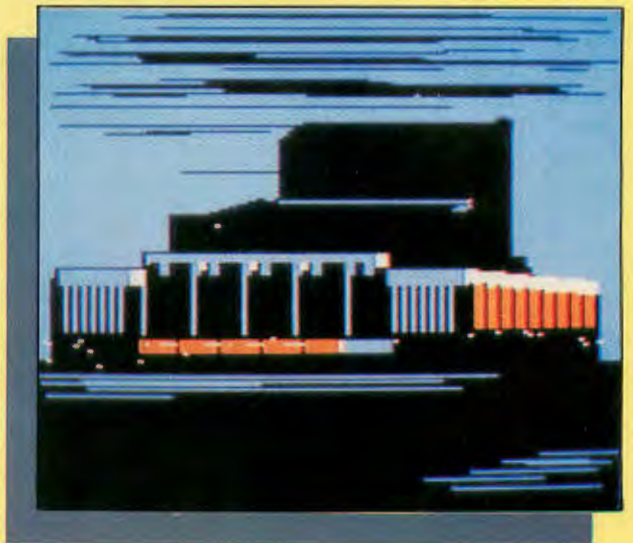
Scorpion
Tim Cummings

With the latter part of October being under the horoscope sign of Scorpio, Tim used *CoCo Max* to create this lethal arachnid. Tim lives in Micilani, Hawaii.



Center
John Bayko

John, who lives in Regina, Saskatchewan, teaches a twelfth grade computer class and created this graphic illustration of the Saskatchewan Center of the Arts with the use of BASIC.



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Jody Doyle, Curator

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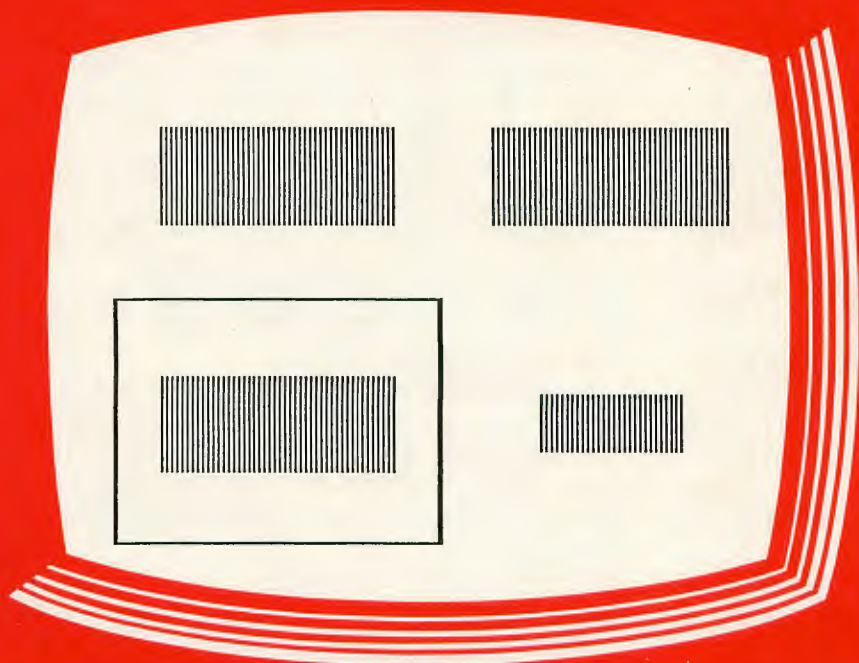
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The challenge in this game is to pick . . .

The Odd Man Out

By Harold Schneider



My daughter, who is almost three years old, is fascinated by the computer.

Whenever she sees me or her sisters using it, she demands a chance to type at the keyboard or use the joysticks. Since this enthusiasm should certainly be encouraged, I have tried to write some games for her to play and become accustomed to using a computer.

Like most other children her age, my daughter loves to watch "Sesame Street." The game song "One of These Things Is Not Like the Others" gave me the idea for this program.

In the program *NotLike*, the child must choose which of four items is different from the other three. When the program is run, four geometric figures are drawn on the screen. Three are identical, but the fourth (which can be in any of the four corners of the screen) is different. It may be a different color, a different shape, or a different size from the others.

After the figures have been drawn and the song has been played, a box appears around the figure in the upper left corner. After a few seconds, the box moves to the next figure, and so on. The child must either press a key or joystick button (from either joystick) while the box is around the different figure.

If the child answers correctly, the box flashes through different colors and a beeping tone is played. Then the screen is erased and new figures are drawn. If the child answers incorrectly, a low note is sounded but nothing else happens. The box continues to move to the different figures and the child must try again.

The game continues until the BREAK key is pressed. There is no scoring since a score would be meaningless to the preschooler.

The program is well-commented. When it is run, arrays and variables are

Dr. Harold Schneider is a professor of mathematical sciences at Roosevelt University in Chicago where he teaches mathematics, computer science and actuarial science.

initialized. The PLAY strings for the song, which appear in DATA lines 1010 through 1020, are read into array PL\$. The DRAW strings for the figures are read from DATA lines 1510 through 1650 into array SS. The array P\$ holds the four possible starting positions for each figure. The arrays 'X' and 'Y' hold coordinates. For I = 1 to 4, these are the center PAINT positions. For I = 5 to 8, 'X' and 'Y' hold the coordinates of the upper left-hand corner, and for I = 9 to 12, they hold the coordinates of the lower right corner.

Lines 100 to 170 control the choosing and drawing of the figures. A random color (C1) and figure (S1) are chosen and the size is fixed at five. The position for the different figure (D) is selected. Still another random choice decides whether to vary the color, shape or size.

The subroutines to choose a different color, shape and size start at lines 500, 600 and 700. If size is chosen, the different figure can either be larger or smaller than the others.

Lines 200 to 230 draw the box and

check whether a key or joystick button is pressed. This should work with all versions of BASIC. If a correct answer is given, the program branches to Line 300, but an incorrect answer branches to Line 350.

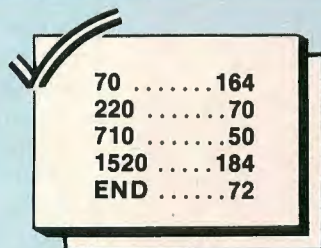
Several easy changes are built into the program. The variable DL, assigned to 110 in Line 20, is the delay constant. It determines how long the box remains around each figure before moving to the next one. Currently, the pause is about 3.5 seconds. You may change DL to make the delay longer or shorter.

The variable V in Line 20 determines the number of things that can vary to make one figure different. When this is three, as it is set in the program, the different figure can vary in color, shape or size from the others. If V equals two, then only color and shape may vary. This makes the program much easier, since size differences are the hardest for a child to discern. If V equals one, then only color changes can occur. Do not use any values for V other than one, two or three.

Variable NS in Line 20 is the number of different shapes available. It is eight for the original program. You can add extra shapes by putting DRAW strings for them in DATA statements at the end of the program and increasing the value of NS accordingly. Use only DRAW statements. Each figure should start from the center position and be restricted to a square of about 70 pixels on each side. Use only relative moves, not absolute coordinates of points. Your figure must be drawn so that a PAINT statement starting in the center will color the entire figure.

NotLike teaches the preschooler important skills in reasoning, color recognition and shape discrimination. In addition, it gives experience in using a computer and is fun to play. I hope your toddler enjoys playing it as much as mine does.

(You may direct questions about this program to the author at 430 S. Michigan Ave., Chicago, IL 60605, 312-747-5432. Please enclose an SASE when writing.) □



The listing: NOTLIKE

```

Ø 'NOTLIKE BY HAROLD SCHNEIDER
1Ø PCLEAR 4:I=RND(-TIMER)
2Ø DL=11Ø:NS=8:V=3:'DL IS DELAY
CONSTANT:'NS IS THE NUMBER OF SH
APES IN THE DATA STATEMENTS AT T
HE END:'SET V=2 TO EXCLUDE SIZE
DIFFERENCES AND V=1 TO ALSO EXCL
UDE SHAPE DIFFERENCES
3Ø DIM X(12),Y(12),P$(4),PL$(8),
C(4),Z(4),S$(NS)
4Ø FOR I=1 TO 8:READ PL$(I):NEXT
I
5Ø X(1)=64:X(2)=192:X(3)=64:X(4)
=192:Y(1)=48:Y(2)=48:Y(3)=144:Y(
4)=144
6Ø X(5)=Ø:X(6)=128:X(7)=Ø:X(8)=1
28:X(9)=127:X(1Ø)=255:X(11)=127:
X(12)=255:Y(5)=Ø:Y(6)=Ø:Y(7)=96:
Y(8)=96:Y(9)=95:Y(1Ø)=95:Y(11)=1
91:Y(12)=191
7Ø P$(1)="BM64,48":P$(2)="BM192,

```

```

48":P$(3)="BM64,144":P$(4)="BM19
2,144"
8Ø FOR I=1 TO NS:READ S$(I):NEXT
I
1ØØ 'DRAW SHAPES
11Ø PMODE 4,1:COLOR Ø,1:PCLS:SCR
EEN 1,1:PMODE 3,1
12Ø C1=RND(3):S1=RND(NS):D=RND(4
)
13Ø FOR I=1 TO 4:C(I)=C1:S(I)=S1
:Z(I)=5:NEXT I
14Ø ON RND(V) GOSUB 51Ø,61Ø,71Ø
15Ø FOR I=1 TO 4:PLAY PL$(2*I-1)
:PLAY PL$(2*I):DRAW P$(I):DRAW "
C=C(I):S=Z(I):"
16Ø DRAW S$(S(I)):PAINT(X(I),Y(I
)),C(I),C(I)
17Ø NEXT I:COLOR 1,Ø:A$=INKEY$
2ØØ 'DRAW BOX AROUND SHAPE
21Ø FOR I=1 TO 4:LINE(X(4+I),Y(4
+I))-(X(8+I),Y(8+I)),PSET,B:FOR
J=1 TO DL:A$=INKEY$
22Ø IF A$="" AND ((PEEK(6528Ø) A
ND 127)=127) THEN 23Ø ELSE IF D=
I THEN 31Ø ELSE SOUND 2Ø,5
23Ø NEXT J:LINE(X(4+I),Y(4+I))-(
X(8+I),Y(8+I)),PRESET,B:NEXT I:G
OTO 21Ø
3ØØ 'CORRECT ANSWER
31Ø C=2:FOR J=1 TO 2Ø:COLOR C,Ø:
LINE(X(4+I),Y(4+I))-(X(8+I),Y(8+
I)),PSET,B:C=C+1:IF C>3 THEN C=1

```



```

35Ø 'INCORRECT ANSWER
36Ø SOUND 12Ø,2:NEXT J:GOTO 11Ø
5ØØ 'DIFFERENT COLOR
51Ø C2=RND(3):IF C2=C1 THEN 51Ø
52Ø C(D)=C2:RETURN
6ØØ 'DIFFERENT SHAPE
61Ø S2=RND(NS):IF S2=S1 THEN 61Ø
62Ø S(D)=S2:RETURN
7ØØ 'DIFFERENT SIZE
71Ø IF RND(4)>3 THEN 72Ø ELSE Z(
D)=3:RETURN
72Ø FOR I=1 TO 4:Z(I)=3:NEXT I:Z
(D)=5:RETURN
1ØØØ 'SONG
1Ø1Ø DATA T3O2L8.BP64L16BP64O3L4
EP64GP64BP64,FP64L8.FP64L16GP64L
8AP64L4.FP64,O2L8.BP64L16BP64O3L
4DP64FP64BP64,L8GP64L4GP64L8FP64
L4EP64
1Ø2Ø DATA L8.BP64L16BP64O2L4BP64
O3EP64GP64BP64,FP64L8.FP64L16GP6
4L8.AP64L16FP64,L8.FP64L16FP64L4
BP64BP64O2L8.BP64O3L16CP64L4DP64
EP64,P64
15ØØ 'CIRCLE
151Ø DATA "BM+Ø,-22L5GL3DL3DL2DL
DL2DL2G3DG2DG2DGD2GD2GD4GDFD5FD2

```

```

FD2FDFFDFDF4RFRF2RFR2FR2DR4FR2ER
4UR2ER2ERE2RERE4UEUE2UEU2EU2EU5E
UHU4HU2HU2HU2HU2UH3L2UL2ULUL2UL
3UL3UL6"
152Ø 'SQUARE
153Ø DATA "BM-26,-26R52D52L52U52
"
154Ø 'EQUILATERAL TRIANGLE
155Ø DATA "BM+Ø,-3Ø;M-3Ø,+49;M+6
Ø,+Ø;M-3Ø,-49"
156Ø 'WIDE RECTANGLE
157Ø DATA "BM-36,-15R72D3ØL72U3Ø
"
158Ø 'TALL TRIANGLE
159Ø DATA "BM+Ø,-35;M+15,+6Ø;M-3
Ø,+Ø;M+15,-6Ø"
160Ø 'SHORT TRIANGLE
161Ø DATA "BM+Ø,-1Ø;M+36,+18;M-7
1,+Ø;M+35,-18"
162Ø 'HEXAGON
163Ø DATA "BM+16,-2ØL28GDG2G2DDG
2DG2DG2DG2DG2DG2F2DF2DF2DF2DF
2DF2DF2DR29UE2UE2UE2UE2UE2UE2UE
2UE2H2UH2UH2UH2UH2UH2UH2UH2U"
164Ø 'TALL RECTANGLE
165Ø DATA "BM-14,-33R28D66L28U66
"

```

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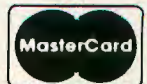
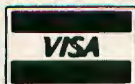
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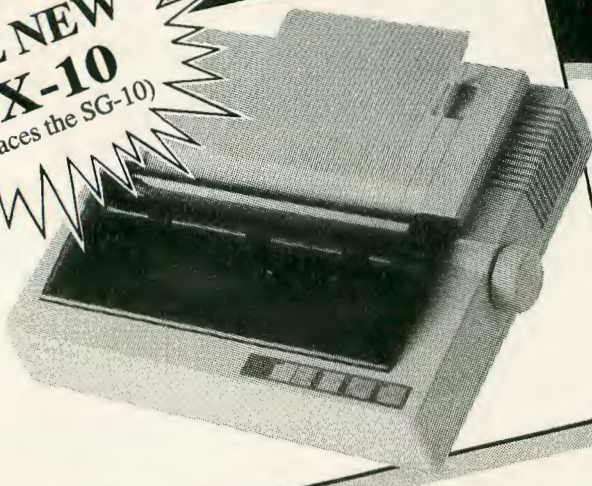
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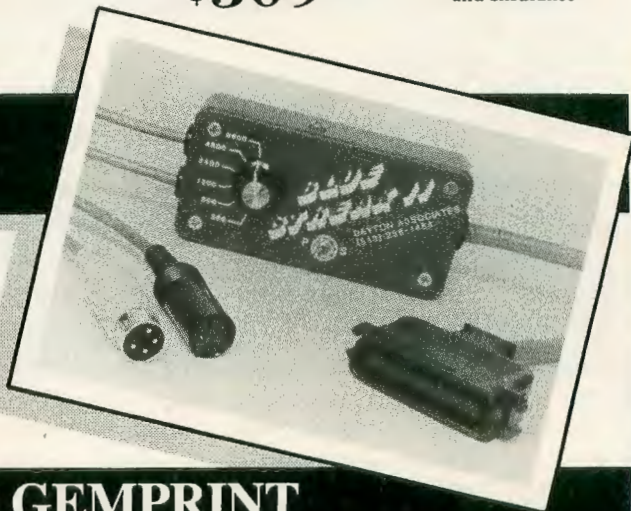
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RECEIVED & CERTIFIED

THE FOLLOWING PRODUCTS have

recently 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:

Artificial Intelligence Package, consists of three programs. The *Happiness Expert* calculates your happiness quotient and offers advice based on responses; *Poet* composes endless reams of poetry on screen or printer; and *Therapist* asks about your problems, then engages you in conversation. *Thinking Software*, 46-16 65th Place, Woodside, NY 11377, \$34.95.

CoCo-Util, a powerful and flexible utility program that allows you to transfer Tandy Color Computer disk files to your MS-DOS machine. You can also transfer MS-DOS files to a Color Computer disk. Migrate application data files from one system to another and save countless hours of retyping. *Mark Data Products*, 24001 Alicia Parkway #207, Mission Viejo, CA 92691, \$39.95 plus \$2 S/H.

DCM — RS232c, two-position modem/printer selector. This device allows connections of any two serial devices to CoCo's serial port at one time. *Derby City Software*, 3025 Kozy Kreek Drive, Louisville, KY 40220, \$34.95.

Disk Anti-Pirate, for 16K/32K/64K CoCo disk systems. This program copy protects BASIC and ML programs on disk using a variety of protection schemes. Autostart programs, encrypt them with your own password and use optional key/commands and functions to disable. *Microcom Software*, P.O. Box 214, Fairport, NY 14450, \$59.95.

Disk BASIC Unraveled, a book containing detailed and documented disassembled listings of Disk BASIC Versions 1.0 and 1.1. Readers need knowledge of 6809 assembly language programming. *Spectrum Projects, Inc.*, P.O. Box 21272, Woodhaven, NY 11421, \$19.95 plus \$3 S/H.

Dragons Temple, a 64K ECB Adventure game. Join King Art's court on a quest for the unknown treasures rumored to be in the dreaded home of Smokey, the fire-breathing dragon. Begin your journey into the dragon's temple armed with a lamp and plenty of oil, for once the lamp goes out, you see only the monster's glowing eyes and the gleaming treasure. *JADE, RFD #2, Box 2740, Clinton, ME 04927, \$13.95.*

GRX-DMP II, a graphics screen print utility for bit-image printers such as the DMP-105. This enhanced version prints from PMODE 4, 3 or 1.7, is shorter, runs faster and works on disk and cassette bases. *Sigma Software*, 14024 152nd Avenue, Renton, WA 98056, cassette \$7.95; disk \$8.95.

Phalanx, a 32K machine language game of Alexander the Great. The scenario places you in the year 334 B.C. when a young Macedonian King named Alexander led a small but well-trained army into the ancient land of Persia. You, as Alexander, control 16 units against an army of Persians in a Simulation of tactical combat. *Ark Royal Games*, P.O. Box 14806, Jacksonville, FL 32238, tape \$20; disk \$22.

Quest for Reality, a 32K ECB Adventure game requiring one joystick. The scenario places you in The Weird Zone, a dream-like fantasy world. The object is to find the Orb of Reality and be set free. Features animated graphics screens and special MAP command. *Steve Britton, Route 2, Box 1015, Friendsville, TN 37737, \$21.95 plus \$1.50 S/H.*

Ultra Label Maker, lets user compose label on Hi-Res screen displaying label just as it will be printed with spaces, italics and underlining. A companion program, *Fontedit*, is included for producing custom drivers for any printer. Labels can also be numbered. *CMD Micro*, 17435 57th Avenue, Edmonton, Alberta, Canada T6M 1E1, \$14.95 plus \$2 S/H.

Universal Monitor Drive, available in three configurations for the CoCo. V.D.1 is designed to drive a color or monochrome monitor with sound capability. The V.D.2 can be used for monitors without sound, and the V.D.3 drives both color and monochrome monitors simultaneously. No soldering required. *Derby City Software*, 3025 Kozy Kreek Drive, Louisville, KY 40220, \$28.95 each.

WordPak-RS, an 80-column video board for the CoCo. This board is designed for OS-9 Version 2.0 and allows use of screen control codes. *Spectrum Projects, Inc.*, P.O. Box 21272, Woodhaven, NY 11421, \$99.95 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.

— Judi Hutchinson

REVIEWING REVIEWS

OS-9 Version 2.00

Editor:

In the July 1986 [Page 166] review of Radio Shack's *OS-9 Version 2.00*, Mr. Goldwasser tells of a problem with the Config utility. His problem was a mirror-image of my own: disks that would not boot up from Disk BASIC.

I learned that the problem stems from not setting the execution directory to /DO/CMDS after inserting the boot/config disk. You need to enter CHX /DD/CMDS before you enter CONFIG. The documentation was not too specific about this step.

Keep up the good work RAINBOW!

*Paul Kapaldo
N. Olmstead, OH*

The Enhancer

Editor:

I was very pleased with Jerry Semones' review of *The Enhancer* [May 1986, Page 207]. However, I think the EVAL command explanation was slightly confusing. To illustrate the power of EVAL: When you enter PRINT VAL("5+7") the computer displays 5.

On the other hand, PRINT EVAL("5+7") produces a result of 12. EVAL can evaluate any legal formula; VAL can evaluate only actual numbers.

I hope this clears up the confusion, and demonstrates the power of EVAL. Once again, I thank Mr. Semones for his excellent review.

*David Skoll
H.D.R. Software*

Homeware

Editor:

I would like to comment on the review of our *Homeware* home management package [July 1986, Page 169]. While the review is largely accurate for five of the six modules that comprise *Homeware*, I think there may be some misunderstanding with the description of the word processor module, *Homwrite*.

It is stated that *Homwrite* contains "both typewriter mode and insert modes." As I understand typewriter mode, it is a mode in which a word processor prints on paper immediately, line by line as you type, rather than waiting until you have typed the entire document. *Homwrite* is set up so that printouts are done after the entire document is typed on screen. There is a mode in which you can type over anything that already may be on screen at the cursor's position, and there is another mode in which your typing is inserted in front of anything that already may be at the cursor's position.

The review states that "the printout is single spaced." As explained on page three of the instructions, the spacing can be changed easily by using the Spacing option that appears on one of the *Homwrite* menu screens.

Finally, since I regularly use *Homwrite* to do my own correspondence-type word processing, I am puzzled by the statement that *Homwrite* is "not on a par with the other modules." While it lacks features commonly found in more complex word processors, I find the program perfectly adequate for letter-writing and similar small household jobs for which it is intended.

*Jim Toth
Tothian Software, Inc.*

The Best Epson Screen Dump Utility

Editor:

Mr. van der Poel announces himself puzzled over a problem I experienced while reviewing *The Best Epson Screen Dump Utility* [February 1986, Page 216]. The problem is screens printed at an offset of a few bytes from their correct starting address.

Users should be grateful for the additional clarification Mr. van der Poel's letter affords [August 1986, Page 132].

*R.W. Odli
Sedro-Woolley, WA*

CGP-220 Screen Dump Package

Editor:

The recent review of my program *CGP 220 Screen Dump Package* illustrates how easy it is for a programmer to forget that not everyone using a computer is an expert. My omission of examples showing how to use the CLEAR statement to reserve memory for various programs in the package is a case in point.

The documentation now contains examples showing how to use the CLEAR statement. My thanks to your reviewer, Cray Augsburg, for bringing this oversight to my attention.

*Bob van der Poe
CMD Micro Computer Services, Ltd.*

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

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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 (LPV7/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminat, etc).

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

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

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

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

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

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

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

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

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

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

— The RAINBOW, Jan. 1982

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Del Mar, CA 92014

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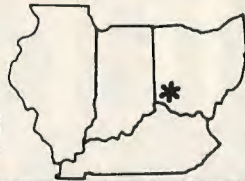




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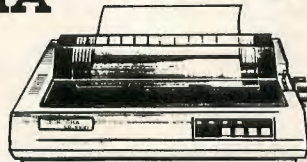
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See Review Page 148

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Software Review

Rapid Action, Good Graphics Highlight Pump Man

Man the joysticks! Aliens are attacking underground and it is your job, as Pump Man, to stop them.

PumpMan is Saguaro Software's version of the arcade game *Dig Dug*. In it, you must dig tunnels under the ground in an attempt to trap and blow up aliens using a high pressure air pump. Or, lead the aliens up a tunnel and drop a rock on them. But beware, these aliens can translocate themselves through solid rock, and pop into one of your tunnels. Watch your step near the fire-breathing dragon!

Quite honestly, I'll confess to being an arcade *Dig Dug* addict. It offers a wonderful diversion from shoot-'em-up and provides a delightful challenge. This is why, when I received *PumpMan* to review, I immediately pounced on my joystick and got ready for hours of fun.

Is *PumpMan* fun? It sure is. But, I must admit to having mixed feelings about the game. While the game was certainly welcome and well-used around my house, it couldn't help but feel that it could have been better.

PumpMan comes on a copy-protected disk, or is available on cassette. While I generally dislike copy protection schemes, I can't fuss too much about the one used for disk, since it does let you make a non-executable backup of the program. If something happens to the original, simply back up the copy (which won't work by itself) onto the original disk and it should work. Loading the game is as easy as typing LOADM "PUMPMAN".

The game is played with one joystick to move Pump Man in one of four directions. The firebutton activates the pump. I sometimes had trouble turning right or left with the older joysticks. It was a frustration to me that the firebutton did not autofire. Holding down the button does not keep the pump activated; you must constantly press it, and even then it sometimes doesn't register.

The graphics are good, and the action rapid. The animation, however, is often flickery which, while not affecting the game play, can be mildly annoying. On the plus side, *PumpMan* keeps your interest, has a game pause feature and comes with 15 board variations. The game's sound effects are adequate, but I do miss the catch background music found in the arcade version. Most all the other features of the arcade game are included, though.

The two-page documentation covers all the necessary features of *PumpMan*.

On a rating scale of one to five, I'd rate *PumpMan* as follows: playability, three; keeps interest, four; documentation, three; graphics, three; sound, two and price vs. value three.

PumpMan is a fun game, and it is evident that Dave Dies the author, has a great deal of talent. As it is, it's very good but a few more weeks of work could have made this game outstanding.

(Saguaro Software, P.O. Box 1864, Telluride, CO 81435, \$24.95 tape, \$29.95 disk; \$1 S/H. Requires 32K and joystick)

— Eric W. Tilenius

Colorchestra Lets the Music Flow

Since I am in a country rock band, write my own music, and own a computer and a synthesizer, I was thrilled when I received Colorchestra, a MIDI sequencer for the Color Computer. There are many MIDI sequencers for other computers but not for the Color Computer. Now those of us who own CoCos and synthesizers won't be tempted to buy another computer to use with our musical instruments. Before I review Colorchestra though, I had better give a little history and explain what MIDI equipment is supposed to do.

MIDI (Musical Instrument Digital Interface) is a universal language adopted by most musical instrument manufacturers so that MIDI-equipped instruments can communicate and control each other, regardless of which company makes the instrument.

When electronic music was first being developed it was possible to interconnect or interface to monophonic synthesizers by using simple voltage signals. But as computerized polyphonic synthesizers became the norm, the old techniques of interfacing became too cumbersome. So MIDIs were developed. They use eight-bit signals to serially transmit all kinds of information from one instrument to another.

Colorchestra is a very attractive product. There is even a ROM pack made of walnut! The documentation is packaged in a sturdy binder and there is a cassette version as well as two disk versions. The software is not copy protected, so make and use copies. You must have the hardware and the software to make it work.

The many features include: works with any MIDI-equipped synthesizer or rhythm machine; 16 polyphonic multifunction tracks; 8,000 note storage not dedicated to any specific track; user friendly Hi-Res graphics interface; real time write mode; solo capability on any track; varying tempo range from 30 to 250 beats per minute; audible and visual metronome; programmable measure locator; sequencer records from any MIDI channel (1-16); each track can output to any MIDI channel (1-16); records full spectrum of MIDI data including program changes, pitch bends and all 128 available MIDI controllers; accepts or transmits MIDI synchronization for rhythm or drum machines; and programmable time signature plus many others.

To use Colorchestra you need a 64K Color Computer and any MIDI-equipped device. With disk drive you also need a Y Cable or a multipack. It does not matter what version of DOS you have because the program makes no ROM calls.

Colorchestra is the beginning of a series of programs from Horizon that allows you to work with the CoCo and a MIDI.

It is not a problem to boot up Colorchestra in either cassette or disk format. In the main menu you will see a well-designed screen of icons giving eight choices. They are Multitrack Recording, Track Editing, Toolbox Menu, Control Panel Menu, Help, Disk I/O, Cassette I/O and System Trash. To choose any of the options is simply a matter of using the arrows to move and pressing ENTER.

Multitrack recording is the heart of the program. Here you can record in any or all of the 16 tracks after selecting recording or playback options. Your options include Recording Resolution (used to clean up timing errors), Time Signature, Tempo, Metronome Mode (to control timing and synchronization with other machines) and Track Selection. When ENTER is pressed, recording begins after one measure. To end recording, press BREAK, which returns you to the main menu.

Track editing and the Tool kit give you the ability to change what you have recorded. You can change individual notes or completely transpose your composition from one key to another.

The control panel is used to change Colorchestra's general options: MIDI echo controls, velocity controls, sequence title, real time filter settings, MIDI in channel selection and MIDI out channel controls.

The options for Help, Disk I/O, Cassette I/O and System Trash are all self-explanatory and easy to use. Each option uses icons and the arrow keys for selection. In the Disk I/O menu you can Load, Save, Kill, Rename and get a directory. In the Cassette I/O you can Save, Load and Verify.

If you have MIDI equipment and a CoCo, now there is a product to let the creative juices flow. Colorchestra is the beginning of a new world for CoCo musicians.

(Horizon Software Corporation, P.O. Box 289, Opelousas, LA 70570, 64K required, \$149.95)

— Thomas E. Nedreberg

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Mission: F-16 Assault: A Must for Serious Game Players

You're flying over enemy terrain at about Mach 2. Suddenly you see the first target, a group of unprotected buildings. You speed up as you drop bombs to destroy this target. But before the bombs hit the ground, a blip appears on the radar. You know what that means, so you get ready for combat. An enemy helicopter glides onto the screen and you fire furiously at the craft for a few seconds before destroying it. You wipe your brow and continue with the mission.

No, you haven't joined the Air Force, you're playing *Mission: F-16 Assault*, one of Diecom's newest 64K arrivals. Of all of the games I've played on my CoCo, this new release from Diecom has to be one of the best. Its graphics and animation are the best I have seen in an action game, and it has down-to-earth logic.

The scenario is as follows: You are in control of a white jet fighter. The ground scrolls beneath the plane. You have full control of the jet's movement around the screen. Your missiles fire forward and the bombs are dropped to the ground.

The entire playing field is situated over enemy territory which is dotted with different types of defenses. There are several tactical areas, including refineries, airports and other vital locations. Points are awarded for destroying

these targets. Not only are these land sites targets, but some also serve the enemy. Airports, for example are used to launch airplanes, and once destroyed, aircraft may no longer take off from that site. There are other sites which are unique in this way, such as missile silos and helicopter pads.

The enemy uses several kinds of defense against your aircraft. These include missiles, jet aircraft, helicopters, boats and tanks. They may all be destroyed except for the surface-to-air missiles and the enemy's missiles which fire from the jet aircraft and helicopters.

All flying aircraft take off from a ground site such as an airport or helicopter pad. Therefore, these craft may be destroyed both on the ground and in the air. To destroy anything on the ground, you must drop a bomb. To destroy an enemy in the air, you must use missiles which fire forward from your aircraft.

Radar is on the right side of the screen and indicates most enemy craft positions. There is one special enemy aircraft which can be used to jam your radar. This aircraft must be destroyed before your radar is destroyed.

Some other features in this game are: a bonus aircraft for every 10,000 points, a pause and restart feature, and a high score board.

I love this game, and give it a full five-star rating. *Mission: F-16 Assault* is a must for all serious CoCo game players.

(Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8. Tape or disk \$28.95 U.S., \$38.95 Can.)

— Pat Downard

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Wall Street Keeps the Interest Flowing

Wall Street is a game which can be played by one to eight people, and the strategy involved does not change with the number of participants. Each player begins the game with 1,000 in cash, and tries, through the purchase and sale of company shares, to increase his or her holdings to a winning amount which can be set at any number between \$2,000 and 99,999,999. *Wall Street* can even be played noncompetitively, i.e., by setting the winning amount of money at a sufficiently high level, the players can enjoy refining their tactics and mastering the idiosyncrasies of the program for several hours without even coming close to a victory.

There are eight American companies to choose from whose high, average and low stock prices are correlated with stock indicator somewhat analogous to the famous Dow Jones Average. The object is to maximize profits by buying low and selling high as in real stock exchanges. At first I thought this was a Simulation of the stock market and anticipated some realistic market action. However, this program is a game, and its departures from realism make the proceedings swifter, more exciting, and for those who don't get too greedy, more profitable. There is an old saying in the stock market, "The Bulls make money, even the Bears make money, but the pigs . . . they don't make any money!"

