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THE COLOR COMPUTER MONTHLY MAGAZINE

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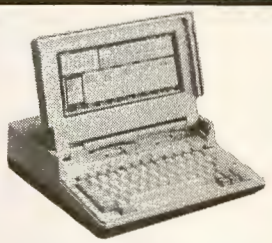

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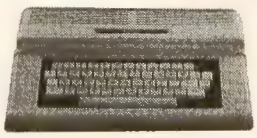

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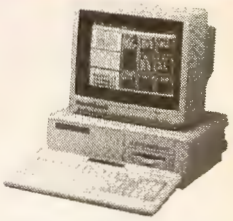

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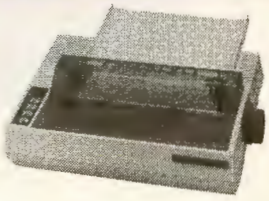

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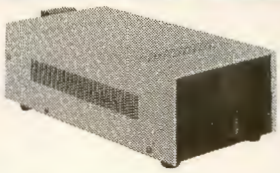

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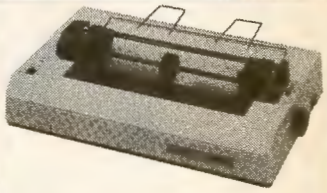

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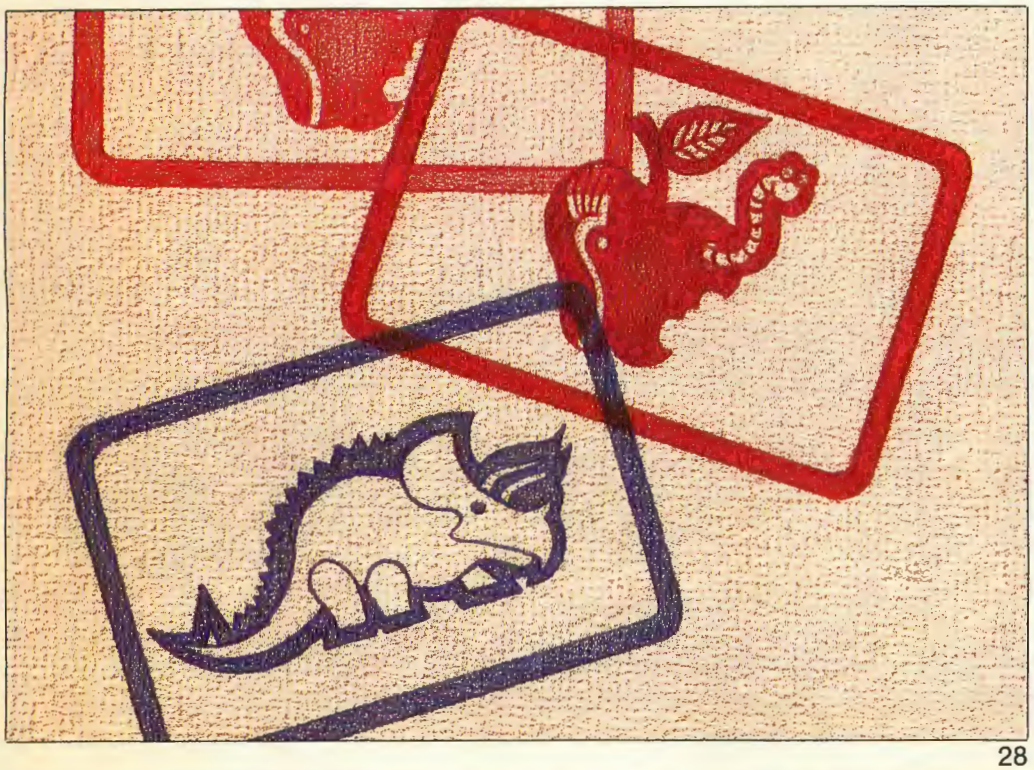

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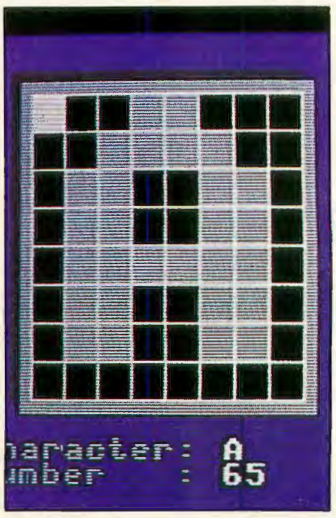

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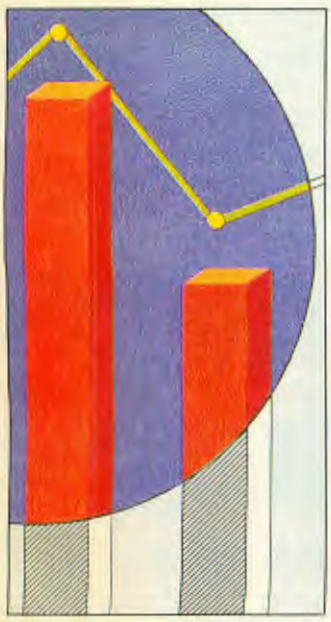

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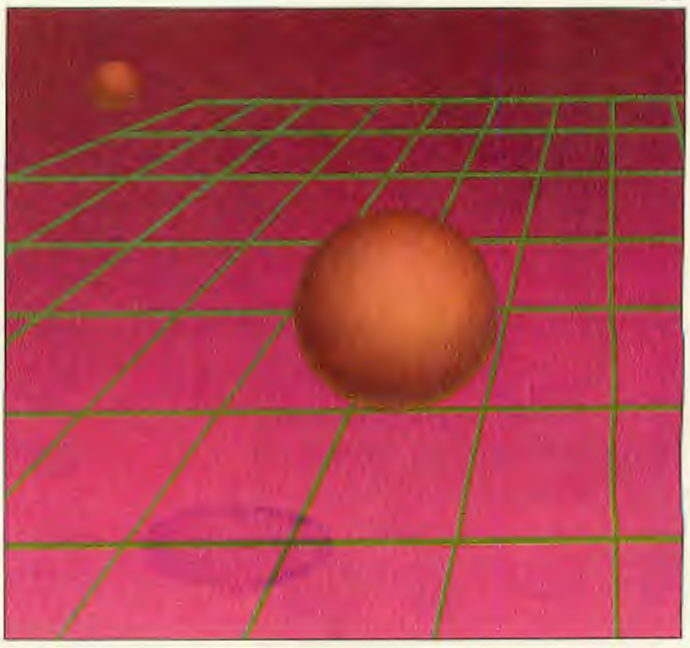

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Letters to the RAINBOW

BACK TALK

Editor:

I would like to comment on two articles in your June '88 issue: David Huag's article, "Internal Sound," Page 99, and Michael F. Wiens' article, "CoCo 3 Potpourri," Page 158. David's article, which describes how to install a speaker and amplifier inside a CoCo to produce sound with monitors that lack this capacity, is flawed in several respects.

First, David suggested using a 9-volt battery as the amplifier's power supply. Such extra power would be expensive. Instead, the correct way to power such an amplifier is off the CoCo's own power supply. For CoCo 1s and 2s, a +10-volt source is available at the positive side of the power supply circuit's 10,000 mfd filter capacitor. The big filter capacitor is a black or gray cylindrical object about 2 inches long and one-half inch in diameter, which is marked with its value (10,000 mfd or 4,700 mfd). The positive and negative sides are indicated by a marking and arrow. CoCo 3s have a convenient +10-volt source at the junction of the cathodes of the power supply's two biggest diodes. The diodes are black, cylindrical objects, one-half inch in diameter and one-half inch long, which are marked with a single silver band on the cathode side of the diode.

Second, David recommended making your own amplifier from "scratch" with an LM 386 chip. While his circuit will probably work, why go to all the trouble? Radio Shack sells a speaker amplifier in a nice little package (Cat. No. 277-1008), which only costs $12 and has everything you need to install sound in your CoCo. It fits beneath the keyboard if you remove its back plate, and the Radio Shack's speaker has been baffled to provide better sound.

Finally, though David showed how to find the sound on *his* CoCo, his instructions won't work on some other CoCo models. David's instructions work fine on CoCo 1s. But on most CoCo 2 models, and all CoCo 3 models, the sound line is at Pin 1 of the custom DAC chip. This is a 20-pin chip marked SCC77526P on most computers. On the CoCo 3 sound can also be obtained, of course, from the audio output jack in the computer.

Next, Michael's article presents a rather faulty technical tip. His first hardware tip says that owners of the old CoCo 1 disk controller (Cat. No. 26-3022) can use the contoller on a CoCo 2 or 3 if they rig up a +12-volt source for that card. Although this is true for the CoCo 2, Michael does not mention that, even with the 12-volt source, the controller will not work properly at double CPU speed. Therefore, if you run OS-9 Level II or any Disk BASIC program that does disk *I/O* at double processor speed, at best the controller won't work, at worst it will operate unreliably — occasionally crashing disks. The reason is that the data separator circuitry on that old controller is a bit sloppy, and there is no simple fix for that problem. Both my column and the "Doctor ASCII" column have warned of this problem before. I strongly advise readers *not* to use that controller in their CoCo 3s. Buy a new one, instead.

Marty Goodman
San Pablo, CA

REVIEWING REVIEWS

Editor:

Needless to say, we at SPORTSware were very pleased, even honored to see the treatment given to the *Wargame Designer* system in the August '88 issue [Page 126]. We tried to create a game-designing system that would fill what we saw a void in the wargame and Adventure game market.

We would also like to comment on the reviews of John Herbert, reviewer of *Wargame Designer*. We have noticed his reviews in the past and have always found them enjoyable. His unique style and humor are refreshing. Unlike some reviewers, who feel that a recitation of the user's manual is enough, you can always tell whether or not Mr. Herbert enjoyed a software package. Feelings are what reviews are all about, and John Herbert relates them with ease. Let's hope that he continues to share his time and talent with the CoCo Community.

Paul L. Olmstead
President

Fair is Fair

Editor:

First, I would like to commend you for your fine magazine. RAINBOW's excellent articles and reviews have helped me enjoy my CoCo. I pay particular attention to RAINBOW's reviews. After reading reviews on *CoCo Newsroom*, *Kung-Fu Dude*, and *Rommel 3D*, I purchased the products. I found certain flaws that were not properly covered in the reviews, and I would like to comment on them now.

Despite *CoCo Newsroom*'s icons, you cannot return to the main menu from type-up. You must re-boot the program. Although knowing this may not have stopped me from buying this program (for it is excellent in all other ways), I think that the review should have mentioned this problem.

Kung-Fu Dude's review mentions that the program is copy-protected. The copy-protection does not appear to be benign. I couldn't get the program to boot. When I called the author, he said that he had encountered this problem before. The fault seems to be with the timing of some drives and the way the program boots the encrypted graphics from Track 0. I have returned the game, and the company is still working on the problem. Perhaps this is an example of the way a vendor can actually thwart future purchases through copy-protection.

Finally, the graphics in *Rommel 3D* have been compromised by the program's demand for speed. Although the game moves quickly and is mildly entertaining, I've seen better games and graphics in BASIC published in THE RAINBOW. I realize that some of my comments (especially for the last product) are subjective, and I see only two choices for me and for others who purchase "less than perfect" software: complain to the vendor or just accept the flaws.

Product reviews should be fair. They let your readers know what is new on the market. They should also temper and confirm the advertiser's claims. I will continue to read your magazine and purchase software from the vendors you review.

Wayne Montague
Mississauga, Ontario

We agree that reviews should be fair. Therefore, we will be working toward more serious "play testing" in-house. We regret it if we've allowed recommendations for flawed products to slip through.

HINTS & TIPS

Editor:

Paul Pritchett [July '88, Page 7] requested a way to hard copy *Micro Illustrator* pictures. I suggest these steps. PCLEAR 8 your CoCo; boot up *Micro Illustrator* and load the picture from the disk. Return to Disk BASIC by removing the disk and pressing RESET twice. Then, run the following program:

```
10 PMODE 4,1:SCREEN 1,1 'WATCH
   OUR PROGRESS
20 FOR X=8252 TO 14396 'PICTURE
   SITS HERE
30 A=PEEK(X):POKE X-4668,A 'MOVE
   PICTURE
40 NEXT X:SOUND 20,1 'BEEP WHEN
   DONE
```

This will move *Micro Illustrator*'s picture to Disk BASIC graphics pages 1 through 4, where any trusty graphic dump program can do its stuff. Hope this helps!

Charles Doane
Miami, FL

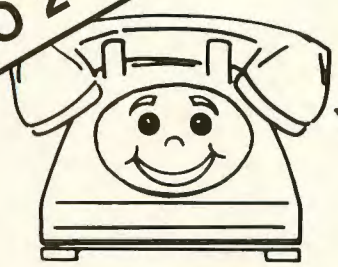
CoCo 3 Artifacting

Editor:

I have tested some machine language programs with the CM-8 patch program listed in the February '88 issue ["Artifact Colors on CoCo 3's RGB," Page 114]. Each of the following will display color when executed on a CoCo 3 with a CM-8 monitor:

From Tom Mix: *Donkey King*, *Draconian*, *Buzzard Bait*, *Brew Master* and *Skyway*.
From Spectral Associates: *Lancer*, *Miss*

RUNS ON COCO 2 & 3



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Phyllis.

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Gobbler, *Devious*, *Color Zap*, *Qiks*, *Space Attax* and *Space Wrek*.
From Radio Shack: *Shooting Gallery*, *Popcorn*, *Mega-Bug* and *Radio Ball*.
From Computer Shack: *Time Bandit* and *Fury*.
From The Rugby Circle: *Caterpillar*.
From Mark Data: *Tut's Tomb*.
From Anteco Software: *8 Ball*.
From T&D Software: *Able Builders*.
From Adventure International: *Arex*.
From Factory Programming: *Outhouse*.

Note: If you use the patch while playing a game that switches between the graphics screen and text screen, sometimes you will only see vertical and/or horizontal lines. Usually this is not critical because the text screen asks you to enter the number of players, the names, the level, etc. If you play the game without the patch and memorize the screen text, you should be able to play the game with the patch. Also, some of the programs mentioned were on a ROM pack but have been transferred to a disk. Don't try to use the patch with a ROM pack — you can't.

Perry M. Dueck
Rosenort, Manitoba

A CoCo 2 *Color Catalyst*

Editor:

Thanks to everyone in the CoCo Community who took the time to drop a line or call about *Color Catalyst* ["Changing the Language," June '88, Page 168]. As it appears in the magazine, the program will only run on the CoCo 3 and certain models of the CoCo 2. (Tandy changed more than the keyboard when it upgraded our favorite machine.) The following changes in Listing 2 will allow you to use *Color Catalyst* on your CoCo 1 or 2:

```
6 POKE359,57:M=113:N=25:PRINT
  @13,"COLOR";:PRINT@36,A$;:
  PRINT@68,B$;:PRINT@100,C$;
8 PRINT@166,"CUSTOM BASIC
  UTILITY";:PRINT@232,"BY MARC
  CAMPBELL";:PRINT@489,"[C]
  MCMLXXXVII";
16 CLS:PRINT"DO YOU WANT TO
  EXIT?(Y/N)":EXEC44539:A$=INKEY
  $:IFA$="N"THEN10ELSECLS:NEW
30 GOSUB82:PRINTS$"BLACK CHAR
  ACTERS ON GREEN",S$"BLACK CHAR
  ACTERS ON ORANGE":S=163:E=195:
  GOSUB83
31 IFQ=1THENPOKE65314,7ELSE
  POKE65314,8
```

Delete Line 17 and lines 125 through 128.

Please note that the reset patch and many of the custom display options will be lost, but the other aspects of the program should work properly. If you experience an I/O Error when loading a custom version of BASIC, put the machine in an all-RAM mode by running Listing 1 and try again.

My thanks to Chuck Scharmann, president of Club 6809 in Massachusetts, for bringing this problem to my attention and helping me fix it.

Marc Campbell
Ephrata, PA

INFORMATION PLEASE

Editor:

I really enjoy your magazine, especially the letters. I've gotten quite a few ideas from this section.

I enjoy *Hall of Kings* and would like to buy *Hall of Kings II* or *III*. However, Prickly Pear Software is no longer in business. Is anyone else selling these games? I would like to continue the Adventure.

Jerry M. Bedell
St. Peters, MO

Glen Dahlgren, the original programmer of The Hall of Kings, *has obtained all rights from Prickly Pear Software to market his trilogy. You can order the programs from Glen at: Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 1523; (412) 372-5674.*

Computer Musicians

Editor:

I am seeking help from all CoCoists who use their CoCos for MIDI applications and music composition or arrangement. Has anyone heard of a voicing program for the Yamaha FB-01 that will work with a CoCo 2 or 3? I do some intricate MIDI work that involves the FB-01, and I need a voicing program that allows me to modify some of the voices on the FB-01.

All other major brands of computers have voicing programs that let them modify the sounds of the FB-01. I hope that such a

program exists for the CoCo. If it doesn't, such a program would be very lucrative to write.

Val Burke
P.O. Box 86
Red Oak, GA 30272

KUDOS

Editor:

I just finished wading through a stack of bills. The only one that I didn't mind was my RAINBOW subscription renewal. Indeed, you even include a postage-paid envelope for the subscription. Subtle touches like this keep CoCo fans coming back — even when Radio Shack ignores the CoCo and praises its PC compatibles.

You are a class act, RAINBOW.

Mike Shay
Lebanon, PA

In Praise of Rainbow Advertisers

Editor:

I just wanted you to know how much I enjoy RAINBOW each month. You perform a great service for all CoCoists. The software companies who advertise in your magazine also maintain high standards. One such company is Gimmesoft. Mr. DiMarco is helpful and considerate to all his customers. My thanks to you both.

Fred Sharpe
Scarborough, Ontario

Confidence-Builder

Editor:

I would like to thank Marc Campbell for his BASIC editor, *Buddy* ["CoCo's Current Companion," July '88, Page 34]. New to computing, and only an average typist, I've been intimidated by long program listings. I've avoided some programs and typed in others with as much enthusiasm as I usually muster for a trip to the dentist. CoCo's built-in editor only added to my frustration.

Buddy has changed all that. The program has more features than my present word processor, is simple to use and works well with my tape system. Since *Buddy* takes the frustration and tedium out of typing in long listings, I ordered several back issues of THE RAINBOW. *Buddy* and RAINBOW are my CoCo's constant companions.

Kay Greenwood
Crystal Springs, MS

PEN PALS

• I am a 19-year-old who would like pen pals from anywhere in the United States. I have a CoCo 2, FD 501 disk drive, DMP-105 printer, CCR-81 cassette recorder/player and a speech/sound cartridge. I would like someone who likes *Doctor Who*, writing and anything in between. It may take some time, but all letters will be answered.

Dennis Duane Ferrell
712 Gloria Grove
Wiggins, MS 39577

• My brother and I are looking for pen pals from all over the country. We are: Scott, age 13, and Andy, age 14½. We have an ECB CoCo 2, DMP-105 and DMP-230 printers, DCM-3 modem, FD 502 disk drive, and a CCR-81 cassette recorder. We will do our best to respond to all letters.

Andy and Scott Brady
51 Barberton Road
Lake Worth, FL 33467

• I'm 31 years old and own a CoCo 2, tape recorder and a DWP-230. My interests are BASIC and assembly programming (practical programs for me and games for my kids) and word processing. My other interests are history, literature, politics and religion. I will answer all letters.

Dan Weaver
66 Bunn St.
Amsterdam, NY 12010

• I am looking for a pen pal who has the same setup as my system. So far, I have a 64K CoCo 2 and a cassette recorder. I am looking for someone who is a novice like myself who might be able to teach me more about this new computer of mine.

Patti French
Rt. 2, Box 9
Grafton, ND

• I am 37 years old and have a 64K CoCo with disk drive and a DMP-130 printer. I enjoy anything that has to do with computers. I would like to hear from anyone, any age and from anywhere in the world.

Chuck Flowers
P.O. Box 246
Rio Dell, CA 95562

• I would like a pen pal from anywhere. I have a CoCo 2 with one disk drive and two joysticks. I am 10 years old.

Kevin Lewis
256 Elron Cresent
Thunder Bay, ON
Canada P7C 5T5

• I am 16 years old and am looking for pen pals from all over the world. My computer system consists of a CoCo 3, DMP-105, two double-sided disk drives and a modem. I like to program in BASIC09, and I collect CoCo 3 pictures.

Heath Dingwell
Rt. 2 Box 230
Litchfield, CT 06759

• I am 16 years old, and I have the CoCo 2 and 3, FD 500 disk drive, DMP-105 printer and CCR-81 cassette. I am looking for pen pals who enjoy arcade and Adventure games.

Shane Pasiechnyk
P.O. Box 344
Marysville, BC
Canada V0B 1Z0

• I am 15 years old. My family and I own four computers — MC-10, CoCo 2, CoCo 3 and Tandy 1000 EX. We have a DMP-106 printer. I would like to have pen pals from anywhere in the world; age doesn't matter.

Gretchen Silverheel
1633 Summit
Kansas City, MO 64108

BULLETIN BOARD SYSTEMS

• The Port City Exchange is a "Phoenix" BBS system in the Mooresville area. It runs on a 64K CoCo 2 and is up 24 hours a day, seven days a week at (704) 663-6022. The parameters are 300 baud, 8-bit, 1 stop bit, no parity. There are multiple message bases and upload/download capacity. *Galactic Conflict* is the online game.

Douglas C. Henderson
(NICKO)
539 Dixie Drive
Mooresville, NC 28115

• There's a new BBS in southern California that needs CoCo users! We have room for uploads and downloads and have some great SIGs and message areas. We operate at 300/1200 baud, N-8-1. Call (818) 995-2461.

Scott Shell (SysOp)
Allen Williams (Co-SysOp)
3425 Clairton Pl.
Encino, CA 91436

• The Drunk Drive [call (517) 893-3091] now has a large archived CoCo download area. The Plastered Board [at (517) 892-7885] and Warped Board [(517) 686-7598] also support the CoCo with a variety of downloads. All are N-8-1, 300/1200 baud and run GT *Powercomm*. Press Q at the menu to have up- and download capacity. Press C to see all file categories. Press F to see all file descriptions. The Drunk Drive and The Plastered Board are online 24 hours a day. Warped Board is online from 6 a.m. to 3 a.m.

Ron Sujkowski
1806 34th St
Bay City, MI 48708

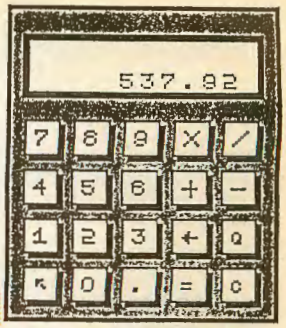
• The Chip to Chip is running at 300/1200 baud, 24 hours a day on a 512K CoCo 3. The system uses *PBBS* software and features message and software exchange for IBM, CoCo and CBM. New members must fill out an online application and use their real names. There is 20 Meg of disk storage space. The SysOp is Allen Jones. Call (902) 539-7743.

David Brown
New Waterford, NS
Canada B1H 4K4

THE RAINBOW welcomes letters to the editor. 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 to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

Word Power 3.2



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Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

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Ever try mailing out the same letter to 50 different people? Could be quite a chore. Not with Word Power 3.2! Using this feature, you can type a letter, follow it with a list of addresses and have Word Power print out personalized letters. It's that easy!

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Pop-up a 4-function calculator while you edit! Great for tables!

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Word Power 3.2 creates ASCII format files which are compatible with almost all terminal/spell-checking & other word-processing programs. Allows you to Display Free Space, Load, Save, Append & Kill files. The ARE YOU SURE? prompt prevents accidental overwriting & deletion. You can select files by simply cursoring through the disk directory. Supports double-sided drives & step-rates.

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Word Power 3.2 drives almost any printer (DMP, EPSON, GEMINI, OKIDATA, etc). Allows options such as baud rates, line spacing, page/print pause, partial print, page numbering/placement, linefeeds, multi-line headers/footers, right justification & number of copies. The values of these parameters & margins can be changed anytime in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear in print. You can view margins, page breaks, justification & more.

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Why buy a hardware Print Spooler? Word Power 3.2 has a **built-in Spooler** which allows you to simultaneously edit one document & print another.

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Word Power 3.2 comes with a well-written instruction manual & reference card which makes writing with Word Power a **piece of cake!** Word Power 3.2 comes on an UNPROTECTED disk and is compatible with RSDOS. Only **$79.95**

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October Magic

This is a happy month! There are a whole bunch of things to be happy about right now. First of all, remember that I write these columns a lot earlier than they appear in THE RAINBOW. Production schedules make this necessary, of course, so it is really an interesting exercise from an intellectual point of view: First, I have to project myself into the future and try to place myself in the time you will be reading this; second, I am as usual "full" of something that has just happened in real time (as they say) and want to tell you about it.

As to what's happening in October itself — it is RAINBOWfest! That really makes me happy, because I sometimes liken RAINBOWfest to the ancient stories of the Scottish Clans' annual gathering. Each time I walk into our convention hotel, I can't help but think of the "Gatherin' o' th' Clans" from legend. Each show is alive with anticipation of new things, new products and, most important of all, new people. We all make new friends and we all renew old acquaintances. And we get an infusion of spirit for our CoCo Community.

All of this is by way of saying I hope you will join us in Princeton October 21st through 23rd.

October, too, begins the start of our busiest half of the year. During the summer, with family vacations, with school out, with the weather so nice, almost everyone's CoCo activity drops a little bit. Why, I remember one year Dick White wanted to take his CoCo on a camping trip with his family, and his wife threatened to hide the batteries he had rigged up!

September means back to work full time and back to school for so many of you (educators as well as students). I know computing sometimes takes a back seat to getting those schedules "set up." But things have usually settled down by October, and we're ready to go. October also means that we have lots of new things on the horizon. After all, the pre- and post-

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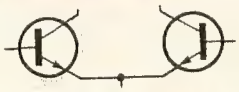

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holiday seasons are the prime sales times for Color Computers. All those software and hardware people are working hard to come up with some new ideas to make your CoCo even more enjoyable.

* * *

But here in Prospect, Kentucky, as I write this I am only projecting into October. Still, it is a very happy month right now — perhaps some "October magic" is taking place!

Just a few days ago my daughter Wendy married Ira Barsky. Many of you who have been to RAINBOWfest may have met Wendy, and probably almost all of you have met Ira. My other daughter, Laurie, was Maid of Honor, and it was a very happy day for every one of us.

Long-time readers of this column will probably be asking where Sacy is living, now that Wendy has "fled the nest." Sacy is Wendy's teddy bear of many years who was almost lost when Wendy took a "Semester At Sea" and someone picked up her duffle bag by mistake as she landed back in the United States in Seattle.

Well, that's the other half of the story of why this is such a happy month for all of us here.

Sacy put on a bow tie and was going to live with his "human grandfather" (me) for a couple of weeks, since Wendy somehow felt it inappropriate to take a teddy bear on her honeymoon. However, several days before the wedding some chest pains sent me to the hospital, and a few days after the wedding I went in for an angioplasty — a procedure doctors use to remove fatty buildup in coronary arteries.

Wendy and Ira delayed their wedding trip (much to my displeasure, I might add), and Sacy went to live at Wendy's new home while I was in the hospital. I am pleased to report the procedure came off splendidly, and I was back at the office — although on a limited basis for a while — three days after the angioplasty. Sacy is living here, supervising my recovery, and will stay until Wendy and Ira return from their trip.

So, it is a good month. We're glad you're with us. And we're glad to be with you!

— Lonnie Falk

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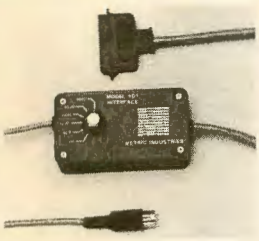

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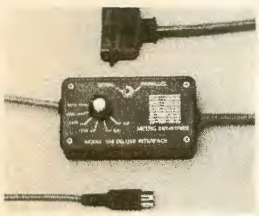

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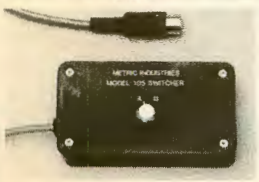

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★ Connects to your COCO to give you 2 switch selectable Serial Ports
★ Comes with a 3 foot cable to connect to your computer
★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
★ Does not require power

Cassette Label Printing Program

★ **New Version 2.1 prints 7 lines** of information on Cassette labels
★ Comes on Tape with instructions to transfer to disk
★ Menu driven, very easy to use
★ **Save and Load Labels from Tape and Disk**
★ Uses the features of your printer to print standard, expanded, and condensed characters
★ **Automatically Centers Each Line of Text**
★ Allows editing of label before printing
★ Program comes with 24 labels to get you started
★ 16K ECB required

Some of the Printers That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidata, Brother, Juki, and Smith Corona.

Some of the Printers That Cannot –
Supply power for the interfaces are Epson, Seikosha, Panasonic, Silver Reed and NEC. If your printer cannot supply power to the interface you can order your interface with the "P" option or you can supply your own AC adapter. We recommend the Radio Shack 273-1431 AC adapter with a 274-328 connector adapter.

Write or call for more information or for technical assistance.

Price List

Model 101	**35.95**
Model 101P	41.95
Model 104	44.95
Model 104P	51.95
Model 105	14.95
Cassette Label Program	6.95
Pin Feed Cassette Labels:	
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Colors (specify) Red-Blue-Yellow-Tan	3.60/C

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(CoCo 2 Versions Included where specified)

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* Disk-to-Disk Copy * Tape-to-Disk Copy
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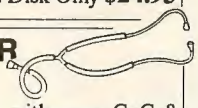
* Disk-to-Tape Copy * Tape-to-Tape Copy

Copies Basic/ML/Data Files. CoCo 1,2 or 3. Req. min. 64K Disk System. Disk Only **$24.95**

COCO CHECKER



Something possibly wrong with your CoCo? CoCo Checker is the answer. Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-Pak Interface and more! Only **$24.95**

DISK UTILITY 2.1A

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename & kill file entries. Lightning fast Disk I/O for format, copy & back-up. Single key execution of Basic/ML programs. This will become your MOST USED program !! CoCo 1,2 or 3. Req. Min. 64K. Disk Only **$24.95**

MAILLIST PRO

The ultimate mailing list program. Allows you to add, edit, view, delete, change, sort (by zip-code or name) and print labels. Its indispensible!! Disk **$19.95** (CoCo 2 version included)

DISK LABEL MAKER

Allows you to design professional disk labels! Allows elongated, normal and condensed format for text. Double Strike, Border Creation, and multiple label printing. Its a MUST for any user with a disk drive. Supports DMP 105/106/110/120/ 130/430, GEMINI, STAR, EPSON and compatibles. (CoCo 2 version included). Only **$19.95**

COCO UTIL II

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Displays most games in color on RGB monitors. CoCo 3 Disk **$24.95**

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Why bother with balancing your checkbook? Let the CoCo do it for you. Allows you to add, view, search, edit, change, delete and printout (in a table/individual entry format) checkbook entries. Updates balance after each entry. Allows files for checking, savings, and other accounts. Disk **$19.95.** (CoCo 2 version included)

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An excellent utility to keep track of your bowling scores. Allows you to save scores under individuals or teams. You can edit change, delete, and compare scores. A must for anyone who wants to keep track of his or her bowling performance. Disk $19.95 (CoCo 2 version included)

VCR TAPE ORGANIZER

Organize your videotapes with this program. Allows you to index tapes by title, rating, type, play time and comments. Also allows you to sort titles alphabetically & view/print selected tapes. If you own a VCR, this program is a MUST!! Disk $19.95 (CoCo 2 version included)

COCO 3 SCREEN DUMP

Fantastic

32, 40, 80 column text dump, PMODE 4 Graphics Dump. Single Keystroke Operation allows you to take snapshots of your screens even when programs are running! Works on DMP's, Epson, Gemini and compatibles. CoCo 1, 2 and 3. Disk **$24.95**

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Let the CoCo keep track of your bills. Allows you to enter bills under various categories and reminds you when they are due. Disk **$19.95**

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Generate monthly calendars on your printer for any year in the 20th century. Disk Only **$19.95** (CoCo 2 version included)

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Advanced disk operating system for CoCo 3. Comes on disk and is EPROMable!! Disk **$34.95.** **ADOS** (for CoCo 1,2): **$27.95**

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User friendly graphics interface with multiple "window" applications for Level II. Only **$54.95**

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Best OS9 Editor/Word Processor Text Formatter. Has Keyboard Macros, supports terminals & windows simultaneously, configurable, auto-indent for C/Pascal programming, mail-merge. New Manual makes it easier than ever. Only **$149.95. DynaSpell $49.95. Both Dynastar and Dynaspell: Only $174.95**

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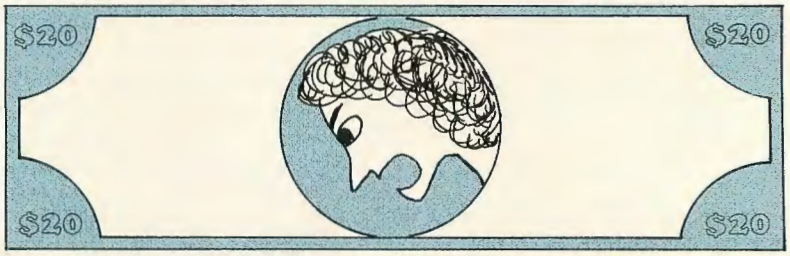
A program to help roommates organize expenses in a fair, precise manner

Bills!



Bills!

Bills!

By David Turner

```
Susan
STATEMENT DUE DATE IS: 10-15-88
RENT                        $175.00
PHONE                        $17.10
CATV                         $17.50
WATER/SEWER                  $15.00
GAS                           $0.00
TRASH                        $25.00
ELECTRICITY                  $62.25
TOTAL                       $311.85

UNPAID FROM LAST BILL       -$15.50 CREDIT

PAYMENT                     $320.00

TOTAL NOW DUE               -$23.65 CREDIT

Susan TO DATE TOTALS
  PAYMENTS      RENT      PHONE      CATV   ELECTRIC      WATER        GAS      TRASH
   $640.00   $350.00     $36.60    $35.00    $114.75     $30.00       $0.00     $50.00
*****************************************************************************************


Lisa
STATEMENT DUE DATE IS: 10-15-88
RENT                        $175.00
PHONE                        $39.90
CATV                         $17.50
WATER/SEWER                  $15.00
GAS                          $38.00
TRASH                         $0.00
ELECTRICITY                  $20.75
TOTAL                       $306.15

UNPAID FROM LAST BILL         $0.50

PAYMENT                     $310.00

TOTAL NOW DUE                -$3.35 CREDIT

Lisa TO DATE TOTALS
  PAYMENTS      RENT      PHONE      CATV   ELECTRIC      WATER        GAS      TRASH
   $620.00   $350.00     $85.40    $35.00     $38.25     $30.00      $78.00      $0.00
*****************************************************************************************
```

Many people today have roommates. One of the main arguments that roommates have is bill payment — who pays what and how much. *Roommate* helps solve that problem and keeps a record of expenses and payments.

When starting the program, you are asked if you are creating a new file or loading a previous file. If you are creating a new file, you are asked the name of the roommate and given a list of expenses. The percentage of each expense to be paid is entered as a whole number, i.e., 90 percent = 90 not .90. When you have entered all the expenses of that roommate, you are prompted for information on the next roommate. Once you have entered information on all roommates, press ENTER to continue the program.

Next, you are asked if you want a printout of each expense that is percentage paid. The printout lists the roommate number and the corresponding percentage of payment per expense. Note that you may exceed 100 percent on any expense, total expenses, or the overall sum of expenses.

You are then asked if you need to change a roommate. This will include the name and all expenses. Simply answer the questions.

David Turner, an Emergency Medical Technician in Little Rock, is interested in computers, photography and astronomy, and has written custom programs for business.

Books That Can Launch A 1000 Programs!!

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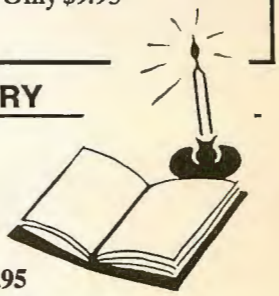
COCO LIBRARY



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Color Computer Disk Manual (with ref card): **$29.95**

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COCO MAX III (with hi-res interface): **$79.95**
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MAXFONTS #1,.#2,#3,#4: Disk **$19.95** Each
CGP-220 Driver Kit For CoCo Max III: **$19.95**
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TELEWRITER 64 (COCO 1&2) :Disk **$57.95** Tape **$47.95**
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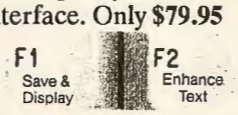
NEW!

The hottest program for your CoCo 3!! Imagine using Windows, Pull-Down Menus, Buttons, Icons, Edit Field, and Mouse Functions in your Basic Programs. No need to use OS9. It uses the 640x255 (or 320x255) hires graphics mode for the highest resolution. Up to 31 windows can appear on the screen at one time. Need extra character sets? Window Master supports 5 fonts in 54 sizes! How about an enhanced Editor for Basic? It gives you a superb Basic Editor which leaves the standard EDIT command in the cold. And don't forget that many existing Basic/ML programs will operate under Window Master with little or no changes. In fact, it does NOT take up any memory from Basic. Requires 1 Disk Drive, RS Hi-res Interface & Joystick or Mouse. Specify 128K/512K. **$69. 95** Window Master & Hi-Res Interface. Only **$79.95**

FUNCTION KEYS



Use F1,F2, ALT, CTRL Keys on your CoCo 3!!! If you program in Basic, this program is a must! Only **$14.95**

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The program now asks if you need to change the percentage paid. This is similar to the previous prompt. It simply verifies the percentages of payment for each roommate.

Now the program asks for the following expenses: Rent, Phone, CATV, Water/Sewer, Gas, Trash and Electricity. Enter the monthly amounts.

You may give the bill's due date and use the date as a reference for your statements.

The printout option gives you a printout that details expenses and payments. The screen print option lists the expenses on the screen. This is generally used as a review. Use SHIFT-@ to stop scrolling.

After completing the printouts, you are asked to save the data. The data file uses an extension to label each month. You might use the last digit of the year and the month number. For example, January, 1988 becomes 801. December 1988 becomes 812. January 1989 becomes 901. This enables you to keep monthly records on disk. The program also lets you delete the previous month.

If you want to convert this program to cassette, change the following lines:

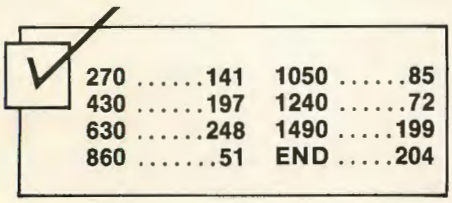
```
1510 OPEN"O",#-1,FP$
1530 WRITE#1 to WRITE#-1
1550 CLOSE#-1
```

```
1610 OPEN"I",#-1,EC$
1630 IFEOF(-1)THEN1660
1640 INPUT#1 to INPUT#-1
1660 CLOSE#-1
```

And delete lines 1490, 1560, and 1590.

Roommate solves many of the problems involved with sharing apartment expenses. The program can help roommates remain friends.

(Questions or comments concerning this program may be directed to the author at P.O. Box 5062, Little Rock, AR 72225. Please enclose an SASE when requesting a reply.) □



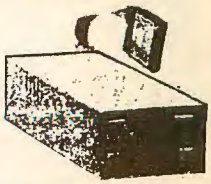
270	141	1050	85
430	197	1240	72
630	248	1490	199
860	51	END	204

The listing: ROOMMATE

```
1Ø 'COPYRIGHT 1988
2Ø 'BY DAVID H. TURNER
3Ø 'POB 5Ø62
4Ø 'LITTLE ROCK, ARK.  72225
5Ø CLEAR1ØØØ
6Ø VERIFYON
7Ø CLS
8Ø INPUT"<L>OAD PREVIOUS DATA OR
        <C>REATE NEW DATA";R$:I
FR$="L"THEN158ØELSEIFR$="C"THEN9
ØELSE7Ø
9Ø Z=Ø
1ØØ Z=Z+1
11Ø IFZ>6THEN23Ø
12Ø CLS
13Ø PRINT"ROOMMATE #"Z
14Ø LINEINPUT"NAME ";NA$(Z)
15Ø INPUT"$ PAY FOR RENT";RC(Z)
16Ø INPUT"$ PAY FOR PHONE";PC(Z)
17Ø INPUT"$ PAY FOR CATV";CC(Z)
18Ø INPUT"$ PAY FOR WATER ";WA(Z
)
19Ø INPUT"$ PAY FOR GAS ";GA(Z)
2ØØ INPUT"$ PAY FOR TRASH";SC(Z)
21Ø INPUT"$ PAY FOR APL";AC(Z)
22Ø GOTO1ØØ
23Ø CLS
24Ø INPUT"DO YOU WANT A PRINTOUT
  Y/N:";R$
25Ø IFR$="Y"THENJ=(-2)ELSEJ=Ø
26Ø PRINT#J,"RMMT*RENT *PHONE *C
ATV *APL      *WATER      *GAS  *
TRASH"
27Ø Z=Ø
28Ø Z=Z+1
29Ø IFZ>6THEN38Ø
3ØØ PRINT#J,Z"  ";:PRINT#J,USING
"###";RC(Z);
31Ø PRINT#J,"     ";:PRINT#J,USI
NG"###";PC(Z);
32Ø PRINT#J,"   ";:PRINT#J,USING
"###";CC(Z);
33Ø PRINT#J,"  ";:PRINT#J,USING"
###";AC(Z);
34Ø PRINT#J,"          ";:PRINT#J
,USING"###";WA(Z);
35Ø PRINT#J,"      ";:PRINT#J,US
ING"###";GA(Z);
36Ø PRINT#J,"     ";:PRINT#J,USI
NG"###";SC(Z)
37Ø GOTO28Ø
38Ø PRINT:PRINT:
39Ø INPUT"DO YOU WANT TO CHANGE
A ROOMMATEY/N";R$
4ØØ IFR$="Y"THEN41ØELSEIFR$="N"T
HEN51ØELSE39Ø
41Ø PRINT"NAME                #"
42Ø Z=Ø
43Ø Z=Z+1
44Ø IFZ>6THEN46Ø
45Ø PRINTNA$(Z);:PRINTTAB(18)Z:G
OTO43Ø
46Ø INPUT"WHICH ONE";Z
47Ø LINEINPUT"NAME ";NA$(Z):INPU
T"$ PAY RENT";RC(Z):INPUT"$ PAY
PHONE";PC(Z):INPUT"$ PAY CATV";C
C(Z):INPUT"$ PAY APL";AC(Z)
48Ø INPUT"$ PAY WATER ";WA(Z):IN
PUT"$ PAY GAS ";GA(Z):INPUT"$ PA
Y TRASH";SC(Z)
```

DISK DRIVES

New Double-Sided Double-Density 360K 40-Track 1/2 ht drives for CoCo 2 & 3. These are the same quality drives that are used in IBM® compatible computers. Buy from someone else and all you get is a disk drive. Buy from us and not only do you get a quality drive but $50 of Free Disk Utility Software (Super Tape/Disk Transfer & Disk Utility 2.1A) and our DISKMAX utility which allows you to access BOTH sides of our drives. It's like buying TWO drives for the price of ONE!! 90-day warranty on all drives!



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KEYBOARD EXTENSION CABLE: Move your keyboard away from the computer & type with ease. Use your existing keyboard with this cable or leave your present keyboard intact and use a second keyboard. Only **$39.95.**

Cable with CoCo 2 Keyboard: $49.95
Cable with CoCo 3 Keyboard: $69.95
CoCo 3 Keyboard (with free FUNCTION KEYS software value $14.95):**$39.95**
CoCo 2 Keyboard: $19.95

NX-1000 Rainbow Printer

Fully Epson Compatible 7 Color Printer.

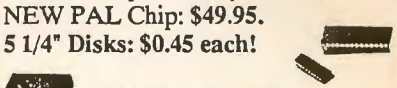
Only $259

CABLES

MAGNAVOX 8505/8515/8CM643 Analog RGB Cable: **$24.95**
SERIAL-TO-PARALLEL INTERFACE: Use your parallel printer at high speed (300-9600 baud) with CoCo. Comes will all cables. No software compatibility problems. Only **$44.95**
15" MULTIPAK/ROMPAK EXTENDER CABLE: $29.95
VIDEO DRIVER: Use a monochrome/color monitor with your CoCo. Comes with audio/video cables. Specify CoCo 1 or 2. Excellent picture quality/resolution! **$34.95**
RS232 Y CABLE: Hook 2 Devices to the serial port. Only **$18.95**
Y CABLE: Use your disk system with Speech Pak,CoCo Max, DS69, etc. **$27.95**
RGB Analog Extender Cable:$19.95
SONY Monitor Cable: $29.95
VIDEO CLEAR: Reduce TV interference.**$19.95**
MODEM CABLE:4 pin to DB25.Only **$19.95**
3-POSITION SWITCHER: $37.95
HI-RES JOYSTICK INTERFACE: $11.99

CHIPS, ETC

Disk Basic Rom 1.1 (Needed for CoCo 3): **$29.95** **ECB ROM 1.1:$29.95**
68B09E or 6809E Chip: $14.95
MultiPak PAL Chip for CoCo 3: **$19.95**
PAL Switcher: Now you can switch between the CoCo 2 and 3 modes when using the Multi-Pak. You need the OLDER & NEW PAL chip for the 26-3024 Multipak. Only $39.95. With NEW PAL Chip: **$49.95.**
5 1/4" Disks: $0.45 each!



UPGRADES

512K Upgrades for CoCo 3: **$CALL**
64K Upgrade for CoCo I's, CoCo II's with Cat #26-3026/27, 26-3134, 26-3136: **$29.95**
64K Upgrade for 26-3134 A/B CoCo II: **$39.95**
(Free 64K Utility Software incl. with 64K Upgr.)

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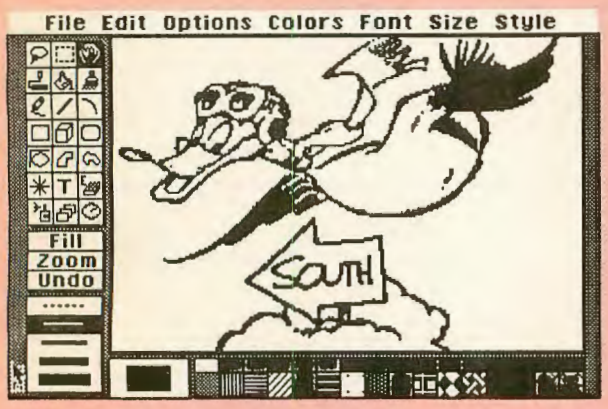
NEW REAL DESKTOP

CoCo Max™ III AND



CoCo Max III is absolutely the best drawing package available for the CoCo 3, and it does more than just let you draw. **CoCo Max III** includes animation, text, color mixing and more features than you would think possible. It combines incredible speed with dazzling graphics and it is a joy to use even its most powerful features.

Pictures, graphs, flyers, cards, signs, school projects, labels, buttons and anything else you might dream of creating is now possible with **CoCo Max III**. Is it any wonder that the majority of CoCo Gallery pictures in the last five months were created with **CoCo Max?**

Thousands of CoCo users have found that you don't have to be an artist to have fun with **CoCo Max**. You'll wonder why you waited so long to get the incredible **CoCo Max III**.

CoCo Max III is the best because it includes:
– a huge picture area (*two* full hi-res 320x192 screens) – a large editing window – Zoom mode for detail work – 28 drawing tools which you just point and click on – shrink and stretch – rotation at any angle (1.5 degree steps) – 512K memory support (*all* features work with 128K too) – an Undo feature to correct mistakes – you can even Undo an "Undo" – Animation – special effects – color sequencing (8 colors, variable speed) – thirteen fonts (more available) – each font has eight different sizes – five style options (bold, italic, 3D, etc.) for thousands of font/size/style combination possibilities. – the CoCo Show "slide show" program – color editing of patterns – automatic pattern alignment – prints in single and double size – smart lasso (move text over a background...) – advanced tools: arc, ray, cube, etc. – select 16 of the 64 colors (all 64 colors are displayed at once for selection!) – picture converter (CoCo Max II, MGE, BASIC) – extensive prompting – "glyphic" clipbook of rubber stamps – double click shortcuts – color mixing (additive/subtractive/none) – money back guarantee – sophisticated data compression saves disk space – pull down menus (no commands to remember) – forty paintbrush shapes – two color lettering – spray can – scrapbooks of pictures – error free – Y-cable or multipack not required – high speed hi-res interface included (plugs into joystick port) – disk is not copy protected – amazing "flowbrush" – RGB and composite monitor support – replace color – printing on black and white printers in five shades of gray – full color printing with optional drivers for the NX-1000 Rainbow and CGP220 – entirely rewritten for the CoCo 3

There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. **CoCo Max III** *is the ultimate program for the CoCo 3. –Rainbow review 4/88*

CoCo Max III: $79.95
Max-10 owners: deduct $10

System Requirements:
CoCo 3 disk system and a Joystick or Mouse

Printer drivers included:
IBM/Epson and compatibles, GEMINI, DMP105/106/130,OKI182/192, CGP220 (B&W), DMP110, DMP200

Color printer drivers (prints 125 different colors) Star NX-1000, CGP-220, or Okimate 20 each **$19.95**

For all CoCo Max Versions
Max Edit Font Editor: A font is a set of characters of a particular style. With Max Edit you can create new fonts or modify the existing ones. **$19.95**

Max Font disks (send for list) each **$19.95**

Max Font Set (95 fonts on 4 disks) **$49.95**

DS69/69B Digitizers: allows you to capture the image from a VCR or video camera and bring it into your computer. CoCo Max will let you load digitized pictures and modify them.

DS-69 (2 images per second. Requires multipak) **$99.95**

DS-69B (8 images/second) **$149.95**

CoCo 1 & 2 Owners Still Available:
(See previous ads or write for information)

CoCo Max II (works on all disk CoCos) **$69.95**

CoCo Max Tape (CoCo 1 & 2 only) **$59.95**

Y-Cable **$24.95**

CoCo Max II Picture Disk Set set of 3 disks: **$29.95**

Guaranteed Satisfaction
Use CoCo Max or Max-10 for a full month. If you are not delighted with either of them, we will refund every penny.

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A division of Sigma Industries, Inc.

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Add $3 per order for shipping ($5 to Canada, 10% to overseas)
CT residents add 7.5% sales tax

PUBLISHING

COLORWARE

Max-10™

THE DAZZLING WORD PROCESSOR

You probably already have a word processor, and you probably wish it had these features:

- Fully menu driven (CoCo Max style) with point and click marking of text. You don't need the arrow keys!
- True WYSIWYG (What You See Is What You Get) including variable size fonts, styles (bold, italics, etc.) and graphics.
- Can print multiple columns on a page.
- Not limited by printer capabilities: fonts up to 24 points (1/3") high, superscripts, small print, etc.
- Fully integrated spelling checker (incredibly fast), no need to exit program to check spelling.
- Graphics can be imported from just about anything (CoCo Max; MGE; BASIC; even Macintosh pictures from a BBS) and resized to fit your document.
- Full screen preview including graphics.

Max–10 has all these unique features, plus all the features you are used to in your current word processor. Even with all this, you don't give up anything. **Max–10** is easier to use, more intuitive, faster and more powerful than anything else. It's not just a word processor, it's a desktop publisher.

THE SLIPPED DISK

Max-10 released

Colorware Inc. today announced the release of the new version of their document creator for the Color Computer 3. The original version which had taken the CoCo community by storm was already being touted as the most innovative word processor for the CoCo 3.

to bring those pictures to life. Multiple columns of text and pictures, various built-in fonts and the capability to load many more as they are made available, spelling checking, and a handy preview function which displays an entire page as it will be printed. This is truly phenomenal!

In summary this reporter can do no better than to paraphrase a well known saying: a CoCo Max picture may be worth a thousand Max-10 words, but the whole is much more than the sum of its parts.

Drawing contest

Submit a good drawing of this little fellow and you just may win our grand prize.

Weather today

Bright, partly cloudy, 30% chance of rain possibly changing to scattered flurries overnight with a low of 33°. Tomorrow's high will be in the mid- to upper- 40's.

Cars #1 cat killers

A study recently conducted by the Rainbow Institute for Deranged Stuffed Animals reveals that the vast majority of feline deaths is due to collisions with heavy mid-size family sedans. No information was made

Now with this new version, Colorware has brought to the CoCo market something many have been clamoring for: a real desktop publishing system. Coupled with the already sensational CoCo Max III color graphic creator and editor, the new Max-10 can add words

PAGE 1

Max–10: $79.95

CoCo Max III owners: deduct $10

Max–10 requires a CoCo 3, at least 1 disk, & joystick or mouse

Printer drivers included: IBM/Epson and compatibles; DMP 105, DMP106, DMP130; CGP220 (B&W); Gemini/Star

Some of the many features of **Max–10:**

– Blinding speed – printing in multiple columns – online dictionary – spell checking – graphics can be mixed with text – full justification of proportionally sized characters – bold, italic, underline superscript and subscript type styles – superb file support, just point and click – "Undo" lets you correct mistakes – easy to use, no commands to remember – any graphics program can be used – pictures can be shrunk or stretched to fit – right and left alignment – centering – variable line spacing – page numbering – current page number displayed on the screen – variable tab stops – left and right margins – tabs and margins can vary in the same document – cut and paste text and graphics anywhere in the file – page break shows on the screen – pull down menus are quick and simple to use – lightning fast access to any point in the document with the scroll box – twenty fonts (styles and sizes), more available – any number of character sizes and styles can be mixed on the same line – up to more than 120 characters per line, depending on font size, style and letters – headers and footers, even with graphics – file compatibility with other word processors – right, left, bottom and top margins – word wrap – set starting page – type ahead – key repeat – key click – scroll up and down – ASCII file output for compatibility – disk directory – kill files– block cut, copy and move – global search and replace – paragraph indent – clipboard – merge – show file (on disk) – free memory display – page count – paragraph count – word count – graphics can be resized and moved – multiple fonts – error recovery – true lowercase – 512K memory support (all features work with 128K too) – complete point and click cursor control – moving, clearing and changing blocks of text is ridiculously easy, just point and click at each end of the text block – onscreen ruler – preview file before loading – search and replace – disk is not copy protected – more than 35 pages of text

CoCo Max III and Max–10 Perfect Together

You do not *need* **CoCo Max III** to insert and print graphics in **Max–10**. Max–10 works with any graphics creation program, and you can also use graphics downloaded from bulletin boards.

Similarly, you do not *need* **Max–10** to create graphics with text in **CoCo Max III**. There are tremendous lettering capabilities in **CoCo Max III**, with its many fonts, styles, and sizes.

Together **Max–10** and **CoCo Max III** are an unbeatable combination. This desktop publishing system is better than anything you've ever seen on a CoCo. We are so confident that you will use, and enjoy using the two software packages, that we offer an unconditional money back guarantee. Stop wasting your time and effort using inferior or obsolete products. Move up to the new generation of CoCo software now.

```
49Ø INPUT"ANOTHER CHANGE  Y/N";R
$:IFR$="Y"THEN41ØELSE5ØØ
5ØØ GOTO23Ø
51Ø '
52Ø 'loaded data and preparation
 for printing new statement
53Ø Z=Ø
54Ø CLS:INPUT"DO YOU WANT TO CHA
NGE % PAYS";R$
55Ø IFR$="Y"THEN41ØELSEIFR$="N"T
HEN56ØELSE54Ø
56Ø INPUT"RENT:";RE
57Ø INPUT"PHONE:";PH
58Ø INPUT"CATV:";CA
59Ø INPUT"WATER/SEWER:";WA
6ØØ INPUT"GAS:";GA
61Ø INPUT"TRASH:";TR
62Ø INPUT"ELECTRICITY:";KU
63Ø LINEINPUT"DATE BILL IS DUE "
;DD$
64Ø Z=Ø
65Ø Z=Z+1
66Ø IFZ>6THEN7ØØ
67Ø IF NA$(Z)="" THEN 69Ø
68Ø CLS:PRINTNA$(Z):INPUT"AMOUNT
 PAID:";PD(Z)
69Ø GOTO65Ø
7ØØ 'printing statement
71Ø Z=Ø
72Ø Z=Z+1:IFZ>6THEN145Ø
73Ø IFNA$(Z)=""THEN144Ø
74Ø PRINTNA$(Z);:INPUT" PRINTOUT
  Y/N";HC$
75Ø IFHC$="Y"THENJ=(-2)ELSEJ=Ø
76Ø PRINT#J,NA$(Z)
77Ø PRINT#J,"STATEMENT DUE DATE
IS: "DD$
78Ø PRINT#J,"RENT";
79Ø PRINT#J,TAB(23);
8ØØ PRINT#J,USING"$$,####.##";((
RC(Z)*RE)/1ØØ)
81Ø PRINT#J,"PHONE";
82Ø PRINT#J,TAB(26);
83Ø PRINT#J,USING"$$##.##";((PC(
Z)*PH)/1ØØ)
84Ø PRINT#J,"CATV";
85Ø PRINT#J,TAB(25);
86Ø PRINT#J,USING"$$###.##";((CC
(Z)*CA)/1ØØ)
87Ø PRINT#J,"WATER/SEWER ";:PRIN
T#J,TAB(25);:PRINT#J,USING"$$###
.##";((WA(Z)*WA)/1ØØ)
88Ø PRINT#J,"GAS ";:PRINT#J,TAB(
25);:PRINT#J,USING"$$###.##";((G
A(Z)*GA)/1ØØ)
89Ø PRINT#J,"TRASH";:PRINT#J,TAB
(26);:PRINT#J,USING"$$##.##";((S
C(Z)*TR)/1ØØ)
```


Real BASIC for OS9!

Only $39.95

```
OS-9 LEVEL TWO VR. 02.00.01
     COPYRIGHT 1986 BY
  MICROWARE SYSTEMS CORP.
  LICENSED TO TANDY CORP.
    ALL RIGHTS RESERVED

July 11, 1988   14:37:30

Shell

OS9: xmode /w6 type=0
OS9: iniz /w6
OS9: rsb <>>>/w6 &
&007
```

CLEAR

```
RSB COPR. 1988 BURKE & BURKE
DISK EXTENDED COLOR BASIC 2.1
COPR. 1982, 1986 BY TANDY
UNDER LICENSE FROM MICROSOFT
AND MICROWARE SYSTEMS CORP.

OK
LOAD "DEMO"
OK
LIST
10 PMODE 4:SCREEN 1,1
20  X=RND(256)-1:Y=RND(192)-1
30  XS=RND(256-X)-1:YS=RND(192-Y)-1
40  LINE  (X,Y)-(X+XS,Y+YS),PSET,BF
```

CLEAR

Welcome to . . .

R. S. B.

See R.S.B. and other Burke & Burke products at the Princeton Rainbowfest. Don't miss our Hard Disk Seminar!

There is nothing wrong with your Color Computer. Do not attempt to adjust it. The BASIC you know and love is now running under Level 2 OS9 windows. You are in command.

Burke & Burke is proud to present another OS9 programming language: Disk Extended Color BASIC.

You've probably heard of this language. It's the one your Color Computer was born with. We're talking PMODE, DIR, COLOR, RENUM, PLAY and other familiar words. Under Level 2 OS9. In as many windows as your memory lets you create.

Our R.S.B. software creates an OS9-compatible version of Disk Extended Color BASIC by reading your CoCo's ROM chips. We add new software for OS9-style graphics, sound, printer, and disk I/O. Of course, you can't use R.S.B. to run machine language programs, and some BASIC commands work slightly differently under R.S.B. Although R.S.B. loads and saves files using OS9's file format, we've also included utilities to transfer BASIC programs and data files between OS9 and BASIC disks.

Did you know that Level 2 OS9 always runs at double-speed? This makes R.S.B. very fast. You must have a CoCo 3 with at least 128K RAM, and a floppy controller with Disk Extended Color BASIC 1.0, 1.1, 2.0, or 2.1 ROM, or CoCo 3 CDOS ROM, to use R.S.B.

Wild & MV Version 2.1 Use "wildcards" with most OS9 commands, or rearrange your directory tree. Features recursive directory searches. A hard disk must! **$19.95**

Check out these OS9 Utilities

Tools to let you spend less time fighting OS9, and more time using it.

EZGen Version 1.04 Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too. **$19.95**

Burke & Burke

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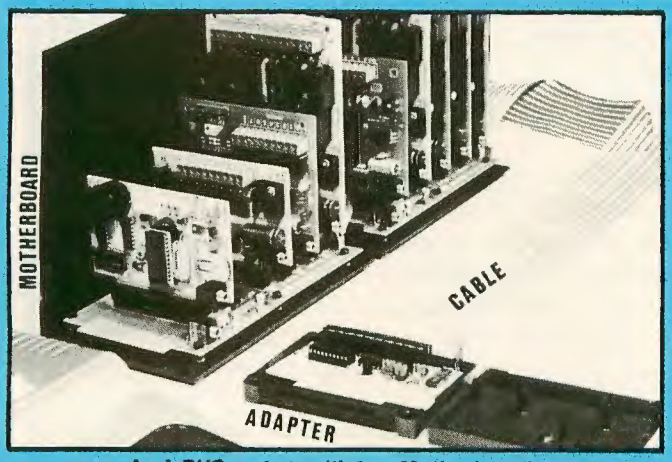
VISA

ILLINOIS RESIDENTS PLEASE ADD 7% SALES TAX. COD's add $2.20. Shipping (within the USA) $2.00 per CoCo XT; $1.50 per disk or ROM. Please allow 2 weeks for delivery (overnight delivery also available for in-stock items). Telephone orders accepted (312) 397-2898.

RAINBOW CERTIFICATION SEAL

The Amazing A-BUS

NEW



An A-BUS system with two Motherboards A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card — RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card — RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card — AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter — AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card — IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O — DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm — CL-144: $89

Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

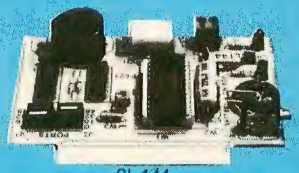
Touch Tone® Decoder — PH-145: $79

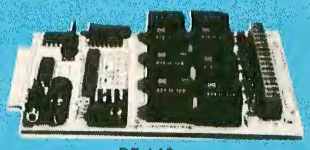
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

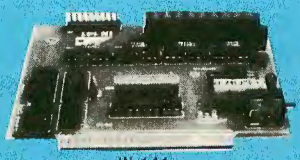
A-BUS Prototyping Card — PR-152: $15

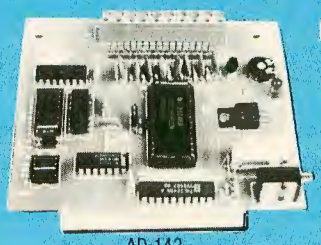
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s

ST-143


CL-144


RE-140


IN-141


AD-142

Smart Stepper Controller — SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option — RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option — PD-123: $89
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option — BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver — ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors — MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter)	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) — CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard — MB-120: $99

Each Motherboard holds 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 A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT & NY residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

a Sigma Industries Company

ALPHA Products

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"Maxsound...bringing a new era to the CoCo Community"
-Cray Augsburg, June '88 Rainbow Review

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CoCo Max III (CoCo III only) See April '88 review. Built in Animation! / Amazing Color Sequencing!!!

Comes with Hi-Res Interface, MINILOAD/BAS, Demo Disk, CoCo Show Pgm. Requires Joystick or mouse. Sale $74.95

MULTI-LABEL III (CoCo III only) See July '87 review. An easy to use, versatile label creating program including many new CoCo III features. Print multiple fonts on each label! This one's a MUST for the CoCo III!! Disk $16.95

FKEYS III (CoCo I/II/III) See April '87 review. A user friendly, programmable function key utility that creates up to 20 function keys. EDITOR, DOS mods, Single or Double sided, 35/40 tracks, DISABLE, and it's EPROMable!. Disk .. $19.95

SIXDRIVE (CoCo I/II/III) This machine language utility modifies DECB 1.0, 1.1, FKEYS III, or ADOS to allow the use of 3 double-sided drives (or 2 D/S drives and **J&R's RAMDISKS**) as 6 S/S drives. Disk $16.95

AUTO DIM (CoCo III only) See Jan. '88 review. This hardware device protects your monitor, or TV from IMAGE BURN after a few minutes of inactivity from your keyboard. Illustrated and easy to install. Hardware $29.95

MPI-CoCo Locking Plate (CoCo III only) **Now 2 styles** Protects your CoCo III and Multi Pak interface from destroying each other! Please specify MPI number 26-3024 or 26-3124 when ordering! Sale $7.95

NEW **Warrior King** (CoCo III only) Become Rastann, Warrior King, on a quest to regain his rightful crown hidden deep within his sinister land. Battle monsters, gain magic & weapons, and travel thru harsh wilderness & dark castle dungeons in this medieval realm. From the creator of Kung-Fu Dude comes this awesome arcade game for the CoCo III! Uses the most detailed 320 x 200 16 color graphics & high speed ML code to vault you into a world of fantasy! Dare ye challange the many perils ahead to become Warrior King? Requires 128k CoCo III, Disk drive, and Joystick $29.95

HALL OF THE KING TRILOGY (CoCo I/II/III) See June '86 & Nov '87 reviews. The epic adventure is back! The largest adventure campaign ever seen for the CoCo is again available. A total of 6 DISK SIDES of intense graphics adventure will have you playing for weeks! Each section is a 2 disk stand alone adventure, but all 3 together form an epic saga! Quest for the legendary earthstone in the ancient dwelling of the dwarfs while you enjoy the classic graphics that made this trilogy famous! Each adventure can be purchased separately for only $29.95, the lowest price ever, or you can SAVE and purchase the entire set for only $74.95. Requires 64k, Disk drive, (and composite monitor for the CoCo III). Please specify HALL of the King I, II, or III ..... $29.95 each or the entire 6 DISK Trilogy for only $74.95

In Quest of the Star Lord (CoCo III only) See Aug '88 review. This is THE graphics

adventure for the CoCo III! Unparalled 320 x 200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. Full **4 Disk sides** of mind loving adventure! Requires 128k CoCo III and Disk drive. **HINT SHEET** ..... $3.95 (+ $1.00 S&H by itself) Disk $34.95

KUNG-FU DUDE (CoCo I/II/III) See Feb. '88 review. An exciting arcade game. The **BEST** karate game ever for the CoCo! Destroy opponents and evade obstacles as you grow even closer to your ultimate objective! Spectacular graphics, sound effects, and animation! Requires 64k, Disk drive, and Joystick. Now displays color on CM8. Disk $24.95

PYRAMIX (CoCo III only) See Dec. '87 review. Brilliant colors, sharp graphics, and hot action in this 100% ML arcade game. You'll enjoy hopping Kubix around the pyramid, avoiding Kaderf, Smack, Smuck, & the Death Square! Disk .. $19.95

NEW **AD&D Character's Companion** (CoCo I/II/III) This great timesaving utility helps create compatible AD&D characters. Includes dice rolling routine, pick ability, race & class. Buy from the Players Handbook, magic items & spell materials. Save, load, and print character info. 3 Disk sides $24.95

White Fire of Eternity (CoCo I/II/III) See Dec '86 review. Enter the era of monsters & magic. Search for the legendary power of White Fire throughout the Forbidden Wood & Dark Caverns in this 64k animated adventure! Disk..$19.95

Champion (CoCo I/II/III) See May '87 review. Become a superhero in this action adventure! Disk..$19.95

Dragon Blade (CoCo I/II/III) See Nov '86 review. Slay evil dragon in this 64k animated adventure! Disk..$19.95

```
9ØØ PRINT#J,"ELECTRICITY";
91Ø PRINT#J,TAB(23);
92Ø PRINT#J,USING"$$,####.##";(K
U*(AC(Z)/1ØØ))
93Ø PRINT#J,"TOTAL ";
94Ø PRINT#J,TAB(23);
95Ø X(Z)=RC(Z)*RE/1ØØ
96Ø W(Z)=PC(Z)*PH/1ØØ
97Ø V(Z)=CC(Z)*CA/1ØØ
98Ø U(Z)=KU*(AC(Z))/1ØØ
99Ø L(Z)=WA(Z)*WA/1ØØ
1ØØØ M(Z)=GA(Z)*GA/1ØØ
1Ø1Ø O(Z)=SC(Z)*TR/1ØØ
1Ø2Ø PRINT#J,USING"$$,####.##";(
X(Z)+W(Z)+V(Z)+U(Z)+L(Z)+M(Z)+O(
Z))
1Ø3Ø T(Z)=X(Z)+W(Z)+V(Z)+U(Z)+L(
Z)+M(Z)+O(Z)
1Ø4Ø PRINT#J,"":PRINT#J,"UNPAID
FROM LAST BILL";:PRINT#J,TAB(25)
;:PRINT#J,USING"$$###.##";(BB(Z)
);:IF BB(Z)<ØTHENPRINT#J," CREDI
T"ELSEPRINT#J," "
1Ø5Ø PRINT#J,"":PRINT#J,"PAYMENT
";
1Ø6Ø PRINT#J,TAB(23);
1Ø7Ø PRINT#J,USING"$$,####.##";P
D(Z)
1Ø8Ø PRINT#J,"":PRINT#J,"TOTAL N
OW DUE";
1Ø9Ø PRINT#J,TAB(23);
11ØØ BA(Z)=(T(Z))-(PD(Z))+(BB(Z)
)
111Ø BB(Z)=BA(Z)
112Ø PRINT#J,USING"$$,####.##";(
BA(Z));
113Ø IF (BA(Z))>ØTHENPRINT#J," N
OW DUE"
114Ø IF (BA(Z))<ØTHENPRINT#J," C
REDIT"
115Ø PRINT#J,""
116Ø PRINT#J,NA$(Z)" TO DATE TOT
ALS"
117Ø RT(Z)=RT(Z)+X(Z)
118Ø PR(Z)=PR(Z)+W(Z)
119Ø CT(Z)=CT(Z)+V(Z)
12ØØ UT(Z)=UT(Z)+U(Z)
121Ø PT(Z)=PT(Z)+PD(Z)
122Ø F(Z)=F(Z)+L(Z)
123Ø G(Z)=G(Z)+M(Z)
124Ø H(Z)=H(Z)+O(Z)
125Ø IFHC$<>"Y"THEN72Ø
126Ø PRINT#J,TAB(2)"PAYMENTS";
127Ø PRINT#J,TAB(16)"RENT";
128Ø PRINT#J,TAB(25)"PHONE";
129Ø PRINT#J,TAB(36)"CATV";
13ØØ PRINT#J,TAB(42)"ELECTRIC";
131Ø PRINT#J,TAB(55)"WATER";
132Ø PRINT#J,TAB(67)"GAS";
133Ø PRINT#J,TAB(75)"TRASH"
134Ø PRINT#J,USING"$$,####.##'
PT(Z));
135Ø PRINT#J,TAB(1Ø);:PRINT#J
ING"$$,####.##";(RT(Z));
136Ø PRINT#J,TAB(19);:PRINT#J
ING"$$,####.##";(PR(Z));
137Ø PRINT#J,TAB(26);:PRINT#J
ING"$$,####.##";(CT(Z));
138Ø PRINT#J,TAB(4Ø);:PRINT#J
ING"$$,####.##";(UT(Z));
139Ø PRINT#J,TAB(49);:PRINT#J,US
ING"$$#,###.##";(F(Z));
14ØØ PRINT#J,TAB(57);:PRINT#J,US
ING"$$#,###.##";(G(Z));
141Ø PRINT#J,TAB(65);:PRINT#J,US
ING"$$#,###.##";(H(Z))
142Ø PRINT#J,STRING$(8Ø,36)
143Ø PRINT#J,"":PRINT#J,""
144Ø GOTO72Ø
145Ø 'save to disk
146Ø CLS:INPUT"READY TO SAVE TO
DISK  Y/N";R$:IFR$="Y"THEN147ØEL
SEEND
147Ø INPUT"LAST THREE LETTERS FO
R PASSCODE";LT$
148Ø FP$="MATE"
149Ø PC$=FP$+LT$
15ØØ VERIFYON:INPUT"PRESS <ENTER
> WHEN READY";R$
151Ø OPEN "O",#1,PC$
152Ø FORZ=1TO6
153Ø WRITE#1,NA$(Z),PT(Z),RT(Z),
PR(Z),CT(Z),UT(Z),BB(Z),F(Z),G(Z
),H(Z),RE,PH,CA,AP,WA,GA,TR,RC(Z
),PC(Z),CC(Z),AC(Z),WA(Z),GA(Z),
SC(Z)
154Ø NEXTZ
155Ø CLOSE#1
156Ø INPUT"READY TO DELETE OLD F
ILE  Y/N";RD$:IFRD$="Y"THENINPUT
"NAME OF OLD FILE:";OF$:OF$="MAT
E"+OF$+"/DAT":KILL OF$
157Ø END
158Ø 'load old data from disk
159Ø INPUT"ENTER LAST THREE LETT
ERS OF CODE";LC$
16ØØ EC$="MATE":LE$=EC$+LC$
161Ø OPEN"I",#1,LE$
162Ø FORZ=1TO6
163Ø IFEOF(1)THEN166Ø
164Ø INPUT#1,NA$(Z),PT(Z),RT(Z),
PR(Z),CT(Z),UT(Z),BB(Z),F(Z),G(Z
),H(Z),RE,PH,CA,AP,WA,GA,TR,RC(Z
),PC(Z),CC(Z),AC(Z),WA(Z),GA(Z),
SC(Z)
165Ø NEXTZ
166Ø CLOSE#1
167Ø GOTO52Ø
```

*"In the beginning there was **VIP Writer** and users saw that it was good..*
It was still the best thing around for the CoCo, But it's not the best anymore.
There's a new word processor to claim the crown... VIP Writer III.
Setting the Standard for CoCo 3 Word Processing."