For example, there was never a stockholders' meeting like the ones in this game where you go in with X shares of a company's stock and emerge with 2X, 3X or 4X and usually more shares. This is an exhilarating way to live the good life if you can resist the urge to hold the stock in the hope that it will double and triple some more, and instead, convert your shares to cash before the broker's fee is assessed at \$10 per share!

We never did discover the relationship between the mulleted rolls of the dice and the ups and downs of the game. We guessed that perhaps the makers of the program first created it on a physical board with squares to determine one's fate for each turn.

As we continued to play we became increasingly convinced that *Wall Street* is to the stock market what Monopoly is to real estate. *Wall Street* is written in BASIC and comes on an unprotected tape which is easily loaded and converted to disk. The documentation is adequate, although it's hard to understand the game until you play it. The game would be improved by writing the current player's name on every screen; we occasionally had some controversy over whose turn it was. Also, some folks wished the program would allow them to liquidate their shares while automatically computing scores before reaching the designated winning amount.

We are happy to recommend this program. Unlike most games, it has held our interest through several playings, and at a cost of \$6 per tape, you'll still have money left over or investing in the real thing.

(Drayon Software, P.O. Box 2516, Renton, WA 98056.
Requires 16K ECB, \$6.)

— Patricia Arrington

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THE COLOR COMPUTER MONTHLY MAGAZINE

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Graphic Echo — A Screen Dump for All Seasons

I recently upgraded my computer and purchased a dot matrix printer, so I was really excited when I received *Graphic Echo* to review. Not only can I type letters and reviews, but with this program, I can also send any graphic screen I have to my printer.

The program is written in machine code, and the directions I received explained how to load the program. There are also two programs; one is for 16K users and the other is for 32K users. The instructions were short, but adequate.

To use *Graphic Echo*, load the graphics to be printed into the computer. Run the graphics and press the BREAK key. This stores the graphics into the computer's memory. LOADM the machine language program. Before executing this program, make sure your printer is set to the graphic mode. Your printer instruction book explains this. When the printer is set, type EXEC. That's it!

The program only takes a few moments for a regular size image to be printed. But wait, there's more! You have a choice, using pokes, of setting one or more of the following options: print enlarged image, print regular image, print negative image, print positive image, set a left margin or automatically center the image.

I experimented with these options, and I was impressed with all of them. I tried different graphics screens and had no problem with any of them. If, during the printing of an image, you want to stop, just press the BREAK key. This stops the printing.

This program will work with all PMODEs, but it is only designed to work with Radio Shack printers.

For the price, *Graphic Echo* is a very useful utility for the CoCo.

(Tothian Software, Inc., Box 663, Rimersburg, PA 16248, \$14.95)

— John H. Appel

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RAINBOWfest-Princeton
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Move Into Control With *Memory Manager*

So, you have a 64K Color Computer but you're not using OS-9? *Telewriter 64* tells you it has more than 22K of buffer space, but how do you get to it for your own BASIC programs? Is there any way to make use of memory above the ROMs?

Here is a two-program set designed to help you make use of that memory, either with your old programs or with program development. *Memory Manager* allows the use of the second 32K of RAM in several ways. *RAMdisk* is a separate program that uses the 32K of RAM exclusively for storage of programs, both BASIC and machine language.

The programs are available on either disk or tape. A CLOADM followed by EXEC installs either program. *Memory Manager* allows using BASIC in both 32K banks of memory, or gaining some RAM by transferring the ROM data to upper RAM and transferring the data as a block to an area above the ROMs. *Memory Manager* also allows you to undo any of these procedures.

Running BASIC in both banks introduces a menu that will copy or exchange banks. This makes it possible to keep a copy of a program under development in memory while debugging. EXEC accesses *Memory Manager* again to exchange banks or copy either bank if your program crashes.

The all-RAM mode allows approximately 8K of RAM for storage of a short program or data. To store data you must know the beginning and ending locations of the data and where you want them placed. Transferring a program is much easier.

The *RAMdisk* is used exclusively to store programs in memory while any single program may be run in the lower 32K of memory. The *RAMdisk* menu contains Display Programs, Save a Program, Delete a Program, Clear All Programs, Return to Last Program and Load a Program. Each of these options pertains to the programs in the upper memory, except Return to Last Program, which begins running the program in lower memory. The menu always shows the programs already in memory, their length and the memory left. Both BASIC and ML programs may be saved, but the beginning, ending and execution addresses must be known for ML programs.

Even though *RAMdisk* and *Memory Manager* are separate programs, they each contain ML subroutines that can be executed without executing the programs as a whole. Using these subroutines, you can copy ML subroutines into the second memory bank, exchange the data in the two banks, copy to either bank, move data to either bank, change BASIC program vectors and condition memory for the all-RAM mode. The utility of these subroutines is that your BASIC program can access them directly. You can, for instance, store data in upper RAM automatically.

The documentation is 10 pages of error-free, clearly reproduced pages. It explains the programs in general and goes through each menu choice. There are few examples.

Using *RAMdisk* at first proved to be difficult. My first attempts nearly all met with a hung-up machine. The problems begin when programs of any complexity start to run in lower RAM. After the running, even if broken early,

re-entering *RAMdisk* or *Memory Manager* with an EXEC was an adventure. I had some success when I modified the programs I was saving and running by adding the line 0 INPUT A. This would keep it from doing anything before I decided my next step.

When you return to the last program from either the *Memory Manager* or *RAMdisk* menu, the program in lower RAM is automatically run. I would suggest to Dynamic Electronics that they modify their programs to not automatically run. You are supposed to BREAK the program if you don't want it to run, but it may have already locked the BREAK key out or poked the machine into conflict with the memory programs. I would think that using these programs for developing your own BASIC programs would be a major inconvenience when your partially developed, fully buggy program starts running every time you return from saving a copy of it or a subroutine.

My efforts at using *RAMdisk* have been successful only in saving and running the simplest of programs. Using *Memory Manager* has met with better success. The two main purposes here are to use memory, either in two equal banks or an 8K block of memory for data or program storage. Although I had some strange things happen when installing *Memory Manager*, when it worked, it worked. I could copy a program to the second bank, then modify the program. If it crashed, I could bring the original back from the second bank. Or, after development, I could copy it to the upper bank and continue developing.

My advice is to make your program-under-development saves to disk. Tape-only users may save time with the *Memory Manager* programs but at a trade-off. The machine may lock up, although there have been times when a reset and EXEC have gained successful re-entry to *RAMdisk* and *Memory Manager*, with upper bank data intact.

I envision two markets for these programs. The first are BASIC-only programmers wanting quick and easy RAM storage while they develop their programs. I advise against *Memory Manager* for them. The other potential market consists of those familiar with machine language programming and the CoCo memory. They would be able to take advantage of subroutines in *Memory Manager* or perhaps diagnose the quirks in the program to use it to real advantage.

(Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640, tape \$27.95, disk \$29.95)

— Dennis Church

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EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily. It also supports the PBJ 80 Column Word-Pak cards. The disk also contains a free standing Machine Language Debug Monitor, to help you debug your assembled programs.

The Editor in EDT/ASM 64D is the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material. Some of it's features include:

- ☞ Local and Global string search and/or replace.
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- ☞ Hi-Res Text Display 28 to 85 columns by 24 lines.
- ☞ Supports the PBJ 80 Column cards Word-Pak I & II.

The Assembler portion of EDT/ASM 64D is the part that creates the Machine Language program. It processes the source file(s) created or edited by the text editor and creates a LOADM or CLOADM binary file on either Disk or Tape. Using library files you can assemble an unlimited size file, using several different disk drives.

- ☞ Supports conditional IF/THEN/ELSE assembly.
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DEBUG is a free standing program debugger which provides all the functions supported by most system monitors. Some of them include:

- ☞ Examine and change the contents of memory.
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Requires 32K and Disk \$59.00

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CBASIC is the only Color Basic Compiler that includes it's own Hi-Res 51, 64 or 85 by 24 line display. It also supports the PBJ "Word-Pak" I, II and R.S. versions as well as the Disto and Double Density 80 column displays. All as part of the standard CBASIC package. You can even include them in your compiled programs by using a single CBASIC command.

CBASIC makes full use of the power and flexibility of the 6883 SAM in the Color Computer. It will fully utilize the 96K of address space available in the CoCo during program Creation, Editing and Compilation. There is a single CBASIC command for automatic 64K RAM control, to allow use of the upper 32K of RAM automatically. When used in compiled programs it will automatically switch the ROMs and RAM in and out when needed. Plus there are two other commands to control of the upper 32K of RAM manually in a program.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs, most likely you'll find you want to use it for writing all your Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and much more.

"The Editor is a very good one and could be the subject for review all by itself."
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"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride."
--Hot CoCo, February 1986

The documentation provided with CBASIC is an 8 1/2" x 11 Spiral Bound book which contains approximately 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

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The price of CBASIC is \$149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk. **not JDOS compatible.**

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Car Dealer Assistant — A Big Help Down on the Lot

Car Dealer Assistant is designed for the small to medium sized auto dealer using a CoCo with one drive and a printer. Each disk holds the system program and up to 200 accounts.

Car Dealer Assistant helps the salesman negotiate a price, figure a payment schedule and write up contracts. It also keeps track of payments and customer data for the office.

The package consists of two laminated three-ring binders, one unprotected master disk and the documentation. One binder holds the master disk and documentation. The other is provided for handy storage. The user is encouraged to make backup copies of the master for day-to-day use, and you're reminded to protect yourself with multiple copies of each disk after you've entered data.

The program consists of a machine language loader and several subprograms in BASIC. The line numbers are provided for you to customize so billings and printouts will have your heading, and the computer will contain your local options and taxes. You can do more customizing if you're familiar with BASIC. The author is available by mail with prompt answers.

The program helps you negotiate a price by giving three "what if" computation subroutines: Purchase, Amortization and Roll Back.

The Purchase Computation section lets your customer look at the final cost based on price, down payment, trade-in and other variables that can be changed and recalculated instantly. Amortization lets your customer see monthly payment schedules based on various time frames, percentage rates and/or amount to be financed. The "Roll Back" routine helps when the customer makes a counter offer. You can enter trade-in, down payment, financing and your own out-the-door costs to see whether you can make the deal and still meet your own profit margin.

All the numbers are held in memory, so it's very easy to change any one figure and see how that affects everything else. You also have a print option you can show your customer or keep for reference. The program automatically moves the final figures to the Customer Data and Contract routines.

Car Dealer Assistant also prints contracts. The program is already programmed to print out on either Motor Vehicle and Security Agreement (Form 522 Rev 5/85) or the Motor Vehicle Purchase Order and Disclosures required by federal law (Form 702 Rev 5/85). Different formats would require some knowledge of BASIC to make changes. Printouts are also available for billings, customer payments, vehicle sales and tax reports.

The Customer Data routine is where you'll keep names and addresses, contract information and vehicle data. Each record has a seven character alphanumeric account number. Up to 200 records are stored on the disk in the order recorded (not by account number).

The program can be used to send statements and update customer payment records if you are doing the financing. It allows up to four payments per month.

The documentation is thorough. Each step is flow charted and explained. The system requires a simple password; the rest is menu driven. You simply choose from options shown on the screen and follow instructions and prompts.

Don't be put off by the small price. This isn't a small package. But there had to be some trade-offs to get such a major application on a microcomputer. It's written for a minimal system with one drive — there's no provision for system vs. data disks and it does no sorting.


Access to customer records is by account number only, but all statements have that number and you can print a cross reference list showing the name on each account. There is no error trapping, so a comma in a dollar amount (\$12,000) would tell you Extra Ignored and compute only the amount to the left of the comma. But these are insignificant in light of the power of the total package.

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— Bob Dooman

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C Compiler: All the Features at Half the Price

The *C Compiler* program may be used to compile C language source code programs into executable machine language OS-9 modules. The *C Compiler* reads C language source files from one or more disk files, compiles them into assembly language source files, optimizes the assembly language source code for speed and compactness, assembles the output into relocatable object code modules, and links the object modules to the library functions and other compiled object code modules to produce executable machine language OS-9 modules.

The Radio Shack *C Compiler* comes on two 35-track OS-9 disks. A light blue, spiral-bound manual of more than 100 pages accompanies the disks.

One disk contains the programs needed to compile a C source program to an executable assembly language program. The second disk contains the compiled library functions, definition files, three C source program examples and some assembly source programs.

The first disk contains files for the following: two-pass compiler executive program, macro pre-processor program, compiler pass 1 program, compiler pass 2 program, relocating assembler program, assembly code output optimizer program and assembly code output linker program.

The second disk contains directories for: source header files containing definitions for various applications, the compiled C library functions, three sample C source code programs and a subdirectory of various assembly source listings.

System calls are provided which perform functions such as open or close a file, change execution or data directory, create a new file and so on. These are provided to extend the portability of the language and to save the user from writing the functions. They are needed because these functions deal with the hardware of the system. With these calls, you won't have to know assembly language code to write programs to perform these functions. In fact, there's a system call (`_os9()`), that lets a C programmer access any

One-Liner Contest Winner . . .

Learn how pi is calculated. Just enter the number of times you desire and see how close you can get.

The listing:

```
Ø CLS:INPUT"HOW MANY TIMES";N:S=
1:FOR I=2 TO N STEP 2:X=I/(I-1):
Y=I/(I+1):S=S*X*Y:PRINT@64,"PI :
";S*2,I:NEXT I:END
```

Richard Goodman
College Station, TX

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

OS-9 system call by passing the function code and a pointer to a register structure as an argument.

The pre-processor directive, `#ASM`, is supported for applications where you must have the speed of embedded assembly language. I found no stacking order of function arguments, so we'll have to experiment if we need this capability.

The optimizer can be suppressed via an option at compile time. This speeds up the compilation. The optimizer shortens the code about 11 percent with a comparable increase in speed, according to Microware. I compared the output of the *line.c* program with and without the optimizer and found that it replaced long branches with short ones where possible (saving one byte each time) and rearranged some code to tighten up things (saving a few more bytes). Of course, a good assembly language programmer could have done the same or better, but for long programs or inexperienced assembly language programmers it's a real boon!

A profiler program is included that keeps track of how many times each function is executed while the program is running. If your program appears to be slow, the profiler can help you find the most-used functions that might require extra effort to speed up the execution time. If it's a memory hog, then the profiler could be used to find functions that are not used and can be omitted.

Something else I really like is the option to output C source code on the assembly output listing. This assists in debugging and/or massaging areas of code that need special assembly language attention to speed up the execution. It helps locate bugs or idiosyncrasies of the compiler, too.

The company that wrote the marvelous, modular OS-9 operating system hard coded the drive number for the library drive in two of the passes! D1 is coded into CCI at offset \$EE5 and in C.PREP at offset \$135C (Microware, how could you?). If you have a RAM disk or a hard disk and want to speed up the compiler, you'll need to patch the descriptor name into these locations.

A good source-level debugger would have been great; maybe we'll get one when enough CoCos have 512K of RAM! We need powerful tools so we can produce good software in less time.

A C source code library for the system calls and library functions would be helpful to beginners and software developers.

This is Version 1.00.00; the last revision was done in 1983. Either they did it right the first time, or nobody's spoken loudly enough to make them update. I do suspect though, that this version was adapted from a version supporting one of the earlier OS-9 systems in existence before CoCo OS-9 was born. How about a new version that doesn't hard code the library drive? Throw in bit fields, too, while you're at it.

The *C Compiler* is a good value at \$99.95. I recommend it for anyone wanting to learn the C language, and for those who know C and don't want to program OS-9 application programs in assembly language. The features included are comparable to C compilers costing twice as much on other computers.

(Tandy Corp; available in Radio Shack stores nationwide, Cat. No. 26-3038, \$99.95)

— Jesse W. Jackson

Unkill: Help for Lost Programs

Sooner or later it will happen. You get that long-awaited disk drive and are thrilled with the power and speed it offers. You'll get so carried away that sooner or later you'll accidentally kill a file you didn't mean to. Some of the more expensive utilities in use today have an unkill feature coupled with a lot of other commands. Now a dedicated program called simply *Unkill* can be used if you make that dreaded mistake.

In order to put this program through its paces, I killed a program on one of my disks and then ran *Unkill*. Prompts guide the user through a series of steps to recover the lost program as long as it has not been overwritten in the meantime. When a file is killed, all that really happens is that the first character of the filename is deleted from the directory on Track 17. The rest of the file is still on the disk, but it's no longer retrievable.

This program requires two disk drives and a printer. The printer is used to read the remaining portion of the filename, as well as the file format, program length in bytes and starting granule. The program examines the entire disk for other killed files. All 67 granules are examined and information displayed as to their use. Using the information displayed on the screen and printer you can make some decisions, with the aid of the program prompts, to recover the lost program.

It is not foolproof, however. The user needs to have some working knowledge of the disk file allocation table and how files are written to the disk. Remember, when a file is killed, the file allocation table is reset.

I was impressed with *Unkill's* ease of use. It's easy on the wallet, too. It may be worth its weight in gold if it saves even one favorite program.

(Proper Programs, P.O. Box 681, Garner, NC 27529, \$9.95 plus \$2 S/H)

— Jerry Semones

Max Fonts: Valuable Add-On

Derringer Software has produced a useful add-on for *CoCo Max* called *Max Fonts*. The existing *CoCo Max* and *CoCo Max II* provide 14 fonts. With *Max Fonts* you can add up to 72 more. There are three disks, each with 24 fonts. You can buy one, two or all three.

Each of the fonts can be modified using the Style pull-down menu. For those who are not familiar with *CoCo Max*, the Style menu allows you to alter the default printing of the fonts by making them bold, outlined, shadowed or italicized. You can also use any of the styles in combination with each other.

Max Fonts comes with five half-pages of documentation printed in very small type. Two pages are all it takes to explain how to use the product. The remaining three pages are used for showing samples of all the fonts. The instructions are clear and easy to follow.

The only drawback I could find is the disk handling required to use *Max Fonts*. After starting *CoCo Max* you must remove the system disk and replace it with the font disk you want to use. The Load Page command on the file menu is used to load the fonts. Due to the limitation of the size of the pull-down menu, only half (12) of the fonts are accessible at a time.

Should you want to use the original fonts provided by *CoCo Max*, Derringer Software has provided them on each of the three *Max Fonts* disks. This prevents having to remove a *Max Fonts* disk and replace the system disk.

Max Fonts is compatible with the original *CoCo Max* as well as the new *CoCo Max II*. I tested the fonts on both systems and had absolutely no problems. *Max Fonts* is easy to use, well-documented and performs the job as designed and advertised. I recommend this software as a valuable add-on for the *CoCo Max* system user.

(Derringer Software Inc., P.O. Box 5300, Florence, SC 29502-5300, \$24.95 each, all three for \$64.95)

— Rick L. Earsley

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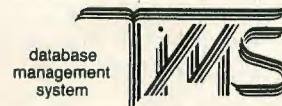
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\$4.95 - Tape

TIMS UTILITY features:

Multi-Term Search - Search your database using a search criterion based on up to 5 keywords. You can use either "AND LOGIC" or "OR LOGIC".

Global Change - This is the "automatic" version of the modify mode. It can be used when there is a unique set of features in a specified field. For example, we could change all references to Rainbow to RB.

Global Delete - Automatically deletes every record in the database which meets the search criteria.

Record Change - Add or delete fields to your records. The maximum number of fields per record is still 8.

Split File Mode - Use "AND" logic (all articles published in Rainbow and written by Davis) "OR" logic (all customers in Ohio or Maryland), or Range Search to split your large file into 2 or more smaller files. You can save your new file to tape or disk.

TIMS UTILITY comes on tape and is disk compatible. It requires 32K, and a file created with either TIMS or TIMSMAIL.

Develop Concentration With *The Memory Game*

As you probably know, it is hard to find a good software package these days that has some educational value in it. Well, I believe that the people at Mikaron Software have finally bridged the gap between fun and education.

The Memory Game is a 64K, Extended Color BASIC program requiring disk drive. The program comes with *The Memory Game*, Puzzle Disk One (stored on the same disk as *The Memory Game*) and a small instruction card. Although the card is small, it contains some very good information and an example of game play. Loading instructions for the game are on the disk.

The Memory Game is played like a game of Concentration. For those of you who are not familiar with it, I will explain. The screen is divided into 30 boxes numbered one through 30. Behind each box is a point value, which remains constant throughout the game. Each turn, you pick two boxes, revealing their point values. If they match, you gain the points, and the boxes they occupied are filled with parts of the main puzzle. If they don't match, the boxes are replaced and the next turn begins.

The main puzzle is a collection of symbols, objects and letters that represent a phrase or saying when put together. The disk has 10 puzzles on it, so you should have fun for awhile. Mikaron Software says they will have more puzzle disks soon.

I found *The Memory Game* to be very enjoyable and fun to play, but I do have one complaint: The speed of the game is extremely slow. Even though I don't look at this as a plus for the game, some people might. The longer there is between turns, the longer you have to remember the positions of the point values, thereby increasing the effectiveness of this program.

The game keeps a running high score, so you can see how well you have been playing. If you would like to play against a friend, the game has a two-player mode for added fun and competition.

Overall, *The Memory Game* is a great value for its price. If you want a game that is fun as well as educational, then *The Memory Game* is right up your alley.

(Mikaron Software Company, P.O. Box 1064, Chester, CA 96020-1064, \$9.95)

— Sean McDonough

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(Reviewed in RAINBOW April '86 issue, pg. 185)



Disk BASIC Unraveled Is a Valuable Library Addition

Here's a book you software hackers out there can really sink your teeth into. *Disk BASIC Unraveled* is a fully detailed and documented disassembled listing of Disk BASIC Versions 1.0 and 1.1. The book is not a tutorial or a how-to manual on machine language, but rather a detailed look at the assembly listings.

The reader needs to have beginning knowledge of 6809 assembly language programming to be able to take full advantage of the opportunities this book offers. It is also assumed that the reader is familiar with the contents of the disk system owner's manual which contains a general description of the overall operation of Disk BASIC and other useful information concerning the physical and logical format of the tracks and sectors.

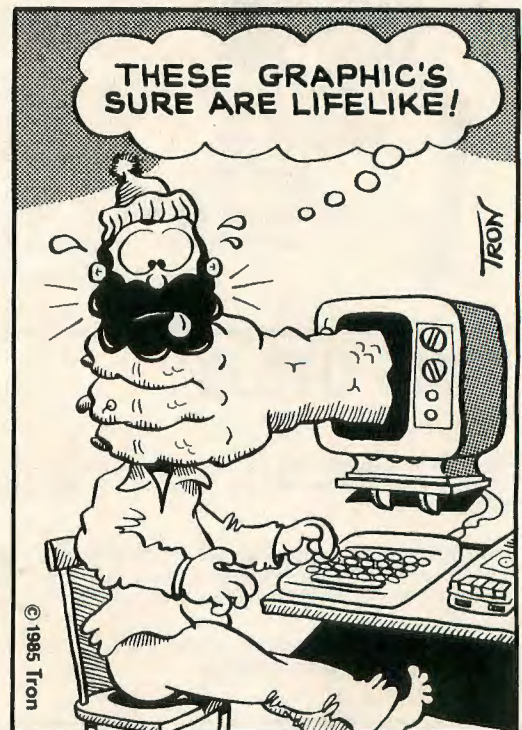
Properly studied and used, *Disk BASIC Unraveled* should help the serious reader understand the theory behind Color DOS, and to modify it for his own purposes or add extra commands or functions.

The book is nicely bound, magazine size and 154 pages long. It's full of useful information for the serious CoCo hacker. There is even a nice section that deals with the 1793 Floppy Disk Controller, which I found to be very useful. If you are inclined toward machine language programming, you will benefit from this publication.

(Spectrum Projects Inc., P.O. Box 21272, Woodhaven, NY 11421, \$19.95 plus \$3 S/H)

— Jerry Semones

LOOSE STRINGS / by Tron



Speedy CoCo Diskzap Utility Does the Trick

The *CoCo Diskzap Utility* program comes from a team of programmers, Paul Kudla and Andy Geist, located in Ontario, Canada working under the name of SuperCom Associates.

One purpose of a disk zap program is to allow the user to modify or repair parts of a program. The means to this end differentiate the various zap programs on the market. *CoCo Diskzap Utility* approaches the task by allowing the user to modify or repair portions of a specific sector of a disk or by calling up an individual file by its specific name.

The program, shipped on a protected disk, is written in machine language (except for a single line BASIC loader) and is totally memory resident, which provides the very fast reaction time to any command in the package; this speed is the reason the authors felt it was necessary to put a warning in the introduction. The program loads and automatically executes using either the BASIC loader line as provided for the purchaser who has the 1.0 Disk ROM or, or those with Version 1.1, just typing in DOS and pressing ENTER does the job.

There are several key features of this software package that set it apart from the run-of-the-mill zap programs. It can be configured to work on disks at 34 tracks or 40 tracks; it can be configured to work with double-sided or single-sided disks; the step rate may be set from six to 30 milliseconds; configuration patterns can be saved; automatically recognizes data address marks in a sector; has selectable sector offsets; needs as little as 16K; handles up to four drives on line; has an automatic repeat key; can be used to verify any sector(s) of the disk or the total disk; reads and displays a CoCo disk directory from within the program; has a fast format function; allows the user to fill any sector(s) with zero (Hex 00); copies specific sectors or the total disk to another disk or another area of the same disk; and produces a hardcopy of the information in specific sector(s) or the total disk both in ASCII and Hex, allowing for the selection of Baud rate for the printer.

The options can be called up from the main menu by simply using the arrow keys. Display and File Zap are the true work horses of the program.

The Display option allows individual sectors to be presented on the screen, and just by pressing the CLEAR key the screen will toggle between Hex or ASCII characters. When the user arrives at the changes, the 'M' key is pressed. This invokes a subsidiary routine to take over and the nibble under consideration appears in inverse video to alert the user to the location where the action will take place. The arrow keys move the highlighted area any place on the screen. When the program is operating under this modification option, it is a very critical time because of the speed at which changes are made. An error now might blow your disk in a wink.

Changes can be made in either ASCII or Hex notations from the keyboard. The program does only what the user requests, so the user is totally responsible for what happens to the disk under operation. For example, in the Hex mode,

pressing the 'Z' puts zeroes from the current cursor position to the end of the page. Pressing the BREAK key aborts the action but pressing ENTER transfers the changes to disk. Needless to say, only those who know what they want to accomplish should attempt to use this very fast option.

The File Zap option is just as fast and powerful, and the same precautions should be followed. The file to be searched for or worked on is called up by name. It does not matter if the file was saved in BASIC, ASCII, or machine language, the program can read and display it on the screen. As in the Display option, changes to any nibble may be made from the keyboard.

Because the disk is copy protected, SuperCom Associates offers to replace for one year a program disk that does not work. After one year, replacements will be issued for the cost of the disk plus shipping and handling. The copy protection system used on the program disk may be part of a problem encountered with Version 1.0 of the program. Version 1.0 would not always load into CoCo with the 1.0 Disk ROM but would with units having the 1.1 Disk ROM; Version 2.0 has corrected the problem. Once loaded, both versions of the program worked as advertised on either CoCo.

Version 2.0 allows the user to select in what notation mode the user wishes to operate. Entries may be made in either hexadecimal or decimal notations, making the program easier to use for those whose native tongue is not Hex.

SuperCom Associates provides the program in a Radio Shack TRS-80 three-ring binder with an eight-page manual. The manual is produced on a daisy wheel printer and is very readable. Actually, the manual understates the program's abilities. *CoCo Diskzap Utility* has a "Hex" of lot to offer.

(SuperCom Associates, 449 Rougemount Drive, Pickering, Ontario, Canada L1W 2B8, disk \$39.95 U.S.)

— Robert E. Foiles

One-Liner Contest Winner . . .

This one will create some nifty changing designs. It looks good on a Color Computer 3, as well.

The listing:

```
1 PMODE3,1:PCLS:FORQ=1TO99999:SC
REEN1,RND(2)-1:X=RND(256)-1:Y=RN
D(192)-1:H=RND(256)-1:V=RND(192)
-1:COLOR(RND(7))+1,1:LINE(H,V)-(
X,Y),PSET,BF:IFPEEK(345)=247THEN
RUN:ELSENEXT
```

Robert Rogers
West Palm Beach, FL

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

Power for the Little Guy: Seikosha SP-1000A Printer

In these times of fancy laserjet printers and super plotters capable of producing large and detailed blueprints, it is nice to know that someone is still thinking of us little guys. Most of us either cannot afford or have no need for such an item; however, we do need some method of getting text on paper. The Seikosha SP-1000A is a versatile printer which packs a lot of features at a more than reasonable price.

When I opened the box and had my first look at this printer, I was immediately reminded of the DMP-130 sold by Radio Shack. This was because of the SP-1000A's solid construction, paper-loading tray and front panel controls. The front panel controls give the user the ability to select or de-select near-letter-quality printing as well as set the left and right margins. However, the true test of any printer comes when you turn it on.

The SP-1000A is capable of printing pica, elite, condensed, proportional and italic fonts in several styles. These styles include bold, double-strike and double-width. The SP-1000A also fully supports subscript and superscript character modes. All standard margin, tab and printhead settings are controlled via control codes, as are underlining and unidirectional printing. The printer codes are what most people would call Epson compatible. For instance, one would issue a PRINT#-2,CHR\$(27);"SO" to select the double-width style.

The SP-1000A also allows the user to select from foreign language fonts for printing. This is done either by changing the DIP switches or by issuing the appropriate control codes. Can your present printer print a tilde over an 'n' without your having to program it to backspace first?

More important is the SP-1000A's ability to be programmed with your own character set. You can store special characters in the 1.5K RAM of the printer and then use them to print characters specific to your own needs. The characters, called download characters, let technical people print reports without having to pen in those strange characters by hand.

The user's manual is well-written. The control codes are summarized at the end of the manual and you may refer to specific pages to find more information on a specific code. This is the closest thing to an index. Along with each control-code explanation the manual includes a programming example. Although these examples were written for the IBM computers, most users should be able to convert them for the Color Computer quite easily.

The SP-1000A has a standard Centronics parallel interface. Although it doesn't have a serial interface, it is a simple matter to purchase and install a serial-to-parallel converter. Cinsoft, who distributes this printer in the U.S. also carries such a converter and is offering a package deal for the printer and interface.

All in all, the Seikosha SP-1000A is an excellent buy. It will more than meet the needs of almost every user. With its low price tag, the SP-1000A would make a good addition to nearly any computer system. This one gets four stars in my little black book.

(Distributed by Cinsoft, 2235 Losantiville Ave, Cincinnati, OH 45237, \$209; \$249 with interface)

— Cray Augsburg



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*See You At
RainbowFest
in
Princeton !!*

One-Liner Contest Winner . . .

This program draws a rainbow to help you get through those rainy days.

The listing:

```
1 PMODE3,1:PCLS:SCREEN1,1:FOR R=
60TO110STEP10:CIRCLE(128,192),R,
,.75:NEXTR:CIRCLE(208,40),20:FOR
M=1TO3:READ X,C:DATA114,3,127,2
,140,4:PAINT(208,40),2,4:PAINT(1
28,X),C,4:NEXTM:FOR X=0TO1STEP0:
NEXT
```

*James Butterworth III
Del Rio, TX*

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

Widen Your Video Horizons With WordPak-RS

One of the longstanding complaints about the Color Computer has been its lack of an 80-column video display. The WordPak-RS is a cartridge designed to plug into the Multi-Pak expansion interface (MPI) to give the user 80-column video on a monochrome monitor. The cartridge has an RCA-type phono jack for the standard video output. It requires a 64K Color Computer and OS-9 Version 2.0. The WordPak-RS features an 80-column by 24-line video display with a full upper- and lowercase character set that includes true lowercase descenders. It also features self-contained video RAM and a programmable display format and cursor.

Installation of the WordPak-RS is relatively simple. The driver and descriptor on a backup of your OS-9 Config disk must be replaced with the driver/descriptor included with the WordPak. Then, use the Config utility to create an OS-9 system disk with these files stored in the root file. When you plug the WordPak in and boot OS-9, you will have an 80-column display.

This display works very well with OS-9. The upgrade to version 2.0 includes several changes that support 80-column video. The DIRectory and LIST commands, as well as several other utilities, have been altered to support the widened screen.

The WordPak-RS allows programmable display and cursor control. To accomplish such things as clearing the screen, inverting the video and complete cursor-movement control, one need only use the OS-9 display command along with the codes supplied in the WordPak-RS manual.

The manual includes a wealth of information. In addition to explaining some OS-9 theory and giving complete installation instructions, the manual offers a great deal of technical information dealing with the theory behind the WordPak-RS. This information, while not going overboard, gives an intermediate programmer enough background to create his own character set. This can then be burned into standard 2716 EPROM and plugged into the WordPak.

I feel the WordPak-RS is an excellent product and would be a welcome addition to any OS-9 user's Color Computer system. While the price is a bit on the steep side, the capabilities of the WordPak-RS really shine and allow one to get down to serious business. Once you have one, you won't know how you ever got along without it!

(Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, \$99.95 plus \$3 S/H)

— Vic Roberts

**See You at
RAINBOWfest-Princeton
October 17-19**

Speed Up the Action With Micro•Fire

Micro•Fire, a new device from Duck Productions, is a small circuit board that fits inside your joystick. Its purpose is to give you rapid-fire control of the firebutton.

The circuit board is small and holds a switch, a multi-turn potentiometer and an 8-pin IC, as well as a few support components. Installation is fairly easy. First, the board must be mounted in the joystick case. This is done by securing the switch through a hole you must drill in the case. Then make three or four quick soldering connections, put the joystick back together and enjoy the new capabilities of your joystick. I cannot think of any joystick for the Color Computer that this device would not work in. Mine was installed in a Radio Shack Deluxe joystick.

The installation manual is well-written and includes a listing for calibrating the rate of fire. The manual describes how to hook up the Micro•Fire to allow single-shot and rapid-fire techniques to be used in the same game without turning the Micro•Fire off.

As for action, Micro•Fire holds up to its promises. With an adjustable firing rate from 25 shots per minute to 900 shots per minute (most CoCo software will only recognize up to about 340 shots per minute) you shouldn't have to worry about the aliens again. Along with several other games (mostly space shoot-'em-ups), I tried the Micro•Fire with *Pegasus* from Radio Shack. Boy, it sure saved me from coming down with "joystick thumb."

Although Micro•Fire won't affect the fire rate on games that control the number of shots per time period via software, I think it is a worthy investment for any serious gamer.

(Duck Productions, 18 Rowe Court, Brampton, Ontario, Canada L6X 2S2, \$19.95, \$24.95 Cnd.)

— Ruth Graham

One-Liner Contest Winner . . .

Ribbon will generate some interesting designs. Give this one a RUN.

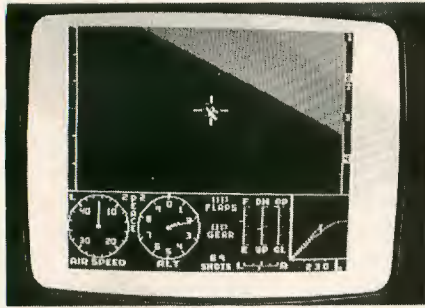
The listing:

```
Ø PCLS: PMODE3, 1: SCREEN1, 1: PMODE4
: Z=34: Y=Ø: FORX=ØTO144ØSTEP7.5: D=
X/57.295: S=COS(D)*57.295+Z: LINE(
S, Y+35) - (S, Y), PSET: Y=Y+1: Z=Z+1: N
EXT: GOTOØ
```

Charles P. Maulick
Staten Island, NY

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

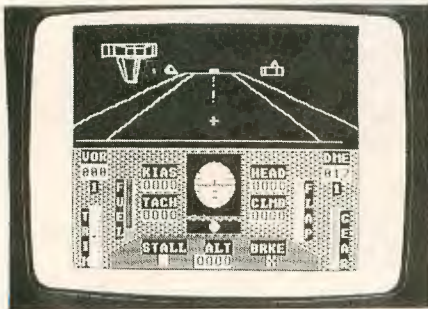
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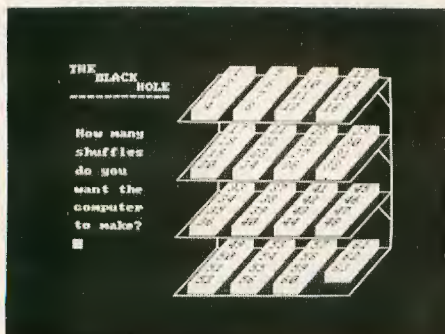
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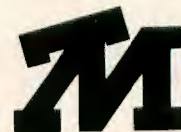
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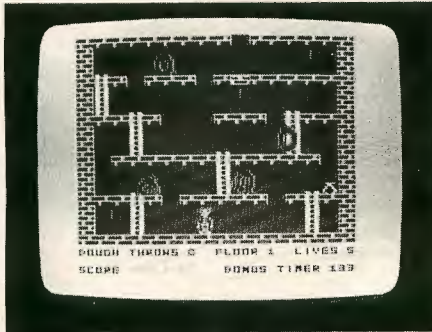
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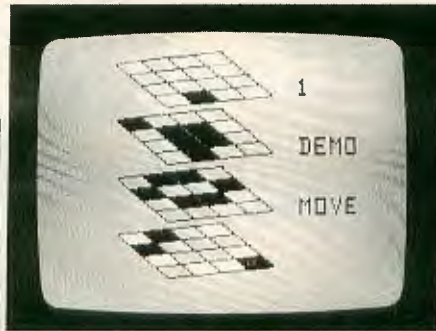
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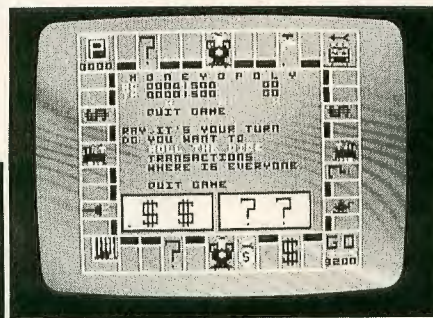


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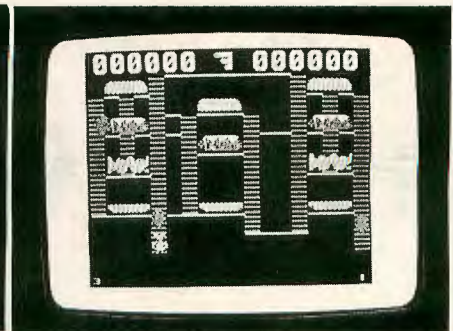
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It's Back to Basics With an Adjective Review

By Steve Blyn
Rainbow Contributing Editor

This month's article presents a grammar review program. It is suitable for a review of any part of speech within a sentence. We have chosen to illustrate with a review of adjectives.

Grammar is making a comeback in education. For many years, in the not too distant past, it was felt that by stressing grammar, student creativity would be stifled. Grammar was put on the back burner. Therefore, many students were educated with very weak skills in grammar. This deficiency came back to haunt them later in life. Colleges, especially, complained of poor basic writing skills of many entering freshmen.

The back-to-basics movement we have witnessed in the past few years includes and even stresses grammar. Correct grammatical usage is again part of most school systems' curricula. Our program helps to review parts of speech.

We chose adjectives as an example of the way to use this program. A sentence appears on the screen. An arrow appears underneath the first letter of the first word in this sentence. The student uses the right-arrow key to move the

arrow underneath the first letter in the word which is the adjective.

Pressing the ENTER key indicates whether this is indeed the sentence's adjective. If correct, the child proceeds to the next sentence. If incorrect, the child repeats the same sentence until he guesses correctly.

There are 10 sentences in this program. You may have as many as you want. The number of sentences is indicated in Line 30 as variable 'N'. Line 60 chooses one of the sentences randomly and Line 110 prints it on the screen.

Lines 130 to 180 contain the routine to move the arrow. The arrow is displayed by using CHR\$45. Line 150 erases the arrow and moves it to the right whenever the right-arrow key is pressed. Line 160 does the same to the left. When CHR\$13 (the ENTER key) is pressed, the program jumps down to Line 190.

Lines 190 to 210 check the student's current positioning of the underline arrow. This indicates whether the student has selected the adjective in this sentence. If the student is correct, he may press the ENTER key to get the next sentence or the 'E' key to end the program. If incorrect, he is instructed to press the ENTER key to try again.

Lines 280 to the end of the program contain the DATA statements. Each contains two parts. The first is the sentence. We limited our sentences to under 32 characters to allow them to fit on one line. You do not have to stick to this idea. It does, however, make for a neater screen display. The second part

of the DATA line is the number of characters counted until the place where the first letter of the adjective occurs in the sentence.

This program is easily modifiable for nouns, verbs, pronouns, adverbs or any part of speech you want to test. We even tried a version with scrambling the words of a sentence and asking the students to move the arrow to the correct first word of the scrambled sentence.

We encourage you to use your creativity to find additional uses for this program. Many times it happens that you are looking for a program to cover particular subject areas or skills. You find that what you need has just not been written commercially. The reason for this is most often a marketing decision. It is not worth the time, effort and cost to a software company to produce a program that has limited appeal. The programs appearing in these monthly columns are meant to be modified to fit particular needs. They are written so that some simple modifications can be performed by those who do not know how to program.

You could work on this *Adjective Review* and turn it into a Noun, Verb, Adverb, Etc., Review, save each version, and eventually cover all parts of speech. Modifications are meant to be done on many of the programs that appear in this column. We encourage you to do so. You can develop a personal library of educational programs that focus on skills for your needs. □

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 owns Computer Island and lives in Staten Island, New York.

The listing: ADJECTIV

```
10 REM"GRAMMAR REVIEW-ADJECTIVES
"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1986"
30 N=10
40 DIM A$(N),A(N)
50 FOR T=1 TO N:READ A$(T),A(T):
NEXT T
60 R=RND(N)
70 CLS
80 PRINT@40,"adjective review";
90 PRINT@72,STRING$(16,255);
100 H=224
110 PRINT@192,A$(R);
120 PRINT@H,CHR$(45);
130 EN$=INKEY$
140 IF EN$=CHR$(13) THEN 190
150 IF EN$=CHR$(9) THEN PRINT@H,
CHR$(143);:PRINT@H+1,CHR$(45);:H
=H+1
160 IF EN$=CHR$(8) THEN PRINT@H,
CHR$(143);:PRINT@H-1,CHR$(45);:H
=H-1
170 PRINT@192,A$(R);
180 GOTO 130
190 G=H-223
200 IF G=A(R) THEN 220
210 IF G<>A(R) THEN 250
```

```
220 PRINT@364,"CORRECT";:PLAY"O4
L100CDEFGCECCCC":PRINT@422,"PRESS
ENTER TO GO ON";
230 EN$=INKEY$
240 IF EN$=CHR$(13) THEN RUN ELS
E IF EN$="E" THEN END ELSE 230
250 PLAY"O2L20BB":PRINT@355,"PRE
SS ENTER TO TRY AGAIN";
260 EN$=INKEY$
270 IF EN$=CHR$(13) THEN 70 ELSE
260
280 DATA SHE IS A BIG GIRL.,10
290 DATA HE WENT TO THE GROCERY
STORE.,16
300 DATA DAVID ATE A CHOCOLATE C
OOKIE.,13
310 DATA THE FAT CAT SAT DOWN SL
OWLY.,5
320 DATA MY FRIENDLY DOG'S NAME
IS SPOT.,4
330 DATA WE WENT TO SEE A SCARY
MOVIE.,18
340 DATA I ATE THE SWEET PEACH Q
UICKLY.,11
350 DATA CAN YOU DRAW A PRETTY P
ICTURE?,16
360 DATA WHERE IS MY BIG BOOK NO
W?,13
370 DATA THE HEAVY DOOR CREAKED
NOISILY.,5
```

One-Liner Contest Winner . . .

This one-liner will flip any previously loaded or drawn PMODE 3 or 4 picture upside-down. This is one of those programs that is good to study for technique.

The listing:

```
10 DIMA(10),B(10):PMODE4,1:SCREE
N1,1:FOR Y=0TO95:GET(0,Y)-(255,Y)
,A,G:GET(0,191-Y)-(255,191-Y),B,
G:PUT(0,Y)-(255,Y),B,PSET:PUT(0,
191-Y)-(255,191-Y),A,PSET:NEXT Y:
FORD=1TO99999:NEXT
```

Mike Hall
Hartland, WI

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

One-Liner Contest Winner . . .

This program displays designs created by the rotation of a line about a fixed point on the line while the point undergoes simple harmonic translation in a horizontal direction.

(Editor's Note: After a mouthful like that, the least you can do is give it a try!)

The listing:

```
1 PMODE4:SCREEN1,1:PCLS:P=RND(10)
)/10:T=RND(360)/57.3:R=RND(8)/4:
FORN=1TO60:V=128+47*SIN(N/9.55):
T=T+R/9.55:W=V-80*(1-P)*COS(T):X
=96-80*(1-P)*SIN(T):Y=V+80*P*COS
(T):Z=96+80*P*SIN(T):LINE(W,X)-(
Y,Z),PSET:NEXT:FORI=1TO2000:NEXT
:GOTO1
```

Steve Halko
Corrales, NM

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

Command Options in the Workspace

By Cray Augsburg
Rainbow's CoCo SIGop
Username: RAINBOWMAG

Last month we discussed some of the commands in the workspace area. We also covered the proper method for uploading files to Delphi. This month we'll continue our discussion of the remaining workspace commands. Take a look at the table of commands. These are the commands available in your Delphi workspace.

Submitting Files

We've already discussed the procedure for uploading files, but how do you go about giving them to the system so other users can download them? This is accomplished with the SUBMIT command. Once you have uploaded your file, type SUBMIT and press ENTER. Delphi asks if the file to be submitted is in your workspace and if you want to continue. Enter Y for yes. Then you are asked how many files you want to submit. It is best to use only the number of files you want to put together in one group. If you answer with more than one, Delphi asks if the files are to be put together as a group.

Next, you are prompted for the file type. Options include program, article,

documentation, data and miscellaneous text. Delphi then asks to which database you want to submit the file(s). Enter the first three characters of the appropriate topic.

If you are submitting more than one file at a time, Delphi asks you to enter how you want the group named in the public database. You can use up to 32 characters and use of this many is advisable, as it helps clarify your group.

Next, enter a description of the file(s). Please include all pertinent information in this description. We would like to see addresses with machine language files, required POKES with BASIC files, system requirements for all programs and loading information for graphics and music. This is to help others as they try to download and enjoy your creations.

Once the complete description is entered, press CONTROL 'Z' to escape to the keyword prompt. If you enter a question mark here you will see what the required primary keyword choices are. Pick the most appropriate and then add others of your choice. After entering the keywords, you are asked for the workspace filename. Then you have the option of entering a special filename if the file absolutely requires one once it has been downloaded (i.e., another file in the group needs to refer to or call the file in question).

Then you are asked for the display name. If only submitting one file, the display name is also the name the public

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

ses to find the file and, therefore, it flows up to 32 characters. Finally, Delphi asks if the submitted file(s) are to be deleted from your workspace.

and press ENTER. This merges TEST.2 onto the tail end of TEST.1, thereby altering TEST.1. TEST.2 remains unchanged in your workspace.

“... the Common area is a place for individual users to offer things to other users.”

That's all there is to it. You have just submitted a file for CoCo SIG members to download, use and enjoy. From here, the file goes to the preview area where it will be downloaded and checked for errors by one of the database elves. If all goes well, we'll send a mail message to let you know your file has been accepted for the public database.

Now, just to confuse things, look at the table again. There is a command called PUBLISH. Sounds like it might do the same thing as SUBMIT, huh? Well, it does. You can use SUBMIT and PUBLISH interchangeably. Try these commands. We are more than happy to have submissions from all CoCo SIG members.

Table of Commands

APPEND	PUBLISH
CATALOG	PURGE
COMMON	RENAME
COPY	SETTINGS
CREATE	SUBMIT
DELETE	UNPROTECT
DOWNLOAD	UPLOAD
EDIT	XUPLOAD
EXIT	XDOWNLOAD
HELP	KUPLOAD
HOME	KDOWNLOAD
LIST	KERMIT

On to Other Commands

Let's try a little experiment. Use CREATE to build two separate short text files online. Call one of them TEST.1 and the other TEST.2. Now, type:

```
APPEND TEST.2 TEST.1
```

CATALOG is another useful command. Try it. Does the result look familiar? It should, as the CATALOG command functions identically to the DIRECTORY command. Use whichever one you feel most comfortable with. You can use RENAME to change the filenames in your workspace area. This sure is a handy command to have around when you need it.

The SETTINGS command allows a user to change default settings as well as important technical information about how files will be transmitted. This command alleviates the need to go all the way back to the main menu to set your password or terminal width.

Now we come to the UNPROTECT command. It is advisable *not* to experiment with this command. All mail and user default files are stored in your workspace. They are in a protected form. This means you cannot inadvertently delete these specific files when playing around in workspace. However, if you UNPROTECT a file, it is fair game to any typing errors. Please be careful with this command. If you need to delete mail, the best way to do it is to go to Mail and delete your messages there. Be warned about UNPROTECT.

The EXIT command takes you out of workspace and returns you to the previous prompt. It accomplishes the same thing as CONTROL 'Z'.

The Common Area

As its name implies, the Common area is a place for individual users to offer things to other users. It can be used to transfer a text file to a friend or for just about anything. To get to the Common area just enter COMMON at the workspace prompt. You are then told

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you are entering the Common area. To get back to your individual workspace, just enter HOME and you'll be there.

To copy a file from the Common area to your own workspace for later perusal, use the COPY command. An example would be:

```
COPY fileto.get HOME:newfile
```

To copy a file from your workspace to the common area, enter:

```
COPY HOME:fileto.go newfile
```

Notice the use of HOME: in the above examples. It is used to transfer files between your workspace and the Common area. The first filename is always the file to transfer and the second name corresponds to what the filename will be once the file is transferred.

COPY can also be used within your individual workspace to create multiple copies of a file. This comes in handy when you're altering or editing a file, but also want to keep a copy of the original.

Aside from the Kermit-specific commands, we have covered about every thing you will meet in workspace. We won't devote any time to Kermit, as it is not yet supported on the CoCo. We might, however, see something in the not too distant future. Who knows. Maybe you'll be the one to implement it on the Color Computer. The specifications files are in the database.

Conference

As you can imagine, things have been buzzing on our CoCo SIG since the announcement of the Color Computer 3 on July 30. That evening, several people joined in a conference led by **Steve Bjork** (6809ER) to discuss the new machine. There were over 30 people in attendance. We heard the Unine and Tymnet V3035 ports were all full. It was taking people forever to get online. We're sorry if you missed the conference, but you can find out more information now by staying tuned to the CoCo SIG.

Unfortunately, one of the people who was unable to attend the conference was **Jim Reed** (JIMREED), our CoCo SIG Manager. I say "unfortunately" — Jim

DATABASE REPORT

By Marty Goodman

The biggest news in the Delphi database is the arrival of **Dale Lear** (DALE-LEAR) as our new OS-9 database section leader. Dale replaces **Steve Bjork**, who will still be checking in regularly. Dale is known to CoCo users as the author of the *Baseball* and *Doubleback* ROM packs, and as the author of *DL LOGO*, a full and powerful LOGO implementation under OS-9 (considerably more elaborate than the Radio Shack disk or Program Pak versions released three years ago). Dale has been using OS-9 since its release for the Color Computer, and was among the first developers of Tandy OS-9-based CoCo software. He also does consulting work relating to UNIX systems. Dale is quite knowledgeable about the details of the CoCo 3. We warmly welcome him to the Delphi family. Look for him on the SIG!

The next biggest news here is the explosion of our Music database. All of these are *Musica 2* files, which can be downloaded using Xmodem and made to play using the *Play* utility available in the Music data library. **Richard P. Trasborg** (TRAS) started us off with *Kool*, and **Cray Augsborg** (RAINBOWMAG) contributed the **Scott Lampton** Transcrip-

tions. Then **Ned Smith** (NEDSM) contributed *Axel Foley*. **Tom King** (CAPNCRUNCH) gave us no fewer than 25 tunes, and **George McCashin** (GMCC) gave us *BACH 184.MUS*. **Allan H. Smith** (LUTHER) gave us two popular tunes (*Wake Me Before You Go* and *Say You're Wrong*) and **Stephen Scherock** (SFSCHEROCK) then gave us a dozen more titles. **Scott Milliken** (IDIOT) recently gave us *Idiosyncrasies*, and is soon to send us quite a number more. One member just spoke to me about uploading a library of Grateful Dead transcriptions. We seek more files to speed this rapidly growing database on its way.

In the General topic area, **Cray Augsborg** has given us a quick introduction to the new commands under Disk Extended Color BASIC 2.1 available on the CoCo 3. I will soon be adding material to the General and Hardware Hacking sections providing new information on our new machine. In the Utilities section **Robert Pierce** (RPIERCE) has given us a memory editor to view and alter CoCo memory locations. **Mike Lucash** (MIKELUCASH) has provided a utility to convert ML programs to data statements to facilitate easy inclusion into BASIC programs. He has also given us a disk zap program. **Mark O'Pella** (MDODEL-

was in New York covering the announcement. While he was busy phoning in news reports to us, it was all we could do to stand still, eagerly awaiting his arrival back here so we could look at the many pictures he took. The lucky guy got to see the thing before we did!

The conference was a smashing success. Most people who had questions got them answered, while others sat back and digested all the information. There were very few hitches and all went smoothly. Soon, you will see here a guideline on holding scheduled conferences.

If you haven't already done so, check out the many new files in the database covering the Color Computer 3. The files are very informative and will give you some insight into the powerful capabilities of the new machine. Also, check elsewhere in this issue for some example programs by our very own **Dale Lear** (DALELEAR). Dale is our OS-9 database section-leader and is also a programmer who has been working with the Color Computer 3. We are very fortunate to have him with us and we look forward to many more great things from him. □



PHI) has given us a disk directory sort program and **Rodger Alexander** (SALZARD) has given us *TESTMAKER.PBJ*, a utility to facilitate the creation of Y/N, matching and essay question tests, written to support the full 80-column display capability of the PBJ Wordpak. It is likely that minor modifications of it will run in the 80-column mode on the CoCo 3. **Stephen Macri** (DRACMAN) uploaded *OSCAR.BAS* (to calculate the orbit of several Ham radio OSCAR satellites). He has also given us *Dates* and *Calendar*, calendar utilities. These use Steve Bjork's mouse software. **Loren J. Howell** (XENOS) gives us a recipe program, and from **Eric Tilenius** (TILENIUS) comes a logarithm table creator, and an envelope addresser.

In the Games topic area, we have received *Miner* from Mike Lucash, and a nuclear plan simulator from **Robert Matthews** (BOBMATTHEWS).

Our Data Communications topic area has been enhanced by *Disk Fone Send* from Mike Lucash, a utility to send an entire disk over the telephone via modem. **Greg Miller** (GREGMILLER, co-author of *McPaint*) has also provided his disk-to-disk terminal transfer utility, which supports sending disk at up to 1200 Baud via the "bit-banger" port from one CoCo to another. Stephen Scherock has sent us a *Mikeyterm* utility, *MTSTART*, to set up *Mikeyterm* for different log ons. He has also contributed *Teleterm* Version 1.32. **Jim Lalone** (TERMITE) has given a dialer utility.

In the Graphics section, I am starting to put up issues of the "CoCo Gallery" for you to download and enjoy. We have received a font editor from **Ken Schunk** (KENSCHUNK), and a Dolly Parton

Picture from Richard Trasborg. Mark O'Pella uploaded a random art generator, and **Ira Goldwyn** (IRAG) has shared a few more of his pictures. Loren J. Howell has sent an animated fire picture, and **Steve Dale** (MARINER1) contributed a rock video image. **Ken Bragg** (KILRCOCO) has sent *LEGEND.DRV* and **Derrik M. Kardos** (DTG) has given an image of the starship enterprise.

In the OS-9 Database, where Dale Lear will soon be assuming his duties, Steve Bjork has provided several versions of his bouncing ball demos. **Robert Wuest** (WUEST) has uploaded a system utility for sending memory modules to standard output, and a calendar program. THE RAINBOW's "KISSable OS-9" material is now available for download in the OS-9 database (at a \$3.50 surcharge for the group as a whole).

With the arrival of the CoCo 3, look for definitive coverage on its hardware and software aspects here on the Delphi CoCo SIG. Soon, I hope to have completed an exhaustive file describing the reasons for some CoCo 2/CoCo 3 software incompatibilities, and how to overcome them, as well as a discussion of the GIME chip. I also expect to be posting some interfaceless RTTY software for the Color Computer. This was written by the authors of *Graphicom* and *WEFAX*. This last will appear in the Data Communications section. As OS-9 support for the CoCo 2 and CoCo 3 grows, we expect to greatly expand our OS-9 section. Stay tuned.

See you on Delphi!

— Marty
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

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The Shock Absorber

By Marty Goodman

Power line surge and spike protectors come in all types and prices. Few people who buy them are aware of the considerable differences in quality among the various products. Some consist merely of a few capacitors across the power line. Some have a single metal oxide varistor (MOV) across the incoming AC line. Slightly better ones have three MOVs running across the two main incoming AC lines and go from each of those lines to ground. Some even add a fuse.

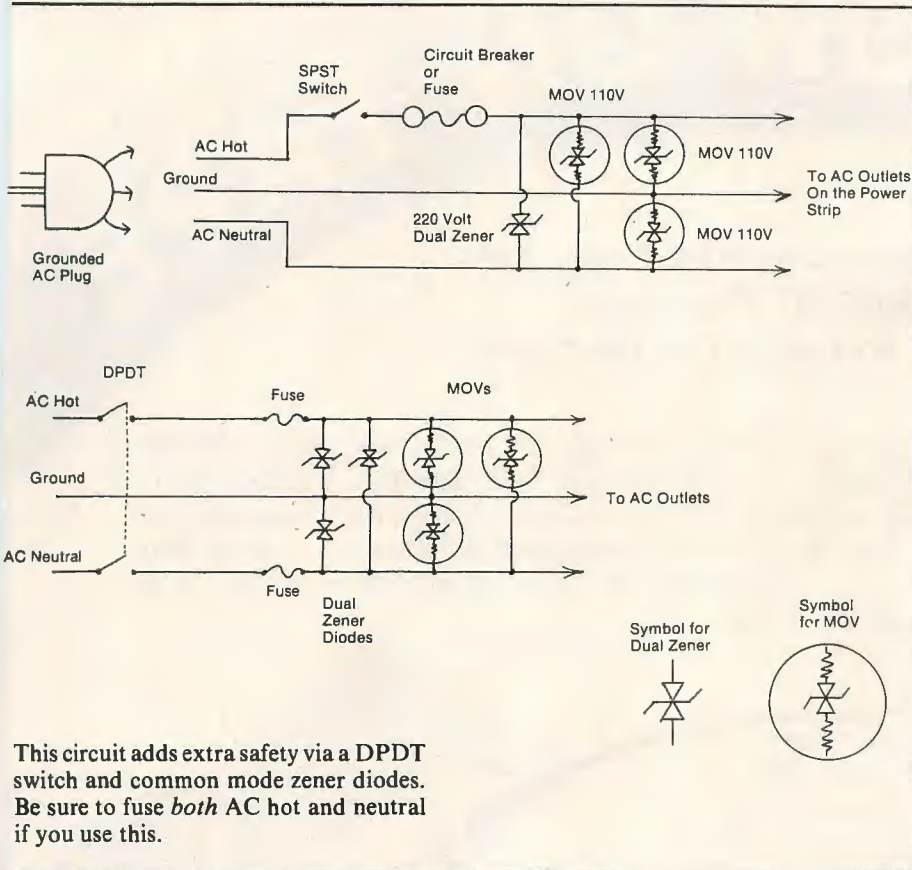
But the *best* surge and spike protectors use dual zener diodes in addition to MOVs and fuses. Such high-quality spike protectors often sell for \$50 to \$100. If you are interested in buying a spike protector for your computer or other sensitive electronic device, be sure to ask the seller if it uses dual zener

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

diodes. If it does not, or if the seller is in the least bit unsure, do not waste your money on the item.

MOVs and dual zener diodes function in a similar fashion. Both are devices that behave as insulators until the voltage across them exceeds a certain preset value. After that, both of them become conductors. Thus, both are used across power lines where a potential short may occur. MOVs differ from zeners in that they are about 10 times slower to respond to a voltage surge, and when they get overloaded they burn out to an open circuit condition (thereby ceasing to provide any protection). Zener diodes respond far more rapidly than MOVs, but when they are overloaded they often fuse to a closed circuit (shorted) condition. Zener diodes clip ultra-fast voltage spikes down to size. MOVs are nice to have because they kick in later and relieve the stress on the zener. Fuses should always be in series with any dual zener diodes you use, so that if the voltage spike persists, causing the zener to short out permanently, the fuse then blows, preventing a fire hazard. There you have the three elements of a quality spike and surge protector: a fuse, a dual zener diode and MOVs.

I've built a number of spike protectors for my equipment at home. I start



with a commercial power strip. A local hardware store sells six-outlet power strips for \$12 each. I select one that is either screwed or snap-fitted together, avoiding those riveted together. I open the strip and add three MOVs and one dual zener to its circuit.

The power strip typically contains a switch, a breaker and a neon light in addition to the grounded AC power cord and the six outlets. I buy the MOVs at Radio Shack (Cat No. 276-568, \$1.69). You need a 220V rated dual zener diode. This part is not available at Radio Shack, but you can find it at electronic supply houses. The cost should be under \$3. If you can't find a dual one, two back-to-back regular 10-watt zeners will work fine.

I've included a schematic diagram for the surge protector. If you shop around very carefully, you may be able to build one for under \$20 in parts in about one hour. Be very careful to fully insulate everything you wire in. Cloth electrical tape will come in very handy.

(Questions about this project may be directed to the author at 1633 Bayo Vista Ave., San Pablo, CA 94806. Please enclose an SASE when writing.)

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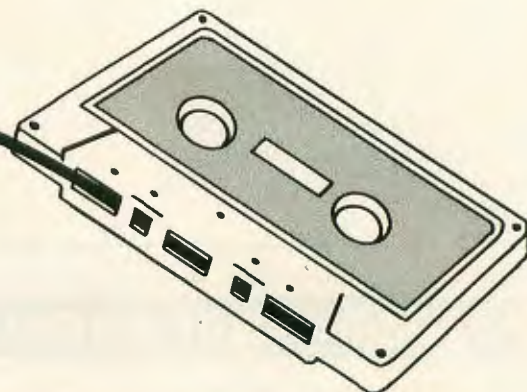
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October 1984 — *8-COLOR*, a utility to get eight colors on the PMODE 4 screen; *The CoCo School Marm Part II*, a spelling practice and examination system; *Developing a Database Manager Part IV*, a tutorial on using direct access disk files; *Follow*, a tutorial that teaches the importance of reading directions; *BLOWUP*, a graphics utility for PMODE 4 screen enlargements; *Tarot*, a Simulation of the popular card game; *Sketch*, a color graphics editor; *Pair 8*, two line printer programs for streamlining, pairing and bracketing of tournament competitions; *Little E*, an upgraded utility to add cursor controlled editing functions to the MC-10 and CoCo; *Convert*, a graphics modification to Radio Shack's *Art Gallery*; *Presidents*, a game of trivia; *Hurricane*, an electronic hurricane tracking chart; and *SCANDAL*, a beginner's assembly language tutorial.

Some Hardware Fixes for the Video Display Generator

By Tony DiStefano
Rainbow Contributing Editor

Last month, I described in detail the innards of the new CoCo B series computer. One difference inside this computer is a new version of the VDG (Video Display Generator). I described it as being an improved version of the old faithful VDG that has been in the CoCo since the beginning.

To make the new VDG compatible with the old one, the new functions of this VDG are not readily accessible. For instance, this VDG has a built-in lowercase character set. But press the old SHIFT/0 and nothing happens. You still get that crummy inverse video lowercase character. So what gives?

Well, in order to get it to work, you may have to add in a little hardware. This is where I come in. Get out the old soldering iron and dig in as I lead you through the modifications to get the most out of your new 'B' series computer. Note: The letter 'B' must appear on the model number of the computer and not inside on the PCB. For instance, the one I have is model number 21-3134B.