–The RAINBOW SEPTEMBER 1988

VIP WRITER III VS THE COMPETITION

VIP Writer has ALWAYS led the pack with features and now VIP Writer III still leads the way! The chart below illustrates this fact. Telewriter 128 only gives you 48K for text. Why is it called Telewriter 128? Word power 3 gives only 72K! VIP Writer III makes use of over 106K! VIP Writer III is the ONLY CoCo 3 word processor worthy of it's name!

WORD PROCESSOR COMPARISON CHART

CoCo3 with 128K	VIP Writer III	Telewriter 128	Word Power 3
Text Storage	OVER 49,000	48,000	72,000
Print Spooler	YES 57,000	NONE	NONE
Total Storage	**106,000**	48,000	72,000
Spelling Checker	**VIP Speller**	NONE	FREE WARE
Screen Display	32/40/64/80	40/80	80

SCREEN DISPLAY OPTIONS

As the chart above shows - VIP Writer III offers more screen width options -all with 24 lines and actual lower case letters. It uses the CoCo 3's hardware display and double clock speed and is VERY VERY FAST! You can choose fore and background colors from up to 64 different hues. Color can be turned ON or OFF for the best possible display using a color or monochrome monitor or TV set. VIP Writer III has a built in on-line context sensitive help facility which displays command usage in easy to read colored windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

TEXT FILE STORAGE

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII file format. You can use VIP Writer III to even create BASIC programs! There is a 49K text buffer and disk or cassette file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display disk directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems HARD DISK.

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typamatic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE within your text file!

PREVIEW PRINT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, orphan lines etc.

PRINTING

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

PRINT SPOOLING

Save up to $150 on a print spooler because VIP Writer III has a built in print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job!

SPELLLING CHECKER

VIP Writer III includes VIP Speller AT NO ADDITIONAL COST! VIP Speller checks text for misspelled words and has a 50,000 word dictionary that can be added to or edited.

DOCUMENTATION

VIP Writer III is supplied with a 125 page instruction manual which is well written and includes many examples. The manual has a tutorial and glossary of terms for the beginner as well as a complete index! VIP Writer III includes VIP Speller. DISK $79.95

VIP Writer owners: Upgrade to the VIP Writer III Disk for $49.95 + $3 S/H. Send ORIGINAL disk and $52.95 total.

VIP Database III

VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground, background, hilite and cursor colors for EASY DATA ENTRY. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. IN-MEMORY SORT of records is LIGHTNING FAST and provides for easy listing of names, figures, addresses, etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. The built-in mail-merge lets you sort and print mailing lists, print form letters, address envelopes - the list is endless. The built-in MATH PACKAGE even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator with unlimited print format capabilities including embeddable control codes for use with ALL printers. DISK $69.95

VIP Database owners: Upgrade to the VIP Database III for $39.95 + $3 S/H. Send ORIGINAL disk and $42.95 total.

VIP Library
/Writer Database Enhanced

The VIP Library /WDE combines all six popular VIP application programs - VIP Database III, VIP Writer III, VIP Speller, VIP Calc, VIP Terminal and VIP Disk-ZAP - into one program on one disk! The program is called VIP Desktop. From the desktop you have instant access to word processing with a spelling checker always in attendance, data management with mail merge, spreadsheet financial analysis, telecommunications and disk maintenance. * DISK $169.95

VIP Library owners: Upgrade to the VIP Library /WDE for $89.90* + $3 S/H. Send ORIGINAL disk and $92.90 total.

* Future VIP Library upgrades available at reduced cost.

All products run under RSDOS and are not copy protected.

SD ENTERPRISES

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Please add $3 for shipping and handling. Outside continental US add $4 S/H. COD orders add an additional $2.25. Checks allow 3 weeks for delivery. All other orders are shipped the same day.

Telewriter 128 is a trademark of Cognitec. Word Power 3 is a trademark of Microcom Software.

The CoCo Gallery

1st

COCO 3

Mill
Gerald E. Adams

Gerald used *CoCo Max III* to illustrate this graphic scene. He is retired and lives in Bremen, Indiana.

2nd

Multichromatic Spheres
Mark Sexton

Mark, of Madera, California, used BASIC and the CoCo 3 for this interesting graphic, then compressed it with an ML program he developed. He is a senior in high school and is fascinated with graphic arts.

SHOWCASE YOUR BEST! You are invited to submit original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

We are taking "CoCo Gallery" to RAINBOWfest Princeton! See Page 117 for details.

3rd

Dragon's Lair, Dragon Slayer

Keith Schuler

Using the CoCo 3 and a program he wrote, Keith developed this depiction of a mythological battle. He enjoys drawing, swimming and using his CoCo.

HONORABLE MENTION

Independence Hall

Brad Bansner

Brad, of Wyomissing, Pennsylvania, used *Color Max Deluxe* to create this illustration of Independence Hall, located in Philadelphia.

1st

COCO 1 & 2

Pirate

Bill & Bob Flock

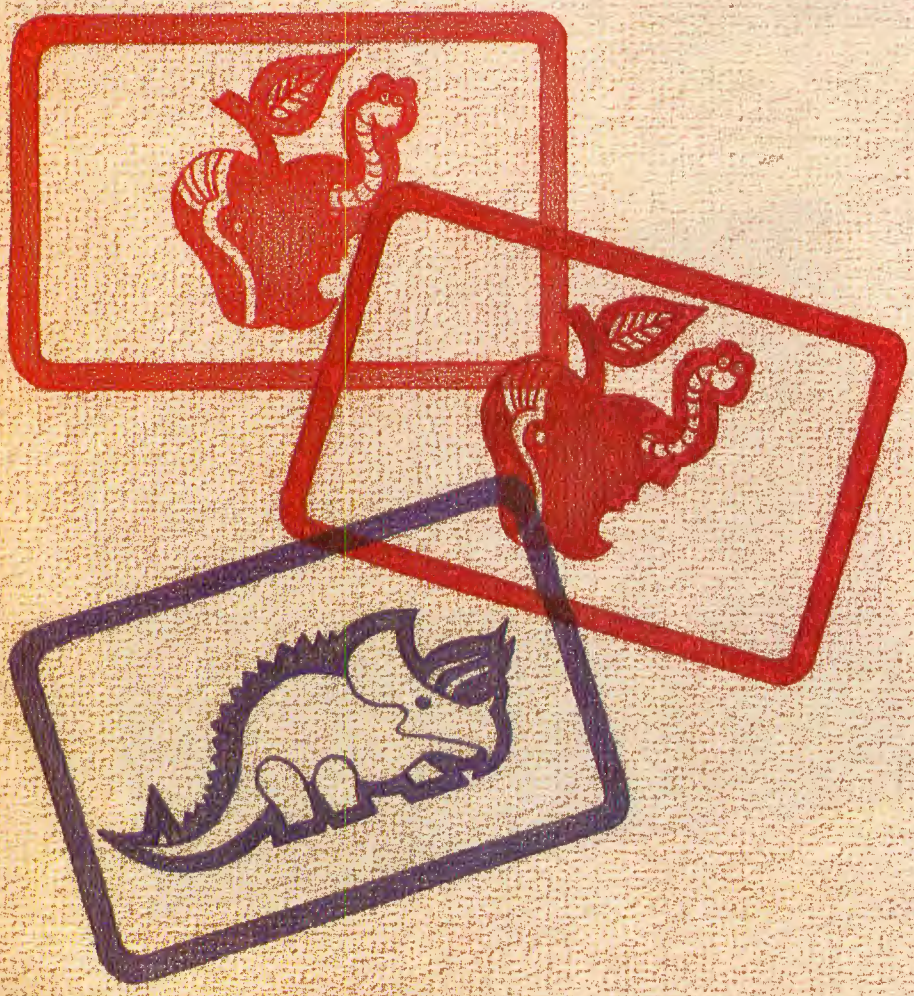
BASIC and the CoCo 2 were used to develop this depiction. Brothers Bill and Bob live in Norwalk, Wisconsin, and enjoy working with computers and programming in BASIC.

Two new graphics commands for PMODE image manipulation

Super Stamper:

The Elastic Rubber Graphics Stamp

By Jeremy Spiller



Take a graphics picture and stretch it, shrink it, turn it upside down and inside out. Enlarge it, rotate it, skew it and distort it. Print it all over your TV screen as many times as you want. Each time you do, one simple command can make it as large, small, distorted or rotated as you like. *SuperStamper* allows you to do all this.

SuperStamper is a graphics tool for use with PMODE 3 or 4 screens, similar to the GET and PUT statements but with several sizable differences. It is a machine language program that can easily become a part of BASIC in your 64K CoCo 1 or 2, or in your CoCo 3.

SuperStamper adds two new commands to BASIC — SGET and SPUT. They do not replace BASIC's GET and PUT statements, but operate alongside them. They live in high memory and do *not* take up any of the memory BASIC uses for programming and data. Unlike GET and PUT, SGET and SPUT do not require that you dimension an array to store what you SGET; this saves valuable memory for your program.

Jeremy Spiller, a high school senior, has been programming since age 12. He is now selling his programs as GoSub Software.

Telewriter-128™

the Color Computer 3 Word Processor

For over 5 years now, Telewriter has been the #1 Color Computer word processor, both in popularity and in performance. Telewriter's near perfect mix of sophisticated professional features and a very natural user interface, has earned it the highest praise in numerous magazines, and an intensely loyal following among tens of thousands of Color Computer users all over the world.

HISTORY

Throughout the history of the Color Computer, Telewriter has pioneered software breakthroughs that set the standards.

In 1981, it was Telewriter 1.0 that first took the Color Computer's inadequate 32X16 all-uppercase display, and replaced it with a graphics-based 51X24 upper and lowercase display.

A few years later, Telewriter-64 added high density 64X24 and 85X24 displays and access to the full 64K of the newer Color Computers.

THE NEW AGE

Today, Telewriter-64 is recognized as the standard Color Computer word processor. It runs on all Tandy Color Computers — from the original Color Computer 1, to the Color Computer 2, and 3.

But the Color Computer 3 brings a whole new level of power to low cost computing and, so, a new Telewriter is here to put that power to work for you. We call it Telewriter-128.

TELEWRITER-128

You don't mess with a good thing, so Telewriter-128 is still Telewriter-64 at heart. The commands, and the user interface are essentially the same. If you know Telewriter-64, then you already know Telewriter-128. And, if you don't know Telewriter-64, you'll still have an easy time learning and using Telewriter-128.

80 COLUMNS

But there are major differences as well. First, Telewriter-128 uses the Color Computer 3's new 80 column screen display.

This means, simply, that using Telewriter-128 on a low cost Color Computer 3 will look a lot like using a more expensive word processor on a much more expensive IBM PC, PS/2, or clone.

SPEED

Second, Telewriter-128 is lightning fast. Telewriter-64 was fast in its own right, but, by accessing the Color Computer 3's video hardware directly, and by running the machine in double speed mode, Telewriter-128 is able to provide extremely fast scrolling and instant paging — functions whose speed is crucial to serious word processing.

In this department, Telewriter-128 doesn't simply keep up with IBM-based word processors — it generally surpasses them!

EASE

Third, Telewriter-128 adds a host of new features big and small, that make it even easier to use.

Features like: Quick function key access to the editor or the menus — an instant on-line help screen summarizing all Telewriter commands and special characters — an option file where you store your personal set of format and screen settings so you only have to set them once!

Then, there's a quick save feature which allows you to save all your current work without leaving the editor. There's a simple way to cursor through the disk directory and read in a file by just hitting ENTER. And there's more.

NEW POWER

Telewriter-64 always had the power to handle any kind of serious writing, from letters to textbooks. But, here too, Telewriter-128 adds major features.

Like Macros — which let you insert whole words or phrases (even sets of control codes or format commands) into your text, with a single keypress. And every time you power up Telewriter-128, the macro definitions are automatically loaded*, so they're always there.

Then there's a Print Preview feature that shows you, on-screen, the way your printed text will look — with margins, headers, centering, justification, page numbering, and page breaks. This guarantees letter perfect documents every time, and makes tasks like widow/orphan line elimination, a breeze.

TELEWRITER-64 OR TELEWRITER-128

We could go on listing features, but the point is this: If you own a Color Computer, you already have the hardware for the most powerful, low cost word processor in town. All you need now is to add the heart and soul:

Telewriter-64, for the Color Computer 1 and 2, costs $59.95 on disk, $49.95 on cassette.

Telewriter-128 for the Color Computer 3 costs $79.95 on disk, $69.95 on cassette.

To order by Mastercard or Visa call (619) 755-1258 anytime, or send check or money order plus $2 shipping (Californians add 6% sales tax) to:

COGNITEC
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ed, *SuperStamper* remains BASIC until you reset or the computer. It will not hines without Extended r memory less than 64K. works only on PMODE 3 or 4 screens and does not work on the high resolution screens of the Color Computer 3. However, CoCo 3 owners can still use *SuperStamper* on their PMODE 3 or 4 screens (provided they switch to CoCo 2 mode — more on this later).

How It Works

Like the GET and PUT commands, SGET and SPUT allow you to specify a rectangle on your graphics screen for storage. Unlike the GET and PUT commands, however, SGET and SPUT allow you to specify three points instead of two. This turns the rectangle into a true parallelogram.

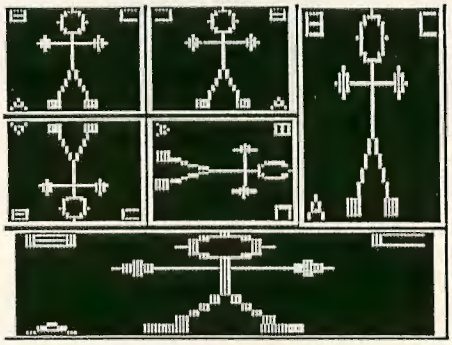
A parallelogram is a four-sided figure in which opposite sides are parallel. Squares and rectangles are special kinds of parallelograms, having right angles at the corners; but the corners don't have to be right angles in order for the opposite sides to remain parallel. By "SGETting" a piece of your graphics screen in a rectangular parallelogram and then "SPUTting" it in a parallelogram of another size, shape and orientation, you can distort, invert, shrink, enlarge or rotate whatever graphic elements were in the original parallelogram.

SuperStamper performs a beautiful mathematical ballet that recalculates the position of every pixel within your SGET parallelogram, and with SPUT, distorts the picture just as if it were made of rubber. The program is made even more versatile by its facility to lengthen or shorten the sides of the parallelogram, thereby enlarging or shrinking the picture.

You can shorten a picture in one dimension while elongating it in the other, giving the image a stretched appearance. Finally, you can rotate your parallelogram so that objects appear right-side-up, upside-down — or any rotational angle in between.

Once you have used the SGET command to specify your graphics parallelogram, you may stamp it all over the screen as many times as you want, using a newly defined parallelogram each time you SPUT it. With this stamping feature, you can draw a small picture in one part of the screen and use that picture to create many screenfuls of striking images. And because SGET and SPUT are compatible with all aspects of BASIC, you can use *SuperStamper* as part of any BASIC graphics program.

SuperStamper allows you to SGET any part of your PMODE 3 or 4 screen up to 256 pixels wide by up to 128 pixels deep. Any attempt to SGET or SPUT with larger numbers will give unexpected results.



Usage Syntax

The syntax for using SGET and SPUT in your BASIC statements is as follows:

```
SGET (AX,AY)-(BX,BY)-(CX,CY)
SPUT (AX,AY)-(BX,BY)-(CX,CY)
```

X specifies the horizontal position of each of the three points that define the parallelogram — a number from 0 to 255; 0 is on the left side of the screen.

Y specifies the vertical position of each of the three points — a number from 0 to 191; 0 is at the top of the screen, and 191 is at the bottom. AX,AY specifies the position of Point A. BX,BY specifies the position of Point B. CX,CY specifies the position of Point C.

Note that you do *not* have to specify an array or an action as you do in the GET and PUT commands. *SuperStamper* uses its own secret array hidden away in high memory, so you won't have to sacrifice any memory that would otherwise be used for your own program.

The SGET command will "lasso" any part of your graphics picture by drawing an imaginary parallelogram around it. The three arguments that follow SGET specify the three points on the screen that define the parallelogram:

SGET (Point A)-(Point B)-(Point C).

The computer always draws four imaginary lines. The first is drawn between points A and B, and the second between points B and C. These two lines define the parallelogram. The other two imaginary lines are drawn opposite and parallel to the first two so as to complete the parallelogram. They meet at imaginary Point D, which is always diagonally across from Point B. (Note that *no* line is drawn between points A and C.)

You may choose any shape parallelogram for "SGETting;" however, in most cases you will probably want to define a rectangle, as it is the easiest shape to keep track of. Once you have defined your SGET parallelogram, the computer copies it into a secret buffer where it is stored in a "standard" form for later stamping with the SPUT command.

SPUT has the same syntax as SGET. The first pair of coordinates following the SPUT define Point A; the second pair define Point B; and the third, Point C. The main thing to remember when using SPUT is that graphics elements that were near any given point when you defined your SGET parallelogram always remain near that point no matter where they are SPUT. For example, let's say you have a picture of a man with his arms and legs outstretched. His right hand is gloved and his left is not. You SGET him by specifying Point A near his right foot (the lower-left corner of the SGET rectangle); Point B near his right hand (the upper-left corner of the rectangle) and Point C near his left hand (the upper-right corner of the rectangle). Now you can stamp him with the SPUT command. If you specify Point A (the first pair of coordinates following the SPUT command) to be the *upper*-left corner of your SPUT rectangle, leaving points B and C to be the lower-left and lower-right corners, respectively, your man will appear upside down and backwards (inverted), just as if he were viewed in a mirror placed under his feet. His left hand now wears the glove instead of his right hand (see the figure for a screen dump of Listing 2's demo).

You can elongate your stick figure by specifying SPUT points farther apart than they were in the original SGET command. You could elongate him right to left while shortening him up and down. You can rotate him by having three points draw a non-vertical line between points A and B, and specifying a line between points B and C at a right angle to the line between points A and B. You can skew him by making Line AB non-vertical, but keeping line BC horizontal. And, of course, you can stamp him with no distortion at all.

Keying In for CoCo 3

Before trying to key in or run *SuperStamper* on a CoCo 3, you must put it into CoCo 2 mode by typing the following lines:

```
10 POKE &HFFDE,0
20 POKE 113,0
30 EXEC 40999
```

Program Organization

Listing 1 is the utility that boots the *SuperStamper* algorithm. It should be saved under the filename SUPRSTMP.BAS. Its function is twofold. First, it transfers the ROM into the all-RAM mode and installs the *SuperStamper* algorithm into the BASIC interpreter, giving it the ability to understand the SGET and SPUT commands. Second, it gives birth to a machine language "clone" of itself that can be saved to disk or tape and later reloaded to perform the same functions, only much faster.

Lines 1000 through 1170 contain the algorithm itself. *Every character in these lines must be correct or* Super-Stamper *will not work.* For this reason, I have included check sums so the computer can tell you if you have made an error. Do not renumber these lines!

The DATA *lines do not contain the letter 'O'! They do, however, contain many zeros!* If you get an error message when running the program, check to see if you have included an 'O' instead of a zero. It is helpful to know that these lines contain only the digits 0 through 9 and the letters A through F and that all the lines are the same length except for Line 1170.

The ML Clone

When executed, the ML clone transfers the computer into the all-RAM mode and installs the algorithm. Note that the ML clone is *not* the same program you keyed in; it is created by SUPRSTMP and lives in a special place in high memory protected from BASIC by Line 70 (CLEAR200,&H7E00). After creating the ML clone, SUPRSTMP will prompt you for a save to disk or tape. When you answer the prompt, the clone will be saved as STAMP.BIN. Once saved, you may install *SuperStamper* very quickly by loading and executing STAMP.BIN. You *must* use the following boot to load and execute:

```
10 CLEAR 200,&H7E00
20 LOADM"STAMP"
   (CLOADM for tape users)
30 EXEC
40 CLEAR 200,&H7FFF
```

Note that you cannot key in or run any program that contains SPUT or SGET unless you have first installed the *SuperStamper* algorithm by either running SUPRSTMP or by executing STAMP.BIN. The computer cannot understand the syntax of SPUT or SGET unless the operating system has been properly modified. The demo is no exception. Therefore, key in SUPRSTMP first and create an easily accessible copy of STAMP.BIN before beginning work on the demo.

It is important to your understanding of the program that you key in and study Listing 2. The listing is very much a part of the documentation for *Super-Stamper* and a graphic demonstration of what happens when you relocate points A, B and C. It contains examples of how to create mirror images and skewed, stretched, inverted and rotated stampings.

The REM statements attached to each SPUT line explain what it does. The important thing to note is not the exact location of each point, but the *relative* position of points A, B and C in each SPUT statement.

The SGET is always done in a rectangle with Point A in the lower-left corner, Point B in the upper-left and C in the upper-right. If your SPUT statement places Point A in the lower-right corner, Point B in the upper-right and Point C in the upper-left, you get a mirror image (see Line 540). If you leave Point A at the lower-left, but displace points B and

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C to the right, your graphics will be skewed in that direction. The box around the stick figure is 80 pixels wide and 60 pixels high. Note that in some of the lines I have allowed BASIC to add these dimensions right inside the parentheses. The term (0,65+60) is the same as (0,125).

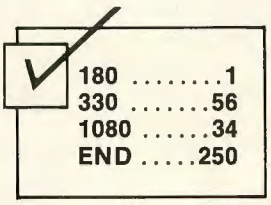
You can use any numerical expression *or variable* inside the parentheses.

Program Quirks

Keep in mind that you are working with digitalized images whose resolution depends upon the exact size and location of each pixel. Whenever you shrink an image using *SuperStamper*, you will lose some detail. Because each pixel is longer up and down than it is right to left, rotations will produce some distortion that you may be able to minimize by adjusting the exact size and position of each SPUT point.

You may be surprised at some of your results. When you skew a picture, you may find that it wraps around to the opposite side of the screen or is partly off the screen because you inadvertently placed Point D (the last corner of the parallelogram that you *didn't* specify in your SPUT statement) outside the 256-by-128 pixel limit.

(Questions or comments regarding these programs may be directed to the author at P.O. Box 1094, Townsend, MA 01469. Please enclose an SASE when writing for a reply.) □



Listing 1: SUPRSTMP

```
5 REM COCO 3 USERS MUST SWITCH
      TO COCO 2 MODE BEFORE KEY-
      ING IN OR RUNNING THIS
      PROGRAM. TYPE
      POKE&HFFDE,Ø:POKE113,Ø:
      EXEC&HAØ27
1Ø REM ************************
2Ø REM *     SUPERSTAMPER      *
3Ø REM *          BY           *
4Ø REM *    JEREMY SPILLER     *
5Ø REM *    COPYRIGHT 1988     *
6Ø REM ************************
7Ø CLEAR 1ØØØ,&H7EØØ
8Ø PO=&H7EØØ
9Ø FOR X=17 TO Ø STEP -1
1ØØ CLS:PRINT "COUNTDOWN =";X
11Ø PRINT "LINE";(17-X)*1Ø+1ØØØ
12Ø READ A$:CS=Ø
13Ø FOR Y=1 TO LEN(A$)-3 STEP 2:
A=VAL("&H"+MID$(A$,Y,2)):POKE PO
,A:PO=PO+1:CS=CS+A:NEXT Y
14Ø IF RIGHT$(HEX$(CS),3)<>RIGHT
$(A$,3) THEN PRINT"ERROR":STOP
15Ø NEXT X
16Ø EXEC &H7EØØ
17Ø CLS:PRINT"SUPERSTAMPER HAS N
OW BEEN IN-   STALLED AS A PART
OF BASIC":PRINT
18Ø PRINT"IT HAS ALSO BEEN STORE
D IN      MEMORY AS A MACHINE LA
NGUAGE    CLONE WHICH CAN BE SAV
ED TO DISKOR TAPE.  ONCE SAVED,
THIS CLONEMAY BE USED TO INSTALL
 SUPER-   STAMPER WITHOUT RUNNIN
G         SUPRSTMP.BAS.
19Ø PRINT:LINE INPUT"PLEASE PREP
ARE DEVICE AND PRESS (D)ISK OR (
T)APE AND (ENTER)    WHEN READY.
 YOU MAY ALSO PRESS  (BREAK) TO
QUIT.";A$
2ØØ IF A$="D" THEN SAVEM"STAMP.B
IN",&H7EØØ,&H7FB8,&H7EØØ ELSE IF
 A$="T" THEN GOSUB 33Ø ELSE 18Ø
21Ø PRINT
22Ø CLS
23Ø PRINT"TO INSTALL SUPER STAMP
, PLACE   THIS AT THE BEGINING O
F YOUR    PROGRAMS:"
24Ø PRINT
25Ø PRINT"1Ø CLEAR 2ØØ,&H7EØØ"
26Ø PRINT"2Ø ";
27Ø IF A$="T" THEN PRINT"C";
28Ø PRINT "LOADM"+CHR$(34);
29Ø PRINT"STAMP"+CHR$(34)
3ØØ PRINT "3Ø EXEC"
31Ø PRINT "4Ø CLEAR 2ØØ,&H7FFF"
32Ø CLEAR 1ØØØ,&H7FFF:END
33Ø CSAVEM"STAMP.BIN",&H7EØØ,&H7
FB8,&H7EØØ:RETURN
34Ø REM THE FOLLOWING DATA
    CONTAINS ONLY ZEROS, NO
    LETTER "OH"'S
1ØØØ DATA 1A5Ø8E8ØØØA6846384A184
27Ø36384397FFFDEEC847FFFDFEDDØE
1Ø1Ø DATA 818CEØØØ25F18EØ13E86Ø2
A78ØCCEØ15ED81C621ED81C6Ø66FC3E
1Ø2Ø DATA 8Ø5A26FB8EEØ15338DØØØE
C6CØ1ØAEC11ØAF815A26F71CAF39BØC
1Ø3Ø DATA 534745D4535Ø55D4EØA6EØ
7E8ØE28EEØ1D7EADD496Ø2D6Ø4DDD9E
1Ø4Ø DATA ØØ8EEØØ28DØ38EEØØB6FØ1
6FØ3E6Ø4EØ841D58EDØ4E6Ø6EØØ29DD
1Ø5Ø DATA 1D58EDØ6868ØA7Ø8396Ø2
D6Ø4DDØØ8EEØØ28D1426F28EEØØBA47
1Ø6Ø DATA 8DØD96ØBD6ØD97Ø2D7Ø486
8Ø97ØA39ECØ4E384ED84ECØ6E3Ø2B11
1Ø7Ø DATA EDØ26AØ83917ØØ98A6CØ8D
128D1Ø8DØE8DØC1183F18525FØ4F98D
1Ø8Ø DATA 1F8B1CAF395F46594659D7
1434Ø28D2B8DAC35828D718D148D94Ø
1Ø9Ø DATA 128D1Ø8DØEA7CØ1183F185
25FØ4F1F8B1CAF3934Ø28D378D8C9EØ
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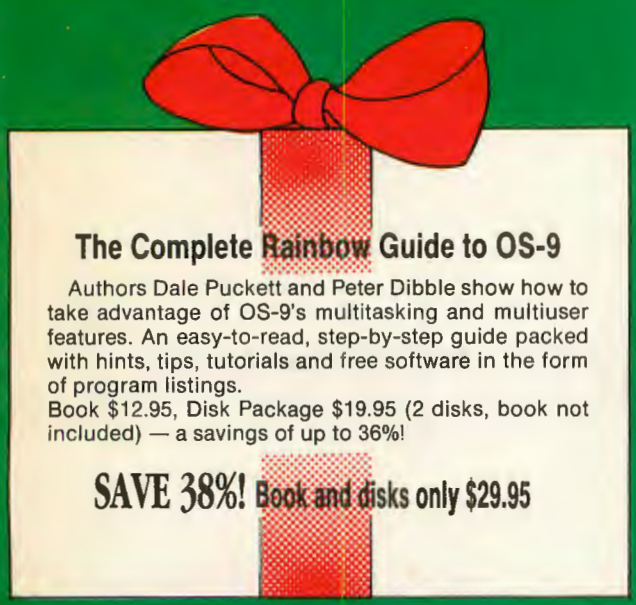

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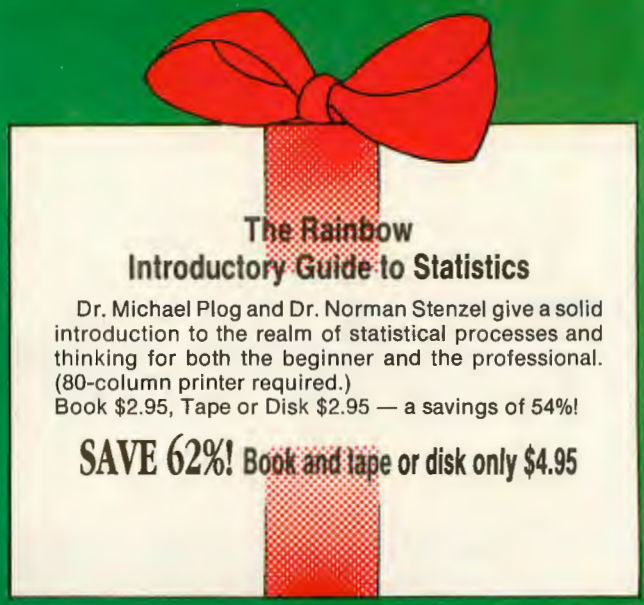

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```
11ØØ DATA 35Ø2Ø8144ØØ8144639DCØØ
C1CØ24F91E8958445644564456F386E
111Ø DATA ØØBA1FØ2D6ØØC4Ø3Ø41459
Ø41459588EE165A6A43AAA8ØA48495C
112Ø DATA A7A439DCØØ1E8958445644
564456F3ØØBA1FØ2E6A496ØØ84Ø39A2
113Ø DATA 27Ø548584A26FCD714398D
33B7EØØFF7EØ118D3C8D29B7EØØBACB
114Ø DATA F7EØØDB7EØØ2F7EØØ48D2C
8D19B7EØØ6F7EØØ81A5Ø7FFF4Ø86CE1
115Ø DATA EØ1F8BCEE18517FEDF397E
B277BDB26ABDB73434Ø4BDB26735D56
116Ø DATA Ø4962C4439C6ACBDB26F39
ØØ3F8ØBF4Ø7FCØFFØØCF2ØEF1ØDFB95
117Ø DATA 3ØFFØØF3Ø8FBØ4F7ØCFFØØ
FCØ2FEØ1FDØ3FF2Ø4D994
```

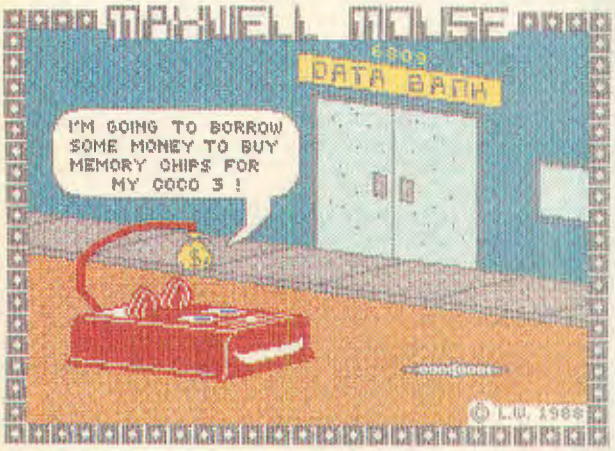
```
120 ......110  530 ........3
250 ......153  640 ......107
350 ......188  END .......11
```

Listing 2: STMPDEMO

```
5 REM COCO 3 USERS MUST SWITCH
      TO COCO 2 MODE BEFORE KEY-
      ING THIS PROGRAM IN. TYPE
      POKE&HFFDE,Ø:POKE113,Ø:
      EXEC&HAØ27
8 REM BEFORE KEYING THIS LISTING
      INTO YOUR COCO, THE SUPER-
      STAMPER ALGORITHM MUST BE
      RESIDENT. YOU MAY DO THIS
      BY FIRST RUNNING LISTING
      #1 (SUPRSTMP.BAS), OR BY
      EXECUTING THE ML CLONE
      (STAMP.BIN)
2Ø REM FAILURE TO DO THIS WILL
       RESULT IN SYNTAX ERRORS
       AND NONSENSE LISTINGS!
3Ø CLEAR 1ØØØ, &H7EØØ
4Ø REM ************************
5Ø REM *   SUPERSTAMPER DEMO   *
6Ø REM *          BY           *
7Ø REM *     JEREMY SPILLER    *
8Ø REM *     COPYRIGHT 1988    *
9Ø REM ************************
1ØØ CLS:PRINT"IN ORDER TO RUN AN
Y PROGRAM     WHICH USES 'SGET'
OR 'SPUT',    YOU MUST FIRST INS
TALL THE      SUPERSTAMPER ALGOR
ITHM BY EITHERRUNNING SUPRSTMP.B
AS OR BY      EXECUTING STAMP.BI
N."
11Ø PRINT
12Ø LINE INPUT"PLEASE PREPARE YO
UR DEVICE AND  INPUT (T)APE OR (
D)ISK TO LOAD  AND EXECUTE STAMP
.BIN, OR       (A)BORT IF YOU HA
VE ALREADY     RUN SUPRSTMP.BAS.
";A$
13Ø IF A$="T" THEN CLOADM"STAMP.
BIN"ELSE IF A$="D"THEN LOADM"STA
MP.BIN"ELSE GOTO 15Ø
14Ø EXEC:GOTO 16Ø
15Ø IF A$="A"THEN GOTO 16Ø ELSE
GOTO 1ØØ
16Ø PRINT:PRINT STRING$(31,"-"):
INPUT"CAN YOUR TV SUPORT ARTIFIC
IAL   COLORS (Y/N)";A$:IF A$="Y"
 THEN PMODE 4,1:SCREEN 1,1:PMODE
 3,1 ELSE IF A$="N" THEN PMODE 3
,1:SCREEN 1,Ø ELSE 16Ø
17Ø PCLS
18Ø S$="R6;U3;L6;U3;R6;BD6;BR4"
19Ø P$="U6;R6;D3;L6;BR6;BD3;BR4"
2ØØ R$="U6;R6;D3;L6;M+6,+3;BR4
21Ø M$="U6;M+4,+6;M+4,-6;D6;BR4"
22Ø L$="U6;BD6;R6;BR4"
23Ø E$="U6;R6;BD3;L6;BD3;R6;BR4"
24Ø Y$="BR4;U3;M-3,-3;BR7;M-4,+3
;BD3;BR7"
25Ø DRAW"BM74,12"+S$+";U6;BD6;R6
;U6;BR4;BD6"+P$+E$+R$
26Ø DRAW S$+"BR4;U6;BL3;R8;BD6;B
R3;U6;R6;D6;BU3;L6;BD3;BR11"+M$+
P$+E$+R$
27Ø DRAW"BM124,22;L6;U6;R6;D6;BU
3;L6;BD3;BR1Ø"+Y$
28Ø DRAW"BM99,3Ø;D3;R6;U6;BR3;BD
6"+E$+R$+E$+M$+Y$
29Ø DRAW"BM99,44"+S$+P$+"U6;BR6;
BD6"+L$+L$+E$+R$
3ØØ SGET(74,13)-(74,5)-(2ØØ,5):R
EM GETS THE WORD "SUPERSTAMPER"
```

Mouse Tales

By Logan Ward



```
31Ø SPUT(Ø,85)-(2Ø,65)-(25Ø,65):
REM STAMPS WORD ELONGATED & SKEW
ED
32Ø SPUT(Ø,9Ø)-(2Ø,11Ø)-(25Ø,11Ø
):REM STAMPS WORD UPSIDEDOWN &BA
CKWARD (INVERTED) AND ELONGATED
& SKEWED
33Ø SGET(97,46)-(97,16)-(166,16)
34Ø SPUT(5Ø,19Ø)-(5Ø,11Ø)-(22Ø,1
1Ø)
35Ø GOSUB 67Ø
36Ø REM DRAWS FIGURE IN BOX
37Ø PCLS:LINE(88,125)-(168,65),P
SET,B
38Ø DRAW"C2BM92,123;M+4,-6;M+4,+
6;BM-2,-2;L2"
39Ø DRAW "BM92,67;D6;R8;U6;L8;BD
3;R8"
4ØØ DRAW"BM164,67;L8;D6;R8"
41Ø DRAW"BM128,82;D18;M-1Ø,+2Ø;B
R2Ø;M-1Ø,-2Ø"
42Ø CIRCLE(128,74),8
43Ø LINE(114,86)-(142,86),PSET
44Ø CIRCLE(112,86),4,2
45Ø PAINT (112,86),2,2
46Ø CIRCLE(144,86),4,3
47Ø PAINT(144,86),3,3
48Ø LINE(114,122)-(12Ø,118),PSET
,BF
49Ø COLOR3
5ØØ LINE(136,122)-(142,118),PSET
,BF
51Ø SGET(88,126)-(88,65)-(17Ø,65
):REM GETS STICK FIGURE
52Ø PCLS
53Ø SPUT(Ø,62)-(Ø,Ø)-(82,Ø):REM
    NO DISTORTION
54Ø SPUT(168,62)-(168,Ø)-(84,Ø):
REM STAMPS AS MIRROR IMMAGE
55Ø SPUT(Ø,65)-(Ø,65+6Ø)-(82,65+
6Ø):REM INVERTED (UPSIDEDOWN & B
ACKWARDS)
555 SPUT(84,65)-(168,65)-(168,12
6):REM SIDEWAYS (9Ø DEGREE ROTAT
ION)
56Ø SPUT(Ø,191)-(Ø,129)-(255,129
):REM ELONGATED RIGHT-LEFT
57Ø SPUT(172,127)-(172,Ø)-(255,Ø
):REM ELONGATED UP-DOWN
58Ø REM THE FOLLOWING DEMONSTRAT
ES SKEWING (TILTING) & ROTATION
59Ø GOSUB 67Ø:PCLS:SPUT(Ø,127)-(
Ø,Ø)-(255,Ø):REM ENLARGED ONLY
6ØØ GOSUB 67Ø:PCLS:SPUT(Ø,127)-(
5Ø,Ø)-(255,Ø):REM ENLARGED &  SL
IGHT SKEW
61Ø GOSUB 67Ø:PCLS:SPUT(Ø,127)-(
128,Ø)-(255,Ø):REM ENLARGED & LA
RGER SKEW
62Ø GOSUB 67Ø:PCLS:SPUT(2ØØ,Ø)-(
2ØØ,127)-(Ø,127):REM 18Ø DEGREE
ROTATION (UPSIDEDOWN)
63Ø GOSUB 67Ø:PCLS:SPUT(128,5Ø)-
(19Ø,11Ø)-(128,16Ø):REM 135 DEGR
EE ROTATION
64Ø GOSUB 67Ø:PCLS:SPUT(42,95)-(
17Ø,31)-(212,95):REM ELONGATED &
45 DEGREE ROTATION
65Ø SOUND 15Ø,5:SOUND 1ØØ,1Ø
66Ø GOSUB 67Ø:GOTO 68Ø
67Ø FOR X=22Ø TO 255:SOUND X,1:N
EXT:RETURN
68Ø CLS:PRINT"NOW YOU MAY TRY IN
SERTING YOUR  OWN POINTS A, B AN
D C. YOU DO   NOT NEED PARENTHES
ES.  TYPE THE X AND Y COORDINATE
S SEPARATED BYA COMMA.  REMEMBER
 THAT THE     TOTAL HEIGHT CANNO
T EXCEED 128  PIXELS":PRINT
69Ø PRINT"EXAMPLE AX,AY ? Ø,127"
:PRINT
7ØØ INPUT"AX,AY";AX,AY
71Ø INPUT"BX,BY";BX,BY
72Ø INPUT"CX,CY";CX,CY
725 IF A$="N"THEN PMODE 3,1:SCRE
EN 1,Ø ELSE IF A$="Y"THEN PMODE
4,1:SCREEN 1,1:PMODE 3,1
73Ø PCLS:SPUT(AX,AY)-(BX,BY)-(CX
,CY)
74Ø GOSUB 67Ø:GOTO 68Ø
```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You asked for it at the Chicago RainbowFest -

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Need to transfer text files to and from PC (MSDOS), RSDOS and FLEX disks into your CoCo (OS-9) system? Have text files on a PC (MSDOS) system at work and want to work on them at home on your CoCo?

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PCDIR	directory of PC disk	**RSDIR**	directory of RSDOS disk
PCDUMP	display PC disk sector	**RSDUMP**	display RSDOS disk sector
PCREAD	read PC file	**RSREAD**	read file from RSDOS disk
PCWRITE	write file to PC disk	**RSWRITE**	write file to RSDOS disk
PCRENAME	rename PC file	**FLEXDIR**	directory of FLEX disk
PCDELETE	delete PC file	**FLEXDUMP**	display FLEX disk sector
PCFORMAT	format PC disk	**FLEXREAD**	read FLEX file
		FLEXWRITE	write file to FLEX disk

Extensive Options Single, double sided disks. 40 or 80 track floppy drives. 8 or 9 sectors. First level sub-directories - PC (MSDOS). FLEX transfers binary files also.

Requires OS-9 (Level 2 for MultiVue), 2 drives (one can be hard), MultiVue for MultiVue version, SDISK (SDISK3 for MultiVue) - see D.P. Johnson ad for SDISK

GSC File Transfer Utilities for CoCo - MultiVue version $54.95

GSC File Transfer Utilities for CoCo - Standard version $44.95

All diskettes are **CoCo OS-9** format. Orders must be prepaid or COD, VISA/MC accepted, add $1.50 S&H, additional charge for COD.

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CBASIC III EDITOR/COMPILER

The ULTIMATE Color Computer III BASIC COMPILER!!!

If you want to write fast efficient machine language programs and you don't want to spend the next few years trying to learn how to write them in Assembly language or with a cheap compiler, then CBASIC III is the answer!!!

CBASIC III is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer 3. It will allow you to take full advantage of all the capabilities available in your CoCo-3 including 512K RAM, without having to spend years trying to learn assembly language programming. CBASIC III allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly. CBASIC III supports all the enhanced hardware available in the CoCo-3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts (Keyboard, Timer, Serial & Clock). We even added advanced commands not available in Basic to give you a level of control only avialable to very advanced Machine Language Programmers. Plus we made it exceptionally easy to use, not like some other compilers. CBASIC III is the friendliest and easiest compiler available for the Color Computer III.

CBASIC III is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocations and so on, because CBASIC III will handle it for you automatically. For Advanced users, CBASIC III will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC III features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/Put, H/Play and H/DRAW, all with 99.9% syntax compatibility. CBASIC III also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT, INKEY, GETCHAR and PUTCHAR commands.

CBASIC makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation, Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K blocks and single or double bytes.

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 Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

The documentation provided with CBASIC III is an 8 1/2 by 11 Spiral Bound book which contains approximatly 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.

CBASIC III is the most expensive Color Basic Compiler on the market, and well worth the investment. You can buy a less expensive compiler for your CoCo-3, and then find out how difficult it is to use, or how limited its features are. Then you'll wish you had bought CBASIC III in the first place. Dollar for dollar, CBASIC III gives you more than any other compiler available. If you can find a better CoCo-3 Basic Compiler then buy it!!!

Requires 128K & Disk $149.00

DATAPACK III PLUS V1.1

SUPER SMART TERMINAL PROGRAM

AUTOPILOT & AUTO-LOG PROCESSORS
X-MODEM DIRECT DISK FILE TRANSFER
VT-100 & VT-52 TERMINAL EMULATION

* No lost data even at 2400 Baud on the COCO-3 Serial I/O port.
* 8 Display Formats, 32/40/64/80 columns at 192 or 225 Res.
* 50K Text Buffer when using the Hi-Res Text Display & Disk.
* ASCII & BINARY disk file transfer support via XMODEM.
* Directly record receive data to a disk file (Data Logging).
* VT-100 terminal emulation for VAX, UNIX and other systems.
* VT-100/52 cursor keys, position, insert/delete, PF & Alt. keys.
* Programmable Word Length, Parity, Stop Bits and baud rates.
* Complete Full and Half Duplex operation, with no garbled data.
* 9 Variable length, Programmable Macro Key buffers.
* Programmable Printer rates from 110 to 9600 baud.
* Send Files directly from the Buffer, Macro Keys or Disk.
* Display on Screen or Print the contents of the Buffer.
* Freeze Display & Review information On Line with no data loss.
* Built in Command Menu (Help) Display.
* Built in 2 Drive Ramdisk for 512K RAM support and much more.

Supports: R.S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

Requires 128K & Disk, $59.95

EDT/ASM III

128/512K DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns by 24 lines in 192 or 225 Resolution, so you use the best display mode whether you are using an RGB or Composite monitor or even a TV for your display. Plus you can select any foreground or background colors or even monochrome display modes. It will even support 512K by adding an automatic 2 drive Ultra Fast Ramdisk for lightning fast assembly of program source code larger than memory. There is also a free standing ML Debug Monitor, to help you debug your assembled programs. EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

* Supports Local and Global string search and/or replace.
* Full Screen line editing with immediate line update.
* Easy to use Single keystroke editing commands.
* Load & Save standard ASCII formatted file formats.
* Block Move & Copy, Insert, Delete, Overtype.
* Create and Edit files larger than memory.

The Assembler portion of EDT/ASM III features include:

* Supports the full 6809 instruction set & cross assembles 6800 code.
* Supports Conditional IF/THEN/ELSE assembly.
* Supports Disk Library file (include) up to 9 levels deep.
* Supports standard Motorola assembler directives.
* Allows multiple values for FCB & FDB directives (unlike R.S. EDT/ASM)
* Allows assembly from the Editor Buffer, Disk or both.

Requires 128K & Disk $59.95

TEXTPRO IV

"The ADVANCED COCO-3 Word Processing System"

* 9 Hi-Res Displays from 58 to 212 columns by 24 lines in 225 Res.
* On Screen Display of Bold, Italic, Underline & Double Width print.
* Up to 8 Proportional Character Sets Supported with Justification.
* Up to 80 Programmable Function Keys & Loadable Function key sets.
* Fully Buffered keyboard accepts data even duiring disk access.
* Autoexecute Startup files for easy printer & system configuration.
* 8 Pre-Defined Printer function commands & 10 Programmable ones.
* Supports Library files for unlimited printing & configurations.
* Disk file record access for Mail Merge & Boiler Plate printing.
* Completely Automatic Justification, Centering, Flush left & right.
* Change indents, margins, line length, etc. anytime in the text.
* Create and Edit files larger than memory, up to a full disk.
* Easily imbed any number of printer format and control codes.
* Built in Ultra Fast 2 drive RAMDISK for 512K support.

TEXTPRO IV is the most advanced word processing system available for the COCO-3, designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional spacing, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is what your looking for. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text your working on. There are no time comsuming, and often frustrating menu chases, you are in total control at all times. You can see what the formatted document will look like before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters right on the screen.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All the character sets used on this AD are proportional spaced characters, all centering, justification, and text printing was performed automatically by TEXTPRO IV.

Requires 128K & Disk $89.95

HI-RES III Screen Commander

The DISPLAY you wanted but didn't get on your CoCo-3

* 54 Different Character Sizes available from 14 to 212 cpl.
* Bold, Italic, Underline, Subscript, Superscript and Plain character styles.
* Double Width, Double Height and Quad width characters.
* Scroll Protect form 1 to 23 lines on the screen.
* Mixed Text & Graphics in HSCREEN 3 mode.
* PRINT @ is available in all character sizes & styles.
* Programmable Automatic Key repeat for fast editing.
* Full Control Code Keyboard supported.
* Selectable Character & Background color.
* Uses only 4K of Extended (2nd 64K) or Basic RAM.
* Written in Ultra Fast Machine Language.

HI-RES III will improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example, you can't use PRINT @ or have different character sizes on the same screen, even when mixing text and graphics with the HPRINT command. Hi-RES III can give you the kind of display you always dreamed about having on your CoCo-3, with a wide variety of display options that you can easily use with your Basic or ML programs.

HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. With the full control code keyboard, you can control many of HI-RES III extended functions with just a couple of simple keystrokes.

Requires 128K Tape or Disk $34.95

512K RAMDISK & MEMORY TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in you CoCo-3. It does not need or require the OS-9 operating system. It works with R.S. DOS V1.0 or V1.1 and it is completely compatible with Enhanced Color Disk Basic! Plus it allows your CoCo-3 to run at double speed all the time even for floppy disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test so you know that your 512K of memory is working perfectly.

Requires 512K & Disk $19.95

"The SOURCE III"

DISASSEMBLER & SOURCE CODE GENERATOR

The SOURCE III will allow you to easily Disassemble Color Computer machine language programs Directly from Disk and generate beautiful, Assembler compatible Source code.

* Automatic label generation and allows specifying FCB, FDB and FCC areas.
* Disassemble programs Directly from disk, unlike other disassemblers.
* Automatically locates Begin, End and Execution address.
* Output Disassembled listing with labels to the Printer, Screen or both.
* Generates Assembler source files directly to disk or printer.
* Built in Hex/Ascii dump/display to locate FCB, FCC & FDB areas.
* 8 Selectable Display formats 32/40/64/80 columns in 192 or 225 Res.
* Selectable Foreground & Background colors & Printer Baud rates.
* Built in Disk Directory an Kill file commands.
* Menu display with single key commands for smooth, Easy operation.
* Written in Ultra Fast Machine Language.

Requires 128K & Disk $49.95

To order products by mail, send check or money order for the amount of purchase, plus $3.00 for shipping & handling to the address below.
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"Window Master"

Screen Display Fonts

Window Master supports up to 54 different character sizes on the screen with 5 different character styles. You can have Bold, Italic, Underlined, Super-Script, Sub-script or Plain character styles or any combination of them in any character size. You can also change the text color and background at any time to get really colorful displays.

Fully Basic Compatible

Window Master is fully compatible with Enhanced Color Disk basic with over 50 Commands & functions added to fully support the Point & Click Window System. Window Master does not take any memory away from Basic, so you still have all the Basic Program memory available.

Hi-Resolution Displays

Window Master uses the full potential of the Color Computer 3 display by using the 225 vertical resolution display modes instead of the 192 or 200 resolution modes like most other programs. It uses either the 320/16 color mode or the 640/4 color display to give you the best display resolution possible, and can be switched to either mode at any time.

Mixed Text & Graphics

Window Master fully supports both Text & Graphics displays and even has a Graphics Pen that can be used with HLINE, HCIRCLE, HSET and more. You can change the Pen width & depth and turn it on or off with simple commands. We also added Enhanced Graphics Attributes that allow graphics statements to use And, Or, Xor and Copy modes to display graphic information. With the Graphics enhancements added by Window Master, you could write a "COCOMAX" type program in Basic! In fact we provide a small graphics demo program written in Basic.

Event Processing

Window Master adds a powerful new programming feature to Basic that enables you to do "Real Time" Programming in Basic. It's called Event Trapping, and it allows a program to detect and respond to certain "events" as they occur. You can trap Dialog activity, Time passage, Menu Selections, Keyboard activity and Mouse Activity with simple On Gosub statements, and when the specified event occurs, program control is automatically routed to the event handling routine, just like a Basic Gosub. After servicing the event, the sub-routine executes a Return statement and the program resumes execution at the statement where the event occured.

Enhanced Editing Features

Window Master adds an enhanced editor to Basic that allows you to see what you edit. It allows you to insert & delete by character or word, move left or right a word or character at a time, move to begin or end of line, toggle automatic insert on/off or just type over to replace characters. The editor can also recall the last line entered or edited with a single key stroke. You can even change the line number in line to copy it to a new location in the program.

Window Master Features

Multiple Windows

Window Master supports multiple window displays with up to a maximum of 31 windows on the screen. Overlapping windows are supported, and any window can be made active or brought to the top of the screen. Windows can be picked up and moved anywhere on the screen with the mouse. There are 6 different Window styles to choose from and the window text, border and background color is selectable.

Pull Down Menus

Menus are completely programmable with up to 16 menus available. They can be added or deleted at any time in a program. Menu items can be enabled, disabled, checked or cleared easily under program control. Menu selection is automatically handled by Window Master & all you have to do is read a function variable to find out which menu was selected.

Buttons, Icons & Edit Fields

Each Window can have up to 128 buttons, Icons or Edit fields active, if you can fit that many. Buttons, Icons and Edit field selection is handled automatically by Window Master when the mouse is clicked on one. All you have to do is read a Dialog function to find out which Button, Icon, or Edit field was selected, its very simple.

Mouse & Keyboard Functions

Window Master automatically handles the Mouse pointer movement, display and button clicks. It will tell you the current screen coordinate, the local window coordinate, window number the mouse is in, the number of times the button was pressed, which window number it was clicked in and more. The Keyboard is completely buffered, and supports up to 80 programmable Function keys that can contain any kind of information or command sequences you can imagine. You can load and save function key sets at any time. So, you can have special sets of function keys for different tasks. The "Ctrl" key is supported so that you have a full control code keyboard available.

Window Master Applications

Window Master pushs the Color Computer 3 far beyond its normal capabilities, into the world of a "User Friendly" operating enviornment. We are already planning several new programs for use with Window Master. So you don't have to worry about having to write all your own programs. And don't forget that many existing Basic and M.L. programs will run under Window Master with little or no changes. The Possibilities for Application programs are endless: Spread Sheets, Word Processing, Communications, Education, Games, Graphic Design, Desk Top Publishing and on and on.

Hardware Requirements

Window Master requires 512K of memory, at least 1 Disk Drive, a Hi-Res Joystick Interface and a Mouse or Joystick.

Technical Assistance

If you run into difficulty trying to use some of Window Master's features, we will be happy to assist you in any way possible. You can write to us at the address below or call us between 10am and 2pm Pacific Standard Time for a more timely response. Sorry, no collect calls will be accepted.

Ordering Information

To order WINDOW MASTER by mail, send check or money order for $69.95, plus $3.00 for shipping & handling to the address below. To order by VISA, MASTERCARD or COD call us at (702)-452-0632
(Monday thru Saturday, 8am to 5pm PST)

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(702)-452-0632

Some Terms Defined

I've had my CoCo 2 for about a year now. Before that I knew very little about writing programs. Could you print a column on what PEEK, POKE, *text, screen dump,* HDRAW, HPRINT, DATA *and* SOUND *mean. I need this information so I can become a better CoCo 2 user.*

Chris Provence
Saranac, NY

Rx I can define those terms for you: PEEK is used to determine the value stored at an address in memory; e.g. PRINT PEEK(1463) will print the value stored at address 1463 in memory. The opposite of PEEK is POKE.

POKE is used to change the value stored at an address in memory; e.g. POKE 1463,2 changes the value stored at Address 1463 to two.

Text files are files comprised of ASCII values. ASCII is an industry-standard code for representing text (components of alphabetic and numeric strings) using one-byte values (eight bits stored at a single address). 'A' = 65, 'B' = 66, . . . '0' = 48, '1' = 49, etc.

A screen dump is a printer's representation of what can be viewed on a computer's screen.

HDRAW, similar to the DRAW command on the CoCo 1, draws lines and boxes and works only with the newer Hi-Res modes on the CoCo 3.

HPRINT allows you to put text on a CoCo 3's Hi-Res screen.

DATA statements are used in conjunction with READ statements; e.g.:

```
10 READ X
20 DATA 23, 46, 55
```

The READ statement in Line 10 will pick up the value 23 for X. If another READ statement is encountered, it will use the value 46, etc.

The SOUND command is used to send audio effects to your TV speaker. SOUND 3,30 sends a low-pitched sound for 30 six-hundredths seconds.

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

A Good Deal

I have recently come across a super deal on IBM disk drives. They are the double-sided drives found on the discontinued IBM PCjr. Will these drives fit and work in the FD500 case? Also, can I use both sides of the drive from Disk BASIC, or just from OS-9? If I can't use both sides, will I be able to use one side of the drive?

Kent Signorini
Grimshaw, Alberta

Rx The IBM disk drive should fit the FD500 case and use your power supply, but you may need to modify your cable. SpectroSystem's ADOS or Burke & Burke's *Hyper-IO* can provide the double-sided capability.

CoCo 2 and 3 — Programs Don't Mix

I own a CoCo 2, Version 1, Release 1, with disk drive. Is there any way to get CoCo 3 programs to run on my machine?

Duane Shwartz
Merrill WI

Rx Unfortunately, *no*. CoCo 3-specific programs take advantage of its additional memory and unique hardware.

Problems With the Humidity

Whenever the humidity is high my CoCo 2 does not function properly. (I get a blank gray screen, and the ROM packs do not work.) I have no problems using my neighbor's computer in the same environment.

Steve Pawlowski
Elmont, NY

Rx There are environmental specifications associated with all electronic equipment. Tandy specs for the CoCo are as follows: temperature, 55 to 85 degrees Fahrenheit; and altitude, 100 to 6,000 feet. Some CoCos may operate outside these specs due to relative age, small differences in parts, manufacturing, etc. As long as your machine operates within the published specs, there is nothing wrong with it. As mentioned before, for many years air-conditioned environments were required to operate computers at all.

IBM Software on a CoCo

In past articles, readers have asked if IBM software could run on the CoCo. I have heard that it was possible to run Apple software on the Tandy 1000. If this is so, why couldn't something be made to run IBM software on the CoCo?

Jared Hawley
Honolulu, HA

Rx Granted, with Tandy's Trackstar 128 board installed in a Tandy 1000, you can run Apple II software; but it costs $399 — twice the price of a CoCo 3! IBM PC coprocessors for the Atari ST and Apple Macintosh run around $1,000 each. Who would buy such a card for a CoCo when a separate Tandy 1000 could be purchased for the same price — or less?

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

Replace CoCo 3's built-in HPRINT font

The Font Master

By Eric Wolf

Stored in the new CoCo 3 is a high resolution font, a specially designed HPRINT character set. The area of memory in which the font is stored is called upon whenever the command HPRINT is performed. Each letter of the message is referenced in the font table of the high resolution graphics screen.

The font table is stored in RAM, which means you can read and write to it. (Its memory location is $F09D through $F49C, for characters 32-127.) *Font Master* allows you to easily change these characters, giving your Hi-Res screens that personal touch.

Font Master uses the 16-color, 320-by-192 graphics screen of the CoCo 3. It offers onscreen menu selection, complete error trapping, choice of tape or disk, editing commands, and easy integration with BASIC and machine language.

Upon saving, loading and running the program, the main screen appears, consisting of a command set (upper-right), editing window (upper-left) and the current character set (bottom). Let's look at these one at a time.

The Edit window shows an enlarged version of the character you are working on and how it presently looks. The current character set is what the entire character set in memory looks like. The highlighted letter is the letter you are currently editing. The command set is a brief listing of all the commands recognized by the *Font Master*, and includes the following:

arrows	control the cursor within the editing window
space bar	sets (turns on) a dot in the editing window
CLEAR	resets (turns off) a dot in the editing window
C	clears entire editing window
X	saves current character and allows you to select a new character to edit
L	loads a character set from tape or disk
S	saves a character set to tape or disk
I	inverts the grid (changes white to black and black to white)

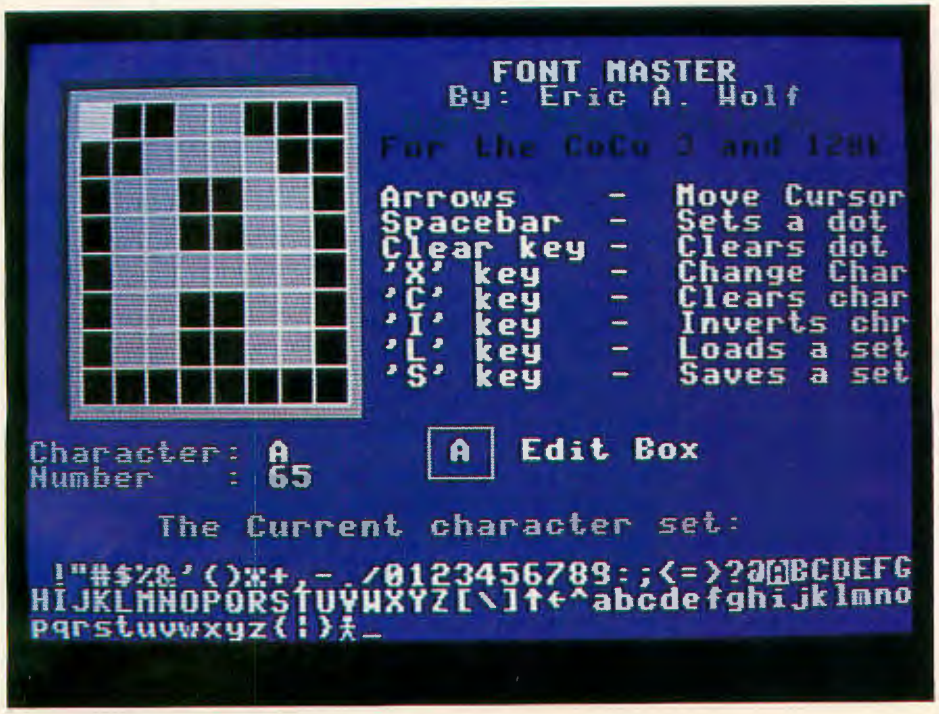
I have included two pre-designed font files (cursive and bold) for you to use and modify for your own purposes. They are included on this month's RAINBOW ON TAPE and DISK.

After you have saved your character set (using *Font Master*), you can integrate it into your own BASIC programs. First, load the program that uses the HPRINT command. Then load your character set — type (C)LOADM and press ENTER. Then, just run your program and the new character set will be in use.

Be careful about pressing the reset button. Doing so restores the original HPRINT font set. After pressing reset, you must reload the character set if you want to use it again.

(Questions or comments about this program may be directed to the author at 1630 N. Johnson St., South Bend, IN 46628. Please enclose an SASE when writing for a reply.) □

Eric Wolf is a free-lance programmer and attends LaSalle High School. He is currently writing a line of computer software that deals with games and utilities, and ML applications for the CoCo.