Let's start with the basics. The old VDG chip number is Motorola MC6847. The new part is another Motorola part numbered MC6847T1, though in some computers, the part number might be XC80652P.

The first and most important change is the lowercase capability. Normally it is disabled, meaning you will not see the lowercase characters when using the SHIFT/0 on the keyboard. Instead, you get the normal inversed character set. You can change it in software. The pin that controls which mode you are in is connected to the PIA, which is memory mapped at \$FF20 to \$FF23, or 65312 to 65315 in decimal. It is connected to PB4 or Bit 4 of address location \$FF22 or 65314. This bit is normally a zero. Changing this to a one gives you real lowercase characters. The only problem is the routine in Extended BASIC will change it back to a zero every time you print something. If you want to do it in BASIC, add this line every time you want to change the screen to true lowercase:

```
10 POKE &HFF22 , (PEEK (&HFF22)
OR 16)
```

What this line does is change Bit 4 to logical level one. But remember, each time you print on the screen or change

from graphics to text, Extended BASIC changes this back. You may want to make this line into a subroutine. Better yet, why don't you do it in hardware? It's more permanent.

There are many ways of doing this change in hardware. Use the one that suits you best, but the first way I present is the simplest. Remove the chip from the socket. Bend Pin 30 (GM0) out so that it does not plug back into the socket. Solder a short piece of wire from Pin 30 to Pin 17. Pin 17 is the 5-volt supply. This action permanently changes the level of the pin to logical level one, giving lowercase all the time.

If the VDG is soldered into the board without a socket, then just cut Pin 30 at the base and pry it up. Use slim-line cutters or a razor blade. Be careful not to cut anything else.

The second way to make the hardware change requires an SPDT switch. Figure 1 shows two ways of wiring the switch to this circuit. Using Figure 1a as a guide, pull Pin 30 out as described before. Solder a wire from Pin 30 to the center of the switch. Solder another wire from one side of the switch to Pin 17 of the VDG. Solder a third wire to the other side of the switch and to Pin 1 of the VDG.

When the switch is toward Pin 17, the

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

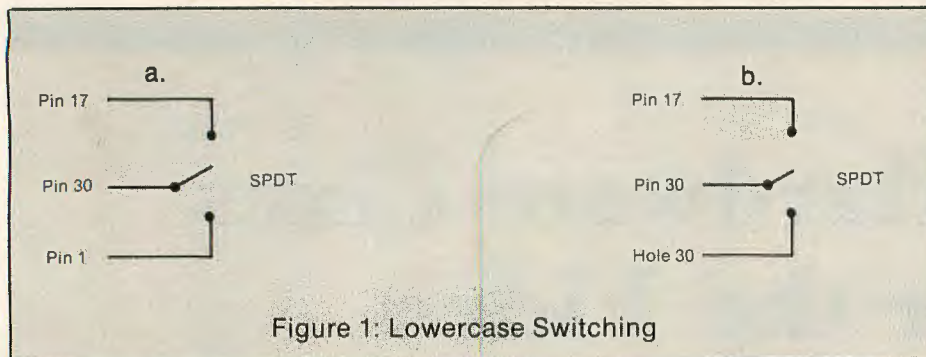


Figure 1: Lowercase Switching

display will always show lowercase characters. When it is the other way, it will always display inverse characters. Figure 1b shows basically the same way as before, but instead of connecting the third wire to Pin 1, connect it to the empty pinhole created when you pulled Pin 30. This way, when the switch is toward Pin 17, you always get lowercase characters. When the switch is the other way, you get whatever display Bit 4 of the PIA is set to. This is the most versatile way of connecting this pin.

The next change has to do with the border. In the normal text mode you see a big green square with black letters. This border is always black in the text mode. Now there is another alternative. How about a green border? There is a way of doing this in software. The pin that controls which mode you are in is connected to the PIA which is memory mapped at \$FF20 to \$FF23 or 65312 to 65315 in decimal. It is connected to PB6 or Bit 6 of address location \$FF22 or 65314. This bit is normally a zero. Changing this to a one gives a green border. The only problem is that the same routine in Extended BASIC that changes the lowercase pin every time you print something also changes this pin. If you want to do it in BASIC, add this line:

```
10 POKE &HFF22 , (PEEK (&HFF22)
OR 64)
```

What this line does is change Bit 6 to logical level one. If you want to change both the lowercase and the green border, change the last value to 80 (16 + 64). The new line to change both the lowercase and green border would look like this:

```
10 POKE &HFF22 , (PEEK (&HFF22)
OR 80)
```

But remember, every time you print on the screen or change from graphics to text, Extended BASIC changes this

back, so again, you may want to make this line into a subroutine. And again, this can be done in hardware.

One way to do this is to remove the chip from the socket. Bend Pin 27 out so that it does not plug back into the socket. Solder a short piece of wire from Pin 27 to Pin 17. This action permanently changes the pin to logical level one, giving a green screen all the time.

If the VDG is soldered into the board without a socket, cut Pin 27 at the base and pry it up.

The second way requires an SPDT switch. Figure 2 shows two ways of wiring the switch to this circuit. Pull Pin 27 out as described previously (see Figure 2a). Solder a wire from Pin 27 to the center of the switch. Solder another wire from one side of the switch to Pin 17 of the VDG. Solder a third wire to the other side of the switch and to Pin 1 of the VDG.

When the switch is toward Pin 17, the display will always have a green border; when it's the other way, it will always have a black border. Figure 2b is basically the same way as before, but instead of connecting the third wire to Pin 1, connect it to the empty pinhole created when Pin 27 was pulled. This way, when the switch is toward Pin 17, you always get a green border and when the switch is the other way, you get whatever display Bit 6 of the PIA is set to. This is also the most versatile way of connecting this pin.

The third modification is the famous inverse video screen. You no longer need to add a gate to do inverse video. The procedure is basically the same as the others, but with different values and different pin numbers. You can change it in software. The pin that controls which mode you are in is connected to PB5 or Bit 5 of address location \$FF20 or 65314. This bit is normally a zero. Changing it to a one gives you an inverse video screen. But remember, Extended BASIC will change it back. If you want to do it in BASIC, add this line every time you want to change to an inverse screen:

```
10 POKE &HFF22 , (PEEK (&HFF22)
OR 32)
```

This line changes Bit 5 to logical level one. To change both the lowercase and the inverse video, change the last value to 48 (32 + 16). The new line to change both the lowercase and inverse video looks like this:

```
10 POKE &HFF22 , (PEEK (&HFF22)
OR 48)
```

Since Extended BASIC will change this back, again you may want to make this line into a subroutine. Don't bother to add the green border value when using the inverse video — it has a lower priority and shuts off anyway. Again, you can do it in hardware.

To make the change in hardware, remove the chip from the socket and bend Pin 29 out. Solder a short piece of wire from Pin 29 to Pin 17. This permanently changes the pin to logical level one, giving inverted video all the time. (Pin 17 is the 5-volt supply.)

If the VDG is soldered into the board without a socket, then just cut Pin 29 at the base and pry it up.

The second way uses an SPDT switch. Figure 3 shows two ways of

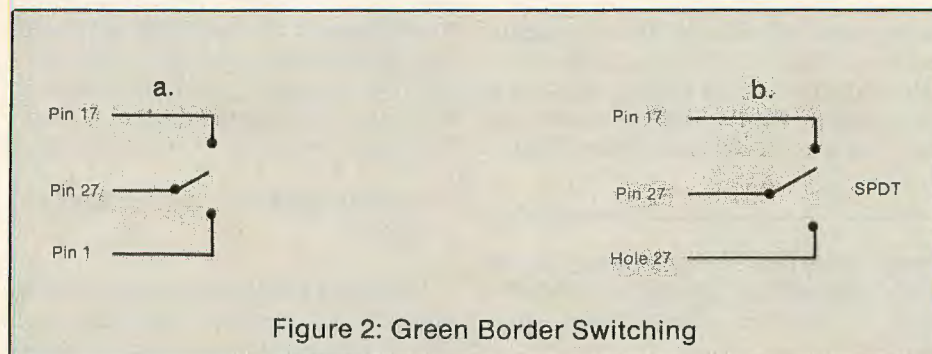


Figure 2: Green Border Switching

wiring the switch to this circuit. To use the first method (Figure 3a), pull Pin 29 out. Solder a wire from Pin 29 to the center of the switch. Solder another wire from one side of the switch to Pin 17 of the VDG. Solder a third wire to the other side of the switch and to Pin 1 of the VDG.

When the switch is toward Pin 17, the display will always have an inverse video; when it's the other way, it will always have a normal screen. The second method (Figure 3b) is much the same as the first. Instead of connecting

the third wire to Pin 1, connect it to the empty pinhole. When the switch is toward Pin 17, you always get inverted video; when the switch is the other way, you get whatever display Bit 5 of the PIA is set to.

These three changes to the new VDG add to the versatility of the CoCo's display. However, I suggest you wire the three pins using the SPDT switches and the empty hole left by each pin because, when in any graphics mode, these three pins are also used by the VDG to control which graphics mode you are in.

"You no longer need to add a gate to do inverse video."

If you hard wire the pins into a particular mode, you will lose certain graphics modes, depending on which pin you hard wired. If you use the most versatile way for each switch, all you have to do to return to the normal or default mode when you need a certain graphics mode is to throw a few switches.

Next month, I'll get into a step-by-step description of how to integrate the new MC6847T1 chip into your older non-'B' CoCos. I wonder just how many original CoCos are still out there? I would like to thank James R. Igou of Newark, Delaware for supplying me with the manual and an MC6847T1 chip to work with. I would also like to thank Bill Warnica of Barrie, Ontario, for his assistance with this and the next article on the new VDG chip.

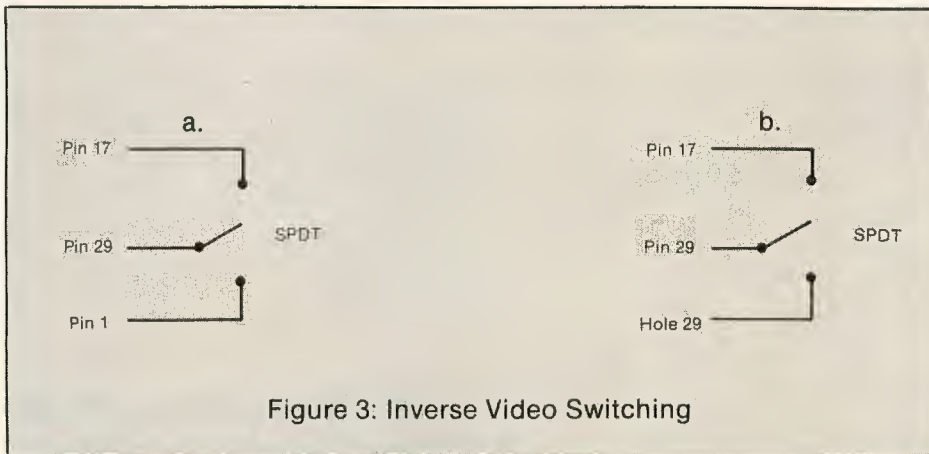


Figure 3: Inverse Video Switching

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A Discussion About Sexism in the Computer Industry

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Is computer education sexist? It is true that more boys than girls are computer hackers, own home computers and take computer classes in school. Ever since computer education began in this country, educators have noted that computer use seems to be associated with gender, and have tried to provide some explanations for it. One explanation deals with child rearing practices. Boys are thought to be trained to enjoy more violent activities, such as the "shoot-'em-up" arcade games.

Another explanation involves academic performance. Boys tend to score higher on group achievement tests in mathematics than girls. Since programming a computer is somewhat math oriented, it makes sense that more boys than girls might become proficient in this activity.

Some explanations center on biolog-

ical differences between boys and girls. Some recent medical research indicates that the brains of males and females are indeed different. The differences, however, are very small, and at present there is no way to determine what effects these chemical differences may have on behavior.

No single explanation can account for the fact that a higher proportion of boys is interested in computers. However, the real issue is whether any girl, if she wants, can successfully achieve her potential and express herself through computers. The answer is obviously affirmative. Women have provided excellent programs for computers, and contributed to the progress of the computer industry. As an example, let's have a short history lesson.

All right, all you programmers — who was the first programmer? Based on the preceding paragraph, you may correctly assume a woman has that honor. The right answer, as you may know, is Lady Augusta Ada Lovelace. Yes indeed, Lady Ada was the first programmer, working with Charles Babbage's Analytical Engine. Babbage created a mechanical computing device during the first half of the 1800s, and

Ada programmed it.

Lady Ada lived from 1816 to 1852. Her father was the poet Lord Byron, familiar to anyone who has taken a high school English literature course. Lady Ada was a poet in her own fashion — not with words, like her father, but with the Analytical Engine. She developed the concepts of subroutines and loops while programming Babbage's machine. You may have heard of the programming language developed by the Defense Department called ADA, honoring Lady Ada Lovelace.

The Analytical Engine, however, was not an electronic device, but a mechanical one. Wheels, gears and cams did the work instead of switches, wires and relays. The machine was not a *true* computer.

Let's go to the second programmer, or the first electronic programmer. Sorry guys, but the person holding this honor is also a woman, Grace Murray Hopper. Grace Hopper was a math teacher at Vassar and Barnard, and a lieutenant in the Navy during World War II. She wrote the complex instructions that made the Mark I, or Automatic Sequence Controlled Calculator, work in 1943.

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

To her, the solution to making the computer work was obvious. "Why start from scratch with every single program you write? Develop one that would do a lot of the basic work over and over again for you."

Grace Hopper designed a computer language called FLOW-MATIC. She is often credited with inventing the COBOL language, although a committee actually designed it, based on her earlier work. While working for the Department of Defense, she was responsible for developing a compiler that would make COBOL run on almost any computer.

Grace worked with the company that built the Univac I, and stayed on until she retired in 1971. She has won nearly every award in the computer industry, is a captain in the Naval Reserve, travels worldwide giving speeches and hopes to celebrate New Year's Eve in 1999, when she will be 94 years old.

There are, of course, many talented women in the computer field. Some write programs; some manage software firms; some provide instruction about computers. In general, however, females are less represented in the indus-

try than males. This situation will probably change during the next few years. Girls in school are being required to take computer courses, just as boys are. Women are entering the professional job markets and finding that

provide encouragement for any student interested in computers. It may be that because of cultural and historical forces, different types of encouragement are needed for female students. If they need role models, there are none better

"No single explanation can account for the fact that a higher proportion of boys is interested in computers."

computers represent an area of employment. Women are beginning to appear in computer clubs (only a few, but still more than just a few years ago) and on bulletin boards.

Perhaps our role as educators is to

than Lady Ada Lovelace and Grace Murray Hopper. Who knows — perhaps the first programmer of the optical computer (using light as opposed to electric impulses) will also be a woman.

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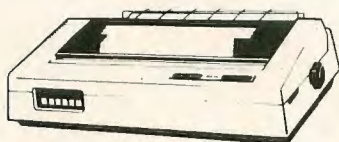
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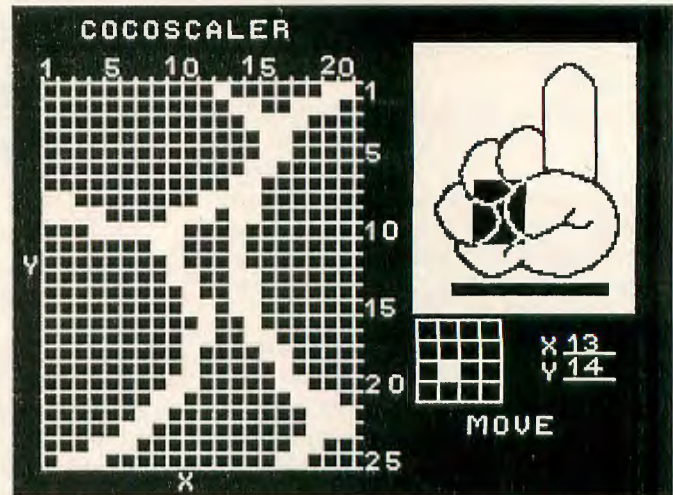
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An easy-to-use detailer for CoCo drawings

The CoCo Scaler

By Wayne Womack



The CoCo Scaler can be used to get more detail in your drawings. While you draw on a low resolution screen, your drawing is displayed in high resolution in the upper-right corner of the screen. The commands available in CoCo Scaler are Move, End, Set and Reset.

Each section of the high resolution screen can be worked on, one section at a time, in the low resolution section. First, load an old drawing or create a new one. If you want an old drawing, it will be loaded and will show up in the high resolution grid. Press 'M' to move a section of the picture to the editing grid. Use the arrows to move the block marker to the correct section. Then press 'S' or 'R' and that section is moved to the editing grid.

Once the section is in place, use the joystick to move to the correct square. Pressing the firebutton fills the square with white (if you press 'R') or black (if you press 'S'). You can toggle between 'R' and 'S' as needed. As you edit in the low resolution grid, the picture in the

Wayne Womack has been a commercial artist for 15 years and lives in Bridgeton, Missouri. In the evenings he teaches BASIC programming at a local high school.

high resolution grid is also changed. When finished with one section, press 'M' to get another section. When you are finished changing the picture, press 'E' and give your drawing a name. It will

be saved with the extension /DRW. (You may direct questions about this program to the author at 12738 Gist Road, Bridgeton, MO 63044. Please enclose an SASE for a reply.)

Line	Function	Line	Function
10-30	Remark statements.	1500-1520	Draw the move screen grid.
40-50	Initialize program.	1530-1710	Joystick and Command processing lines.
60-320	Create each letter of the alphabet.	1720-1780	Draw X and Y position on the screen.
233-610	Create the numbers.	1790-1920	Show you where you are on the high resolution screen.
620-630	More program initialization.	1930-2100	Scan the high resolution area and transfer it to the low resolution side for editing.
640-1130	Draw the Title Screens.	2110	Clears everything off screen except the drawing area for saving the picture to disk.
1140	Timing Loop.	2110	Timing loop.
1150	Clears the screen.	2130-2200	Save the drawing to disk.
1160-1200	Let you choose an old drawing or start a new drawing.	2210-2280	Load a drawing.
1210-1220	Draw frame for the high resolution screen in the upper right corner of the screen.	2290-2310	This is a temporary block to show you where you are while in moving mode.
1230-1250	More program initialization.		
1260	Writes CoCo Scaler at top of screen.		
1270-1330	Draw the grid used for the low resolution screen.		
1340-1490	Draw numbers and letters on the screen.		

180	.....11	1620	.....133
360	.....126	1700	.....22
580	.....82	1860	.....136
840	.....232	2000	.....73
1030	.....196	2170	.....173
1240	.....174	END	.....22
1480	.....176		

The listing: SCALER

```

1Ø 'THE COCO SCALER
2Ø 'BY VW SOFTWARE
3Ø '1Ø/21/84
4Ø CLEAR15ØØ:PCLS
5Ø DIM NO$(25),A(25),SC(25)
6Ø '***LETTERS***
7Ø LA$="BM+1,ØU4E2F2D2BL4R4D2BR3
"
8Ø LB$="BM+1,ØU6R3F1D1G1BL3R3F1D
1G1BL3R3BR4"
9Ø LC$="BM+1,ØBR3E1BU4H1L2G1D4F1
R2BR4"
1ØØ LD$="BM+1,ØBR3E1U4H1L3D6R3BR
4"
11Ø LE$="BM+1,ØBR5BU6L5D3R3BL3D3
R5BR3"
12Ø LF$="BM+1,ØBR5BU6L5D3R3BL3D3
BR6"
13Ø LG$="BM+1,ØBR5E1U2L2BR2BU2H1
L2G1D4F1R2BR4"
14Ø LH$="BM+1,ØU6BD3R4BU3D6BR4"
15Ø LI$="BM+1,ØBU6R4BL2D6BL2R4BR
3"
16Ø LJ$="BM+1,ØBU1F1R2E1U5BD6BR4
"
17Ø LK$="BM+1,ØU6BD3R2E2U1BL2BD3
F2D1BR3"
18Ø LL$="BM+1,ØU6BD6R5BR3"
19Ø LM$="BM+1,ØU6R1F2D1U1E2R1D6B
R3"
2ØØ LN$="BM+1,ØU6F5BU5D6BR3"
21Ø LO$="BM+1,ØBR3L2H1U4E1R2F1D4
G1BR4"
22Ø LP$="BM+1,ØU6R3F1D1G1L3D3BR7
"
23Ø LQ$="BM+1,ØBR3L2H1U4E1R2F1D4
G1BH1F2BU1BR3"
24Ø LR$="BM+1,ØU6R3F1D1G1BL3R3F1
D2BR3"
25Ø LS$="BM+1,ØBU1F1R2E1U1H1L2H1
U1E1R2F1BD5BR3"
26Ø LT$="BM+1,ØBR6BU6L6BR3D6BR5"
27Ø LU$="BM+1,ØBU6D5F1R3E1U5BD6B
R3"

```

```

28Ø LV$="BM+1,ØBU6D4F2E2U4BD6BR3
"
29Ø LW$="BM+1,ØBU6D6R1E2U2D2F2R1
BU6D6BR3"
3ØØ LX$="BM+1,ØU1E4U1BL4D1F4D1BR
3"
31Ø LY$="BM+1,ØBU6D2F2E2U2BL2BD4
D2BR5"
32Ø LZ$="BM+1,ØBU6R4D1G4D1R4BR3"
33Ø '***NUMBERS***
34Ø NO$(Ø)="BM+1,ØBR1R2E1U4H1L2G
1D4F1BH1E4BD5BR3"
35Ø NO$(1)="BM+1,ØBU4E2D6BR3"
36Ø NO$(2)="BM+1,ØBU5E1R2F1D1G4R
4BR3"
37Ø NO$(3)="BM+1,ØBU5E1R2F1D1G1L
1BR1F1D1G1L2H1BF1BR6"
38Ø NO$(4)="BM+1,ØBU2E4D6BL4BU2R
6BD2BR3"
39Ø NO$(5)="BM+1,ØBR4BU6L4D3R3F1
D1G1BL3BU1F1R2BR3"
4ØØ NO$(6)="BM+1,ØBR5BU5H1L2G1D4
F1R2E1U1H1L3BD3BR6"
41Ø NO$(7)="BM+1,ØBR3U2E3U1L5BD6
BR8"
42Ø NO$(8)="BM+1,ØBR3L2H1U1E1H1U
1E1R2F1D1G1L2BR2F1D1G1BR4"
43Ø NO$(9)="BM+1,ØBU1F1R2E1U4H1L
2G1D1F1R3BD3BR4"
44Ø NO$(Ø)="BM+6,-1U4H1L2G1D4F1R
2E1G1BR4"
45Ø NO$(1Ø)=NO$(1)+NO$(Ø)
46Ø NO$(11)=NO$(1)+NO$(1)
47Ø NO$(12)=NO$(1)+NO$(2)
48Ø NO$(13)=NO$(1)+NO$(3)
49Ø NO$(14)=NO$(1)+NO$(4)
5ØØ NO$(15)=NO$(1)+NO$(5)
51Ø NO$(16)=NO$(1)+NO$(6)
52Ø NO$(17)=NO$(1)+NO$(7)
53Ø NO$(18)=NO$(1)+NO$(8)
54Ø NO$(19)=NO$(1)+NO$(9)
55Ø NO$(2Ø)=NO$(2)+NO$(Ø)
56Ø NO$(21)=NO$(2)+NO$(1)
57Ø NO$(22)=NO$(2)+NO$(2)
58Ø NO$(23)=NO$(2)+NO$(3)
59Ø NO$(24)=NO$(2)+NO$(4)
6ØØ NO$(25)=NO$(2)+NO$(5)
61Ø MI$="BM+2,-3R3BD3BR2"
62Ø A=5:B=2Ø
63Ø PMODE 4,1:PCLS: SCREEN 1,1
64Ø DRAW "BM81,177;XLV$;": DRAW
"BM8Ø,177;XLV$;": DRAW "BM9Ø,177
;XLW$;": DRAW "BM91,177;XLW$;"
65Ø DRAW "BM1Ø5,177;XLS$;XLO$;XL
F$;XLT$;XLW$;XLA$;XLR$;XLE$;"
66Ø PMODE 4,1
67Ø LINE(4,4)-(25Ø,166),PSET,B
68Ø LINE(4,182)-(25Ø,182),PSET
69Ø LINE(4,185)-(25Ø,185),PSET

```

```

700 XX=254:YY=166
710 NT$="L25504V3T255;4;4;"
720 FORX=4TO250 STEP5
730 XX=XX-5
740 LINE(X,4)-(XX,YY),PSET
750 PLAY NT$
760 NEXT
770 FORY=8TO166 STEP5
780 YY=YY-5
790 LINE(4,YY)-(250,Y),PSET
800 PLAY NT$
810 NEXT
820 FORI=1TO1000:NEXTI
830 LINE(4,4)-(250,165),PRESET,B
F
840 LINE(6,167)-(250,181),PRESET
,BF
850 NT$="L20002;1;2;3;4;"
860 VN$="V1T15"
870 DRAW "BM95,177;XLP$;XLR$;XLE
$;XLS$;XLE$;XLN$;XLT$;XLS$;"
880 X=4
890 PLAY VN$
900 FORY=5TO52 STEP4: X=X+6
910 LINE(X,Y)-(X*2.75,Y*2.75),PS
ET,B
920 FORI=1TO2
930 PLAY "V+T"+NT$
940 NEXTI
950 LINE(X+1,Y*2.75)-(X*2.75,Y*2
.75),PRESET
960 LINE(X*2.75,Y+1)-(X*2.75,Y*2
.75),PRESET
970 NEXTY
980 LINE(82,52)-(82*2.75,52*2.75
),PSET,B
990 FORI=1TO2:PLAY "V+T"+NT$:NE
XTI
1000 LINE(6,167)-(250,181),PRESE
T,BF
1010 DRAW"BM95,95;S16;XLC$;XLO$;
XLC$;XLO$;":DRAW"BM96,94;XLC$;XL
O$;XLC$;XLO$;S12;"
1020 DRAW"BM102,119;XLS$;"
1030 DRAW"BM119,119;XLC$;"
1040 DRAW"BM135,119;XLA$;"
1050 DRAW"BM152,119;XLL$;"
1060 DRAW"BM171,119;XLE$;"
1070 DRAW"BM190,119;XLR$;"
1080 DRAW"BM+0,0;S4;"
1090 LINE(4,163)-(250,163),PSET
1100 DRAW "BM50,177;XLC$;XLO$;XL
P$;XLY$;XLR$;XLI$;XLG$;XLH$;XLT$
;"
1110 DRAW "BM135,177;XNO$(1);XNO
$(0);XMI$;XNO$(2);XNO$(1);XMI$;X
NO$(8);XNO$(4);"
1120 PLAY "T404"
1130 PLAY "V2L8CFAO+CP80-AL4.O+C

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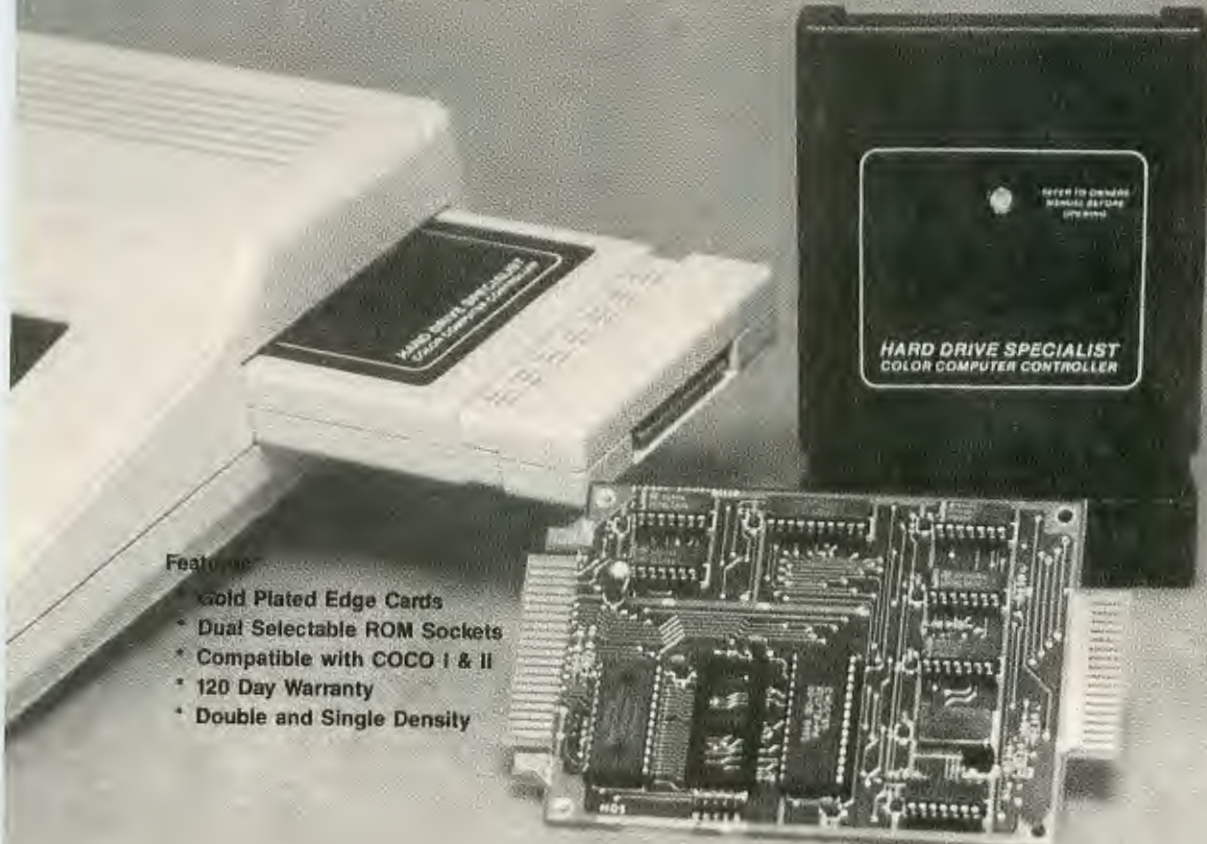
```

P4P80-"
1140 FORI=1TO1000:NEXTI
1150 PCLS
1160 CLS:PRINT:PRINT:PRINT:PRINT
"
NEW OR OLD SCREEN":PRINT
:PRINT"
PICK N OR O"
1170 X$=INKEY$
1180 IF X$="O"THEN2210
1190 IF X$="N"THEN1220
1200 GOTO1170
1210 '***SMALL DRAWING BOARD***
1220 LINE(155,15)-(239,119),PSET
,BF
1230 '***INIT PROGRAM***
1240 PMODE 4,1:SCREEN1,1:RS=0:X1
=1:Y1=1:X2=15:Y2=33:X3=160:Y3=12
6:X4=157:Y4=17
1250 DIM M(21,26)
1260 DRAW "BM27,12;XLC$;XLO$;XLC
$;XLO$;XBK$;XLS$;XLC$;XLA$;XLL$;
XLE$;XLR$;"
1270 '***LARGE GRID***
1280 FORX=12 TO 132 STEP6
1290 LINE(X,28)-(X,180),PSET
1300 NEXT X
1310 FORY=30 TO 180 STEP6
1320 LINE(12,Y)-(135,Y),PSET
1330 NEXT Y
1340 '***NUMER LARGE GRID***
1350 DRAW "BM 11,27;XNO$(1);"
1360 DRAW "BM 36,27;XNO$(5);"
1370 DRAW "BM 59,26;XNO$(1);":DR
AW "BM 65,27;XNO$(0);"
1380 DRAW "BM 89,26;XNO$(1);":DR
AW "BM 96,27;XNO$(5);"
1390 DRAW "BM 119,26;XNO$(2);":D
RAW "BM 125,27;XNO$(0);"
1400 DRAW "BM 4,103;XLY$;"
1410 DRAW "BM 64,188;XLX$;"
1420 DRAW "BM 136,36;XNO$(1);"
1430 DRAW "BM 136,60;XNO$(5);"
1440 DRAW "BM 136,90;XNO$(10);"
1450 DRAW "BM 136,120;XNO$(15);"
1460 DRAW "BM 136,150;XNO$(20);"
1470 DRAW "BM 136,180;XNO$(25);"
1480 DRAW "BM 203,135;XLX$;":LIN
E(212,135)-(231,135),PSET
1490 DRAW "BM 203,145;XLY$;":LIN
E(212,145)-(231,145),PSET
1500 '***MOVE GRID***
1510 FORY=122 TO 154 STEP 8: LIN
E(156,Y)-(188,Y),PSET:NEXTY
1520 FOR X=156 TO 188 STEP 8:LIN
E(X,122)-(X,154),PSET:NEXTX:PAIN
T(X3,Y3):GOSUB1730:GOSUB1760:DRA
W "BM 175,166;XBK$;XLS$;XLE$;XLT
$;"
1530 '***COMMANDS***
1540 X$=INKEY$

```

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```

1550 J=JOYSTK(0):K=JOYSTK(1):P=P
EEK(65280)
1560 IF J=0 THEN X1=X1-1: X2=X2-
6: IF X1<=1 THEN X1=1: X2=15
1570 IF J=63 THEN X1=X1+1: X2=X2
+6: IF X1=>20 THEN X1=20: X2=129
1580 IF J=0 OR J=63 THEN GOSUB17
30
1590 IF K=0 THEN Y1=Y1-1: Y2=Y2-
6: IF Y1<=1 THEN Y1=1: Y2=33
1600 IF K=63 THEN Y1=Y1+1: Y2=Y2
+6: IF Y1=>25 THEN Y1=25: Y2=177
1610 IF K=0 OR K=63 THEN GOSUB17
60
1620 IF PPOINT(X2-2,Y2-2)=0 THEN
PSET(X2,Y2):PSET(X2-1,Y2):PSET(
X2+1,Y2):PSET(X2,Y2+1):PSET(X2,Y
2-1):PRESET(X2,Y2):PRESET(X2-1,Y
2):PRESET(X2+1,Y2):PRESET(X2,Y2+
1):PRESET(X2,Y2-1):GOTO 1640
1630 PRESET(X2,Y2):PRESET(X2-1,Y
2):PRESET(X2+1,Y2):PRESET(X2,Y2+
1):PRESET(X2,Y2-1):PSET(X2,Y2):P
SET(X2-1,Y2):PSET(X2+1,Y2):PSET(
X2,Y2-1):PSET(X2,Y2+1)
1640 IF P=126 AND RS=0 OR P=254
AND RS=0 THEN PRESET(X1+X4,Y1+Y4
):PAINT(X2,Y2):GOTO1540
1650 IF P=126 AND RS=1 OR P=254
AND RS=1 THEN PSET(X1+X4,Y1+Y4):
LINE(X2-2,Y2-2)-(X2+2,Y2+2),PRE
SET,BF:GOTO1540
1660 IFX$=""THEN1540
1670 IFX$="E"THEN LINE(174,156)-
(230,166),PRESET,BF:DRAW"BM175,1
66;XBK$;XLE$;XLN$;XLD$;":GOTO211
0
1680 IFX$="R"THEN SOUND1,1:RS=1:
LINE(174,156)-(230,166),PRESET,B
F:DRAW "BM 175,166;XLR$;XLE$;XLS
$;XLE$;XLT$;":GOTO1540
1690 IFX$="S"THEN SOUND1,1:RS=0:
LINE(174,156)-(230,166),PRESET,B
F:DRAW "BM 175,166;XBK$;XLS$;XLE
$;XLT$;":GOTO1540
1700 IF X$="M"THEN SOUND1,1:LINE
(174,156)-(230,166),PRESET,BF:DR
AW"BM175,166;XLM$;XLO$;XLV$;XLE$
;":GOSUB1800:GOTO1540
1710 GOTO1540
1720 '***POS. NUMBERS***
1730 LINE(209,123)-(234,134),PRE
SET,BF
1740 DRAW "BM213,133;XNO$(X1);"
1750 RETURN
1760 LINE(209,136)-(234,144),PRE

```

```

SET,BF
177Ø DRAW "BM213,143;XNO$(Y1);"
178Ø RETURN
179Ø ***LOC. ON MOVE SCREEN***
180Ø GOSUB229Ø
181Ø X$=INKEY$: IF X$=""GOTO 181
Ø
182Ø IF X$<>CHR$(1Ø) AND X$<>CHR
$(9) AND X$<>CHR$(8) AND X$<>CHR
$(94) AND X$<>"S" AND X$<>"R" TH
EN 181Ø
183Ø LINE(X3-3,Y3-3)-(X3+3,Y3+3)
,PRESET,BF
184Ø IF X$=CHR$(1Ø) THEN SOUND1,
1: GOSUB 229Ø: Y4=Y4+25: Y3=Y3+8
: IF Y4>92THEN Y4=92: Y3=15Ø: SO
UND1Ø,5
185Ø IF X$=CHR$(9) THEN SOUND1,1
: GOSUB 229Ø: X4=X4+2Ø: X3=X3+8:
IF X4>217THEN X4=217: X3=184: S
OUND1Ø,5
186Ø IF X$=CHR$(8) THEN SOUND1,1
: GOSUB 229Ø: X4=X4-2Ø: X3=X3-8:
IF X4<157THEN X4=157: X3=16Ø:SO
UND1Ø,5
187Ø IF X$=CHR$(94) THEN SOUND1,
1: GOSUB 229Ø:Y4=Y4-25: Y3=Y3-8:
IF Y4<17THEN Y4=17: Y3=126:SOUN
D1Ø,1
188Ø PAINT(X3,Y3)
189Ø IF X$="S" THEN SOUND1,1: GO
SUB229Ø: RS=Ø: LINE(174,156)-(23
Ø,166),PRESET,BF:GOSUB194Ø:DRAW
"BM175,166;XBK$;XLS$;XLE$;XLT$;"
:RETURN
190Ø IF X$="R"THENSOUND1,1: GOSU
B229Ø: RS=1:LINE(174,156)-(23Ø,1
66),PRESET,BF:GOSUB194Ø:DRAW "BM
175,166;XLR$;XLE$;XLS$;XLE$;XLT$
":RETURN
191Ø GOSUB229Ø
192Ø GOTO181Ø
193Ø '***SCAN SCREEN***
194Ø LINE(2Ø9,123)-(234,134),PRE
SET,BF
195Ø POKE 65495,Ø
196Ø XS=9:YS=27

```

```

197Ø FORI=1TO25:SY=I+Y4:YS=YS+6
198Ø LINE(2Ø9,136)-(234,144),PRE
SET,BF
199Ø DRAW "BM213,143;XNO$(I);"
200Ø FORN=1TO2Ø: SX=N+X4
201Ø XS=XS+6
202Ø LINE(2Ø9,123)-(234,134),PRE
SET,BF
203Ø DRAW "BM213,133;XNO$(N);"
204Ø A(N)=PPOINT(SX,SY)
205Ø IF A(N)=Ø THEN PAINT(XS,YS)
ELSE LINE(XS-2,YS-2)-(XS+2,YS+2
),PRESET,BF
206Ø NEXTN:XS=9:NEXTI
207Ø LINE(2Ø9,136)-(234,144),PRE
SET,BF:DRAW "BM213,143;XNO$(Y1);
"
208Ø LINE(2Ø9,123)-(234,134),PRE
SET,BF:DRAW "BM213,134;XNO$(X1);
"
209Ø POKE 65494,Ø
210Ø RETURN
211Ø LINE(1,1)-(256,14),PRESET,B
F:LINE(1,15)-(154,12Ø),PRESET,BF
:LINE(1,12Ø)-(256,192),PRESET,BF
212Ø FORI=1TO2ØØØ:NEXTI
213Ø CLS:PRINT:PRINT:PRINT:PRINT
"
SAVE GRAPHICS"
214Ø PRINT"
=====
"
215Ø PRINT"
DRAWINGS NAME
"
216Ø PRINT"
UP TO":PR
INT"
8 CHARACTERS"
217Ø PRINT:PRINT"
-----
--/DRW";
218Ø PRINT@294," ";:INPUTNA$
219Ø IF NA$="" THEN215Ø
220Ø SAVEM NA$+"/DRW",3584,9727,
3584:END
221Ø CLS:PRINT:PRINT:PRINT:PRINT
"
LOAD GRAPHICS"
222Ø PRINT"
=====
"
223Ø PRINT"
DRAWINGS NAME
"
224Ø PRINT"
UP TO":PR
INT"
8 CHARACTERS"
225Ø PRINT:PRINT"
-----
--/DRW";
226Ø PRINT@294," ";:INPUTNA$
227Ø IF NA$=""THEN223Ø
228Ø LOADM NA$+"/DRW":SCREEN1,1:
GOTO124Ø
229Ø GET(X4+1,Y4+1)-(X4+2Ø,Y4+25
),M,G
230Ø PUT(X4+1,Y4+1)-(X4+2Ø,Y4+25
),M,NOT
231Ø RETURN

```

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The Challenge Returns: Driller II Is a Thriller, Too

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred B. Scerbo at 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.

Let's face it. Sequels are a major part of our everyday life. We've had *Rocky VI*, *Psycho III* and *Polltergeist II*. If something works, we're tempted to try for a repeat of the success story. The "Wishing Well" is no exception. Some of the best programs on these pages have often been the inspiration for newer and better versions, or better yet, sequels. This month's "Wishing Well" offers a newly written sequel to a program that first appeared in these pages over three years ago: *Multi Math Driller*. So, here it is! The wait is over! You asked for it! The saga continues . . . *Multi Math Driller II*.

Fred Scerbo is a special needs instructor at the North Adams Public Schools in North Adams, Massachusetts. 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.

The Wish

The prime motivating force behind *Driller I* was a desire to counter the effects of the math software glut which had the "let's see how many aliens you can kill" approach. As a teacher, I have a bit of a problem with the idea that zapping, blasting and killing are the best ways to teach our youngsters. Not only that, but the novelty of zapping soon wears off and actually serves as a block to our learning efforts. As a student progresses, the game aspect of such software only slows down further progress.

Driller I took a different approach. Instead of a spaceship, we have a large oil rig ready to drill into the ground. Sitting above the drill was a multiplication problem. Running in an underground stream below the drill was a river of moving answers which, of course, included the correct response. When the correct answer ran under the drill, pressing the spacebar or the fire-button on the right joystick caused the drill bit to sink into the ground and detect the correct answer below it.

Sound different? It was, and I received very favorable responses from parents and teachers who found the program a welcome alternative to the violent software their youngsters were too often confronted with. To be per-

fectly honest, this sequel is a bit overdue. However, that is one of the problems that a column like this runs into trying to grant so many wishes. To my patient readers I offer my apologies. Better than that, however, *Driller II* is now a reality.

The Program

Driller II is designed to fit into a 16K Color BASIC CoCo and the MC-10 with the 20K expansion unit. To use the program in a 16K Extended CoCo, you will need to clear the graphics memory. You may do this in two ways: PCLEAR1 or POKE25,6:NEW.

Do not use this POKE if you are using a disk drive. Use the PCLEAR1 method instead. If you have 32K or 64K, you already have all the memory you need.

Driller II, like its companion program, uses CHR\$ graphics to give us an attractive nine-color screen. Since we do not need to use the Hi-Res graphics, using CHR\$ colors gives a much more dramatic effect. It also gives a much larger image since the largest number we will be working with is a two digit number.

The program contains a large number of DATA statements at the end of the listing. These must be keyed in exactly, since they form the basis for our enlarged letters and numbers displayed in

color. Notice that several lines have only a string of commas. Be sure to key these in just as you see them.

Several parts of the listing also use lowercase letters. Be sure to use the SHIFT/'0' to type these into your CoCo. They will appear as inversed letters on

your screen. The inverse video characters give us a nice effect. Use the SHIFT/'0' to return to normal again.

While the listing is similar to *Driller I*, the line arrangements are a bit different, so it is not likely that you could just alter that listing to create this one. I

have made the corrections for the joystick problem that some newer CoCo owners run into, so this program should work on all models. (The MC-10 version does not have the joystick option.

Naturally, I have designed this version to operate in much the same fashion

80	109	600	191
160	242	685	193
245	104	775	79
345	69	850	202
425	209	END	70
485	175		

The listing: DRILLER2

```

1 REM*****
2 REM*   MULTI MATH DRILLER 2 *
3 REM*   BY FRED B. SCERBO *
4 REM*   COPYRIGHT (C) 1986 *
5 REM*   6Ø HARDING AVENUE *
6 REM*   NORTH ADAMS, MA Ø1247 *
7 REM*****
1Ø CLSØ
15 CLEAR5ØØ
2Ø FOR ZZ=1TO96:BB$=BB$+CHR$(128
):NEXTZZ
25 BR=3Ø:YS=2Ø
3Ø REM IF MC-1Ø THEN MC=1536Ø
35 MC=Ø
4Ø DIM A(45,9),B(4,12)
45 FORI=2TO11:FORY=1TO9:READ A(I
,Y):NEXTY,I
5Ø FORI=19TO44:FORY=1TO9
55 READ A(I,Y)
6Ø NEXTY,I
65 FORI=1TO4:FORY=1TO12:READ B(I
,Y):NEXTY,I
7Ø FOR ZZ=ØTO31:PRINT@ZZ,CHR$(18
8);:NEXT ZZ:FOR ZZ=32ØTO351:PRIN
T@ZZ,CHR$(179);:NEXT ZZ:FORI=ØTO
21:SET(Ø,I,4):SET(63,I,4):NEXT
75 W$="MULTI":C=32:L=38:GOSUB545
:W$="MATH":C=16:L=136:GOSUB545:W
$="DRILLER":C=64:L=225:GOSUB545
8Ø FORI=57TO61:SET(I,14,5):SET(I
,18,5):NEXT:FORI=15TO17:SET(58,I
,5):SET(6Ø,I,5):NEXT
85 REM <SHIFT><Ø> FOR LOWERCASE
9Ø R$=CHR$(128):PRINT@417,"by"+R
$+"fred"+R$+"scerbo"+R$+R$+"copy
right";
95 POKE1467+MC,49:POKE1468+MC,57
:POKE1469+MC,56:POKE147Ø+MC,54
1ØØ GOSUB685:FORI=417TO48Ø:PRINT
@I,CHR$(128);:NEXTI
1Ø5 PRINT@353,"select"R$"speed"R
$"from"R$"fast"R$"to"R$"slow";:G
OSUB115
11Ø GOTO12Ø
115 W$="1 TO 9":C=112:L=422:GOSU
B545:RETURN
12Ø X$=INKEY$:IFX$=""THEN12Ø
125 X=ASC(X$):IFX<49THEN12Ø
13Ø IFX>57THEN12Ø
135 K=VAL(X$):DL=K*8
14Ø CLSØ:W$="SELECT":C=32:L=4:GO
SUB545:W$="DESIRED":C=48:L=98:GO
SUB545
145 W$="LEVELS":C=16:L=196:GOSUB
545:W$="FROM":C=64:L=296:GOSUB54
5:GOSUB115
15Ø X$=INKEY$:IFX$=""THEN15Ø
155 X=ASC(X$):IFX<49THEN15Ø
16Ø IFX>57THEN15Ø
165 K=VAL(X$)
17Ø CLSØ:W$="DO YOU":C=8Ø:L=5:GO
SUB545:W$="WANT THE":C=112:L=96:
GOSUB545:W$="LEVELS":L=196:C=64:
GOSUB545
175 W$="ASSORTED":C=32:L=288:GOS
UB545:W$="Y ":C=16:L=386:GOSUB54
5:W$="OR ":C=Ø:GOSUB545:W$="N ":
C=16:GOSUB545
18Ø PRINT@L+1,CHR$(19Ø);CHR$(188
)CHR$(191);:PRINT@L+33,CHR$(128)
CHR$(188)CHR$(188);:SET(54,28,4)
185 X$=INKEY$:IFX$="Y"THEN2ØØ
19Ø IFX$="N"THEN2Ø5
195 GOTO185
2ØØ AJ=1:GOTO2Ø5
2Ø5 CLSØ:GOSUB215
21Ø GOTO22Ø
215 W$="WHAT IS":C=16:L=3:GOSUB5
45:RETURN
22Ø FOR ZZ=416TO447:PRINT@ZZ,CHR
$(188);:NEXT ZZ:FOR ZZ=48ØTO51Ø:
PRINT@ZZ,CHR$(179);:NEXT ZZ
225 POKE1535+MC,179
23Ø E=29:F=34:FORG=1ØTO24STEP2
235 FORI=E TO F:SET(I,G,5):NEXTI
24Ø SET(E-1,G+1,6):SET(F+1,G+1,6
)
245 E=E-1:F=F+1:NEXTG
25Ø FORI=12TO26:SET(31,I,3):SET(
32,I,3):NEXTI
255 PRINT@1Ø8,"divided"R$"by";:F

```


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ion that the first one did. I have designed it so that the division problems have whole number answers.

Running The Program

On running *Driller II*, a title card not unlike the original comes up on the screen. Pressing the spacebar moves us to our choices. First, you must select the speed at which the answers run below the drill. One is the fastest while nine is the slowest.

Then you select the level of difficulty from one to nine. The number of the level corresponds to the division table presented. Next, you decide whether or not you want the levels assorted. An assortment at level nine will give problems all the way down to level one. This helps review previous levels.

Unlike other "Wishing Well" programs, *Driller I* and *II* both have a set number of problems that must be completed. In this case, the number of problems is 20 and is signified by the value YS in Line 25. The value of BR is the total number of tries at problems

until you get through the 20. You may alter these values in the the listing. Just be sure that BR is larger than YS.

When a problem appears, press the spacebar or right joystick firebutton the moment the problem is under the drill. If it goes past the drill, you may be marked wrong, so adjust the speed at the beginning to fit your needs. If the answer is wrong, you will be told to try again. If you take too long, the screen reminds you to think.

If your answer is correct, the screen displays a multi-colored CORRECT and reprints the problem and answer. Pressing the spacebar or joystick button advances you to the next problem.

If you get all the problems right, the oil well explodes in a colorful display. I think you'll like the effect. Users of *Driller I* would often try harder to get all the answers correct. It's a nice incentive.

MC-10 Modifications

Only two lines need to be changed to

make this program work on the MC-10. Change the value of MC from zero to 15360 in Line 35. Also, delete Line 345 since the joystick routine is not needed. Be sure to save the program before running it, since an error in one of the POKE values could crash the program and lock up your machine if you make a typo. That goes for CoCo users as well.

Conclusion

I hope that *Driller II* proves as valuable to you as *Driller I* was. In fact, if any of you have suggestions as to other "Wishing Well" programs which you would like to see expanded or revised or continued as this one was, drop me a line with your ideas. Those of you who haven't seen *Driller I* may want to request a back issue of September 1983. Who knows? Maybe someday I might put out a "Best of the Wishing Well" with some of those oldies all in one place. Let me know what you think. □

```
OR TP=1TO YS:NP=Ø:IF TR=>BR THEN
49Ø
26Ø F=RND(9):IF F=LN THEN26Ø
265 IF AJ=Ø THEN E=K
27Ø IF AJ=1 THEN E=RND(K)
275 FORLL=132TO196STEP32:PRINT@L
L,R$R$R$R$R$R$R$;:NEXTLL
28Ø E=E*F:F=E/F:E2=E
285 IFE<1ØTHEN3ØØ
29Ø EE$=STR$(E):E1=VAL(MID$(EE$,
2,1)):E2=VAL(RIGHT$(EE$,1))
295 I=E1+2:L=132:C=112:GOSUB635
3ØØ LN=F:I=E2+2:L=136:C=112:GOSU
B635:I=F+2:L=151:GOSUB635
3Ø5 AN=E/F:F$=STR$(AN)
31Ø FORI=1TO6:G=RND(9):H=RND(9):
H$=STR$(G*H):F$=F$+" "+H$:NEX
TI
315 J$=LEFT$(F$,32)
32Ø PRINT@448,J$;
325 L$=RIGHT$(J$,31):M$=LEFT$(J$
,1):J$=L$+M$
33Ø FORP=1TO DL:NEXTP:IFTR=>BR T
HEN49Ø
335 IFINKEY$=CHR$(32)THEN37Ø
34Ø REM IF MC-1Ø DELETE LINE345
345 POKE339,255:IFPEEK(339)=254T
HEN37Ø
35Ø NP=NP+1:IFNP=15ØTHEN36Ø
355 GOTO32Ø
36Ø PRINT@Ø,BB$;:W$="THINK":C=64
:L=6:GOSUB545:SOUND1,2:SOUND1,2:
SOUND1,2
365 GOTO32Ø
37Ø TR=TR+1:PRINT@431,CHR$(186)C
HR$(181);:PRINT@463,CHR$(138)CHR
$(133);
375 IF AN=VAL(MID$(J$,15,4))THEN
385
38Ø GOTO425
385 PRINT@Ø,BB$;
39Ø FORC=16TO112STEP32:W$="CORRE
CT":L=3:GOSUB545:SOUNDC+1,1:NEXT
C
395 L=Ø:PRINT@Ø,BB$;:IFE<1ØTHEN4
Ø5
4ØØ I=E1+2:L=Ø:C=48:GOSUB635
4Ø5 L=4:I=E2+2:C=48:GOSUB635:L=L
+4:FORI=15TO22:SET(I,2,6):NEXT:S
ET(18,Ø,6):SET(18,4,6):I=F+2:C=4
8:GOSUB635
41Ø W$=" IS":C=16:GOSUB545:W$=ST
R$(AN):C=32:GOSUB545
415 GOSUB685:PRINT@Ø,BB$;:GOSUB2
15:CR=CR+1:NEXT TP
42Ø GOTO445
425 PRINT@Ø,BB$;:W$="WRONG":C=64
:L=6:GOSUB545:SOUND2Ø,1:SOUND2,1
:SOUND2Ø,1:SOUND2,1
43Ø WR=WR+1:PRINT@Ø,BB$;:W$="TRY
":C=32:L=1Ø:GOSUB545:FORI=1TO3ØØ
:NEXT:PRINT@Ø,BB$;:W$="AGAIN"
435 C=96:L=6:GOSUB545:FORI=1TO3Ø
Ø:NEXT:PRINT@Ø,BB$;:GOSUB215:IF
NP>1ØØTHEN NP=Ø
44Ø GOTO32Ø
```

```

445 IFTR<>YS THEN49Ø
45Ø PRINT@Ø, BBS; :FOR JJ=448TO479
:PRINT@JJ, CHR$(159); :NEXTJJ
455 FORI=28TO1ØSTEP-1:SET(31, I, 2
):SET(32, I, 2):SOUND23Ø, 1:NEXTI:F
ORI=1TO7:SET(3Ø-I*2, 1Ø-I, 2)
46Ø SET(33+I*2, 1Ø-I, 2):SOUND23Ø,
1:NEXTI:SET(3Ø-I*2, 11-I, 2):SET(3
3+I*2, 11-I, 2)
465 FORI=1TO12:SET(13-I, 2+I*2, 2)
:SET(5Ø+I, 2+I*2, 2):SOUND23Ø, 1:NE
XTI:FORI=1TO2Ø:SOUNDRND(23Ø), 1:N
EXT
47Ø CLSØ:W$="YOU HIT":C=32:L=2:
GOSUB545:W$="PAYDIRT":C=64:L=98:
GOSUB545
475 W$="WITH A":C=48:L=196:GOSUB
545:W$="PERFECT":C=16:L=29Ø:GOSU
B545
48Ø W$="SCORE":C=112:L=39Ø:GOSUB
545
485 GOSUB685
49Ø CLSØ:W$="OUT OF":C=16:L=6:GO
SUB545:W$=STR$(TR)+" TRIES":C=48
:L=96:GOSUB545:W$="YOU HAD"
495 C=32:L=196:GOSUB545:W$=STR$(
WR):C=64:L=3Ø7-(LEN(W$)*3):GOSUB
545
5ØØ W$="MISSES":IF WR=1 THEN W$=
" MISS"
5Ø5 C=112:L=388:GOSUB545
51Ø IFINKEY$=CHR$(13)THEN52Ø
515 GOTO51Ø
52Ø PRINT@483, "press"R$"enter"R$
"for"R$"another"R$"try";
525 FORI=1TO1ØØØ:NEXT
53Ø IFINKEY$=CHR$(13)THEN54Ø
535 GOTO53Ø
54Ø RUN
545 P=LEN(W$):FORZ=1TOP:I=ASC(MI
D$(W$, Z, 1))-46
55Ø IFI=31THEN585
555 IFI=32THEN595

```

```

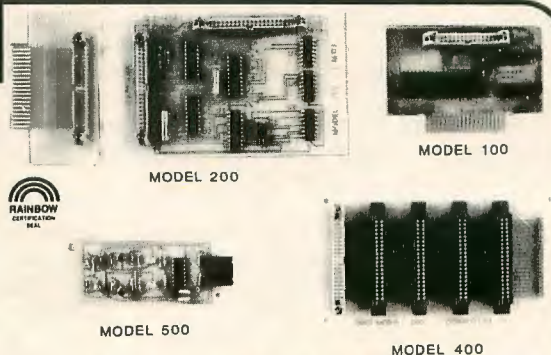
56Ø IFI=41THEN6Ø5
565 IFI=42THEN615
57Ø IFI=-14THEN625
575 GOSUB635
58Ø GOTO63Ø
585 I=1:GOSUB66Ø
59Ø GOTO63Ø
595 I=2:GOSUB66Ø
6ØØ GOTO63Ø
6Ø5 I=3:GOSUB66Ø
61Ø GOTO63Ø
615 I=4:GOSUB66Ø
62Ø GOTO63Ø
625 L=L+2
63Ø NEXT:RETURN
635 PRINT@Ø+L, CHR$(A(I, 1)+C) CHR$
(A(I, 2)+C) CHR$(A(I, 3)+C);
64Ø PRINT@32+L, CHR$(A(I, 4)+C) CHR
$(A(I, 5)+C) CHR$(A(I, 6)+C);
645 PRINT@64+L, CHR$(A(I, 7)+C) CHR
$(A(I, 8)+C) CHR$(A(I, 9)+C);
65Ø L=L+4:RETURN
655 GOTO655
66Ø PRINT@Ø+L, CHR$(B(I, 1)+C) CHR$
(B(I, 2)+C) CHR$(B(I, 3)+C) CHR$(B(I
, 4)+C);
665 PRINT@32+L, CHR$(B(I, 5)+C) CHR
$(B(I, 6)+C) CHR$(B(I, 7)+C) CHR$(B(
I, 8)+C);
67Ø PRINT@64+L, CHR$(B(I, 9)+C) CHR
$(B(I, 1Ø)+C) CHR$(B(I, 11)+C) CHR$(
B(I, 12)+C); :L=L+5:RETURN
675 PRINT@Q, CHR$(154); :PRINT@Q+3
Ø, CHR$(145) CHR$(128) CHR$(154) CHR
$(145);
68Ø PRINT@Q+63, CHR$(153) CHR$(155
) CHR$(152); :PRINT@Q+96, CHR$(152)
;:RETURN
685 FORI=1TO15ØØ:TU=RND(9999)
69Ø REM MC-1Ø DELETE LINE695
695 IFPEEK(339)=254THEN7Ø5
7ØØ IFINKEY$=""THENNEXT
7Ø5 RETURN

```

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71Ø DATA135,14Ø,139,143,128,143,
132,14Ø,136
715 DATA129,143,128,128,143,128,
132,14Ø,136
72Ø DATA142,14Ø,139,131,14Ø,129,
14Ø,14Ø,14Ø
725 DATA14Ø,14Ø,139,14Ø,14Ø,143,
14Ø,14Ø,136
73Ø DATA143,133,138,14Ø,141,142,
128,132,136
735 DATA143,14Ø,14Ø,14Ø,14Ø,143,
14Ø,14Ø,14Ø
74Ø DATA143,14Ø,14Ø,143,14Ø,143,
14Ø,14Ø,14Ø
745 DATA142,14Ø,143,128,135,136,
132,136,128
75Ø DATA143,14Ø,143,143,14Ø,143,
14Ø,14Ø,14Ø
755 DATA143,14Ø,143,14Ø,14Ø,143,
14Ø,14Ø,14Ø
76Ø DATA135,14Ø,139,143,14Ø,143,
14Ø,128,14Ø
765 DATA143,14Ø,139,143,14Ø,139,
14Ø,14Ø,136
77Ø DATA143,14Ø,14Ø,143,128,128,
14Ø,14Ø,14Ø
775 DATA143,14Ø,139,143,128,143,
14Ø,14Ø,136

78Ø DATA143,14Ø,14Ø,143,14Ø,14Ø,
14Ø,14Ø,14Ø
785 DATA143,14Ø,14Ø,143,14Ø,14Ø,
14Ø,128,128
79Ø DATA143,14Ø,14Ø,143,132,143,
14Ø,14Ø,14Ø
795 DATA143,128,143,143,14Ø,143,
14Ø,128,14Ø
8ØØ DATA132,143,136,128,143,128,
132,14Ø,136
8Ø5 DATA14Ø,141,142,128,133,138,
14Ø,14Ø,136
81Ø DATA143,129,142,143,141,13Ø,
14Ø,128,14Ø
815 DATA143,128,128,143,128,128,
14Ø,14Ø,14Ø
82Ø DATA,,,,,,,,,,,,,,,,,,,,,
825 DATA 143,14Ø,143,143,128,143
,14Ø,14Ø,14Ø
83Ø DATA143,14Ø,143,143,14Ø,14Ø,
14Ø,128,128
835 DATA143,14Ø,143,143,129,143,
14Ø,14Ø,142
84Ø DATA143,14Ø,143,143,141,13Ø,
14Ø,128,14Ø
845 DATA143,14Ø,14Ø,14Ø,14Ø,143,
14Ø,14Ø,14Ø
85Ø DATA14Ø,143,14Ø,128,143,128,
128,14Ø,128
855 DATA143,128,143,143,128,143,
14Ø,14Ø,14Ø
86Ø DATA139,128,135,141,131,142,
128,14Ø,128
865 DATA,,,,,,,,,,,,,,,,,,,,,
87Ø DATA139,128,135,132,143,136,
128,14Ø,128
875 DATA14Ø,14Ø,143,131,14Ø,128,
14Ø,14Ø,14Ø
88Ø DATA143,13Ø,129,143,143,132,
136,143,14Ø,128,128,14Ø
885 DATA143,139,128,143,143,132,
139,143,14Ø,128,132,14Ø
89Ø DATA143,128,128,143,143,134,
137,143,132,136,132,136
895 DATA141,13Ø,129,142,129,134,
137,13Ø,14Ø,128,128,14Ø

Submitting Material To Rainbow

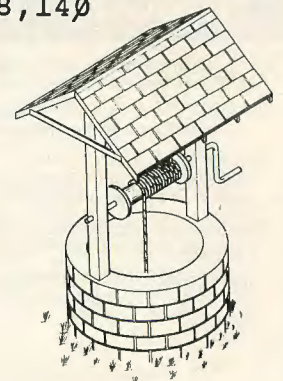
Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

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 a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.



Printer-Interface Package

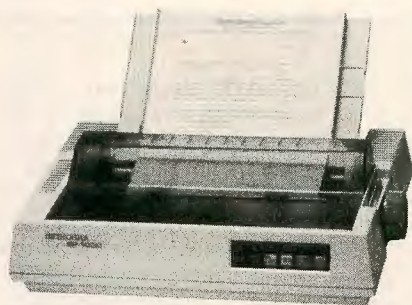
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- Standard 1.5K buffer.

Printout Sample

```

789 ; ; <=> ? @ ABCDEF
<=> ? @ ABCDEFGHIJKLM
789 ; ; <=> ? @ ABCDEFGHI
/0123456789 ; ; <=> ? @ ABCDEFGHI
789 ; ; <=> ? @ ABCDEF
<=> ? @ ABCDEFGHIJKLM
789 ; ; <=> ? @ ABCDEFGHI
EFGHIJKL
789 ; ; <=> ? @ ABCD EFGHIJKLNOPQ

```

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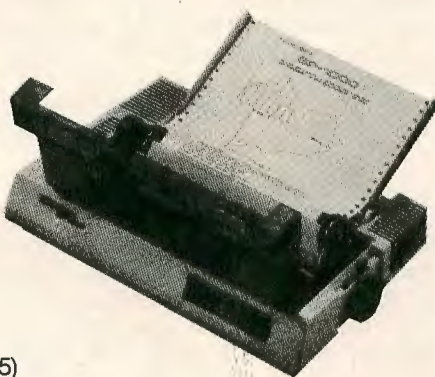
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Better to Leave EPROMs to Those in the Know

By Marty Goodman

• *I have been considering the Disto Super Controller and its associated EPROM Programmer. I do not know much about EPROMs or their applications. Can I put my existing software into EPROM? How do I install such EPROMs?*

Ricky Heavner
Miami, FL

In most cases EPROMs and EPROM programmers can only be fully used by folks who are familiar with the specifics of the Color Computer hardware and ROM software. It is possible to put commercial programs into EPROM, but a little tricky, and in most cases you gain little by doing so.