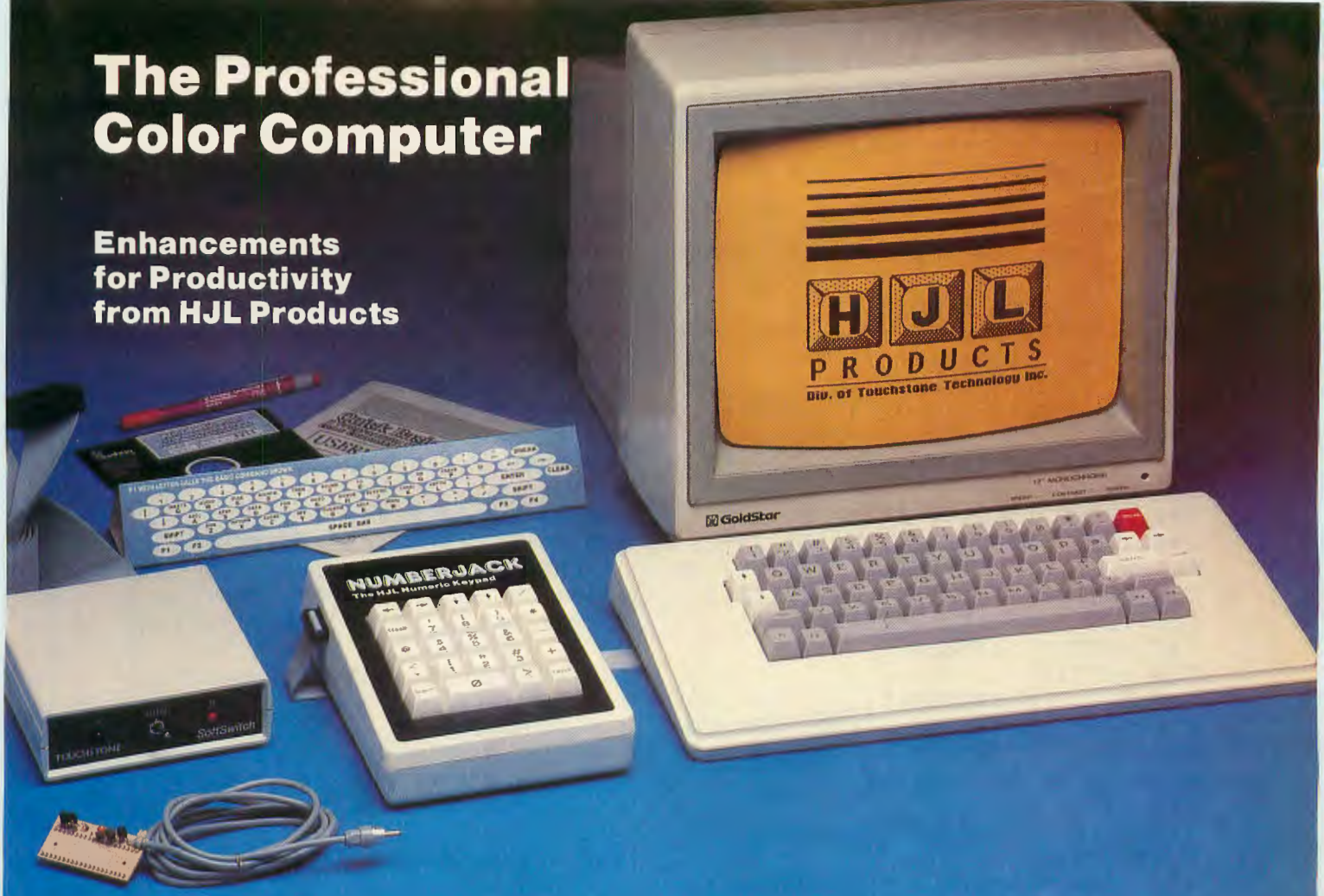
130	191	425	23
180	31	495	6
260	243	555	200
305	63	640	16
375	84	END	194

The listing: FONTMSTR

```
15 REM RAINBOW MAGAZINE PRESENTS
2Ø REM
25 REM ************************
3Ø REM *  The Font Master !!!  *
35 REM *   By: Eric A. Wolf    *
4Ø REM * Don't Panic Software  *
45 REM * For a CoCo 3 and 128k *
5Ø REM ************************
55 REM
65 ONBRK GOTO 71Ø
7Ø ONERR GOTO 53Ø
75 PALETTE RGB
8Ø POKE65497,Ø
85 RESTORE:FORY=ØTO15:READ A:PAL
ETTE Y,A:NEXTY
9Ø DATA 8,56,Ø,3,3,63,3,Ø,63,9,Ø
,Ø,Ø,Ø,Ø,63
95 ATTR 7,Ø
1ØØ WIDTH 4Ø
1Ø5 HBUFF 1,5ØØØ
11Ø HBUFF 2,128
115 CH=65
12Ø HSCREEN2:HCLS
125 HCOLOR15:HPRINT(21,1),"FONT
MASTER":HCOLOR1:HPRINT(19,2),"By
: Eric A. Wolf":HCOLOR6:HPRINT(1
7,3),"Don't Panic Software":HCOL
OR2:HPRINT(16,4),"For the CoCo 3
 and 128k"
13Ø HCOLOR1:HPRINT(6,19),"The Cu
rrent character set:":HPRINT(Ø,1
6),"Character:":HPRINT(Ø,17),"Nu
mber   :":HCOLOR15
135  HPRINT(16,6),"Arrows    -
Move Cursor":HPRINT(16,7),"Space
bar  -  Sets a dot":HPRINT(16,8)
,"Clear key -  Clears dot":HPRIN
T(16,9),"'X' key   -  Change Cha
r"
14Ø HPRINT(16,1Ø),"'C' key   -
Clears char":HPRINT(16,11),"'I'
key   -  Inverts chr"
145 HPRINT(16,12),"'L' key   -
Loads a set":HPRINT(16,13),"'S'
key   -  Saves a set"
15Ø HPRINT(22,16),"Edit Box"
155 GOSUB25Ø:GOSUB3Ø5:GOSUB26Ø:G
OSUB28Ø
16Ø C1=Ø:C2=Ø
165 HGET(2Ø+C1*12,2Ø+C2*12)-(2Ø+
C1*12+11,2Ø+C2*12+11),1:HCOLOR15
:HLINE(2Ø+C1*12,2Ø+C2*12)-(2Ø+C1
*12+11,2Ø+C2*12+11),PSET,BF
17Ø A$=INKEY$:IFA$=""THEN17Ø ELS
E HPUT(2Ø+C1*12,2Ø+C2*12)-(2Ø+C1
*12+11,2Ø+C2*12+11),1,PSET
175 IF A$=CHR$(8) THEN C1=C1-1:I
F C1<Ø THEN C1=Ø:SOUND1ØØ,1
18Ø IF A$=CHR$(9) THEN C1=C1+1:I
F C1>7 THEN C1=7:SOUND1ØØ,1
185 IFA$=CHR$(1Ø) THEN C2=C2+1:I
F C2>7 THEN C2=7:SOUND1ØØ,1
19Ø IFA$=CHR$(94) THEN C2=C2-1:I
F C2<Ø THEN C2=Ø:SOUND1ØØ,1
195 IFA$=CHR$(32) THEN HCOLOR1:H
PAINT(24+C1*12,24+C2*12),1,15:HS
ET(151+C1,128+C2,15):PLAY"V31T25
5L255;CC"
2ØØ IFA$=CHR$(12) THEN HCOLOR2:H
PAINT(24+C1*12,24+C2*12),2,15:HS
ET(151+C1,128+C2,Ø):PLAY"V31T255
L255;CC"
2Ø5 IFA$=CHR$(67) THEN SOUND1ØØ,
1:GOSUB265
21Ø IFA$=CHR$(73) THEN GOSUB32Ø
215 IFA$=CHR$(88) THEN GOSUB385:
GOSUB34Ø:GOSUB25Ø:GOSUB3Ø5:GOSUB
265:GOSUB28Ø
22Ø IFA$=CHR$(76) THEN GOSUB385:
Z$=A$:GOTO4Ø5
225 IFA$=CHR$(83) THEN GOSUB385:
Z$=A$:GOTO4Ø5
23Ø GOTO 165
235 '
24Ø ' PROGRAM SUBROUTINES
245 '
25Ø HCOLORØ:HLINE(Ø,168)-(319,19
2),PSET,BF:HCOLOR15:T=21:FORY=32
 TO 128 STEP 4Ø:A$="":FOR X=Y TO
 Y+39:A$=A$+CHR$(X):NEXTX:HPRINT
(Ø,T),A$:T=T+1:NEXTY
255 RETURN
26Ø HCOLOR3:HLINE(12,12)-(116,11
6),PSET,BF:HCOLOR1:HLINE(16,16)-
(12Ø,12Ø),PSET,BF
265 HCOLORØ:HLINE(144,124)-(166,
14Ø),PSET,BF:HCOLOR1:HLINE(144,1
24)-(166,14Ø),PSET,B:
27Ø HCOLOR2:HLINE(2Ø,2Ø)-(116,11
6),PSET,BF:HCOLOR15:FOR X=Ø TO 8
:HLINE(2Ø+X*12,2Ø)-(2Ø+X*12,2Ø+8
*12),PSET:HLINE(2Ø,2Ø+X*12)-(2Ø+
8*12,2Ø+X*12),PSET:NEXTX:RETURN
275 GOTO 275
28Ø T=24:T1=Ø:A=CH-32:A=A*8:FOR
Y=&HFØ9D+A TO &HFØ9D+A+7:P=PEEK(
Y):FOR X=7 TO Ø STEP-1:IF P>=INT
(2^X) THEN P=P-INT(2^X):HPAINT(2
4+((7-X)*12),T),1,15:HSET(151+(7
-X),128+T1,15)
285 NEXTX:T=T+12:T1=T1+1:NEXTY:H
```

The Professional Color Computer

Enhancements for Productivity from HJL Products



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The Self-contained ProCase-57 Keyboard - $79.95 NEW

It's the popular HJL keyboard perfectly fitted into its own sleek, low-profile case. Put your CoCo on a shelf or hang it on the side of your desk. ProCase-57 comes with 5-foot cable; installs in just a few minutes with no soldering.

The HJL-57 Keyboard Kit - $59.95/69.95

Overwhelming favorite of serious CoCo users worldwide, the HJL-57 keyboard provides the smooth consistent feel and reliability you need for maximum speed with minimum input errors. Installs in your color computer without soldering. Just $59.95 for Original or F-version. Kits for CoCo 2 and CoCo 3 are $69.95.

The NumberJack Keypad - $59.95

A self-contained numeric keypad for serious number-crunching. Besides the numbers, it has all the cursors, symbols and math keys, including autoshifted ADD and MULTIPLY. Includes cable and connectors for solderless installation.

The Monitor Adapter - $25.95

This universal driver works with all monochrome monitors. Easily installed without clips, jumpers or soldering (except some CoCo 2s with soldered-in video chips). Here's crisp, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor - $99.95

Our high-resolution amber monitor gives you the display preferred by most computer pros. Once you've used it, you'll never go back to the TV set. 12-inch CRT has etched non-glare face-plate. (Requires adapter sold above)

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High-performance programming aid works with any CoCo that has 4 function keys. 26 one-touch BASIC statements, 10 user-defined macros at a time (save as many sets of macros as you like), auto line-numbering, instant screen dump to printer, and global search, make this software ideal for any BASIC programmer. Specify disk or cassette.

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Ordering Information: Specify model (Original, F-version, or CoCo 2 Model Number). Payment by C.O.D., check, MasterCard, or Visa. Credit card customers include complete card number and expiration date. Add $2.00 for shipping, 3.50 to Canada; except monitors (call for shipping charges before ordering monitors). New York state residents add 7% sales tax. **Dealer inquiries invited**

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```
COLORØ:HLINE(88,16*8)-(112,18*8)
,PSET,BF:HCOLOR15:HPRINT(1Ø,17),
CH:HPRINT(11,16),CHR$(CH)
29Ø RETURN
295 NEXTX,Y
3ØØ RETURN
3Ø5 W2=INT((CH-32)/4Ø):W1=(CH-32
)-W2*4Ø
31Ø HGET(W1*8,168+W2*8)-(W1*8+7,
168+W2*8+7),2:HPUT(W1*8,168+W2*8
)-(W1*8+7,168+W2*8+7),2,NOT:RETU
RN
315 HPUT(W1*8,168+W2*8)-(W1*8+7,
168+W2*8+7),2,PSET:RETURN
32Ø SOUND2ØØ,1:FORY=ØTO7:FORX=Ø
TO 7
325 IF HPOINT(24+(X*12),24+(Y*12
))=1 THEN HPAINT(24+(X*12),24+(Y
*12)),2,15:HSET(151+X,128+Y,Ø) E
LSE HPAINT(24+(X*12),24+(Y*12)),
1,15:HSET(151+X,128+Y,15)
33Ø NEXTX,Y:RETURN
335 GOTO335
34Ø HCOLORØ:HPRINT(6,19),"The Cu
rrent character set:":HCOLOR1:HP
RINT(8,19),"Select new character
":SOUND1ØØ,1:GOSUB315
345 GOSUB3Ø5
35Ø A$=INKEY$:IFA$=""THEN35Ø ELS
E GOSUB315
355 IF A$=CHR$(94) THEN CH=CH-4Ø
:IF CH<32 THEN CH=CH+4Ø
36Ø IF A$=CHR$(1Ø) THEN CH=CH+4Ø
:IF CH>127 THEN CH=CH-4Ø
365 IF A$=CHR$(8) THEN CH=CH-1:I
F CH<32 THEN CH=32
37Ø IF A$=CHR$(9) THEN CH=CH+1:I
F CH>128 THEN CH=127
375 IF A$<>CHR$(13) THEN 345 ELS
E SOUND1ØØ,1:HCOLORØ:HPRINT(8,19
),"Select new character":HCOLOR1
:HPRINT(6,19),"The Current chara
cter set:"
38Ø RETURN
385 SOUND2ØØ,1:A=CH-32:A=A*8:FOR
Y=ØTO7:P=Ø:FORX=Ø TO 7
39Ø IF HPOINT(24+(X*12),24+(Y*12
))=1 THEN P=P+(2^(7-X))
395 NEXTX:POKE &HFØ9D+A+Y,P:NEXT
Y
4ØØ RETURN
4Ø5 IF Z$="L" THEN 41Ø ELSE IF Z
$="S" THEN 58Ø ELSE RUN
41Ø HSCREENØ:ATTR 7,Ø:CLS:LOCATE
9,1:ATTR 7,Ø,U:PRINT"Load a char
acter set:";:ATTR 7,Ø:LOCATE 1,7
:PRINT"Use arrows to select & Pr
ess <ENTER>."
415 CR=1
42Ø ATTR 7,Ø:LOCATE 14,3:PRINT"F
rom disk":LOCATE 14,4:PRINT"From
 tape":LOCATE14,5:PRINT"Exit bac
k"
425 IF CR=1 THEN LOCATE 14,3:ATT
R 1,5:PRINT"From disk"; ELSE IFC
R=2 THEN LOCATE 14,4:ATTR 1,5:PR
INT"From tape"; ELSE LOCATE 14,5
:ATTR 1,5:PRINT"Exit back";
43Ø A$=INKEY$:IFA$=""THEN43Ø
435 IFA$=CHR$(13) THEN 45Ø ELSE
IF A$="^" THEN CR=CR-1:IF CR<1 T
HEN CR=3
44Ø IF A$=CHR$(1Ø) THEN CR=CR+1:
IF CR>3 THEN CR=1
445 GOTO 42Ø
45Ø ATTR 7,Ø:IF CR=3 THEN GOTO12
Ø
455 ON CR GOTO 46Ø,475
46Ø POKE65496,Ø:CLS:PRINT"INSERT
 "+CHR$(34)+"CHARACTER SET"+CHR$
(34)+" DISK IN DRIVE":PRINT"#Ø A
ND PRESS ANY KEY FOR A DIRECTORY
."
465 A$=INKEY$:IFA$=""THEN465 ELS
E DIRØ
47Ø GOTO 48Ø
475 CLS:POKE65496,Ø:PRINT"Prepar
e the cassette recorder":PRINT"f
or loading a character set....."
:PRINT
48Ø PRINT:LINEINPUT"Enter Filena
me: ";A$
485 IF LEN(A$)=Ø THEN 495 ELSE I
F LEN(A$)>8 AND CR=2 THEN 49Ø EL
SE IF LEN(A$)>14 AND CR=1 THEN 4
9Ø ELSE IF LEN(A$)>8 AND INSTR(A
$,"/")=Ø THEN 49Ø ELSE 5ØØ
49Ø PRINT"Filename too long !":G
OTO48Ø
495 PRINT"Please enter a filenam
e !!":GOTO48Ø
5ØØ IF INSTR(A$,"/")=Ø AND LEN(A
$)=<8 AND CR=1 THEN A$=A$+"/BIN:
Ø"
5Ø5 ON CR GOTO 51Ø,52Ø
51Ø LOADM A$
515 GOTO 525
52Ø CLOADM A$
525 PRINT:PRINT"Loaded ....":FOR
X=1TO1ØØØ:NEXTX:POKE65497,Ø:GOTO
12Ø
53Ø CLS:B$="Unkwown Error... #"+
STR$(ERNO)+" In "+STR$(ERLIN)
535 IF ERNO=2Ø THENB$="I/O ERROR
" ELSEIF ERNO=19 THEN B$="Device
 number error" ELSE IF(ERNO=31 O
R ERNO=26)THEN B$="Can't find co
rrect character file" ELSEIF ERN
O=23 THEN B$="Input past end of
file ..."\
54Ø IF ERNO=1 THEN B$="Syntax Er
ror in line "+STR$(ERLIN)
```

```
545 FORY=1TO2:LOCATE(2Ø-LEN(B$)/
2),6:PRINTB$:NEXTY
55Ø LOCATE 4,13:PRINT"Do you wis
h to try again (Y/N)"
555 A$=INKEY$:IFA$="Y" THEN GOTO
 4Ø5 ELSE IFA$="N" THEN 12Ø ELSE
 555
56Ø IF Z$="L" THEN 455 ELSE 115
565 ATTR7,1:CLS:LOCATE 5,11:PRIN
T"File not on device specified":
GOTO55Ø
57Ø CLS:LOCATE1Ø,11:PRINT"Input
past end of file":GOTO55Ø
575 CLS:PRINT"ATTENTION USER !!!
"::PRINT"ERROR #";ERNO;"IN LINE
";:PRINT ERLIN:PRINT:END
58Ø HSCREENØ:ATTR 7,Ø:CLS:LOCATE
9,1:ATTR 7,Ø,U:PRINT"Save a char
acter set:";:ATTR 7,Ø:LOCATE 1,7
:PRINT"Use arrows to select & Pr
ess <ENTER>."
585 CR=1
59Ø ATTR 7,Ø:LOCATE 14,3:PRINT"T
o disk":LOCATE14,4:PRINT"To tape
":LOCATE14,5:PRINT"Exit back"
595 IF CR=1 THEN LOCATE 14,3:ATT
R 1,5:PRINT"To disk"; ELSE IFCR=
2 THEN LOCATE 14,4:ATTR 1,5:PRIN
T"To tape"; ELSE LOCATE 14,5:ATT
R 1,5:PRINT"Exit back";
6ØØ A$=INKEY$:IFA$=""THEN6ØØ
6Ø5 IFA$=CHR$(13) THEN 62Ø ELSE
IF A$="^" THEN CR=CR-1:IF CR<1 T
HEN CR=3
61Ø IF A$=CHR$(1Ø) THEN CR=CR+1:
IF CR>3 THEN CR=1
615 GOTO 59Ø
62Ø ATTR 7,Ø:IF CR=3 THEN GOTO12
Ø
625 ON CR GOTO 63Ø,64Ø
63Ø POKE65496,Ø:CLS:PRINT"Insert
 disk to save character set upon
  into drive #Ø"
635 GOTO 645
64Ø POKE65496,Ø:CLS:PRINT"Prepar
e cassette to save character set
."
645 PRINT:LINEINPUT"Enter Filena
me: ";A$
65Ø IF LEN(A$)=Ø THEN 66Ø ELSE I
F LEN(A$)>8 AND CR=2 THEN 655 EL
SE IF LEN(A$)>14 AND CR=1 THEN 6
55 ELSE IF LEN(A$)>8 AND INSTR(A
$,"/")=Ø THEN 655 ELSE 665
655 PRINT"Filename too long !":G
OTO645
66Ø PRINT"Please enter a filenam
e !!":GOTO645
665 IF LEN(A$)=<8 AND INSTR(A$,"
/")=Ø AND CR=1 THEN A$=A$+"/BIN:
Ø"
67Ø PRINT:PRINT"Press any key to
 save..."
675 B$=INKEY$:IFB$=""THEN675
68Ø ON CR GOTO 685,695
685 VERIFYON:SAVEM A$,&HFØ9D,&HF
49C,&HFØ9D
69Ø GOTO 7ØØ
695 CSAVEM A$,&HFØ9D,&HF49C,&HFØ
9D
7ØØ PRINT:PRINT"Saved ...":FORX=
1TO1ØØØ:NEXTX:POKE65497,Ø:GOTO12
Ø
7Ø5 REM ** END OF PROGRAM **
71Ø HSCREEN Ø:STOP
```


PREMIUM COCO3 512K UPGRADE

- Made in USA by J&R Electronics
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CT CocoTech NEW

MACPLAY

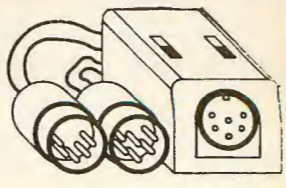
RAINBOW CERTIFICATION SEAL

With **MACPLAY** and a CoCo 3 you can play MAC sound files (Included on the second diskette) with pure 6 BIT sound quality that the CoCo can produce! Or download other MAC sound files from a computer information service or MAC bulletin board systems to hear even more. Sound files can last for a few seconds or up to 1/2 minute. MAC sound files included on the second diskette contain excerpts from the 3 Stooges to the Road Runnner and more!!

MACPLAY is only.....$ 19.95

UltiMax

You can use **UltiMax** as a normal HI-REZ joystick interface or switch it to be used with a popular Max III graphics program. The other feature of **UltiMax** is the option to have a large or small stick area so you can be more accurate with your drawings!



The **UltiMax** interface is only **$29.95**

Or trade in your original HiRes interface (sent postage prepaid) and get **UltiMax** for only.....$14.95

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Disadvantage; requires a multi-pak.

KIT INCLUDES: Burke & Burke (B&B) XT PC interface. Hard drive with controller, 3 foot ST506 cable set. Hard Drive Case with 60 watt power supply and **fan**. Includes OS9 LI and LII software. 1 megabyte transfer in 45 seconds! Type ahead under OS9. Complete instructions. Easy one evening assembly.

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The fourth in a series of tutorials for the beginner to intermediate machine language programmer

Machine Language Made BASIC
Part IV: Getting Graphic

By William P. Nee

With this article we start to explore the Color Computer's best capability: the speed and ease with which it can create graphics. The standard way to begin any graphics program is with PMODE, PCLS and SCREEN. These three commands, along with PCLEAR, will set certain locations within the memory. The main locations we will use for graphics and their meanings are shown in Figure 1.

When you first power up, the computer assumes PCLEAR 4, PMODE 0, PAGE 1, and sets the addresses as indicated under START. Since PMODE 0,1 uses only the first graphics page, the computer assumes that you will be using $600 to $C00-1 for graphics ($E00 to $1400-1 with disk). If not, you must tell the computer something different. The three main graphic commands in machine language are shown in Figure 2.

Nothing is as easy as it looks. If you try these commands, your machine language program will become lost. The problem arises between the PCLS command and where *EDTASM+* stores the program. On power-up with *EDTASM+*, Location $FF/100 is #$600; this is where the edit buffer (your typed-in program) and the symbol table will begin. Since graphics also begin at $600, a PCLS will set all graphic bits to 0 and,

Location	Indicates	Start	W/Disk
$B6	PMODE (1 - 4)	(0)	(0)
$B7/B8	end of graphics page +1	(#$C00)	(#$1400)
$B9	bytes per line (#$10 or #$20)	(#$10)	(#$10)
$BA/BB	start of graphics page	(#$600)	(#$E00)
$BC/BD	(#$600 if not disk, #$E00 if disk)		

Figure 1

```
1) PMODE  LDB  #(0 - 4)   PMODE 0 to PMODE 4
          JSR  $9628
   PAGE   LDB  #(1 - 8)   PAGE 1 to PAGE 8
          JSR  $9653
2) PCLS   JSR  $9542      PCLS
3) SCREEN LDB  #(0 - 1)   graphics = 1, text = 0
          JSR  $95AA
          LDB  #(0 - 1)   color set 0 or color set 1
          JSR  $9682
```

Figure 2

Address	Description	PCLEAR4	W/Disk	PCLEAR8	W/Disk
$19/1A	basic starts @	#$1E01	#$2601	#$3601	#$3E01
$1B/1C	variables start @	#$1E03	#$2603	#$3603	#$3E03
$1D/1E	arrays start @	#$1E03	#$2603	#$3603	#$3E03
$1F/20	free memory @	#$1E03	#$2603	#$3603	#$3E03
$33/34	data statements @	#$1E00	#$2600	#$3600	#$3E00
$A6/A7	input buffer @	#$1E00	#$2600	#$3600	#$3E00

Figure 3

```
                PCLEAR      1   2   3   4   5   6   7   8
                W/Out Disk  0C  12  18  1E  24  2A  30  36
                With Disk   14  1A  20  26  2C  32  38  3E
        LDB  #$( * )    * use number from table above
        STB  $19
         - OR -
        LDB  #(1 - 8)   PCLEAR 1 to PCLEAR 8
        LDA  #6
        MUL
        ADDB $BC        #$E00 if disk, else #$600
        STB  $19
```

Figure 4

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

in the process, wipe out the buffer. To avoid this problem we must change the contents of $FF/100.

Graphic pages 1 to 4 are from $600 to $1DFF (with disk, from $E00 to $25FF), and we must put the edit buffer above graphics. Whatever number we put into Location $FF/100 must end in 00 and allow enough room for the text program before the ORG address. Let's use $2800 for the buffer address at $FF/100. This will allow locations $2800 to $3000 for the text and symbols and leave $3000 and up for the assembled program. This is done in the following manner:

1) insert *EDTASM+* cartridge and power up
2) press Z and ENTER to get into *ZBUG*
3) press W and ENTER to read two bytes at a time
4) type FF/ to look at $FF/100
5) type 2800 and press ENTER to change to #$2800
6) type GC006 and press ENTER to execute $C006 (keeps $FF/100 the same)

The assembler will now store the written program and symbols in a buffer starting at $2800. You can actually read the program in the "A" mode starting at $2A00. The "S" stack starts at the buffer location plus #$177, decreasing from there.

The next problem arises if you try to use '5' to '8' in the PAGE command at $9653. Since the computer is set only for PCLEAR 4, any higher number will give you a Function Call error message. To avoid this, we must PCLEAR some more pages. The BASIC PCLEAR command affects the addresses shown in Figure 3.

These numbers change as your BASIC program increases and becomes more complicated, but their initial value is assigned by the PCLEAR you select. So, in machine language, any PCLEAR must be put at least into Location $19. Either the program or table shown in Figure 4 can be used to get the PCLEAR HEX value you desire.

The second method, while a few bytes longer, is preferable because it will recognize whether or not disk is being used.

If you want to use PCLEAR 8, the *EDTASM+* buffer must begin at $3600 ($3E00 with disk) or higher. The program must execute at an address even higher — generally the length of your text program plus an additional 200 bytes. The *EDTASM+* will give you a Bad Memory error message if you try to write your program over the execution address. If it does, increase the ORG location until it is above the text portion of your program.

The program for this article is in machine language only. It can be executed entirely from *ZBUG* and will break when you hit any key without losing the program. Initially, Location $FF/100 is set to #$3E00 to get above disk graphics; the program will ORG at $4382 to leave room for the editor buffer and symbol table. Once you've typed in the program, switch to *ZBUG*. In the "A" mode you can follow the program and symbols from $4000 to $4381. That is why the program must ORG at least at $4382.

Once the program has been checked for errors, you can examine the buffer locations in the "W" mode for the following information.

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Location

buffer start	+02	program end +1
	+0E	symbols start at
	+10	symbols end at
	+40	"S" stack location
	+9F	text start
	+A5	text end
	+A9	text start
	+AB	text end

The location in Buffer +10 plus 1 will give you the lowest ORG location that will not conflict with the buffer.

Using the EQU command makes typing in routine addresses unnecessary and makes the program easier to follow. Eight pages are cleared; the program is set for PMODE 3,1; PCLS. The screen is filled, then displayed with SCREEN 1,1. The program switches to PMODE 3,5 and then fills and displays the screen. The action keeps alternating until you hit any key — JSR ($A000). When you do, the computer is reset for text screen and the program ends. In *ZBUG*, type FINISH = to see that the program ends at $43DA. Type FINISH - PCLEAR +1 = to get the length of the program, which is #$59 bytes.

A good technique to prevent the slight flicker on the graphics screen when alternating pages is to fill the screen first, then display it with the SCREEN command. This also gives the best animation effect. Since the program starts with PCLEAR, type GPCLEAR or G4382 to execute it. The END must be followed with PCLEAR.

You are not limited, by the way, to eight graphic pages of #$600 bytes each as long as you have enough memory to go higher without running into the edit buffer or the assembled program. The PCLEAR table continues in Figure 5.

Generally, though, PCLEAR 12 is the highest you will use. The buffer must start at least at $4E00 ($5600 with disk) and execute even higher (text programs plus symbol length plus #$200).

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216 C, Mason, WI 54846-9302. Please enclose an SASE when requesting a reply.) □

PCLEAR	9	10	11	12	13	14	15	16	17	18
W/Out Disk	3C	42	48	4E	54	5A	60	66	6C	72
With Disk	44	4A	50	56	5C	62	68	6E	74	--

Figure 5

The listing: PAGER

```
                                                    EDTASM+/Ø1.ØØ.ØØ    PAGE 1

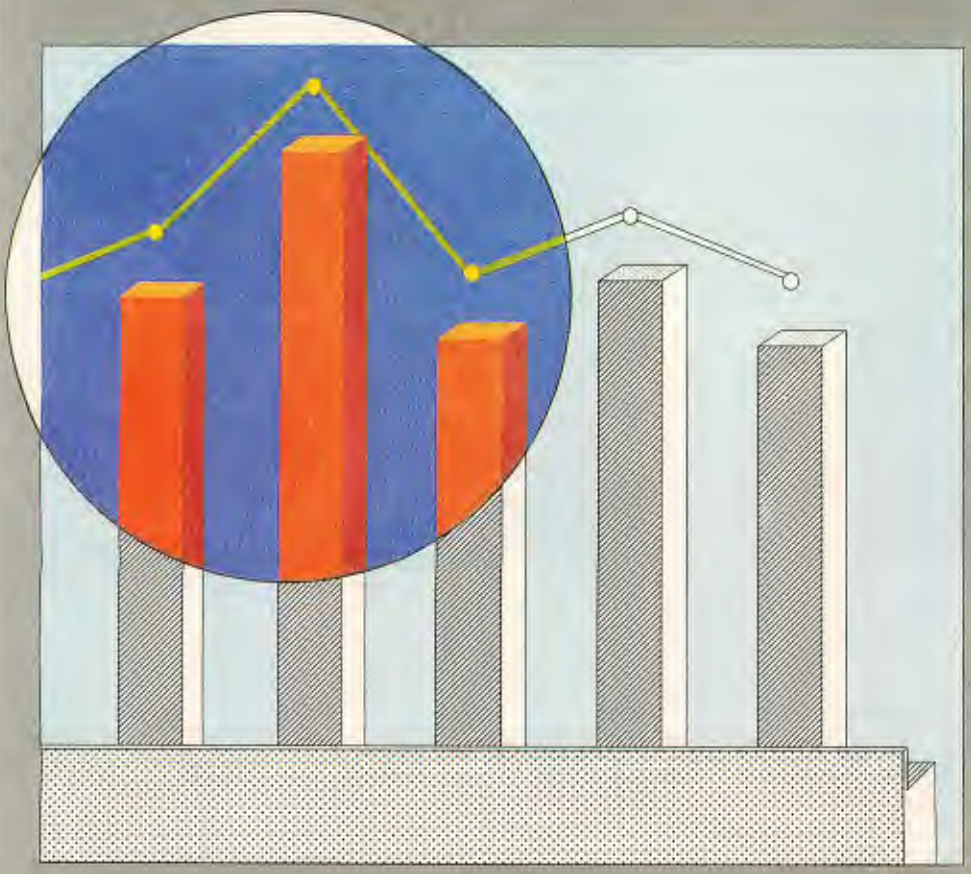
                    ØØØ5Ø *  $FF/1ØØ=#$3EØØ
4382                ØØ1ØØ          ORG     $4382
          9628      ØØ11Ø PMODE    EQU     $9628
          9653      ØØ12Ø PAGE     EQU     $9653
          9542      ØØ13Ø PCLS     EQU     $9542
          95AA      ØØ14Ø SCREEN   EQU     $95AA
          9682      ØØ15Ø CSET     EQU     $9682
4382 C6   Ø8        ØØ16Ø PCLEAR   LDB     #8       FOR 8 PAGES
4384 86   Ø6        ØØ17Ø          LDA     #6       #$6ØØ BYTES PER PAGE
4386 3D             ØØ18Ø          MUL
4387 DB   BC        ØØ19Ø          ADDB    $BC      WITH OR WITHOUT DISK?
4389 D7   19        ØØ2ØØ          STB     $19      WHERE BASIC WOULD START
438B C6   Ø3        ØØ21Ø          LDB     #3       PMODE 3
438D BD   9628      ØØ22Ø          JSR     PMODE
439Ø C6   Ø1        ØØ23Ø PAGE1    LDB     #1       PAGE 1
4392 BD   9653      ØØ24Ø          JSR     PAGE
4395 BD   9542      ØØ25Ø          JSR     PCLS
4398 9E   BA        ØØ26Ø          LDX     $BA      START OF GRAPHICS ON PAGE 1
439A CC   ØØØØ      ØØ27Ø          LDD     #Ø
439D ED   81        ØØ28Ø LOOP1    STD     ,X++
439F C3   ØØØ3      ØØ29Ø          ADDD    #3
43A2 9C   B7        ØØ3ØØ          CMPX    $B7      END OF GRAPHICS ON PAGE 1
43A4 25   F7        ØØ31Ø          BLO     LOOP1
43A6 C6   Ø1        ØØ32Ø          LDB     #1
43A8 BD   95AA      ØØ33Ø          JSR     SCREEN   DISPLAY THE SCREEN
43AB C6   Ø1        ØØ34Ø          LDB     #1
43AD BD   9682      ØØ35Ø          JSR     CSET     COLOR SET 1
43BØ C6   Ø5        ØØ36Ø          LDB     #5       PAGE 5
43B2 BD   9653      ØØ37Ø          JSR     PAGE
43B5 BD   9542      ØØ38Ø          JSR     PCLS
43B8 9E   BA        ØØ39Ø          LDX     $BA      START OF GRAPHICS ON PAGE 5
43BA CC   ØØØØ      ØØ4ØØ          LDD     #Ø
43BD ED   81        ØØ41Ø LOOP5    STD     ,X++
43BF 83   ØØØ3      ØØ42Ø          SUBD    #3
43C2 9C   B7        ØØ43Ø          CMPX    $B7
43C4 25   F7        ØØ44Ø          BLO     LOOP5
43C6 C6   Ø1        ØØ45Ø          LDB     #1
43C8 BD   95AA      ØØ46Ø          JSR     SCREEN
43CB C6   Ø1        ØØ47Ø          LDB     #1
43CD BD   9682      ØØ48Ø          JSR     CSET
43DØ AD   9F AØØØ   ØØ49Ø DONE     JSR     [$AØØØ]
43D4 27   BA        ØØ5ØØ          BEQ     PAGE1
43D6 5F             ØØ51Ø          CLRB
43D7 BD   95AA      ØØ52Ø          JSR     SCREEN
43DA 3F             ØØ53Ø FINISH   SWI              RTS IF IN BASIC
          4382      ØØ54Ø          END     PCLEAR

ØØØØØ TOTAL ERRORS
```

Add many more than four colors in HSCREEN 4, plus some techniques to put more style and depth into your graphics

Breaking the Four-Color Barrier

By Rusty Cutchin



Several years ago, as a yearbook editor for two trade associations of electronic technicians, I had the idea of putting the two groups' logos on the cover of the yearbook via the hot new medium of computer graphics. I programmed the designs at home on my CoCo 1 with good old PMODE 4 commands (and lots of artifact colors). But what I remember most about the project was transferring the program's variables to the Zenith Z-100 computer at the office and watching the designs come up in glorious 640-dot-wide resolution and 16 colors. Imagine — diagonal lines became lines instead of staircases, and circles became circles instead of Ferris wheels!

As a part-time layout artist I came to appreciate detail and resolution as much as — perhaps more than — color. Now that the CoCo 3 supports 640-by-192 graphics, I've been surprised to see that the excellent programmers writing graphics editors for the CoCo 3 are sticking with what is essentially a wide PMODE 4 screen (HSCREEN 2) in order to conveniently access 16 colors. This probably has something to do with the number of CoCo users not yet using RGB monitors, without which mixed

Rusty Cutchin is a former editor of Cashbox, *the record-industry newspaper. He owns Bass Hit Productions, which produces records and markets music software for the CoCo.*

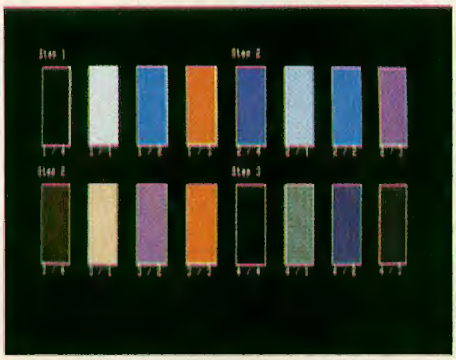
text and graphics in the highest resolution leaves a lot to be desired.

For those of you who *do* have an RGB monitor and don't mind spending a little extra time for more professional-looking results, particularly in business-oriented graphics, I have a couple of programs to easily get many more than four colors in HSCREEN 4, plus some techniques to put more style and depth into your graphics.

These techniques are not sophisticated, and anyone with a rudimentary knowledge of Enhanced BASIC can duplicate and expand on them. Creating new colors is simply a matter of using alternating vertical lines of different colors to create a new color. In HSCREEN 4, the distance between lines is so narrow that a new color or shade is created by the two adjacent lines.

Listing 1, NUCOLORS, illustrates this. After setting up the screen and variables, the program uses the HLINE command to draw 16 boxes on the screen and fill these boxes with lines of different colors to create new colors and shades. The program tells you the step rate of the line loops used, as well as the two color codes that make up the new color in each box. I chose black, white, blue and red as the four default colors in Line 10. As neutral and primary colors, they create the secondary colors purple and gray and pleasing lighter or darker shades of themselves. You can substitute yellow for white and create different shades of green and orange, as well as browns or any other shade that can be created out of four colors.

How you control the actual color depends on the palette colors you use and the step rate of the line loops in lines 45 and 50, where the vertical lines are actually drawn. The step rate 'S' (distance between vertical lines of one color) is initially set to 1 in Line 20, so that the first four boxes will contain the default colors just as if you had set them with HPAINT. If you set 'S' to '2' in Line 20, the first four boxes will have new colors in them. 'S' will increase by 1 in Line 65 for the next four boxes, returning to a value of 2 in Line 70 for boxes 9 through 12 unless you change these lines. When you leave more than two lines of space between lines being drawn (Step 3 or higher), the area begins to look more like vertical lines than solid colors. If you modify the program by adding another line loop before Line 45 or 50 to use three colors instead of two to make up your new color, however, you'll need Step 3 or higher. NUCOLORS tells you the step rate you're using (above the box), as well as the color codes (below the box).



But how to use these new colors practically, and how to fill areas other than boxes? Listing 2, DEMO, draws a dual business graph, creates a pie chart and bar graph using these new colors, adds colored text to the screen, and illustrates a few simple techniques to make your Hi-Res pictures more appealing. Many business users and hobbyists alike have bought expensive graphics packages, only to find that software doesn't turn you into an artist. A knowledge of basic design and layout principles is just as important when you're creating an advertisement or business graph.

DEMO first draws a background grid in lines 30 through 50. This gives a high-tech look to your design from the outset, and though a little overused in broadcast graphics, is still effective. It's kept in a darker color so it will stay a *background* design. Then in lines 60 through 130, the program creates two gray background boxes containing shadowed white boxes in which are printed the questions our graphs will answer. The outer box, the inner box and its shadow have given the graphics some 3-D depth with just a few commands. In lines 40 through 190 we use another default color to print the background data for our bar graphs. Notice that we always erase just enough of the blue grid before drawing something new in its place. This keeps images from interfering with each other and also highlights foreground designs.

In Line 200 the real fun begins. We create a blank box in Line 210 that we fill with new colors by going to the subroutine at Line 500 to draw our alternating colored lines. The subroutine at Line 600 draws the circle for our pie chart (Line 225). Then at lines 230 and 240 we call a subroutine to clean up the area outside our circle and presto — a new shape with two colors not in our default HSCREEN 4 palette! The rest of the program uses the lines subroutine (Line 500) to give us new colors for our bars, a new section for our pie chart and text to finish things up.

As you can see, a professional-looking graph or picture with full resolution and more than four colors is easily available, thanks to the great features of the CoCo 3. Here's hoping those talented 6809 programmers out there will enhance their fine products with a professional graphics editor that fully utilizes the CoCo 3's capabilities!

(Questions or comments concerning these programs may be addressed to the author at 1313 Cricket Lane, Woodbridge, NJ 07095. Please enclose an SASE when requesting a reply.) □

Listing 1: NUCOLORS

```
1 'NUCOLORS
2 'BY RUSTY CUTCHIN
5 '
10 PALETTE1,63:PALETTE2,15:PALET
TE3,38:PALETTE0,0
15 HSCREEN4:HCLS4:HCOLOR1
20 C1=1:C2=4:S=1:A=15:B=15:P1=1:
P2=10
25 FOR Y=15 TO 110 STEP 95
30 FOR T=1 TO 2
31 S$=STR$(S)
32 HPRINT(P1,P2-10),"Step"+S$
35 FOR X=A TO (A+240) STEP 80
40 HLINE(X,Y)-(X+48,Y+64),PSET,B
45 HCOLOR C1:FORV1=X TO (X+45) S
TEP S:HLINE(V1+2,Y+1)-(V1+2,Y+63
),PSET:NEXTV1
50 HCOLOR C2:FORV2=X TO (X+45) S
TEP S:HLINE(V2+1,Y+1)-(V2+1,Y+63
),PSET:NEXT V2
51 C1$=STR$(C1):C2$=STR$(C2)
52 HCOLOR1:HPRINT(P1,P2),C1$+" /
"+C2$
54 P1=P1+10
```

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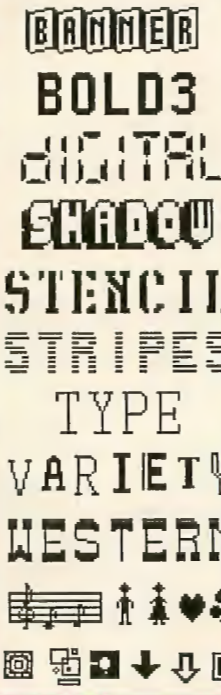
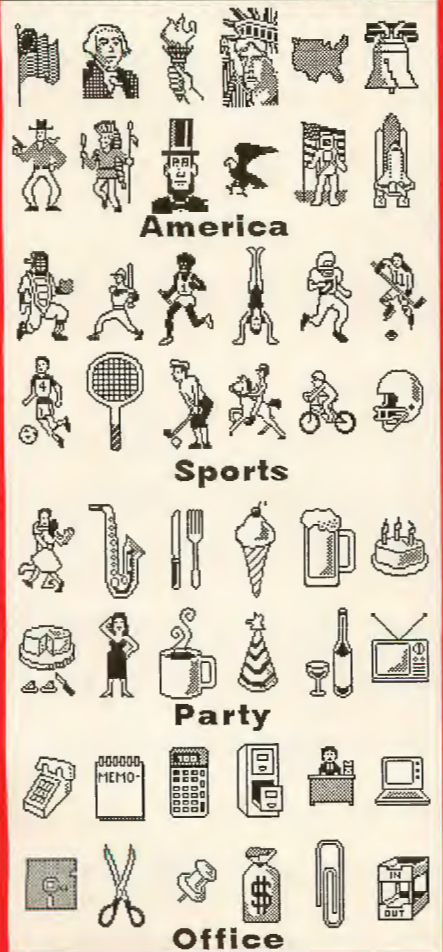
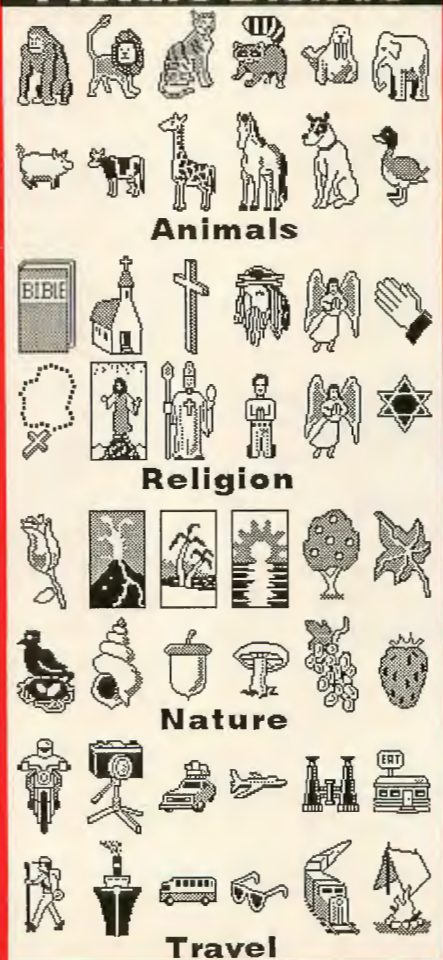


Font Disk B

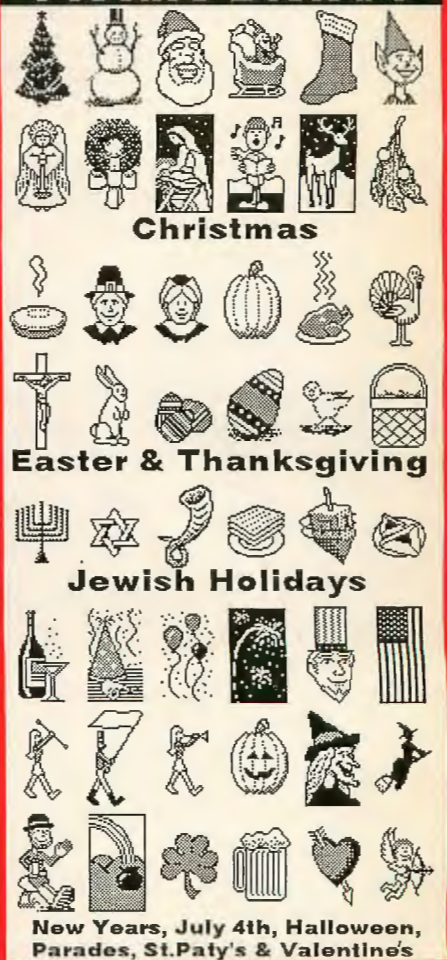
Samples From Picture Disk #2



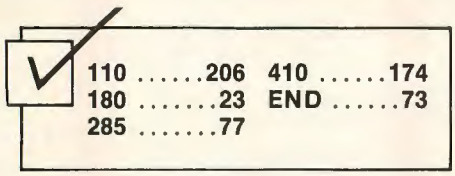
Samples From Picture Disk #3



Samples From Picture Disk #4



```
55 C2=C2+1:IFC2=5THENC2=1
6Ø NEXTX
65 S=S+1
66 A=A+32Ø:C1=C1+1:NEXT T
7Ø S=2:A=15:P1=1:P2=22:NEXTY
75 GOTO 75
```



Listing 2: DEMO

```
1Ø PALETTEØ,Ø:PALETTE1,63:PALETT
E2,38:PALETTE3,15
2Ø HSCREEN4:HCOLOR3
21 '
3Ø 'Draw Grid
35 '
4Ø HLINE(Ø,Ø)-(639,191),PSET,B
45 FORG1=41TO639 STEP4Ø:HLINE(G1
,Ø)-(G1,191),PSET:NEXTG1
5Ø FORG2=ØTO191 STEP 16:HLINE(Ø,
G2)-(639,G2),PSET:NEXTG2
55 '
6Ø 'Draw Question Boxes
61 '
65 HCOLOR4:HLINE(Ø,Ø)-(28Ø,1Ø),P
SET,BF
7Ø HCOLOR1:HPRINT(Ø,Ø),"WHAT AME
RICANS THINK OF THE ECONOMY
75 HCOLOR1:FORX=5TO26ØSTEP2:HLIN
E(X,19)-(X,52),PSET:NEXTX
8Ø HCOLOR4:HLINE(12,24)-(255,5Ø)
,PSET,BF:HCOLOR1
85 HLINE(7,22)-(25Ø,48),PSET,BF
9Ø HCOLOR4:HPRINT(1,3),"Do you t
hink what has happened
95 HPRINT(1,4),"to the stock mar
ket recently
1ØØ HPRINT(1,5),"will lead to a
recession?
1Ø5 HCOLOR1:FORX=285TO56ØSTEP2:H
LINE(X,19)-(X,52),PSET:NEXTX
11Ø HCOLOR4:HLINE(292,24)-(558,5
Ø),PSET,BF
115 HCOLOR1:HLINE(287,22)-(553,4
8),PSET,BF
12Ø HCOLOR4:HPRINT(36,3),"Do you
 think the national economy
125 HPRINT(36,4),"is getting bet
ter, getting worse,
13Ø HPRINT(36,5),"or staying abo
ut the same?
135 '
14Ø 'Print Bar Graph Data
145 '
15Ø HCOLOR4:FORX=281TO639STEP4Ø:
HLINE(X,64)-(X,19Ø),PSET:NEXTX
155 FORY=64TO191STEP16:HLINE(281
,Y)-(638,Y),PSET:NEXTY
16Ø HCOLOR2:HPRINT(35,7),"5Ø - -
 - - - - - - - - - - - - - - - -
 - - -
165 HPRINT(35,1Ø),"4Ø - - - - -
- - - - - - - - - - - - - - - -
17Ø HPRINT(35,13),"3Ø - - - - -
- - - - - - - - - - - - - - - -
175 HPRINT(35,16),"2Ø - - - - -
- - - - - - - - - - - - - - - -
18Ø HPRINT(35,19),"1Ø - - - - -
- - - - - - - - - - - - - - - -
185 HPRINT(35,22)," Ø - - - - -
- - - - - - - - - - - - - - - -
19Ø HCOLOR1:HPRINT(38,23),"
Better        Worse        Same
195 '
2ØØ 'Draw Pie Chart
2Ø5 '
21Ø HCOLOR1:HLINE(25,7Ø)-(255,19
Ø),PSET,B
215 X=25:Y=7Ø:A=14Ø:B=19Ø:C1=3:C
2=2:S1=2:S2=2:GOSUB5ØØ
22Ø X=14Ø:A=255:C1=2:C2=1:GOSUB5
ØØ
225 X=25:A=255:HCOLOR1:GOSUB 6ØØ
23Ø H=4:P=1:E=X+2:F=Y+2:GOSUB7ØØ
235 HCOLOR4:HLINE(25,7Ø)-(255,19
Ø),PSET,B:GOSUB 6ØØ
24Ø H=4:P=4:E=A-2:F=B-2:GOSUB7ØØ
245 '
25Ø ' Draw Bars
255 '
26Ø X=325:Y=142:A=365:B=18Ø:C1=4
:C2=1:S1=1:S2=2:GOSUB5ØØ
```

One-Liner Contest Winner . . .

This one-liner displays the poke and peek values for the CoCo 3 keyboard. Just press a key. It comes in handy when you're working on key-repeating routines.

On Coco 3 Misc disk.

The listing:

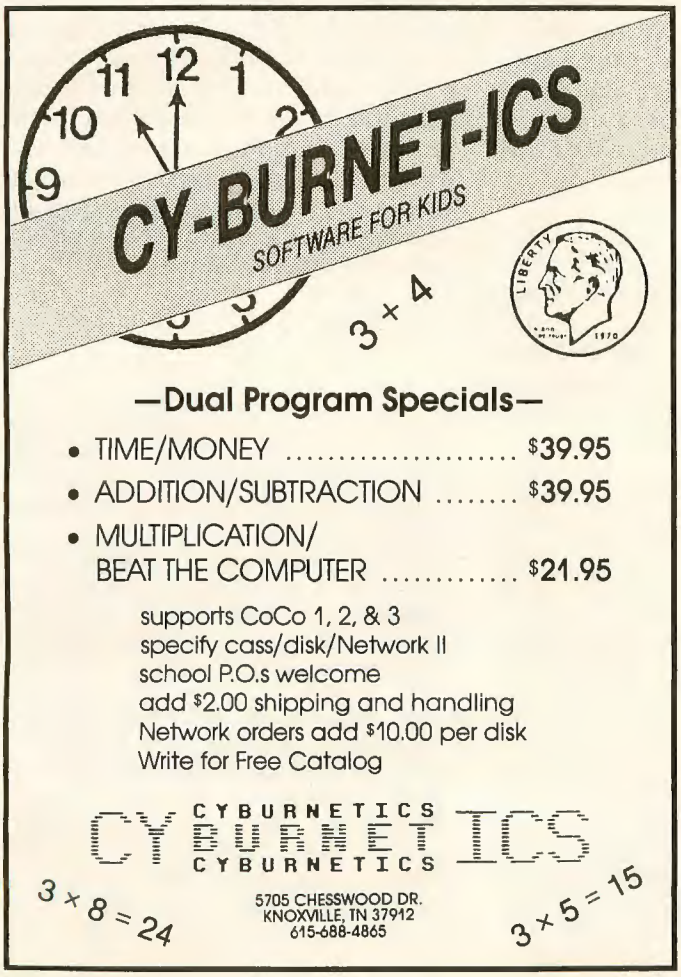
```
Ø CLS
1 W=337:PRINT@Ø,"POKE LOCATIONS
AND VALUES FOR   THE KEYBOARD";:
FORT=1TO8:PRINT@(W-336)+(T*32)+6
4,W+T"=",PEEK(W+T):IFPEEK(W+T)<>
255THENSOUNDPEEK(W+T),1:NEXT:GOT
O1ELSENEXT:GOTO1
```

? ? ? ?

Larry Lim
Cincinnati, OH

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