For more information, check the essay on EPROMs in the Hardware Hacking section of the CoCo SIG on Delphi.

• *The letters I, O, H, J, K, L, N and M have ceased to work on my old 64K 'F' board CoCo. Can you help me?*

Paul Grover
Plover, WI

These keys are all wired to Row 2 of the keyboard matrix layout. The most likely

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

cause of your problem is a broken trace on the plastic keyboard connector. Unfortunately, this is very difficult to repair; a replacement keyboard is needed in this case. It is also possible, though less likely, that the connection is broken on the motherboard, either where the keyboard connector socket is soldered in or somewhere between that and its connection to the 6822 keyboard PIA.

• *When my computer is turned on it reads EXTENDED COLOR BASIC 1.1. But when I type EXEC 41175, I get back COLOR BASIC 1.2. Which version do I have?*

I am considering purchasing a Tandy Disk Drive 0 Package with one drive in it. Can I later add another drive acquired from a source other than Radio Shack? Are there any makes or models of drives you would recommend?

Robert H. Ruggley
Heyworth, IL

Color Computers have their BASIC operating system installed in three separate pieces: The Color BASIC ROM, the Extended Color BASIC ROM, and the Disk BASIC ROM. When turned on, the computer displays the copyright and sign-on message associated with the highest level ROM (Color BASIC is the lowest, and Disk BASIC is the highest). Thus, your computer has Version 1.1 of the Extended BASIC ROM. When you type EXEC 41175 the computer shows the copyright and sign-on message in the Color BASIC ROM, a different part of the code. Thus, your computer's Color BASIC ROM is Version 1.2.

If you are referring to the current model Radio Shack Drive 0 package that has a one-half height drive in a full-height horizontal cabinet, then the answer is yes, you can add

any of a wide variety of makes of bare disk drives as a second drive, and have them both fit in the cabinet and work just fine as Drive 1. Depending on the exact brand of drive you buy, you may encounter minor problems configuring the drive to make it this it is Drive 1, or making the 34-pin connector reach to the circuit board of some model disk drives. Both of these problems are easily solved.

Nearly any 40-track capable, 5½ inch single- or double-sided drive should work fine. Brands I have had good experience with are TEAC model 54A single-sided or model 55B or 55BV double-sided, TE model 501 single-sided and model 50C double-sided, and double-sided Shugart Matshusita and Panasonic model 455.

Single-sided disk drives are no longer being made and will soon be unavailable.

• *My 16K Extended Color BASIC responds with 8487 when I type PRINT MEM. Why is this? How can I get the use of the full 16K?*

Harold Harmo
Riverside, CA

Although there is 16K of RAM in your computer, the BASIC operating system must use a considerable portion of it in order to function. This is why when you type PRINT MEM you are told that roughly half of the amount of memory is available for BASIC programs and data use. You can get more memory by typing PCLEAR 1, and still more by typing POKE 25,6:POKE &600,0:NEW.

• *Is there a POKE on the Color Computer to inverse the screen?*

Jesus Padilla
San Luis Potosi, Mexico

No. There is no simple way to generate reverse video with a software POKE. But there are software utilities available to do so.

How can I run my CoCo 2 off a 12 VDC power pack like one used for a VCR? How can I get a service manual for my CoCo 2? The local Radio Shack was unhelpful.

Francis Crosby
Romulus, NY

A comprehensive service manual is available for all models of CoCo 2. All Radio Shack stores should be able to order one for you. The CoCo 2 service manual is also available directly from Radio Shack National Parts. You can call them and ask for help, giving them the catalog number of your computer.

All models of CoCo 2 use pretty nearly the same power supply. They generate an unregulated +10 volts at about 1.2 amps, and an unregulated -10 volts at about .2 amps. These voltages are fed both to the SALT chip and the heat sunk pass transistor, and regulated to +5 volts using the regulation circuitry in the SALT chip. The -10 volts is used only inside the SALT chip and is required for the cassette port and relay to work and for the bit banger RS-232 port to work. Everything else works off just 5 volts

only. You can get the needed negative voltage using a small battery. A 9-volt alkaline battery should do. A more elaborate approach would be to get -10 volts out of the +12-volt battery using a switching DC to DC voltage inverter. You can get 10 volts by running the 12-volt battery through three or four diodes in series. Each diode produces a .5 to .6 volt drop.

immediately pointed out to me on Delphi, a PCLEAR 0 under Disk BASIC can easily be accomplished by typing:

POKE 25,14
POKE &HE00,0
NEW

CORRECTION

In the August "CoCo Consultations" column, I wrote some slightly misleading material regarding the PCLEAR 0 statement. While the expression PCLEAR 0 is not legal in BASIC, in Extended BASIC you can accomplish, in effect, a PCLEAR 0 (clearing all graphics pages from memory, freeing a maximum amount of RAM for BASIC programs) by typing:

POKE 25,6
POKE &H600,0
NEW

I implied that only a PCLEAR 1 was possible under Disk Extended BASIC. This was careless of me. For, as Art Flexser

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

For quicker response time, your questions may also be posted in the FORUM section of RAINBOW's CoCo SIG on Delphi. In FORUM, type ADD and address your questions to the username MARTYGOODMAN. Marty is on most every evening to respond to FORUM messages. Other CoCo SIG members may also reply to questions posted in this public message area. Please be sure to leave your name and address in any FORUM questions, since those of wide interest will be selected for publication in this column.

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*This program makes it easy to use
several different graphics programs
without all the extension changing hassle*

Picture File Extension Changer

By Jeff White

In recent years many new graphics programs have come on the market for the Color Computer, each with its own unique qualities. I find myself going from one to another quite often: using one program for drawing the basic outline of

Jeff White is a self-taught programmer and has had a CoCo for three years. He is president of the Carrollwood CoCo Club and owner of Merlin's Software. Jeff lives in Tampa, Florida.

the picture, another to paint it and yet another to edit my mistakes.

The problem with this is that they all use different extensions to load and save the files. It is a hassle to rename the file each time you go from one to another, particularly when you have a whole disk of files and each one must be renamed. I went to work to solve this problem and *Picture File Extension Changer* was the result.

This program changes individual file extensions or it can do an entire disk at once. It is menu driven and easy to use.

The first thing that appears when running the program is the title screen. I used *Maxcmp* to convert the file to ASCII so I could merge the file with the title. You are asked if you need instructions.

The main menu appears next and there are seven options to choose from. The most popular extensions are used for options one through six. Option seven allows you to enter whatever extension you want. After selecting one of the choices, you are asked whether you want to rename all of the files or

260	.....192	1260	.....136	1910	.....81
420	.....203	1360	.....133	1990	.....197
600	.....137	1520	.....213	2080	.....189
840	.....24	1640	.....3	2170	.....134
1070	.....178	1730	.....203	2260	.....182
		1820	.....195	END	.....126

Editor's Note: The following listing must be entered exactly as it appears in the magazine. To generate the underscore() use SHIFT-up arrow. To generate the backslash (\) use SHIFT-CLEAR.

The listing: EXTCHNGR

```

1Ø 'PICTURE FILE
   EXTENTION CHANGER
2Ø 'BY JEFF WHITE
3Ø '(C) 1986
4Ø '
5Ø '
6Ø 'MERLIN'S SOFTWARE
7Ø '13Ø4 FOUR SEASONS BLVD.
8Ø 'TAMPA, FLA. 33613
9Ø '(813) 971-4451
1ØØ B=3:CLS(B)
11Ø PMODE4,1
12Ø POKE179,1
13Ø PCLS

```


rename individual files. If you choose files, every file with that extension will be changed. Be careful when in this mode; if you are changing files with BIN extensions, all files with BIN extensions will be changed, not just picture files. Next, you are asked to enter the drive number of the disk you want to rename.

If you chose to rename all files earlier, it renames all selected extensions to the new extension. If you chose to rename individual files, a menu of all the files appears. Just enter the number next to the file you want to rename and it does it. When finished, press 'Q' to quit.

After quitting, you are asked if you

want to do another disk. If so, it returns to the main menu. If not, the program ends.

(Questions about this program may be directed to Mr. White at 1304 Four Seasons Blvd., Tampa, FL 33613. Please enclose an SASE when writing.) □

```

140 SCREEN1,1
150 GOSUB1510
160 FORT=1TO900:NEXTT
170 PMODE4,1:SCREEN1,1
180 FORI=1 TO 152:LINE(0,I)-(256
,I),PRESET:NEXT
190 A$=INKEY$:IF A$="" THEN 190
200 FORI=192 TO 152 STEP-1:LINE(
0,I)-(256,I),PRESET:NEXT
210 IF A$="Y" THEN 1240
220 CLEAR2000
230 B=3
240 DIM C$(11),PIC$(68)
250 CLS(B)
260 PRINT" picture file extention
n changer"
270 POKE1024,32:POKE1032,32:POKE
1037,32:POKE1047,32:POKE1055,32
280 PRINT@96,"1. RENAME <BIN> TO
<MAX>"
290 PRINT"2. RENAME <MAX> TO <BI
N>"
300 PRINT"3. RENAME <BIN> TO <PI
C>"
310 PRINT"4. RENAME <PIC> TO <BI
N>"
320 PRINT"5. RENAME <BIN> TO <PI
X>"
330 PRINT"6. RENAME <PIX> TO <BI
N>"
340 PRINT"7. RENAME <ANOTHER <EX
T>"
350 PRINT@185,"pick a";:PRINT@21
7,"number"
360 POKE1213,32
370 O$=INKEY$:IF O$="" THEN 370
380 IF O$="1" THEN OE$="BIN":NE$
="MAX"
390 IF O$="2" THEN OE$="MAX":NE$
="BIN"
400 IF O$="3" THEN OE$="BIN":NE$
="PIC"
410 IF O$="4" THEN OE$="PIC":NE$
="BIN"
420 IF O$="5" THEN OE$="BIN":NE$
="PIX"
430 IF O$="6" THEN OE$="PIX":NE$
="BIN"
440 IF O$="7" THEN PRINT@352,"";
:INPUT"OLD EXTENTION";OE$:PRINT@

```

```

352," " " :PRIN
T@352,"";:INPUT"NEW EXTENTION";N
E$
450 O=VAL(O$)
460 IF O<1 OR O>7 THEN 370
470 PRINT@352,"RENAME (1)ALL OR
(2) INDIVIDUAL?";
480 R$=INKEY$:IF R$="" THEN 480
490 IF R$="1" THEN A=1:GOTO520
500 IF R$="2" THEN A=2:GOTO520
510 GOTO480
520 PRINT@448," (ENTER
)= 0"
530 POKE1471,95
540 PRINT@416,"";:INPUT"ENTER DR
IVE NUMBER (0,1,2,3)";K
550 IF K<0 OR K>3 THEN 530
560 DRIVE K
570 CLS(B)
580 GOSUB800
590 'RENAME INDIVIDUAL FILES
600 PRINT@392,"enter the number"
;
610 PRINT@425,"of the picture";
620 POKE1425,32:POKE1421,32
630 POKE1448,32:POKE1451,32:POKE
1455,32:POKE1463,32
640 PRINT@456,"to be renamed";
650 POKE1482,32:POKE1485,32:POKE
1493,62
660 POKE1494,32:POKE1495,32
670 PRINT@488,"type (q) to quit"
;
680 POKE1516,32:POKE1517,60:POKE
1519,62:POKE1520,32:POKE1523,32
690 PRINT@470,"";:LINE INPUT"";F
$
700 FORT=1496TO1503:POKE T,62:NE
XT
710 IF F$="Q" THEN 1140
720 F=VAL(F$)
730 IF F<1 OR F>C THEN 660
740 CLS(B)
750 PRINT@192," ";PIC$(F);" IS
NOW BEING RENAMED"
760 P$=PIC$(F)+"/"+NE$
770 RENAME PIC$(F)+"/"+OE$ TO P$
780 GOSUB800
790 GOTO600
800 'GET FILE NAMES

```

```

810 FOR X = 3 TO 11
820 DSKI$ K,17,X,A$,B$
830 IF (LEFT$(A$,1)=CHR$(&HFF))
THEN 850
840 C$(X)=A$+LEFT$(B$,127):NEXT
X
850 X=X+1:C=1
860 FOR Y = 3 TO X:FOR Z=0 TO 7
870 IF MID$(C$(Y),Z*32+9,3)<>OE
$ THEN 920
880 PIC$(C)=MID$(C$(Y),Z*32+1,8)
890 L$=LEFT$(PIC$(C),1)
900 IF (L$=CHR$(0) OR L$=CHR$(&H
FF)) THEN 920
910 C=C+1
920 NEXT Z:NEXT Y
930 IF A=1 THEN GOSUB1030
940 C=C-1
950 IF C=0 THEN 1470
960 MID=INT(C/2)+1
970 CLS(B):TAB=1
980 FOR D = 1 TO C
990 PRINT@TAB,USING"###";D;:PRINT
".--> ";PIC$(D);
1000 TAB=TAB+32:IF D=MID THEN TA
B=16
1010 NEXT D
1020 RETURN
1030 'RENAME ALL FILES
1040 FORD=1 TO C-1
1050 IF C=1 THEN 1470
1060 PRINT@224,"<"+"OE$+"> FILES
NOW BEING RENAMED TO<"+"NE$+"> FI
LES."
1070 P$=PIC$(D)+"/"+"NE$
1080 RENAME PIC$(D)+"/"+"OE$ TO P
$
1090 NEXTD
1100 CLS
1110 DIR
1120 PRINT@384,"ALL <"+"OE$+"> FI
LES HAVE NOW BEEN RENAMED TO <
"+"NE$+"> FILES."
1130 GOTO1160
1140 CLS:DIR
1150 PRINT@384,"ALL SELECTED <"+"
OE$+"> FILES HAVE NOW BEEN CHA
NGED TO <"+"NE$+"> FILES."
1160 PRINT@448,"DO YOU WISH TO D
O ANOTHER DISK? (yes
/NO) ";
1170 FORT=1TO300:NEXT
1180 PRINT@448,"DO YOU WISH TO D
O ANOTHER DISK? (YES
/no) ";
1190 FORT=1TO300:NEXT
1200 A$=INKEY$:IF A$="" THEN1160
1210 IF A$="Y" THEN 220

```

```

1220 IF A$="N" THEN 1230 ELSE 12
00
1230 POKE113,0:EXEC40999
1240 'INSTRUCTIONS
1250 CLS(B)
1260 PRINT" INSTRUCTION
S ";
1270 PRINT" MANY NEW GRAPHIC PRO
GRAMS HAVE COME ON THE MARKET RE
CENTLY THATUSE EXTENTIONS OTHER
THAN THE STANDARD <BIN>. THERE
MAY BE ";
1280 PRINT"TIMES WHEN YOU WOULD
LIKE TO USEA FILE FROM ONE BUT I
T HAS TO BERENAMED BECAUSE OF TH
E EXTENTION";
1290 PRINT"DIFFERENCE. MANY TIME
S YOU MAY WISH TO WORK ON A FUL
L DISK OF FILES BUT YOU WOULD H
AVE TO GO ";
1300 PRINT"AND RENAME EVERYONE.
WELL THIS PROGRAM WILL HELP YOU
OUT. ";
1310 PRINT@448," PRESS SPACEBA
R TO CONTINUE ";
1320 EXEC44539
1330 CLS(B)
1340 PRINT" PICTURE FILE EXTENTI
ON CHANGER WILL CHANGE THOSE EXT
ENTIONS FORYOU. THE PROGRAM IS M
ENU DRIVEN AND VERY EASY TO USE.
YOU HAVE A";
1350 PRINT"CHOICE OF RENAMING AL
L OF THE FILES OR SOME OF THE
FILES. "
1360 PRINT" IF YOU CHOOSE TO REN
AME ALL THEFILES IT WILL CHANGE
EVERY <BIN>FILE ON THE DISK SO C
HECK TO MAKE SURE ALL THE FIL
ES ON THE DISK ARE PICTURES."
1370 PRINT:PRINT
1380 PRINT@448," PRESS SPACEBA
R TO CONTINUE "
1390 EXEC44539
1400 CLS(B)
1410 PRINT" IF YOU CHOOSE INDIVI
DUAL YOU CAN PICK WHICH ONES Y
OU WANT TO CHANGE. BASIC FILES A
RE IGNORED IN BOTH CASES."
1420 PRINT" THAT IS ABOUT ALL YO
U NEED TO KNOW. I HOPE THIS PRO
GRAM IS AS HANDY TO YOU HAS IT H
AS BEEN FORME."
1430 PRINT:PRINT:PRINT:PRINT:PRI
NT
1440 PRINT@448," PRESS SPACEBA
R TO CONTINUE "
1450 EXEC44539

```

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```

1460 GOTO 220
1470 CLS(B):DIR
1480 PRINT:PRINT"THE ARE NO <"
+OE$+"> FILES ON DISK"
1490 FORT=1TO4000:NEXT:GOTO220
1500 'TITLE PAGE DATA
1510 FOR X=&H7E00 TO &H7E95
1520 READ H$:POKE X,VAL("&H"+H$)
:NEXT
1530 DATA 9E,33,30,6,10,8E,5E,0,
86,8,A7,8C,3A,86,6,A7,8C,34
1540 DATA A6,80,80,30,48,48,48,5
9,6A,8C,29,27,E,6A,8C,25,26
1550 DATA F4,E7,A0,C6,8,E7,8C,1C
,20,EB,86,6,A7,8C,14,A6,80,26,A
1560 DATA A6,4,81,22,26,C,30,5,A
6,80,80,30,48,48,20,D9,0,0
1570 DATA 8E,5E,0,10,8E,E,0,A6,8
0,A7,8C,42,6F,8C,40,A6,80,A1,8C,
3A
1580 DATA 26,F,E6,80,A6,80,A7,A4
,8D,10,8D,1D,5A,26,F7,20,4,A7,A4
1590 DATA 8D,5,8D,12,27,E2,39,10
,8C,25,E0,24,4,31,A8,20,39,31,A9
1600 DATA E8,21,39,6D,8C,F,26,B,
10,8C,25,FF,26,3,6C,8C,4,1A,4,39
1610 READ Z:EXEC&H7E00
1620 RETURN
1630 DATA1
1640 "j^X40>ZB3nX40>XR3nX80>XIoo
cmo?cZ3OoloOcljPgojS0ljP[oo?Wbm^
C
1650 "Z1>cTi_ ;an?cZ1ooZ103Z8_oZ2
03Z60l0of1PIVMVI65oHF1TIVMWIV3o0
0
1660 "3Z30l00>X:onX4o^XOooc'>X5
0>X:ocl0?V5QHv1PI6EQ?000?nX7onX4
0
1670 "?ooo_cmoOclooooo?glo>XConX
80>XIo'o7ifLW00NAT9bNWQl7YRITHLL
0
1680 "0>X=o'000jP[o7'1l0020h?3'1>
3Ph<2'^;RHh?cloOgno_oon?SoookPP>
X
1690 "90>X:o'm78c<A6AUI6A4a8d<73
nX7onX40?n78?iSHF7Z16EQoP000jQ?oj
P
1700 "P0jQko0=n4a<QXLC5aFIR<3=10
0>X=o'000h>X41>X8n60H10?Z100LOWUg
K
1710 "f1_cTmoOcm3NGSL0031'D11PL
71'0l0@000>X;ooklnO_inOgmoOWkn?S
Z
1720 "2?oZ103ooglo?'20jPBa<ah0@>
XConX80>XKoo3di0'o30cZ2>'_9b0'jP
g
1730 "ojQ<0'20N0@000=k knoL?oomO
I_s'80o0oolg>c@Z60Kooi0000jP_o0

```