```
265 X=366:Y=151:A=4Ø6:C2=3:S2=3:
GOSUB 5ØØ
27Ø X=43Ø:Y=97:A=47Ø:C1=4:C2=1:S
2=2:GOSUB5ØØ
275 X=471:Y=87:A=511:C2=3:S2=3:G
OSUB 5ØØ
28Ø X=535:Y=62:A=575:C2=1:S2=2:G
OSUB5ØØ
285 X=576:Y=67:A=616:C2=3:S2=3:G
OSUB5ØØ
29Ø '
3ØØ 'Draw Graph Key
3Ø5 '
31Ø X=315:Y=62:A=335:B=7Ø:C2=1:S
2=2:GOSUB5ØØ
315 Y=72:B=8Ø:C2=3:S2=3:GOSUB5ØØ
32Ø HCOLOR1:HPRINT(43,8),"Before
 the plunge
325 HPRINT(43,9),"After the plun
ge
33Ø '
35Ø 'Finish circle
355 '
36Ø HCOLOR4:HLINE(M1,M2)-(M1-R,M
2+1Ø),PSET
365 HLINE(M1,M2)-(M1,M2+R),PSET
37Ø PT=3:HPAINT(M1-2,M2+4),PT,4
375 HCOLOR1
38Ø HPRINT(1Ø,13),"Yes
385 HPRINT(1Ø,14),"31%
39Ø HPRINT(6,18),"Don't Know/
395 HPRINT(7,19),"No Answer
4ØØ HPRINT(1Ø,2Ø),"19%
4Ø5 HCOLOR4:HPRINT(23,15),"No
41Ø HPRINT(23,16),"5Ø%
415 GOTO 415
42Ø '
5ØØ 'Fill boxes to make new colo
rs (SR)
5Ø5 '
51Ø FORV1=X+1TOA-1 STEP S1:HCOLO
RC1:HLINE(V1,Y+1)-(V1,B-1),PSET:
NEXTV1
515 FORV2=X+2TOA-1 STEP S2:HCOLO
RC2:HLINE(V2,Y+1)-(V2,B-1),PSET:
NEXTV2
52Ø RETURN
525 '
6ØØ 'Draw circle (SR)
6Ø5 '
61Ø M1=X+((A-X)/2):M2=Y+((B-Y)/2
):R=(A-X)/2
615 HCIRCLE(M1,M2),R-2:RETURN
62Ø '
7ØØ 'Clean circle border (SR)
7Ø5 '
71Ø HPAINT(E,F),H,P
715 RETURN
```

In this and in future "CoCo Consultations," I will be trying something new. In addition to the familiar Q & A column, I will also include tidbits of information contributed by various folks and, in some cases, comment on the information. Thus, even if you don't have a question, *I invite you to send in any little hints or descriptions of experiences you have had with the CoCo that you think might be of interest to the CoCo-owning public in general.*

By Marty Goodman
Rainbow Contributing Editor

Using the CoCo 3's MMU

Where would I get the information needed to properly use the MMU of the CoCo 3 to access all 512K of memory via assembly language?

Brian O'Neill
Kirkland, WA

The best reference for that is the service manual for the CoCo 3. This book, which costs about $14 and can be ordered from the people at your local Radio Shack store (they will have to call Tandy National Parts to order it for you), is the reference that all commercial CoCo 3 software developers use. After a bit of time spent experimenting to clear up a few minor ambiguities in the information there, any assembly language programmer should be fully able to use the MMU of the CoCo 3. If you need to see some examples of its use, however, you might want to order a copy of Spectral's *Super Extended BASIC Unravelled* from Microcom. This is a complete, commented disassembly of the ROM in the CoCo 3 that includes a guide to the GIME chip similar to that found in the CoCo 3 service manual. By paying careful attention to the start-up code and Hi-Res screen handling code found there, you will see examples of the use of the MMU by Microware's programmers.

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. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

CoCo 3 Cold Start

How do I do a cold start on the CoCo 3?

Randall Reid
(RANDOMR)
Wiarton, Ont.

From BASIC you can type `POKE &H71,0:EXEC&H8C1B` and press ENTER. This resets the cold start flag at $71 (the same flag used by the CoCo 1 and 2) and then jumps to the special CoCo 3 cold start sequence. That special CoCo 3 cold start routine was "snuck in" on top of what used to be the (unusable) `DLOAD` command. In fact, you can accomplish the same thing by typing `POKE &H71,0:DLOAD` and pressing ENTER! Of course, you can also just hold down the CTRL and ALT keys, press the reset button, then release those keys and press the reset button again. But then you have to gaze briefly at the ugly faces of the "three mugateers."

A Sound Deal

I'm using a NEC Multisync monitor with my CoCo 3 and get an exceptionally crisp, sharp image. But the NEC Multisync doesn't have an audio input. Can you recommend a means of getting sound out of the CoCo 3?

Lewis Kurfist
(LEWKAY)
Parkridge, NJ

The back of the CoCo 3 has an RCA phono-type audio output jack. You can connect that to the Aux or Line Input of any nearby hi-fi system and get sound that way. Or, you can buy a $12 Radio Shack "speaker amplifier" (Cat. No. 277-1008) and hook that to the CoCo 3 via a cable that has an RCA phono plug at one end and a ⅛-inch mini phono plug at the other. This "speaker amplifier" requires a 9-volt battery, but you may be able to run it off a battery eliminator if the eliminator in question has sufficiently cleanly-filtered DC power so as to prevent a nasty hum in the amplifier.

If you're a hacker, you may want to mount that unit inside the CoCo 3 under the keyboard and "steal" 10 volts to run it from the CoCo's main power supply at the junction of D1 and D2. If you get a hum, you can smooth it out by regulating that power down to about seven volts by using a 7805 regulator whose ground is floated with a small-value (100 ohm or so) resistor.

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.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

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See You At Princeton RAINBOWfest!

Three do-it-yourself fixes for the hardware hacker

Quick Fixes

By Marty Goodman

Each of the following three discussions present information to enable hardware tinkerers to make inexpensive repairs and upgrades to their CoCo equipment. These three projects have the following in common: They address widespread problems with CoCo systems; they take no more than an hour or two to complete; they require little hardware construction expertise; and the total cost of parts for any of the projects is under $5.

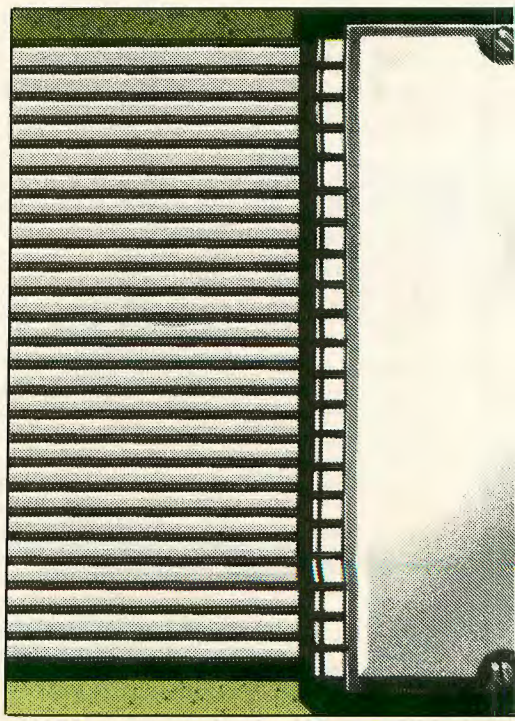
Although the information will not be presented in a strictly *for-the-beginner* fashion, anyone with modest experience building electronic projects should be able to follow these instructions. Indeed, only one of the three projects requires that you even read a schematic diagram.

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. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Project One: Sparklies

Many CoCo 3 users have complained of "sparklies." These are little linear flashes of light that appear on a monitor screen some — or all — of the time. Generally, OS-9 Level II users with RGB monitors and 512K of memory report seeing them during disk I/O, but they have been reported by Disk Extended BASIC users on monochrome monitors — even appearing when the disk is not in operation. These are caused by subtle timing problems between the GIME chip and the DRAM chips it needs to address.

Until recently the only known ways to cure the problem were complex, tedious, expensive or all three. You could buy a different brand of DRAMs for your upgrade board, replace the old (1986) GIME chip with a newer variant (1987) of that chip. You could also unsolder your 68B09E chip, replace it with a socket, and insert a 6309E (Hitachi-made CMOS version of the 6809E) in that socket. The DRAM chip and GIME chip replacements cost $180 and $50, respectively. The 6309E chip costs $12 to $25, is difficult to get and, because the replacement process requires the removal of the CoCo motherboard and the unsoldering of a 40-pin chip, is a viable alternative only for the



most experienced and well-equipped hardware tinkerer.

History of the Fix

In March of this year, Roger Krupski of RGB Systems reported some startling news on Delphi: He had found a way to cure the sparklies with a quick, cheap modification. Roger was experimenting with various-length Y cables on his system (something I have repeatedly warned RAINBOW readers *not* to do) and found that when he added a cable to the system, his sparklie problem got worse. He then decided to manipulate the system-timing in a simple, direct way. He hooked an AM radio-type, 10- to 365-pF variable capacitor in parallel with C10, (a timing fudge factor/RFI suppression capacitor present on the E clock). In this manner, he could *tune out* the sparklies. When he had his long Y cable hooked up, it took more capacity to tune out the sparklies than when he was not using the cable. Roger examined the waveform with his 100-MHz oscilloscope and found that his modification removed some of the overshoot in the E clock waveform and smoothed out a *jog* in the middle of it. It also shifted the time constant for that E clock fudge factor circuit that Tandy had provided.

After considerable experimentation, observation and measurement, Roger arrived at the modification that seemed to work best. A few other tinkerers on Delphi who had sparklie problems tried it and reported considerable success in curing them. Of course, the following suggestion is still *quite* experimental. It *is* possible that such manipulation of the clock timing could cause problems (including decreased system reliability.) I recommend that *only* those CoCo 3 owners with serious sparklie problem try the following fix, and I urge those who try it to report to me, in care of RAINBOW, what success they have with the fix.

The Fix

The fix that worked best for Roger is as follows:

Remove R9 and R10 from the CoCo 3 motherboard and replace those 47-ohm resistors with 100-ohm resistors. Then remove C10 and C11 from the board and replace those 39-pF capacitors with 100-pF capacitors.

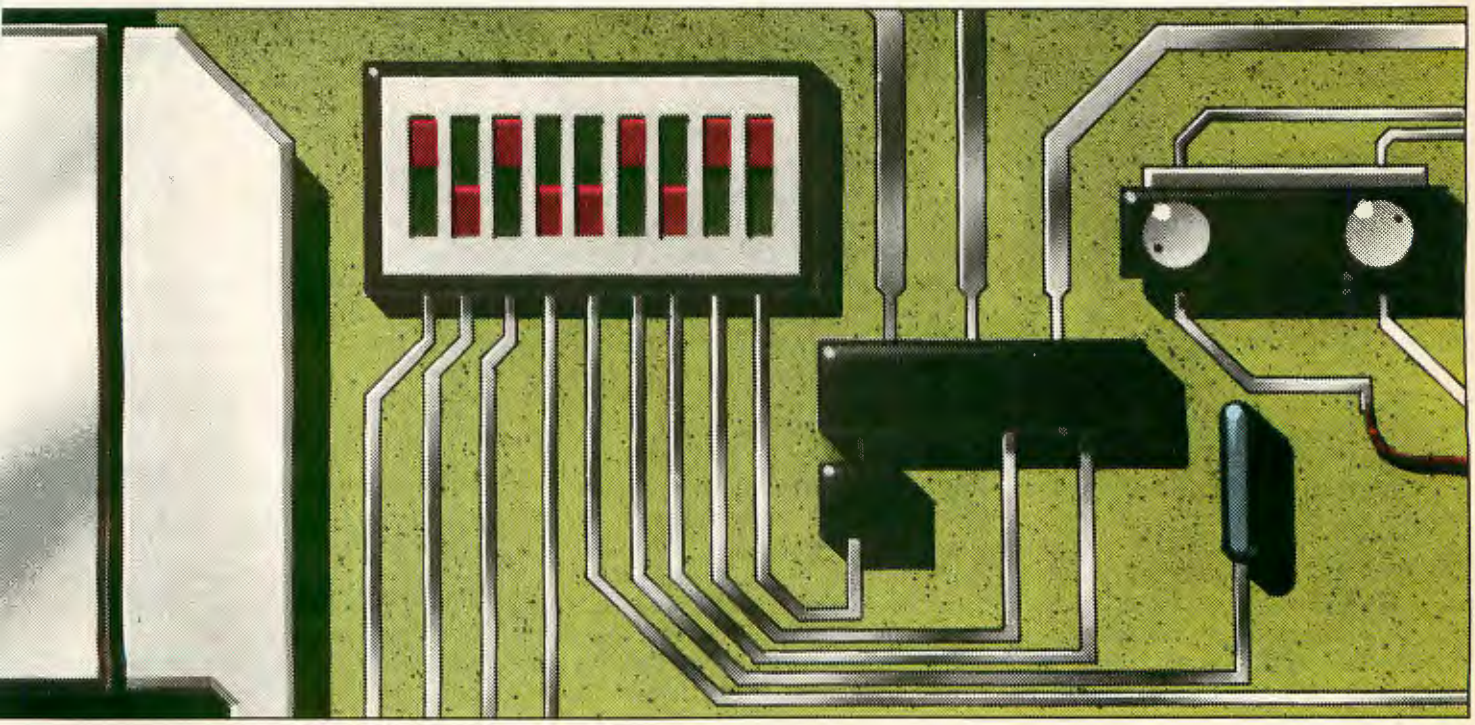
Help with the Details

With the computer open in front of you, R9 and R10 are the two small, side by side cylinders just in front (front = toward the keyboard) and near the left-hand corner of the GIME chip (the 64-pin, square, socketted chip). On the CoCo motherboard, they are clearly marked R9 and R10 in white silk-screened letters. Each has yellow, purple and black color-bands. Remove and replace these resistors with 100-ohm resistors. The resistors may be purchased at Radio Shack, Cat. No. 271-1311, 271-152 or 271-012. While any one of these three will work, the first (No. 271-1311) will probably fit best physically in the space available.

C10 is a tiny green blob located behind the GIME chip, to the left of a prominent black cylindrical electrolytic capacitor (C9). C11 is an identical tiny green blob located near the right-hand edge of the board, to the left of the front screw that holds down the 40-pin system bus connector. It, too, is located to the left of a prominent black cylindrical electrolytic capacitor (C27), and immediately to the left of the resistor R11. Both of these capacitors are clearly labeled on the motherboard as C10 and C11 in white silk-screened lettering. Remove both capacitors and replace them with 100-pF capacitors (Radio Shack Cat. No. 272-123).

Your total parts cost for this project should be under $2.

If the sparklies are not completely cured (or at least considerably lessened), put things back the way they were. Although you will probably destroy the original resistors and capacitors you removed, replacement parts are available at Radio Shack (Cat. No. 271-009 for the 47-ohm resistors; Cat. No. 272-121 47-pF cap will do to replace



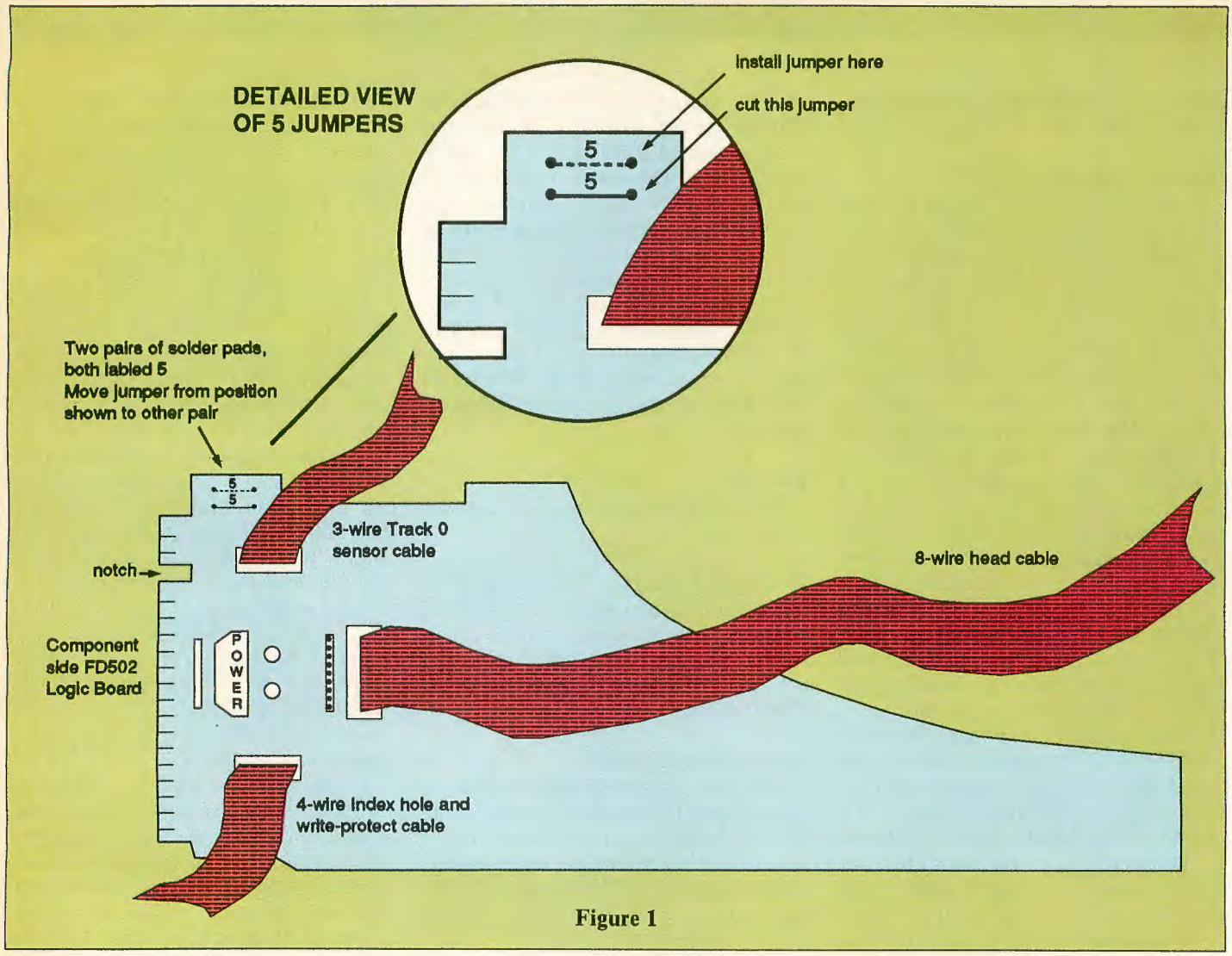


Figure 1

the original 39-pF cap). If the sparklies are not *quite* cured, you might want to experiment with different capacitor values. Try values ranging between 50 and 500 pF.

Remember that opening the case of the computer voids any warranty you might have with Tandy, and that Tandy repair services *does* reserve the right to refuse to repair computers that, in the opinion of the repairperson who sees the machine, are butchered beyond repair by their owners.

Project Two: FD 500/FD 502 Drive Fix

There is a potentially *serious* problem that will plague some owners of the newest disk drive systems sold by Tandy for the CoCo. This problem *only* occurs if you buy *both* your Drive 0 system and your second drive from Radio Shack, and you own a model FD 500 or the latest FD 502 double-sided drive systems. The problem will cause crashed disks when copying from Drive 0 to Drive 1 under both Disk BASIC and OS-9 (although the problem is more serious and frequent under OS-9). However, there *is* a simple hardware fix for the problem.

Essential Background

By convention, the disk drive hardware for the CoCo was set up so that when any *one* drive was being accessed, the drive spindle motors on *all* drives in the system are on. All software written for the CoCo, especially the Disk Extended BASIC and the OS-9 Levels I and II operating systems, expect such behavior. This convention differs from the conventions of other PC Compatible, hardware. There, when any one floppy disk is accessed, *only* that disk's spindle motor spins.

Now, because CoCo's disk-access software expects all drive spindle motors in the system to be running when any one drive is accessed, if you tell the computer to read something from one drive and copy it to another drive, the system software will *not* wait for the motor on the other drive to come up to speed. (It knows you have one drive running and assumes that all other drive motors are at speed.)

The Tandon TM65L type drives used in the FD 500 CoCo drive system and the drives used in the FD 502 double-sided CoCo drive system have *jumpers* that determine if the drive motor will start in response to *just* a motor-on signal (as required for proper CoCo operation) or if the motor-on line must be active *and* the drive selected. These jumpers were properly set for CoCo operation on the Drive 0 unit of the FD 500 and FD 502 drives.

However, those buying an addition (Drive 1) to their FD 500 and FD 502 drives are in for a rude surprise. The Tandy stock-added drive for the FD 500 and FD 502 is generally supplied with incorrectly set motor logic jumpers. If you own a two-drive FD 500 or FD 502 system, and *both* drives were purchased from Tandy, check to see if your system has this problem.

Under Disk Extended BASIC, type `POKE &HFF40,2` and press ENTER. If the Drive 1 light *and* motor are on, there is a problem that you can correct using the fix described as follows. (If your drives were set up properly, only the Drive 1

light — not the motor — would go on.) You can also check this problem by opening your drive case to see the spindle motors of both drives, typing POKE&HFF40,9 and pressing ENTER. Drive 0's drive light will go on, and its motor should go on, too. If the the spindle motor for Drive 1 does *not* go on as well, you will need to correct this with the fix described below.

The FD 500 Fix:

Open the drive case and expose the bare Drive 1 drive. You may need to completely remove it, disconnecting the 34-pin connector and the four-wire power connector and removing the two screws holding it to the case. Look on the drive's circuit board for three staking pins arranged in a 90-degree angle and labeled JP 7. If pins B and C are jumpered, you have found the problem. Remove the jumper that connects pins B and C, and shift it so that it joins pins A and C. If your drive is a different version, you may have to hunt for the jumper that correctly affects the motor's operation. Look for a jumper with zero resistance to Pin 16 (motor status) of the drive's 34-pin connector.

The FD 502 Drive Fix:

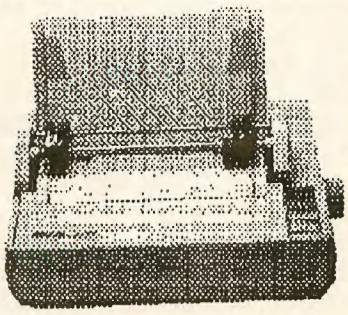
The FD 502 drive is a bit more complicated to fix. The FD 502 drive's motor logic control jumper is *soldered* in, and the jumper is relatively inaccessible, requiring that you not only remove the drive from the case, but that you also partly or completely remove the logic control board from the bare drive to gain access to the right jumper.

Open up the disk drive case and remove the top (Drive 1) drive (see Figure 1). This will entail removing four screws to open the case, the four-wire power connector and the 34-wire edge card connector from the drive and the two screws that hold the drive in place.

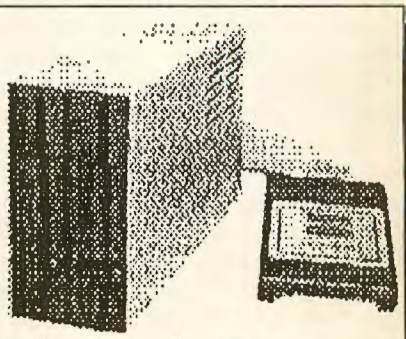
Next, look at the component side of the drive's printed circuit logic board. The component side has prominent cylindrical electrolytic capacitors and a number of connectors attached to it. (The underside of that board has some surface-mount resistors and capacitors soldered to it.) Position the board so that the edge connector is facing you, and the little notch in that connector is to your left. You must now identify three connectors.

To the left of the four-wire power connector's original position is a connector that hooks to a three-wire mylar cable going to the Track 0 detect sensor. Further back and to the right of the power connector is a four-wire mylar cable that plugs into the circuit board, carrying Index-Hole and Write-Protect detector information. Behind the four wire power connector, some cylindrical capacitors and some bare staking pins, is an eight-wire mylar connector that carries signals from the drive motor's heads to the logic board. You will probably have to remove all three of these cables at their logic board connection.

These three mylar cables are attached to little white connectors that, in turn, plug into mating connectors on the circuit board. Do *not* tear the mylar when removing these connectors. Note, too, that the mylar is *not* plugged directly into the connector, as is the case with the CoCo keyboard connector. It is *bonded* to a connector, which mates to another connector that is soldered to the PC board. Do not try to pull the connector out by the mylar ribbon. Try using a jewelers' screwdriver to carefully remove those connectors.



COCO ACCESSORIES



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After you have removed these three connectors, you will find three hold-down screws that attach the printed circuit board to the disk drive. Remove these, and lift out the printed circuit board from the drive.

To the left and behind the notch that marks Pin 2 of the 34-pin connector, you will see two pairs of pads on the circuit board labeled '5'. While the right pair is jumpered, the left pair is not. Remove the jumper from the right pair of pads, and solder one across the other pair of pads.

Put the drive back together, attach the connectors and reinstall the drive in the cabinet.

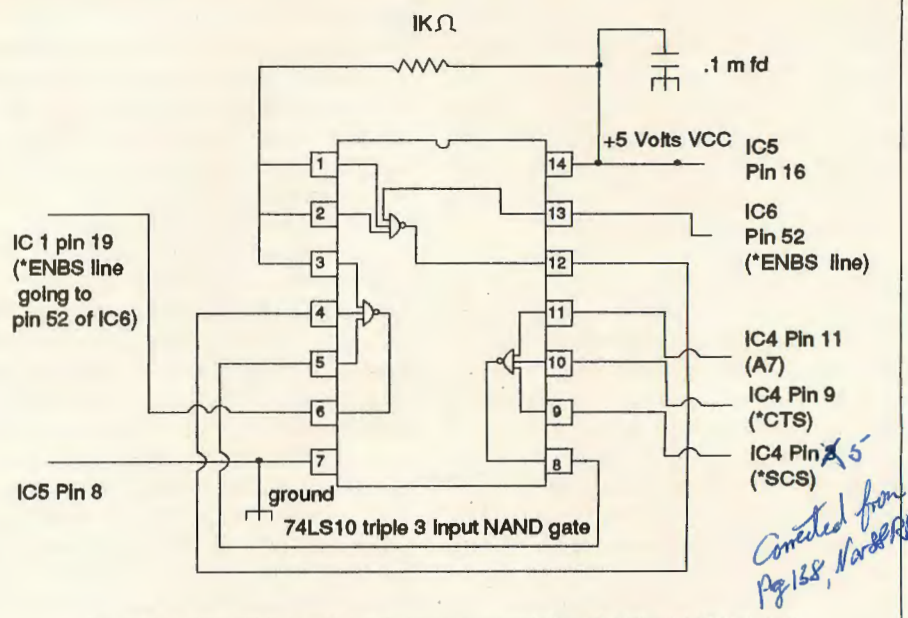
Testing Your Work:

From Disk BASIC, type `POKE &HFF40,2` and press ENTER. The Drive 1 light should come on, but *none* of the motors should go on. While `POKE &HFF40,8` should cause *both* motors to go on, *none* of the drive lights should go on. `POKE&HFF40,10` should cause both motors and the Drive 1 light to go on, and `POKE &HFF40,0` should turn everything off. If your system behaves in that fashion, you've fixed it properly. If it behaved in that fashion originally, you should *not* attempt to fix it.

Thanks to Kevin Darling (KDARLING) of Raleigh, NC. Kevin was, to my knowledge, the first person to discover the FD 502 drive problem. Kevin was developing driver software for Tony DiStefano's No Halt Controller using a two-drive FD 502 system and kept running into problems. Eventually, he discovered the improperly jumpered FD 502 Drive 1 unit. It was an impressive detective job. Kevin later collected reports that the FD 500 system had a similar problem. Thanks, also, to Glen Hathaway (HATHAWAY) who informed me of the JP 7 on his Tandon TM65L jumper and its effect on the motor logic.

Project Three: Multi-Pak Upgrade

As I wrote over a year ago, Tandy has recommended that owners of all Multi-Pak models who want to use them with a CoCo 3 must upgrade them. At present, I am uncertain whether the upgrade is required for the new Multi-Paks (Cat. No. 26-3124), but still recommend it be done. Some of the Cat. No. 26-3134 Multi-Paks currently sold have an 'A' suffix after the catalog number (26-3124A), and have the upgrade board already installed. Those with older Cat. No. 26-3124 Multi-Paks should read on for instructions on how to make up and add this upgrade board themselves.



Be sure to also cut the trace on the printed circuit board of the Multi-Pak that connects Pin 19 of IC1 to Pin 52 of IC6

Figure 2: Upgrade for Multi-Pak

The needed upgrade for the older Multi-Pak (Cat No. 26-3024) was easy. You obtained a new PAL chip for it, and replaced the old, socketted PAL chip in the Multi-Pak with this new one. For a while, that upgrade PAL chip was available through Tandy National Parts. More recently, National Parts has refused to provide that part to end users. However, the part is still available from third-party CoCo retailers, such as Microcom.

Owners of the smaller, newer (Cat. No. 26-3124) Multi-Paks faced a more difficult upgrade. A Satellite Board had to be ordered from National Parts and then properly installed. This board is currently hard to get, and the instructions for its installation that I provided over a year ago are also dated, because those old instructions were keyed to particular wire colors. Tandy has since changed the wire colors of the upgrade board, making my original instructions nearly useless.

One of our members on Delphi took the trouble to "reverse engineer" the Multi-Pak Satellite Board upgrade and post a schematic for it. The upgrade consists of a *single*, 35-cent small scale TTL logic chip, a 10-cent deglitching capacitor and a 5-cent resistor. With the information provided in the schematic diagram (Figure 2) and a small printed circuit board, hardware tinkerers should be able to do their own upgrade for a fraction of the cost charged by Tandy repair.

Those who would attempt this upgrade must be sure to first *cut* the trace that connects Pin 19 of IC 1 to Pin 52 of IC 6 on the printed circuit board of their Multi-Paks. Note that IC 6 is a monster square integrated circuit. It is a custom chip made *just* for the Multi-Pak. Note, too, that its pins are smaller than those of the other ICs — soldering to Pin 52, as called for in the upgrade, can be a delicate matter. Skill and fine tips on your soldering iron are both essential.

The schematic diagram shows the 74LS10 (triple three input NAND gate) IC with its pins arranged as they actually are on the chip, but it also shows what the pins connect to internally. This upgrade turns off the Multi-Pak's data bus when addresses that have Bit 7 set are presented to it. This protects the GIME chip registers from bus conflicts with any I/O devices plugged into the the Multi-Pak that try to use addresses greater than $FF7F. Addresses accessed via the *CTS line ($C000 through $DFFF) and the *SCS line ($FF40 through $FF5F) are unaffected.

Thanks to Jim Johnson (REINDEER), who provided this information.

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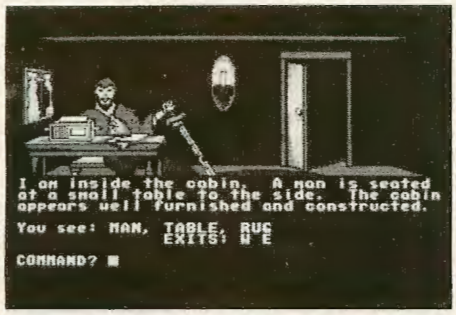

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Lower rates, expansion and online editing

Time for a Change

By Cray Augsburg
Rainbow Technical Editor

Those who have been using Delphi for a year or so may be familiar with the Delphi Advantage plan. Essentially, this plan offers reduced rates for members who guarantee to use at least $24 worth of online time each month. Now Delphi has reduced Advantage Plan usage rates to $4.80 per online hour. Figure 1 shows a comparison between Delphi Advantage rates and the hourly rates of two other services.

To sign up for the Delphi Advantage, enter USING ADVANTAGE at the Main> prompt on Delphi. There is a one-time entry fee of $19, and you must commit to using at least $24 of online time each month (unused portions of the $24 do not carry forward to the next month.) The $24 usage commitment is applied at the beginning of each month. Many of you probably use Delphi quite a bit more than this already. A quick review of your account should be all that is necessary to determine if the Delphi Advantage would be beneficial to you.

In addition to the reduced access rates, Delphi Advantage members receive the monthly Delphi newsletter and a monthly summary of usage. The plan is open to all members in good standing (no outstanding accounts). You can cancel online anytime you decide the plan is not helping you.

A New Development

Through an agreement with Dave Thomas (MORTIMER), Falsoft, Inc., publishers of THE RAINBOW and PCM, now manages the Portable Place SIG on Delphi. PCM has covered the Tandy portables for more than five years now. While PCM's magazine coverage of portable computers will still exclude non-Tandy products, the newly acquired SIG welcomes users of all portables. Good luck to the staff as they embark in this new direction.

Oldie, But Goldie

Last month we covered some useful applications of files in the Delphi Workspace. Now, let's focus our discussion on the files themselves or, rather, the text editors used to create them.

In the past, we have used the CREATE command to build text files online. This is OK for simple notes. But what if we want to correct mistakes in longer files? The CREATE command only lets us write the file. Once a file is saved, the only way to make corrections is to retype the entire file. Here is where Delphi's online text editors really come in handy.

Delphi offers a choice between two different line-oriented editors: *EDT* and *Oldie*. I prefer to use *Oldie* because its command structure is based on slash commands as are other areas of Delphi. In addition, *Oldie* shows you exactly where you are in the file by supplying you with two numbers. The first number indicates your current position in the file. The second number indicates the total number of lines in the file.

We'll save discussion of *EDT* for a future column. Use the Settings section of Workspace to set *Oldie* as your default online text editor. To invoke the editor while in Workspace, enter EDIT *filename*. Listed below are the commands available with *Oldie*. Please note the slashes are used as delimiters in the command lines. They *are* required.

- /APPEND/*string*/ adds the text *string* to the end of the current line.

Cray Augsburg is RAINBOW's technical editor 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 CRAY.

Database Report

By Don Hutchison
Rainbow CoCo SIG Database Manager

This month in the CoCo SIG, we've got some great graphics that I'm sure you will enjoy.

OS-9 Online

In the General topic of the database, Keith Alphonso (ALPHASOFT) uploaded a text file describing Alpha Software Technologies' BBS system. Jim Johnson (REINDEER) sent in an article about creating a customized system disk that boots up into an 80-column text window.

The Utilities topic includes Bill Brady (OS9UGED), who posted a file management utility called Runner, and John Beveridge (JOHNTORONTO), who uploaded a program to remove the first block from files sent in CoCoBin format by the *Wiz*.

In the Patches topic, Chris Burke (COCOXT) sent us a patch to correct a bug in the Rename command of *EZGen* Version 1.04. Chris also uploaded an *EZGen* script to fix an error processing bug in Version 2.2b of the Burke & Burke BBFHDisk.dr hard disk driver. Kevin Darling (KDARLING) uploaded an 80-column patch for *TS/Edit*, provided by Bob Santy.

In the Telcom topic, Merle Kemmerly (TOOK3) uploaded Version 3.0.0 of *Telstar*, a terminal program for the CoCo 3 under Level II OS-9. Bill Brady uploaded the WizAcia device driver and M2w descriptor (the ACIA port driver used by the *Wiz*). Bill also posted the source code for the SuperBoard version. Warren

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Daytime	2400 bps	$12.60/hr	$12.75/hr	$42.50/hr
Daytime	1200 bps	$12.60/hr	$12.75/hr	$35.00/hr
Daytime	300 bps	$12.60/hr	$6.25/hr	$35.00/hr

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Figure 1: Service access rates as of August 1, 1988.

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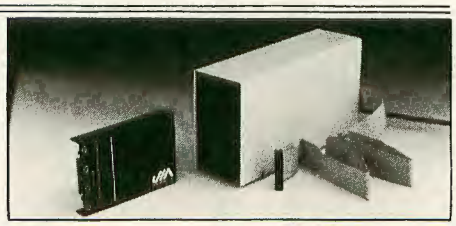

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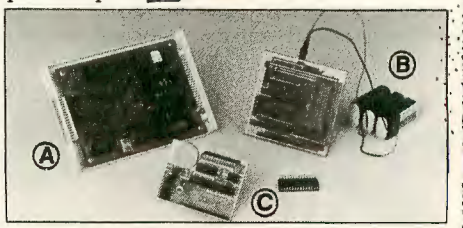

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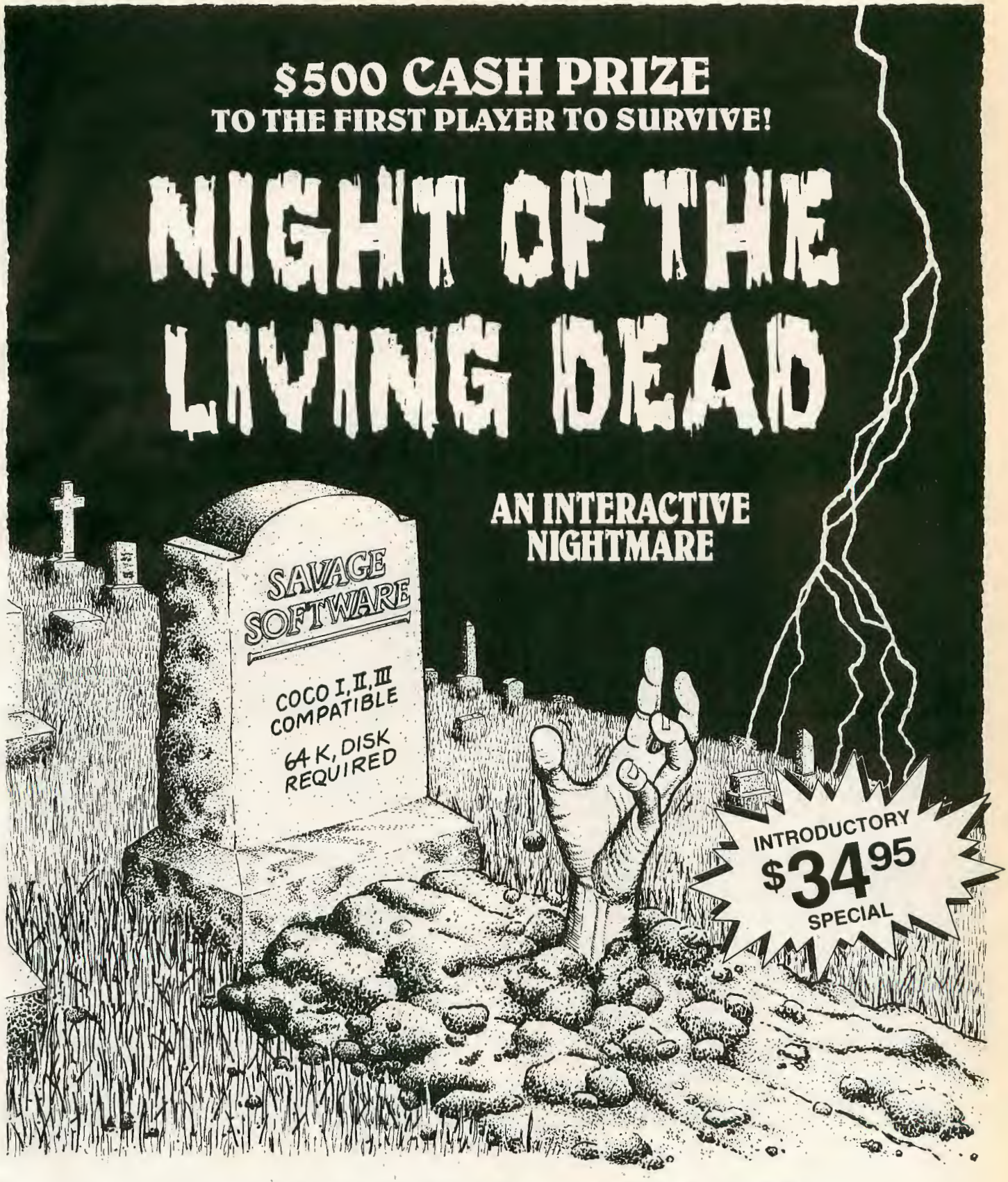

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- /BOTTOM moves the edit pointer to the bottom of the file.
- /CHANGE/*string1*/*string2*/ replaces *string1* in the current line with *string2*.
- /DELETE removes the current line from the file.
- /DIRECTORY shows a directory of Workspace files.
- /EDT invokes *EDT*. (You can always move to *EDT* from *Oldie*, but you cannot call *Oldie* from within *EDT*.)
- /EXIT leaves the editor and saves the file.
- /FETCH merges an existing Workspace file into the file you are now editing.
- /GLOBAL/*string1*/*string2*/ changes all occurrences of *string1* in the file to *string2*.
- /HELP shows the HELP command list onscreen.
- /INVISIBLE toggles the line number display on and off.
- /LOCATE/*string*/ finds the next occurrence of *string* in the file and moves the edit pointer to that line.
- /NEXT moves the edit pointer to the next line in the file. You can also use /+ to move one line forward and /- to move one line backward.
- /PRINT prints the current line on the screen.
- /QUIT leaves the editor without saving the file.
- /REPLACE/*newline*/ replaces the current line of text with *newline*.
- /SAVE saves the current file — as it stands — as a Workspace file.
- /TOP moves the edit pointer to the top of the file.
- /UPLOAD merges a file from your computer into the file you are editing at the current position of the edit pointer. Uses buffer capture (^R/^T flow control).
- /VIEW toggles display of the text on and off. It affects display of text while using /NEXT.
- /WHERE is used to find the current position of the edit pointer. (Especially useful for those who have used /INVISIBLE to turn off the line number display.)

These slash commands can be abbreviated *if* enough characters are supplied for the command to be unique. In fact, you can abbreviate all the commands down to one character except /DIRECTORY and /EDT (/D defaults to delete and /E will exit the editor).

Next month we'll learn to use these commands to make online editing of text files a breeze.

Hrach (WAROCK) posted *RiBBS-Trek*, a rework of the public domain *Star Trek* game for use on *RiBBS* systems. Jim Hollier (PGJIM) sent us *JTerm* Version 2.9, an upgraded version of the popular *JimmyTerm* program. Bob Ayella (BOBAYELLA) uploaded *BBTerm*, a freeware terminal program. Finally, Paul Pollock (PAULBELL) posted a set of accessory programs for use with *XCom9*.

Barry Aaron (BARRYAARON) uploaded a BASIC09 program for the Graphics and Music topic. Barry's program generates complicated and attractive patterns of dots.

The Programmers Den topic gives us Mike Stute (GRIDBUG), who uploaded the Printf and Scanf functions for the standard C library.

CoCo SIG

Jerry Semones (JERRYS) posted a humorous text file called *And It Was Good*, which describes the corporate decision-making process, in the General Information topic of the database.

In the CoCo 3 Graphics topic, Bruce Nelson (DOCNELSON) uploaded his picture of the galaxy. Mark Garbarini (FI9) uploaded four original drawings that he created with *The Rat*, and I (DONHUTCHISON) posted the CoCo Gallery files for three previous months. John Barrett (JBARRETT) sent us two of his *CoCo Max 3* pictures. Eric Robichaud (EGROBICHAUD) uploaded an updated version of his MGE viewer utility for MS-DOS machines. (The MS-DOS programs, *PKXARC* or *ARC* are required to unARC these files. *TC*, as used on the CoCo, will *not* work.) Bob Wharton (BOBWHARTON) posted some fantasy drawings, a picture of the Qantas koala, an NFL logo, and the 1988 Baseball All-Stars logo. David Mills (DAVIDMILLS) uploaded a nude drawn by Brad Bansner. Finally, Zack Sessions (ZACKS) uploaded some PMODE4-to-MGE conversions and a program he wrote to do them.

The Source for 6809 Assemblers topic includes Roger Krupski (HARDWAREHACK), who posted an 80-column screen dump program for the CoCo 3, and Jason Forbes (COCO3KID), who posted the source code for his game *Life*.

In the Utilities & Applications topic, Robert Pierce (RPIERCE) sent us a disk editor package, and Eric Tilenius (TILENIUS) uploaded a utility that breaks the long lines in ASCII files (created by many word processors) into files containing lines of a specified length. (This utility inserts carriage returns as needed to ensure that line length.) Malcolm Heath (MACHEATH) uploaded his no-hassle check register for the CoCo 3. While Ken Halter (KENHALTER) posted a program that prints four disk directories in a row, Craig Moore (CRAIGMOORE) posted *CMAudio*, a freeware sound-sampling program designed for the CoCo 3. Troy House (AMTEX) uploaded his *TV Guide Companion*.

In the Hardware Hacking topic, Marty Goodman (MARTYGOODMAN) uploaded a text file that describes how to modify a standard Hi-Res joystick adapter for use with *CoCo Max 3*.

The Classic Graphics topic included my posting of the CoCo Gallery files for twelve previous months, Jason Forbes' *Life* tutorial graphics and some graphics simulations for the game and some of John Barrett's favorite cute faces.

Dick White (DICKWHITE) posted six archived poll results files in the Archives topic.

Product Reviews & Announcements included Mike Stute's review of *Lyra* Version 2.52, and Spencer Lepley's (SPENCELEPLEY) review of *Max-10*.

In the Data Communications topic, Malcolm Heath posted a version of the *WeFax* program for the DMP-105/106 printer.

That does it for this month. See you online on Delphi!

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Great for 512K Systems! From Color Venture and OWL-WARE

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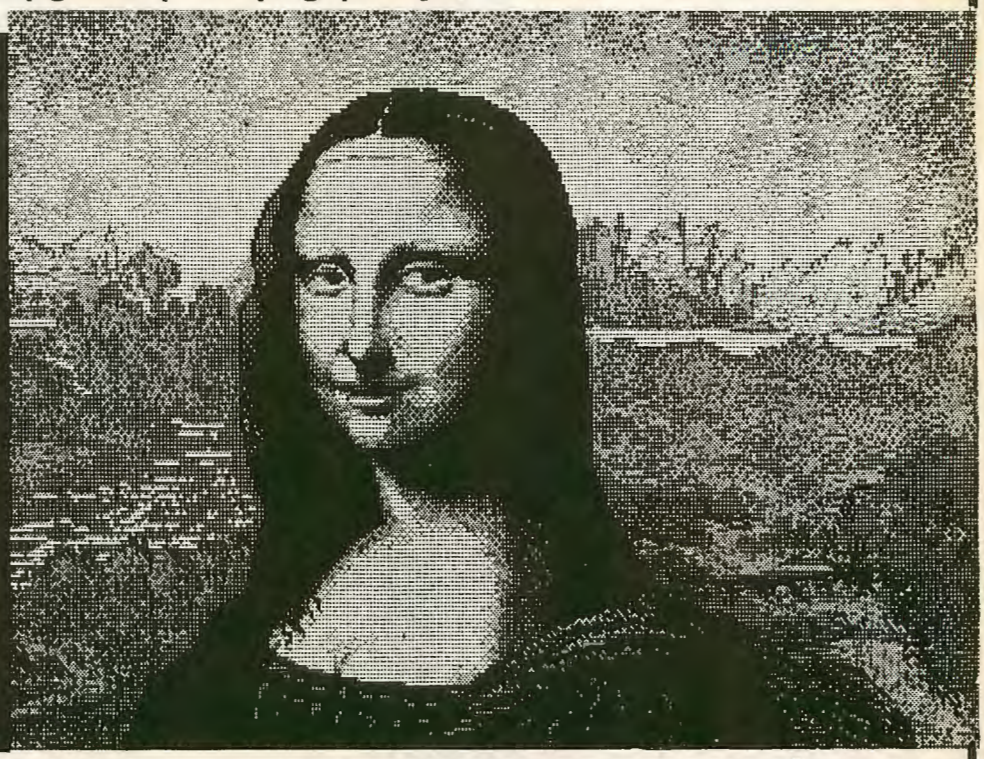

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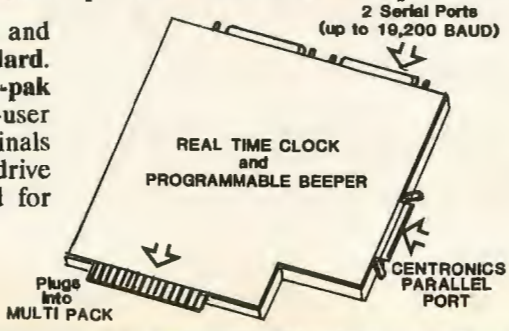

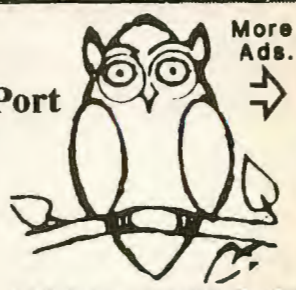

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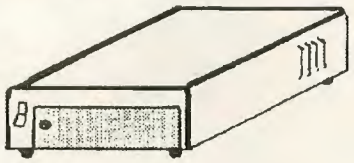

10 Meg.	20 Meg.	40 Meg.	80 Meg. (2 X 40 Meg.)
System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)			
$469.	$599.	$725.	$1,069.
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(na)	$489.	$609.	(lower prices)

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User Sets BASIC/OS-9 Partitions	YES	Yes	No
Add to Existing OS-9 Drive Without Reformat	YES	Yes(?)	No
Drives 0-3 Hard/Floppy	YES	No	Yes
Built in Park	YES	No	Yes
Speed*	FAST	Fast	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but all three systems are fast. On ours all BASIC commands work including DSKINI, DSKI$, and DSKO$.

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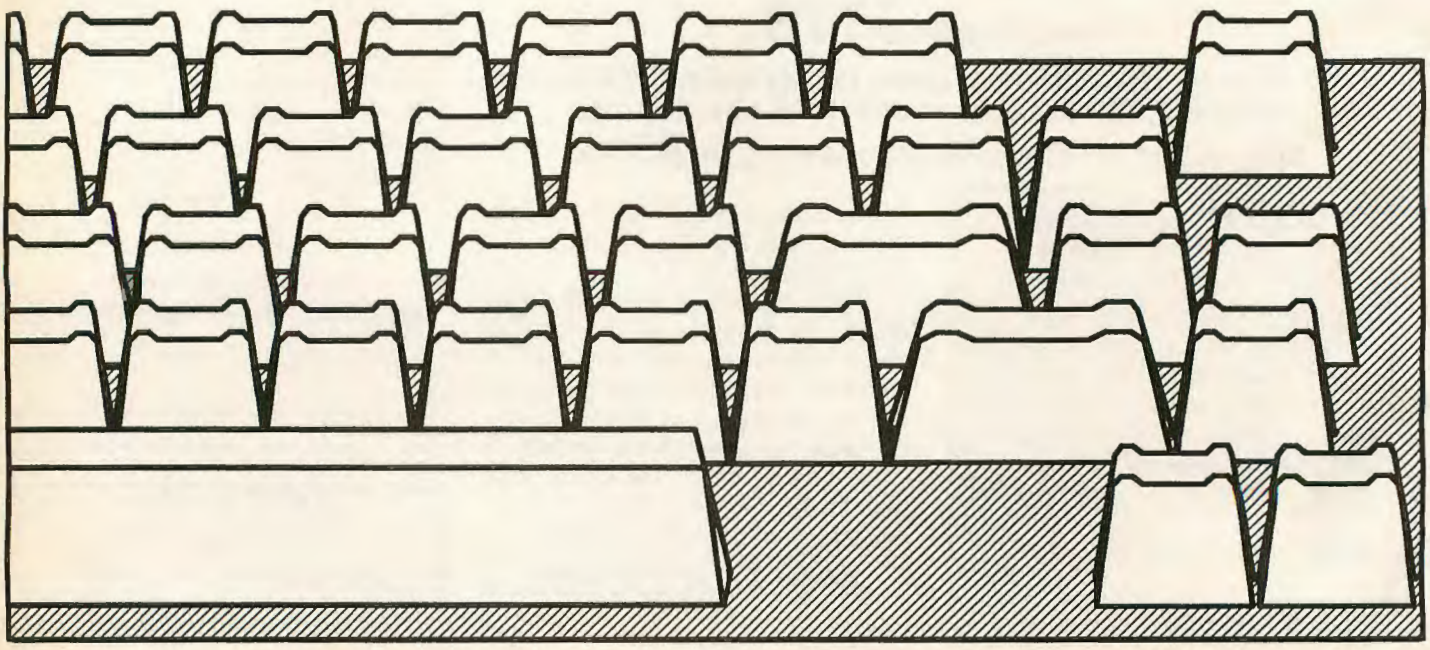
A program to make your keyboard perform like the big boys — and more

Get More Power From Your CoCo Keyboard

By Michael Sweet

Every month more and more hardware and software seems to come out for the CoCo, and the first thing most CoCo owners get is a new keyboard. Most available keyboards contain four extra keys, either four function keys or two function keys and the ALT and CTRL keys. The program presented in this article will patch BASIC so the extra keys will perform functions similar to those of the PC Compatibles. Also added are a print spooler (32K buffer for 64K machines), an added device number for owners of the Radio Shack Sound-Speech Pak, and a screen print (dump to printer) routine for both

Mike Sweet is a student at Cayugo County Community College. He has won awards for programming in the New York state math symposium and hopes to make programming his career.



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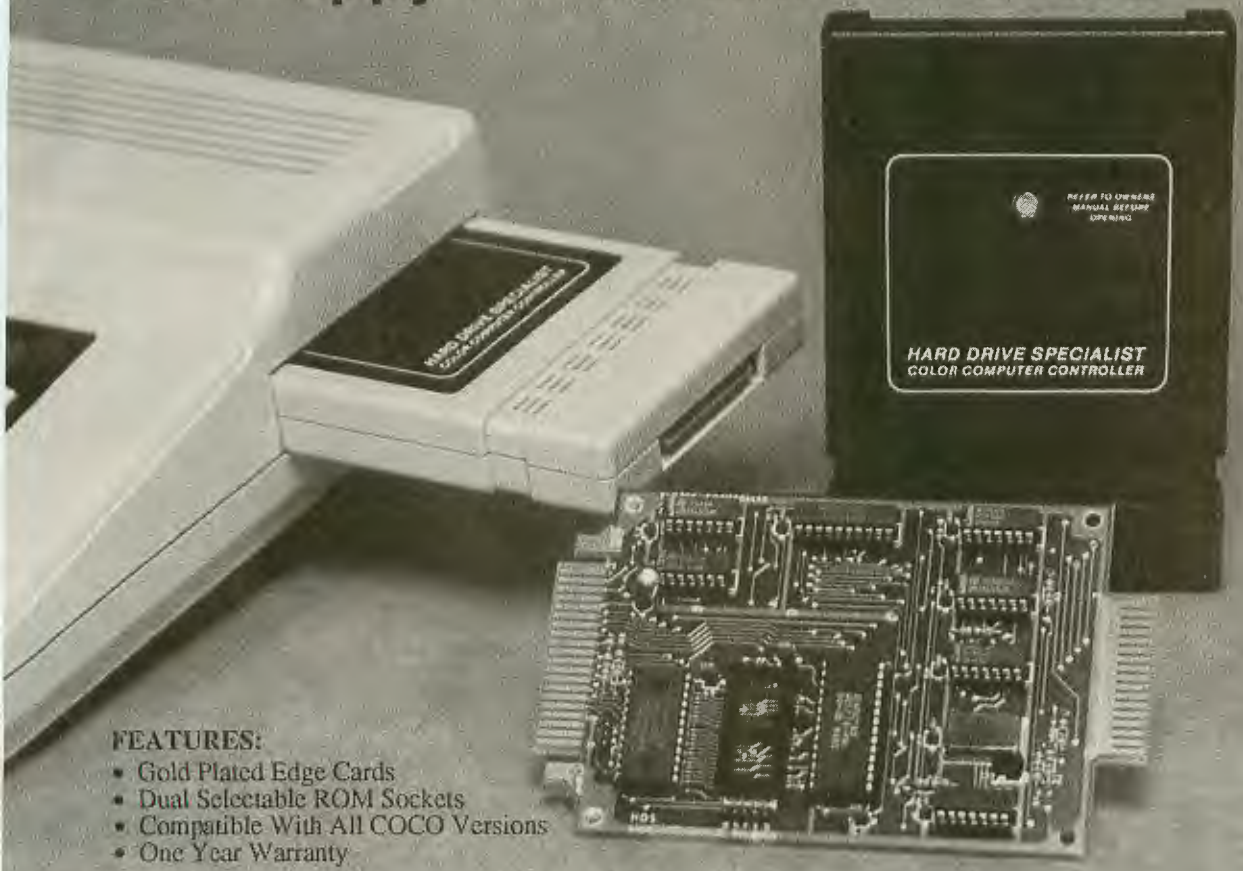

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the text screen and any graphics screens.

The standard CoCo keyboard contains 54 keys, with the SHIFT keys tied to the same input so that the computer "sees" only 53 keys. Radio Shack did not allow for the four extra keys, so the normal key scan will not return correct codes for these keys. To utilize the extra keys, you will need an assembler (*EDTASM+* or similar). As listed, the program will work on a 32K CoCo or a CoCo 3. It can be altered to work with 16K and 64K machines as follows:

For 64K systems, make the following changes:

```
100       ORG      $7800
1690      CMPX     #$FF00
2100      CMPX     #$FF00
```

and add the following lines:

```
1660      STA      $FFDF
1680      STA      $FFDE
2070      STA      $FFDF
2090      STA      $FFDE
```

For 16K systems make the following changes:

```
100       ORG      $3000
1690      CMPX     #$4000
2100      CMPX     #$4000
```

Please note that the 64K version will *not* work properly on a CoCo 3.

Once you have assembled the program to tape or disk, go into BASIC, type `CLEAR 200,&H6FFF` for 64K or `CLEAR 200,&H27FF` for 16K and load the program. Execute the program, remembering that you must never type EXEC more than once after you have loaded it — doing so will destroy all the old I/O routine pointers. If you have typed the program in correctly, all the keys should function normally. Holding them down should yield auto-repeat. The extra keys should work as shown in Figure 1.

The program initializes itself at START by redirecting BASIC's I/O routines (screen output, keyboard input and printer output). Note that the INKEY$ function address is changed to point to a new routine (lines 340 through 430) so that it will check the keyboard buffer. The between-statements routine is also redirected for the same reason (lines 440 through 450). BASIC also checks to see if you have specified a legal device number (as in a PRINT#-1 statement) and reports an FC error if you haven't. In order to allow a device number of -3 for the Speech Pak, this also had to be changed (lines 460 through 470). The next 550 lines contain the code for the interrupt routine (NEWIRQ, for keyboard entry checking and print spooling); the output to the Speech Pak (SPEECH); for output to the screen (CHROUT); for spooler use (both PRINTR for entry of print data into the buffer and SERIRQ for spooler output to the printer); and the keyboard scan routine itself (POLKEY, POLCAT, NEW16A, GETKEY and NEW19A).

Now the screen print program (SCRKEY) is encountered. Since SCRKEY is called from POLKEY, the stack has to be reset in order for it to return correctly. Then Location $FF22 is read. If it is >127 (negative), then the program goes to GRAPH. Otherwise the text screen is assumed to be seen, and text from $400 to $5FF is converted to ASCII format and sent to the printer. If it is a graphics screen, the starting address of the screen is assumed to be in Address $BA (BASIC's screen pointer).

A page code, CHR$(12), is sent to the printer, along with a half forward linefeed code. On most Tandy printers this is a CHR$(27) plus CHR$(28) combination; if yours is different, change lines 6480 and 6500 to LDA numbers, putting the codes after the number signs.

Then the old line length is saved, and the width is set for the graphics mode you are in. If it is one of the four-color modes, the program moves to COLOR for the dump. Otherwise, it produces a reversed screen image to the printer (white dots appear black). This can be changed by de-commenting (removing the asterisks) in lines 6930 and 7440.

Once the dump is done, the program restores the old line length and full linefeed. The codes used by Tandy are CHR$(27) and CHR$(54). If your printer uses different codes, change lines 7050 and 7070 the same way you did before.

In order to produce a large image, I decided to use the block graphics characters available on Tandy printers (lines 7660 through 7730). If your printer does not use the same codes (two codes per line, in Hex), replace them with codes corresponding to the low-resolution graphics characters (see *Getting Started With Color BASIC*). If your printer does not support these characters, the screen print routine will work only for the text mode. One possible solution is to add a graphics dump routine.

A note to Tandy printer owners: Look in your printer manual for details on the block graphics characters. Some print modes (Correspondence, etc.) do not allow graphics.

*** ALT + letter or number = Command**

@	PRINT @	S	SIN(
A	ATN(	T	TAN(
B	BACKUP	U	USING
C	COS(	V	VERIFY
D	DATA	W	WRITE
E	EDIT	X	PEEK
F	FILES	Y	POKE
G	GOTO	Z	PPOINT(
H	HEX$(	0	RND(0)
I	INPUT	1	#-1,
J	JOYSTK(	2	#-2,
K	KILL	3	#-3,
L	LINE	4	&H
M	MEM	5	&O
N	NEW	6	CHR$(
O	OPEN	7	STRING$(
P	PRINT	8	INSTR(
Q	PSET	9	MID$(
R	PRESET		

Unshifted

* F1 RUN and ENTER
* F2 LIST and ENTER

Shifted

* F1 SCREEN 0 and ENTER
* F2 POKE 111,254:DIR and ENTER

*** CTRL + letter = Command**

@	screen print (dump to printer)
A	CHR$(1)
B	CHR$(2)
C	CHR$(3) or BREAK
D	CHR$(4)
E	CHR$(5)
F	CHR$(6)
G	CHR$(7)
H	CHR$(8) or left arrow
I	CHR$(9) or right arrow
J	CHR$(10) or down arrow
K	CHR$(11)
L	CHR$(12) or CLEAR
M	CHR$(13) or ENTER
N	CHR$(14)
O	CHR$(15)
P	CHR$(16)
Q	CHR$(17)
R	CHR$(18) or SHIFT-0
S	CHR$(19)
T	CHR$(20)
U	CHR$(21) or SHIFT-left arrow
V	CHR$(22)
W	CHR$(23)
X	CHR$(24)
Y	CHR$(25)
Z	CHR$(26)

* Keyboards with four function keys: Use F1 for ALT, F2 for CTRL, and F3 and F4 for F1 and F2.

Figure 1

Details of the I/O Routines

Several changes were made to the printer routine, the first one being the addition of a print spooler. Memory locations &H9B and &H9C contain the carriage width (number of characters per line) and the current printer head position. When the end of a line is reached, a carriage return, CHR$(13), is sent. Also, locations &H97 and &H98 are the current page line number and the maximum page line number. When the current page line number is equal to the maximum, a form feed, CHR$(12), is sent. This way you won't print over the perforations in the printer paper. The page length (in Line 320) and the line length (second two digits of Line 290) can be from 01 to FF Hex (1 to 255 decimal) and can be changed without affecting the program's function. Also, the baud rate is set to 29 Hex (1200 baud) and can be changed for printers that handle faster baud rates. Replace the first two digits in Line 290 with the Hex value for the baud rate you want.

The Speech Pak output routine (lines 1470 through 1610) merely does what Radio Shack's program on Page 11 of the CoCo manual does, but now all you have to do is type:

```
PRINT #-3,"HELLO"
```

and you will hear the computer say "hello." One interesting side effect of this is that Extended BASIC uses Device #-3 for input from a modem. That could make writing terminal software considerably easier! The SPEECH routine itself keeps scanning Address &HFF7E until Bit 7 is set (ready to receive signal — >127). Then it sends a

The listing: KEYPOWER

```
7ØØØ                ØØ1ØØ          ORG     $7ØØØ
7ØØØ BE   Ø1ØD      ØØ11Ø START    LDX     $1ØD
7ØØ3 BF   7ØB6      ØØ12Ø          STX     1+NEWRTI
7ØØ6 8E   7ØAF      ØØ13Ø          LDX     #NEWIRQ
7ØØ9 BF   Ø1ØD      ØØ14Ø          STX     $1ØD
7ØØC B6   Ø1ØC      ØØ15Ø          LDA     $1ØC
7ØØF B7   7ØB5      ØØ16Ø          STA     NEWRTI
7Ø12 BE   Ø168      ØØ17Ø          LDX     $168
7Ø15 BF   7ØCC      ØØ18Ø          STX     1+NEW67
7Ø18 8E   7ØB8      ØØ19Ø          LDX     #NEW167
7Ø1B BF   Ø168      ØØ2ØØ          STX     $168
7Ø1E B6   Ø167      ØØ21Ø          LDA     $167
7Ø21 B7   7ØCB      ØØ22Ø          STA     NEW67
7Ø24 BE   Ø16B      ØØ23Ø          LDX     $16B
7Ø27 BF   758B      ØØ24Ø          STX     1+NEW6A
7Ø2A 8E   7586      ØØ25Ø          LDX     #NEW16A
7Ø2D BF   Ø16B      ØØ26Ø          STX     $16B
7Ø3Ø B6   Ø16A      ØØ27Ø          LDA     $16A
7Ø33 B7   758A      ØØ28Ø          STA     NEW6A
7Ø36 CC   295Ø      ØØ29Ø          LDD     #$295Ø
7Ø39 97   96        ØØ3ØØ          STA     <$96
7Ø3B D7   9B        ØØ31Ø          STB     <$9B
7Ø3D CC   ØØ4Ø      ØØ32Ø          LDD     #$4Ø
7Ø4Ø DD   97        ØØ33Ø          STD     <$97
7Ø42 BE   Ø128      ØØ34Ø          LDX     $128     GET FUNCTION CALL ADDRESS LOCATION
7Ø45 86   14        ØØ35Ø          LDA     #$14     # OF ADDRESSES
7Ø47 1Ø8E 7Ø87      ØØ36Ø          LDY     #NEW128 NEW TABLE LOCATION
7Ø4B 1ØBF Ø128      ØØ37Ø          STY     $128
7Ø4F EE   81        ØØ38Ø S1       LDU     ,X++
7Ø51 EF   A1        ØØ39Ø          STU     ,Y++
7Ø53 4A             ØØ4ØØ          DECA
7Ø54 26   F9        ØØ41Ø          BNE     S1
7Ø56 CE   75D3      ØØ42Ø          LDU     #INKEY
7Ø59 EF   3C        ØØ43Ø          STU     -4,Y
7Ø5B 8E   75E6      ØØ44Ø          LDX     #NEW19A BETWEEN STATEMENTS BREAK CHECK
```


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character to the Speech Pak and returns.

The spooler routine is standard issue. After putting the character into a circular buffer, it updates the line position and page line values as necessary. The actual printing is done during an IRQ interrupt, where the routine checks to see if the printer is busy or not. If not, it will, if possible, pull a character out of the buffer and send it to the printer.

POLKEY is quite similar to BASIC's keyscan routine at $A1C1, but the addition of the four keys and their functions required some overhauling. First, the SHIFT key is not masked from the rollover any longer, although pressing it alone will not return a code. The same holds true for the ALT and CTRL keys. For this reason, holding down one of these keys for more than a second and then pressing another key with it gives an instant repeat of that key.

Following the POLKEY routine is the POLCAT routine, which is called during the IRQ interrupt. First it calls POLKEY to see if a key has been pressed. If not, it returns. If the code returned is negative, the corresponding eight-character string is put into the keyboard type-ahead buffer. Otherwise, the code returned is put into the buffer. The buffer will hold up to 128 characters. If the buffer is full, the speaker will beep a warning to you.

At Line 4170 the ALT keys are defined, starting with ALT-@. Each definition may be up to eight characters long, and the ASCII code of the last character must be 128 or greater for the program to recognize the end of its definition. Also, each definition must start on an even eight-byte boundary from ALTCHR. Thus, RMBs are used to fill up the rest of the unused bytes between definitions.

The function key definitions come at Line 5270 and may be up to 16 characters long. Therefore, they must come at even 16-byte boundaries to each other, again using RMBs.

NEW16A is called during the input routine and at the OK prompt. If the keyboard is being called for input, the routine will wait, with the cursor flashing, until the buffer has some characters in it. Once a key has been pressed, the cursor is erased and the buffer is updated, moving the buffer contents down one character. Then the keystroke is returned to the input routine.

NEW19A is the between-statements BREAK and SHIFT-@ check. The keyboard buffer is checked to see if a keypress has been made. If so, NEW19A checks to see if it was BREAK or SHIFT-@. If it was neither, it continues with the Extended BASIC routine at $82C0 (for TRON tracing). If BREAK was pressed, the screen is restored to text and the spooler buffer is reset. The BASIC routine waits until another key is pressed, and then goes to the Extended BASIC between-statements routine.

Conclusion

Once you get this program up and running, you'll probably wonder how you got along without the use of your function keys. I also own a Tandy 1000, and it was the basis for my new keyboard driver. I must say, though, that even though that computer is supposed to run five times faster than the CoCo, it lacks the ease and friendliness of the CoCo.

(Questions or comments concerning this program may be directed to the author at 206 E. Main St., Elbridge, NY 13060. Please enclose an SASE when requesting a reply.) □

```
7Ø5E BF   Ø19B    ØØ45Ø          STX    $19B
7Ø61 8E   7Ø79    ØØ46Ø          LDX    #NEW161
7Ø64 BF   Ø162    ØØ47Ø          STX    $162
7Ø67 86   7E      ØØ48Ø          LDA    #$7E
7Ø69 B7   Ø167    ØØ49Ø          STA    $167
7Ø6C B7   Ø16A    ØØ5ØØ          STA    $16A
7Ø6F B7   Ø1ØC    ØØ51Ø          STA    $1ØC
7Ø72 B7   Ø19A    ØØ52Ø          STA    $19A
7Ø75 B7   Ø161    ØØ53Ø          STA    $161
7Ø78 39           ØØ54Ø          RTS
7Ø79 32   62      ØØ55Ø NEW161   LEAS   2,S
7Ø7B C1   FD      ØØ56Ø          CMPB   #$FD
7Ø7D 2D   Ø5      ØØ57Ø          BLT    DNERR
7Ø7F C1   ØF      ØØ58Ø          CMPB   #15
7Ø81 2E   Ø1      ØØ59Ø          BGT    DNERR
7Ø83 39           ØØ6ØØ          RTS
7Ø84 7E   A61F    ØØ61Ø DNERR    JMP    $A61F
7Ø87              ØØ62Ø NEW128   RMB    4Ø
7ØAF BD   734B    ØØ63Ø NEWIRQ   JSR    POLCAT
7ØB2 BD   71DF    ØØ64Ø          JSR    SERIRQ
7ØB5 7E   8ØØØ    ØØ65Ø NEWRTI   JMP    $8ØØØ
7ØB8 34   Ø4      ØØ66Ø NEW167   PSHS   B
7ØBA D6   6F      ØØ67Ø          LDB    <$6F
7ØBC 27   45      ØØ68Ø          BEQ    CHROUT
7ØBE C1   FD      ØØ69Ø          CMPB   #$FD
7ØCØ 1Ø27 ØØA4    ØØ7ØØ          LBEQ   SPEECH
7ØC4 5C           ØØ71Ø          INCB
7ØC5 35   Ø4      ØØ72Ø          PULS   B
7ØC7 1Ø2B ØØC2    ØØ73Ø          LBMI   PRINTR
7ØCB 7E   8ØØØ    ØØ74Ø NEW67    JMP    $8ØØØ
7ØCE 8C   Ø6ØØ    ØØ75Ø SCR      CMPX   #$6ØØ
7ØD1 25   2E      ØØ76Ø          BLO    CONT1
7ØD3 8E   Ø4ØØ    ØØ77Ø          LDX    #$4ØØ
7ØD6 EC   88 2Ø   ØØ78Ø SCROLL  LDD    32,X
7ØD9 ED   81      ØØ79Ø          STD    ,X++
7ØDB EC   88 2Ø   ØØ8ØØ          LDD    32,X
7ØDE ED   81      ØØ81Ø          STD    ,X++
7ØEØ EC   88 2Ø   ØØ82Ø          LDD    32,X
7ØE3 ED   81      ØØ83Ø          STD    ,X++
7ØE5 EC   88 2Ø   ØØ84Ø          LDD    32,X
7ØE8 ED   81      ØØ85Ø          STD    ,X++
7ØEA 8C   Ø5EØ    ØØ86Ø          CMPX   #$5EØ
7ØED 25   E7      ØØ87Ø          BLO    SCROLL
7ØEF 9F   88      ØØ88Ø          STX    <$88
7ØF1 CC   6Ø6Ø    ØØ89Ø          LDD    #$6Ø6Ø
7ØF4 ED   81      ØØ9ØØ SCLOOP   STD    ,X++
7ØF6 ED   81      ØØ91Ø          STD    ,X++
7ØF8 ED   81      ØØ92Ø          STD    ,X++
7ØFA ED   81      ØØ93Ø          STD    ,X++
7ØFC 8C   Ø6ØØ    ØØ94Ø          CMPX   #$6ØØ
7ØFF 25   F3      ØØ95Ø          BLO    SCLOOP
71Ø1 35   96      ØØ96Ø CONT1    PULS   A,B,X,PC
71Ø3 AF   61      ØØ97Ø CHROUT   STX    1,S
71Ø5 34   Ø2      ØØ98Ø          PSHS   A
71Ø7 9E   88      ØØ99Ø          LDX    <$88
71Ø9 81   2Ø      Ø1ØØØ          CMPA   #$2Ø
71ØB 25   15      Ø1Ø1Ø          BLO    CTRLCH
71ØD 4D           Ø1Ø2Ø          TSTA
71ØE 2B   ØA      Ø1Ø3Ø          BMI    CONT2
7111Ø 81  6Ø      Ø1Ø4Ø          CMPA   #$6Ø
7112 24   Ø4      Ø1Ø5Ø          BHS    *+6
7114 8A   4Ø      Ø1Ø6Ø          ORA    #$4Ø
7116 2Ø   Ø2      Ø1Ø7Ø          BRA    CONT2
7118 8Ø   6Ø      Ø1Ø8Ø          SUBA   #$6Ø
711A A7   8Ø      Ø1ØØØ CONT2    STA    ,X+
711C 9F   88      Ø11ØØ          STX    <$88
711E 2Ø   AE      Ø111Ø          BRA    SCR
7120 35   96      Ø112Ø CRTS     PULS   A,B,X,PC
7122 81   Ø8      Ø113Ø CTRLCH   CMPA   #8
7124 26   ØF      Ø114Ø          BNE    CONT3
7126 9E   88      Ø115Ø          LDX    <$88
7128 8C   Ø4ØØ    Ø116Ø          CMPX   #$4ØØ
712B 27   F3      Ø117Ø          BEQ    CRTS
712D 86   6Ø      Ø118Ø          LDA    #$6Ø
712F A7   82      Ø119Ø          STA    ,-X
7131 9F   88      Ø12ØØ          STX    <$88
7133 35   96      Ø121Ø          PULS   A,B,X,PC
7135 81   ØD      Ø122Ø CONT3    CMPA   #$ØD
7137 26   14      Ø123Ø          BNE    C5
7139 86   6Ø      Ø124Ø          LDA    #$6Ø
713B D6   89      Ø125Ø          LDB    <$89
713D C4   1F      Ø126Ø          ANDB   #$1F
713F 5Ø           Ø127Ø          NEGB
7140 CB   2Ø      Ø128Ø          ADDB   #$2Ø
7142 9E   88      Ø129Ø          LDX    <$88
7144 A7   8Ø      Ø13ØØ CONT4    STA    ,X+
7146 5A           Ø131Ø          DECB
7147 26   FB      Ø132Ø          BNE    CONT4
7149 9F   88      Ø133Ø          STX    <$88
714B 2Ø   81      Ø134Ø          BRA    SCR
714D 81   ØC      Ø135Ø C5       CMPA   #$ØC
714F 26   CF      Ø136Ø          BNE    CRTS
7151 8E   Ø4ØØ    Ø137Ø          LDX    #$4ØØ
7154 CC   6Ø6Ø    Ø138Ø          LDD    #$6Ø6Ø
7157 9F   88      Ø139Ø          STX    <$88
7159 ED   81      Ø14ØØ C6       STD    ,X++
```

```
715B ED  81      0140          STD     ,X++
715D ED  81      0142          STD     ,X++
715F ED  81      0143          STD     ,X++
7161 8C  0600    0144          CMPX    #$0600
7164 25  F3      0145          BLO     C6
7166 35  96      0146          PULS    A,B,X,PC
7168 35  04      0147  SPEECH  PULS    B
716A 32  62      0148          LEAS    2,S
716C 7D  FF7E    0149  SPWAIT  TST     $FF7E
716F 2A  FB      0150          BPL     SPWAIT
7171 B7  FF7E    0151          STA     $FF7E
7174 34  02      0152          PSHS    A
7176 B6  FF01    0153          LDA     $FF01
7179 84  F7      0154          ANDA    #$F7
717B B7  FF01    0155          STA     $FF01
717E B6  FF03    0156          LDA     $FF03
7181 8A  08      0157          ORA     #8
7183 B7  FF03    0158          STA     $FF03
7186 86  3C      0159          LDA     #60
7188 B7  FF23    0160          STA     $FF23
718B 35  82      0161          PULS    A,PC
718D AF  E4      0162  PRINTR  STX     ,S
718F 34  03      0163  SPOOL   PSHS    CC,A
7191 BE  71DA    0164          LDX     SPPOS
7194 1A  50      0165          ORCC    #$50
7196 A7  80      0167          STA     ,X+
7198 8C  8000    0169          CMPX    #$8000
719B 25  03      0170          BLO     SPRTS
719D 8E  7774    0171          LDX     #BUFSTR
71A0 BF  71DA    0172  SPRTS   STX     SPPOS
71A3 BC  71DC    0173  WAITSP  CMPX    SPSTRT
71A6 27  FB      0174          BEQ     WAITSP
71A8 81  0D      0175  UPDATE  CMPA    #$0D
71AA 26  12      0176          BNE     UP1
71AC 0F  9C      0177          CLR     <$9C
71AE 0C  97      0178          INC     <$97
71B0 96  97      0179          LDA     <$97
71B2 91  98      0180          CMPA    <$98
71B4 25  06      0181          BLO     UPRTS
71B6 86  0C      0182          LDA     #$0C
71B8 AD  9F A002 0183          JSR     [$A002]
71BC 35  93      0184  UPRTS   PULS    A,X,CC,PC
71BE 81  0C      0185  UP1     CMPA    #$0C
71C0 26  06      0186          BNE     UP2
71C2 0F  9C      0187          CLR     <$9C
71C4 0F  97      0188          CLR     <$97
71C6 35  93      0189          PULS    A,X,CC,PC
71C8 0C  9C      0190  UP2     INC     <$9C
71CA 96  9C      0191          LDA     <$9C
71CC 91  9B      0192          CMPA    <$9B
71CE 25  EC      0193          BLO     UPRTS
71D0 0F  9C      0194          CLR     <$9C
71D2 86  0D      0195          LDA     #$0D
71D4 AD  9F A002 0196          JSR     [$A002]
71D8 35  93      0197          PULS    A,X,CC,PC
71DA     7774    0198  SPPOS   FDB     BUFSTR
71DC     7774    0199  SPSTRT  FDB     BUFSTR
71DE 39          0200  SERRTI  RTS
71DF B6  FF22    0201  SERIRQ  LDA     $FF22
71E2 44          0202          LSRA
71E3 25  F9      0203          BCS     SERRTI
71E5 BE  71DC    0204          LDX     SPSTRT
71E8 BC  71DA    0205          CMPX    SPPOS
71EB 27  F1      0206          BEQ     SERRTI
71ED A6  80      0208          LDA     ,X+
71EF 8C  8000    0210          CMPX    #$8000
71F2 25  03      0211          BLO     SERPRT
71F4 8E  7774    0212          LDX     #BUFSTR
71F7 BF  71DC    0213  SERPRT  STX     SPSTRT
71FA 8D  13      0214  SERIAL  BSR     STOPBT
71FC 5F          0215          CLRB
71FD 8D  12      0216          BSR     SENDBT
71FF C6  08      0217          LDB     #8
7201 34  04      0218          PSHS    B
7203 5F          0219  SLOOP   CLRB
7204 44          0220          LSRA
7205 59          0221          ROLB
7206 58          0222          ASLB
7207 8D  08      0223          BSR     SENDBT
7209 6A  E4      0224          DEC     ,S
720B 26  F6      0225          BNE     SLOOP
720D 32  61      0226          LEAS    1,S
720F C6  02      0227  STOPBT  LDB     #2
7211 F7  FF20    0228  SENDBT  STB     $FF20
7214 9E  95      0229          LDX     <$95
7216 34  10      0230          PSHS    X
7218 BD  7346    0231          JSR     DELAY
721B 35  10      0232          PULS    X
```


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```
721D 16  0126    02330          LBRA    DELAY
7220 32  7B      02340 POLKEY   LEAS    -5,S    SET ASIDE STACK SPACE
7222 6F  63      02350          CLR     3,S     NO KEY HELD DOWN
7224 7A  7345    02360          DEC     TIMER   TIME HELD-1
7227 26  05      02370          BNE     POLL1   IF NOT HELD LONG ENOUGH FOR REPEAT
7229 86  03      02380          LDA     #$3     REPEAT DELAY
722B BD  7318    02390          JSR     RESET   RESET ROLLOVER TABLE FOR RECOGNITION
722E 8E  0152    02400 POLL1    LDX     #$152   ROLLOVER TABLE
7231 4F          02410          CLRA
7232 4A          02420          DECA            A=-1
7233 A7  E4      02430          STA     ,S      SCAN #
7235 A7  62      02440          STA     2,S     ROW MASK
7237 A6  62      02450 POLL2    LDA     2,S     ROW MASK
7239 49          02460          ROLA            NEXT ROW
723A 1024 00AF   02470          LBHS    PDONE   IF NO KEY PRESSED
723E A7  62      02480          STA     2,S     SAVE NEW ROW MASK
7240 6C  E4      02490          INC     ,S      NEXT SCAN ROW
7242 BD  7303    02500          JSR     SCAN    GET THIS ROW'S KEY PRESSES
7245 A7  61      02510          STA     1,S     SAVE BIT MASK
7247 A8  84      02520          EORA    ,X
7249 A4  84      02530          ANDA    ,X      NO REPEAT(UNLESS TABLE RESET)
724B E6  61      02540          LDB     1,S
724D E7  80      02550          STB     ,X+     NEW POLL VALUE
724F 5C          02560          INCB            +1
7250 27  E5      02570          BEQ     POLL2   IF NO BITS OFF(KEY PRESS)
7252 6C  63      02580          INC     3,S     KEY PRESSED
7254 4D          02590          TSTA
7255 27  E0      02600          BEQ     POLL2   IF ITS A KEY THAT IS BEING HELD DOWN, IGNOR
E IT
7257 C6  F8      02610          LDB     #$F8    -8
7259 CB  08      02620 POLL3    ADDB    #$08    +8
725B 44          02630          LSRA
725C 24  FB      02640          BHS     POLL3   LOOP UNTIL ROW*8 IS COMPUTED
725E 8E  7343    02650          LDX     #DELAY-3        POINT TO @ SIGN
7261 EB  E4      02660          ADDB    ,S      ADD TO COL FOR SCAN CODE
7263 27  30      02670          BEQ     EXCEPT  IF @ SIGN KEY, IT'S AN EXCEPTION
7265 C1  1A      02680          CMPB    #$1A
7267 2F  1E      02690          BLE     LETTER  IF A-Z
7269 8E  72F1    02700          LDX     #TSTART-$36
726C C1  20      02710          CMPB    #$20
726E 2F  25      02720          BLE     EXCEPT  IF ARROW KEYS OR SPACE BAR
7270 8E  72D3    02730          LDX     #TSTART-$54
7273 C1  30      02740          CMPB    #$30
7275 2C  1E      02750          BGE     EXCEPT  IF ENTER OR OTHER KEY
7277 BD  730C    02760          JSR     SHIFT   ELSE ITS CHR$(33)-CHR$(63),DO SHIFT CHECK
727A C1  2B      02770          CMPB    #$2B
727C 2F  02      02780          BLE     *+4
727E 88  40      02790          EORA    #$40
```


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Reviewed in this month's Rainbow!