```

8
1740 "oZ19VKSH6AcP000jPsojP@0jPGo
?aoZ19l07cmojQ?ojPP0jQko?SPc=^K\
k
1750 "nc\k0I7P'0H?^X=o'0000P8420
QeT;Z1H@40024Q8@4onX40=b109RHn?S
m
1760 "oO]i<023klR69UShn7RHh?P000
3Z2ol07[>c\ijc\k<c7P10jPsojP@0o
n
1770 "2<W8b<[:b\;6bW831k^3PjQ3oj
PP0oon0_hb<jPK\k^gZ1Nb<_h20jPOo0
o
1780 "0L30H6oP00N28<n>01lnX=o'00
0210P80000410'<71'1?3al07ogZ1@00
7
1790 "fm_ccoZ1?l0?oooo';Z303Z2om
0729PK7KZ16Hl003Z2?oZ103oo'o?cl3
?
1800 "jPCHfLn001loOnX@onX80?oo0o
0<1^;cno_cIPk1l003oooZ13oZ1ooPbA
]
1810 "161SZ1UTHOP00jPgo000?3aloO
goZ3_mo7'1?7nX@oclo0NX90>X<onX;O
n
1820 "X9onX40>X5o'2<g<c<c8d6033Z
4ooZ203oon3\K60P<2@<70'<K6cZ1>b<
1830 "h20jPOoln?a>AVIjPKI67h00>X
=o'41jRci6@Ta@D7Z107Z8?oZ103Z10l
7
1840 "IfMWHNUaH@<7jQ?ojPP0jPOon>
?<f9Ra\K>c\IRL3'<P>>X4on7YbAQn61
S
1850 "Z1]WHf5m>@63Z3ool1NO[jn?Sn
o_khnoPh>Y7onX40?ool>O[jn;Rn_[jh
^
1860 "cPh>XConX80>X6ooh0hg0'4X;2
o_k2TS;RPPHOooo'm_K'17QbIVkvi^X4
m
1870 "QJF1Ql0@>X?ocl4hc4'<N?Z11W
a003ZAooZ103ooc0FQ<CTM3'L34ATL?3
o
1880 "o_cino;Z1?KbloWho?kooooZ20
3Z1?1?Cdo2l\;2jPK?'<ChL043oooZ1G
m
1890 "1LFI\C5QHFEUHC4'6PA0LjQ3o?
clo48J>QhJFY\H00>Y7onX40?ooOgmo0
7
1900 "c5bM7SaGP00?10Wal0?cmoOglo
?an07aoooooZ203Z1ol6iVIVjPIWHW0o
7
1910 "X30jPOoln4H34cVi_Kfi^a<6>0
1lnXCo'=c\c<'=3P'0@?ZAooZ103Z10l
0
1920 "nH^CX1N;1@00oon2<W8b<[:b\;
6bW831k^3PonX80>X7o'KTHF=QHNX4IF
7

```

193ø "aHD<ø2>X7on396g'H6>X6FAQnø
ø3Z8_olnø?gjPKcl?SZ=_oZ1ø3oh<kHf
1
194ø "Wi6ATH>EZDøø3oo'oZ2\n?3alo
OooZ2ø3Z1oløW;k6P83Z1Yn7i'L7jPoo
1
195ø "n?a>AVIjPKI67høø>XRocloø<L
<3ø'\C8Lø4>XQon68?eUI6AoHf=PHO'ø
ø
196ø "jPOojP@øogmn07gmo?cojP@oOo
oon?[bm>CXb=6AXj>7QnX5onX8ø>X7oo
1
197ø "763ø'H7mPH6<a>9n7'?3Z4ooZ1
7oZ9?lOcnX4Kln?3aoZ1Oolnø[jn?Sno
198ø "khnoShjQ3o8øbLS8'<jPC<Q'ø@
noShjPCojP@øool3lc<b<36'\;:d^82ø
o
199ø "gmn07emo?coooooloOcljPCojPP
øjPOo7hOWHc<cl'<3'a=S' 'L??nX7onX
;
200ø "o^Xho'clhoFiTH61WIdM73cZ4?
n3jPJc<g>c<b=3Q'lojPCojP@øjPGoø<
k
201ø "Fi\K6alHøø?ool^9'N5a>Ad=1B
8'>7^X4onX8ø>XIoo37V3lQHlO7jPG?a
f
202ø "MS<AR7'?3Z<ol?chnøQhb<S9b]
aPøøjQ3ol>OYjN7QjPGmnN;\h>3Z1?oZ
1
203ø "ø3Z10lø?69P?8I6?øøøool?chn
?jPNO7aoZ1?oZ2ø3oon3_hn?Z3O_Skn3
P
204ø "ool7hWøa4832jPON'Y8bL<øø>
Xfo'3SIF1Pj75Røø3Z3oo'l9n\ [8b?jP
B
205ø "<'øø?goZ1OoZ1ø3ooon79f3iH
f5QIFUaøø3oQj>AVLS<k>c\b=RAXH>7o
o
206ø "oojPPøooløoPL3<CP'9øcl3ø@P
<3lo?'o?3'ooo'm?clo?'<oOhL34jPK>
'
207ø "?<øø>Xfob49TN5S\lX<ø63Z3oo
løNL[2'>36'>C8lhøø>X7onX4ø>X5o'2
c
208ø "ah>3Rl^92lcZ4ooZ2ø3oofø\;2
øP<2C<g<c<jPK\S;nøP>X7ocllLRL_;b<
S
209ø "<bL_;bl?aøø3Z3OoZ;_cZ17cZ1
OcZ2oloø?T:øP3P1PHn>3\hN>X7onX4ø
>
210ø "X5o'øH6ATI>efHøø3Z4ooZ2ø3o
oo3Tc=c<c>X;kø'oøø3Z1olø08h61Phf
a
211ø "XH63Qkg'ø8jPgoøø3Z17X2o'8
2NWYjNø31øø;Z17X2o'82jPAjø_12ø^X
4
212ø "NP;oøP;Z17X2o^X7ø>X;o'møo\
;ø'?w1'Lo?S'lojPOojP@øoooo_'lnh
V

213ø "lPHVAh@ø4jQ?ojPPøjPOon>?<f
9R'_k2'\IRL3'<P>>X7ooQbAUm6A^X5M
Q
214ø "J67'øøjPgoøø3Z17X2o'82NWYj
>P83øøøø@61Pø<øøøø1PL7ø' 'øøøNg]i
N
215ø "ø;oøø1jNWQøjPTøjPcoOWam07c
Z2?kZ1ooZ1ø3oooøDU83VSXJ6UZK7øø3
Z
216ø "4ooZ2ø3Z1ol?'g<a6AWiø@7QRc
7QP'LojPOoøGS13PHVjPIflY1øø>X=o'
ø
217ø "øø61PHø3Pøø3Z17øø1øø'2øH1ø
øøø>?cbkmoOGfmbNo_hna\;a'øø1fL;ø
P
218ø "d>3'1øø'<øø>X<o'o>c\køa<cL
kLn>øø3Z1ooZ1ø3Z10mø7c4a<G6c7Pøø
j
219ø "Q?ojPPøjQkon>=<F5QIF4a7IVa
lh'H6<c7h?3Z2OoZ2'3Z1@4øøøø1PD4
I
220ø "ø'øøø;cOgmjiOooknc07Pølnoo
ooinIVQD<øgoocøø3Z3?1øAn][HfM['h
<
221ø "33R1PjPOojP@øjPGoø1VjW9RH6
1Pø@>XConX8ø>XNo'OP?1RHf9P'hø821
?
222ø "PL3<'Hhø47jPwoøøø821ø@8D52
Q8CZ1PPøøøP82øWnjP@ø^7Sh<37'1?[j
1
223ø " _9Pøø;JTøa<?3'133ø1øøøjP
ohøkZ1lSh6API6Q'ø@>X7onX4ø>X5o'3
7
224ø "c<c7d>S7øø3Z4ooZ2ø3Z7_oPSc
5PH<3o'<37HWøø3X3PjPgoøøøP@42øjP
@
225ø "øjP@23'826QXj>P;kjPDø>P;o'
X;Z17X2?'82NW[Z3ø3Z2omoøGRHV1PHf
A
226ø "PI6Qaø'>X7onX4ø>X5oan?C'n?
cln?3aoZ4ooZ2ø3Z7_112L?7Hf?Sø'>3
8
227ø "l>31al'jPgoøøø22QX2o'82jPA
jø_12ø^X4NP;oøP8J6SYjø_12ø^X4NP;
o
228ø "øP;Z17X2ønx8ø>X<o'loS8'<3>
'\;ø'hø87Z1ooZ1ø3ool2N8d<31^cXh>
7
229ø "YhN7Z4ooZ2ø3Z7_11>7b<øø3Z1
S1?c'1?jPgoøNX4N@7mø@7Z17T1o@41j
P
230ø "Aigod1øNX4N@7mø@7Z17T1o@41
NGUiL@7aø@5QPH41ø@7Z2ooQ2;mHF1PO
f
231ø "=-SI671øø>X7onX4ø?ooOnX6?go
Z6?oZ2ø3ZO_1?cdl?3clo1bM7Q'lojPO
o
232ø "jP@øjR;oPPøjY;'jP@øjR;'jP
@øY



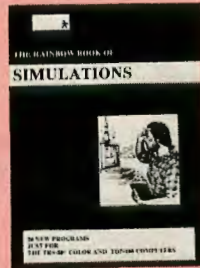
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We have compiled a list of Color Computer Clubs because of the many requests we have received. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs that 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 Falsoff Building
P.O. Box 385
Prospect, KY 40059**



ARIZONA

ucson Color Computer Club, Bill Nunn, 9631 E. Stella, Tucson, 85730, (602) 721-1085

CALIFORNIA

olor America Users Group, Mark Randall, 2227 Canyon Road, Arcadia, 91006, (818) 355-6111

os Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213, (213) 838-4293

California Computer Federation, (San Fernando Valley Chapter), Pete Ellison, 366 West Providencia Ave., Burbank, 91506, (818) 840-8902

California Computer Federation, (San Francisco Chapter), Art Murray, P.O. Box 7007, Redwood City, 94063, (415) 366-4560, BBS (415) 364-2658

The Davis CoCoNuts, Shneur Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

South Bay Color Computer Club, Patricia Scheffer, 1435 W. 172nd Street, Gardena, 90247, (213) 371-2016

South Bay Color Computer Club, Bill Tillerson, 73 Alamitos Ave., Suite 2, Long Beach, 90802, (213) 432-3037

Ventura County Color Computer Club (VC4), Doug McLaughlin, Oxnard Public Library, 214 South "C" Street, Oxnard, 93030, (805) 984-4636 or BBS (805) 484-491

Citrus Color Computer Club, Jack Brinker, P.O. Box 6991, San Bernadino, 92412, (714) 824-1866

South Bay Color Computer Users Group, John G. Say, 3117 Balmoral Drive, San Jose, 95132, (408) 923-2967

COLORADO

The ESCO Computer Club, David E. Schulz, 1299 Harrison Street, Denver, 80206, (303) 388-6988

DISTRICT OF COLUMBIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, Virginia 22193, (703) 690-2453

FLORIDA

Northwest Florida CoCo Nuts, Lee Gottcher, P.O. Box 1032, Fort Walton Beach, 32549, (904) 678-8894

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282

CoCo Chips Color Computer Club, 715 5th Avenue NE, Largo, 33540, (813) 581-7779

Broward County Color Computer Club, George Aloia, 2263 N.W. 65 Avenue, Margate, 33063, (305) 972-0975

South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609

Color-6809 Users Group, Emery Mandel, 4301 11th Avenue North, St. Petersburg, 33713-5207, (813) 323-3570, BBS (813) 321-0397

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33583, (813) 921-7510

GEORGIA

The Northeast Atlanta Color Computer Club, Joe Novosel, P.O. Box 450915, Atlanta, 30345, (404) 921-7418

Atlanta Color Computer Users Group, Terry E. Love, 5155 Maroney Mill Rd., Douglasville, GA 30134, (404) 949-5356

ILLINOIS

Illinois Color Computer Club of Elgin, Tony Podraza, 119 Adobe Circle, Carpentersville, 60110, (312) 428-3576

Northern Illinois Color Computer Club, Kenneth Trenchard, Sr., 6145 N. Sheridan Road 30, Chicago, 60660, (312) 973-5208

Willow-Works Club, Kevin L. Adair, 5753 S. Laffin, Chicago, 60636, (312) 737-5716

Peoria Color Computer Club, Harold E. Brazee, 102 Twin Oak Court, East Peoria, 61611, (309) 694-4703

Glenside Color Computer Club, Ed Hathaway, 8 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694

Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Chicago OS-9 Users Group, John Chasteen, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

INDIANA

Three Rivers Color Computer Club, R.R. 3, Box 269, Angola, 46703

CoCo Program Exchange, Erik Merz, 3307 Arrow Wood Dr., Fort Wayne, 46815, (219) 749-0294

Indy Color Computer Club, Kevin S. Jessup, Sr., P.O. Box 26521, Indianapolis, 46236, (317) 873-5808

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

IOWA

CoCo Questers, Scott Bellman, 2420 Salem Court, Bettendorf, 52722, (319) 359-7702

Metro Area Color Computer Club (MACCC), David E. Hansen, 3147 Avenue J, Council Bluffs, 51501, (712) 323-7867

Dubuque Tandy Users Group, Wesley Kullhem, 1995 Lombard, Dubuque, 52001, (319) 556-4137

KANSAS

KC CoCo Club, Gay Crawford, P.O. Box 11192, Kansas City, 66111, (913) 764-9413

Micro 80 Users Group, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Color Computer Club of Wichita, William Wales, 220 East Harry St., Lloyd Electronics, Wichita, 67220, (316) 685-9587, BBS (316) 685-8752

KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Hardburly, 41747, (606) 439-4209

LOCO-COCO, Jim Spillman, 2405 Woodmont Dr., Louisville, 40220, (502) 454-5331

LOUISIANA

Cajun CoCo Club, Rick Herbert, P.O. Box 671, Crowley, 70526, (318) 788-3148

MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenburg, 01462, (617) 582-6514

CLUB 6809, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

MICHIGAN

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

CCUG (Color Computer Users Group), Rich Van Manen, O-599 Lake Michigan Dr., Grand Rapids, 49504, (616) 453-8351

Grand Rapids Area Tandy Users Group, Robert M. Worth, Jr., 1726 Millbank S.E., Grand Rapids, 49508 (616) 245-9324

Greater Kalamazoo Color Computer Club, Jim Rix, 1835 Chevy Chase Blvd., Kalamazoo, 49008, (616) 344-7631

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

MISSISSIPPI

Singing River C.C. Club, Mark Welch, 3605 Vancleave Rd., # 118, Gautier, 39553, BBS (601) 875-8688

Gulf Coast Color Computer Assoc., Ed Keels, 22 Christy Cove, Gulfport, 39503, (601) 832-1210

CoCo Art Club, Joel Bunyard, Rt. 16, Box 11, 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 User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, 1610 N. Marlan, Springfield, 65803

NEBRASKA

Siouxland Color Computer Club, Alan Pedersen, 611 D Street, South Sioux City, 68776, (402) 494-2284

NEVADA

C.A.T. F.U.N., Paul A. Osborne, 201 Miners Road, Fallon, 89406, (702) 423-5789

NEW HAMPSHIRE

CoCo Nuts, Matthew Pietruszewicz, R.F.D. #1, Box 548, Pelham, 03076, (603) 635-7098

NEW JERSEY

West Orange CoCo Club, Gregg Favolora, 12 Blackburne Terrace, W. Orange, 07052, (201) 736-1748 (let ring 12 times)

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 4125, Albany, 12204, (518) 465-9793

Adirondack CoCo Club, (Greene County Chapter), Pete Chast, P.O. Box 61, Athens, 12015, (518) 945-1636

Adirondack CoCo Club (Glens Falls Chapter), Richard Mitchell, 39 Center St., Fort Edwards, 12828

Island Color Computer Club, Joseph Castelli, P.O. Box 901, Bellmore, 11710, BBS (516) 783-7506
Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (718) 763-4233, BBS (718) 837-2881

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 13357, (315) 895-7730

Rockland County Color Computer Users Group, Harold L. Laroff, P.O. Box 131, Monsey, 10952-0131, (914) 425-2274

Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 216, Olean, 14760, (716) 933-7488, BBS (716) 933-7489

The Rochester S-80 Computer Club, Inc., Gary Panepinto, P.O. Box 15476, Rochester, 14615, (716) 392-6133

New York Color Computer User Group, Carl Glovinsky, 15 Bolivar St., Staten Island, 10314, (718) 761-0268

NORTH CAROLINA

Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348

Raleigh Color Computer Club, David Roper, P.O. Box 680, Garner, 27529

OHIO

Central Ohio Color Computer Club, Jim Upperman, 5201 Wilcox Road, Amlin, 43002, (614) 876-1767

Color Computer Club, Inc., William Wills, P.O. Box 468, Canfield, 44406

Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Dr., Dayton, 45439, (513) 299-3060

Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

Greater Toledo Color Computer Club, William Paul Saba Sr., 3423 Cragmoor Ave., Toledo, 43614, (419) 385-9004

Tri-County Computer Users Group, William J. Loeffler, 2612 Dale Avenue, Rocky River, 44116, (216) 356-0779

Miami Valley CoCo Club, Tim Ellis, 1805 W. Parkway Dr., Piqua, 45356, (513) 773-2244

OKLAHOMA

Green Country Computer Association, Michael Keller, P.O. Box 2431, Tulsa, 74101, (918) 245-3456 (DATA)

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

Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616

Pittsburgh Color Group, Ralph Marting, P.O. Box 351, West Mifflin, 15122, (412) 823-7607

RHODE ISLAND

New England COCONUTS, P.O. Box 28106, North Station, Providence, 02908

SOUTH CAROLINA

LoCo CoCo Club, Larry Coyle, 4334 Flynn Dr., Charleston, 29405, (803) 747-0802

Midlands 80 Computer Club, Frank Eargle, P.O. Box 7594, Columbia, 29202, TBBS (803) 791-7389

Spartanburg County CoCo Club, Lawrence Easler, Jr., Rt. 1 Highway 221, Spartanburg, 29302, (803) 578-3120

TENNESSEE

Tri-Cities Computer Club, Gary Collins, P.O. Box 4506 CRS, Johnson City, 37602-4506, (615) 929-1862

Foothills Micro-Computer Club, Aaron Sentell, P.O. Box 1541, Maryville, 37801, (615) 982-4629

TEXAS

The San Antonio Color Computer Club, James Leatherman, 2430 Rawhide Lane, San Antonio, 78227

UTAH

Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032, BBS (801) 487-6787

VIRGINIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, 22193, (703) 690-2453

Central Virginia Color Computer Club, Roger Lee, Rt. 2 Box 175, Madison Heights, 24572

WASHINGTON

Northwest Computer Club, Larry Haines, East 2924 Liberty, Spokane, 99207, (509) 483-5547

Mount Rainier Color Computer Club, Ron Amos, 2450 Lenore Drive N., Tacoma, 98406, (206) 752-8735

WEST VIRGINIA

Mil-O-Bar Computer Club, Jim LeMaster, P.O. Box 130, Ona, 25545, (304) 743-4752 after 4 p.m.

Blennerhassett CoCo Club, David Greathouse, 1306 Wells Circle, Parkersburg, 26101

WISCONSIN

Southern Wisconsin CoCo Club, David C. Buehn, 24607 67th Street, Salem, 53168, (414) 843-3830

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) 439-5245

BRITISH COLUMBIA

Salmon Arm CoCo, David Coldwell, RR #4, Site 26 Comp. 13, Salmon Arm, V1E 4M4

MANITOBA

Winnipeg Micro-80 Users Group, Robert Black, 1755 King Edward St., Winnipeg, R2R 0M3, (204) 633-7196

NOVA SCOTIA

Halifax Dartmouth CoCo Users Group, Eugene Naugler, P.O. Box 572, Dartmouth, B2Y 3Y9

Colour Computer Halifax User Group (CoCo Hug), Paul A. Power, 6354 London St., Halifax, B3L 1X3, (902) 455-6341

ONTARIO

ESSA Color Computer Club, Albert L. Ley, 40 Perry Street, Barrie, L4N 2G3, (705) 728-9481

Kingston CoCo Club, Kenneth Bracey, 316 Westdale Ave., Apt. 4-C, Kingston, K7L 4S7, (613) 544-2806

K-W CoCo Club, P.O. Box 1291, Station C, Kitchener, N2G 4G8

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-7706

Niagara Regional CoCo Club, Gerry Chamberland, 6843 Cumberland Cr., Niagara Falls, L2H 2J9, (416) 357-3462

Ottawa 6809 Users Group, Norm Shoihet, 1497 Meadowbrook Road, Ottawa, K1B 5J9, (613) 741-1763

Sarnia Computer Users Group, J. Verdon, P.O. Box 1082, Sarnia, N7T 7K5, (519) 344-6985

QUEBEC

Club d'Ordinateur Couleur du Quebec, Inc., Centre de Loisirs St-Mathieu, 7110-8e Ave., St-Michel, Montreal, H2A 3C4, (514) 270-7507

Club ORCO-RS, Jacques Bedard, 33 Lisieres, St-Constant, P.Q., J0L 1X0, (514) 632-4311

Le Club Couleur du Nord, Gabriel Pigeon, C.P. 315, Barraute, P.Q., J0Y 1A0, (819) 734-2577

SASKATCHEWAN

Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, S7L 4H9, (306) 382-1459, BBS (306) 384-8040

FOREIGN

AUSTRALIA

Blacktown City TRS-80 Colour Computer Users

Group, Keith Gallagher, P.O. Box 264, Rivstone, New South Wales, 2765, (02) 627-4662

COCOPIUG, Harry Murphy, 8 Lois Court, Regeville, New South Wales, 2750

CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, 7005

ISRAEL

The First Color Computer Club of Israel, J. Yo Krinsky, Data Processing Division, 1 Ra' Street, Netanya, Israel, (053) 52277

MEXICO

Mexcoco Users Group, Sergio Waisser, Paseo de Soledad #120, Mexico City, D.F., 53920, phone 294-36-63

the NETHERLANDS

Color Computer Club Benelux, Jorgen te Giff Eikenlaan 1, 4641 GB Ossendrecht, the Netherlands

PERU

Piura Color Computer Club, Carlos Alvarez, B. 142, AV. Guillermo Irazola, J-6 URB. Miraflores, Castilla, Piura, Peru, phone (074) 327182

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, Kriekamp 27A, Hamburg 65, West Germany 200 FRG, phone (040) 536-36-76

new clubs

Editor:

CoCo clubs desiring to exchange public domain software with the Color America Users Group can contact Jack Eizenga, Dis Librarian, 3811 N. Foster Avenue, 91706. Call (818) 960-8010. At the present time we have 25 disks full of public domain software. We believe this to be one of the largest collections anywhere.

*Jack W. Eizenga,
Baldwin Park, CA*

• I would like to announce the beginning of the Fresno Color Computer Club (F.C.C.C.). For information, write to 607 E Magill, 93710.

*Mike Cycot
Fresno, CA*

• Is there anyone who lives in my area who would like to start a CoCo club? Write me at 8250 Dorothy Street, 91770.

*Tony Kwan
Rosemead, CA*

• I would like to announce a new CoCo club called the South Bay Color Computer Users Group. TBBS is running 11 various CoCo sub-boards with four separate up/download software bases. Members will receive a monthly newsletter which contains a BBS list, pokes page, news section with the latest happenings from CompuServe, Delphi and other branches of the CoCo world. We will be holding monthly meetings where members can access our program library. For more information call (408) 867-2823, Allan Schaffer; (408) 923-2967, John Say; or call our TBBS at (408) 253-6293.

*John Say
San Jose, CA*

I would like to announce the existence of the CoCo Cartel, a Color Computer users group. For more information, write to 4059 Cascadia Drive, 31904.

*Dennis Weldy
Columbus, GA*

Does anybody out there want to start a public domain software club? The club could include a directory of current public domain software that the club already has. This could be in the form of a newsletter. Its members could give and receive public domain software. The list could grow larger and larger with every contribution. This would really get the public domain software out in the open. Send suggestions to 1821 Malibu Drive, 83401.

*David Harris
Idaho Falls, ID*

Announcing the formation of the Willow-Works Club. If you're interested in joining, here is a \$10 entry fee. For more information, write to 5753 S. Laflin, 60636.

*Kevin L. Adair
Chicago, IL*

The Indy Color Computer Club meets the first and third Tuesdays of each month, 7 p.m., Cropsey Auditorium, Central Library, St. Clair at Pennsylvania, Indianapolis. Membership information may be obtained by calling Paul Chastain at (317) 545-2125, the I.C.C.C. Hotline BBS at (317) 873-5808 or by writing to I.C.C.C., P.O. Box 26521, Lawrence, IN 46226.

*Kevin S. Jessup, Sr.
Lawrence, IN*

The Color Computer Club of Wichita meets on the last Thursday of the month at 7 p.m., District 70 I.A.M. Lodge, 235 ByPass and Meridian. Write me at 220 East Harry Street, 67220 or call (316) 685-9587.

*William Wales
Wichita, KS*

The Red Stick CoCo Club is in operation. For information, write me at 3527 Hickorywood Avenue, 70807.

*Justin Young
Baton Rouge, LA*

We would like to announce the existence of the Tandy Computer Club located in the Portland area. For more information, please call (207) 854-2862, or write P.O. Box 428, 04092.

*Del Cargill
Westbrook, ME*

A VIP users group (for owners of VIP products), was recently formed. Interested persons can write me at Box 194, 01463. Hints, brief articles, letters, VIP database formats and CALC templates are gratefully received. There are no set dues, but contributions to defray the cost of copying and

mailing the quarterly newsletter are most welcome.

*John Ogasapian
Pepperell, MA*

Announcing the formation of a new CoCo club called the Williamsport Area Color Computer Club. Meets every third Wednesday of the month at 7 p.m. in the James V. Brown Library. If you have any questions contact me at (717) 322-9715 or send a message in the SIG on Delphi.

*Christian Ross
(CGR)
Williamsport, PA*

The New England COCONUTS meets at the Warwick Public Library at 600 Sandy Lane, usually on the fourth Thursday of the month from 7 to 9 p.m. The address is Box 28106, North Station, 02908. We ask that all inquiries include an SASE for a response.

*Robert J. Sullivan, Jr.
Providence, RI*

A few of my friends and I have decided to organize a CoCo club in Chattanooga. Write to me at 13809 Lillard Road, 37379 if you are interested.

*Bill Kroulek
Soddy, TN*

I would like to announce the formation of the Virginia CoCo Club (VACC). We meet once a month in the Fairfax County Library. We have many benefits to offer such as a newsletter, a public domain software library and we are currently working on obtaining discounts from major manufacturers in the CoCo community. For more information, contact me by calling (703) 347-4022 or writing to Rt. 3, Box 203F, 22186. I can also be reached on the Handy Tandy BBS, which has a private section and features for club members only at (703) 573-7282.

*Michael Saint
Warrenton, VA*

I am writing to let everyone know the new mailing address for the Vancouver Colour Computer Club is P.O. Box 76734, Postal Stn S, V5R 5S7.

*Don MacDonald
Vancouver, British Columbia*

The 6809E Users Group was recently started with a goal of fellowship and the sharing of experience and knowledge in the use of the Color Computer. A big part of the club is the information and programs from RAINBOW magazine. For information, write to 136 Lansdowne Street, E3N 2M7.

*Vance G. Anderson
Campbellton, New Brunswick*

I would like to announce to all CoCo users of Nova Scotia that the CoCo Co-Op is just starting out and wants to hear from you. We have games, hints, scores, clubs and

reviews. A newsletter full of contests, ideas, hints to games, everything brought by the readers. Will exchange newsletters with other clubs. For more information, write to me at P.O. Box 427, B0S 1C0.

*Michael Cress
Bridgetown, Nova Scotia*

The Sarnia Computer Users Group meets on the last Tuesday of the month at Alexander Mackenzie School. We have club disks and offer a newsletter. Anyone in the Sarnia area with a computer is invited to join. For more information, write me at 254½ Confederation Street, N7T 2A1.

*Norm Lamoureux
Sarnia, Ontario*

The Durham 80C Computer Club meetings are held at Durham College in Oshawa, Room B 305, 7 p.m., first Wednesday of each month. We've been in operation for four years. Write to P.O. Box 95, Whitby, Ontario, L1N 5R7 for more information.

*Durham 80C Computer Club
Whitby, Ontario*

The Club Micro-Ordinateur De Montreal-Nord has been in existence for six months. We teach BASIC language, assembly language and give many explanations on utilities programs. We meet every Saturday at Polyvalente Henri-Bourassa Local 101 from 1 to 4 p.m. For more information, write 12365 Boulevard Langelier #7, H1G 5X6 or call (514) 323-5958.

*Gardy Neptune
Montreal-Nord, Quebec*

I am pleased to announce the promotion of the Advance Color Club of Rio De Janeiro. Our club library can boast the ownership of over 700 CoCo programs and we are growing daily due to new submissions. At present we have 102 members. We welcome correspondence from other existing CoCo groups. Anyone wishing to find out what owning a CoCo is all about can send a self-addressed stamped envelope to:

*Pedro Napolitano Filho
Advance Color Club
Rau Humaita 104 Ap. 103 Botafogo
Rio De Janeiro, RJ CEP 22261, Brazil*

Announcing the existence of the Piura Color Computer Club in Peru. For information call (074) 327182 or write to me at:

*Carlos Alvarez
Piura Color Computer Club
Av. Guillermo Irazola
J-6 URB. Miraflores Castilla
Box #142
Piura, Peru*

Anyone interested in joining the Puerto Rico CoCo Club can write me at:

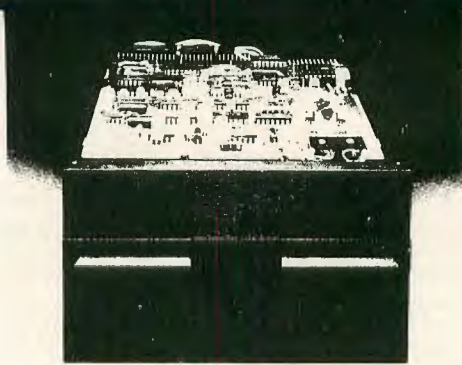
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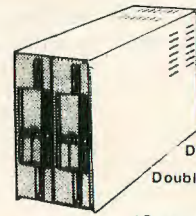
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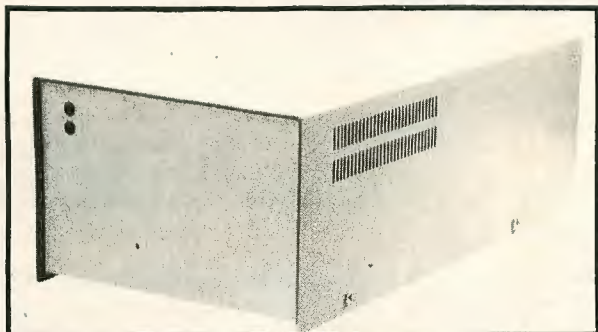
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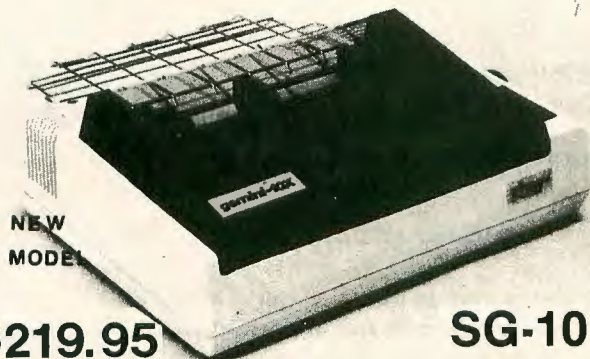
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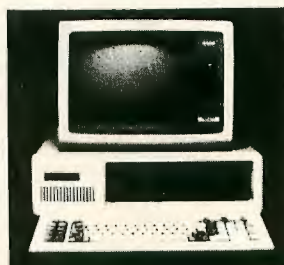
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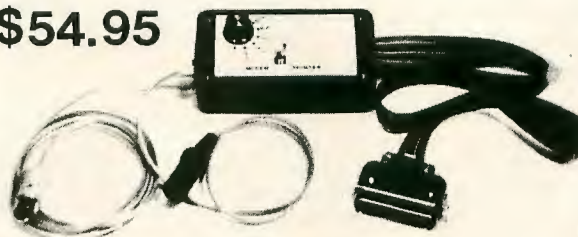
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No Time Like the Present

By Dan Downard
Rainbow Technical Editor

• I have a 64K 'E' Board CoCo and am planning to upgrade to 512K. Can I run OS-9 Level 2 on this upgraded system? Also, is it true that Motorola recently introduced a new VDG chip with the same pinouts as CoCo's present chip that performs all of the same functions but adds true lowercase and the rest of the ASCII character set?

John Farrar
Lebanon, TN

John, you couldn't have picked a better time to be interested in OS-9 Level II and 512K. We have a cure for your concern for the new VDG chip, too.

As you probably noticed in last month's RAINBOW, the new CoCo 3 has been released. It features 128K expandable to 512K; enhanced Extended Color BASIC; OS-9 Level II (additional cost); a new combination VDG and SAM chip (called a GIME); upper- and lowercase 32, 40 or 80 column text; 640 X 192 four-color graphics; 320 X 192 sixteen-color graphics; composite, RF and analog RGB outputs; a new keyboard; plus it's compatible with most of the software and hardware you now own.

I don't recommend any modifications to your existing CoCo because at \$219.95, it's more economical to just purchase a new CoCo.

I am not aware of software available for any of the current memory upgrades that will allow you to run OS-9 Level II. Even though a new VDG with lowercase is available, it is not pin-for-pin compatible with the old VDGs.

CoCo Compatible?

• I have just acquired a Commodore 1902 Video Monitor. It has three switches: Composite, RGB and SEP. If I buy the Universal

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

Video Driver and change the monitor switch to Composite, will this monitor work for the CoCo 2?

David Lindberg
Cooperstown, NY

Your Commodore 1902 will work fine with a CoCo 2, David. You will need a video driver for the CoCo; the one you mentioned should work fine. You are also correct in setting the switch to composite.

Ed Ellers informed me that the SEP position on the switch is for use with Commodore computers. They use a separate composite signal for the color information, so SEP stands for separate color signal.

No Dice

• I have an old 16K Extended BASIC Color Computer. Decimal memory locations 16384 through 32767 (hexadecimal 4000 through 7FFF) are described as "not used." Is there any way I can use this wasted space for program and variable storage? I would like to know this because it sure would prevent a substantial amount of OM Errors. Thank you very much.

Charles M. Murphy
New Hartford, NY

Sorry, Charlie! With only 16K of RAM you can't use memory locations above 16383 (\$3FFF). With a 64K upgrade the addresses you mentioned will be at your disposal.

OS-9 Not Needed

• I have a 64K CoCo with two drives and a Gemini 10X printer. A friend of mine purchased a second-hand MC-10. He asked me to type in the program you wrote for the October 1983 RAINBOW. This was to convert the CoCo's programs to MC-10 BASIC..

This program is for OS-9, which I do not have. Is there any program I can get that will convert CoCo's programs to work on his MC-10?

When I type this MC10CONV program I get SN Errors, since I do not have OS-9.

Evidently this machine was not popular and does not have its own software source.

Donice Chero
Pittsburgh, P.

You don't need OS-9 to assemble the program you mentioned, Donice. It just happened that we used the Microwave assembler in the Motorola compatible mode to generate the object code for this program. It seemed like the thing to do since OS-9 has just been released for the CoCo. I hope I didn't confuse too many people.

If you don't want to fool around with an assembler, let me suggest buying a copy of RAINBOW ON TAPE.

Don't Sweat It

• I have formatted the other side of single sided disks. My local computer store manager tells me that when I run my disks on the other side, they are internally rotating in the opposite direction than was intended and in doing so I am redispersing any dust captured by the felt cloth and possibly damaging my disk drives. Is this correct or is it safe to continue with the process?

Armando Marin Aria
San Juan, PR

Armando, it sounds as if your local supplier is a true purist. He is correct; the disks do rotate in the opposite direction. I wouldn't worry about it, though. You can actually buy commercial diskettes that already have the write protect notches and timing holes for dual-sided operation, so evidently the disk manufacturers feel that it's OK.

Cursory Inspection

• Is there a CHR\$ or POKE to turn the cursor off and on in my CoCo?

I used to be able to do this on a TRS-80 Model II by using PRINT CHR\$(2) for off and PRINT CHR\$(1) for on. Those same statements don't seem to work on my CoCo.

Dorothy Witt
Indianapolis, IN

There are no routines to turn the cursor on or off in Extended BASIC, Dorothy. If you ave 64K, and first run a program such as ?OMRAM to get to the 64K mode, you can isable the cursor with POKE&HA199,&H39 or POKE41369,57). To restore the cursor, ypePOKE&HA199,&HA (or POKE41369,10).

way I can fix this problem and get the true 100 character per second print rate from my printer?

Melvin A. Halpern
Charlotte, NC

The only thing I would suggest, Melvin, is that you set the BOTEK interface at 9600 Baud and POKE150,1. This fills up the buffer as fast as possible. It appears you can't print and fill the buffer at the same time. If this is the case, you may try disabling your buffer. If anyone has suggestions, please write.

and receiver, write me. My address is 10153 Parkview Dr. #8, 22110. Thank you.

Jerry Rossano
Manassas, VA

Jerry, when using OS-9 the ROMs, or EPROMs in your case, are disabled and you are in the 64K mode. When first turning on your computer some kind of operating system has to be there, or the microprocessor won't know what to do. You also need some type of boot program to tell the computer to jump to OS-9. A BASIC program that does this is included in the OS-9 package.

Printer Problems

I have a Gemini 10 printer (not the 10X). I have connected it to CoCo with a BOTEK Serial interface and do a lot of word processing using Telewriter 64. The system works fine except that if I try to print out a long ext the printer is excruciatingly slow. Instead of 100 characters per second, it prints at a rate of only two lines every 14 seconds or about 10 characters per second. This rate continues until the last 40 or so lines of text are reached after which the printer prints rapidly and continuously until the end of the text.

The Gemini 10 has a built-in 2.3K buffer which may be causing this problem. I like all the good features of my system and do not want to buy a new printer. Is there any

Who's In Control?

Does it matter what operating system you have before you run OS-9? I would like to get Cooking With CoCo on an EPROM, so when the computer is turned on, it automatically runs the BASIC file called AUTO-EXEC.BAS which in turn would boot OS-9 by running *.BAS. Is this possible or would that EPROM interfere with OS-9?

Is it possible to put another Multipak on the system by plugging another one into the already existing one with a ribbon cable?

Anyone out there interested in a "real" remote keyboard with infrared transmitter

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**KISSABLE OS-9**

Getting Revved Up For Fall Fun

By Dale L. Puckett
Rainbow Contributing Editor

Stand by for excitement! Sources confirm that the new Color Computer runs OS-9 Level II. Another OS-9 user who has seen the machine reported that its graphics capability is somewhere between the Atari ST-512 and the Commodore Amiga. Graphics programs running on both of these machines look super, so we are in for a real treat. I can hardly wait for all the details. While we're waiting, I'll give a review of OS-9 memory management schemes.

Much of the power of the new Color Computer will be made possible by Microware's OS-9 6809 Level II Operating System. On the surface, the casual

user who only runs commercial programs probably won't notice much difference between OS-9 Level I and OS-9 Level II. Users who must deal with large data files in memory or programmers who want to run two or three tasks at a time through an OS-9 pipeline will notice a tremendous improvement.

Most of the problems we have run into with OS-9 on the original Color Computer are caused by the limited amount of memory available in the 64K of memory addressed directly by the 6809 microprocessor. While it's true that OS-9 based computers exist that use only 4K of ROM and 2K of RAM, these small computers are really controllers. Essentially, they run the same small machine code program forever, monitoring external real world conditions in real time, opening and closing the valves and switches that keep a manufacturing process on track.

If you write all of your OS-9 programs in assembly language, you can get by with as little as 24K of workspace. Higher level languages like BASIC09 require at least 40K. Essentially, OS-9 Level I was designed for use on computers being used by one person. Most Level I machines contain 4K of ROM and 60K of RAM. The Color Computer

uses 64K of RAM. It gets the information that is normally stored in ROM from Track 34 of an OS-9 boot disk. Level I machines can only address 64K of memory.

OS-9 Level II computers use memory management hardware that allows the 6809 microprocessor to address more than 64K of memory. Most of them use a chip called a DAT (Dynamic Address Translator). This chip moves memory in and out of the 64K address space used by the 6809. Most DAT chips switch 4K blocks of memory in and out of the 6809's workspace. In the past several years however, several large scale integration (LSI) chips have been released. These chips often switch the memory in and out of the 6809's 64K block in 2K increments.

The random access memory in your Color Computer can hold either data or programs. If you could peek into your computer's memory while it is running, you would see the names of a number of modules at the top of the 6809's 64K workspace. At the bottom of the workspace you would see a lot of temporary data being used by the programs stored in those modules. In the middle, you would find a bit of free memory to run additional programs.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide and co-author, with Peter Dibble, of The Official Rainbow Guide to OS-9, is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.

When you load a new OS-9 program module it is placed at the top of the available memory space. When you run that program, it will use the first memory at the bottom of the available memory space. The amount of memory required by each program is stored in the program's module header.

If you have worked with computers or a while, you have probably come to realize that you can never have too much memory. OS-9 designers knew this and threw in a lot of features to help manage this important resource. OS-9 requires that all programs be reentrant. A program that is reentrant can be used by more than one person or process at the same time.

For example, two users may want to run a BASIC09 program at the same time. Many older operating systems would require that two copies of BASIC09 be loaded into memory to make it possible. But, since BASIC09 is reentrant, both users can use the same copy of it. In this example, we have saved more than 22K of memory — a large chunk in a 64K computer.

Despite OS-9's built-in memory saving features, we have all run into a problem called memory fragmentation.

On an OS-9 Level I computer, fragmentation can be a serious problem. On Level II computers the problem goes away — almost.

Memory fragmentation becomes a problem when the available free memory is broken up into so many little pieces that OS-9 can't find enough memory in one contiguous block to load another program module or assign data memory to a running process. A process, by the way, is a program that is running.

An operating system that permits more than one program to run at the same time needs a way to divide the system's memory between programs. Earlier operating systems like CP/M, FLEX and PC-DOS didn't bother to manage their memory; they didn't allow more than one program to run at a time.

OS-9 Level I uses a first-fit allocation scheme to manage its memory. This means that when you attempt to load a program module or run a program, OS-9 assigns the first block of memory big enough to hold your module or meet the data requirement of your program. It assigns as much of this first free block of memory as the module needs and remembers that the rest of the block is

available as a smaller block. The main disadvantage of this approach is it uses big blocks of memory and leaves a lot of small blocks that can only be used to hold small program modules or satisfy small memory requests.

If you want to watch OS-9's memory allocation in action on your Color Computer you can use the Mdir, Mfree and Sleep utilities to study the process. Start by experimenting with the example given on pages 302 to 306 of *The Complete Rainbow Guide to OS-9*.

The only way to de-fragment memory is to kill some of the processes running so they release the memory they are using. After killing them, you can restart them. When they are restarted, they will be assigned memory at both ends of the available memory space, leaving a larger chunk of memory free in the middle.

Memory fragmentation becomes a problem when the available free memory is broken up into so many little pieces that OS-9 can't find enough memory in one contiguous block to load another program module or assign data memory to a running process. A process, by the way, is a program that is running.

68020 - 68020 - 68020

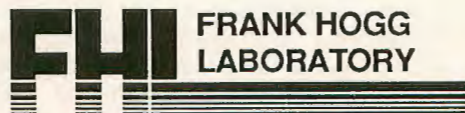
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Fragmentation can take place in the data storage area at the bottom of available memory or in the module storage area at the top of memory. You will most often run into fragmentation in the data memory area when starting a lot of processes. This happens because each process has been assigned some

“Memory fragmentation is caused by changing memory demands.”

space for data. If you terminate a medium-aged process first you will wind up with a small chunk of available memory in between the data memory used by the oldest and youngest running processes.

As you will see when you experience the long-awaited new Color Computer, life is much easier with OS-9 Level II. And the most important advantage revolves around the way Level II systems manage their memory. Level II systems use Dynamic Address Translation hardware that gives the system a way to use lots of memory — even though the 6809 microprocessor can only address 64K.

OS-9 Level II lets each process run in its own 64K memory address space, isolated from all other processes that may be running on the system. This means that if you want to run a 4K sort program, you could request up to 60K of data memory for that process. In other words, the program module and the data area it uses must fit in a 64K space. The OS-9 system code which includes all device descriptors and drivers, file managers, etc., is running in its own 64K space independent of the workspace you are using. The end result for the average user is that OS-9 Level II will appear to be much easier to use.

A Gold Mine of Helpful Tips

We all seem to run into these same problems at one point or other in our OS-9 career. For example, Fred Swatelle of Huntsville, Texas recently sent us a number of interesting observations and some tips that are a real gold mine for beginners. We featured his sound-generating programs last April.

Swatelle wanted to save space on the system disk he uses with the OS-9 assembler so he used his editor to trim

down the files in the Defs directory. Remember, if you try these tricks you should work only with a copy of the original system disk.

Before Swatelle edited the files on his disk, he listed the files to the printer so he would have a hard copy to work from. To do this he had to delete the OPT -L directives in the files. Additionally, he had to add the following lines at the beginning of the Rbfdefs and Scfdefs files.