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```
728Ø 4D          Ø28ØØ          TSTA
7281 26   1A     Ø281Ø          BNE     FINAL1
7283 CB   1Ø     Ø282Ø          ADDB    #$1Ø
7285 2Ø   16     Ø283Ø          BRA     FINAL1
7287 CA   4Ø     Ø284Ø LETTER   ORB     #$4Ø
7289 BD   73ØC   Ø285Ø          JSR     SHIFT
728C BA   Ø11A   Ø286Ø          ORA     $11A
728F 26   ØC     Ø287Ø          BNE     FINAL1
7291 CA   2Ø     Ø288Ø          ORB     #$2Ø    SHIFTED LETTER
7293 2Ø   38     Ø289Ø          BRA     FINAL3
7295 58          Ø29ØØ EXCEPT   ASLB            2 CODES/KEY
7296 8D   74     Ø291Ø          BSR     SHIFT   SHIFT KEY CHECK
7298 27   Ø1     Ø292Ø          BEQ     *+3     IF NOT PRESSED
729A 5C          Ø293Ø          INCB
729B E6   85     Ø294Ø          LDB     B,X     CHARACTER CODE RETURNED
729D C1   6Ø     Ø295Ø FINAL1   CMPB    #$6Ø
729F 24   2C     Ø296Ø          BHS     FINAL3  IF A LOWERCASE LETTER, NO ALT CODE FOR IT
72A1 C1   3Ø     Ø297Ø          CMPB    #$3Ø
72A3 25   28     Ø298Ø          BLO     FINAL3  IF LOWER THAN A #, NO CODE FOR IT EITHER
72A5 C1   4Ø     Ø299Ø          CMPB    #$4Ø
72A7 25   ØA     Ø3ØØØ          BLO     ALT2    IF ITS A #, GET ITS CODE
72A9 86   F7     Ø3Ø1Ø ALT1     LDA     #$F7    ELSE DO
72AB 8D   61     Ø3Ø2Ø          BSR     SHIFT+2 AN ALT CHECK
72AD 27   12     Ø3Ø3Ø          BEQ     FINAL2  IF NOT PRESSED
72AF CB   4Ø     Ø3Ø4Ø          ADDB    #$4Ø
72B1 2Ø   1A     Ø3Ø5Ø          BRA     FINAL3  RETURN AN ALT CODE
72B3 C1   39     Ø3Ø6Ø ALT2     CMPB    #$39    > #
72B5 22   16     Ø3Ø7Ø          BHI     FINAL3  YES
72B7 86   F7     Ø3Ø8Ø          LDA     #$F7    ELSE DO AN
72B9 8D   53     Ø3Ø9Ø          BSR     SHIFT+2 ALT CHECK
72BB 27   1Ø     Ø31ØØ          BEQ     FINAL3  IF NOT PRESSED
72BD CB   6B     Ø311Ø          ADDB    #$6B    ELSE RETURN AN ALT CODE
72BF 2Ø   ØC     Ø312Ø          BRA     FINAL3
72C1 86   EF     Ø313Ø FINAL2   LDA     #$EF    DO A CTRL CHECK
72C3 8D   49     Ø314Ø          BSR     SHIFT+2
72C5 27   Ø6     Ø315Ø          BEQ     FINAL3  IF NOT PRESSED
72C7 CØ   4Ø     Ø316Ø          SUBB    #$4Ø    ELSE RETURNED IS 64 LESS
72C9 1Ø27 Ø369   Ø317Ø          LBEQ    SCRKEY  IF CTRL-@, DO A SCREEN DUMP
72CD E7   64     Ø318Ø FINAL3   STB     4,S     SAVE ASCII CHARACTER
72CF 8E   Ø45E   Ø319Ø          LDX     #$45E
72D2 BD   7346   Ø32ØØ          JSR     DELAY
72D5 86   FF     Ø321Ø          LDA     #$FF    NO ROW MASK
72D7 8D   2A     Ø322Ø          BSR     SCAN
72D9 4C          Ø323Ø          INCA
72DA 26   11     Ø324Ø          BNE     PDONE   IF KEY STILL BEING PRESSED
72DC A6   62     Ø325Ø          LDA     2,S     ELSE MAYBE SCAN WAS A MISTAKE
72DE 8D   23     Ø326Ø          BSR     SCAN
72EØ A1   61     Ø327Ø          CMPA    1,S
```


Armchair Admiral

"Avast ye swabbies!" Roars Captain Blackbeard. "Hoist the Jolly Roger! When I gives the word, give 'em a broadside!" As Blackbeard's flotilla closes upon it's prey, a lookout suddenly cries, "Captain, a British Man-of-War!"

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VIP Writer

VIP WRITER

RATED "BEST" IN SEPT '88 "RAINBOW"

VIP Writer has all the features of VIP Writer III described elsewhere in this magazine except the screen widths are 32, 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Hard disk is not supported. Even so, VIP Writer is the BEST word processor for the CoCo 1 & 2! VIP Writer includes VIP Speller AT NO ADDITIONAL COST. **DISK $69.95**

VIP Database

VIP DATABASE

"ONE OF THE BEST" JULY 1984 "RAINBOW"

VIP Database has all the features of VIP Database III described elsewhere in this magazine except the screen widths are 51, 64 & 85. Screen colors are black, green and white, double clock speed is not supported, Spooler is unavailable. Even so, VIP Database is the most complete database for the CoCo 1 & 2! **DISK $49.95**

Turn the page for more VIP software!

```
72E2 26 09      0328 PDONE  BNE   PDONE   NO, IT WAS RIGHT, BUT KEY RELEASED
72E4 C1 12      0329        CMPB  #$12    ELSE MAYBE IT WAS SHIFT-0
72E6 26 17      0330        BNE   PRTS    NO
72E8 73 011A    0331        COM   $11A    ELSE SWITCH BETWEEN UPPER/LOWERCASE
72EB 20 10      0332        BRA   NOKEY   DON'T RETURN A KEY CODE FOR IT
72ED 6D 63      0333 PDONE  TST   3,S
72EF 27 07      0334        BEQ   PD1     IFKEY NOT PRESSED
72F1 B6 7345    0335        LDA   TIMER
72F4 81 5B      0336        CMPA  #$5B
72F6 26 05      0337        BNE   NOKEY
72F8 86 5C      0338 PD1    LDA   #$5C
72FA BD 7318    0339        JSR   RESET
72FD 6F 64      0340 NOKEY  CLR   4,S     NO KEY CODE RETURNED
72FF 32 64      0341 PRTS   LEAS  4,S
7301 35 82      0342        PULS  A,PC
7303 B7 FF02    0343 SCAN   STA   $FF02
7306 B6 FF00    0344        LDA   $FF00
7309 8A 80      0345        ORA   #$80
730B 39         0346        RTS
730C 86 7F      0347 SHIFT  LDA   #$7F
730E B7 FF02    0348        STA   $FF02
7311 B6 FF00    0349        LDA   $FF00
7314 43         0350        COMA
7315 84 40      0351        ANDA  #$40
7317 39         0352        RTS
7318 B7 7345    0353 RESET  STA   TIMER
731B CC FF08    0354        LDD   #$FF08
731E 8E 0152    0355        LDX   #$152
7321 A7 80      0356 RLOOP  STA   ,X+
7323 5A         0357        DECB
7324 26 FB      0358        BNE   RLOOP
7326 39         0359        RTS
7327 5E5F       0360 TSTART FDB   $5E5F
7329 0A5B       0361        FDB   $0A5B
732B 0815       0362        FDB   $0815
732D 095D       0363        FDB   $095D
732F 2020       0364        FDB   $2020
7331 3012       0365        FDB   $3012
7333 0D0D       0366        FDB   $0D0D
7335 0C5C       0367        FDB   $0C5C
7337 0303       0368        FDB   $0303
7339 0000       0369        FDB   $0000
733B 0000       0370        FDB   $0000
733D A5A9       0371        FDB   $A5A9
733F A7AB       0372        FDB   $A7AB
7341 0000       0373        FDB   $0000
7343 4013       0374        FDB   $4013
7345 5C         0375 TIMER  FCB   $5C
7346 30 1F      0376 DELAY  LEAX  -1,X
7348 26 FC      0377        BNE   DELAY
734A 39         0378        RTS
734B BD 7220    0379 POLCAT JSR   POLKEY
734E 4D         0380        TSTA
734F 27 0F      0381        BEQ   BEEP-1
7351 2B 31      0382        BMI   FILLBF
7353 F6 739D    0383 PUTBUF LDB   NUMCHR
7356 2B 09      0384        BMI   BEEP
7358 7C 739D    0385        INC   NUMCHR
735B 8E 739E    0386        LDX   #CHRBUF
735E A7 85      0387        STA   B,X
7360 39         0388        RTS
7361 B6 FF23    0389 BEEP   LDA   $FF23
7364 84 F3      0390        ANDA  #$F3
7366 B7 FF23    0391        STA   $FF23
7369 F6 FF22    0392        LDB   $FF22
736C CA 02      0393        ORB   #$02
736E F7 FF22    0394        STB   $FF22
7371 8A 04      0395        ORA   #$04
7373 B7 FF23    0396        STA   $FF23
7376 86 40      0397        LDA   #$40
7378 F6 FF22    0398        LDB   $FF22
737B C8 02      0399 BLOOP1 EORB  #$02
737D F7 FF22    0400        STB   $FF22
7380 4A         0401        DECA
7381 26 F8      0402        BNE   BLOOP1
7383 39         0403        RTS
7384 C6 08      0404 FILLBF LDB   #8
7386 80 80      0405        SUBA  #$80
7388 3D         0406        MUL
7389 10BE 741E  0407        LDY   #ALTCHR
738D 31 AB      0408        LEAY  D,Y
738F A6 A0      0409 FLOOP1 LDA   ,Y+
7391 2B 05      0410        BMI   FNEXT1
7393 BD 7353    0411        JSR   PUTBUF
7396 20 F7      0412        BRA   FLOOP1
7398 84 7F      0413 FNEXT1 ANDA  #$7F
739A 16 FFB6    0414        LBRA  PUTBUF
739D 00         0415 NUMCHR FCB   0
739E            0416 CHRBUF RMB   128
741E 50         0417 ALTCHR FCC   /PRINT/
     52
     49
     4E
     54
7423 C0         0418        FCB   $C0
7424            0419        RMB   2
7426 41         0420        FCC   /ATN/
     54
     4E
7429 A8         0421        FCB   $A8
742A            0422        RMB   4
742E 42         0423        FCC   /BACKU/
     41
     43
     4B
     55
7433 D0         0424        FCB   $D0
7434            0425        RMB   2
7436 43         0426        FCC   /COS/
     4F
     53
7439 A8         0427        FCB   $A8
743A            0428        RMB   4
743E 44         0429        FCC   /DAT/
     41
     54
7441 C1         0430        FCB   $C1
7442            0431        RMB   4
7446 45         0432        FCC   /EDI/
     44
     49
7449 D4         0433        FCB   $D4
744A            0434        RMB   4
744E 46         0435        FCC   /FILE/
     49
     4C
     45
7452 D3         0436        FCB   $D3
7453            0437        RMB   3
7456 47         0438        FCC   /GOT/
     4F
     54
7459 CF         0439        FCB   $CF
745A            0440        RMB   4
745E 48         0441        FCC   /HEX$/
     45
     58
     24
7462 A8         0442        FCB   $A8
7463            0443        RMB   3
7466 49         0444        FCC   /INPU/
     4E
     50
     55
746A D4         0445        FCB   $D4
746B            0446        RMB   3
746E 4A         0447        FCC   /JOYSTK/
     4F
     59
     53
     54
     4B
7474 A8         0448        FCB   $A8
7475            0449        RMB   1
7476 4B         0450        FCC   /KIL/
     49
     4C
7479 CC         0451        FCB   $0CC
747A            0452        RMB   4
747E 4C         0453        FCC   /LINE/
     49
     4E
     45
7482 A8         0454        FCB   $A8
7483            0455        RMB   3
7486 4D         0456        FCC   /ME/
     45
7488 CD         0457        FCB   $0CD
7489            0458        RMB   5
748E 4E         0459        FCC   /NE/
     45
7490 D7         0460        FCB   $D7
7491            0461        RMB   5
7496 4F         0462        FCC   /OPE/
     50
     45
7499 CE         0463        FCB   $CE
749A            0464        RMB   4
749E 50         0465        FCC   /PRIN/
     52
     49
     4E
74A2 D4         0466        FCB   $D4
74A3            0467        RMB   3
74A6 50         0468        FCC   /PSET/
     53
     45
     54
74AA A8         0469        FCB   $A8
74AB            0470        RMB   3
74AE 50         0471        FCC   /PRESET/
     52
     45
     53
     45
     54
74B4 A8         0472        FCB   $A8
74B5            0473        RMB   1
74B6 53         0474        FCC   /SIN/
     49
     4E
74B9 A8         0475        FCB   $A8
```

```
74BA          Ø476Ø     RMB    4
74BE    54    Ø477Ø     FCC    /TAN/
        41
        4E
74C1    A8    Ø478Ø     FCB    $A8
74C2          Ø479Ø     RMB    4
74C6    55    Ø48ØØ     FCC    /USIN/
        53
        49
        4E
74CA    C7    Ø481Ø     FCB    $C7
74CB          Ø482Ø     RMB    3
74CE    56    Ø483Ø     FCC    /VERIF/
        45
        52
        49
        46
74D3    D9    Ø484Ø     FCB    $D9
74D4          Ø485Ø     RMB    2
74D6    57    Ø486Ø     FCC    /WRITE/
        52
        49
        54
        45
74DB    A3    Ø487Ø     FCB    $A3
74DC          Ø488Ø     RMB    2
74DE    5Ø    Ø489Ø     FCC    /PEEK/
        45
        45
        4B
74E2    A8    Ø49ØØ     FCB    $A8
74E3          Ø491Ø     RMB    3
74E6    5Ø    Ø492Ø     FCC    /POK/
        4F
        4B
74E9    C5    Ø493Ø     FCB    $C5
74EA          Ø494Ø     RMB    4
74EE    5Ø    Ø495Ø     FCC    /PPOINT/
        5Ø
        4F
        49
        4E
        54
74F4    A8    Ø496Ø     FCB    $A8
74F5          Ø497Ø     RMB    1
74F6    52    Ø498Ø     FCC    /RND(Ø/
        4E
        44
        28
        3Ø
74FB    A9    Ø499Ø     FCB    $A9
74FC          Ø5ØØØ     RMB    2
74FE    23    Ø5Ø1Ø     FCC    /#-1/
        2D
        31
75Ø1    AC    Ø5Ø2Ø     FCB    $AC
75Ø2          Ø5Ø3Ø     RMB    4
75Ø6    23    Ø5Ø4Ø     FCC    /#-2/
        2D
        32
75Ø9    AC    Ø5Ø5Ø     FCB    $AC
75ØA          Ø5Ø6Ø     RMB    4
75ØE    23    Ø5Ø7Ø     FCC    /#-3/
        2D
        33
7511    AC    Ø5Ø8Ø     FCB    $AC
7512          Ø5Ø9Ø     RMB    4
7516    26    Ø51ØØ     FCC    /&/
7517    C8    Ø511Ø     FCB    $C8
7518          Ø512Ø     RMB    6
751E    26    Ø513Ø     FCC    /&/
751F    CF    Ø514Ø     FCB    $CF
752Ø          Ø515Ø     RMB    6
7526    43    Ø516Ø     FCC    /CHR$/
        48
        52
        24
752A    A8    Ø517Ø     FCB    $A8
752B          Ø518Ø     RMB    3
752E    53    Ø519Ø     FCC    /STRING$/
        54
        52
        49
        4E
        47
        24
7535    A8    Ø52ØØ     FCB    $A8
7536    49    Ø521Ø     FCC    /INSTR/
        4E
        53
        54
        52
753B    A8    Ø522Ø     FCB    $A8
753C          Ø523Ø     RMB    2
753E    4D    Ø524Ø     FCC    /MID$/
        49
```


★ ★ ★ NEW ★ ★ ★

BASH by Steve Bjork

Based on a popular arcade game which we can't mention (But sounds like "Art Gannoyed"). BASH challenges you to clear the screen by "BASHING" your ball through multiple brick layers. Of course you'll have help getting through this 20 level game by activating options like, Slow Ball, Expanded Paddle, Multi-Ball and more!

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WARP FIGHTER 3-D by Steve Bjork

Blast into Hyper-Drive with this fun-filled starship shoot-em-up! You'll have a captain's eye view out of your 3-D cockpit as you try to rid the galaxy of the evil enemy forces. Game includes 3-D glasses and works on any Color T. V., Composite or RGB monitor.

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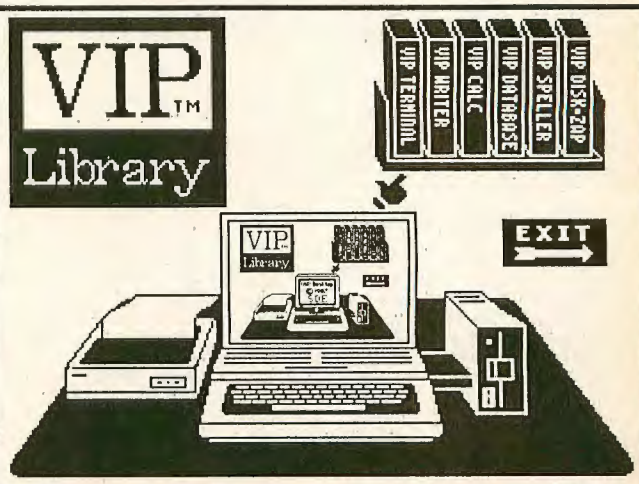

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```
            44
            24
7542        A8          0525Ø          FCB     $A8
7543                    0526Ø          RMB     3
7546        52          0527Ø          FCC     /RUN/
            55
            4E
7549        8D          0528Ø          FCB     $8D
754A                    0529Ø          RMB     12
7556        4C          0530Ø          FCC     /LIST/
            49
            53
            54
755A        8D          0531Ø          FCB     $8D
755B                    0532Ø          RMB     11
7566        53          0533Ø          FCC     /SCREEN Ø/
            43
            52
            45
            45
            4E
            2Ø
            3Ø
756E        8D          0534Ø          FCB     $8D
756F                    0535Ø          RMB     7
7576        5Ø          0536Ø          FCC     /POKE111,254:DIR/
            4F
            4B
            45
            31
            31
            31
            2C
            32
            35
            34
            3A
            44
            49
            52
7585        8D          0537Ø          FCB     $8D
7586 ØD     6F          0538Ø NEW16A   TST     <$6F
7588 27     Ø3          0539Ø          BEQ     *+5
758A 7E     8ØØØ        0540Ø NEW6A    JMP     $8ØØØ
758D AF     E4          0541Ø          STX     ,S
758F 34     Ø4          0542Ø          PSHS    B
7591 7D     739D        0543Ø          TST     NUMCHR
7594 26     21          0544Ø          BNE     GETKEY
7596 9E     88          0545Ø          LDX     <$88
7598 A6     84          0546Ø N1       LDA     ,X
759A 8B     1Ø          0547Ø          ADDA    #$1Ø
759C 8A     8F          0548Ø          ORA     #$8F
759E A7     84          0549Ø          STA     ,X
75AØ C6     2Ø          0550Ø          LDB     #32
75A2 4A                 0551Ø N2       DECA
75A3 12                 0552Ø          NOP
75A4 12                 0553Ø          NOP
75A5 12                 0554Ø          NOP
75A6 12                 0555Ø          NOP
75A7 26     F9          0556Ø          BNE     N2
75A9 7D     739D        0557Ø          TST     NUMCHR
75AC 26     Ø5          0558Ø          BNE     N4
75AE 5A                 0559Ø          DECB
75AF 26     F1          0560Ø          BNE     N2
75B1 2Ø     E5          0561Ø          BRA     N1
75B3 86     6Ø          0562Ø N4       LDA     #$6Ø
75B5 A7     84          0563Ø          STA     ,X
75B7 F6     739D        0564Ø GETKEY   LDB     NUMCHR
75BA 8E     739E        0565Ø          LDX     #CHRBUF
75BD A6     84          0566Ø          LDA     ,X
75BF 7A     739D        0567Ø          DEC     NUMCHR
75C2 34     Ø2          0568Ø          PSHS    A
75C4 A6     Ø1          0569Ø N3       LDA     1,X
75C6 A7     8Ø          0570Ø          STA     ,X+
75C8 5A                 0571Ø          DECB
75C9 26     F9          0572Ø          BNE     N3
75CB A6     EØ          0573Ø          LDA     ,S+
75CD 35     94          0574Ø          PULS    B,X,PC
75CF 34     14          0575Ø POLL     PSHS    X,B
75D1 2Ø     E4          0576Ø          BRA     GETKEY
75D3 7D     739D        0577Ø INKEY    TST     NUMCHR
75D6 27     Ø7          0578Ø          BEQ     NOKEY2
75D8 8D     F5          0579Ø          BSR     POLL
75DA 97     53          0580Ø          STA     <$53
75DC 7E     B68F        0581Ø          JMP     $B68F
75DF ØF     56          0582Ø NOKEY2   CLR     <$56
75E1 ØF     53          0583Ø          CLR     <$53
75E3 7E     B69B        0584Ø          JMP     $B69B
75E6 32     62          0585Ø NEW19A   LEAS    2,S
75E8 1C     AF          0586Ø          ANDCC   #$AF
75EA 7D     739D        0587Ø          TST     NUMCHR
75ED 27     14          0588Ø          BEQ     NEW9A
75EF B6     739E        0589Ø          LDA     CHRBUF
75F2 81     Ø3          0590Ø          CMPA    #$Ø3
75F4 27     1Ø          0591Ø          BEQ     BREAK
75F6 81     13          0592Ø          CMPA    #$13
75F8 26     Ø9          0593Ø          BNE     NEW9A
75FA 8D     D3          0594Ø          BSR     POLL
75FC 7D     739D        0595Ø P1       TST     NUMCHR
75FF 27     FB          0596Ø          BEQ     P1
7601 8D     CC          0597Ø          BSR     POLL
7603 7E     82CØ        0598Ø NEW9A    JMP     $82CØ
7606 8D     C7          0599Ø BREAK    BSR     POLL
7608 8E     7774        0600Ø          LDX     #BUFSTR
760B BF     71DA        0601Ø          STX     SPPOS
760E BF     71DC        0602Ø          STX     SPSTRT
7611 4F                 0603Ø          CLRA
7612 B7     FF22        0604Ø          STA     $FF22
7615 B7     FFCØ        0605Ø          STA     $FFCØ
7618 B7     FFC2        0606Ø          STA     $FFC2
761B B7     FFC4        0607Ø          STA     $FFC4
761E B7     FFC6        0608Ø          STA     $FFC6
7621 B7     FFC9        0609Ø          STA     $FFC9
7624 B7     FFCA        0610Ø          STA     $FFCA
7627 B7     FFCC        0611Ø          STA     $FFCC
762A B7     FFCE        0612Ø          STA     $FFCE
762D B7     FFDØ        0613Ø          STA     $FFDØ
7630 B7     FFD2        0614Ø          STA     $FFD2
7633 7E     AEØ9        0615Ø          JMP     $AEØ9   BREAK ROUTINE ADDRESS
7636 32     65          0616Ø SCRKEY   LEAS    5,S
7638 96     6F          0617Ø          LDA     <$6F
763A 34     Ø2          0618Ø          PSHS    A
763C C6     FE          0619Ø          LDB     #$FE
763E D7     6F          0620Ø          STB     <$6F
7640 86     ØC          0621Ø          LDA     #$ØC
7642 AD     9F AØØ2     0622Ø          JSR     [$AØØ2]
7646 F6     FF22        0623Ø          LDB     $FF22
7649 2B     34          0624Ø          BMI     GRAPH
764B 8E     Ø4ØØ        0625Ø          LDX     #$4ØØ
764E A6     8Ø          0626Ø SLOOPA   LDA     ,X+
7650 2A     Ø2          0627Ø          BPL     SNEXTA
7652 86     6Ø          0628Ø          LDA     #$6Ø
7654 81     4Ø          0629Ø SNEXTA   CMPA    #$4Ø
7656 24     Ø6          0630Ø          BHS     SLOOPB
7658 8B     6Ø          0631Ø          ADDA    #$6Ø
765A AD     9F AØØ2     0632Ø          JSR     [$AØØ2]
765E 81     6Ø          0633Ø SLOOPB   CMPA    #$6Ø
7660 25     Ø2          0634Ø          BLO     *+4
7662 8Ø     4Ø          0635Ø          SUBA    #$4Ø
7664 AD     9F AØØ2     0636Ø          JSR     [$AØØ2]
7668 1F     1Ø          0637Ø SNEXTB   TFR     X,D
766A C4     1F          0638Ø          ANDB    #$1F
766C 26     EØ          0639Ø          BNE     SLOOPA
766E 86     ØD          0640Ø          LDA     #$ØD
7670 AD     9F AØØ2     0641Ø          JSR     [$AØØ2]
7674 8C     Ø6ØØ        0642Ø          CMPX    #$6ØØ
7677 25     D5          0643Ø          BLO     SLOOPA
7679 35     Ø2          0644Ø          PULS    A
767B 97     6F          0645Ø          STA     <$6F
767D 4F                 0646Ø          CLRA
767E 39                 0647Ø          RTS
767F 86     1B          0648Ø GRAPH    LDA     #27
7681 AD     9F AØØ2     0649Ø          JSR     [$AØØ2]
7685 4C                 0650Ø          INCA
7686 AD     9F AØØ2     0651Ø          JSR     [$AØØ2]
768A ØF     9C          0652Ø          CLR     <$9C
768C C4     7Ø          0653Ø          ANDB    #$7Ø
768E 54                 0654Ø          LSRB
768F 54                 0655Ø          LSRB
7690 54                 0656Ø          LSRB
7691 8E     7754        0657Ø          LDX     #GTABLE
7694 3A                 0658Ø          ABX
7695 96     9B          0659Ø          LDA     <$9B
7697 34     Ø2          0660Ø          PSHS    A
7699 A6     84          0661Ø          LDA     ,X
769B 48                 0662Ø          LSLA
769C 48                 0663Ø          LSLA
769D 97     9B          0664Ø          STA     <$9B
769F C5     Ø2          0665Ø          BITB    #$Ø2
76A1 27     63          0666Ø          BEQ     COLOR
76A3 EC     84          0667Ø MONO     LDD     ,X
76A5 34     Ø6          0668Ø          PSHS    D
76A7 34     Ø2          0669Ø          PSHS    A
76A9 9E     BA          0670Ø          LDX     <$BA
76AB CE     7764        0671Ø          LDU     #GTABLE+16
76AE B7     76G5        0672Ø          STA     M1+2
76B1 B7     76D3        0673Ø          STA     M3+2
76B4 Ø8     98          0674Ø          LSL     <$98
76B6 A6     61          0675Ø MLOOP1   LDA     1,S
76B8 A7     E4          0676Ø          STA     ,S
76BA C6     8Ø          0677Ø MLOOP2   LDB     #$8Ø
76BC 4F                 0678Ø MLOOP3   CLRA
76BD E5     84          0679Ø          BITB    ,X
76BF 27     Ø2          0680Ø          BEQ     M1
76C1 8A     Ø8          0681Ø          ORA     #8
76C3 E5     88 2Ø       0682Ø M1       BITB    32,X
76C6 27     Ø2          0683Ø          BEQ     M2
76C8 8A     Ø2          0684Ø          ORA     #2
76CA 54                 0685Ø M2       LSRB
76CB E5     84          0686Ø          BITB    ,X
```

```
76CD 27   02       06870          BEQ     M3
76CF 8A   04       06880          ORA     #$04
76D1 E5   88 20    06890 M3       BITB    32,X
76D4 27   01       06900          BEQ     M4
76D6 4C            06910          INCA
76D7               06920 M4
                   06930 *        EORA    #$0F    DE-COMMENT THIS IF Y
OU WANT THE OUTPUT INVE
RTED(WHITE LINES)
76D7 A6   C6       06940          LDA     A,U
76D9 AD   9F A002  06950          JSR     [$A002]
76DD 54            06960          LSRB
76DE 26   DC       06970          BNE     MLOOP3
76E0 30   01       06980          LEAX    1,X
76E2 6A   E4       06990          DEC     ,S
76E4 26   D4       07000          BNE     MLOOP2
76E6 E6   61       07010          LDB     1,S
76E8 3A            07020          ABX
76E9 6A   62       07030          DEC     2,S
76EB 26   C9       07040          BNE     MLOOP1
76ED 86   1B       07050 FULL     LDA     #27
76EF AD   9F A002  07060          JSR     [$A002]
76F3 48            07070          LSLA
76F4 AD   9F A002  07080          JSR     [$A002]
76F8 EC   63       07090          LDD     3,S
76FA 32   65       07100          LEAS    5,S
76FC 97   9B       07110          STA     <$9B
76FE 97   6F       07120          STA     <$6F
7700 4F            07130          CLRA
7701 04   98       07140          LSR     <$98
7703 04   97       07150          LSR     <$97
7705 39            07160          RTS
7706 04   9B       07170 COLOR    LSR     <$9B
7708 EC   84       07180          LDD     ,X
770A 34   06       07190          PSHS    D
770C 34   02       07200          PSHS    A
770E 8E   7764     07210          LDX     #GTABLE+16
7711 B7   7728     07220          STA     C1+2
7714 B7   7737     07230          STA     C3+2
7717 08   98       07240          LSL     <$98
7719 A6   61       07250 CLOOP1   LDA     1,S
771B A7   E4       07260          STA     ,S
771D C6   C0       07270 CLOOP2   LDB     #$C0
771F 4F            07280 CLOOP3   CLRA
7720 E5   84       07290          BITB    ,X
7722 27   02       07300          BEQ     C1
7724 8A   08       07310          ORA     #8
7726 E5   88 20    07320 C1       BITB    32,X
7729 27   02       07330          BEQ     C2
772B 8A   02       07340          ORA     #2
772D 54            07350 C2       LSRB
772E 54            07360          LSRB
772F E5   84       07370          BITB    ,X
7731 27   02       07380          BEQ     C3
7733 8A   04       07390          ORA     #4
7735 E5   88 20    07400 C3       BITB    32,X
7738 27   01       07410          BEQ     C4
773A 4C            07420          INCA
773B               07430 C4
                   07440 *        EORA    #$0F    DE-COMMENT THIS I
F YOU WANT THE OUTPUT INVE
RTED
773B A6   C6       07450          LDA     A,U
773D AD   9F A002  07460          JSR     [$A002]
7741 54            07470          LSRB
7742 54            07480          LSRB
7743 26   DA       07490          BNE     CLOOP3
7745 30   01       07500          LEAX    1,X
7747 6A   E4       07510          DEC     ,S
7749 26   D2       07520          BNE     CLOOP2
774B E6   61       07530          LDB     1,S
774D 3A            07540          ABX
774E 6A   62       07550          DEC     2,S
7750 26   C7       07560          BNE     CLOOP1
7752 20   99       07570          BRA     FULL
7754      1020     07580 GTABLE   FDB     $1020
7756      1020     07590          FDB     $1020
7758      2020     07600          FDB     $2020
775A      1030     07610          FDB     $1030
775C      2030     07620          FDB     $2030
775E      1060     07630          FDB     $1060
7760      2060     07640          FDB     $2060
7762      2060     07650          FDB     $2060
7764      E0E4     07660          FDB     $E0E4
7766      E3E8     07670          FDB     $E3E8
7768      E2EA     07680          FDB     $E2EA
776A      E6EE     07690          FDB     $E6EE
776C      E1E5     07700          FDB     $E1E5
776E      E9ED     07710          FDB     $E9ED
7770      E7EC     07720          FDB     $E7EC
7772      EBEF     07730          FDB     $EBEF
7774               07740 BUFSTR
          7000     07750          END     START

00000 TOTAL ERRORS
```

Hint . . .

Windows Three

Here are three handy screens to keep on your work disks to call when you want to develop a new procedure or run an old one. Use the BASIC09 editor to create the three procedures. Note: The `vdgint` command is not usually found on the System disk supplied but is in the `MODULES` directory of the Configuration disk. You will need it in your commands directory if you want to call up a 32-column screen.

A 32-column CoCo 1 and 2 Screen

```
PROCEDURE scrn32
SHELL "load vdgint"
SHELL "deiniz /w3"
SHELL "xmode /w3 type=1 pag=16"
SHELL "shell i=/W3&"
PRINT "Press <CLEAR. . ."
```

A 40-column CoCo 3 Graphics Screen

```
PROCEDURE scrn40
DIM path:INTEGER
SHELL "iniz /w1"
OPEN #path,"/w1":WRITE
RUN gfx2(path,"DWSET",6,0,0,40,24,0,1,1)
SHELL "merge sys/stdfonts >/w1"
SHELL "merge sys/stdptrs >/w1"
SHELL "merge sys/stdpats_4 >/w1"
SHELL "display 1b 3a c8 01>/w1"
RUN gfx2(path,"SELECT")
SHELL "shell i=/w1&"
SHELL "shell"
```

An 80-column CoCo 3 Graphics Screen

```
PROCEDURE scrn80
DIM path:INTEGER
SHELL "iniz /w2"
OPEN #path,"/w2":WRITE
RUN gfx2(path,"DWSET",7,0,0,80,24,0,1,1)
SHELL "merge sys/stdfonts >/w2"
SHELL "merge sys/stdptrs> >/w2"
SHELL "merge sys/stdpats_4 >/w2"
SHELL "display 1b 3a c8 01>/w2"
RUN gfx2(path,"SELECT")
SHELL "shell i=/w2&"
SHELL "shell"
```

At the BASIC09 B prompt, save each screen separately as source code that ends up in your root directory (`/D0`); e.g., `save scrn32`. Then pack each of them separately as packed code, which ends up in your commands directory (`/D0/CMDS`); e.g., `pack scrn32`. You may then call a screen by typing, say, `scrn40` at the OS-9 prompt, or by typing `$scrn40` at the BASIC09 prompt.

By keeping the source code in your root directory, you can amend the features of any of the screens by loading the code into BASIC09. For instance, you might want to change the `scrn40` blue color to black by editing `RUN gfx2(path, "DWSET", 6,0,0,40,24,0, 1,1)` to read `RUN gfx2(path, "DWSET", 6,0,0, 40,24,0,2,1)`.

Del Turner, Kamloops, BC

Corrections

"Barden's Buffer" (August 1988, Page 170): Bill Barden has written to make a few points about his timing program. In Mr. Barden's words, "Art Flexser, author of ADOS, correctly points out that the timing program will work only under Radio Shack Disk BASIC 1.1. He [Art Flexser] also adds a few suggestions: 1) Use POKE&HFF03,&H34 to disable the interrupts from BASIC and POKE&HFF03,&H35 to enable them. 2) Use an ORCC instruction to disable and enable the interrupts in assembly language rather than a TFR (a TFR will work, however.)"

"The Old Switcheroo II" (August 1988, Page 120): Mark Haverstock wrote to correct some errors in part numbers given in his article. The correct Radio Shack catalog number for the experimenter's box is 270-030, not 270-2301. Similarly, the number for the five-pin in-line DIN jack is 274-006, not 274-005.

"Flight Simulator II" (Review, August 1988): The correct price for *Flight Simulator II* is $34.95, not $24.95 as stated in the review. The program is available only through Radio Shack and cannot be purchased directly from SubLOGIC.

"Escape From Tut's Tomb" (August 1988, Page 58): Due to a production error, part of the listing for 2PART1 is missing from the printed magazine. The missing portions are reproduced below. The files on RAINBOW ON TAPE and RAINBOW ON DISK are unaffected and include the complete program.

```
69Ø DATA 32,3,15,14,7,18,1,2Ø
7ØØ DATA 21,12,1,2Ø,9,15,14,19
71Ø DATA 32,6,9,14,9,19,8,5
72Ø DATA 4,32,16,1,18,2Ø,2Ø,23
73Ø DATA 15,12,15,1,4,32,14,5
74Ø DATA 24,2Ø,32,16,1,18,2Ø,Ø
75Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
76Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
77Ø DATA Ø,Ø,Ø,Ø,Ø,134,255,183
78Ø DATA 43,196,183,43,197,183,4
3,198
79Ø DATA 183,43,199,183,43,164,1
83,43
8ØØ DATA 165,183,43,166,183,43,1
67,57
81Ø DATA 182,15,16Ø,129,56,38,1Ø
Ø,182
82Ø DATA 3Ø,22Ø,177,3Ø,23Ø,34,32
,37
83Ø DATA 54,182,3Ø,221,177,3Ø,23
1,34
84Ø DATA 22,37,44,182,3Ø,222,177
,3Ø
85Ø DATA 232,34,12,37,34,182,3Ø,
223
86Ø DATA 177,3Ø,233,34,2,32,24,1
82
87Ø DATA 3Ø,22Ø,183,3Ø,23Ø,182,3
Ø,221
88Ø DATA 183,3Ø,231,182,3Ø,222,1
83,3Ø
89Ø DATA 232,182,3Ø,223,183,3Ø,2
33,189
9ØØ DATA 21,224,189,21,224,134,3
,183
91Ø DATA 3Ø,237,182,15,161,183,3
Ø,22Ø
92Ø DATA 182,15,162,183,3Ø,221,1
82,15
93Ø DATA 163,183,3Ø,222,182,15,1
64,183
94Ø DATA 3Ø,223,57,63,4,Ø,Ø,Ø
95Ø DATA Ø,Ø,4,Ø,4,Ø,4,Ø
96Ø DATA 4,Ø,Ø,Ø,Ø,Ø,Ø,Ø
97Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
98Ø DATA 194,251,255,255,255,255
,255,255
99Ø DATA 255,187,185,197,161,222
,7,255
1ØØØ DATA 82,161,197,11,Ø,Ø,171,
238
1Ø1Ø DATA 161,181,1,2,221,161,16
1,2
1Ø2Ø DATA 4,16Ø,24Ø,Ø,255,255,25
5,255
1Ø3Ø DATA 255,255,255,255,255,25
5,255,255
1Ø4Ø DATA 255,255,255,255,255,25
5,255,255
1Ø5Ø DATA 255,255,255,255,255,25
5,255,255
```

For quicker reference, 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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NOVICES NICHE

We're Looking for a Few Good Shorties

Help! The Niche needs more submissions! If you have written a good shortie, please send it in. We're looking for graphics, utilities, educational programs and games (especially games!). How short is a shortie? Well, if you printed out your listing in 32 columns, as we do, it should fit on one half of an 8½-by-11 inch page (be under 12 inches). (Entering `PRINT#-2,CHR$(27)CHR$(81)CHR$(32)` will allow most Epson-compatible printers to `LLIST` a program in 32 columns if you want to check this.)

Graphics

Fright Night

16K ECB

By Patricia Moos

Spook is a short but flashy Halloween program. It draws a jack-o'-lantern on the `PMODE 3` graphics screen, then starts playing an eerie tune. At first the music is slow, but as it repeats it plays faster and faster. Finally, the music stops and the image flashes.

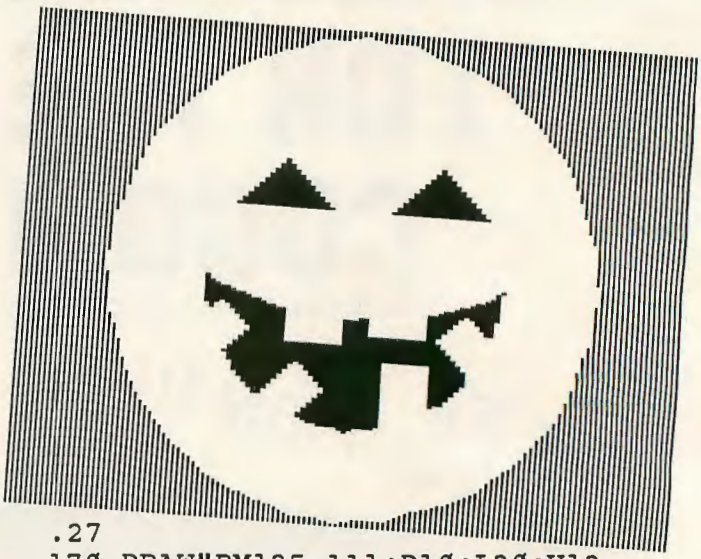
Because of the `GOTO 230` statement in Line 270, the pumpkin will flash endlessly after it finishes its song. If you would like your jack-o'-lantern to run endlessly from start to finish, replace Line 270's `GOTO 230` statement with `GOTO 10` and add these two lines:

```
225 FOR T=1 TO 20
265 NEXT T
```

Put the monitor in your window and share the specter with trick-or-treaters on Halloween night.

The listing: SPOOK

```
1Ø PMODE 3,1
2Ø PCLS
3Ø SCREEN 1,1
4Ø CIRCLE(128,96),95,8
5Ø CIRCLE(128,96),6Ø,8,1,Ø,.Ø8
6Ø DRAW"BM183,118;H1Ø;G1Ø;F14"
7Ø CIRCLE(128,96),6Ø,8,1,.1Ø,.18
8Ø DRAW"BM158,143;U15;L15;D25"
9Ø CIRCLE(128,96),6Ø,8,1,.21,.32
1ØØ DRAW"BM1Ø8,15Ø;E1Ø;H1Ø;G14"
11Ø CIRCLE(128,96),6Ø,8,1,.35,.4
2
12Ø DRAW"BM78,128;E1Ø;H1Ø;G5"
13Ø CIRCLE(128,96),6Ø,8,1,.46,.5
Ø
14Ø CIRCLE(128,74),75,8,.5Ø,.1Ø,
.2Ø
15Ø DRAW"BM156,1Ø7;D1Ø;L2Ø;U8"
16Ø CIRCLE(128,74),75,8,.5Ø,.24,
.27
17Ø DRAW"BM125,111;D1Ø;L2Ø;U12
18Ø CIRCLE(128,74),75,8,.5Ø,.31,
.4Ø
19Ø DRAW"BM8Ø,7Ø;E2Ø;F2Ø;L37"
2ØØ DRAW"BM14Ø,7Ø;E2Ø;F2Ø;L37"
21Ø PAINT(1ØØ,4Ø),8,8
215 PAINT(1,1),6,8
22Ø GOSUB 29Ø
23Ø PMODE 4,1:SCREEN1,1
24Ø FOR X=1TO1ØØ :NEXT X
25Ø PMODE 3,1:SCREEN1,1
26Ø FORX=1TO1ØØ:NEXT X
27Ø GOTO23Ø
29Ø B$="P4;E#;D;E+;P4;D+;C;D+;P4
"
3ØØ C$="O4;C;O3;A+;G;E-;G;A+;P2"
31Ø D$="T3;C;D;E-;F;G;D+G;"
32Ø E$="T4;C;D;E-;F;G;D+G;"
327 G$="T7;C;D;E-;F;G;D+;G
328 H$="T1Ø;C;D;E-;F;G;D+;G"
329 I$="T15;C;D;E-;F;G;D+;G"
34Ø PLAY D$+B$+D$+C$
35Ø PLAY E$+B$+E$+C$
37Ø PLAY G$+B$+G$+C$
38Ø PLAY H$+B$+H$+C$
39Ø PLAY I$+B$+I$+C$
4ØØ RETURN
```



Ad Infinitum

CoCo 3

By Rick Weshenfelder

If you're one of those people who liked the Lava Lamp, you'll love *Eyecatcher.* Just type in, load and run the program to see an infinite number of CoCo 3 graphics. Press any key to start the program over again.

I used the speed-up poke (POKE 65497,0) because the program has to do quite a bit of number crunching. (Note: CoCo 2 users should use the CoCo 2-specific speed-up poke in translating this program to their machines.)

If you like to fiddle with the programs you type in, you might try changing the values of some of the variables to see what will happen. F controls the spacing between lines as they are drawn. TI controls how often the colors will change, and TM is responsible for resetting the program. There are more, but these will do for a start.

If you want to tinker more with the program, I have some suggestions. Try, for example, adding a routine to let the number keys change the background color. Remove the variable TM entirely for a continuous picture, or make an option that switches between continuous and timed pictures.

The listing: EYECATCH

```
10 '>>> EYE CATCHER <<<
20 ' RICK WESHENFELDER
30 CLS:POKE65497,0:ONBRKGOTO180:
TIMER=0
40 WIDTH80:PALETTERGB:PALETTE0,0
:HSCREEN2:HCOLOR1,0
50 F=2:F1=.995^F:F2=1-F1
60 HA=RND(320):HB=RND(320):VA=RN
D(192):VB=RND(192)
70 H1=RND(0)*SGN(160-HA):V1=(1-A
BS(H1))*SGN(96-VA)
80 H1=H1*F:V1=V1*F
90 PC=RND(8):PALETTE(8+PC)-1,(PC
*8)-1:TI=TIMER:IFTI>=50THENTI=0:
TIMER=0:TM=TM+1:HC=(HC+1)*-(HC<1
5)
100 IFTM=5THENTM=0:HCLS:GOTO50
110 IF HA+H1>319 OR HA+H1<0 THEN
 HA=HA-H1:HCOLORHC,0:GOTO70
120 IF VA+V1>191 OR VA+V1<0 THEN
 VA=VA-V1:HCOLORHC,0:GOTO70
130 HA=HA+H1:VA=VA+V1:HB=HB*F1+H
A*F2:VB=VB*F1+VA*F2
140 HLINE(HA,VA)-(HB,VB),PSET
150 HLINE(319-HB,VB)-(319-HA,VA)
,PSET
160 HSET(HA,VA,15-HC):HSET(HB,VB
,15-HC):HSET(319-HA,VA,15-HC):HS
ET(319-HB,VB,15-HC)
170 IFINKEY$=""THEN110ELSEHCLS:T
IMER=0:TM=0:GOTO50
180 POKE65496,0:PALETTE0,32:WIDT
H32:PALETTERGB:END
```

Tying up DRAW Strings

32K ECB

By Keiran Kenny

With *CopyPix* you can use LINEINPUT to enter DRAW commands and see what you have drawn as soon as you press ENTER.

On running the program you will see a text screen with the word *Draw* at the upper-left corner. Type in one of the DRAW commands (U15, for example — see your Extended Color BASIC manual) and press ENTER. The program then shifts you to the PMODE 4 screen to show what you have done. Pressing the space bar returns you to the text screen for another prompt. Add a few more commands, press ENTER again, and watch your drawing grow. You can enter DRAW strings up to a maximum of about four text screen lines in length, but you may find that entering commands one to four at a time is preferable.

When the program starts, the cursor is at the center of the screen (128,96). Enter a BM or B command if you want to change the cursor position at any time. Otherwise, each new line will follow on from the end of the last line you drew.

If a cassette recorder is connected to your CoCo, you can save your pictures to tape. To save a picture, position the tape and enter SP (save picture) at the LINEINPUT prompt, then press Record and Play. To load a saved picture, position your tape and enter LP (load picture), then press Play on the recorder. (Do not put space between the DRAW prompt and either SP or LP; doing so will result in an error.) When you load a picture from tape, the cursor will be at Position 128,96.

The listing: COPYPIX

```
0 'COPYPIX' BY KEIRAN KENNY,
   SYDNEY, 1988.
10 CLS
20 GOTO170
30 LINEINPUT"DRAW";D$
40 IFD$="SP"THENPMODE4,1:COLOR0,
1:PCLS:SCREEN1,1:GOSUB80:CSAVEM"
",PEEK(&HBA)*256,PEEK(&HB7)*256-
1,&HB44A:GOTO150
50 IFD$="LP"THENN=0:PMODE4,1:COL
OR0,5:PCLS:SCREEN1,1:CLOADM:GOTO
120
60 PMODE4,1:COLOR0,5:PCLS:SCREEN
1,1
70 IFN THENGOSUB80:GOTO110ELSE11
0
80 PG=1
90 FORT=5TO8:PCOPYT TOPG:PG=PG+1
:NEXT
100 RETURN
110 DRAWD$
120 N=1
130 PG=5
140 FORT=1TO4:PCOPYT TOPG:PG=PG+
1:NEXT
150 K$=INKEY$:IFK$<>CHR$(32)THEN
150
160 GOTO30
170 PCLEAR8:GOTO30
```

Utility

Seeing the Bigger Picture

CoCo 3

By Erich Sweaney

CoCo Plus is a short program that increases the CoCo 3's HSCREEN 2 or 4 screen by six vertical pixels (from 192 to 198). To use 198 vertical pixels in your own programs, type in lines 40 and 70 every time you use the HSCREEN 2 or 4 command.

The HCIRCLE command does not work properly when you enter it between vertical locations 192 and 198, and the HPAINT command requires a little experimentation, but all the other commands work fine. Type in and run this listing for a demonstration.

The listing: COCOPLUS

```
Ø REM COCO PLUS
1Ø REM INCREASES GRAPHICS FOR TH
E COCO 3 FROM 192 TO 198
2Ø REM BY ERICH SWEANEY
3Ø PALETTE RGB
4Ø HSCREEN 2:POKE &HFF98,128:POK
E &HFF99,62
5Ø REM MAKES SCREEN LARGER
6Ø REM CHANGE POKE &HFF99,62 TO
POKE &HFF99,61 TO USE HSCREEN 4
7Ø POKE &HE7BA,2Ø1
8Ø REM LET'S HLINE GOTO 198
9Ø HCLS8
1ØØ PALETTE 7,37
11Ø HCOLOR 7
12Ø HLINE(Ø,Ø)-(32Ø,198),PSET,B
13Ø HCOLOR 2:HLINE(Ø,Ø)-(32Ø,192
),PSET,B
14Ø HPRINT(2,23),"OLD 192":HCOLO
R 7:HPRINT(2Ø,24),"NEW 198"
15Ø HCOLOR 3:HLINE(Ø,192)-(32Ø,1
98),PSET,B
16Ø HPAINT(1Ø,197),4,3
17Ø REM YOU MUST SET THE LOWEST
POINT DOWN,WHEN HPAINTING BETWEE
N 192-198 OR IT WONT WORK WRIGHT
18Ø HCOLOR 2:HCIRCLE(25Ø,194),1Ø
19Ø REM SORRY HCIRCLE DOES NOT W
ORK GOOD
2ØØ REM MOST OTHER HSCREEN GRAPH
IC COMMANDS WORK
21Ø REM TO USE HSCREEN 2,4 IN YO
UR PROGRAMS JUST TYPE LINE 1Ø AN
D 4Ø IN WHEN EVER YOU USE HSCREE
N
22Ø HPRINT(2,2),"NEW GRAPHICS CA
PABILTY"
23Ø HCOLOR 5:HPRINT(2,3),"FOR HS
CREEN 2 AND 4"
24Ø HCOLOR 4:HPRINT(2,4),"CHANGE
S FROM 192 TO 198"
25Ø HCOLOR 6:HPRINT(2,5),"BY"
26Ø HCOLOR 7:HPRINT(2,6),"ERICH
SWEANEY"
27Ø POKE 65497,Ø:FOR L=Ø TO 3ØØ
STEP 2:HCOLOR RND(8):HLINE(L,8Ø)
-(L+2Ø,18Ø),PSET:HLINE(L,18Ø)-(L
+5Ø,8Ø),PSET:NEXT L
28Ø GOTO 28Ø
```

Game

Taking on the One-Armed Bandit

4K

By Kenneth Carlin

I recently rediscovered a game I had written more than five years ago that is still fun to play (and it will run on *every* CoCo there is, from the old 4K non-extended all the way to the 512K CoCo 3) — it's a Low-Res interpretation of the classic slot machine.

Game play is extremely simple. After the title screen, you are prompted to press P to play the game; this constantly seeds the random number generator with new values, ensuring a completely new game every time. You are then prompted for a bet between one and five tokens. The windows will flash random blocks of graphics, simulating the spin of the wheel. If the symbols match after the machine has stopped, you win. Payoff is as follows:

Window	Payoff
yellow in 1st	2x
yellow in 1st and 2nd	5x
3 blue or 2 blue and a bar	10x
3 red or 2 red and a bar	20x
3 white or 2 white and a bar	35x
3 cyan or 2 cyan and a bar	50x
3 magenta or 2 magenta and a bar	100x
3 orange or 2 orange and a bar	200x

In case you hadn't guessed, the bar mentioned above is the

***** in Window 3. With any winning combination, the payoff is flashed on the screen along with the message "Winner!" Play ceases only when you run out of money or grow tired of playing.

There are a few things you may want to add to this game to make it more enjoyable. Personally, I like to pull back on some sort of "arm" when I play a slot machine. If you have a joystick, you can incorporate it into the program by following a few short steps. First, retype Line 28 so that it reads as follows:

```
28 Q=JOYSTK(0):IFJOYSTK(1)>30THE
NPRINT@389," PLEASE RESET THE AR
M":GOTO28
```

Now retype Line 29 to read:

```
29 PRINT@389,"  PULL THE ARM BAC
K":Z=JOYSTK(0):IFJOYSTK(1)<>63TH
EN29ELSEPRINT@340,""GOTO4
```

These two changes allow the joystick to function as the slot machine's arm. If prompted to reset the arm, push the joystick all the way up. Then give it a pull. Once the joystick is pulled all the way down, the machine will engage. If you want sound in the game, add :SOUND100,1 to the end of Line 8, and change the end of Line 23 to read ML=ML+1:SOUND1,1:NEXT. That's about it. It's rather short, but I wrote it to stay within the constraints of a 4K computer. Feel free to dress it up in any way you see fit. Chances are you have more than enough memory to add quite a few features.

The listing: SLOTS

```
1 CLS:CLEAR27Ø:ML=25:PRINT@41,"O
NE ARM BANDIT":PRINT@36Ø,"BY  KE
N  CARLIN":A$="  ":B$="  ":C$="
    ":D$=CHR$(142):E$=CHR$(139)
2 FORA=1TO5:D$=D$+CHR$(131):E$=E
$+CHR$(14Ø):NEXT:D$=D$+CHR$(141)
:E$=E$+CHR$(135):F$=CHR$(133)+C$
+CHR$(138):G$=A$+D$+B$+D$+B$+D$:
H$=A$+F$+B$+F$+B$+F$:I$=A$+E$+B$
+E$+B$+E$:J$=G$+B$+H$+B$+I$:DIMK
$(8):D=159:FORC=1TO7:FORE=1TO2
3 K$(C)=K$(C)+CHR$(D)+" ":NEXTE:
K$(C)=K$(C)+CHR$(D):D=D+16:NEXTC
:K$(8)="*****":GOSUB32:CLS:DIMG(
3):PRINT@192,J$:GOTO24
4 H(1)=RND(RND(7)):H(2)=RND(RND(
7)):H(3)=RND(7)+1
5 FORK=1TO3:FORE=1TO5Ø:ON K GOTO
 6, 7, 8
6 PRINT@227,K$(RND(7));
7 PRINT@237,K$(RND(7));
8 PRINT@247,K$(RND(7)+1);
9 NEXTE:PRINT@227+((K-1)*1Ø),K$(
H(K));
12 NEXTK:FORT=1TO5ØØ:NEXT:C1=POI
NT(6,14):C2=POINT(26,14):C3=POIN
T(46,14)
13 IF((C1=C2)AND(C2=C3))OR((C1=C
2)AND(C3=-1))THEN14ELSEIF(C1=C2)
ANDC1=2THEN14ELSEIFC1=2THENMO=BE
*2:PA$=" 2 TO 1":GOTO23ELSE24
14 C1=C1-1
15 ON C1 GOTO 16, 17, 18, 19, 2Ø
, 21, 22
16 MO = BE*5:PA$=" 5 TO 1":GOTO2
3
17 MO = BE*1Ø:PA$="1Ø TO 1":GOTO
23
18 MO = BE*2Ø:PA$="2Ø TO 1":GOTO
23
19 MO = BE*35:PA$="35 TO 1":GOTO
23
2Ø MO = BE*5Ø:PA$="5Ø TO 1":GOTO
23
21 MO = BE*1ØØ:PA$="1ØØ TO 1":GO
TO23
22 MO = BE*2ØØ:PA$="2ØØ TO 1"
23 PRINT@332,"WINNER !":PRINT@13
5,"PAYOFF IS "PA$:FORX=1TOMO:PRI
NT@56,ML;:ML=ML+1:NEXT
24 IFML=ØTHEN3ØELSEPRINT@45,"MON
EY LEFT:"ML;:PRINT@79,"THIS BET:
 ?":PRINT@389,"PLACE YOUR BET  (
1-5)":Y$=INKEY$
25 BE$=INKEY$:Z=RND(99999):IFBE$
=""THEN25ELSEPRINT@32Ø,"":PRINT@
135,"":BE=VAL(BE$):IFBE<1ORBE>5T
HEN25
26 IFML-BE<ØTHENPRINT@448,"*YOU
DO NOT HAVE THAT MUCH LEFT*";:FO
RT=1TO18ØØ:NEXT:PRINT@448,"":GOT
O25
27 PRINT@88,BE:ML=ML-BE:PRINT@56
,ML:PRINT@389,""
28 '
29 PRINT@39Ø,"":GOTO4
3Ø CLS
31 PRINT@198,"YOU ARE OUT OF MON
EY":PRINT@294,"CARE TO PLAY AGAI
N ?":PRINT@334,"(Y/N)":P$=INKEY$
:IFP$=""THEN31ELSEIFP$="Y"THEN1E
LSECLEAR2ØØ:END
32 PRINT@192,J$:PRINT@227,K$(RND
(7));:PRINT@237,K$(RND(7));:PRIN
T@247,K$(RND(8));:PRINT@455,"PRE
SS <P> TO PLAY":Z=RND(9999):W$=I
NKEY$:IFW$<>"P"THEN32ELSERETURN
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

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

A continuation of last month's "opposites" game, for more advanced students

Two for the Price of One

By Fred B. Scerbo
Rainbow Contributing Editor

Over the last two months I've introduced two brand-new programs, *Opposite Concepts 1* and *Match Game of Opposites 1*. These programs were designed to train the young user in telling the difference between opposite concepts by employing a set of 20 pairs of examples (i.e., hot versus cold). *Match Game* took these concepts one step further and made recall of the terms a great deal of fun. (You could even have adults play this variation of *Concentration* just for fun, since both young and old would have the same chances of winning. Remember, you can't put a price tag on quality time you spend with your kids — this is just another tool for that goal.)

This month, I'm offering you a set of 20 additional opposite concepts. These concepts will be a little more abstract, with terms like "in front of" and "behind" or "talk" and "listen." Those of you who want details on how these programs work should refer to the last two months' articles, rather than having all the technical lingo repeated here.

How these 20 came into being is almost an adventure in itself. After I had struggled to come up with the first set, one of the elementary teachers who has since started using these programs commented that she would hardly be able to come up with 20 sets of opposites to begin with. When I remarked to her that I had already developed a second set of 20, with the graphics to go along with it, she was quite surprised. She then dared me to come up with a third set of 20. (Believe it or not, after sitting down with a few of my own upper-level students for a half hour, we actually were able to come up with 20 more, as well as the graphics to go along with them. I'll save those for several months, though, to see what your reaction is to these first installments. We don't want to overdo a good thing.)

Fred Scerbo is a special needs instructor for 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.

Too Much Typing!

If you have typed in the last two months' programs, I am going to give you a few pointers on how to save some time in getting both new programs quickly into your CoCo. Remember, the easiest way to get these programs error-free is by subscribing to either RAINBOW ON TAPE or RAINBOW ON DISK. If you don't have a subscription, I'll now mention two quick ways to save some hacking time.

Tape Only?

Those of you without a disk drive will not be able to use the MERGE command found in Extended Disk BASIC. In that case, if you want to type in the listing shown here, you should load your error-free copy of *Opposite Concepts 1* from two months ago. Next, follow the steps shown below.

1. With the program loaded, type DEL 395-790 and press ENTER.
2. Retype lines 2, 85, 90 and 95 from this month's new listing.
3. Type in lines 395 through 790 from the new listing.
4. Save your new listing to tape with a different filename, such as OPOSITE2.

Now you may take some steps to use this data in *Match Game of Opposites*, following these steps:

1. Reload OPOSITE2.
2. Type DEL 0-390 and press ENTER.
3. Type DEL 795- and press ENTER.
4. Delete lines:

400	500	600	700
410	510	610	710
420	520	620	720
430	530	630	730
440	540	640	740
450	550	650	750
460	560	660	760
470	570	670	770
480	580	680	780
490	590	690	790

We do not need these DATA lines in *Match Game of Opposites*. Simply type the line number and press ENTER.

5. Type RENUM 110,395,0 and press ENTER.
6. From last month's listing type in lines 1 through 105 and 310 through 620. Also, retype Line 2 to read 2 REM*MATCH GAME OF OPPOSITES 2*.
7. Save the entire program and test it for errors. You may want to use a different filename, such as MATCH2.

You will now have copies of both programs with all the new data in place. If you find this too confusing, simply type in the listing as you see it here.

Disk Users Only!

Disk users have a much easier time with this, since you can use the MERGE command. To get OPOSITE2, follow the same instructions as you would above for tape. What you are actually doing is deleting the old DATA lines from OPOSITE1 and typing in the new lines 395 through 790. Also be sure to retype lines 2, 85, 90 and 95.

However, for the next program you can save a great deal of time by using the MERGE command. To do this, after you have saved OPOSITE2 to disk,

follow steps 1 through 5 above for *Match Game of Opposites*. From that point on, do the following:

6. On a new formatted disk, save this new DATA list by typing SAVE"VOL2",A and press ENTER. This saves the lines to your disk in ASCII.
7. Load your copy of *Match Game of Opposites* from last month's issue. Next, place the new disk with VOL2 on it in your drive, type MERGE "VOL2" and press ENTER. The new lines will now take the place of all the old data, and the program should be ready to run, provided you have not made any typing errors. Also, retype Line 2 as 2 REM *Match Game of Opposites 2*.
8. Save this new version with the filename MATCH2 or some other appropriate name. You don't want to use the same filename as VOL1, since you would be killing the old file and writing over it with your new program.

Both programs are now ready to run. Refer to the last two months' issues for instructions on how to run the programs. Only the material covered will be different.

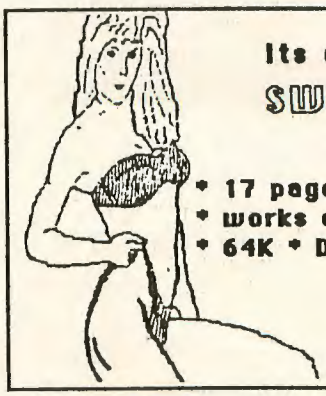
Next month will be the final chapter in this series of early childhood education programs. I'll list a third, totally different program, which will introduce this material inserted into sentences while still using our graphics. Let me know if these programs prove as valuable to you as you they have to our elementary students! □

Editor's Note: For your convenience, both programs (OPOSITE2 and MATCH2) will appear on this month's issue of RAINBOW ON TAPE and RAINBOW ON DISK. This will ensure that those of you who want bug-free copies will not have to merge for MATCH2.

50	170	565	95
95	127	605	108
165	71	635	94
260	237	675	235
340	174	705	151
400	194	750	192
440	93	785	187
475	241	910	32
525	4	END	113

The listing: OPOSITE2

```
1 REM****************************
2 REM* OPPOSITE CONCEPTS VOL.2 *
3 REM*   COPYRIGHT (C) 1988    *
4 REM*    BY FRED B. SCERBO    *
5 REM*    6Ø HARDING AVENUE    *
6 REM*  NORTH ADAMS, MA Ø1247  *
7 REM****************************
1Ø CLEAR3ØØØ
15 CLSØ:PRINTSTRING$(32,188);STR
ING$(32,156);:FORI=1TO 256 :READ
 A:PRINTCHR$(A+128);:NEXT
2Ø PRINTSTRING$(32,195);STRING$(
32,179);
25 PRINT@422,"  BY FRED B.SCERBO
  ";:PRINT@454," COPYRIGHT (C) 1
988 ";
3Ø DATA126,124,124,125,117,124,1
24,122,126,124,125,117,124,124,1
25,117,124,124,124,116,126,117,1
24,126,125,117,124,124,117,124,1
24,124
35 DATA122,,,117,117,115,115,122
,123,115,119,117,,,117,117,115,1
15,115,,122,,,122,,117,115,114,1
17,115,115,115
4Ø DATA122,,,117,117,,,,122,,,11
7,,,117,,,,117,,122,,,122,,117,,
,,,,117
45 DATA124,124,124,124,116,,,32,
12Ø,,,116,124,124,124,116,124,12
4,124,116,124,,116,124,,116,124,
124,116,124,124,124
5Ø DATA46,44,44,45,37,,,32,42,,,
37,44,44,45,36,44,44,45,36,46,,3
6,46,32,37,44,44,36,44,44,45
55 DATA42,,,37,37,35,35,34,43,35
,35,37,,,37,33,35,35,39,,42,,,42
,,37,35,34,33,35,35,39
6Ø DATA42,,,37,37,,,42,42,,37,37
,,,37,37,32,,,,42,33,32,42,33,37
,,,37,,,
65 DATA44,44,44,44,36,44,44,4Ø,4
4,44,44,36,44,44,44,36,44,44,44,
36,44,36,44,44,44,36,44,44,36,44
,44,44
7Ø X$=INKEY$:IFX$<>CHR$(13)THEN7
Ø
75 DIM P$(2Ø,2),A$(6),B$(2Ø),C$(
2Ø),A(2Ø),N(2Ø),B(4),C(4),D(4),E
(4),F(4),AO(2Ø)
8Ø FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO2Ø:READP$(I,1),B$(I)
,P$(I,2),C$(I):NEXT
85 COLOR1,Ø
9Ø REM TITLE
95 CLS:PRINTSTRING$(32,"=");:PRI
NT@68,"OPPOSITE CONCEPTS VOL.2":
```

Its our all new

SWIMSUIT ISSUE

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```
PRINT@134,"A) REVIEW ALL TERMS":
PRINT@198,"B) QUIZ GRAPHICS":PRI
NT@262,"C) QUIZ TERMS ONLY"
1Ø0 PRINT@324,"<<<SELECT YOUR CH
OICE>>>"
1Ø5 PRINT:PRINTSTRING$(32,"=");:
PRINT@42Ø,"DEDICATED TO THE STUD
ENTS":PRINTTAB(8)"OF JOHNSON SCH
OOL"
11Ø X$=INKEY$:X=RND(-TIMER):IFX$
="A"THEN365ELSEIFX$="B"THEN115EL
SEIFX$="C"THEN795ELSE11Ø
115 CLSØ:PMODEØ,1:PCLS1
12Ø LINE(Ø,Ø)-(254,17Ø),PRESET,B
125 LINE(6,4)-(122,82),PRESET,BF
13Ø LINE(128,4)-(248,82),PRESET,
B
135 LINE(6,86)-(122,164),PRESET,
B
14Ø LINE(128,86)-(248,164),PRESE
T,B
145 DRAW"BM26,188CØNU1ØR1ØNU1ØBR
6R1ØU6L1ØU4R1ØBR6NR1ØD4NR1ØD6R1Ø
BR12BU6NE4D2F4BR6R1ØU6L1ØU4R1ØBR
6ND1ØR1ØD4NL1ØBR6NR1ØD6U1ØR1ØD1Ø
BR6NR1ØU1ØR1ØBR6NR1ØD4NR1ØD6R1ØB
R1ØU1ØNL4R1ØD4NL1ØD6NL14BR6U1ØR1
ØD4NL1ØD6BR6U1ØR1ØD4L1ØR4F6BR6E4
U2H4"
15Ø DATA13Ø,6,246,8Ø,6,86,12Ø,16
2,13Ø,86,246,162
155 PAINT(2,2),Ø,Ø:PCOPY1TO3
16Ø PMODEØ,4:PCLS1
165 LINE(Ø,Ø)-(254,17Ø),PRESET,B
F
17Ø LINE(8,6)-(12Ø,8Ø),PSET,BF
175 PCOPY4TO2:PMODEØ,1:SCREEN1,1
18Ø DATA"BM2,8C1","BM13Ø,8CØ","B
M2,9ØCØ","BM13Ø,9ØCØ","BM2,48CØ"
,"BM13Ø,48CØ"
185 FORI=1TO2Ø
19Ø A(I)=RND(2Ø):IFN(A(I))=1THEN
19Ø
195 N(A(I))=1:NEXTI:FORY=1TO2Ø:C
OLOR1,Ø
2ØØ FORI=2TO4
2Ø5 B(I)=RND(3)+1:IFN(B(I))=ØTHE
N2Ø5
21Ø N(B(I))=Ø:NEXTI:FORI=1TO4:N(
I)=1:NEXT
215 B=RND(2Ø):IFB=A((Y))THEN215
22Ø C=RND(2Ø):IFC=B OR C=A((Y))T
HEN22Ø
225 DRAW A$(1):DRAWP$(A(Y),1)
23Ø DRAW A$(B(2)):DRAWP$(B,2)
235 DRAW A$(B(3)):DRAWP$(C,2)
24Ø DRAW A$(B(4)):DRAWP$(A(Y),2)
245 COLOR1,Ø
25Ø Z=Ø
255 PMODEØ,4
26Ø DRAW A$(1)+"CØ":DRAWP$(A(Y),
1)
265 DRAW A$(B(2))+"C1":DRAWP$(B,
2)
27Ø DRAW A$(B(3))+"C1":DRAWP$(C,
2)
275 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2)
28Ø PMODEØ,1:SCREEN1,1
285 LINE(8,6)-(12Ø,8Ø),PSET,B
29Ø X$=INKEY$:IFX$=" "THEN3ØØELS
EIFX$="@"THEN965
295 COLOR1,Ø:LINE(8,6)-(12Ø,8Ø),
PRESET,B:GOTO285
3ØØ Z=Z+1:IFZ=4THENZ=1
3Ø5 COLOR1,Ø:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
31Ø X$=INKEY$:IFX$=" "THEN3ØØELS
EIFX$=CHR$(13)THEN32ØELSEIFX$="@
"THEN965
315 COLOR1,Ø:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO3Ø5
32Ø IFZ+1=B(4)THEN33Ø
325 NW=NW+1:FORK=1TO5:PMODEØ,4:S
CREEN1,1:SOUND1Ø,3:PMODEØ,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO3Ø5
33Ø NC=NC+1:PMODEØ,4:PCLS1:LINE(
Ø,4Ø)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(13Ø,
44)-(248,122),PRESET,B:PAINT(2,4
2),Ø,Ø
335 DRAW A$(5):DRAWP$(A(Y),1)
34Ø DRAW A$(6):DRAWP$(A(Y),2)
345 SCREEN1,1
35Ø X$=INKEY$:IFX$<>CHR$(13)THEN
35Ø
355 PMODEØ,1
36Ø PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO965
365 PMODEØ,2:PCLS1:SCREEN1,1:LIN
E(Ø,4Ø)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
Ø,44)-(248,122),PRESET,B:PAINT(2
,42),Ø,Ø
37Ø FORI=1TO2Ø:DRAW A$(5):DRAWP$
(I,1)
375 DRAW A$(6):DRAWP$(I,2)
38Ø X$=INKEY$:IFX$<>CHR$(13)THEN
38Ø
385 COLOR1,Ø:LINE(8,46)-(122,12Ø
),PSET,BF:LINE(132,46)-(246,12Ø)
,PSET,BF:NEXTI
39Ø RUN
395 DATA"BR24BD1ØR2ØF1ØL2ØNH1ØR6
ØM+2Ø,+8BL2ØNL6ØBR2ØM-2Ø,+8L6ØG1
ØR2ØE1ØL2ØU16BL8NL16BD4NL16BD4NL
16BD4NL16BD4NL16BD32BR1ØU6NR1ØU4
R1ØBR6ND1ØR1ØD4NL1ØD6BR6R1ØU6L1Ø
U4R1ØBR6R6ND1ØR6"
4ØØ DATA FAST
4Ø5 DATA"BR42BD44NR3ØH1ØU1ØE1ØR2
ØF8D1ØG4L16H6U4E4R8F4D2G2L4H2BD8
```

```
R16E6R6NE6F4D4NL4G4L6BU8BR4RBD34
BL46R1ØU6L1ØU4R1ØBR6D1ØR6BR6U1ØR
1ØD1ØNL1ØBR6NU1ØR6NU8R6U1Ø"
41Ø DATA SLOW
415 DATA"BR32BD4R6ØD46L6ØU46BF2R
1ØNF4R18ND6R18NG4R1ØD5NG4D16NL6D
16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M-18,-4BD46BL26NU1ØR1ØU6NL1ØU4NL
1ØBR6NR1ØD4NR1ØD6R1ØBR6U6NR1ØU4R
1ØBR6ND1ØR1ØD1ØNL1ØBR6U1ØR1ØD4L1
ØR4F6BR6NR1ØU6NR1ØU4R1Ø"
42Ø DATA BEFORE
425 DATA"BR32BD4R6ØD46L6ØU46BF2R
1ØNF4R18ND6R18NG4R1ØD5NG4D16NL6D
16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
4U16NR6U16NF4U5BD23BR28F8U2H8NU2
M+18,-4BD46BL56U1ØR1ØD4NL1ØD6BR6
U6NR1ØU4R1ØBR6R6ND1ØR6BR6NR1ØD4N
R1ØD6R1ØBR6U1ØR1ØD4L1ØR4F6"
43Ø DATA AFTER
435 DATABF3ØE8R2E2NH6R2E2R4E2NH6
R6E2R6NH6R4F2R6F2R4NH8F2R2F2R2F8
H2L2G2L2G2L4G2L6G2L2ØH2L6H2L4H2L
2H2NL2F2R2F2R4F2R6H4U2H2U4E2BR3Ø
F2D4G2D2G4BU4BL1ØU8F2D4L4U6D8H2U
4BG36BD8U1ØR1ØD4NL1ØD6BR6NU1ØR6N
U8R6NU1ØBR6U1ØR1ØD4NL1ØD6BR6U1ØD
4NE4F6BR6NR1ØU6NR1ØU4R1Ø
44Ø DATA AWAKE
445 DATA"BF24BR4F2R2F2NG6R2F2R6F
2NG6F2R8NG6R8E2R6NG8E2R4E2R2E2R2
NG1ØE2BU2ØBL7ØR1ØG1ØR1ØBR6RBR6RB
R6NR1ØE1ØNL1ØBD1ØBR6RBR6RBR6NR1Ø
E1ØNL1ØBD1ØBR6RBR6RBL86BD54U1ØR1
ØD4NL1ØD6BR6R1ØU6L1ØU4R1ØBR6D1ØR
8BR6NR1ØU6NR1ØU4R1ØBR6NR1ØD4NR1Ø
D6R1ØBR6U1ØR1ØD4L1Ø"
45Ø DATA ASLEEP
455 DATA"BD6BF38R8E4U1ØR4U6L4U6H
4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4BU
8NLNR2BU6BL4NR2BR6R2BR4ØBD2ØR8E4
U1ØR4U6L4U6H4L16G4D6L4D6R4D1ØF4R
8BU6NE4NH4BU8NLNR2BU6BL4NR2BR6R2
BL54BD44NU1ØR6NU8R6NU1ØBR6U1ØBR6
R6ND1ØR6BR6D1ØU6R1ØU4D1Ø"
46Ø DATA WITH
465 DATA"BR6ØBD44R8E4U1ØR4U6L4U6
H4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BL52BD44NU1
ØR6NU8R6NU1ØBR6U1ØBR6R6ND1ØR6BR6
D1ØU6R1ØU4D1ØBR6U1ØR1ØD1ØNL1ØBR6
NU1ØR1ØU1ØBR6R4ND1ØR4"
47Ø DATA WITHOUT
475 DATA"BR6ØBD5ØR8E4U1ØR4U6L4U6
H4L16G4D6L4D6R4D1ØF4R8BU6NE4NH4B
U8NLNR2BU6BL4NR2BR6R2BU12NL12R4U
2NL16U2NL3ØR14L2D8NF2NG2BD46BL44
NU1ØR6NU8R6NU1ØBR6NU1ØBR6R1ØU6L1
ØU4R1ØBR6NR1ØD4NR1ØD6R1Ø"
48Ø DATA WISE
```


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485 DATA"BR6ØBD5ØR8E4U1ØR4U6L4U6
H4L16G4D6L4D6R4D1ØF4R8BU1ØNG4NF4
BU4NLNR2BU6BL4NR2BR6R2BU1ØR6M-1Ø
,-2ØM-1Ø,+2ØBD48BL36U6NR1ØU4R1ØB
R6ND1ØR1ØD1ØNL1ØBR6U1ØR1ØD1ØNL1Ø
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BR6D1ØU6R1ØU4D1Ø"
49Ø DATA FOOLISH
495 DATA"BRBD26BR24R76M-3Ø,-1ØL4
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4R1ØBR6R4ND1ØR4BR6R4ND1ØR4BR6F4N
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5ØØ DATA PRETTY
5Ø5 DATA"BD22BR2ØNE4NG4R76NH4NF4
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U6R2NU6R2NU6R2NU6ND6R1ØNU6ND6R2N
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51Ø DATA UGLY
515 DATA"BR16BD2ØR8ØM-4,+2ØL36M-
4,-18NL36E4R36H2L32R12U4R8D4BD42
BL56NR8D1ØR8BR6U1ØR8D1ØNL8BR12M-
6,-1ØBR12M-6,+1ØBR12NR8U6NR8U4R8
BR6ND1ØR1ØD4L1ØR4F6"
52Ø DATA COVER
525 DATA"BR16BD2ØR8ØM-4,+2ØL36M-
4,-18NL36BU8BE4R36H2L32R12U4R8D4
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-1ØBR12M-6,+1ØBR12NR8U6NR8U4R8BR
6ND1ØR1ØD4L1ØR4F6"
53Ø DATA UNCOVER
535 DATA"BD2BR56F12D4G2L4D2F2D2M
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2ØBR12NR26BD4M+2Ø,+6BU2ØM-2Ø,+6B
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6"
54Ø DATA TALK
545 DATABD18BR94U4H4L4NU8L8G4D2G
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34E2R2E2U4E2U1ØH2U4H2L2H2BL12BD2
8E2R2E2U4E2U4H2U4H2L2H2BL12BD4NF
6D14L6F2L2BD26BR4D1ØR8BR6NU1ØBR8
R1ØU6L1ØU4R1ØBR6R6ND1ØR6BR6NR1ØD
4NR1ØD6R1ØBR6U1ØF1ØU1Ø
55Ø DATA LISTEN
555 DATA"BR3ØBD8NE4NU8NH4BL8D1ØN
R6ØD2ØNR6ØD1ØR6ØBR6F4H2G2E4BR6U2
ØNL6ØU2ØL6ØBD6ØBL14R1ØU6L1ØU4R1Ø
BR6R6ND1ØR6BR6ND1ØR1ØD4NL1ØD6BR6
U1ØR1ØD4L1ØR4F6BR12U1ØL6R12"
56Ø DATA START
565 DATA"BR2ØBD8D1ØNR6ØD2ØNR6ØD1
ØR6ØBR6F4H2G2E4BR6U2ØNL6ØU2ØNL6Ø
D4ØBR6NE4NR8NF4BD2ØBL82U6NR1ØU4R
1ØBR8D1ØBR8U1ØF1ØU1ØBR8D1ØBR8R1Ø
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U6L1ØU4R1ØBR6D1ØU6R1ØU4D1Ø"
57Ø DATA FINISH
575 DATA"BR44BD4R6F4R2E4R2F4R2E4
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14E12BF6BD4NR8L4D6R12D6L12R6ND4N
U16BD3ØBL26U1ØR1ØD4L1ØR4F6BR8NU1
ØBR8NR1ØU1ØR1ØBR6D1ØU6R1ØU4D1Ø"
58Ø DATA RICH
585 DATA"BR58BD6R6F2R2F2R2F4R2F4
D4F2D6G2D4G4L2G4L2G2L2G2L12H2L2H
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2R4BD12BL2NG4D16L4R8BR8BU4U4R2L6
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6U1ØR1ØD1ØNL1ØBR6U1ØR1ØD1ØNL1ØBR
6U1ØR1ØD4L1ØR4F6"
59Ø DATA POOR
595 DATA"BR36BD2ØR5ØD3ØL5ØU3ØBF6
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BR4ND16BR4D16BD4NL24BR8BU4R4U2L4
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NH8BL12M-14,-6BD58BR14U1ØF1ØU1ØB
R6ND1ØR1ØD1ØNL1ØBR8NU1ØBR8R1ØU6L
1ØU4R1ØBR6F4NE4D6"
6ØØ DATA NOISY
6Ø5 DATA"BD2BR36F12D4G2L4D2F2D2G
4NL1ØF2D2G4D4G2L14G2D4BR28U24E4R
2F4D1ØE2R2F2E2R2F2E2R2F2D1ØG4BU2
ØBL8R6U4L6U4R6BR6D8U4R8U4D8BR6U8
D4R8U4D8BR4R2BR4R2BL84BD38U1ØR1Ø
D1ØNL1ØNF2NH4BR6NU1ØR1ØNU1ØBR8NU
1ØBR8NR1ØU6NR1ØU4R1ØBR6R6ND1ØR6B
L64BU48L6"
61Ø DATA QUIET
615 DATA"BR4ØBD2R44F4D2M-8,+2ØG8
L4D4F4NL2ØD6L2ØU6E4U4L4H8M-8,-2Ø
U2E4BD4BR2G2M+6,+16R2U18NL4BR28D
18R2M+6,-16H2L4BL22BD4NG2D16NL2R
2BR2BU6R4U4L4U4R4BR4R2ND8R2BD56B
L32NU1ØR8NU8R8NU1ØBR8NU1ØBR8U1ØF
1ØU1Ø"
62Ø DATA WIN
625 DATA"BR34BD16R6U4L6U4R6BR4NR
6D8R6BR4U8R6D8NL6BR4U8R6D4L6R2F4
BR4NR6U4NR6U4R6BD2ØBL5ØD1ØR1ØU1Ø
NL1ØBR6BD4R6BR1ØBD6R4NR4U1ØNG4BR
1ØD1ØR1ØU1ØL1ØBF18L74U44R74D44BD
22BL64NU1ØR8BR6U1ØR1ØD1ØNL1ØBR6R
1ØU6L1ØU4R1ØBR6NR1ØD4NR1ØD6R1Ø"
63Ø DATA LOSE
635 DATA"BR62BD36R8E4U1ØR4U6L4U6
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BU4NLNR2BU6BL4NR2BR6R2BD1ØBF8M-1
2,+18M-12,-18BU24BR38D3ØR4U3ØL4U
6R12D2R8F6D4L4H4L6U2L1ØBL5ØBD8L2
2D2NR22R2D4F6G6D4L2NR22D2R22U2L2
U4H6E6U4BD48U1ØR1ØD1ØNL1ØBR6NU1Ø
R8BR6R2NR1ØU1ØL2R12D1Ø"
64Ø DATA OLD
645 DATA"BR6ØBD44R8E4U8R4U6L4U6H
4L16G4D6L4D6R4D8F4R8BU6NE4NH4BU8
NLNR2BU6BL4NR2BR6R2BU8U2H2L4BR26
BD6R1ØD2ØL1ØU2ØE2R6L2U2L2BL58BD4
L2G2D4F2R2D1ØG2D2F2E2U2H2U1ØR2E2
U4H2L2BD4ØBL6F4ND6E4BR6D1ØR1ØU1Ø
NL1ØBR6D1ØR1ØNU1ØBR6U1ØF1ØNU1ØBR
6NR1ØU1ØR1ØBD4NL4D6"
65Ø DATA YOUNG
655 DATA"BR18BD4R6ØD46L6ØU46BF2R
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16NH4D5L1ØNH4L18NU6L18NE4L1ØU5NE
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8BD28BL6ØNR8U6NR8U4R8BR6ND1ØR1ØD
4NL1ØD6BR6U1ØR8D4L8R2F6BR6NU1ØR8
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66Ø DATA EARLY
665 DATA"BR18BD4R6ØD46L6ØU46BF2R
1ØNF4R18ND4R18NG4R1ØD5NG4D16NL6D
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D8BD28BL56NU1ØR8BR6U1ØR1ØD4NL1ØD
6BR12U1ØL6R12BR6NR1ØD4NR1ØD6R1Ø"
67Ø DATA LATE
675 DATABR12BD4ØR1ØØL14BU2E2NR6U
2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2L
1ØU4R4U2E6R2ØF4R1ØD8NR2BL54L4NG2
U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
L1ØU2ØR28D6R6D6R8ND8BE22D8NE4NH4
BL6ØBD42D1ØBR6U1ØF1ØNU1ØBR12U6NR
8U4R8BR6ND1ØR8D4L6F6BR6U1ØR8D1ØN
L8BR6U1ØF1ØU1ØBR6R8L4D1Ø
68Ø DATA IN FRONT OF
685 DATABR12BD4ØR98L8BU4NG2U2H2L
2G2D2NF2L14NG2U2H2L2G2D2NF2L1ØU2
ØR28D6R6D6R8D8L4BL56BD2E2NR6U2H2
L2G2D2NF2L14NG2U2H2L2G2D2NF2L1ØU
4R4U2E6R2ØF4R1ØD8NR2BH22NU8NH4NE
4BD52BL14NU1ØR8U6NL8U4NL8BR6NR8D
4NR8D6R8BR6U1ØD4R8U4D1ØBR8U1ØBR8
ND1ØF1ØU1ØBR6R8D1ØL8R2U8
69Ø DATA BEHIND
695 DATA"BR12BD4ØR1ØØL64BU2E2NR6
U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
L1ØU4R4U2E6R2ØF4R1ØD8R2BD4R8U24N
G4U4NR44L8E12NR4ØBG16BL12NL14NH4
NG4BD42BL2ØNR1ØD4NR1ØD6R1ØBR6U1Ø
F1ØU1ØBR6R6ND1ØR6BR6NR1ØD4NR1ØD6
R1ØBR6U1ØR1ØD4L1ØR4F6"
7ØØ DATA ENTER
7Ø5 DATA"BR12BD4ØR1ØØL14BU2E2NR6
U2H2L2G2D2NF2L14NG2U2H2L2G2D2NF2
L1ØU4R4U2E6R2ØF4R1ØD8NR2BD4L52U2
4NF4U4NL44R8H12NL4ØBF16BR12R14NH
4NG4BD42BL6ØNR1ØD4NR1ØD6R1ØBR6E6
NH4NE4F6BR8U1ØBR8R6ND1ØR6"
71Ø DATA EXIT
715 DATA"BR3ØBD24ND1ØF1ØM+28,-8R
1ØF1ØG4NL1ØG6L1ØM-28,-8G1ØU1ØU2B
```

```
R36NH4NG4BR1ØBU4R2BR12R2BU6R2BU6
R2BU6R2BU1ØBR4NF4G4L8H4G4L8H4G4L
8H4G4L8H4G4L8H4G4BD6ØBR1ØU1ØR1ØD
4NL1ØD6BR6NU1ØR8BR8U1ØBR6D4F6E6U
4BR6NR1ØD4NR1ØD6R1Ø"
72Ø DATA ALIVE
725 DATA"BR3ØBD24ND2ØF1ØNG1ØR6NU
4ND4R6NU6ND6R6NU8ND8R6NU8ND8R6NU
8ND8R6ND8U8R4F8G4NL4G4L4BD26BL46
NL2U1ØL2R12D1ØNL1ØBR6NR1ØU6NR1ØU
4R1ØBR6ND1ØR1ØD4NL1ØD6BR6R2NU1ØR
1ØU1ØL12BU38BL1ØE2U2H2U2E2U2H2U2
BL12D2F2D2G2D2F2D2G2"
73Ø DATA DEAD
735 DATA"BR34BD34NU8R6NU8R6NU8BR
6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE4
F4BR6ND4U12L68D16NR68U18R68U2L68
U2R68U2L68U2R68U2L68U2R68U2NL68L
28NU6L1ØNU6BD32ND6BR1ØND6BD2ØBL1
8ND1ØR1ØBD4NL4D6NL1ØBR6U1ØR1ØD1Ø
L1Ø"
74Ø DATA GO
745 DATA"BR34BD34NU8R6NU8R6NU8BR
6U8R8D4NL8D4BR6NU8R8BR6U8D4R4NE4
F4BR6ND4U12L68D16NR68U32R68ND32L
28NU6L1ØNU6BD32ND6BR1ØND6BU2ØBL3
4R2NU8R8U8NL1ØBR6ND8R8D8NL8BR6U8
F8U8BR6R2ND2BR4R4ND8R4BD58BL6ØR1
ØU6L1ØU4R1ØBR6R6ND1ØR6BR6ND1ØR1Ø
D1ØNL1ØBR6U1ØR1ØD4L1Ø"
75Ø DATA STOP
755 DATA"BR22BD16NR68M+4,+1ØF16G
6R4ØH6E16M+4,-1ØBD1ØBR6R1ØF4D6G1
ØM-1Ø,+3L1ØE6R1ØE6U2H2L4U4BU1ØBL
3ØG6D4NF4G8BD32BL36R2NU1ØR1ØU6NL
1ØU4NL12BR6ND1ØR1ØD4L1ØR4F6BR6U1
ØR1ØD1ØNL1ØBR6NU1ØU6R4NE4F6BR6NR
1ØU6NR1ØU4R1ØBR6ND1ØF1ØU1Ø"
76Ø DATA BROKEN
765 DATA"BR22BD16NR68M+4,+1ØF16G
6R4ØH6E16M+4,-1ØR1ØF4D6G1ØM-1Ø,+
3L1ØE6R1ØE6U2H2L4BD46BL66U6NR1ØU
4R1ØBR8D1ØBR8E6NH4NE4F6BR6NR1ØU6
NR1ØU4R1ØBR6R2ND1ØR1ØD1ØNL12"
77Ø DATA FIXED
775 DATA"BR3ØBD42R5ØE4U6M-6,-16E
2U4H4L12G2D6F2R4NE2D1ØH2L2H2L4H2
L6G2L4G2L2G2L4BU1ØR12U2L12U2R12N
R16U2NR16L12U2R12U2L12BR6ØR12D2L
12D2NL16R12D2L12NL16D2R12D2L12BD
52BL74R8U6L8U4R8BR6R4ND1ØR4BR6ND
1ØR8D4L8R2F6BR8U1ØR8D1ØNL8BR6U1Ø
F1ØU1ØBR6NR8D1ØR8U6L2"
78Ø DATA STRONG
785 DATA"BR3ØBD42R12D2R1ØD2R6U2R
1ØU2R12E4U6M-6,-16E2U4H4L12G2D6F
2R4NE2D12L34BU16NR26NU4ND2U2R26B
R22R22NU2ND4D2L22BD56BL52NU1ØR6N
U8R6NU1ØBR6NR1ØU6NR1ØU4R1ØBR6ND1
ØR1ØD4NL1ØD6BR6NU1ØU6R4NE4F6"
79Ø DATA WEAK
795 CLS:V=1
8ØØ FORI=1TO2Ø
8Ø5 AO(I)=RND(2Ø)
81Ø IF N(AO(I))=1 THEN 8Ø5
815 N(AO(I))=1:NEXTI
82Ø FOR P=1TO2Ø
825 CLS
83Ø PRINT@68,"WHAT IS THE OPPOSI
TE OF"
835 PRINT@132,C$(AO(P))+" ?"
84Ø FOR Q=1TO2
845 C(Q)=RND(2Ø):IF C(Q)=AO(P) T
HEN845
85Ø FOR K=Q-1 TO ØSTEP-1:IF C(K)
=C(Q) THEN845
855 NEXTK
86Ø NEXTQ:C(3)=AO(P)
865 FOR E=1TO3
87Ø F(E)=RND(3)
875 FOR K=E-1 TO Ø STEP-1:IF F(K
)=F(E) THEN87Ø
88Ø NEXTK:NEXTE
885 PRINT
89Ø PRINTTAB(8)"1-"+B$(C(F(1))):
PRINT
895 PRINTTAB(8)"2-"+B$(C(F(2))):
PRINT
9ØØ PRINTTAB(8)"3-"+B$(C(F(3))):
PRINT
9Ø5 G$=INKEY$:IFG$="@"THEN965
91Ø IF G$=""THEN9Ø5
915 G=VAL(G$)
92Ø IF G<1 THEN 9Ø5
925 IF G>5 THEN 9Ø5
93Ø IF C(F(G))<>AO(P) THEN945
935 PRINT:PRINT"  RIGHT! THE ANS
WER IS: "+B$(AO(P))
94Ø NC=NC+1:GOTO955
945 PRINT:PRINT"   SORRY! THE AN
SWER IS: "+B$(AO(P))
95Ø NW=NW+1
955 X$=INKEY$:IFX$<>CHR$(13)THEN
955
96Ø NEXT P
965 CLS:PRINT@1Ø1,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
97Ø PRINT@229,"WHILE DOING"NW"WR
ONG."
975 NQ=NC+NW:IF NQ=ØTHEN NQ=1
98Ø MS=INT(NC/NQ*1ØØ)
985 PRINT@293,"YOUR SCORE IS"MS"
%."
99Ø PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
995 X$=INKEY$:IFX$="Y"THEN RUN
1ØØØ IFX$="N"THENCLS:END
1ØØ5 IFX$="C"THEN1Ø15
1Ø1Ø GOTO995
1Ø15 IFV=1THEN825
1Ø2Ø IFV=ØTHEN28Ø
```

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Modify last month's program to smooth out your art work

New Directions

By Joseph Kolar
Rainbow Contributing Editor

Last month, we studied the eight directional motion DRAW commands and developed a design on our graph paper screen. That is not the end of CoCo's abilities, however. CoCo can use other directions. CLOAD and run the *Graphic Paper* program you saved onto tape. If your program doesn't have a holding line, type 300 GOTO 300. (Note: When using these new direction commands, first plot the drawing on graph paper.)

Look at Listing 1, but don't copy and run it. You will only get junk. Follow the instructions found in this article and have fun learning this new concept.

Using LHUERFDG motion commands you created angular drawings. The results of these artistic efforts, even in PMODE 4, have jagged outlines. You see the telltale step syndrome. To mute these angular forms and give them the semblance of gentle curves, use the M motion command. Use real graph paper to draw the lines as they are explained.

We will now make some changes in last month's *Graph Paper* program. Key in 97 PSET(110,90,3) and run. This is the point of origin, around which we shall build a design. Both horizontal and vertical lines are in increments of 10 (i.e., 0,10,20, to 240). Dark guide lines are in increments of 40 (i.e., 0,40,80, etc.). The dark lines are an overlay to help locate specific points. They are created in lines 80 and 90. You may use them or remove them by inserting a REM in front of the lines.

Look at the graph on the computer screen. Starting at the left margin, we have three white lines and then a dark line. Along the horizontal line that displays the dot, count the first dark line as 40, the next dark line as 40, and the three white lines between (each having a value of 10) as a total of 30. Together the lines total 110.

Count down from the top border, along the vertical line on which the dot is displayed. There are two dark lines with one white line between (90 total).

Delete Line 97 and key in Line 100. Use S40 to make the lines created by the UDLREFGH DRAW command 10 times as large as they appear in the default mode. This way the lines drawn with the computer are equivalent to lines drawn on real graph paper. Thus, everything you draw on the screen can be duplicated on real graph paper and vice versa.

For this tutorial we will use the coordinates (110,90), oriented so that any line created will begin and end at some intersection where a vertical line crosses a horizontal one. We won't use the guide lines in lines 80 and 90, so mask them with a REM. Unless the color C*x* (where *x* is the color used) is changed, it is only necessary when using the DRAW statement to enter the color in the first program line. CoCo will remember to use the same color until you give it new instructions.

Once we put in the starting point, BM110,90, we can make each successive move begin where the previous move ended. You will see how much easier it is to draw in this manner than to draw lines located by using BM*x,y* (where *x* is the horizontal component, and *y* is the vertical component).

Run the program, study it, press BREAK and type LIST100. The elements that created the line on our screen graph paper were NM+1,2. On the real graph paper, put a heavy dot at an intersection. N tells CoCo that after it moves M+1,2 it must return to its original position (back to the dot). M+1 tells CoCo to move one space in a positive direction — from the starting point of the move, to the right. On your graph paper, draw a line from the dot to the first horizontal/vertical intersection on the right. M+1 is followed by ,2. The 2 or +2 tells CoCo to move down two spaces in the positive vertical direction. Now draw a perpendicular line that starts at the end of the last pencil line and ends at the second horizontal/vertical intersection. Put a heavy dot at the end.

CoCo will draw a line between the two dots, M+1,2 or M+1,+2. The N made the cursor return to its starting point.

To see the lines on the screen, type EDIT100 and press ENTER and X to end. Press the left arrow once to remove the closing quotation mark, type RD2 and enter. Type RUN, and press BREAK. To edit Line 100, use the spacebar to move under the R. Press 3D to remove RD2. Press ENTER and run.

Look at Line 101 in the listing (DRAW "NM+1,-2"). On real graph paper, draw a line in a positive direction (R) from the dot at (110,90). In the program, a comma separates the vertical and horizontal directions. The vertical element is -2 (i.e., it moves up two from the end of the horizontal line just drawn). Draw the line (U2) and make a dot. CoCo will use NM+1,-2 to connect the dots and return. Key in Line 101 and run.

There are two components to these new moves. The first (horizontal) is separated by a comma from the second (vertical) component: Mh,v. If this move is prefixed by an N (NMh,v), the cursor will return to its original position after the move is completed. If the command is prefixed by a B (BMh,v), an invisible line will be drawn. In effect, it is a jump move to a new location.

If the movement of the horizontal is negative, it moves to the left of the starting point. If it is a positive value, the movement is to the right. If the movement of the vertical component is negative, the cursor moves up from the starting point; if it is a positive value, it moves down.

The formula is as follows:

M(+ or -)h,(+ or -)v
M = movement
+h = right
-h = left
, = separates elements
+v = down
-v = up

Key in and list Line 102 (DRAW "NM-1,-2"). We have returned to (110,90). On real graph paper, we will move M-

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

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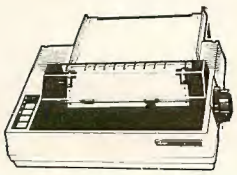

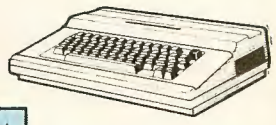

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1, which moves us one unit to the left. Draw in the line and end with a heavy dot. The vertical component is -2, which is two units up. Continue the line you began, moving up two spaces. End with a heavy dot. Connect the two dots. CoCo will draw this line when you run the program.

Next look at Line 103. We move one unit to the left because the first element is -1. Draw the appropriate line. The comma tells us that the next component, 2 or +2, is the vertical element. Draw a line down two units and make a dot. Draw a line between the two dots. CoCo will draw this line and return to its point of origin.

Key in Line 103 and run. You should now have an X on your screen. (To show you the importance of those N prefixes, delete them from lines 100-103. Can you guess what your drawing will look like? Try it! Replace all the N's and let's continue.)

Key in and list Line 110. We keep returning to our original position (110,90) so that our design will emanate from a single point. We are now going to make a two-unit-long X, using the directions, EFGH. Run the program. Now we will make another X that emanates from (110,90) and goes to the following points in succession: (130,100), (130,80), (90,80) and (90,100).

Get out your graph paper. Put a dot at some intersection and label it (110,90). Find the four points listed above, and put a dot at each set of coordinates. Connect them one at a time to the central dot. Use this information to determine the NMh,v locations. Use NM so we can return to (110,90).

When you find the first location, check Line 111. Key in Line 111 and see how you have done. Do the same for the other coordinates and key in lines 112, 113 and 114. We now have a triple X. The temptation is to add the routine, NL2NR2NU2ND2, but we want to be more creative than that.

Key in Line 120. This tells CoCo to draw an invisible line (jump move) two units to the left and one unit up. (CoCo connects the beginning point with the end point.) Then it asks CoCo to make a conventional move, one unit up and, from there, one unit right.

Key in Line 121. BR2 caused the cursor to jump two spaces to the right, and then draw one space to the right of and one space down from the jump. Now work out the other arms of the design, lines 122 and 123. Use your graph paper to visualize what you are creating. After you key in those lines and run the program, you should have a symmetrical design. We are going to add one-unit lines to the four segments. Key in Line 130 and run.

There is always more than one way to do anything. The simplest way to make this design is to pick the central point (110,90) and proceed as we have already done (the old N ploy).

Your last move ended at (90,100). Pick out an intersection and mark a dot. I usually label the 90 to the left of and the 100 above the dot so I know where I am starting. Since each line is 10 units from the next, I know that to get from 90 to 110 on the horizontal, I must move to the right two units, or M+2. To get from 100 to 90 on the vertical, I must go up one unit, or -1. Run the program.

You will notice that you are able to print over an existing line. I chose to make it invisible with a jump move by prefixing my command with B.

Key in Line 131. Use your graph paper to draw this, so you can visualize the program as you read it. We are back at (110,90). Run the program. Next key in and run Line 140. We moved four units in each direction and made a square.

The last instruction of Line 140 is not NU4, which would return us to the center, but U4, which keeps us in a corner. There is method to our madness. Lines 150 through 157 connect the eight spokes of our drawing in a clockwise direction. Work out the movement statements one at a time using the formula we used earlier. If you look at the tips of the U and E spokes, you can count the three lines between them on the horizontal plane. They are to the right of the center, so they are positive (M+3). Add the comma to separate the components. Note that the E spoke is one unit down (+1). Thus, your direction would be M+3,1 or M+3,+1. Continue to calculate the formula for each section until you have completed the octagon. After you complete this, check with the listing to see if your calculations are the same as those in lines 150 through 157.

We will now edit Line 100 and center the design on CoCo's screen at (128,96). Move the cursor under the second 1 and press 2C to tell CoCo that you want to change the next two characters. Press 28 and SHIFT-up arrow. Move the cursor under the 0 of 90, press C to tell CoCo that one letter will change, enter and run the program.

We now have a pie figure, and we will paint alternating pieces of this pie. Unmasking the guide lines (80 and 90) will help when locating the coordinates for the PAINT command. Any pair of coordinates in the green background area within the segment are satisfactory.

Look at the coordinates given in lines 170 through 173 of the listing. They are located somewhere in the background. Convert the PAINT lines to PSET lines if you want to see the point chosen:

```
170 PSET(132,71,4)
171 PSET(155,109,4)
172 PSET(116,125,4)
173 PSET(105,94,4)
```

Run the program.

When you plan to use the PAINT command, find a point within the boundaries to be painted. Then change the PSET line to a PAINT line in this manner: Change PSET(116,125,4) to PAINT(116,125),4,*x*, where *x* is the border color. See how easily you can make the big switch?

Key in lines 170 through 173. You don't have to delete the original lines; use them as a guide and key in the proper data. When you run the program, the guide lines (in Color 4) will block part of your PAINT command. Next, paint the right half of the four "propeller blades" (that is what they look like to me). Use PSET to find points within the boundaries of these blades, and convert the PSET command to a PAINT command. If you would prefer, key in lines 180 through 183 and run. (The program uses Color 1, so there is little difference.)

At this point we want to get rid of the *Graph Paper* program. It is sacrilege to delete it, so we will bypass it. Key in lines 6 and 99 without the REM and run. Now for the masterpiece: Mask lines 6 and 99, key in Line 15 without the REM and run.

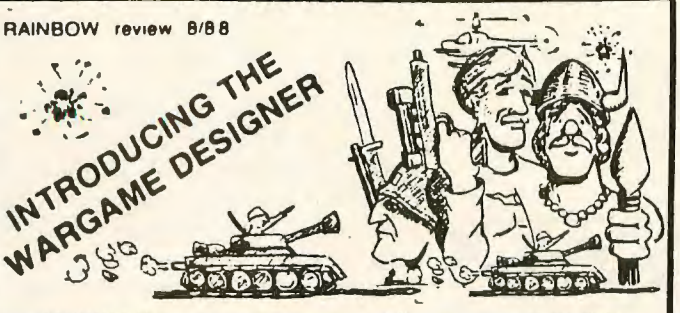
Want another masterpiece? Change the foreground from Color 4 to 3 in lines 170 through 173 and from Color 2 to 1 in lines 180 through 183. Unmask lines 6 and 99 and run. Who wants to practice? Gain more confidence in handling your new skill by changing all the fours in Line 140 to fives. Choose a starting point on one of the spokes and link up the eight spokes in lines 150 to 157. The modified program will be in next month's article.

This tutorial is not just a game; it has practical value. Have your utility program ready for the next lesson, and we will create more beautiful works next month. □

The listing:

```
Ø 'LISTING1
5 CLEAR5ØØ
6 'GOTO99
1Ø PMODE3,1:PCLS:SCREEN1,Ø
15 'GOTO1ØØ
2Ø A$="D1ØR24Ø":B$="D1ØL24Ø"
3Ø C$="R1ØD16Ø":D$="R1ØU16Ø"
4Ø E$=A$+B$+A$+B$:F$=C$+D$+C$+D$
5Ø DRAW"C2BMØ,ØD1ØR24ØD1ØL24ØD1Ø
R24ØD1ØL24Ø"+E$+E$+E$
6Ø DRAW"BMØ,ØR1ØD16ØR1ØU16ØR1ØD1
6ØR1ØU16Ø"+F$+F$+F$+F$+F$
7Ø DRAW"C4BMØ,ØR24ØD16ØL24ØU16Ø"
8Ø DRAW"C4BMØ,4ØR24ØD4ØL24ØD4ØR2
4ØD4ØL24Ø"
9Ø DRAW"BM4Ø,ØD16ØR4ØU16ØR4ØD16Ø
R4ØU16ØR4ØD16Ø"
99 'PMODE4,1:PCLS:SCREEN1,1
1ØØ DRAW"S4ØC3BM128,96NM+1,2"
1Ø1 DRAW"NM+1,-2"
1Ø2 DRAW"NM-1,-2"
1Ø3 DRAW"NM-1,2"
11Ø DRAW"NE2NF2NG2NH2"
111 DRAW"NM+2,1"
112 DRAW"NM+2,-1"
113 DRAW"NM-2,-1"
114 DRAW"NM-2,1"
12Ø DRAW"BM-2,-1UR"
121 DRAW"BR2RD"
122 DRAW"BD2DL"
123 DRAW"BL2LU"
13Ø DRAW"BM+2,-1NH3"
131 DRAW"NE3NF3NG3"
14Ø DRAW"NL4ND4NR4U4"
15Ø DRAW"M+3,1"
151 DRAW"M+1,3"
152 DRAW"M-1,3"
153 DRAW"M-3,1"
154 DRAW"M-3,-1"
155 DRAW"M-1,-3"
156 DRAW"M+1,-3"
157 DRAW"M+3,-1"
17Ø PAINT(132,71),4,3
171 PAINT(155,1Ø9),4,3
172 PAINT(116,125),4,3
173 PAINT(1Ø5,94),4,3
18Ø PAINT(144,85),2,3
181 PAINT(144,114),2,3
182 PAINT(116,1Ø4),2,3
183 PAINT(115,78),2,3
3ØØ GOTO3ØØ
```


RAINBOW review 8/88



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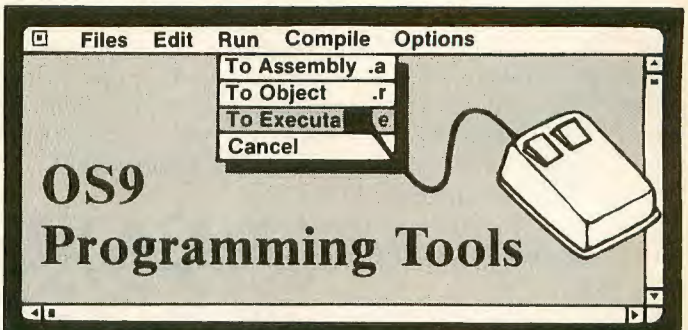

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Create whirlpools and waves in an undulating grid

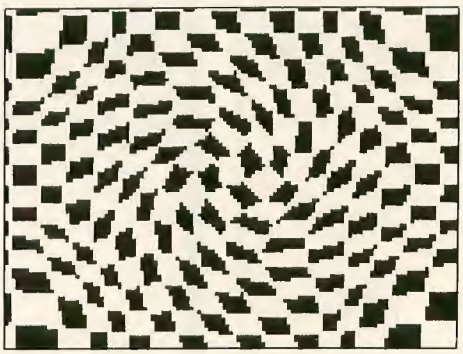
Warped Animation

By Patrick D. Grengs II

Gravitational Grid uses several user-entered parameters to simulate a warped checkerboard. These parameters control both the resolution of the display and the characteristic deformations in the grid. Although a joystick allows faster "gravity-center" entry, its use is not necessary.

As you run the program, you will be asked a number of questions. The first of these concerns screen resolution. If you want your display to be animated, press N at the prompt, "High Resolution (Y/N)." Since the animated display must create four consecutive screens, it will take about four times longer to generate an animated display than a high resolution display. The next prompt, "Enter X Linear Step," pertains to the width, in pixels, of each of the displayed checkers. Similarly, "Enter Y Linear Step" designates the height, in pixels, of each checker square.

The next prompt asks for the gravity type: Linear or Normal. This determines the gravity that the checker board will experience during its creation. Linear gravity produces *sharp* blips in the grid while normal gravity produces *smooth* blips.



"<1> Points <2> Grid <3> Checkers" asks for the type of grid to be created. While the Points option produces a grid composed of points where the vertices should be located, Grid creates the actual grid, with corresponding vertices connected by line segments. Checkers creates a grid with every other region filled in. If you choose the Checker option, you will be asked to enter a filling — paint or linear. If you choose the Paint option, every other block will be filled using CoCo's PAINT command. If you choose the Linear option, a *filling* algorithm will be used to fill alternating blocks. The time requirement for this algorithm is costly, so only use this option on complex grids. (If the PAINT command is used on complex or folded grids, too many blocks may be accidentally painted.

Those of you who want to create an animated display will also be asked for the horizontal and vertical direction of movement on the grid.

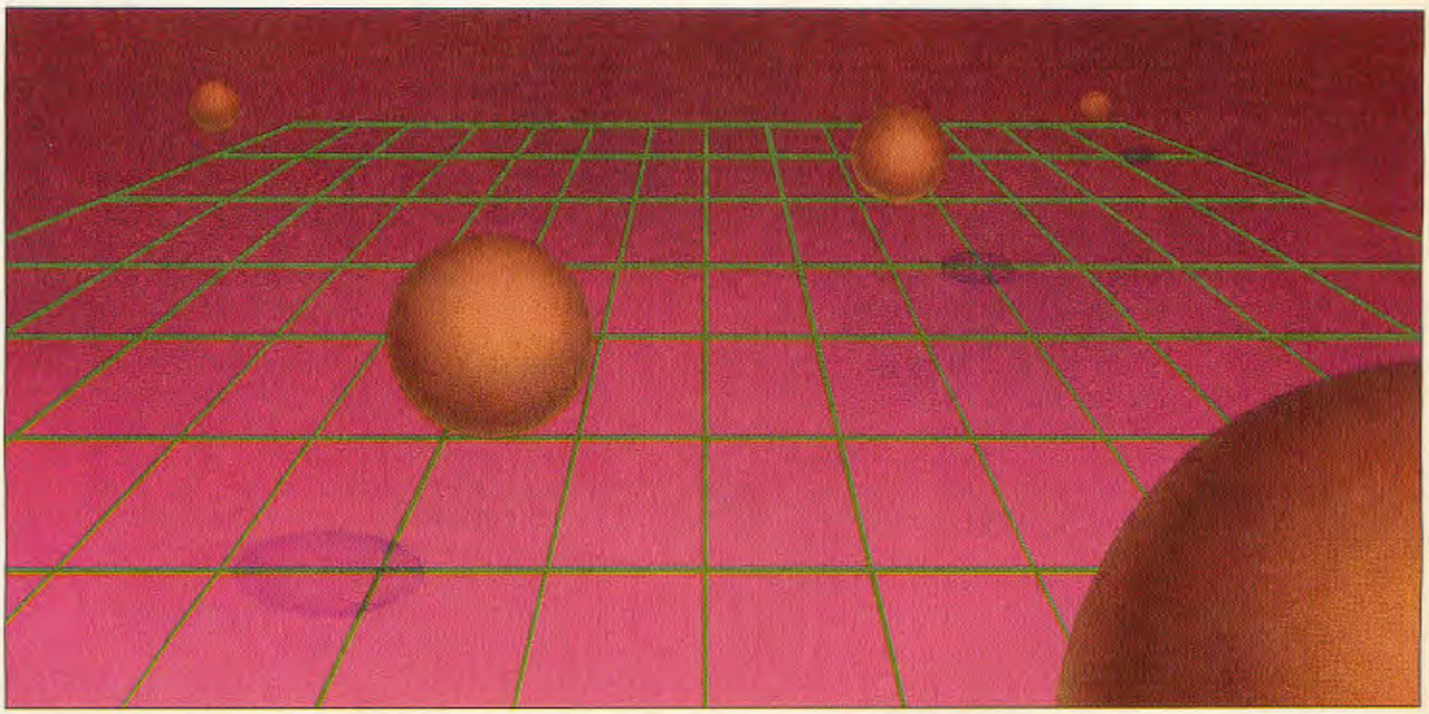
Finally, you must choose the size (magnitude) of the blips and the degree of twist imposed on them.

After the numeric parameters have been entered, each blip's center must be defined. To do this, move the cursor to the point at which you want to place a center of gravity. Press the space bar or joystick button. Now move the dot to the outer region of influence. (The distance between the center and outer region is called the *radius of influence* of the blip.) You now have four choices:

Press U for an upward blip — the top of the grid will appear pushed up at one point.

Press D for a downward blip — the grid will appear pulled down at one point.

Patrick Grengs, a math and computer science major, works part-time at 3M's CAD/CAM center. Patrick enjoys graphics and animation programming on his CoCo.



Press R for a right twist — a *tornado*, moving in a clockwise direction, will appear on the grid.
Press L for a left twist — The *tornado* will move in a counter-clockwise direction on the grid.

A circle, which indicates the radius of influence, will appear after each blip is completed. Press ENTER after all blips have been defined. The screen will be cleared and the grid created.

A number of nested FOR NEXT loops control the grid creation process, but the key to the program is the gravity and twisting algorithms. The gravity algorithms push or pull the grid's vertices toward or away from the various centers of gravity. The distance is determined by a distance function: The further the vertex is from the center of gravity, the less the vertex will be affected. With Linear Gravity, the function is directly proportional to the distance between the vertex and the center of influence. With Normal Gravity, the effect is based on a simple sinusoidal function of distance. Normal Gravity will produce more realistic deformations in the grid.

The twisting algorithms rotate the vertices of the grid in either a clockwise or counter-clockwise manner. The angle of rotation is based on the distance. Linear Twisting gives us an angle directly proportional to the distance. The angle from Normal Twisting is based on a sinusoidal function of distance. As with Normal Gravity, Normal Twisting produces more realistic results.

Here are the parameters for a generic animated grid:

Prompt Question:	**Answer:**
High Resolution (Y/N):	N
Enter X Linear Step:	16
Enter Y Linear Step:	12
Gravity Type:	2 (Normal)
1.Points 2.Grid	
3.Checkers:	3
Filling:	1 (Paint)
Horizontal Direction:	2 (Right)
Vertical Direction:	2 (Down)
Enter Magnitude:	1
Max. Angle Twist:	90

Enter a blip at the screen's center, with a large radius of influence. Use either gravity or twisting as the force on the grid. Press ENTER. Now go and get yourself a cup of coffee, since it will take about a half an hour to create your animated display.

In order to save your high-resolution/animated display, press BREAK to exit from the display, and use these commands for each of the following:

- Enter `CSAVEM"filename",1536,7679,0` to save a high-resolution grid onto tape.
- Enter `SAVEM"filename",3584,9727,0` to save a high-resolution grid onto disk.
- Enter `CSAVEM"filename",1536,13833,0` to save an animated grid onto tape.
- Enter `SAVEM"filename",3584,15881,0` to save an animated grid onto disk.

Use the following procedure to view any files you save:

1. `RUN "GRAVGRID"`.
2. Press BREAK.
3. `LOADM"filename"`.
4. Type `GOTO 190`, and press ENTER
5. Control the keyboard speed using A through Z. Pressing A creates a fast display. The farther you move through the alphabet, the slower your display will become.

I hope that you enjoy *Gravitational Grid* and its demonstration of the CoCo's graphics display power. I welcome any improvements or questions you might have about the program.

(Questions or comments regarding this program may be directed to the author at 375 West Hathorn, River Falls, WI 54022. Please enclose an SASE when requesting a reply.) □

57	2	370	106
69	70	920	205
150	205	END	12
194	48		

The listing: GRAVGRID

```
Ø GOTO 2
1 GOTO 5
2 PCLEAR 8
3 GOTO 1
5 '----------------------------'
  '     GRAVITATIONAL GRID     '
  '          VR: 3.1           '
  '  BY: PATRICK D. GRENGS II  '
  '      DECEMBER , 1985       '
  '  RV: JULY 27, 1986         '
  '----------------------------'
1Ø CLEAR2ØØ:PLAY"L255"
15 E$=STRING$(32,128)
16 PI=ATN(1E+9)
2Ø DIM X(5Ø),Y(5Ø),D(5Ø),V(5Ø),
   G(5Ø),XT(256),YT(192),N(1)
25 GOSUB9ØØ
3Ø IF H$="Y" THEN 45
32 R1=XS/4*XM:IF XM=1 THEN
   S1=-3*R1 ELSE S1=Ø
34 R2=YS/4*YM:IF YM=1 THEN
   S2=-3*R2 ELSE S2=Ø
45 P$="O5V15CAFDB"
5Ø PMODE4,1:PCLS:SCREEN1,1
52 X=128:Y=96:TG=Ø
55 IF JOYSTK(Ø)<9 AND X>7 THEN
   X=X-8
56 IF JOYSTK(Ø)>54 AND X<248THEN
   X=X+8
57 IF JOYSTK(1)<9 AND Y>7 THEN
   Y=Y-8
58 IF JOYSTK(1)>54 AND Y<184THEN
   Y=Y+8
6Ø IF(PEEK(343)AND8)=Ø AND X>1
   THEN X=X-2
61 IF(PEEK(344)AND8)=Ø AND X<254
   THEN X=X+2
62 IF(PEEK(341)AND8)=Ø AND Y>1
   THEN Y=Y-2
63 IF(PEEK(342)AND8)=Ø AND Y<19Ø
   THEN Y=Y+2
65 PUT(X,Y)-(X+1,Y+1),N,NOT:PLAY
   "L255":PUT(X,Y)-(X+1,Y+1),N,
   NOT
67 IFPEEK(345)<>255 AND TG=ØTHEN
   TG=TG+1:A=X:B=Y:PUT(A,B)-(A+1
   ,B+1),N,NOT:PLAYP$:GOTO 55
68 I$=INKEY$:IF(I$="U" OR I$="D"
   ) AND TG=1 THEN C=C+1:X(C)=A:
   Y(C)=B:D(C)=SQR((A-X)^2+(B-Y)
   ^2)*MM:PUT(A,B)-(A+1,B+1),N,
   NOT:CIRCLE(A,B),D(C):PLAYP$:
   G(C)=1:IF I$="U" THEN V(C)=-1
   :GOTO52 ELSE V(C)=1:GOTO52
69 IF(I$="R" OR I$="L") AND TG=1
   THEN C=C+1:X(C)=A:Y(C)=B:D(C)
   =SQR((A-X)^2+(B-Y)^2):PUT(A,B
   )-(A+1,B+1),N,NOT:CIRCLE(A,B)
   ,D(C):PLAYP$:G(C)=2:IF I$="R"
   THEN V(C)=1:GOTO52 ELSE V(C)=
   -1:GOTO52
7Ø IF I$<>"" THEN IF ASC(I$)=13
   THEN GP=C:GOTO1ØØ
71 GOTO55
1ØØ PCLS
11Ø IF H$<>"Y" THEN FOR PM=1 TO
    7 STEP 2:PMODE2,PM:SCREEN1,1
    :PCLS:J=Ø:CC=Ø
115 FOR K=S2-YS*1 TO 192+YS STEP
    YS:J=J+1:X=S1-XS:Y=K:ON G
    GOSUB5ØØ,51Ø:XT(J)=X:YT(J)=Y
    :NEXT
12Ø FOR X1=S1 TO 256+XS STEP XS:
    Z=Ø:CC=CC+1:IFCC=2 THEN CC=Ø
121 C=CC
125 X=X1:Y=S2-YS:ON G GOSUB5ØØ,
    51Ø:XT=X:YT=Y
13Ø FOR Y1=S2 TO 192+YS STEP YS:
    C=C+1:Z=Z+1
135 X=X1:Y=Y1:ON G GOSUB5ØØ,51Ø:
    PSET(X,Y,5):IF CH>1 THEN
    LINE(XT(Z),YT(Z))-(XT,YT),
    PSET:LINE-(X,Y),PSET:LINE-
    (XT(Z+1),YT(Z+1)),PSET:LINE-
```

CoCo Cat By Logan Ward