```
i fp1
use /d0/defs/os9defs
endc
```

After you have followed the example, assemble the three files and redirect the listing to your printer.

```
OS9: asm/d0/defs/os9defs
L >/p <CR>
```

Then, using the printed listing and a good editor, you can remove all comments from the code, as well as any unnecessary assembler directives. For example, Pag directives and blank lines may both be deleted. A text editor which displays the carriage returns is the best tool for the job because it makes it easy to delete strings of blank spaces. After you have finished, keep these bare bones files in your Defs directory and keep the hard copy listing as a reference manual. And if you have a few moments of spare time, use it to study the OS9Defs files. You will really be surprised at the information in these files.

Here's an example of one man's improvement being another man's obstacle. Swatelle tried out the new OS-9 Version 2.00.00 Dump utility and decided he didn't like it. The new version automatically configures the format of its output to the column width stored in the device descriptor being used. For example, if you type:

```
OS9: dump >/p <CR>
```

OS-9 checks the device descriptor, /p, and learns that your printer is 80 columns wide. It then formats its output accordingly. However, if you redirect the output of the Dump utility to a file, you will find it stored on your disk in the old 32-column format.

Swatelle wanted to be able to use the manual width control parameters available in the original Dump, so he deleted the new Dump and copied the old version from his Version 1.01 disk to his system disk.

If you own *DeskMate* but have not yet purchased your copy of OS-9 Version 2.00.00, you can use the module in the *DeskMate* system disk with the OS9Gen utility command from your original Version 1.01 system disks to make new system disks that use the Version 2.00.00 kernel. This will give you some of the new features like repeating keys, etc.

If you do have your copy of OS-9 Version 2.00, here's another tip from Swatelle. He says that after he modified the modules that came with Version 2.00.00 to match his hardware, he saved them in place of the original copy in the Modules directory of his backup copy of the Config disk. For example, after using Xmode and TunePort on the device descriptor for the printer device descriptor, /p, Swatelle deleted the copy on his working Config disk and saved the new version in a file named p.dd.

Again, remember you must only make these changes on a working copy of your Config disk. In fact, you should always make a working copy of all your OS-9 software immediately and store the original, unmodified disks in a safe place — just in case something happens to your working copy.

If you just moved to OS-9 and have not yet purchased an OS-9 disassembler, never fear. If you have been using Disk BASIC for a while and own Roger Schrag's *Super-Patched EDTASM*, you can use it to disassemble OS-9 code too. First, boot OS-9 and load the modules you want to disassemble. Then, run the Mdir e utility to find where they are stored in memory. Finally, without turning off your Color Computer, run *SPEDTASM*.

You will need to do some translation manually, since this Disk BASIC based disassembler won't recognize that an SWI2 interrupt is an OS-9 system call. You'll also need to look up the value of the byte following each SWI2 in the OS-9 technical information manual to find out which system call it is.

If you have swapped system disks or changed execution directories since you first booted OS-9 and you want to return to the original system disk booted from, just use the CLEAR/BREAK keys to terminate the current Shell. When you do this, SysGo starts a new Shell that uses the original execution and data directories.

Parallel Driver Patch for Disto

If you are using one of the earlier versions of the parallel driver for Tony

DiStefano's fantastic Disto PPrint hardware and have an older printer, you may be wondering about the Device Not Ready Error that keeps popping up. The delay loop that waits for the printer to signal it is ready to accept more characters did not allow enough time for some of the slower hardwares.

To solve the problem, run the OS-9 Debug utility and execute the following steps:

```
LParallel
.<SPACEBAR>.+4C
=20
Q
```

The original value at an offset of 4C Hex from the beginning of the Parallel module is 26, the Hex code for Branch If Not Equal (BNE). This patch changes it to a 20, the code for Branch Always (BRA). This causes the driver to skip the Device Not Ready trap. Be cautioned however, that it will cause your system to wait for the printer forever if it happens to be offline. After you make the patch above you can save the module Parallel into a temporary disk file and then verify if into a permanent file using the Verify utility's update CRC parameter.

```
OS9: save temp.Parallel
Parallel
OS9: verify <temp.Parallel>Fixed.Parallel u
```

After making the patch and executing the two command lines you will be able to load the new drivers. You could also OS9Gen the Fixed.Parallel driver into your OS-9 boot file if you want to take the time.

And, from what I see, DiStefano is still at it — designing better hardware

for our Color Computers. The latest idea is the queue, a keyboard adapter that will convert the standard CoCo keyboard into parallel ASCII. The device will be buffered and interrupt driven, and will support auto-repeat.

Multi-Tasking in Action

If you use a computer at work that lets you use desk accessories, you'll enjoy this tip from Pete Lyall. He runs *DynaStar* concurrently with the *XCom9* terminal program available from the OS-9 Users Group Software Library, or its author Greg Morse.

"Because of XCom's size — 5K for program, 2K for data — I am able to use *DynaStar* to edit a file while still online with *XCom9*. Try that with CoCo DOS!" Lyall said. "*XCom9* is a simple, no fancy stuff, freeware terminal. If accustomed to a terminal program that 'takes over' your system and gives you menu control, it may seem a little sparse at first. But once you get used to it, you will appreciate the fact that it is designed not to interfere with other programs running concurrently. It allows file capture and transmission as well as Xmodem file transfer."

Jonathan Cluts, a former Tandy employee, added that he had run Sled, a full-screen editor in memory with *XCom9*. "I have also downloaded a file, called up a new Shell, started that file printing and then gone on to download another file," Cluts said.

Congratulations

Congratulations are in order for Wayne Day, president of Golden Triangle Corporation and fellow RAINBOW author. Day recently formed the Tandy Users Network (TandyNet) to serve the full line of Tandy microcomputers. He

has operated The Color SIG on CompuServe since its beginning in 1982. The new network takes the place of four existing Tandy SIGs that had been operated by individual managers scattered across the nation. TandyNet will allow the individual SIGs to share information, improving the support for Tandy computer users.

"Over the years, the forums have become a gigantic users group that holds meetings 24 hours a day," he said. "We have taken the idea one step further and created a blanket group — the Tandy Users Network."

A Tip of the Hat to Tim Harris

Tim Harris, who has contributed several programs to this column and *The Complete Rainbow Guide to OS-9*, was published in the May issue of *Dr. Dobb's Journal*. Harris took an earlier article in that publication to task.

"One of the most novel features added in Version 2 of MS-DOS is the concept of 'installable device drivers,'" the article said. Color Computer owners have been using this "new concept" for at least three or four years! But, let's quote Harris:

"I would like to say that this concept may be new and novel for Microsoft and MS-DOS but it is certainly not a new and novel concept for other operating systems. The initial 6809 OS-9 Level I released in 1978 sported this feature," Harris told *Dr. Dobb's Journal* readers. Good job Tim. That's the kind of evangelism we need. If we tell them often enough, they are bound to stop and pay attention.

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Listing 1: gotoxy

```
nam gotoxy.adm3

ttl DynaStar editor XY routine for Disto 80 Column Card

*
* Allan G. Jost January 10, 1982
*
use /H0/DEFS/Defsfiler

ttl DynaStar XY routine for CoCo
opt g
org 0

EndMem equ . no data space for a subroutine
Vers equ 2 version number
mod EndMod,Name,Sbrtn+Objct,Reent+Vers,Entry,EndMem
Name fcs "gotoxy"
fcb Vers
Entry bra Go
fcb 24 number of lines on terminal
fcb 80 number of characters per line
fcb 1 This terminal scrolls
fcb 1 length of Clear Line Sequence
fcb 4 byte that clears line
fcb 0 no initialization sequence

* on entry X contains X-coordinate: 1 .. 80
* B contains Y-coordinate: 1 .. 24

Go equ * actual entry point
leas -3,S make working space
addb #31 change Y to cursor control char
stb 2,S and put into work space
tfr X,D get the X coordinate
addb #31 and change it also
stb 1,S
ldb #2 xy-cursorcode
stb 0,S finish building work space
lda #1 standard output path
leax 0,S the escape sequence
ldy #3 and its length
os9 i$write put it out to console
leas 3,S restore stack by releasing work space
rts back to caller now, folks
emod
EndMod equ * this is the end, folks.
```

Listing 2: HGraph.c

```
/*
HGRAPH - Horizontal Bar Graph Program
by Milt Webb

This program demonstrates the use of structures
and sequential disk files containing mixed types.
Create a bar graph with up to 16 bars by entering
the title, subtitle, scale (range) of the graph
and the label and value of each bar. The program
is menu driven and the graph files are read/saved
in the current data directory. This program is written
for 80 column displays. The #defines may be altered
accordingly for hi-res displays.

*/

#include <stdio.h>
#include <ctype.h>
#define TRUE 1
#define FALSE 0
#define TERMWID 80 /* width of terminal screen */
#define MAXITEMS 16 /* size array of items to graph */
#define TITLEN 41 /* length of title, subtitle string +1 */
#define LBLEN 19 /* length of label strings +1 */
#define NAMLEN 12 /* length of filename */
#define STOP "" /* empty string */
#define CLEARS 2 /* clear screen, home cursor for wordpak */

char h1[] = "HORIZONTAL BAR GRAPH v1.1";
char h2[] = "by Milt Webb";
long i, count, j, points;
long GWIDTH = (TERMWID - LBLEN - 1);

struct param {
char title[TITLEN];
char subtitle[TITLEN];
long upper;
long lower;
long count;
} header;

struct data {
char label[LBLEN];
long value;
} bar[MAXITEMS];
```

Harris sent to *Dr. Dobb's Journal*. But even if you are writing letters like this and telling all your friends about OS-9, please don't forget to cover another very important audience — those people already using OS-9.

Are we covering this base? I don't think so because we don't have everything we need. If OS-9 is to succeed in the consumer marketplace it must have a reason for being. There must be hundreds of application programs to do the jobs that people buy computers to do.

To make this happen we must encourage the programmers already within our ranks. We must salute them when they move the state of the art forward. We must encourage them to make bold steps forward with innovative techniques, rather than discourage them with our criticism.

I say these things after reading the mail on both CompuServe's OS-9 SIG and on RAINBOW's Delphi CoCo SIG. There are a lot of helpful people using both of these electronic bulletin boards, but there is also too much criticism. This criticism, especially when combined with low sales and minimal profit, discourages programmers from writing new programs. As a result, we all suffer.

For example, people criticize Tandy for making a business decision when they designed their OS-9 implementation. Then, they criticize Microware for delivering the product the customer ordered. They don't stop to realize one important basic of the business world — the customer is always right.

Frankly, Tandy had a good reason for every feature they put in Color Computer OS-9. We may or may not agree with the selection made by Tandy's designers, but we must realize that these business decisions were not made lightly. And to be quite honest, we must also realize that if Microware hadn't been willing to deliver the product Tandy wanted, Tandy probably would have picked another operating system for the Color Computer. Then where would we be?

Everyone deserves a pat on the back once in awhile — especially when he is not getting rich in a market he is supporting out of pure love. If this positive attitude theory seems like a lot of hogwash to you, I challenge you to look around the business world. I think you'll find that companies that project a positive, can-do attitude to the public and to their own employees are the ones getting ahead. Organizations run by

managers who try to think of reasons not to do something are falling like flies.

The bottom line: If you know a better way to do something, do it. If it's something everyone can use, sell it. If it's not, share it. But, do it. And, please don't put the other guy down just because his approach is a little different.

Sell Your Program in Japan

Ark Corporation is interested in good applications to market in Japan. They report that the Fujitsu FM-11, an OS-9 Level II machine, is the most popular in Japan. The company is also introducing three types of plug-in OS-9 68K boards for the leading personal computers in Japan.

"The biggest and most well-known disadvantage of OS-9 when compared to other systems is its lack of application programs," says Ark's Vice-President Hirokazu Sugawara. "Thus, we are looking for good OS-9 programs to introduce in Japan while developing our own. We need good programs for business, communications, database management, entertainment, home accounting, programming and word processing."

If they like your program, Ark will grant you an exclusive distribution license in the Japanese market, prepare a Japanese operating manual and make any modifications needed to make it fit the Japanese market. They pay 10 to 20 percent of the program's retail value in royalties. Their FAX number is 03-350-8383. Their phone number is 03-350-5171. If you have a good program, go for it!

Bob Rosen called my attention to the fact that OS-9 has made *Byte* magazine again — this time in a brief report from Comdex. *Byte* reported that Micro-trends of Schaumburg, Ill., has introduced versions of OS-9 for the Amiga, Atari ST and Macintosh. The report also mentioned compact disk interactive and noted that OS-9 "is similar to UNIX but smaller and less complex."

An Assembly Language Tip

John Bowden, a Navy cryptologic technician stationed in Adak, Alaska, wrote us recently and asked how to run another OS-9 command from within an assembly language program.

"My quest started with the simple desire to clear my text screen in OS-9 without typing the cumbersome Display C," Bowden said. "At first I used a simple procedure file that ran the command line Display C when I typed CLS. That was fine but it took a lot of

```
main()
(
  int k,r;
  pflinit(); /* need this to print long integers */
  while(1) /* make menu repeat until Q is hit */

  (
    putchar(CLEAR); /* clear display and home cursor */
    printf("\n\n");
    center(h1);
    center(h2);
    printf("\n");
    printborder();
    printf("\n\n\n");
    center("Type 'L' to LOAD graph file.");
    printf("\n");
    center("Type 'C' to CREATE a new graph.");
    printf("\n");
    center("Type 'Q' to QUIT program.");
    printf("\n\n\n");
    printborder();
    printf("Selection: ");
    k=toupper(getchar());
    switch(k)
    {
      case 'L':
        if ( r = (readgraf() == TRUE) ) dograf();
        printf("Press ENTER to return to menu.");
        k=getchar();
        break;

      case 'C':
        askinfo();
        askitems();
        dograf();
        if ( r = (savgraf() == TRUE) )
        {
          printf("Press ENTER to return to menu.");
          k=getchar();
        }
        break;

      case 'Q':
        exit(0);
        break;

      default:
        break;
    } /* end switch */
  } /* end while */
} /* end main */

askinfo()
/* get title, subtitle & range of graph */
{
  while (getchar() != '\n'); /* purge input buffer */
  printf("Title for graph: ");
  gets(header.title);
  printf("Subtitle: ");
  gets(header.subtitle);
  printf("Enter the upper range for this graph: ");
  scanf("%ld", &header.upper);
  printf("Enter the lower range for this graph: ");
  scanf("%ld", &header.lower);
  while (getchar() != '\n'); /* purge input buffer */
}

askitems()
/* Get labels and data values for graph */
{
  putchar(CLEAR);
  printf("Enter up to %d items for this graph.\n", MAXITEMS);
  printf("Maximum label length is %d characters.\n", LBLEN-1);
  printf("Press <ENTER> at a label prompt when finished.\n");
  printborder();
  printf("\n");

  header.count = 0;
  /* get things started */
  printf("Enter label for item %ld: ", header.count+1);

  while ( header.count < MAXITEMS
    && strcmp(gets(bar[header.count].label),STOP) != 0 )
  {
    printf("Now, the data for > %s: ", bar[header.count].label );
    scanf("%ld", &bar[header.count++].value);
    printf("\n");
    while (getchar() != '\n'); /* purge input buffer */
    printf("Enter label for item %ld: ", header.count+1);
  }
}
```

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me because of the extensive disk I/O. What I really would like to do is implement the Display C command in assembly language."

There are two ways to clear the Color Computer screen from within an OS-9 assembly language program. A short assembly language program that sends the clear screen character, 12 decimal or OC Hex, to the standard output would be the most direct route. We'll show you the code to do that first, and then list a short segment of code to run your program from within another program. We'll finish with a piece of code to let you execute the display command with the character 12 decimal as a parameter.

This program will clear the screen on your Color Computer
 * Syntax: cls <ENTER>

```
nam cls
* Use standard OS-9 Defsfiles

ifpl
use /D0/DEFS/defsfile
endc

opt L
ttl Clear Screen Utility

* Use standard OS-9 module header

mod classz,clsnam,type,revs,start,size
clsnamfcs /cls/
typeset PRGRM+OBJCT
revsset REENT+1

*.Data Memory Area Defined here

clrchrmb 1

* Reserve room for stack
rmb 250
sizeequ .

* Actual code starts here

startlda #00Cclear screen character
sta clrchr store it in data area
leax clrchr,upoint to character
ldy #1we want to send one character
lda #1to the standard output path
os9 i$writego send it
clrbclear carry
os9 f$exitand exit
emodmark the end of the module
classizequ *
end
```

This short assembly language program sends the character 12 decimal to OS-9's standard output path. On a Color Computer this character clears the screen. In fact, most printers use the same character for a form feed, so you can redirect the output of the new command to start a new page on the printer.

OS9: cls>/p

To run your CIs program from within another assembly language program you can insert the following code in your other program.

* Execute cls utility command
 * First define the strings

```
shlstrfcs /shell/
cmdstrfcc /cls/
```

```
dograf()
/* display the graph */
{
  putchar(CLEAR);
  center(header.title);
  center(header.subtitle);
  printf("\n\n");
  printf("%20ld%60ld",header.lower,header.upper);
  printborder();
  for ( i=0 ; i<header.count ; i++)
  {
    printf("%-18s|", bar[i].label);
    points = ((bar[i].value -header.lower) * GWIDTH)
              / (header.upper -header.lower);

    if ( bar[i].value < header.lower )
      putchar('<');
      else if ( points < 1 )
        points = 1; /* need at least one point */
    else if ( points > GWIDTH )
      points = GWIDTH;

    for ( j=0 ; j<points ; j++ )
      putchar('*');

    if (bar[i].value > header.upper)
      putchar('>');
    else printf("\n");
  }
  printborder();
}

readgraf()
/* read data from graph file - current data directory */
{
  int c;
  int errflg=TRUE;

  FILE *filptr;
  char filename[NAMLEN];

  while (getchar() != '\n'); /* purge buffer */
  printf("Enter filename for graph to view: ");
  gets(filename);

  if ( ( filptr=fopen(filename,"r") ) == NULL )
  {
    printf("Sorry, cannot open %s.\n", filename);
    errflg=FALSE;
  }
  else
  {
    fread(&header,sizeof(header),1,filptr);
    fread(&bar[0],sizeof(bar),1,filptr);
    fclose(filptr);
  } /* end else */

  return errflg;
} /* end func */

savgraf()
/* save graph data in current data directory */
{
  int c;
  int errflg=TRUE;
  FILE *filptr;
  char filename[NAMLEN];

  printf("Enter filename for this graph: ");
  gets(filename);

  if ( ( filptr=fopen(filename,"w") ) == NULL )
  {
    printf("Sorry, cannot open %s.\n",filename);
    errflg=FALSE;
  }
  else
  {
    fwrite(&header,sizeof(header),1,filptr);
    fwrite(&bar[0],sizeof(bar),1,filptr);
    fclose(filptr);
  } /* end else */

  return errflg;
} /* end func */

center(string)
char *string;
/* print argument centered on display */
{
  int spaces, num;
```

```

spaces = (TERMWID - strlen(string)) / 2;
for (num = 1 ; num <= spaces ; num++)
    putchar(' ');
printf("%s\n",string);
}

printborder()
/* print a border row of '=' signs */
{
int num;
for ( num=0 ; num<TERMWID ; num++ )
    putchar('=');
}

```

Listing 3: cls

```

PROCEDURE cls
DIM hp:BYTE
DIM name:STRING[3]
name="/hi"
OPEN #hp,name:WRITE
PRINT #hp,CHR$(12);
CLOSE #hp
END

```

Listing 4: printat

```

PROCEDURE printat
PARAM col,row:INTEGER
DIM hp:BYTE
DIM name:STRING[3]
name="/hi"
OPEN #hp,name:WRITE
PRINT #hp,CHR$(2); CHR$(col+32); CHR$(row+32);
CLOSE #hp
END

```

Listing 5: toggle

```

PROCEDURE toggle
DIM name:STRING[3]
DIM hp:BYTE
name="/hi"
OPEN #hp,name:WRITE
PRINT #hp,CHR$(20)
CLOSE #hp
END

```

Listing 6: box

```

PROCEDURE box
(* Calling syntax is : *)
(* RUN BOX (hstart,vstart,hend,vend) *)
PARAM hstart,vstart,hend,vend:INTEGER
RUN gfx("line",hstart,vstart,hend,vstart)
RUN gfx("line",hstart,vstart,hstart,vend)
RUN gfx("line",hend,vstart,hend,vend)
RUN gfx("line",hend,vend,hstart,vend)
END

```

Listing 7: fillbox

```

PROCEDURE fillbox
PARAM hstart,vstart,hend,vend:INTEGER
DIM linecount,counter:INTEGER
linecount:=vend-vstart
FOR counter:=0 TO linecount-1
RUN gfx("line",hstart,vstart+counter,hend,vstart+counter)
NEXT counter
END

```

Listing 8: pixsaver

```

PROCEDURE pixsaver
DIM vdisplay,number:INTEGER
DIM title:STRING[10]

```

fcbl 13<RETURN> character

```

leax sh1str,pcrpoint to "shell"
ldy #4size of parameter string
leau cmdstr,pcrpoint U-register to "cls"
lda #lit's 6809 object code
clroptional data area size
os9 f$forkgo start the cls as a process
bcs error
os9 f$waitand wait for it to finish

```

* resume other program execution

You could modify this code to run the OS-9 Display utility command like this

* Execute display utility command
 * With "C" as a parameter
 * Define the strings

```

sh1strfcs /shell/
cmdstrfoc /display c/
fcbl 13<RETURN> character

```

```

leax sh1str,pcrpoint to "shell"
ldy #10size of parameter string
leau cmdstr,pcrpoint U-register to "cls"
lda #lit's 6809 object code
clroptional data area size
os9 f$forkgo start the cls as a process
bcs error
os9 f$waitand wait for it to finish

```

* resume other program execution

Study the differences between the two code segments and you'll quickly pick up the idea. If you put code like this in your assembly language programs, it is up to you to insure that the programs running from within those programs are actually loaded in memory or available in the current execution directory. Have fun!

RS-232 Tip

For something that is supposed to be simple, serial communication between two computers is often quite confusing. We get a lot of letters from people trying to use their Color Computers with other computers. In fact, I had trouble when I tried to fire up my RS-232 Pak the first time.

I could get my terminal programs to run perfectly when I plugged the RS-232 Pak into a modem. But every time I tried to communicate with another computer I was stopped at the pass. I could send, but I couldn't receive — even though I had made the connection through a null modem cable.

The problem revolves around the fact that the RS-232 Pak wants to see a carrier signal from the modem before it works properly. My solution was to short Pin 20, the data terminal ready signal from the RS-232 Pak to Pin 8, the carrier detect line. I made this connection on the end of the cable that plugged into the RS-232 Pak. By cheating like this I was essentially telling the RS-232 Pak that there was always a carrier.

Other people cheat their connections to the RS-232 Pak in a similar manner. For example, one programmer I know always creates a false carrier by jumper-

ng pins 6, 8 and 20 on both ends of his cable.

To make your second computer look like a modem you also need to connect Pin 2 on one end of your cable to Pin 1 on the other and vice versa. Additionally you must short Pin 4 to Pin 5 on both ends of the cable and make sure that Pin 7 is passed through from one end of the cable to the other. The only disadvantage to shorting these control pins is your terminal will not be able to send a hardwired signal to your Color Computer to tell it to stop sending if it happens to get behind.

This Month's Listings

We've received several notes from people who have upgraded their hardware and don't have the proper GoTo-XY routine to work with *DynaStar* and *DynaSpell*. Our first listing this month will let you use your Disto 80-column card with these programs. You can modify the listing to work with the standard Color Computer screen in Version 2.00.00 by simply changing the size definitions.

Our next listing is a C program named *HGraph.c* from Milt Webb. *HGraph.c* creates horizontal bar graphs on an 80-column screen, demonstrates how to use a menu within a C program and shows you how to save and read sequential files containing mixed data types. It is Webb's first program.

Our final listings were contributed by Robert B. Stephens. He uses BASIC09 with the Xscreen package from Microtech Consultants, Inc. He displays all his text on the Xscreen device, /hi. If you are using a different screen, you can use similar code by just changing the name of the device. I tried both *Cls* and *Printat* with the standard Tandy 32-column display and they worked just fine.

"I wrote a short procedure called *Pixsaver* to save graphics screens," Stephens said. "Picture files are stored in a directory named PIX. To view the pictures you use a procedure named *Pixshow*. Another procedure named *Toggle* lets you inverse letters with Xscreen. The latter may be used to highlight single words or inverse the entire display."

That's it for October. Hopefully, by the time I sit down to write the November column we will have at least seen the new OS-9 Level II Color Computer. In any case we'll be attempting to round up more tips for all OS-9 users. □

```
DIM pixpath,pixbyte,hp:BYTE
DIM name:STRING[3]
name="/hi"
OPEN #hp,name:WRITE
RUN printat(0,0)
INPUT "Picture title?",title
CREATE #pixpath,"/D0/pix/"+title:WRITE
RUN gfx("Gloc",vdisplay)
RUN printat(0,0)
PRINT #hp," "
FOR number:=0 TO 6143
pixbyte:=PEEK(vdisplay+number)
PUT #pixpah,pixbite
NEXT number
CLOSE #pixpah
CLOSE #hp
END
```

Listing 9: *pixshow*

```
PROCEDURE pixshow
(* If you are not using a hi-res display, you *)
(* must add gfx("mode") statement to this procedure. *)
DIM pixbite,hp:BYTE
DIM px:BYTE
DIM name:STRING[3]
DIM vdisplay,number:INTEGER
name="/hi"
OPEN #hp,name:WRITE
PRINT #hp,CHR$(12)
RUN printat(0,0)
PRINT #hp USING "s64^","PixShow : See Pix directory for file names."
PRINT #hp USING "s64^","Filename";
RUN gfx("Gloc",vdisplay)
RUN printat(28,13)
INPUT file$
OPEN #px,"/d0/pix/"+file$:READ
SEEK #px,0
FOR number:=0 TO 6143
GET #px,pixbite
POKE vdisplay+number,pixbite
NEXT number
CLOSE #hp
CLOSE #px
END
```

Listing 10: *calc*

```
PROCEDURE calc
DIM a,b,c,d,e,f,g,h,i,j,k,l,m,n:REAL
DIM o,p,q,r,s,t,u,v,w,x,y,z:REAL
DIM pp:BYTE
DIM sp:BYTE
DIM name:STRING[2]
name="/p"
PRINT CHR$(12)
PRINT "C A L C U L A T O R ... All Basic Math Functions work!"
PRINT "Variables are letters a-z -- assign with let a=xxx"
PRINT "The printer path is #pp -- Send text or variables there at will."
PRINT "If you want anything hardcopy -- don't forget to turn on your printer."
INPUT " ... Printer on? (y/n) ",yesno$
IF yesno$="y" THEN OPEN #pp,name:WRITE
ELSE PRINT
ENDIF
INPUT "Do you want to save some of this stuff? (y/n) ",query$
IF query$="y" THEN
PRINT "File name is ScratchPad: Send data there at will."
PRINT "Syntax is PRINT #sp, <text>, <mathfunction(variable)>"
OPEN #sp,"ScratchPad":UPDATE
ELSE PRINT
ENDIF
PRINT "Type <cont> <ENTER> to close paths."
PAUSE
IF yesno$="y" THEN
PRINT "Printner path closed."
CLOSE #pp
ENDIF
IF query$="y" THEN
PRINT "Scratch Pad closed."
CLOSE #sp
ENDIF
END
```

Listing 11: *make_scratchpad*

```
PROCEDURE Make_ScratchPad
DIM Scratch_Pad:BYTE
CREATE #Scratch_Pad,"ScratchPad":UPDATE
PRINT "The ScratchPad file for Calculator has been created."
CLOSE #Scratch_Pad
END
```

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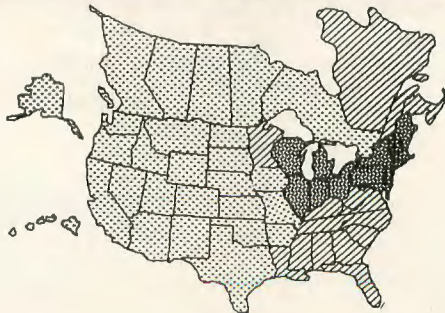
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- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
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- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
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Colorscan will print program listings in blazing color, make remarks in red, line numbers green, search for strings and print in blue, etc. All these features and more.

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 Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

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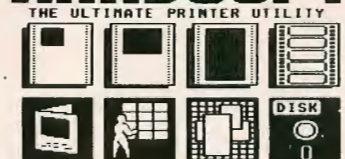
TYPESETTER & FONT EDITOR
 Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

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Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both Standard BIN files and Graphicom screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

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- GREETING CARDS - The greeting card option allows the user to custom design greeting cards using both text and graphics.
- GIANT POSTERS - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
- 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!
- USER CALL - Have an application that HARDCOPY routines can't quite match? HARDCOPY routines can be added to EXTENDED BASIC through theUSR command!

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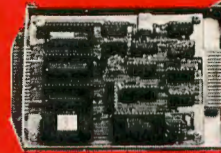
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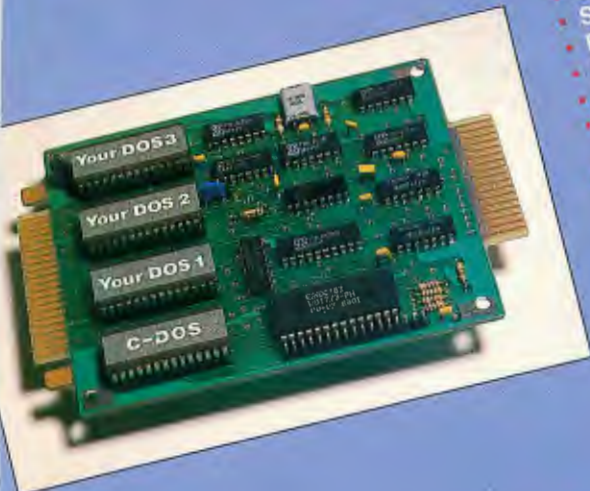
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*All OS-9 drivers sold separately

HEAT UP YOUR COCO!

New HARD DRIVES

Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance,



you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a

ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.

5 1/4" 5 MByte full size \$495
 5 1/4" 10 MByte 1/2 size \$650
 3 1/2" 20 MByte (shown above) \$795

JFD-CP DISK CONTROLLER

Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a



Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS

DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).

JFD-CP Disk Controller with JDOS \$139

COCO-CLASSIC

Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

JFD-COCO Disk Controller with JDOS \$99

DRIVE SYSTEMS

Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2



operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.

Drive 0 System with one single side drive \$279
 Drive 0 System with one double side drive \$349
 Drive 0,1 System with two single side drives \$389
 Drive 0,1 System with two double side drives \$489

MEMORY MINDER**



Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check

your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

PRECISION ALIGNMENT DISKS (From Dyan)

PAD-40X1: Tests single side disk drives \$26
 PAD-40X2: Tests double/single disk drives \$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package \$59
 Memory Minder: single/double side package \$75

*OS/9 is a registered trademark of Microware, Inc.

**Memory Minder is a registered trademark of J&M Systems, Ltd.

New TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.



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