```
    (XT(Z),YT(Z)),PSET
14Ø IF CH=3  AND  C/2=INT(C/2)
    THEN ON PT GOSUB17Ø,171
142 XT(Z)=XT:YT(Z)=YT:XT=X:YT=Y
145 NEXT Y1:XT(Z+1)=X:YT(Z+1)=Y:
    NEXT X1
15Ø S1=S1+R1:S2=S2+R2
16Ø IF H$<>"Y" THEN NEXT PM:
    GOTO19Ø
165 GOTO999
17Ø PAINT((XT(Z)+XT+X+XT(Z+1))/4
    ,(YT(Z)+YT+Y+YT(Z+1))/4),1,1
    :RETURN
171 D=Ø:D1=X:D2=XT:GOSUB29Ø:
    D2=XT(Z):GOSUB29Ø:D2=XT(Z+1)
    :GOSUB29Ø:D1=XT:GOSUB29Ø:
    D1=XT(Z):GOSUB29Ø:D2=XT:
    GOSUB29Ø
172 D1=Y:D2=YT:GOSUB29Ø:D2=YT(Z)
    :GOSUB29Ø:D2=YT(Z+1):GOSUB
    29Ø:D1=YT:GOSUB29Ø:D1=YT(Z):
    GOSUB29Ø:D2=YT:GOSUB29Ø
175 D=D+.ØØØ1
177 X3=(XT(Z+1)-XT(Z))/D:
    Y3=(YT(Z+1)-YT(Z))/D:
    X4=(X-XT)/D:Y4=(Y-YT)/D
179 A1=XT(Z):B1=YT(Z):A2=XT:
    B2=YT
18Ø FOR I=Ø TO D:LINE(A1,B1)-
    (A2,B2),PSET:A1=A1+X3:B1=B1+
    Y3:A2=A2+X4:B2=B2+Y4:NEXT:
    RETURN
19Ø 'DISPLAY FRAMES
192 X$=INKEY$:T=1Ø
194 FOR P=1 TO 7 STEP 2:PMODE2,P
    :SCREEN1,1:I$=INKEY$:IF I$<>
    ""THEN T=ASC(I$)*4-256
196 FORI=1 TO T:NEXTI,P:GOTO194
199 FOR P=1 TO 7 STEP 2:PMODE2,P
    :SCREEN1,1:NEXT:GOTO199
2ØØ 'LINEAR GRAVITY
22Ø IF D<D(I) THEN DF=(D(I)-D)/
    D(I):A=A+V(I)*(X(I)-X)*DF:
    B=B+V(I)*(Y(I)-Y)*DF
23Ø RETURN
25Ø 'NORMAL GRAVITY
27Ø IF D<D(I) THEN DF=(D(I)-D)/
    D(I):DX=(X(I)-X):A=A+V(I)*
    (DX-DX*SIN(PI*D/D(I))):DY=(Y
    (I)-Y):B=B+V(I)*(DY-DY*SIN
    (PI*D/D(I)))
28Ø RETURN
29Ø 'RETURN MAX
295 E=ABS(D1-D2):IF E>D THEN D=E
296 RETURN
3ØØ 'LINEAR TWIST
34Ø IF D<D(I) THEN AG=AN*V(I)*
    (D(I)-D)/D(I):X4=X-X(I):Y4=
    Y-Y(I):X=X4*COS(AG)-Y4*SIN
    (AG)+X(I):Y=X4*SIN(AG)+Y4*
    COS(AG)+Y(I):A=A+X5-X:
    B=B+Y5-Y
35Ø RETURN
37Ø 'NORMAL TWIST
41Ø IF D<D(I) THEN AG=AN*V(I)*
    (1-COS(PI*(D(I)-D)/D(I))):
    X4=X-X(I):Y4=Y-Y(I):X=X4*
    COS(AG)-Y4*SIN(AG)+X(I):Y=
    X4*SIN(AG)+Y4*COS(AG)+Y(I)
42Ø RETURN
5ØØ A=Ø:B=Ø:FOR I=1 TO GP:D=SQR(
    (X-X(I))*(X-X(I))+(Y-Y(I))*
    (Y-Y(I))):ON G(I) GOSUB 2ØØ,
    3ØØ:GOTO52Ø
51Ø A=Ø:B=Ø:FOR I=1 TO GP:D=SQR(
    (X-X(I))*(X-X(I))+(Y-Y(I))*
    (Y-Y(I))):ON G(I) GOSUB 25Ø,
    37Ø
52Ø NEXT I:X=X+A:Y=Y+B:IF X<Ø
    THEN X=Ø ELSE IF X>255 THEN
    X=255
525 IFY<Ø THEN Y=Ø ELSE IF Y>191
    THEN Y=191
53Ø RETURN
9ØØ CLSØ
91Ø PRINT@4,"-=< GRAVITY INFLUXO
R >=-";
915 PRINT@96,"HIGH RESOLUTION (Y
/N)";:INPUT H$
92Ø PRINT@128,"ENTER X LINEAR ST
EP:";:INPUT XS:IF XS<1 OR XS>64
    THEN PRINT@128,E$;:GOTO92Ø
93Ø PRINT@16Ø,"ENTER Y LINEAR ST
EP:";:INPUT YS:IF YS<1 OR YS>64
    THEN PRINT@16Ø,E$;:GOTO93Ø
95Ø PRINT@192,"GRAVITY TYPE: 1>L
INEAR  2>NORMAL";:INPUT G:IF G<1
    OR G>2 THEN PRINT@192,E$;E$;
    :GOTO95Ø
955 PRINT@224,"<1> POINTS <2> GR
ID <3> CHECKERS";:INPUT CH
957 IF CH=3   THEN PRINT@256,
    "FILLING: 1>PAINT 2>LINEAR";
    :INPUT PT:IF PT<1 OR PT>2
    THEN PRINT@256,E$:GOTO957
959 IF H$="Y" THEN 97Ø
96Ø PRINT@288,"HORZ. DIR. 1-LEFT
 2-RIGHT";:INPUT XM:IF XM<1 OR
    XM>2 THEN PRINT@288,E$:GOTO
    96Ø
962 XM=XM*2-3
965 PRINT@32Ø,"VERT. DIR. 1-UP 2
-DOWN";:INPUT YM:IF YM<1 OR YM>2
    THEN PRINT@32Ø,E$;:GOTO965
967 YM=YM*2-3
97Ø PRINT@352,"ENTER MAGNITUDE:"
    ;:INPUT MM:IF MM=Ø THEN MM=1
98Ø PRINT@384,"ENTER MAX. ANG. T
WIST:";:INPUT AN
985 AN=AN/9Ø*PI
99Ø RETURN
999 SCREEN1,1:GOTO999
```

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores 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.

★ Current Record Holder ● Shutout

ADVANCED STAR*TRENCH (THE RAINBOW, 7/86)
4,750 ★Stephane Martel, Laval, Quebec
4,475 David Schaller, Clarkston, WA
4,500 Frankie DiGiovanni, Olney, MD
4,300 Jeffrey Warren, Waynesville, NC
3,960 Maurice MacGarvey, Dawson Creek, British Columbia

ASTRO BLAST *(Mark Data)*
48,825 ★Tony Bacon, Mt. Vernon, IN

BEE ZAPPER (THE RAINBOW, 9/87)
15,785 ★David Hartmann, Osoyoos, British Columbia
12,825 Frederick Lajoie, Middleton, Nova Scotia
12,350 Tom Carpenter, Palenville, NY
12,175 Sara Mittelstaedt, Kiel, WI
11,675 Daniel Hartmann, Osoyoos, British Columbia

BLITZ (THE RAINBOW, 6/88)
32,440 ★Joel Klein, Indianapolis, IN

BOUNCING BOULDERS *(Diecom Products)*
10,930 ★Patrick Garneau, Ste-Croix, Quebec

BREWMASTER *(NOVASOFT)*
46,175 ★Wendy Staub, Moundsville, WV

CANYON CLIMBER *(Radio Shack)*
1,725,100 ★John Guptill, Columbia, MO
1,627,500 Matthew Fumich, Munford, TN
293,200 Alan Kramer, Cooksville, MD
213,400 Sara Mittelstaedt, Kiel, WI
202,000 David Brown, New Waterford, Nova Scotia

CASHMAN *(MichTron)*
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COLOR BASEBALL *(Radio Shack)*
238-0 ★●John Valentine, Marlborough, CT
137-0 ●Jennifer Johnson, Meriden, CT
130-0 ●Matthew Snider, Pinehurst, TX
125-0 ●Andrew Smith, Cincinnati, OH
119-0 ●Adam Silverstein, Chicago, IL
111-2 David Czarnecki, Northhampton, MA
96-0 ●Chad Blick, Irwin, PA
74-0 ●Mike Korte, Vienna, VA
43-0 ●Jason Kopp, Downs, IL
28-0 ●Kelly Jones, West Salem, OH

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188 Frederick Lajoie, Middleton, Nova Scotia

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43,806 ★Domingo Martinez, Miami, FL
35,331 David Schaller, Clarkston, WA
31,673 Douglas Bacon, Middletown, CT
30,753 Pasha Irshad, Silver Spring, MD
30,326 Frederick Lajoie, Middleton, Nova Scotia

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100,500 ★Richard Winkelbauer, Bronx, NY

DEMON ATTACK *(Imagic)*
279,435 ★Jon Hobson, Plainfield, WI
202,260 Tom Briggs, Hillsdale, NY
89,285 Upton Thomas, Arnold, MD

DEMON ATTACK (continued)
72,410 Glenn Hodgson, Aberdeenshire, Scotland
67,760 Jim Davis, Sandwich, IL

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234,300 ★Steven Turcotte, Matane, Quebec

DESERT RIDER *(Radio Shack)*
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65,351 Jason Hackley, Clinton, CT
64,789 Roby Janssen, Clear Lake, IA
63,014 Rebecca Henderson, Ballston Spa, NY
62,702 William Currie, Bryans Road, MD

DEVIL ASSAULT *(Tom Mix)*
1,866,100 ★Stephane Martel, Laval, Quebec
623,550 Dale Krueger, Maple Ridge, British Columbia
75,000 Blake Cadmus, Reading, PA
40,800 Benoit Landry, Drummondville, Quebec

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53,100 ★Jim Davis, Sandwich, IL
52,600 Eric Olson, Wheaton, IL

DOWNLAND *(Radio Shack)*
99,980 ★Danny Wimett, Rome, NY
98,985 Karl Gulliford, Summerville, SC
97,740 Stephane Deshaies, Beloeil, Quebec
89,490 Neil Edge, Williston, FL
77,254 Tom Audas, Fremont, CA
73,346 Jean-Francois Morin, Loretteville, Quebec
70,142 Chris Goodman, Baltimore, MD
68,142 Cooper Valentin, Vavenby, British Columbia
67,721 Keith Yampanis, Jaffrey, NH
62,442 Eddie Lawrence, Pasadena, Newfoundland
55,300 Patrico Gonzalez, Buenos Aires, Argentina
50,362 Jennifer Johnson, Meriden, CT
49,500 Danny Perkins, Clifton Forge, VA
49,441 Kevin Pater, Port Alberni, British Columbia
49,254 David Brown, New Waterford, Nova Scotia
44,281 Kelly Jones, West Salem, OH
43,502 Mike Ells, Charlotte, MI
43,369 Jason Kloostra, Jenison, MI
41,896 Antonio Hidalgo, San Jose, Costa Rica
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35,611 Adam Broughton, Morris, PA
35,169 Daniel Norris, New Albany, IN
23,649 Jim Herr, Newton, WI
23,257 Courtney Shaffer, La Grangeville, NY

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199 Milan Parekh, Anaheim, CA

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5,680 Kathy Rumpel, Arcadia, WI
3,760 Rick Beevers, Bloomfield, MN
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22,250 Dave Staub, Moundsville, WV
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357,890 Jason Clough, Houston, TX
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249,960 Matthew Fumich, Munford, TN
169,410 Danny Dunne, Pittsfield, NH

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23,643,720 Geran Stalker, Rivordalo, GA
20,921,490 Randall Edwards, Dunlap, KS
10,222,940 Clinton Morell, Sacramento, CA
7,493,340 Stirling Dell, Dundalk, Ontario
515,980 Matthew Heid, Fifelake, MI

GANTELET II *(Diecom Products)*
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GHANA BWANA *(Radio Shack)*
2,350,750 ★Michael Heitz, Chicago, IL
702,520 Joseph Delaney, Augusta, GA
282,070 Kelly Jones, West Salem, OH
105,820 David Reash, Hadley, PA

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400/422 Jeff Holtham, Waterloo, Ontario
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2,676,300 Janet Boyd, Amarillo, TX
1,141,650 Craig Pennell, Amarillo, TX
1,013,100 William Weller, Kailua, HI
595,700 Daniel Wibier, Santa Rosa, CA

JOKER POKER (THE RAINBOW, 3/87)
62,067,906 ★Carole Rueckert, Mansfield, OH
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8,179,710 Brenda Kim, Athens, OH
3,796,898 Curtis Trammel, Murphysboro, IL
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257,600 Keith Cohen, Rocky Mount, NC

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184,120 John Farrar, Lebanon, TN
174,810 Donald Cathcart, Halifax, Nova Scotia
133,990 Paul Blessing, Spring, TX

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9,016 Heather Richwalski, Medford, WI
8,756 Gail Bacon, Middletown, CT
8,199 Eric Mellon, Newark, DE
6,404 David Hartmann, Osoyoos, British Columbia

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1,414 Sara Mittelstaedt, Kiel, WI
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355,570 Stirling Dell, Dundalk, Ontario
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144,510 Donald Cathcart, Halifax, Nova Scotia
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1,276-0 •Jonathan Dorris, Indianapolis, IN
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1,242-0 •William Currie, Bryans Road, MD
1,210-0 •Gregg Thompson, Chesterfield, VA

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38,640 ★Dave Staub, Moundsville, WV

PAC PANIC *(Cougar)*
34,950 ★Heather Hamblen, Bar Harbor, ME

PEGASUS AND THE PHANTON RIDERS *(Radio Shack)*
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303,100 Mike Grant, Fresno, CA
261,000 Domingo Martinez, Miami, FL
225,300 Richard Adams, Jr., Alvarado, TX
114,100 Kreig Bryson, Woodstock, GA
85,000 Ronald Reynolds, Ottawa, IL

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159,400 David Cornette, Green Bay, WI
104,479 David Stewart, Kent, OH

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54 ★Rusty Breitbach, Rickardsville, IA
54 ★Jeff Coburn, Easton, PA
54 ★Walter Hearne, Pensacola, FL
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54 ★Thomas Payton, Anderson, SC
54 ★Jeff Szczerba, Sturtevant, WI
54 ★Brad Wilson, Lithia Springs, GA
51 Christian Grenier, Valleyfield, Quebec
49 Randy Venable, Coal City, WV

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236,650 Jeff Mrochuk, Edmonton, Alberta

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105,560 ★Heather Condit, Grafton, ND
26,889 Claude Jalbert, Matane, Quebec
20,800 Kristopher Santos, Laurel, MD

PYRAMID *(Radio Shack)*
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PYRAMID 2000 *(Radio Shack)*
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220 ★Mike Snyder, Allen, OK
125 Chris VanOosbree, Emmetsburg, IA
100 Peter Antonacopoulos, Toa Baja, Puerto Rico

QUIX *(Tom Mix)*
8,407,772 ★John Haldane, Tempe, AZ
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1,201,383 Milan Parekh, Anaheim, CA
1,003,104 Elisa Goodson, Sao Paulo, Brazil
326,192 Martin Parada, Arcadia, CA

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1,062,190 Eric Mellon, Newark, DE
800,150 Mike Snyder, Allen, OK
760,380 Jake Runge, Franklin, OH
581,730 David Morrison, Brewer, ME

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Ensign-Class 4 ★Richard Kelton, Newport News, VA

RESCUE ON FRACTALUS *(Epyx)*
1,000,948 ★Steven Ujvary, Calgary, Alberta
323,167 Kenneth Hill, Severna Park, MD
292,633 David Richards, Huntington, WV
288,084 Donald Cathcart, Halifax, Nova Scotia
270,000 Russell Johnson, Sarnia, Ontario

RETURN OF THE JET-I *(ThunderVision)*
336,563 ★Jesse Collicott, Inman, KS

RETURN OF JUNIOR'S REVENGE *(Colorware)*
1,792,800 ★Chad Presley, Luseland, Saskatchewan

ROGUE *(Epyx)*
71,833 ★Jon Fogarty, Yale, MI
63,934 Marshall Weisenburger, Quincy, IL
43,222 Hans Lutenegger, Madison, IA
27,542 Melanie Lapoint, Fitchburg, MA
21,682 Paul Blessing, Spring, TX

SAILOR MAN *(Tom Mix)*
231,700 ★Luis Camino, Lima, Peru

SANDS OF EGYPT *(Radio Shack)*
67 ★Tristan Terkuc, Richmond, Ontario
82 Edward Rocha, Cobleskill, NY
85 Paul Summers, Orange Park, FL
86 Roy Grant, Toledo, OH
87 Neil Haupt, Elyria, OH

SAUCER DEFENSE *(THE RAINBOW, 4/87)*
40,000 ★David Hartmann, Osoyoos, British Columbia
4,000 Frankie DiGiovanni, Olney, MD

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25,450 ★John Garness, Newell, SD

SHOOTING GALLERY *(Radio Shack)*
27,270 ★Jocelyn Hellyer, Montgomery, IL
25,510 Donald Knudson, Minot, ND
20,480 Kevin Pereira, Corsicana, TX

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55,623 ★Paul Robbins, Picayune, MS
14,702 Richard Winkelbauer, Bronx, NY
13,794 Phillip Holsten, Modesto, CA
6,082 David Morrison, Brewer, ME
5,433 Benoit Landry, Drummondville, Quebec

SLAY THE NERIUS *(Radio Shack)*
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6,200 John Weaver, Amsterdam, NY

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103,140 ★Richard Winkelbauer, Bronx, NY
88,090 Jason Landreth, Texico, IL
60,430 Jennifer Johnson, Meriden, CT
44,540 Kevin Pereira, Corsicana, TX
37,970 Frederick Lajoie, Middleton, Nova Scotia

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3,460 David Morrison, Brewer, ME
2,040 Wendy Straub, Moundsville, WV
1,840 Dave Staub, Moundsville, WV

SPRINGSTER *(Radio Shack)*
303,520 ★Mavis Hartmann, Osoyoos, British Columbia
200,670 Denise Root, Thorndale, PA

STAR BLAZE *(Radio Shack)*
6,550 ★Flint Weller, Swarthmore, PA

STRATA (THE RAINBOW, 5/88)
2,768 ★H. Dingwell, Litchfield, CT

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507,700 Adam Broughton, Morris, PA
303,600 Tim Hennon, Highland, IN
138,400 Gary Budzak, Westerville, OH
125,200 Michelle Murray, Salem, IN

THEXDER *(Sierra On-Line)*
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1,314,100 Frankie DiGiovanni, Olney, MD
312,300 Timothy DeJong, Rock Valley, IA
274,300 H. Dingwell, Litchfield, CT
195,000 Emmett Keyser, Napa, CA

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VARLOC *(Radio Shack)*
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2,032 ★Edward Rocha, Cobleskill, NY
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2,008 Philip Puffinburger, Winchester, VA
1,995 Denise Rowan, Minneapolis, MN

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15,063 John Conley, Everett, WA
14,613 Carolyn de Lambert, Everett, WA
11,902 Martha James, Swarthmore, PA
10,489 Karl Gulliford, Summerville, SC

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10,577,051 ★Doug Lute, Clymer, PA

WILDWEST *(Tom Mix)*
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WISHBRINGER *(Infocom)*
400/201 ★Brad Wilson, Lithia Springs, GA

WIZARD'S DEN *(Tom Mix)*
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195,050 Mark Touchette, Preston, CT

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2,061,000 ★Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA
1,630,150 Jon Fogarty, Yale, MI
1,300,500 Dan Brown, Pittsford, NY
1,100,600 Andrew Urquhart, Metairie, LA
376,600 Matthew Yarrows, Easthampton, MA
126,300 Roberto Hidalgo, San Jose, Costa Rica

ZEUS *(Aardvark)*
4,500 ★Benoit St-Jean, Galineau, Quebec
3,380 Martin Kertz, Forrest City, AR

ZORK I *(Infocom)*
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350/587 Matthew Yarrows, Easthampton, MA

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— Angela Kapfhammer

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, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• George Lane: In order for you to complete your quest in *Sands of Egypt*, you must drop the scepter. When the computer says where, type ON MUMMY. After you do that, type GO CRACK, get the ladder and type GO CRACK again. In *Dallas Quest*, type PULL CURTAIN.

In *White Fire of Eternity*, I have the ring and I need the pick, but I do not know how to get it.

Michael Duvall
Zanesville, OH

• Troy Ferguson: In order to kill the gargoyle in *Raaka-Tu*, you first have to get the burning lamp and the candle. After you get these two items, go back into the room and go north until the gargoyle comes at you. Type LIGHT CANDLE WITH LAMP and immediately leave the room after you drop it.

When you get to the vault and decide to go inside, whatever you do, don't pull the handle.

How do you get past the bronze gates?

Tracy Nahas
New London, CT

• Dan Breault: In *Gates of Delirium*, the people are located in towns, except two; they are located in a dungeon and a castle. The dungeons are the guardians of all but one of 10 gate keys. These gate keys will be needed to win the game. The shrines are in the second world 18 levels below Twin City I. Use the Moon Gates to get to Twin City I. Enter the dungeon inside the town, but make sure you have all your party with 2,400 hitpoints or the depths of the dungeons will kill you.

Duane Whitlock
North East, MD

• Mike Duvall: To get the palm fronds in *Sands of Egypt*, you must go to the pool. From the cliff, go down, west, south and east. Type GO TREE and you'll be at the palm tree. Drop all the items and type CLIMB TREE. At the top of the tree, type GET DATES. Climb down and get your items. Go south and then east. At the pool, type FEED CAMEL and he will kneel so you can mount him. Ride the camel and dismount him. You will be at the pyramid. Climb it and get the axe. Go back to the pool by riding the camel. Go to the tree and climb it with the axe. At the top, type CHOP FRONDS. Get the fronds and go down. Type BRAID FRONDS and you will have a sturdy rope.

Shawn Maloney
Ozone Park, NY

• Jim Barkel: In *Downland*, to get off the rope, go to the right end and push the joystick over to the right while pushing the button. As soon as you are on the slatted part, push the handle to the middle, then push to the right and you'll be on the rope.

In Chamber 6, what is the rope used for when you first walk in?

David Breyer
Cincinnati, OH

Scoreboard:

In *Bedlam*, after getting stuck with the hypodermic needle and returning to your cell, to stop running into the walls type PLUGH and you will return to your normal self again.

To get Houdini down, type UNTIE HOUDINI. How do you get the straitjacket off him?

How do you wake up the "real doctor" lying unconscious in the corner?

Jerry Hagerty
North Syracuse, NY

Scoreboard:

How do you get Roger the Rogue Elephant to cooperate in *Dallas Quest*? How do you get past the cannibals in order to enter the cave?

Eric Costello
Pine Bluff, AR

Scoreboard:

In *Dallas Quest*, if you want to get the flashlight, you have to pull the curtain in the trading post.

In *Dragon Blade*, how do you get past the stone door after the whirling pool?

Eric Vermette
La Tuque, Quebec

Scoreboard:

I have successfully landed the Heart of Gold on Magrathea in *Hitchhiker's Guide to the Galaxy*, but I cannot unjam the hatch or enter the screening door.

John Knight
Kalamazoo, MI

Scoreboard:

In the *Interbank Incident*, how can I get into the Air Force base in Germany?

In *Enchanter*, how do I find water?

In *Sands of Egypt*, where can I find the scepter?

Kristy Craig
Little Rock AFB, AR

Scoreboard:

In the *Interbank Incident*, I found the code book, computer, disk, cartridge and the IBC special card, but I am not able to find the secret hideout. Please help.

In *To Preserve Quandic*, how do I pass the helicopter on the roof?

Georges Fortin
Baie-St. Paul, Quebec

Scoreboard:

In the *Interbank Incident*, I can't seem to find the crooks.

In *Dallas Quest*, after you enter the barn with the owl, you must kill the rat by typing DROP OWL.

In *Sands of Egypt*, the magnifier is used to light the torch from the sun's rays.

Katie Miller
Chino, CA

Scoreboard:

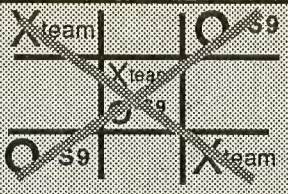
In *Madness and the Minotaur*, in order to get the third spell, I must tie the Hydra up so I can enter the room with the parchment, but after I get the spell, I am told that I need the rope for the next spell. Is there a way to untie the Hydra or to kill it so I can get the rope back?

Duane Whitlock
Northeast, MD

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 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 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.

XTEAM & OS-9



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Software CoCo 1, 2 & 3

Night of the Living Dead — An Interactive Nightmare

Apparently you were wrong about that road you thought was a shortcut a couple of hours ago.

You've managed to get yourself totally lost, and it's looking less and less likely that you're going to make it back to school in time for your first day of classes tomorrow.

The only person you've seen for miles is the hitchhiker you picked up over an hour ago. She says her name is Sheena.

Night of the Living Dead begins innocuously enough, but just wait a few minutes. You see, the dead are waking up — they're *very* hungry. And your car is out of gas.

Night of the Living Dead from Adventure Novel Software is a two-disk text Adventure for 64K ECB disk-based CoCos. Unlike the movie of the same name (zombies are the only thing in common), it begins with your character stranded in the middle of nowhere. Without gas, your 1970 Mercury Montego "might as well be a rabbit." You're stuck with a strange woman who wears a Frank Zappa T-shirt and is by turns threatening and polite.

To the east is a cemetery and a church. To the west is an impenetrable thicket. To the north and south the gravel road stretches endlessly and will take you nowhere. But things don't seem hopeless, at least not until a heavily made-up man (like a corpse?) with a gaping hole in his neck shambles toward you. What to do? *I* tried running, but there's nowhere to run.

Adventure Novel Software says that the only goal in *Night of the Living Dead* is to stay alive, which is not an easy feat. I'm embarrassed to tell how far I got — and I even had help.

Unlike most games, there is more reward in solving this Adventure than just the satisfaction in knowing you've done it: A cash prize of $500 is offered to the first person who "survives." To win, an Adventurer must be a registered owner and send in a transcript or written solution by registered mail. The correct entry with the earliest postmark wins. If by December 31, 1988, there is no winner, one will be chosen at random from the owner registration cards mailed back.

Needless to say, I do not have a ghost of a chance of claiming the loot. I died more times than I can remember, and in the most horrible ways. The further along I got, the more spectacular my deaths.

"If you are faint of heart or squeamish of stomach, I recommend you not try this game. Literally, heads will roll."

In my very first death my head struck a sharp object; fortunately, I died immediately. For my second death, I was treated to a screwdriver through the skull (watch out for that man with the gaping hole in his neck). In my third death, my jugular was ripped open and the last thing my dying eyes saw was a zombie having my arm for lunch. For the benefit of those of you swallowing to hold back your last meal, I shall refrain from regaling you with more vivid accounts of my demises.

Night of the Living Dead provides some pretty grotesque descriptions. If you are faint of heart or squeamish of stomach, I recommend you *not* try this game. Literally, heads will roll. And there are colorful descriptions of oozing flesh and sucking sounds (sorry, I had to throw that in) — yet Adventure Novel Software's Bob Schuette says that the gory descriptions have even been toned down in the latest version!

When you see the disk jackets (or if you've seen the Adventure Novel Software ad), you may wonder where "Savage Software" fits into the scheme of things. "Savage Software" is Curtis Fennell, the "editorial" half of *Night of the Living Dead* — Adventure Novel and Schuette are the programming half.

Descriptions of the character's current location are provided at the top of the screen above a black bar. A "clock" in the upper-right corner keeps track of the time and moves. As this is a text Adventure, there are no graphics (Schuette and Fennell say graphics wouldn't do the story justice — your imagination serves better). Text is shown on the 32-character screen. The game is disk-intensive — so leave the Data disk in the drive.

Game play is typical for Adventures of the verb-noun command variety. But commands of many more than two words may be given. There is a help function that shows how to use a variety of commands. You can talk to the characters, question them or ask them to perform a specific task, e.g.: `SHEENA, TELL ME ABOUT FRANK ZAPPA.`

The usual command abbreviations are supported (`N`, `S`, `E`, `W`, `U` and `D`). The "examine" command can be shortened to `X`, the "inventory" command to `I`. Also, there is no inventory limit. The `SCRIPT` command sends all text to the printer.

I am not very experienced with Adventures and so was frustrated when sometimes my "interpreter" would not recognize a reference to something it informed me of just a few moves earlier, or when it wouldn't understand something I thought was totally obvious. A quick rereading of the help screen yielded this advice: "If the game does not understand a verb, try a synonym

Putting the Savage in Savage Software (And the Novel in Adventure Novel)

There are a lot of people who would just as soon read a good book as go to a movie. Some writers can evoke images more vivid than any movie screen can. From his narrative in *Night of the Living Dead*, Curtis Fennell, known to the CoCo market as Savage Software, has shown he is one such writer.

Curtis and Bob Schuette, the writing and programming team behind *Night of the Living Dead*, have been friends since college. It was during those years that Curtis first found out about a new form of computer entertainment — Adventure games. Back then, the games were in their infancy. Even the better ones limited players to two-word commands, and the puzzles did not always make a lot of sense.

When Bob recently contacted Curtis about writing an Adventure for the CoCo, he had no idea that Curtis was already working on one. The game design systems Curtis tried were limiting, and he was invariably disappointed in how the final product worked.

So they decided to join forces. Using Bob's Adventure Novel design system, Curtis brought *Night of the Living Dead* to life. It was a challenge for Curtis to develop the story line without going overboard in grotesque descriptions. Much of the debugging process, in fact, involved rewriting text some players found unappealing. Graphics were removed from the game because they simply could not do it justice. "Without question, the scariest visions exist in the player's own mind," Curtis says.

Schuette believes his exclusive game design system will provide a fresh, new outlook for Adventures. "We're in the business of entertainment. Our goal is to supply the computer industry with unique games that, while challenging, can be solved by most players," he explains.

"Don't get me wrong. These games will never be pushovers. The players will definitely get their money's worth from us. But I also don't want them to get so completely stumped and frustrated that they never get the full enjoyment from finishing the game on their own." A self-taught programmer and chemical engineer, Bob's experience ranges from writing game software to programming industrial process controllers. But he has found some innovative uses for the CoCo: "As an avid fan of windsurfing, I'm constantly interested in what the wind is doing — how fast it is blowing, and whether it is picking up or falling off. By rewiring an old DC motor and putting a set of annometer cups on it, I can constantly monitor the wind speed through my CoCo joystick port. It's kept me from making quite a few useless trips to the lake."

Bob still uses one of the original 64K CoCo 1s and says he has never experienced a failure, even after he has left it on for weeks at a time. This love of his CoCo 1 helped Bob decide to keep his games compatible with all three CoCos.

"I've had some opportunities to work with the new CoCo 3, and I think it is a fine machine," he says, "but I'm sure there are many people out there who want to stay with the older models. It would be a shame if all the new software developed was designed specifically for the CoCo 3. At least for now, you can be sure that one company will still be producing software for all three CoCos." □

Zombies 10, People Zip

No, you fool! Stay away from that door — don't go in there! Oh, well, another one bites the dust.

How many times have you watched a hack-and-slash movie and actually cheered for the monster because the characters are so *stupid* they deserve to die?

I mean, if you're staying in a hotel (or a summer camp) where a body count is taken daily, would *you* traipse off la-ti-da by yourself to the remotest, spookiest place around and then appear *surprised* when the ax falls? Would you even stick around after the first body is found? Not me — I'd get the *@#$%*! outta there! You think that you would, too? We think we're so smart. In their shoes, we wouldn't be so stupid, and we'd live a lot longer.

We can be smug in our superiority most of our lives. It is doubtful we'll be menaced by Jason, Freddy or Zombie (thank God!). But *what if*? What if by some means we could pass through the other side of the camera lens and put our wits on the line against the ghoulies.

Night of the Living Dead and Adventures like it let us do this. I tried the game, and I wasn't very successful at surviving. I now have new respect (or sympathy, at least) for those stupid people who blunder boldly into the attic, the cellar and the cemetery. You see — they had no choice. The script wouldn't let them back out and run.

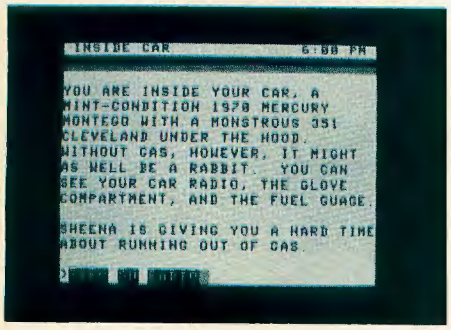
In playing *Night of the Living Dead*, as I knew the goal was to "survive," I thought I would just run up the gravel road until I was safe (zombies are rather sluggish, you know). Well, the game wouldn't let me. It forced me into a situation and made me follow its "script." Of course, how I acted within the confines of the situation was up to me — so I promptly got knocked off.

I knew the zombie was steadily creeping up on me, but what was I doing? Checking out the scenery, examining my inventory for a possible weapon, twiddling my thumbs. If I were a character in a horror movie, the audience would probably be cheering my imminent demise. I feel two sayings are applicable here (I'm fond of sayings): "Don't knock something 'til you've tried it," and "Don't criticize unless you've been in someone else's shoes."

And now for the moral of this lunacy: "Don't make fun of horror movie victims just because they walk into obvious traps — *unless* you've survived *Night of the Living Dead*."

Have a happy Halloween, and watch out for zombies. □

for it." (Hint: SEARCH is sometimes more revealing than EXAMINE.)



The SAVE command allows you to stop and save your progress at any game prompt — this is very handy, as it "saves" you from having to start back from the beginning of the game every time you die (which, if you are like me, you will do frequently). When you type SAVE, a mini-menu pops up that prompts you for the drive of your "save" disk, then for the game number — you can save five.

After you die, you are asked if you want to restore a previously saved game. If you do, a similar menu prompts you for the drive and the game number. If you indicate you *don't* want to restore a game, you must do a cold start to get back to Disk BASIC.

I tried *Night of the Living Dead* on a CoCo 1, 2 and 3, and it worked fine on all. The only thing it wouldn't work on was an old, gray-case E-board CoCo 1, and that was because of the high-speed poke, I suspect. But most CoCoists will be able to play the game.

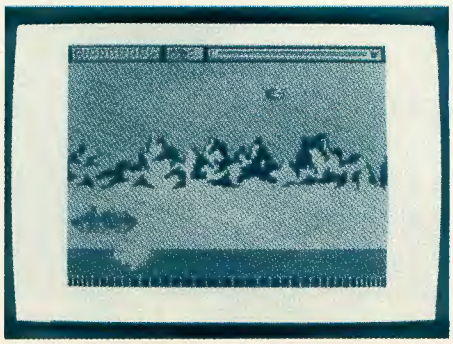
I found *Night of the Living Dead* fun to play, and I especially appreciated the exciting and smooth narrative flow — this Adventure reads better than most. I expect that those who are fans of zombie movies will like the game, and connoisseurs of "ordinary" Adventures will get a kick out of it, too.

(Adventure Novel Software, P.O. Box 8176, Spartanburg, SC 29305, 803-578-7421; $34.95 introductory offer: First product review from this company appearing in THE RAINBOW)

— Lauren Willoughby

Moon-Runner — Souped-Up Lunar Buggy

In *Moon Runner* you command an amphibious patroller armed with laser and overhead missiles. Your mission is to battle enemy forces across the lengths of eight moons and then destroy the Trigan base.



Opposing you is an array of strong enemy forces, including attacking spacecraft, tanks, mines and surface rockets. Even the moon's surface is against you. There are crevices, rocks, trees and cacti among the obstacles you must either jump over or destroy.

While you have nine patrollers to accomplish your mission, they are thin-skinned craft and easily destroyed. When they are gone, the mission is terminated. Also, the patrollers use up fuel quickly. To keep going, you must shoot down the fuel satellites that orbit the moons.

Once you have fought your way to the Trigan base, the game gets harder! You must blast holes in the rotating force shield protecting the Trigan generator. This is not easy — the base shoots back! Because your laser is short-ranged, you must move close to the base, firing your laser constantly. It's a heavyweight slugfest.

Moon Runner is a well-crafted program that takes up a full disk. You must leave the disk in the drive while you are playing because the program accesses the disk throughout the game. Since the nine top scores are recorded, do not write-protect the disk.

Besides joystick control, you also have two keyboard controls. The ENTER key pauses the action, as well as resumes game play. The Q key ends a particular game (your patroller blows up!). You

are returned to the main menu to begin again.

The game has complete instructions and is easy to play, but hard to master.

A nice programming touch is the flexibility with which you can play at different levels. For example, if you complete Level 2, you can select levels 3, 2 or 1 to play next. A frustration with most arcade games is losing all your men, tanks, etc., and having to start all over again. That's boring — *Moon Runner* is not!

This is one good arcade game. It runs on the CoCo 1, 2 and 3, with RGB or composite monitors. You will need 32K, one disk drive and a joystick. The scrolling graphics and animation are exceptional, and the CoCo 3 version makes use of the PALETTE command.

For its combination of affordability and playability, *Moon Runner* is one first-class addition to the CoCo library.

(Nick Bradbury, 10500 Sandpiper Lane, Knoxville, TN 37922, 615-966-0172; $15: First product review from this company appearing in THE RAINBOW)

— T.C. Taulli

Software CoCo 1, 2 & 3

Inventory Manager — A Program You Can Count On

Being in business myself, I was more than happy to receive a copy of *Inventory Manager* by Forrest Enterprises for my latest review assignment. Nor could the timing have been any better, as the program arrived in time for me to use with my own inventory.

Inventory Manager is just what the title says. It basically handles all the necessary (not to mention dreaded) tasks involved in recording and updating your inventory records. Actually, about the only thing it doesn't do is take inventory for you.

One of the first things I would like to point out is that *Inventory Manager* comes on a non-protected disk, which makes it possible for you to make a backup copy. Another welcome feature is that the program is written mainly in BASIC, which makes it easy to modify to suit your personal needs.

Modification was necessary in my particular case because I am in the food service business, and the inventory procedure differs a little from that of other types of businesses. I work a lot with weights and fractions, whereas most businesses need only be concerned with the physical count of a particular item. All it took was a phone call to the distributor and my problem was solved.

Upon loading *Inventory Manager* you are greeted with a simple title screen. Pressing any key takes you to the configuration menu, where you tell the program the number of disk drives used, the printer's baud rate, the company name and address, and which version (there are two) of *Inventory Manager* you would like to run. This configuration is a nice feature — systems change. (To save you the time of having to answer these questions every time you load the program, you can use a second boot-up program after configuration. You change the appropriate program lines to match your system, as described in the manual.)

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Once you have configured the program for your system, you are presented with the main menu. From here you are given the option of doing such things as creating a new file or printing out inventory, purchase orders and item lists. Or you can sort, edit and move any number of items within your various files.

The first time you run the program you will naturally have to start by creating a file. You will be prompted for the name of the file to be created and then for all the necessary information to set up your own inventory system (this is where the only real difference between Version 1 and 2 will be of any importance).

The first two things you are prompted for are the identification number (up to four digits) and the item order number (a code of up to 10 characters that your supplier uses to identify a particular item), such as a part number.

If your particular business does not require an order number, you may want to use Version 2, which handles all its sorting and file management by use of the item I.D. number alone. This saves a lot of unnecessary typing — you can just press ENTER when prompted for information.

Next you will be asked for an item description (up to 40 characters), the inventory quantity (the amount you have on hand) and the "trigger" order quantity. The trigger order quantity is a useful feature that "triggers" automatic ordering of an item when the inventory quantity of an item matches or falls below the specified trigger quantity.

Next you will be prompted for the "after order" quantity. This along with the trigger order number is how the program decides how much of a particular item needs to be ordered when using the auto-order feature. The last two prompts are the item cost (how much a particular item costs you) and the retail cost (how much you plan to charge for the item).

The best part is that if you should make a mistake while entering any of this information, you can update it at a later time. You can even delete the entire record if you decide you no longer want to carry a particular item. Items can be moved from one file to another or converted to allow files created with Version 1 to be used on Version 2, or vice versa. All of this makes *Inventory Manager* a very flexible and full-featured inventory control and purchase order entry system.

After all the items have been entered into inventory files, *Inventory Manager* can complete what to me used to be some very time-consuming tasks. To start with, placing a purchase order is now as simple as just answering a few prompts. For example, I was able to print out a purchase order containing 71 items, with individual prices calculated and totaled at the bottom, including additional charges (postage and handling, etc.), all in just a couple of minutes. This is a welcome improvement to the usual 30 to 45 minutes spent doing the same thing by hand.

With the inventory printout option I was able to get an entire listing of my stock, including unit cost and total cost for each item — not to mention the total value of my entire stock — with just a few keystrokes. I found this to be exactly what I needed to help determine my operating costs and to prepare my inventory/sales reports (which are required by the company I work for), and I could do it in just a few steps taking less than a half-hour. Now that's a lot of power for your dollar, especially if you compare it to expensive programs out there for some of the *other* machines.

Everything considered, I must say I am *very* pleased with the performance of *Inventory Manager*. It does everything I would expect of a program of this type, and maybe even a little more. In my opinion, if you own a business and find inventory to be a tedious and time-consuming job, I think buying this product would definitely be money well spent!

Inventory Manager comes on a non-

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protected disk and will run on any CoCo with at least 64K and one disk drive (although I recommend two drives). Be sure to specify which CoCo you have when you order (1, 2 or 3). A printer is also optional but *highly* recommended if you hope to use the full potential of this program. It comes with a 13-page manual that tells you everything you need to know. If for some reason you do run into a problem, you can call the author, Mike Forrest. I found him to be more than happy to help me, and within two days after the call I had an updated version in my mailbox. Now *that's* service!

(Forrest Enterprises, 6266 Melody Lane, #3074, Dallas, TX 75231, 214-369-5425; $25: First product review from this company appearing in THE RAINBOW)

— Bryan Gridley

Software CoCo 3

Disk Manager Tree — OS-9 File Management

Managing files on a disk with the limited file management utilities provided with OS-9 Level II is not an easy task — especially if you have a hard disk. The simple copy and delete commands do the job . . . one file at a time. But what if you want to copy or delete a number of files on a disk? Well, you could type the appropriate command over and over again, changing the filename each time, or you could use *Disk Manager Tree* from Alpha Software.

Disk Manager Tree is a file manipulation utility that runs under OS-9 Level II and makes excellent use of the windowing capability built into the operating system. The package is designed to work with standard floppy disk systems, hard disk systems and RAM disks. When you execute *DMT*, it scans the entire disk that is mounted in the specified device, say /d0, and displays the disk structure graphically. For my system disk, *DMT* displayed the following:

```
---/d0
|--CMDS
|  |--ICONS
|--SYS
```

This tree structure is displayed in one of three windows. A second window is used to display the files in the selected directory, and the third window displays the various commands available and serves as a dialog box. From the main menu you can change to another directory or create and delete directories.

Using the up and down arrow keys you can select a subdirectory; by pressing the ENTER key you can display its list of files in Window 2. A submenu appears providing options to view, tag, copy and delete files. A file is selected by moving the up and down arrow keys and pressing the ENTER key to tag it. If you press C the file can be copied; pressing D deletes the file, and F1 allows you to view the file. When you view the file, a pop-up window appears and the file scrolls through the window.

Copying and deleting multiple files is a piece of cake with *DMT*. Simply move the arrow keys to the appropriate files and press ENTER to tag them. Once all the files have been tagged, simply press C or D. When copying, *DMT* prompts for the new directory; when deleting files, *DMT* asks if you are sure all of the tagged files should be deleted. If you agree, *DMT* proceeds to delete them.

DMT is a useful "workhorse" type program for managing the OS-9 disk system. Although I don't have a hard disk system, I can see that such a utility would be quite useful. I found the utility especially useful for rearranging files on floppy disks. Being able to select a number of files to be copied to other floppies really speeds up disk maintenance.

The only problem I found with *DMT*

is in the View File option. Once a text file is selected for viewing, there is no way to terminate the listing other than by scrolling through the entire file. This is, of course, a major concern if you happen to choose a large file to view. I hope that Alpha Software will correct this in the next revision of the program.

I should also mention that *DMT* comes with an icon and instructions on how to include *DMT* in *Multi-Vue*. And, finally, *DMT* takes up about 70K of memory — which is not a problem on a 512K CoCo but might be for a 128K CoCo.

I strongly recommend *DMT* for new and advanced users to OS-9. It is an efficient and easy way to manage files. The program is very simple to use, has a good manual and an online help capability.

(Alpha Software Technologies, 2810 Buffon St., Chalmette, LA 70043, 504-279-1653; $29.95)

— Donald Dollberg

Software CoCo 1, 2 & 3

Shadow World — Adventures in Time

Shadow World is a text-only Adventure written for your 64K ECB Color Computer. It also runs fine on the CoCo 3. In *Shadow World*, your goal as a scientist is to find out why experimental lab animals have been dying as a result of time-travel experiments performed by a company that has stolen your time-travel formula.

This is a difficult Adventure to solve, but it is possible. The author has placed many items and locations in the game that are not necessary for the solution, and the result is a tough yet challenging Adventure.

As with most Adventures, this one also recognizes various abbreviated commands, such as N for north and INV for inventory. Your progress is best monitored with the use of a map, and provisions are made to save and reload a game using the standard (C)SAVE and (C)LOAD commands. A perfect score is 10, and I scored 8 — but only with the help of a solution sheet the author sent for the purpose of the review.

The game scenario is interesting and challenging. The only flaw I can see is that *Shadow World* is a text-only Adventure. Our CoCos are outstanding graphics computers, and this good Adventure could be a great one with graphics.

Shadow World is available on either tape or disk and is not copy-protected, so backup copies for your own protection is not a problem.

(Prodek Software, c/o Mike Snyder, Route 2, Box 81, Allen, OK 74825, 405-857-2852; $10.50 for tape, $12.50 for disk: First product review for this company appearing in THE RAINBOW.)

— Robert Gray

Software CoCo 1, 2 & 3

BASIC Screen Editor — Full-Screen Editing Capabilities

I learned BASIC by typing in listings from magazines. I started with plain BASIC, which meant erasing the line and typing it over (really tough on those 255-character packed lines). Then I expanded my CoCo with Extended Color BASIC and, bless Tandy, there was a line editor built-in. Now I could fix those typos with relative ease. Coincidentally, as my experience on the CoCo expanded, I also became a "professional" programmer and had access to a multitude of editors.

Most of these editors I used in my work allowed me to load in whole files to edit a full screen at a time. What a pleasure that was. Then I would come home to CoCo's humble line editor and wish for better things. Well, let me tell you, better things could be here.

BASIC Screen Editor by Douglas Pokorny and Gil Winograd takes the CoCo line editor one step further. It provides a full-screen editor especially for BASIC programs. It allows you to edit anything that appears on the screen — including direct commands.

BSE includes a short formatting program that must be run before using the editor the first time. It initializes and customizes the editor to your current CoCo setup and favorite features. Once you've set everything up, all you have to do is type DOS if your CoCo supports that command, else type RUN"BSE". If you ever change your mind or your CoCo, just run the configuration program to change the initialization parameters.

What does *BSE* do for you? After the title screen, you don't even know it's there. So start typing in that great program you found in THE RAINBOW and run it. Oh, no, the dreaded SN Error! List the line in question and use the BASIC line editor to fix your typo. The normal Tandy editing commands are still active. What happened to the *BSE* program? Oh, it's still there, waiting for you to decide that you need a heavy-duty fixer.

List a bunch of lines. Say you want to customize the program with your own name in the PRINT statements. Great, just use the arrow keys to put the cursor over the word you want to change and type away. Press the arrow keys to get to the next change and type away again. If you hold down an arrow key for about a second, it starts autorepeating. Slick, I can travel all over the screen with hardly a thought.

Here is a complete list of all the features of *BSE* and the keystrokes to generate them:

arrow keys	move cursor one character
BREAK	deletes character under the cursor
SHIFT-left arrow	backspaces
F1	recalls custom palette (CoCo 3)
F2	uses default CoCo 3 palette
CLEAR-@	erases screen
CLEAR-up arrow	puts caret on-screen
CLEAR-down arrow	toggles insert mode
CLEAR-left arrow	moves cursor to beginning of line
CLEAR-right arrow	moves cursor to end of line
CLEAR-BREAK	deletes from cursor to end of line
CLEAR-ENTER	splits the line at the cursor
SHIFT-@	toggles *BSE* on and off

The program is reset-proof, and other features include automatic lowercase-to-uppercase conversion, compatibility with the CoCo 1, 2 and 3, and compatibility with JDOS and ADOS. I'm using it with a 128K CoCo 3. It is written in position-independent machine lan-

guage and comes on an unprotected disk.

The manual is eight pages of extremely readable text that fully explains the program's use and operation. It has plenty of examples and is written in fairly plain English so that even an inexperienced user should have no trouble understanding it. There were one or two minor typos, but I'm really fussy about manuals.

BSE performed as described with some minor problems. I couldn't get some of the shifted characters to autorepeat — strange things got printed on the screen (the distributor says this can't be fixed so they are going to put a notice in the manuals). Another point I am concerned with is that the program allows you to type in more characters on a BASIC line than the CoCo allows; this could present a minor retyping chore if you get carried away packing lines.

But on the other hand, no matter what I did, I couldn't get the program to have a major malfunction. In fact, I found it really neat to be able to re-execute command lines by just moving the cursor back to the beginning of the line (like a DIR command) and pressing ENTER. Another fun feature is the program's ability to recover programs after a NEW command. As long as it is on the screen, a line can be recovered by simply moving the cursor to the beginning of each line and pressing ENTER. Presto! Recovered code.

I would not call this program a full-featured editor because some features are missing that I would consider essential — like being able to scroll through the whole file and having cut-and-paste capabilities. Nonetheless, it has plenty of useful features that makes the CoCo easier to use. Given the reasonable price and the program's resident state, this looks like a good deal for all you BASIC programmers.

See pg 34, Jul 88 RB for type-in pgm for same plus other features.

(Second City Software, P.O. Box 72956, Roselle, IL 60172, 312-653-5610; $19.95 plus $2.50 S/H)

— C.L. Pilipauskas

Al-Write — CoCo 3 Editor/Assembler

Al-Write is an editor/assembler written just for the CoCo 3. When the package first arrived, I was excited with the idea of a new tool for writing assembly programs that might allow me to retire my old super-patched *EDTASM+*, which has been modified to run on the CoCo 3.

Al-Write comes on one unprotected disk with a 57-page manual. The disk may be backed up with the BACKUP command; in fact, this is the only way a working copy can be made because the program makes use of the command DOS for starting the program. Do not just copy the files! Instructions for this should have been included in the manual. Backing up your master disk is always important — but especially so when working with assembly language.

SPECIAL EVENT!

COCO GALLERY LIVE
SHOWCASE YOUR BEST AT RAINBOWFEST

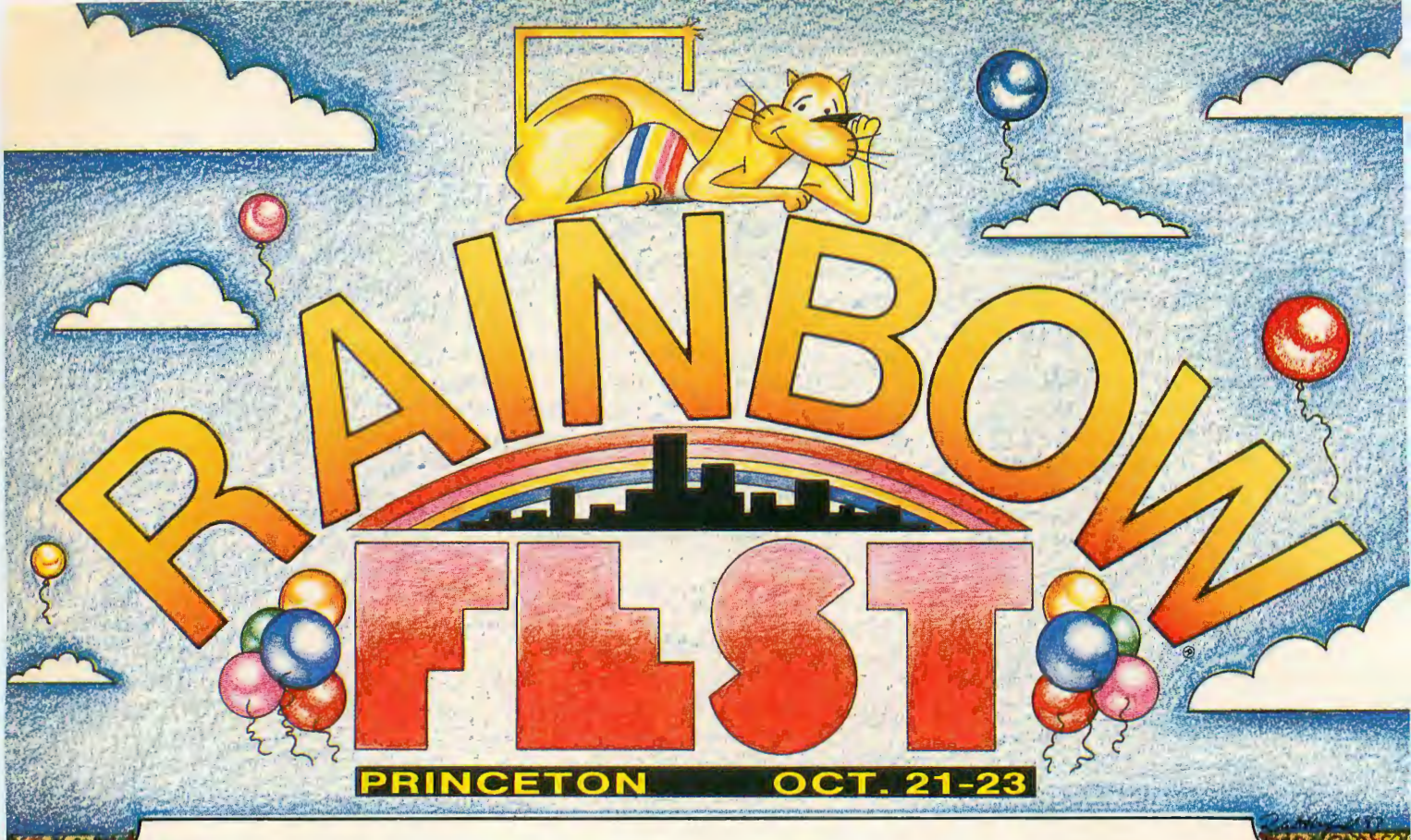
We are taking the popular "CoCo Gallery" on the road to RAINBOWfest Princeton — and we'd like you t submit your own graphics creations to be exhibited at the show!

RULES

- You can enter color or black-and-white photographs or printouts of your original artwork produced on the CoCo 1, 2 or 3. Entries must be framed, mounted or matted, and may not be smaller than 5-by-7 inches or larger than 11-by-14 inches.
- Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is ***not*** an original work.
- Along with your entry, send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.). Please include a few facts about yourself, too!
- Your name, address and phone number, along with the title of your work, must be clearly marked on the back of each entry, and a disk copy of each piece must also be included.
- Entries must be mailed to THE RAINBOW before October 10, 1988, or brought to the RAINBOWfest registration booth by 10 a.m., Saturday, October 22.
- All entries to CoCo Gallery Live become the property of Falsoft, Inc.

There will be two categories: one for graphics produced on the CoCo 1 and 2, and one for CoCo 3 graphics. Several awards will be made in each category. Winners will be determined by votes from RAINBOWfest attendees. In case of any ties, winners will be determined by our chief judge, CoCo Cat.

Prizes and ribbons will be presented Sunday, October 23, 1988, and winning entries will be published in the February '89 issue of THE RAINBOW. Send your entry to "CoCo Gallery Live," THE RAINBOW, 9509 U.S. Highway 42, Prospect, KY 40059.



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 like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time. Princeton is the show** to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

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

A special feature of RAINBOWfest is the **Educational Sandbox**, which features **child-oriented workshops** to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through seventh-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest 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, there are many other attractions in the Princeton area.

The Hyatt Regency Princeton offers special rates 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. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

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

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

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COCO COMMUNITY BREAKFAST

Dick White — RAINBOW Contributing Editor

Our keynote speaker for the traditional CoCo Community Breakfast is Dick White, contributing editor for THE RAINBOW. Mr. White, who has a long background with microcomputers, will discuss his personal experiences in the early years as he traces the development of the Color Computer since its introduction in 1980.

SPECIAL EVENT!

We're pleased to present The Educational Sandbox, a joint Tandy/RAINBOW effort. This is a computer workshop for RAINBOWfest kids. There will be two sessions on both Saturday and Sunday. One workshop will be for the kindergarten through third-grade set, and the other for fourth- through seventh-graders. Each workshop will last between 45 minutes and one hour, and will give the children and their parents hands-on experience in using Tandy computers and software.

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Advance ticket deadline: October 7, 1988. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

Several times while I was running *Al-Write* the disk did a self-destruct.

Al-Write will run only on a CoCo 3 using Disk BASIC 1.1 and one or more disk drives. If you are not sure which version you have, look at the start-up logo when you first turn your computer on. It should read Disk Extended Color BASIC 2.1; if it reads 2.0, you have Disk BASIC 1.0.

First I tried to run the program on my 512K CoCo 3 and was presented with a blank screen and blinking cursor. Since I also have 128K CoCo 3s for the kids, I took command and used them for testing. I had a few problems with *Al-Write*, but a request for help brought a new disk with Version 1.1 and additional information not in the manual. Because almost any new product is likely to have bugs, I expect the manual may be updated by the time you read this. The new 1.1 version also fixed the ghosting bug and works with 512K.

When you type DOS you are presented with the copyright notice; pressing any key will put you in the main menu. From here your first option is Edit, which will put you in a BASIC full-screen editor that can support 32- or 40-column screens. While the 80-column screen is not supported, most programmers should find the 40-column screen satisfactory. The colors used in the display (black, white and green) are compatible with any type of monitor or TV.

While the manual is sizable, I must take exception to some of the terms used and other inaccurate information that it contained. More about using *Al-Write* and some of its excellent features would be a real help. An index would have helped greatly in locating needed information. Very important instructions for using *Al-Write* were missing or hard to find.

From the menu you can view your disk directory in a neat two-column format; load or save your source file; assemble code; run assembled code; quit *Al-Write* or select the Options menu. You must use the Options menu to name your binary/object code disk file. When you load or save your source text file you are prompted for a filename. In the Options menu you can select screen or printer output for your assembly listing.

No method is provided for listing your text file to a printer! The Options menu lets you set a default origin for your assembled program, but it must reside totally in the range of $6000 to $7FFF, which is fine for some applications. You may also use the origin directive in your source code, but only one ORG is allowed.

Another stated limitation is that the assembled program must not "handle" memory outside the $6000 to $7FFF range if it is to run within the *Al-Write* environment. This eliminates the ability to access any graphics or text screens, system registers, BASIC hooks in low memory, etc. Some utilities published in THE RAINBOW require access to these memory areas. This also means you cannot take advantage of the extended memory of the CoCo 3 system within *Al-Write*. But programmers *can* write and assemble a program anywhere in memory with *Al-Write*, then load and execute it from BASIC.

SAMPLE.ASM is a text file you can test the assembler with. Several times I was greeted by an unknown system error even with the sample. If you do get this error you must turn your CoCo 3 off and then on to recover, even if it was run from *Al-Write*'s menu. The start label is not supported and is not allowed, but you can use any other valid label name to specify the execution point in your program. To do this you follow the END statement with the label you have chosen; if you fail to do this the program will crash the system when you try to run it. *Al-Write* uses a default execute address of $000 unless you specify the address directly or with a label in the END statement.

One feature I really like is the ability to write subroutine source code and save it in a disk file — thus you can build yourself a subroutine library. The subroutines may then be added to your main program using the Include function; this can save a lot of typing or reinventing of the wheel, so to speak. The Include feature works very well. While assembling the source code, it loads in and includes (merges) source text from disk files. Includes may not be nested. There's no need to worry about conflicting line numbers because *Al-Write* does not need or use them.

Al-Write follows some predefined conventions for register usage allowing easy parameter passing. Parameter passing is well-explained in the manual, which provided examples. *Al-Write* does allow you to do a trial assembly; the program assembles your text, listing errors found while assembling your source file. *Al-Write* does provide error messages, but it usually overprints the line with the error. Normally when the assembler encounters an error the assembly process is aborted and you are returned to the editor, but this may be overridden with the NoEdit directive. Other directives include List/NoList, CLS (clear the screen) and Wait, which will stop and wait for a key press before continuing during assembly.

Well, if you are a person who reads only the last paragraph of a review, here is mine in a CoCo-nutshell. While *Al-Write* has some excellent features, its limitations preclude it for many practical uses. If the memory location and access restrictions within the environment could be eliminated, *Al-Write* could set a new standard for assembly language programming under Disk BASIC. *Al-Write* will run on any CoCo 3 with Disk BASIC 1.1. Though the manual was sizable, some very important information was either missing or hard to find. While I had problems at first getting *Al-Write* to work as expected, I received a quick response from the author, a new version with bugs fixed and additional information not in the manual.

(Daniel Jimenez, P.O. Box 4967, San Antonio, TX 78285, 512-690-1788; $30: First product review from this company appearing in THE RAINBOW)

— J.D. Walker

Software CoCo 3

Word Power 3.1 — 80 Columns and Windows, Too

After using *VIP Writer* with my CoCo 2 and a composite monitor for several years, I looked forward to viewing an 80-column screen with the CoCo 3. But I was greatly disappointed at the lack of good "friendly" word processing software that followed. I tried two systems advertised in RAINBOW, but they failed to meet my requirements — versatility and the KISS factor (Keep It Simple, Stupid).

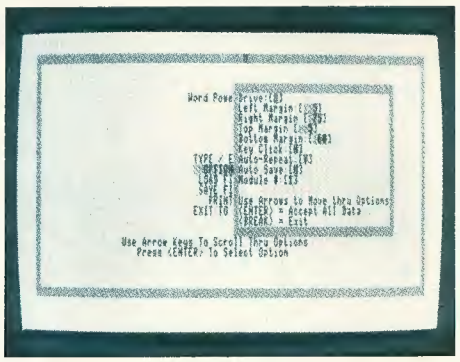
So I continued using *VIP* with its 64-column window until Microcom came out with *Word Power* 3. The first version of the system had a few bugs, but it showed great promise. Through close coordination and cooperation with those who recognized this promise, Microcom now offers CoCoists a very useful system that is *fun* and a joy to use.

Before going into a detailed review of this system, I would like to point out that I am impressed with the software development capability of Microcom.

After I received the initial version and noted a few problems, I received their 3.1 version, which took care of these problems and included many other enhancements. I called to express my thanks and was told that they plan to revise the program as necessary to make it more responsive to the needs of the public based on recommendations and to provide previous customers updated versions for cost and handling. This is *real* PR!

One of the most impressive things about this word processor is that it was developed for the CoCo 3 from scratch and, unlike other word processors, is not "patchwork." This makes it more sufficient in fully utilizing the versatile capabilities of the CoCo 3. Written in machine language and operating in the double-speed mode, it has amazing execution speed and enables very fast screen reformatting. Also, *Word Power* 3.1 is not copy-protected, which means you can make copies for your own use.

The system's ease of learning really impressed me. Memorizing the key commands is a snap because most follow a logical pattern, and the system employs an effective use of colorful windows. It is much easier to use than the *VIP* software and two other CoCo 3 word processing systems I had tried. Even *WordStar,* which I use in my work, is nightmarish in comparison with *Word Power* 3.1.



The first requirement in using *Word Power* is running the program SETUP, which establishes your defaults, some of which can be changed while typing and editing.

When you run SETUP, the first thing you see is the main menu:

1. Set Colors
2. Set Parameters
3. Set Printer Codes
4. Save Setup File

Word Power 3.1 opens beautiful horizons of colors that you pick out yourself, and you can change them if you tire of a particular set. I have an RGB color monitor, and I use a beautiful sky blue background with black letters when I am in the edit mode, and my linefeed symbols are purple. In the window mode I have a red border with an amber background on the inside. There are many colors and combinations from which to choose. If you have a monochrome monitor, you still go through the color selection routine to get the "mix" that appeals to you.

When selecting parameters you are asked whether you want a key-click, automatic key repeat and automatic saving (which is *great* in my case, because I live in "the lightning capital of the world," which seasonally experiences frequent power disruptions). I set my left and right margins at 1 and 79, respectively, so that I can see as much as possible on the screen without scrolling to the right. But before printing I change the margins to give me a 1-inch border.

After entering your default parameters, you need to enter the various codes

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Reviewed
Sept. 1986 pg 141
April 1987 pg 140

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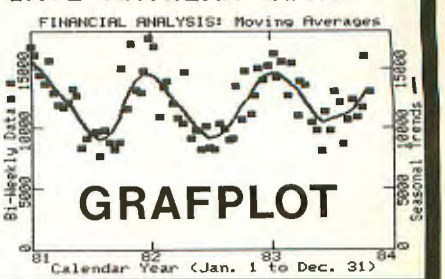

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PLEASE CIRCLE
TAPE or DISK

for your printer to underline and print in bold, script or italics, etc. There are provisions to handle all your printing needs.

When you have finished entering your printer codes, you save your setup, write-protect your backup disk, cold-start your computer and run BOOT. You then see the main menu inside a colored window border on the background color you selected:

Type/Edit
Options
Load File
Save File
Print
Exit to DOS

If you wanted to load a file, you would select Load File using the arrow keys. You would then see an instruction window and the directory of your file disk within another colorful window. These helpful windows and the logical use of the control and other function keys make *Word Power* 3.1 very user-friendly.

In the Type/Edit mode, you create or edit documents. At the top of the 80-column screen display is shown the percentage of memory used and the current column, line and page number; it also indicates whether type is in the upper- or lowercase mode and insert or overstrike mode. Another nice feature is the page-break display, which enables you to see exactly where the page ends; this improves the aesthetic appeal of your documents.

The type-ahead feature lets you type as fast as you want — without losing text. It is very easy to center or right-justify text, as well as to underline text or use boldface, italics, super- and subscripts. Underlining is displayed onscreen, and the bold/italicized/etc. text is displayed in different colors. I find this preferable to inserting printer codes within the text that throw off line lengths and page-break locations, and which require much more memorizing.

The Locate/Replace feature lets you find a phrase and replace it with another. I especially like the wild card feature that lets you search similarly spelled words with a single reference.

An instant display of all the commands is available in the help screen, which can be accessed with CTRL-?. The word count feature is great for students. It instantly displays the total number of words in the entire text, regardless of the cursor position.

Another feature is option code embedding, which enables you to change margins, spacing, etc., in a portion of text (for example, a single-spaced quote in double-spaced text). *Word Power* 3.1 has logical embedded codes (for example, LM for left margin, LS for line spacing, etc.). These codes are listed in the help screen.

Word Power 3.1 has a very user-friendly disk input/output menu. The directory, which shows the remaining granules on the disk, is displayed on the left side of the screen. You can select files by simply cursoring through this window and pressing CLEAR; or you may enter your own filename. If you have text in memory and load another file, it will be appended to the text in memory. All saving and loading is done in ASCII format, making *Word Power* 3.1 compatible with most other word processors, spelling checkers and text formatting utilities.

Of all the word processors I have used, *Word Power* has the maximum text storage capacity. On a 512K CoCo 3, it gives you over 460K of text space, which is roughly 336 pages of double-spaced text. On a 128K CoCo, the storage capacity is more than 72K.

In the printing mode, you select parameters such as baud rate, line spacing, page numbering, right justification, number of copies, headers, footers, etc. The single-sheet pause feature lets me use single sheets instead of perforated paper. The WYSIWYG (What You See Is What You Get) feature is excellent! If you elect *not* to print to the printer, you can view the document onscreen as it will appear after printing. Also, *Word Power* is "printer independent"; that is, it is compatible with almost any printer.

With the mail merge feature, you can type a letter, follow it with a list of addresses and print out personalized letters. This is a useful feature for clubs, schools and other organizations that send bulk mail.

The program comes with a spelling checker/dictionary program on a separate disk. It will work with any ASCII file. I find it very handy to proofread my text for spelling errors. It shows how the incorrect word appears in the text and lists possible correct spellings. At this point I have the option to ignore or substitute the correct word. I also have an option to add words for a "personalized" dictionary.

A nifty little punctuation-checking program included on the *Word Power* disk will check the text for punctuation errors such as capitalization, words appearing twice in a row, spacing and more. Note that the program will not correct errors, but mark them. The user can then choose to go back into the file and correct the errors. I am not aware of any similar program for the CoCo.

The package comes with a 40-page manual and a command reference card.

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The manual is well-written and guides you step-by-step through the various features.

There is no capability lacking in *Word Power* 3.1 that would preclude its ranking with the highest among word processors, and future enhancements promise to make it a system not to be without. Couple the great text features of *Word Power* 3.1 with the vivid, beautiful colors, and you *really* have "something to write home about"!

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; $79.95)

— Thomas Poor

Software CoCo 1, 2 & 3

HELLO/BAS — Menu Greetings

I'll admit it: I am not a one-computer woman. Though the CoCo is nearest and dearest to my heart, I dabble with MS-DOS machines (in my work) and have been know to dally with Commodores. But don't judge me too harshly — I always come back to the CoCo, the friendliest and most versatile computer around.

Sometimes, though, I can't help but compare features and inwardly compose a wish list. One thing I wish is that IBM compatibles had a disk operating system built in, like CoCo's Disk BASIC (some Tandy IBM compatibles *do* have MS-DOS built in). It takes IBM machines and their look-alikes so *long* to boot. In comparison, CoCo springs awake, ready to go.

One thing MS-DOS *can* do is automatically execute an AUTOEXEC.BAT file, which can carry out instructions and load specific files for you. With my MS-DOS machine, all I have to do is turn it on — by following the AUTOEXEC.BAT file I wrote, it calls up a menu program that lets me boot (with just one keystroke!) any program on my hard disk. If there's one thing I'm bonkers about, it's menus. And since I'm compiling a wish list, I wish CoCo had an AUTOEXEC.BAT function that could give me a menu of programs on my floppy disk for "point-and-shoot" loading. (Tony DiStefano's projects look interesting, but I am not a hardware person.)

Now, you're probably wondering why I've wasted three paragraphs of what is *supposed* to be a review, spouting off in left field. There's a reason for this: menus.

HELLO/BAS gives 32K ECB CoCos menus. With the program's little auto-repeating cursor, I can zip around an alphabetized menu presentation of a floppy disk directory, press ENTER when I come to a BASIC program I want to load and — bingo — it loads and runs. Just as nifty as my MS-DOS menu.

And what's more, a utility provided allows me to boot *HELLO/BAS* from a floppy by entering the DOS command (this works a lot faster than waiting for MS-DOS's AUTOEXEC.BAT file to finish executing — *HELLO/BAS* does use the high-speed poke). Typing a three-letter command is better than typing the 10-character command, RUN"HELLO".

What's the big deal in saving seven keystrokes? Well, computers *are* supposed to save time — why did you ditch your typewriter in favor of a word processor, anyway? Another reason for using menus is ease of operation. Menus let you set up a sort of "turnkey" system. New users may stare blankly at you when you try to describe the process of calling up a directory, then loading and running a program, but even a child can quickly figure out how to "point and shoot."

The *HELLO/BAS* disk comes with five files: HELLO, DOS BOOT, HELP, DISK INIT and LOG BOOK. HELLO, of course, is the main program. When you run HELLO, the program will read the disk directory, alphabetize and display it. The program can be configured to run on any drive. The screen can show 24 files at a time, but there are extra "pages" that can take care of the 25th file and beyond.

In addition to the alphabetized directory display, the screen also shows you the default drive number, which screen "page" you are currently in, the number of files on the disk and the number of granules free. You select and load a program by moving a cursor to the file (via any arrow key) and pressing ENTER. The auto-repeating "cursor wrap" feature is nice — pressing the down arrow key at File 24 takes you back to the top of the directory list. The program does *not* induce finger sweat. Pressing P allows you to print out a hard copy of the directory; pressing CLEAR lets you read another disk in the current default drive.

DISKINIT creates "autobootable" *HELLO/BAS* disks. It is best to run DISKINIT on newly formatted disks, because the DOS BOOT program it generates is sector-dependent; on a semi-full disk there may already be programs occupying the intended sector. This means that you will probably have to create your own *HELLO/BAS* bootable disks from scratch (a bootable disk must contain DOS BOOT and HELLO — HELP is helpful, but not necessary) and

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Reviewed in RAINBOW, February 1988.

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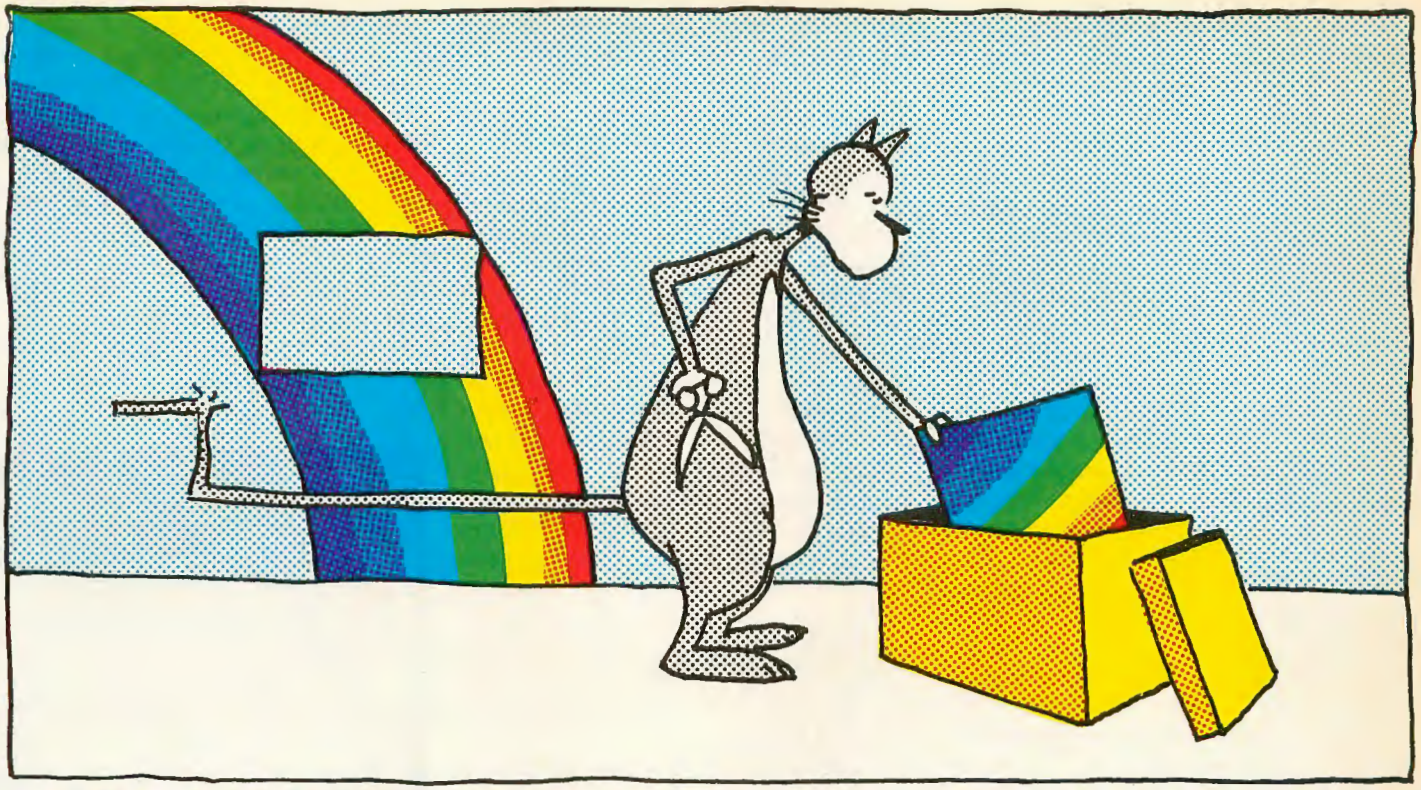

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copy your favorite BASIC programs to the disk. DOS BOOT and HELLO take up one gran each of disk space, and HELP takes up two.

HELLO/BAS will not load machine language programs, which is a downer. The author apologizes for this lack on one "page" of the nine-page help file.

HELLO/BAS is one professional-looking, well-behaved (as long as you stay away from ML) and user-friendly utility for BASIC programs. Once you start using it, you may find yourself growing spoiled. I like *HELLO/BAS* and have put it on the same disk with some of my favorite RAINBOW programs.

The applications are varied. Whether you're a new CoCoist or an old pro, you'll find a use for *HELLO/BAS*. Seasoned hackers can see whole alphabetized directories at a time (without the SHIFT-@ shuffle), along with other information. New users can circumvent syntax errors. And it would be especially useful for handicapped people and children. Do your fingers a favor and introduce the CoCo in your life to *HELLO/BAS*.

(RCPierce Software, P.O. Box 1787, Main Post Office, Edmonton, Alta., Canada T5J-2P2, 403-474-8435; $19.95 US, $22.95 CDN: First product review from this company appearing in THE RAINBOW)

— Carol Hartman

Software CoCo 1 & 2

Quest for the Ring — The Vanished Kingdom

You say you've solved *Labyrinth* and have already congratulated yourself for a job well done? Not so fast, King William. Zarth, the evil wizard, found out you were escaping and did some fast work before he was destroyed. He hid your crown, locked your castle and made all the people in your kingdom vanish. Then he hid the ring he used to cast all those spells. Now you have to find the ring so you can undo all the spells and get your people back.

You start this graphics Adventure in front of your castle. From there you can wander around the kingdom, looking for your crown and Zarth's ring. The kingdom contains mountains, streams, chasms and a lake, but no people to ask for help. (I happen to think the piranha fish ate them, but the author says Zarth made them disappear!) You're on your own, but you can use any objects you find and the clues they provide. The only living thing you'll ever see is the dragon, and he's not about to help you, believe me!

The first thing that struck me when I loaded the game was the excellent graphics. (If you don't have a color monitor, borrow somebody's. The graphics are *much* better in color.) Every time I went to a different screen I sat there for a minute just soaking up the scenery. The second thing I noticed was the sound. A little song plays during the title and "RIP" screens. A note sounds at every keystroke, and a little bird chirps when it's your turn to input.

After I died the first time (on my second move!), I discovered the self-booting feature. By just pressing the CLEAR key you can start the game over without reloading. Those of us who die often really appreciate this; I've seen this feature only in programs written in machine language.

I thoroughly enjoyed this Adventure. The graphics and the logic used are a definite plus. Games that have you do illogical things (i.e., go through mirrors) leave me frustrated. In duplicate scenes (like fields), the trees, rocks and chasms are shown in different places, so it's easy to know where you are. *Quest for the Ring* has a limited vocabulary, but I found that more of a help than a hindrance. Everything I needed to do could be accomplished with a dozen commands. And speaking of help, I got all the help I needed when I looked at objects.

I also got all the help I needed from my 10- and 11-year-old sons (and half the neighborhood children). I'd start playing the game and the next thing I knew there'd be three or four chairs pulled up around me, with the occupants offering advice on what to do next. If I left my chair for a cup of coffee, I'd come back to find it occupied by one of the kids, who'd look excitedly at me and say, "I'll take over from here."

Quest for the Ring is a fun game, simple yet challenging. You have to reason things out, but it isn't so complicated that it will take you months of playing to solve. The kingdom is laid out very neatly, and what you have to do is straightforward. Also, you can carry as much as you want. Your hands never seem to get full. This eliminates the decision of what to drop in order to pick up something else. Decisions like those in other games cause a lot of backtracking and frustration for novice Adventurers.

There is no save feature, so you lose everything you've collected whenever you die. However, starting the game over and recollecting everything is fairly easy if you draw a map as you go along. You score points for every object you find, with a possible score of 504 at the end of the game. Don't let the number 504 scare you, though — there aren't 504 objects in the game. Some things you pick up are worth 30 points, others maybe 50. To see what you are carrying, you have to type USE INV instead of just INV.

Like its predecessor, *Quest for the Ring* is also a stand-alone Adventure for the CoCo 1 or 2, with 64K disk Extended Color BASIC. Note that it will not work on CoCo 1s earlier than an F board. This two-disk set has 59 Hi-Res screens and can run on either a one or two-drive system. The optional high-speed poke is also available. The disks aren't copy-protected, so workable backups can be made, but only with the BACKUP command. Files cannot be copied one at a time. This protection, the only one the authors put in, prevents the loading and running of any of the single "modules" of the game.

RTB guarantees all its software to load, or you can return it for a prompt replacement at no cost to you. I can personally vouch for this service, because my original review copy didn't load. When I called the company, I expected to hear an answering machine at the other end (it was late Saturday afternoon). What I got was a real person. He was very helpful and supportive, and once he realized he couldn't solve my problem over the phone he sent out a replacement copy immediately.

All in all, I think RTB Software has a real winner here. *Quest for the Ring* is a game that can be played and enjoyed by all ages and skills, and is well worth the price. I'd recommend completing the trilogy with *Labyrinth* and *Adventure in Lumeria*, and watching for other

games from this company, which seems to be getting better with each program.

(RTB Software, P.O. Box 777, West Acton, MA 01720, 508-263-0563; $34.95 plus $3 S/H)

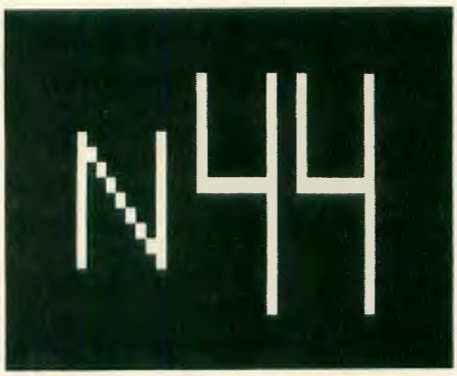
— Gail Allore

Software CoCo 1, 2 & 3

Home Bingo — CoCo Calls the Numbers

Home Bingo is a handy program to have around the house if you like to play this popular game with your family. It's also suited to the commercial bingo halls, although one might have a tough time convincing hard-core bingo patrons that a computer is selecting the numbers randomly. I suppose that being able to see and hear those rattling ping-pong balls provides an added sense of honesty and randomness to the typical bingo player.

Home Bingo is supplied on either disk or cassette and is written in BASIC. It requires a minimum of 32K RAM and Extended Color BASIC, and it works fine on the CoCo 3, as well. The program loads simply by entering RUN "BINGO". A short menu of options is displayed. Both regular bingo games and round robin games are supported.



In regular games, the computer first displays the number sequence, such as *No. 3*, followed by the actual bingo number being called. Numbers such as G58 are extremely large and take up most of the screen.

If the round robin selection is made, the sequence is not counted but the displayed bingo numbers are just as large as in the regular games. The program keeps track of the numbers it calls so that the same number is never duplicated in a game.

All 75 bingo numbers are available in the program and all are displayed in large green characters on a black background with the prefix, such as 'B', being only about half the size of the actual number. This is helpful in that it tends not to distract from the importance of the number itself. Most professional bingo players don't even need to see or hear the prefix. They have played enough games to know that "58" belongs in the 'G' column.

Home Bingo is a good program at a fair price and provides the CoCo user with a way to bring a little more high-tech into those smoke-filled bingo halls across America.

(Williams Enterprises, 53 Old Derry Road, Box 7, Hudson, NH 03051, 603-883-2859; Cassette $9.95 or Disk $11.95, plus $2 S/H: First product review from this company appearing in THE RAINBOW)

— Jerry Semones

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MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

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The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

Bug Buster, an upgraded arcade game that has you chasing specimens of the species *Bugus computerum* out of the disk drive, ROM, RAM, power supply and the printer. (The bugs infested your CoCo "a long time ago, while you were looking the other way.") This upgrade to *Bug Buster* features faster action and smaller targets. Requires a 32K CoCo, a disk drive and a joystick. *Tothian Software, Box 663, Rimersburg, PA 16248; $19.95.*

◆F **CMM**, a stock market trading program "that will make money on a particular stock, whether the stock increases or decreases in price, providing the stock returns to its original price." For the CoCo 1, 2 and 3. Requires a disk drive and a DMP printer. *Weller Enterprises, P.O. Box 8004, La Crescenta, CA 91214, (818) 352-6811; $49.95.*

◆F **Good Games Trio**, a collection of 3 two-player games: *ADI*, *Othello* and *Connect Five*. *ADI* is a computerized version of a "board" game invented hundreds of years ago in Africa. *Othello* uses an 8-by-8 board and permits the user to obtain printouts of current games. *Connect Five* is based on the pencil-and-paper game and is mapped out in 10 columns. For the CoCo 1, 2 and 3; uses the high-speed poke. *RCPierce Software, P.O. Box 1787, Main Post Office, Edmonton, AB, Canada T5J 2P2, (403) 474-8435; $19.95 US, $22.95 CDN.*

Hall of the King Trilogy, a trio consisting of *Hall of the King*, *Hall of the King II: The Inner Chamber* and *Hall of the King III: The Earthstone Revealed*. Each graphics Adventure takes place in Firrhest, where a dwarven race once lived, and where the powerful Earthstone is hidden. Each program comes on a flippy — two sides of the disk are used. Requirements include 64K and a disk drive. For the CoCo 1, 2 and 3. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; $74.95 for set, $29.95 each, plus $2.50 S/H.*

◆F **Hard Bodies**, an on-disk swimsuit issue — "page after page of models in swimsuits that will make your CoCo screen sizzle." For the CoCo 1, 2 and 3; requires 64K disk. *Baron Products, 3937 Shady Hill, Dallas, TX 75229, (214) 350-3900; $15.*

See pg 125

◆F **HELLO/BAS**, a directory utility that lets you list and print a disk directory in alphabetical order, swap default drives with a key press and load and run BASIC programs from a menu. For the CoCo 1, 2 and 3. Requires 32K ECB and uses the high-speed poke. *RCPierce Software, P.O. Box 1787, Main Post Office, Edmonton, AB, Canada T5J 2P2, (403) 474-8435; $19.95 US, $22.95 CDN.*

In Quest of the Star Lord Hint Sheet, a listing of the commands necessary to solve Sundog Systems' CoCo 3 *In Quest of the Star Lord* Adventure. The commands are encoded (but you have the key) in order that you don't learn more than you wanted to by a careless glance. The hint sheet is intended to be sold only to registered owners of *In Quest of the Star Lord*. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; $3.95.*

Moneyman II, a menu-driven program composed of seven modules designed to perform common financial calculations: Savings Planner, Loan Planner, Budget Planner, Checking Account, Savings Account, Reconcile Bank Statement and Summarize Deductibles. The modules interact and call on each other as needed. Requires 32K ECB and a disk drive. An additional drive is optional, and a printer is recommended. *Tothian Software, Box 663, Rimersburg, PA 16248; $24.95.*

◆F **Night of the Living Dead**, a text Adventure with a ghoulish turn: You are lost in a remote area, and the dead are waking up. The only goal is to survive. As an incentive, the company is offering $500 to the first player whose character can live through it (deadline December 31, 1988). For the CoCo 1, 2 and 3. Requires 64K and a disk drive. *Adventure Novel Software, P.O. Box 8176, Spartanburg, SC 29305, (803) 578-7421; $34.95 introductory offer.*

VIP Database III, a CoCo 3 database that supports 40-, 64- and 80-column screens, uses separate text and highlight colors for easy data entry, features in-memory sort of all records and a built-in print spooler. The database can store up to 550 records of 256 characters on a one-disk system, and it supports multi-criteria searches with up to 16 separate relational keys. Requires the CoCo 3. *SD Enterprises, P.O. Box 1233, Gresham, OR 97030, (503) 663-2865; $69.95.*

◆F **Wildcard Copy**, a Disk BASIC supplement that lets you do a multiple copy with one command, equivalent to the COPY * command on other systems. It can be used to copy files with the same name but different extensions and files that share an extension. The program is written in BASIC for two disk drives and the CoCo 1, 2 and 3. *RVC Software, P.O. Box 560, Englishtown, NJ 07726, (201) 446-2033; $15.*

◆F **Word Processing: TRS-80 & Star NX-10**, a word processing program written in BASIC for the duo of the CoCo and the Star Micronics NX-10 dot matrix printer. The program takes advantage of the printer's capabilities, including underlining, italics, NLQ print, emphasized and bold print, superscripts and subscripts, Pica and Elite, etc. For 64K CoCo 1, 2 and 3; comes on cassette only. *Lee Sullivan, P.O. Box 8718, Penacook, NH 03303, (603) 753-4497; $12.*

◆F **First product received from this company**

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 reviewers for evaluation.

— Lauren Willoughby

Computer Island Educational Software

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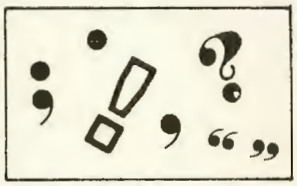

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Assembly Language for the Complete Novice: Part II

By William Barden, Jr.
Rainbow Contributing Editor

Last month's column looked at the basic architecture of the 6809 microprocessor used in the Color Computers, and many of the instructions and addressing modes of the 6809. In this column, I'll write some simple programs, assemble them by hand and by assembler and incorporate them in BASIC programs. This column will present the basic ideas of assembly language programming. Let's see if you're brave enough to learn it.

Hand Assembling

A *sort* usually arranges items in alphabetical order, generally from A to Z. Therefore, if we want to sort all the characters on a text screen in order, we would use a sort — probably a *bubble sort*.

A Bubble Sort

A bubble sort compares the first entry in a list with the next one. If that entry is smaller, swap the entries. The bubble sort continues, one entry at a time, until it reaches the end of the list. If any entries are switched, the process repeats. When no swap has been switched, the list is sorted. Look at the following example:

```
*F   F   F   F   F   F   F
 G  *G   A   A   A   A   A
 A   A  *G   B   B   B   B
 B   B   B  *G   G   G   G
 Y   Y   Y   Y  *Y   C   C
 C   C   C   C   C  *Y   D
 D   D   D   D   D   D  *Y   (one pass over)

*A   A   A   A   A   A   A
 F  *B   B   B   B   B   B
 B   F  *F   F   F   F   F
 G   G   G  *C   C   C   C
 C   C   C   G  *D   D   D
 D   D   D   D   G  *G   G
 Y   Y   Y   Y   Y   Y  *Y   (two passes over)

*A   A   A   A   A   A   A
 B  *B   B   B   B   B   B
 F   F  *C   C   C   C   C
 C   C   F  *D   D   D   D
 D   D   D   F  *F   F   F
 G   G   G   G   G  *G   G
 Y   Y   Y   Y   Y   Y  *Y   (three passes over, sorted)
```

In the preceding example, the asterisk shows the suspect item. While the list is sorted after three passes, another pass must be made to verify that no switch has occurred.

The text screen starts at location $400 in CoCo memory and goes to $5FF, 512 characters. Here is a BASIC program that would complete this sort:

```
100 Y = 0
110 FOR X = &H400 TO &H5FE
120     A = PEEK( X )
130     IF A <= PEEK ( X + 1 ) THEN GOTO 1701
140     B = PEEK( X + 1 )
150     POKE X, B:POKE X + 1, A
160     Y = 1
170 NEXT X
180 IF Y< > 0 THEN GOTO 100
190 END
```

If you run this program, you'll see the characters on the screen rearrange themselves in alphabetical order — really a CoCo-coded order, like ASCII. Figure 1 shows the results of the sort after the program is listed on the screen. The sort takes quite a long time in BASIC — about 58 minutes, depending on the characters' random order. How would this be done in assembly language?

The Assembly Language Version

The sort compares two values, the current location and the current location + 1. To compare in assembly language, we must have one value in a register — typically the A or B register — and compare it with another value in memory. In

---

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

```
AAAAAAAAAAAAAAAABCCDDDDDDDEEEEEE
EEEEFFFFFFFFGHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHIIKKNNOOOOOOPRRRRR
SSTTTTTTTUUUX



                                  &
&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
(),,,,,,,,,,,,,,,,,,,,,,,,,,,000
00000000000000000000000000000000
00000011111111111111112222222333
33334444445666677888888889:::===
```

Figure 1: After the Sort

machine language, the compare instruction would be presented in this manner:

```
LDA     ,X+     GET FIRST ENTRY
CMPA    ,X      COMPARE TO I+1
BLS     ONE70   GO IF ENTRY I GE ENTRY I+1
```

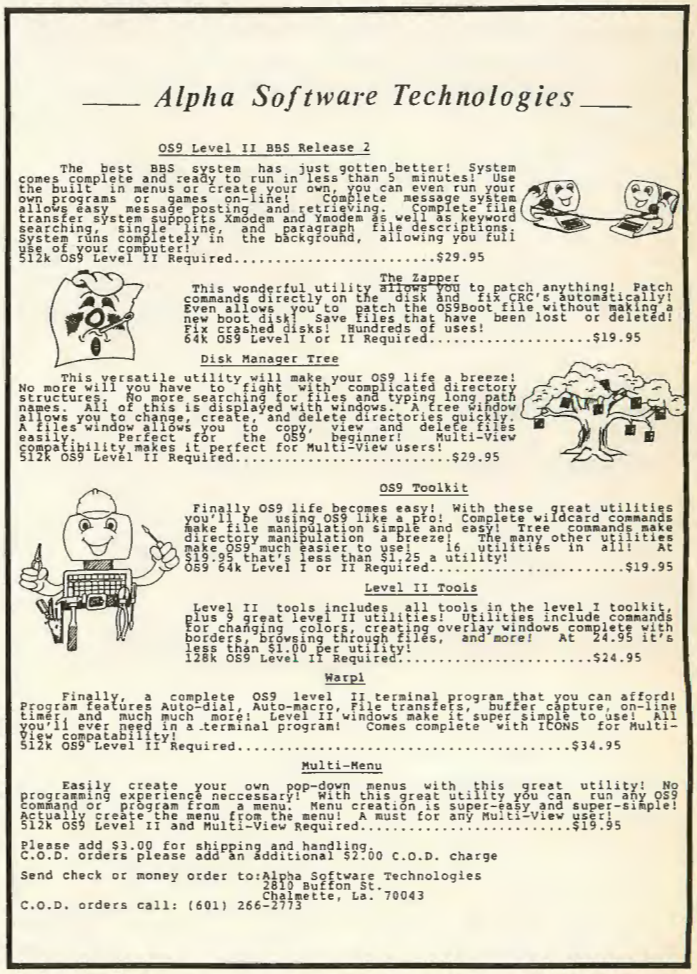
The LDA instruction loads the A register with the current entry from the screen. LDA uses the X register as a pointer to the screen. X changes from $400 to $5FF and has been loaded with an address in this range before the compare instruction. The plus sign on the LDA adds one to the contents of X *after* the load, so that X now points to the *next* location on the screen.

The CMPA instruction *compares* the contents of the A register with the contents found at the screen location indicated by the X register. The X register now points to the Screen Location +1. CMPA affects the *condition codes* in the CPU. The condition codes have a bit for a zero condition, negative condition and carry condition. Both signed and unsigned comparisons can be tested. In this case the comparison is unsigned, and is a BLS (Branch on Less Than or Same). A branch is made to Location ONE70 only if the contents of A were less than or equal to the contents of the next screen location.

If the next screen location had been greater than A, the two locations would have been switched. Because the A register already contains the current value, the B register can be loaded with the next value for the swap. The two locations can be switched by storing A in the next location and B in the current location in this manner:

```
LDB     ,X      GET SECOND ENTRY
STB     -1,X    SWAP B TO A
STA     ,X      SWAP A TO B
```

A *change* flag must also be set. Use the Y register for the



ag. A '1' is loaded into the register to indicate the
f no change occurs, the register will hold 0): LDY #1
ANGE".
ntire code, including a compare instruction, swap (if necessary) and set change flag, now looks like this:

```
LDA     ,X+     GET FIRST ENTRY
CMPA    ,X      COMPARE TO I+1
BLS     ONE70   GO IF ENTRY I GE ENTRY I+1
LDB     ,X      GET SECOND ENTRY
STB     -1,X    SWAP B TO A
STA     ,X      SWAP A TO B
LDY     #1      SET "CHANGE"
```

At this point, we also know that the Y register is initially set to 0 and that the X register points to the start of the screen memory:

```
LDX     #$400   POINT TO SCREEN
LDY     #0      SET CHANGE FLAG TO 0
LDA     ,X+     GET FIRST ENTRY
CMPA    ,X      COMPARE TO I+1
BLS     ONE70   GO IF ENTRY I GE ENTRY I+1
LDB     ,X      GET SECOND ENTRY
STB     -1,X    SWAP B TO A
STA     ,X      SWAP A TO B
LDY     #1      SET "CHANGE"
```

Since this action is taken for every screen location from $400 to $5FE, stopping at $5FE, we must have a way to stop the compare instruction. X is incremented from $400 through $5FE. When it reaches $5FF, we should stop to see if the change flag has been set. If it has, we must go back for another pass. If it has not, the sort is complete. If X does not stop at $5FF, however, we'll continue looping and compare for *this* pass:

```
CMPX    #$5FF   TEST FOR SCREEN END
BNE     ONE10   GO IF NOT ONE PASS
```

If one pass has been completed, test the change flag by comparing the contents of the Y register with 0 and branching back if Y = 1 (indicating that at least one swap has occurred):

```
CMPY    #0      TEST CHANGE FLAG
BNE     HUNDRD  GO IF CHANGE OCCURRED
```

The whole sequence now looks like this:

```
LDX     #$400   POINT TO SCREEN
LDY     #0      SET CHANGE FLAG TO 0
LDA     ,X+     GET FIRST ENTRY
CMPA    ,X      COMPARE TO I+1
BLS     ONE70   GO IF ENTRY I GE ENTRY I+1
LDB     ,X      GET SECOND ENTRY
STB     -1,X    SWAP B TO A
STA     ,X      SWAP A TO B
LDY     #1      SET "CHANGE"
CMPX    #$5FF   TEST FOR SCREEN END
BNE     ONE10   GO IF NOT ONE PASS
CMPY    #0      TEST CHANGE FLAG
BNE     HUNDRD  GO IF CHANGE OCCURRED
```

There are several branches in this sequence. We've named them to correspond to the BASIC implementation of this sort. If we use *labels* instead of line numbers, as in BASIC, we have:

```
HUNDRD  LDX     #$400   POINT TO SCREEN
        LDY     #0      SET CHANGE FLAG TO 0 ONE10
        LDA     ,X+       GET FIRST ENTRY
        CMPA    ,X        COMPARE TO I+1
        BLS     ONE70     GO IF ENTRY I GE ENTRY I+1
        LDB     ,X        GET SECOND ENTRY
        STB     -1,X      SWAP B TO A
        STA     ,X        SWAP A TO B
        LDY     #1        SET "CHANGE"
ONE70   CMPX    #$5FF     TEST FOR SCREEN END
        BNE     ONE10     GO IF NOT ONE PASS
        CMPY    #0      TEST CHANGE FLAG
        BNE     HUNDRD  GO IF CHANGE OCCURRED
```

(I've indented to indicate the inner loop.)

Hand Coding

My first program — one that read a single punched card from a card reader and then boot the system — was completely hand coded. In one card, I made a quantum leap in my understanding of assembly language programming. I'm not saying that hand coding this program will do the trick for you, but it may help.

The first step in hand coding is to make a skeleton of the instructions based upon instruction length. You can find the instruction length in the list of instructions found in the back of assembler manuals, on a 6809 instruction sheet or in books on 6809 programming. As I explained in the last column, different addressing modes require different instruction lengths, as do different types of instructions. Branch instructions are always two bytes — opcode followed by displacement value. *Load immediate* instructions are two or three bytes — opcode followed by a 1-byte (A or B) value or a 2-byte (D, X or Y) value. *Load from memory* instructions are 3-byte instructions — opcode followed by two bytes of

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The listing:

```
Ø CLS:CLEAR2ØØØ:K=Ø:M=1:FORA=3TO
11:DSKI$ Ø,17,A,B$,C$:D$=B$+LEFT
$(C$,127):E$(Ø)=LEFT$(D$,8):FOR
F=1TO7:E$(F)=MID$(D$,F*32+1,8):N
EXTF:FOR G=ØTO7:PRINT@K,"#";M")"
E$(G):K=K+16:M=M+1:IF K>5ØØTHEN
K=48Ø
1 EXEC44539:NEXTG:NEXTA:END
```

Worth a run for my Coco 3!

John M. Beck
Suitland, MD

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

memory address. *Indexed addressing* instructions vary depending upon the offset. The skeleton here looks like this:

```
XXXXXX    HUNDRD LDX   #$400    POINT TO SCREEN
XXXXXXXX         LDY   #0       SET CHANGE FLAG TO 0
XXXX      ONE10  LDA   ,X+        GET FIRST ENTRY
XXXX             CMPA  ,X        COMPARE TO I+1
XXXX             BLS   ONE70     GO IF ENTRY I GE ENTRY I+1
XXXX             LDB   ,X        GET SECOND ENTRY
XXXX             STB   -1,X      SWAP B TO A
XXXX             STA   ,X        SWAP A TO B
XXXXXXXX         LDY   #1        SET "CHANGE"
XXXXXX    ONE70  CMPX  #$5FF     TEST FOR SCREEN END
XXXX             BNE   ONE10     GO IF NOT ONE PASS
XXXXXXXX         CMPY  #0      TEST CHANGE FLAG
XXXX             BNE   HUNDRD  GO IF CHANGE OCCURRED
```

Each two X's represent two hexadecimal digits or one byte. Now we can add the opcodes for the instructions by finding them in the instruction list:

```
8EXXXX    HUNDRD LDX   #$400    POINT TO SCREEN
108EXXXX         LDY   #0       SET CHANGE FLAG TO 0
A6XX      ONE10  LDA   ,X+        GET FIRST ENTRY
A1XX             CMPA  ,X        COMPARE TO I+1
23XX             BLS   ONE70     GO IF ENTRY I GE ENTRY I+1
E6XX             LDB   ,X        GET SECOND ENTRY
E7XX             STB   -1,X      SWAP B TO A
E7XX             STA   ,X        SWAP A TO B
10BEXXXX         LDY   #1        SET "CHANGE"
BCXXXX    ONE70  CMPX  #$5FF     TEST FOR SCREEN END
26XX             BNE   ONE10     GO IF NOT ONE PASS
10BCXXXX         CMPY  #0      TEST CHANGE FLAG
26XX             BNE   HUNDRD  GO IF CHANGE OCCURRED
```

Note that some opcodes are made up of two bytes. Motorola ran out of opcodes and also wanted to make frequently used instructions shorter.

Now we can add the immediate values — values loaded into a register and found within the instruction. For example, the LDX instruction loads $400 into the X register:

```
BE0400    HUNDRD LDX   #$400    POINT TO SCREEN
108E0000         LDY   #0       SET CHANGE FLAG TO 0
A6XX      ONE10  LDA   ,X+        GET FIRST ENTRY
A1XX             CMPA  ,X        COMPARE TO I+1
23XX             BLS   ONE70     GO IF ENTRY I GE ENTRY I+1
E6XX             LDB   ,X        GET SECOND ENTRY
E7XX             STB   -1,X      SWAP B TO A
A7XX             STA   ,X        SWAP A TO B
10BE0001         LDY   #1        SET "CHANGE"
BC05FF    ONE70  CMPX  #$5FF     TEST FOR SCREEN END
26XX             BNE   ONE10     GO IF NOT ONE PASS
10BC0000         CMPY  #0      TEST CHANGE FLAG
26XX             BNE   HUNDRD  GO IF CHANGE OCCURRED
```

Now let's tackle the branches. In the last column, we learned that branches use a relative addressing mode, which adds the current location to a displacement field in the instruction. To hand code this value, do the following: For a forward branch, start at 0=next instruction after the

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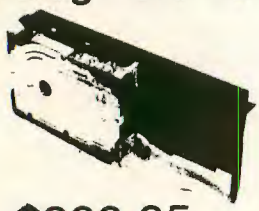

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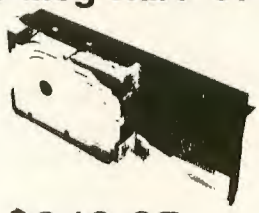

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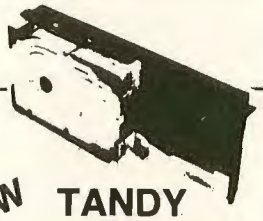

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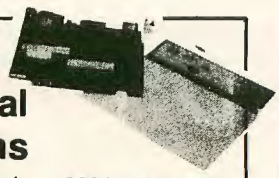

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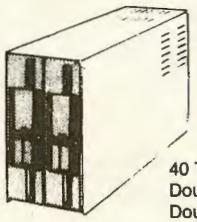

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branch and add one for each following byte. For a backward branch, start at the $FF=second byte of the branch and subtract one for each of the above. Thus, if BNE ONE10 branches back 21 bytes, start at FF (the second byte of BNE), and move back in the following manner: FF, FE, FD, FC, FB, FA, F9, F8, F7, F6, F5, F4, F3, F2, F1, F0, EF, EE, ED, EC to EB (first byte of LDA). The machine language commands would look like this:

```
8E0400      HUNDRD LDX   #$400   POINT TO SCREEN
10BE0000           LDY   #0      SET CHANGE FLAG TO 0
A6XX        ONE10  LDA   ,X+       GET FIRST ENTRY
A1XX               CMPA  ,X       COMPARE TO I+1
230A               BLS   ONE70    GO IF ENTRY I GE ENTRY I+1
E6XX               LDB   ,X       GET SECOND ENTRY
E7XX               STB   -1,X     SWAP B TO A
A7XX               STA   ,X       SWAP A TO B
10BE0001           LDY   #1       SET "CHANGE"
8C05FF      ONE70  CMPX  #$5FF    TEST FOR SCREEN END
26EB               BNE   ONE10    GO IF NOT ONE PASS
10BC0000           CMPY  #0      TEST CHANGE FLAG
26DE               BNE   HUNDRD   GO IF CHANGE OCCURRED
```

Now we can fill in the second byte of the *indexed* instructions. These are a bit tricky. You must note what type of indexing is being used and whether there's a displacement value. You must also code in the index register field, RR. Here the code value for the index register is 00, for X. The trickiest coding is for the STB -1,X, which is coded as 00011111. The RR register code is 00, so the result is 00011111. The five-bit field holds the displacement value of 111111, equal to -1 in two's complement notation.

```
8E0400      HUNDRD LDX   #$400   POINT TO SCREEN
10BE0000           LDY   #0      SET CHANGE FLAG TO 0
A680        ONE10  LDA   ,X+       GET FIRST ENTRY
A1B4               CMPA  ,X       COMPARE TO I+1
230A               BLS   ONE70    GO IF ENTRY I GE ENTRY I+1
E6B4               LDB   ,X       GET SECOND ENTRY
E71F               STB   -1,X     SWAP B TO A
A7B4               STA   ,X       SWAP A TO B
10BE0001           LDY   #1       SET "CHANGE"
8C05FF      ONE70  CMPX  #$5FF    TEST FOR SCREEN END
26EB               BNE   ONE10    GO IF NOT ONE PASS
10BC0000           CMPY  #0      TEST CHANGE FLAG
26DE               BNE   HUNDRD   GO IF CHANGE OCCURRED
```

Finding a Place for the Code

Now that we have the code, we need to know where to put it. If we use assembly language code with BASIC, we must place the code out of harm's way. We don't want BASIC to clobber the machine language bytes as it stores variables or internal variables. One way to do this is by using the CLEAR command in BASIC. This command allocates string space and protects a block of memory. For example, CLEAR 300,&H3EFF allocates 300 bytes of string space and protects all memory above $3EFF — just a little under the 16K point. There's still enough room for BASIC to function in the memory under this point.

There are other places we *could* put the machine language bytes (such as in the middle of large arrays or in strings), but this is the safest place — a place that will never be touched by BASIC.

Now that we know where the machine language bytes go, we can assign locations to each of the instructions. Because some instructions refer to absolute memory locations (such as LDA CONSNT, instruction locations should be assigned *after* making the skeleton of instruction lengths. We are going to do it now. (We are lucky that the program above is relocatable anywhere in memory — it contains no absolute addresses.)

We can see from the code shown in Figure 2 that the machine language bytes occupy memory from $3F00 to $3F21. Now, how do we get them there? Assuming that we're

```
3F00  8E0400      HUNDRD  LDX   #$400   POINT TO SCREEN
3F03  10BE0000            LDY   #0      SET CHANGE FLAG TO 0
3F07  A680        ONE10   LDA   ,X+       GET FIRST ENTRY
3F09  A1B4                CMPA  ,X       COMPARE TO I+1
3F0B  230A                BLS   ONE70    GO IF ENTRY I GE ENTRY I+1
3F0D  E6B4                LDB   ,X       GET SECOND ENTRY
3F0F  E71F                STB   -1,X     SWAP B TO A
3F11  A7B4                STA   ,X       SWAP A TO B
3F13  10BE0001            LDY   #1       SET "CHANGE"
3F17  8C05FF      ONE70   CMPX  #$5FF    TEST FOR SCREEN END
3F1A  26EB                BNE   ONE10    GO IF NOT ONE PASS
3F1C  10BC0000            CMPY  #0      TEST CHANGE FLAG
3F20  26DE                BNE   HUNDRD   GO IF CHANGE OCCURRED
3F22
```

Figure 2

going to be working in BASIC, we can use the BASIC POKE statements to move any type of data anywhere we want within the 64K addressing space of BASIC. The easiest way to do this is to list the data in DATA statements and then to use a loop to move the data:

```
900 CLEAR 300, &H3EFF
1000 DATA &H8E,&H04,&H00,&H10,&H8E,&H00, &H00,
&HA6
1001 DATA &H80,&HA1,&H84,&H23,&H0A,&HE6, &H84,
&HE7
1002 DATA &H1F,&HA7,&H84,&H10,&H8E,&H00, &H01,
&H8C
1003 DATA &H05,&HFF,&H26,&HE8,&H10,&H8C, &H00,
&H00
1004 DATA &H26,&HDE
1010 FOR I = &H3F00 TO &H3F21: READ A: POKE I, A:
NEXT
```

The loop at Line 1010 moves the 22 bytes of data into the $3F00 protected area.

Next, now that we have the machine language code there, how do we get to it? Here again, BASIC has the answer. The DEFUSR statement defines where the code is. There's an ID number attached to this statement so it becomes DEFUSR0 - DEFUSR9, but since we have only one machine language program we'll use DEFUSR0. Once defined, the code is called by a USR0 statement, which tells the BASIC interpreter to use the defined location and transfer control to the machine language program found there:

```
900 CLEAR 300, &H3EFF
1000 DATA &H8E,&H04,&H00,&H10,&H8E,&H00, &H00,
&HA6
1001 DATA &H80,&HA1,&H84,&H23,&H0A,&HE6, &H84,
&HE7
1002 DATA &H1F,&HA7,&H84,&H10,&H8E,&H00, &H01,
&H8C
1003 DATA &H05,&HFF,&H26,&HE8,&H10,&H8C, &H00,
&H00
1004 DATA &H26,&HDE
1010 FOR I = &H3F00 TO &H3F21: READ A: POKE I, A:
NEXT
1020 DEFUSR0 = &H3F00
1030 A=USR0(0)
1040 GOTO 1040
```

We are now all set to call the program, or are we? Once the program is executed, what will happen? The last instruction was a BNE. It branches back to the beginning of the bubble sort if the data is not sorted. However, if the data *is* sorted, the next instruction in sequence is executed. But there is no next instruction. Since the next instruction will be garbage, the program will probably blow up in some strange loop after the sort is done.

After the sort let's return to a BASIC calling program by

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using a stack (described last month). The stack saves the return address of a control point in the BASIC interpreter. We can pop that return address by including a 6809 RTS (Return from subroutine) instruction as the *last* instruction of the machine language code as shown in Figure 3.

"Assembly language is tedious, and it is hard to learn. But if you want to do things that you just can't do in compiled languages, assembly language is the only way to go."

We'll have to include that in the storage portion of the BASIC program as well:

```
900 CLEAR 300, &H3EFF
1000 DATA &H8E,&H04,&H00,&H10,&H8E,&H00, &H00,
&HA6
1001 DATA &H80,&HA1,&H84,&H23,&H0A,&HE6, &H84,
&HE7
1002 DATA &H1F,&HA7,&H84,&H10,&H8E,&H00, &H01,
&H8C
1003 DATA &H05,&HFF,&H26,&HEB,&H10,&H8C, &H00,
&H00
1004 DATA &H26,&HDE,&H39
1010 FOR I = &H3F00 TO &H3F22: READ A: POKE I, A:
NEXT
1020 DEFUSR0 = &H3F00
1030 A = USR0(0)
1040 GOTO 1040
```

Now we *are* all set to run the sort. The USR0 will transfer control to the machine language code; the screen sort will be done; the RTS will return control to BASIC. BASIC will execute the next instruction after the USR0 that is, in this case, a continual loop so screen result is not disturbed.

If you run this code, you'll see a rapid sort of the screen. This is several times faster than the equivalent BASIC code, and *speed* is the reason that assembly language is used.

Assembler Assembling

You can see that it is possible to hand assemble machine language code. However, it's very tedious. Grace Hopper, the major force behind COBOL, says that it's almost impossible to assemble a string of 40 ones and zeroes and not make a mistake. For this reason, it's much easier to assemble the code automatically. The symbolic code:

```
HUNDRD  LDX     #$400    POINT TO SCREEN
        LDY     #0       SET CHANGE FLAG TO 0
ONE10   LDA     ,X+        GET FIRST ENTRY
        CMPA    ,X         COMPARE TO I+1
        BLS     ONE70      GO IF ENTRY I GE ENTRY I+1
        LDB     ,X         GET SECOND ENTRY
        STB     -1,X       SWAP B TO A
        STA     ,X         SWAP A TO B
        LDY     #1         SET "CHANGE"
ONE70   CMPX    #$5FF      TEST FOR SCREEN END
        BNE     ONE10      GO IF NOT ONE PASS
        CMPY    #0       TEST CHANGE FLAG
        BNE     HUNDRD   GO IF CHANGE OCCURRED
        RTS              RETURN TO BASIC
```

is entered into the assembler program. This *source code* is the actual assembly language. The assembler then proceeds in the same way that we proceeded in hand assembling. It makes one pass through the lines of code, allocates space for

```
3F00   8E0400       HUNDRD  LDX     #$400    POINT TO SCREEN
3F03   108E0000             LDY     #0       SET CHANGE FLAG TO 0
3F07   A680         ONE10   LDA     ,X+        GET FIRST ENTRY
3F09   A184                 CMPA    ,X         COMPARE TO I+1
3F0B   230A                 BLS     ONE70      GO IF ENTRY I GE ENTRY I+1
3F0D   E684                 LDB     ,X         GET SECOND ENTRY
3F0F   E71F                 STB     -1,X       SWAP B TO A
3F11   A784                 STA     ,X         SWAP A TO B
3F13   108E0001             LDY     #1         SET "CHANGE"
3F17   8C05FF       ONE70   CMPX    #$5FF      TEST FOR SCREEN END
3F1A   26E8                 BNE     ONE10      GO IF NOT ONE PASS
3F1C   108C0000             CMPY    #0       TEST CHANGE FLAG
3F20   26DE                 BNE     HUNDRD   GO IF CHANGE OCCURRED
3F22   39                   RTS              RETURN TO BASIC
3F23
```

Figure 3

each instruction and assigns opcodes. It also builds a symbol table of all labels and symbols in the code. The symbol table for this code would look like this:

```
HUNDRD      $3F00
ONE10       $3F07
ONE70       #3F17
```

The assembler now makes a second pass and fills in opcodes, displacements, and absolute addresses. The result is *object code* that looks much like the machine language code we generated. This object code is usually loaded by a *loader*, resulting in true machine language code — ones and zeroes.

If you understand what's happening in the process above, the assembler won't pose any problems for you. Assemblers have a few more commands called *pseudo-operations* or *pseudo-ops* that allow you to define the origin of the program, allocate space for constants or define constants, define text strings, etc., but these are relatively easy to understand.

As I mentioned in the previous column, one of the best assemblers for the CoCo was Disk *EDTASM*. I say *was* because Radio Shack has discontinued it. Disk *EDTASM* was like *Turbo PASCAL* for the PC compatibles — it operated in a highly interactive environment that allowed you to edit a program, quickly assemble it *in memory* and then debug the assembled code, all in the same program. It was a one-step process. If you want to learn assembly language, I suggest that you look for a copy of this. Once you *know* assembly language, the assembler you use is not as critical, but Disk *EDTASM* is a great learning tool.

A Second Example

Let's try a second example:

```
100 CLS 110 X = 16: Y = 8
120 DX = 1: DY = 1
130 L = &H400 + 8 * 32 + 16
140 X = X + DX
150 Y = Y + DY
160 IF ( X < 0 OR X > 31 ) THEN DX = -DX: X = X + DX
170 IF ( Y < 0 OR Y> 14 ) THEN DY = -DY: Y = Y + DY
180 POKE &H400 + L, 96
190 L = Y * 32 + X
200 POKE &H400 + L, 79
210 GOTO 140
```

This BASIC code clears the text screen and then moves an 'O' around inside the screen on a diagonal path. As the 'O' is moved, the old position is erased. The effect is like the cursor in an old *Pong* game — the cursor bounces around within the screen.

As in the first example, each poke is used to set characters on the screen directly. Character 96 is a space, which clears the character position. Character 79 is an uppercase 'O'. Variable X, the column, varies from 0 to 31. Variable Y, the row, varies from 0 to 14. Using up to 15 rows traces the same path, and the display is not very interesting.

The variables DX and DY are the increments to add to X and Y. At the start, the increments are one and one, which results in the movement of one character position over and one down. When Character O hits the side of the screen, however, one or both of the increments are changed by negation. This changes the direction of the move. Both change at a corner.

How would this be coded in assembly language? The assembly language program for this is shown in Listing 1. It follows the same logic as the BASIC program. As you can see, this is an *EDTASM+* (Disk *EDTASM*) listing. The source code (the text) contains the pseudo-op ORG to set the origin to $3F00 and several FCB pseudo-ops to initialize variables. Otherwise, you'll find it easy to follow. The listing also includes absolute addresses in some of the instructions, unlike our first example. Variables XR, YR, DX, and DY are located in absolute addresses.

The BASIC code for the program is shown in Listing 2. It uses the same scheme of relocation by DATA values we used in the first example. There is no RTS; however, the display runs continuously (reset to regain control). If you run the program, you'll be amazed — nothing shows up on the screen. Why?

This program is so much faster than the BASIC version that the 'O' is moving too fast to be seen. If you don't believe me, substitute &H12, &H12 for the &HA7, &HB4 in Line 180. This will prevent the old character from being erased. Now when you run the program you see the screen fill up with O's as the "cursor" moves around the entire screen in the wink of an eye.

This is a very brief introduction to assembly language. Assembly language is tedious, and it is hard to learn. But if you want to do things that you just can't do in compiled languages, assembly language is the only way to go.

See you next month with more CoCo topics. □

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Listing 1: PONGBIN

```
3FØØ                ØØ1ØØ          ORG     $3FØØ
3FØØ 8E   Ø51Ø      ØØ11Ø PINGPO   LDX     #$51Ø    X=16, Y=8
3FØ3 B6   3F4F      ØØ12Ø PPM      LDA     XR       X
3FØ6 BB   3F51      ØØ13Ø          ADDA    DX       X=X+DX
3FØ9 2C   Ø6        ØØ14Ø          BGE     PP1      GO IF GE Ø
3FØB 7Ø   3F51      ØØ15Ø          NEG     DX       FLIP X DIRECTION
3FØE BB   3F51      ØØ16Ø          ADDA    DX       BACK
3F11 81   1F        ØØ17Ø PP1      CMPA    #31      TEST
3F13 2F   Ø6        ØØ18Ø          BLE     PP2      GO IF GT 31
3F15 7Ø   3F51      ØØ19Ø          NEG     DX       FLIP X DIRECTION
3F18 BB   3F51      ØØ2ØØ          ADDA    DX       BACK
3F1B F6   3F5Ø      ØØ21Ø PP2      LDB     YR       SAME FOR Y IN B
3F1E FB   3F52      ØØ22Ø          ADDB    DY
3F21 2C   Ø6        ØØ23Ø          BGE     PP3
3F23 7Ø   3F52      ØØ24Ø          NEG     DY
3F26 FB   3F52      ØØ25Ø          ADDB    DY
3F29 C1   ØE        ØØ26Ø PP3      CMPB    #14
3F2B 2F   Ø6        ØØ27Ø          BLE     PP4
3F2D 7Ø   3F52      ØØ28Ø          NEG     DY
3F3Ø FB   3F52      ØØ29Ø          ADDB    DY
3F33 B7   3F4F      ØØ3ØØ PP4      STA     XR       STORE NEW X
3F36 F7   3F5Ø      ØØ31Ø          STB     YR       STORE NEW Y
3F39 86   6Ø        ØØ32Ø          LDA     #96      BLANK
3F3B A7   84        ØØ33Ø          STA     ,X       ERASE OLD
3F3D 86   2Ø        ØØ34Ø          LDA     #32      A=32,B=Y
3F3F 3D             ØØ35Ø          MUL              Y*32
3F4Ø F3   3F4E      ØØ36Ø          ADDD    XR-1     Y*32+X
3F43 C3   Ø4ØØ      ØØ37Ø          ADDD    #$4ØØ    ADD START OF SCREEN
3F46 1F   Ø1        ØØ38Ø          TFR     D,X      NOW IN X
3F48 86   4F        ØØ39Ø          LDA     #79      O
3F4A A7   84        ØØ4ØØ          STA     ,X       IN NEW POSITION
3F4C 2Ø   B5        ØØ41Ø          BRA     PPM      CONTINUOUS LOOP
3F4E      ØØ        ØØ42Ø          FCB     Ø
3F4F      1Ø        ØØ43Ø XR       FCB     16       MUST BE 16 BITS
3F5Ø      Ø8        ØØ44Ø YR       FCB     8
3F51      Ø1        ØØ45Ø DX       FCB     1
3F52      Ø1        ØØ46Ø DY       FCB     1
          ØØØØ      ØØ47Ø          END

ØØØØØ TOTAL ERRORS
```

Listing 2: PONGBAS

```
1ØØ CLEAR 3ØØ,&H3EFF
11Ø DATA &H8E,&HØ5,&H1Ø,&HB6,&H3
F,&H4F,&HBB,&H3F
12Ø DATA &H51,&H2C,&HØ6,&H7Ø,&H3
F,&H51,&HBB,&H3F
13Ø DATA &H51,&H81,&H1F,&H2F,&HØ
6,&H7Ø,&H3F,&H51
14Ø DATA &HBB,&H3F,&H51,&HF6,&H3
F,&H5Ø,&HFB,&H3F
15Ø DATA &H52,&H2C,&HØ6,&H7Ø,&H3
F,&H52,&HFB,&H3F
16Ø DATA &H52,&HC1,&HØE,&H2F,&HØ
6,&H7Ø,&H3F,&H52
17Ø DATA &HFB,&H3F,&H52,&HB7,&H3
F,&H4F,&HF7,&H3F
18Ø DATA &H5Ø,&H86,&H6Ø,&HA7,&H8
4,&H86,&H2Ø,&H3D
19Ø DATA &HF3,&H3F,&H4E,&HC3,&HØ
4,&HØØ,&H1F,&HØ1
2ØØ DATA &H86,&H4F,&HA7,&H84,&H2
Ø,&HB5,&HØØ,&H1Ø
21Ø DATA &HØ8,&HØ1,&HØ1
22Ø FOR I=&H3FØØ TO &H3F52: READ
 A: POKE I,A: NEXT I
23Ø FOR I=&H3FØØ TO &H3F52: PRIN
T HEX$( PEEK( I ) );" ";: NEXT I
24Ø CLS
25Ø DEFUSRØ = &H3FØØ
26Ø A = USRØ( Ø )
```

Accessible Applications

Introducing the OS-9 Team

By Richard A. White
Rainbow Contributing Editor

Last month, we discussed some general operating system ideas and the ways in which OS-9 differed from them. All operating systems must connect the computer's computing and memory areas to its input and output components. An operating system provides the connections to the outside world. Most operating systems hide this connecting code in a program that is loaded when the computer is booted.

Because you seldom need to know this code, you would not need to know its location. There is a problem, however, if the operating system is not set up for new hardware you want to add.

One solution to this problem is buying a new version of the operating system. Owners of MS-DOS machines have done this many times. ("Want a hard disk? Fine. But Version 2.1 of DOS won't work with this. A 3.1 will work just fine. $50 please. You only have 256K of RAM? That's a little small for Version 3.1. Oh, it will fit fine, but nothing else will fit with it. For $250 we have this memory upgrade board to take you to 640K.")

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.*

OS-9 was designed to handle such situations without causing the trauma that other systems cause. Higher-performance options are not quite free, but the cost is compensated by the intellectual challenge. OS-9 can be altered so easily because the user can get to each of the operating system modules and change or replace them, or add others. In this article, we will discuss why and how you make changes in your OS-9 system.

Modules

There is a distinction between user and system modules. While user modules are loaded and used after booting a system, system modules are included in the kernel and boot files. Kernel files contain the programs that start and manage the system's operation. Input and output (I/O) files communicate with attached hardware. All system modules should be in the kernel or in `OS9Boot`. As we go along, note which modules should be in `OS9Boot` and which should not. Under Level II, the kernel includes `REL`, `Boot`, `OS9p1`, `OS9p2`, `Init`, `CC3Go` and `Clock`. The first three are stored on Track 34 of the boot disk and are loaded when you type `DOS` to start up OS-9. `REL` resets the system hardware, prepares it for OS-9 and calls `OS9p1`. `OS9p1` initializes the system, and `Boot` loads `OS9Boot`.

`Init`, `OS9p2`, `CC3Go` and `Clock` must be in your `OS9Boot` file. `Init` is not a program. It is a data module containing system constants. `OS9p2` handles memory management, the module directory and functions associated with module management, and process control. This is the heart of multitasking capability in OS-9. `CC3Go` now loads *Shell* and *GrfDrv*, establishes communications with *Shell* and starts the `StartUp` file.

Shell handles communication between you and the computer. The program interprets commands that are typed in and calls the proper operating system code to execute them. Though not part of the operating system, it may be considered an application program that interfaces with the operating system. *Shell* is designed to be loaded separately from `OS9Boot` as is *GrfDrv*. Do *not* put either of these into your `OS9Boot`.

Shell's input may come from sources other than the keyboard. Input can also be redirected from any source managed by OS-9. Typically, alternate input comes from a disk file containing commands identical to those typed from the keyboard. The `StartUp` file is one such disk file. But `CC3Go` automatically starts the process of reading this file on boot. *Shell* interprets commands from `StartUp` as if they had been typed. A simple `StartUp` file provided with OS-9 sends a welcome message to the screen and runs `Setime` to set `Clock` to the present date and time. `StartUp` can be quite long. Mine exceeds 50 lines.

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 or disk) to:

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Managers and Submanagers

We have discussed some of the OS-9 modules that get things started, but other modules that have been involved deserve our attention. The `StartUp` file was read in. The modules that manage system startup need help reading it. The `Boot` module contains enough code to find and read in `OS9Boot`, but any other disk access is beyond its capability. It finds `OS9Boot` by its length. `Boot` reads sectors in sequence looking for `OS9Boot`'s length. If `OS9Boot` were split into two parts, `Boot` would be defeated. `StartUp` may be anywhere on the disk and may be split into separated sectors. A more competent disk handler than `Boot` is needed.

"OS-9 can be altered so easily because the user can get to each of the operating system modules and change or replace them, or add others."

All data transfer from and to the computer's hardware (drives, printer and terminal) is managed by the I/O manager called `IOMan`. In addition, `IOMan` takes care of communications between processes — tasks that do not involve hardware but have functional similarities. To accomplish its role, `IOMan` uses three submanagers that are designed to handle different types of communications.

The simplest type of communication is a stream of characters. The keyboard generates such a stream, which is irregular and unpredictable in terms of when characters are sent and how characters are grouped. The computer deals with the characters one at a time as they are presented to it. This stream is called a sequential character file and its submanager is named `SCF`. The screen, printer and modem are also `SCF` devices. `SCF` can handle any number of these devices and is limited only by what can be attached to a CoCo.

Disk drives are organized into blocks of data called sectors. When a disk is read, a block of data of known size (256 bytes on the CoCo) is loaded in. A block of memory must be received, stored in a defined area of memory (the buffer). It must then be read (out of the buffer), as needed, to the using application in the character stream. Because the sectors containing the required data may be distributed at random locations on the disk, the submanager must read the disk's file allocation table and determine the sectors and the order it needs to call. This submanager's basic function is to handle random blocks. The submanager's name, `RBF`, refers to random block files.

`RBF` manages any storage device based on blocks of data, including floppy disks, hard drives and RAM disks. Compare this with `Boot`'s disk access code that reads in `OS9Boot`. `Boot` can only find where `OS9Boot` starts on a disk and the number of contiguous sectors it occupies. If `OS9Boot` is divided into parts that are at different locations on a disk, `Boot` cannot operate. For this reason, always use a newly formatted disk to make a new boot disk so that `OS9Boot` will *not* be saved in two places.

Communications between processes have complexities all their own. The sending process cannot generate data faster than the receiving process can handle it. The submanager controlling the process must know the needs of the receiving process and control the sending process so that it does not exceed these needs. In this respect, this submanager is like `RBF`, which ensures that the data rate does not exceed the storage rate of the storage device. However, there is no block organization to the data. The process of transferring data from one operating process to another is called piping; therefore, the submanager is named `PipeMan`.

Drivers

Human managers organize, direct and control, but seldom do any of the actual work that makes something happen. OS-9 managers and submanagers are no different. Their management duties are all they can handle, and they need help carrying out their functions. Their helpers are called drivers, and these do the actual work of transferring data to and from processes and hardware.

The standard device drivers supplied with OS-9 are `CC3IO` (handles the terminal functions), `CC3Disk` (handles floppy disks), `Piper` (works with pipes), `Printer`, `RS-232` and `Modem`. `ACIAPAK` replaces `RS-232` if you use the RS-232 in your Multi-Pak Interface. Most specialized hardware use special

drivers. The hard disk, for instance, requires an additional driver. Like CC3Disk, this driver works with RBF.

If the basic OS-9 design philosophy is followed, a driver can handle a variety of similar devices having different characteristics. Floppy drives, for example, have changed drastically in the last eight years. When the first CoCo came out, a 5¼-inch drive was typically a single-sided, single-density, 35-track device that stored less than 100K. The first CoCo drive added double-density, 156K storage. A friend who owned a Model I told me I would only need four or five disks because of their large capacity. I almost believed him.

A couple of years later, double-sided, 40-track drives were standard on IBM PC's. Now single-sided drives are not even made, and 3½-inch drives that store 720K are common.

When Radio Shack brought out OS-9 Level I for the CoCo, it must have believed my friend. The disk driver was hard-coded to use 35-track, single-sided disks only. This change in OS-9 design made it impossible to use larger drive capacities with the stock driver. How should it have been done?

With OS-9, the driver obtains the characteristics of a device from a data module (a device descriptor) each time it needs to access that device. This is what Level II CC3Disk does. The device descriptors carry the names used to call the drive. If you want to load a program in the CMDS directory on disk 1, you type LOAD/D1/CMDS/MYPROG. *Shell* interprets this request and sends it to RBF, which works with CC3Disk to load the file. A first step is to read the drive characteristics from the device descriptor module, D1.

The characteristics stored in a device descriptor are the maximum capabilities of the drive. They tell OS-9 nothing about how the disk in that drive is formatted. The specifics about the disk itself are read from the disk and compared with the capacity given by the descriptor. As long as the disk characteristics are equal to or less than those reported by the descriptor, the disk can be read and written. So a 35-track, single sided disk works just fine in a 40-track, double-sided drive.

As noted, Level II comes with CC3Disk, which uses its device descriptors to determine the capabilities of each drive. It also comes with various pre-made device descriptors covering some of the more popular drive choices. Not all possible descriptors are provided, and Murphy's Law requires that at least one that you want will not be there. For example, there is no 40-track single-sided descriptor. If you have such a drive, you can use the 35-track descriptor but not use the last five tracks. There are descriptors for the current standard 5¼-inch drive, which is 40-track, double-sided with a 6-ms step rate.

One of the favorite pastimes of OS-9 addicts is hacking the code. That means changing modules to make them better (though a pessimist, in a fit of kindness, might say to make them different). This has led to all sorts of patches, modified modules, rewritten modules and programs to do some of this. OS-9's database on Delphi is full of such information. Some of the information is quite useful. One in particular, *DMode* by Kevin Darling, provides a way to patch a module that is on a disk. With *DMode* and information in the OS-9 manuals, you can make any device descriptor you need.

Programs to make device descriptors

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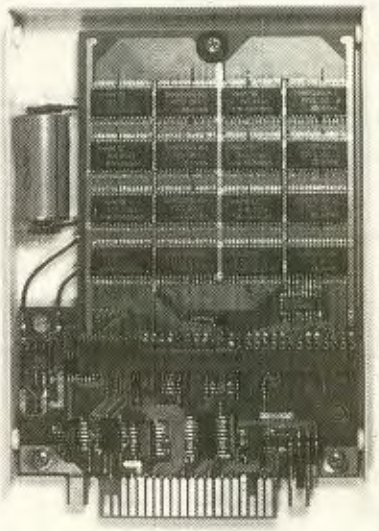

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are included in commercial packages such as *SDisk*. There are ways to do whatever is needed. When I installed my 3½-inch drive, I only needed to make a device descriptor and a new OS9Boot that included the descriptor.

CC3Disk cannot manage a hard drive, so a new driver is needed. Hard drive suppliers provide drivers with their packages and descriptors when appropriate. The user must make a new OS9Boot, which includes these modules, and proceed with the installations — it takes a little more than just a new boot. Burke & Burke began by providing only an interface and software, leaving users to supply their own hard drive. Thus, a wide variety of drives can be used. To solve the descriptor problem, Chris Burke wrote a program to make a descriptor that matches the drive used. This is fine for a person who can get a real deal on an older drive and the data to make the descriptor. However, it is a problem for the non-technical person. Burke & Burke now provides a complete package.

Next we have Printer and its descriptor P, which drives a printer through the serial port. Unless you have a very old printer, you will want to run it faster than the 600-baud default rate. OS-9 provides Xmode to change SCF descriptors. Initially, run Xmode at the beginning of a session by typing Xmode /p baud=4 to run at 2400 baud. (I have a serial-to-parallel converter, so I use Xmode /p baud=6 and work at 9600 baud.) Next, automate the procedure by putting the Xmode statement in your StartUp file. It will look exactly as you would type it from the keyboard, but it takes a few seconds for Xmode to load and run — a waste of precious time. So, the final step in the automation is to make a new boot using P after you have changed it with Xmode. (More about that in a later column.

Use Xmode to change the 300-baud default of T1 or T2 as well. These descriptors work with RS-232 and the serial port, or the ACIAPAK and the RS-232 Pak respectively.

The last I/O system to be discussed is the terminal made up of your keyboard and your video display. In Level I, this was pretty simple. It consisted of the driver CCIO and the device descriptor TERM. With the arrival of the CoCo 3, a number of people wrote 80-column drivers, which were made available on information services like Delphi and allowed us to use the 80-column screen before the release of OS-9 Level II. Here, again, new hardware required only a new driver and a new device descriptor.

OS-9 Level I does not provide graphics support, but the BASIC09 package for Level I supplies a graphics interface module, Gfx. This is an assembly language program that handles both color graphics and joystick functions. Gfx is loaded, either before running BASIC09 or by a Shell statement in the program, and then called by the program with the BASIC09 RUN statement. Like *Shell*, Gfx can be viewed as an applications program that interfaces with the operating system. Remember that all applications programs must be loaded separately and never be put into your OS9Boot.

One of the real strengths of OS-9 Level II is its windowing and graphics capabilities. The windowing capability coupled with multitasking sets OS-9 apart from all other microcomputer operating systems. (The much ballyhooed OS-2 for PC Compatibles lacks windowing, though windows will be provided by either Microsoft *Windows* or IBM's *Presentation Manager.*)

The modules involved in windows and graphics fit into the OS-9 pattern. As always, there is a driver, CC3IO, and a number of device descriptors. Each active window needs a separate device descriptor, but you can have more descriptors in your boot than you have active windows. In fact, you should so there are free descriptors for the new windows you open. Think of each window as a separate terminal, available to run its own program.

Two basic window device descriptors should be in your boot: TERM, a 32- or 40-character display in which OS-9 boots up, and W, a generic descriptor is not used alone to run a window.

Your OS-9 option may have additional window descriptors in your boot, generally named W1, W2, etc. W1 through W7 come with OS-9 Level II, and several are pre-configured. W8 through W15 come with *Multi-Vue*. Additional descriptors are available from the Delphi OS-9 Database, or can be made by you. Six or eight descriptors are generally sufficient; 15 is more than most people need.

Level II provides the major graphics capabilities available from the *Shell* level. To accomplish this, you need an interface module for your OS9Boot and an application program named GrfDrv, which OS-9 automatically loads on boot. Two interface modules, VDGInt and GRFInt, come with Level II. VDGInt interface provides the CoCo 1 and 2 with 192-by-256 pixel graphics and a 32-character screen when using the TERM window. To use 40- or 80-character windows and the CoCo 3's high resolution graphics, GRFInt must be in your boot. The Config program lets you choose which interface to include in your boot, but you can include both. WindInt is an enhanced version of GRFInt that comes with *Multi-Vue*. It should replace GRFInt if you use it.

Remember, GrfDrv is a graphics application program required by Level II and automatically loaded at boot. It must *not* be in your OS9Boot. Like *Shell*, GrfDrv provides functions the system needs to handle the screen, but it is not part of the operating system.

The Summary

Those are the OS-9 system modules, supporting application modules and their basic functions. To end, let us summarize the principle differences between Level I and Level II.

- Many of the Level I modules are unchanged in Level II. The kernel of the operating system was changed to deal with the expanded memory and its GIME memory manager chip.
- CC3Disk replaced the CCDisk of Level I and reads the disk drive device descriptors. CC3Disk lets you fully customize your system to your drive.
- CC3IO is the new keyboard and video graphics device driver that deals with the window device descriptors.
- GrfDrv is an entirely new program containing a complete set of graphics primitives accessible from the keyboard, batch files or machine language programs. There are few limits: If you want 15 windows, you can have 15 windows. Each will support what is, in effect, a separate terminal with a separate application running or ready to run.
- If you get a hard disk, describe it in a device descriptor and add it, and its driver, to your boot.

There is a lot of effort involved in learning how to set up and use OS-9. Actually, the setup is the hard part. A StartUp file can load program modules, initialize windows, start applications and hand the user a machine that is ready to edit text, work on a spreadsheet, and call up a Bulletin Board System at the press of the CLEAR key. The investment comes in learning to configure the boot, write StartUp files and do this work. Those not wanting to make this investment in time may not want to dabble in OS-9. But who knows when they will change their minds?

Another Cry for Standards

By Dale L. Puckett
Rainbow Contributing Editor

This month's column will explain why a standard, intuitive user interface is needed in OS-9 application programs and will present a listing of Bill Brady's FMenu, a procedure file that modifies OS-9 Level I CCDisk drivers and a format utility that recognizes and uses double-sided disk drives. I'll pass along a small correction to last month's *Gfx3* listing and give you a few lines of code that put the new functions to good use.

Designed With the User in Mind

Why do we keep coming back to standards? Most of us buy a CoCo because we have a job for it to do. However, after we bring it home, we discover that it can do *many* jobs. Unfortunately, every time we buy a new software package, we have to learn how to run the CoCo again. This is neither fair nor productive.

For OS-9 to survive in the CoCo market, the number of application programs must rival the number available for Disk BASIC-based Color Computers. Moreover, these new applications must be easier to use than the present crop of Disk BASIC programs, and they all must work the same way.

Tandy recognized the problem several years ago and had Microware develop *Multi-Vue*. Now we must force the software developers (who depend on us to buy their products) to use *Multi-Vue* and create a standard way to do everything that a program must do. We must also insist that the forum SysOps (whose royalty checks depend on the time we use their databases) show others how to use *Multi-Vue* so that our hackers can standardize and enhance the public domain software they make available to us.

We can't insist that newcomers to OS-9 learn to use its internal power. Everyone would be better off if this work were done inside all OS-9 application programs. Indeed, the millions of CoCo owners now stuck with Disk BASIC applications might join us if they could use OS-9 to do their work without learning a new routine for every application.

Wouldn't we rather sell our application software to a base of several million users than to three or four thousand hackers? Don't we need the money?

Take this indictment seriously, but don't absorb too much guilt. After all, the MS-DOS world suffers from the same problem. When you buy a new MS-DOS application program for your business, you still need to send your employees to school for two or three days — and pay the expert $695 per employee for the honor.

However, MS-DOS machines are generally owned by large companies that can afford to pay for this training. CoCo owners, on the other hand, can barely afford the price of new software. (They certainly can't afford the time to learn excessively complex operating system details that have nothing to do with the work at hand.) We must hide these complexities from these CoCo owners if we want them to use our products and buy OS-9 application software.

During a recent conversation with a Tandy official, I asked if there was anything new and exciting on the horizon. "New and exciting?" he asked. "We've made the tools available. Now, we're anxiously waiting to see what people do with them." How can we ignore this challenge?

Model for Future OS-9 Applications

Bill Brady addressed the OS-9 standards problem best when he said, "After you learn your 50th piece of software, you lose interest." That may be the reason you only need to double click on a *Multi-Vue* icon to run *WizPro*. It's quite relaxing to lean back and watch

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VizPro connect you to your favorite bulletin board or forum. *WizPro* is an important product with an impressive list of features. The program's most important feature, however, is the standard it sets for future OS-9 application software — especially in the user-interface arena.

Brady has always encouraged fellow developers to release software that's intuitive and friendly. The CoCoBin standard he designed and placed in the public domain is a perfect example. Yet, many of the people who should promote this move toward an intuitive and detail-free user interface, discourage and prevent its growth.

I write this after downloading my first CoCoBin XModem file from GEnie recently. Brady, the OS-9 SysOp on GEnie, had E-Mailed me an updated pre-alpha version of *WizPro*. After starting the XModem download, I instructed *WizPro* to receive it. A few seconds later, I was amazed when my screen displayed a window that looked like a MacBinary file from one of the many Macintosh bulletin boards.

As if by magic, *WizPro* knew the name of the file it was receiving and the number of blocks in the file. As the download proceeded, *WizPro* kept me informed of the download's progress. Later it saved the program in a file and gave it the name that file had on Brady's computer. CoCoBin also automatically took care of the file attributes and other details I once handled manually. All I had to do was run the new program.

Automatic file transfer is only the beginning. Now that Brady has shipped the alpha test version of *WizPro*, he's installing the full CoCoBin II standard. Now when you download a *Multi-Vue*-based program with *WizPro*, you will receive the program, the *Multi-Vue* AIF file and the icon file for the program — all automatically. When the download is complete, each file will be stored individually. You only need to move the program file to your CMDS directory, the icon file to your CMDS/ICONS directory and the AIF file to any working directory. To run your new program, just double click on the icon.

Once you use *WizPro* to download a file uploaded in CoCoBin format, you'll never want to return to straight XModem. Knowing that we published the CoCoBin standard more than a year ago and the CoCoBin II standard more recently, I asked Bill why CompuServe and Delphi have no files available in this format.

Brady said that the SysOps have been discouraging the use of the CoCoBin standard and seem to prefer that everyone download on XModem. "Unfortunately, after you download a straight XModem file you aren't finished," Bill explained. "Before you can run the program you just downloaded, you must load it into memory and save it to a new file or run the OS-9 verify utility against it. Then you must run the OS-9 Attr utility to set the execute bits on the new file, or you still won't be able to run your new program. Who needs it?" he ended.

"For OS-9 to survive in the CoCo market, the number of application programs must rival the number available for Disk BASIC-based Color Computers."

The Macintosh SIGs on the major national data services were leaders in the creation of the MacBinary standard. The SysOps recognized that it was unnecessarily complicated for the end user to download a file containing a Macintosh application program. They needed a better way. If they didn't find it, their subscribers would stop downloading files. They would lose online time, and worse, their users wouldn't have access to the many new tools that were being developed and placed in the public domain. Our own SysOps should follow this wise decision.

In addition to the CoCoBin standard, Bill Brady has donated other products to the public domain. His WizXmod — a BASIC09 procedure used to add XModem transfer capability to a program — has been available in RAINBOW's Delphi OS-9 Online and other national data services for nearly a year.

FMenu

This month we feature FMenu — a new creation that Brady has put in the public domain. Use FMenu in *WizPro* when you send a file to the host computer. Adding FMenu as a subroutine or procedure to your BASIC09 application program allows you to select a file from any OS-9 directory. The code for FMenu appears in Listing 1.

FMenu works like — though better than — the standard file dialog Apple gives Macintosh users. The standard file dialog box is one of the major reasons every Macintosh application program opens, closes and saves files in a similar manner. If we want OS-9 to survive in today's market, we must create a consistent and intuitive user interface. We can begin this process by including FMenu in our OS-9 programs.

Use FMenu to move up and down a list of files in any directory by striking the up and down arrow keys. When the file you want appears in the window at the bottom of your screen, press ENTER to select it. Brady uses the arrow keys instead of a mouse because the computer cannot display the mouse's position on a text-only screen, and *WizPro* is designed to work in a text window (for increased display speed) or in a graphics window. I suggested that Bill add a GMenu subroutine that would allow mouse selection of files when *WizPro* is run in a graphics window. (I think he agreed.) Perhaps we will soon have GMenu in the public domain as well.

FMenu offers a quick-find feature. Thus, if you *think* you know a filename but you don't know its spelling, type the first few character of the filename. FMenu will move to the first file with a similar name. (You might even find it the first try.) When you select a directory, press ENTER to move into it. You can skip the directory names and move to the filenames by pressing the space bar. You can return to the beginning of the directory you are listing by pressing ALT-up arrow. Pressing ALT-down arrow takes you to the bottom of the directory listing.

***WizPro* — A Closer Look**

When I asked him to define *WizPro*, Brady said, "It's a telecommunications program that does terminal emulation, but those definitions only scratch the surface. *WizPro* is entirely user redefinable. You can run in a text window or a graphics screen. *WizPro* is also user extendible. You can replace any procedure and add new protocols, autopilots and procedure creation programs. You can even add another terminal program as an extension."

Why would you want to modify your terminal program? Hosts and data services often change their protocol. With *WizPro*, you won't have to rewrite an entire *Comms* program to adopt to a new host — you only need to change the extension. Brady feels *WizPro*'s extendibility should remove much of

the delay that follows the changes made by host systems.

Brady also explains why you might add another terminal program as an extension of *WizPro*: "If you really like a particular public domain terminal program, you can run it as an extension of *WizPro*. When you do this, you pick up a few fringe benefits, too. *WizPro* takes care care of all the autologging, record keeping, screen initialization, colors, fonts, etc. — all the dirty work — before it gives control to the other program."

WizPro makes it easy for you to run extension programs, too. When you call these from the menu, *WizPro* passes an initialization string that contains all of the parameters you once had to remember and type at the OS-9 prompt.

What makes *WizPro* different from other terminal programs available on OS-9? According to Brady: "The others are designed to be used in a limited set of circumstances with a specific host or a specific computer and a single baud rate. *WizPro* works with any host at any rate."

Although *WizPro* has grown from the discoveries made during the development and servicing of *Wiz*, *WizPro* does not replace *Wiz*. Rather, the program is designed to combat obsolescence.

WizPro includes mouse pause (or is it mouse paws?) that brings the host to a halt when you click the mouse. Now you'll never watch a message scroll off the screen before you can read it.

`Clipper` is another new feature Brady has added to the program. By pressing ALT-up arrow, you can browse through an 8K buffer that contains the most recently received text. With `Clipper`, you can receive new text online while you view the buffer. You can mark a series of lines and send a snapshot of them to a file, your printer or modem. You can even load the buffer from a file stored on your computer and send a snapshot to the modem or printer.

Brady has improved his conference mode. Now you can use all the control keys except CTRL-X while in the conference mode. Brady can add this function because *WizPro* knows what is happening when it calls an extension. So if you enter `Clipper` while in the conference mode and try to send some text or a file to the host, *WizPro* will switch into the half-duplex time delay mode and send the information. This is the only mode most services will let you use in conference mode. *WizPro* knows that and acts accordingly.

Writing a Program Longer Than 64K

WizPro is so functional because it uses more than 64K of memory (128K of memory in your CoCo 3). Brady shared a few of his secrets with me:

"I can use more than 64K of memory because I overlay procedures and move them in and out of the 64K process space *WizPro* uses," Brady said. "*WizPro* always leaves two 8K blocks of memory free in its 64K process space. All the real-time spacecraft telemetry and command software used by NASA is written in a similar manner."

Through careful design and construction of the program, Brady makes sure that there are always two 8K blocks available. He uses three blocks for data storage, one block as an 8K buffer and two others to hold an additional 4K of *WizPro*'s variables. Out of the eight 8K blocks in a 64K workspace, six blocks have been used. There are two blocks left.

Brady keeps those two 8K blocks free and uses them to run the *WizPro* extension procedures. He switches them into the 64K process space with the BASIC09 `RUN` command. After they have done their job, he switches them out of *WizPro*'s 64K space by using the `KILL` command. Because of BASIC09 and OS-9's excellent design, these extension programs can be located either in the remainder of your CoCo 3's 512K of memory or in a file on one of your disks.

If you want to use Brady's trick to build your own giant BASIC09 programs, you'll need to be aware of one more detail. Brady loads the name of the command he wants to run in a string variable and then runs the string. An example helps clarify this procedure.

First, Brady dimensions a 32-byte string variable named `Proc`. Before *WizPro* calls the XModem procedure, it initializes `Proc` in this manner: `proc:= "XModem"`. The program then runs `Proc` and passes any necessary variables. The command line should read something like this:

```
run proc (paths,colors,flags
. . . fonts, port)
```

The ellipsis in the program line stands for a number of variable names not typed. In some cases, Brady passes 23 variables to a *WizPro* extension procedure. When he passes these parameters, he is giving the extension procedure access to everything *WizPro* knows.

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To use this BASIC09 feature, Brady had to carefully organize his program. You will need to do the same. You must also kill each procedure after it runs, or you will run out of space. Most of the time — all the time if you load your packed modules into memory before you run your program — your program won't slow down. When you run the procedures, OS-9 just switches them into the program's workspace. When you kill them, they are switched out. The program does this by toggling a few bytes on your CoCo 3's GIME/memory-management chip.

Because *WizPro* is interrupt-driven, it is fast and behaves well in OS-9's multitasking environment. *WizPro* doesn't take over your computer. *WizPro* XModem can download a long file in one window while you play flight simulator in another window. In addition, *WizPro*'s front end driver `WizAcia` (also released to the public domain) is signal driven. Therefore, program extensions can be called by the host if a certain byte or byte sequence is received, and all of this happens automatically, transparent to the user at the host's command.

Another look at *Gfx3*

If you're a seasoned BASIC programmer, I'll bet you've already caught the mistake in the two nested `IF-THEN-ELSE` decision trees in *Gfx3*, I should have assigned the variable `Act` to a value of 1, 2, 3, etc., instead of 100, 200, 300, etc. You must make this change to get *Gfx3* to perform properly.

When you get ready to create your own *Gfx3*, make sure that you type the names of the actions exactly the way you defined them in *Gfx3* in the calling program. For example, if your *Gfx3* decision tree is looking for an action named `ss.wnset`, then you must type `ss.wnset` exactly that way in the `run gfx3 (''ss.wnset'')` line in your calling program. *Gfx3* is extremely case-sensitive. The calling program *must* spell the action verb right.

After writing *Gfx3*, I discovered that the module is 2,089 bytes when packed. The original BASIC09 code was 3,806 bytes long and uses 76 bytes to store data. Since this data memory comes out of `RunB`'s 8K memory pool, this will not take any additional 8K memory blocks.

Listings Show *Gfx3* Benefits

To see the benefit of having a subroutine package like *Gfx3* available for your own BASIC09 programs, compare the two different modifications of the *MVShell* code (listings 2 and 3). The first listing comes from a program I named *MVShell2*. It exercises the menu bar we created in June and July with OS-9 System Calls. The other listing comes from *Gfx3Test* and exercises the menu bar in the same manner as does the *MVShell2*. Compare the two listings. You'll want to get right to work on your own *Gfx3*.

"Because* WizPro *is interrupt-driven, it is fast and behaves well in OS-9's multitasking environment.* WizPro *doesn't take over your computer.* WizPro *XModem can download a long file in one window while you play flight simulator in another window."

We're starting both listings cold with `RUN Gfx2(StdOut,"CurOff")` from the July column's listing. This will let you add both versions of the code to different copies of *MVShell*. When you run it, you will see the menus pop down and receive a report telling you which menu number and item was selected when you clicked the mouse. Unfortunately, I didn't get a chance to write the code that runs when you make a menu selection. It's designed, however, and should be in a later column.

My *Gfx2* file is 2,497 bytes long — 2,250 for the original *Gfx2*, 94 bytes for `InKey`, 99 bytes for `SysCall` and 54 bytes for `Cls`. If I merge my present *Gfx2* and the *Gfx3* files, I will use 4,586 bytes out of an 8K block. That leaves 3,605 bytes in the 8K block of memory used by OS-9 when it loads *Gfx2* and *Gfx3* from the same file. There are an additional 3,605 bytes to use as we like.

We could do several things with this memory. We could, in fact, use it to make the Tandy `Menu` functions available on all our BASIC09 programs. Yes, I think a 3,600 byte subroutine module is in order. We'll shoot for that listing in the November column.

About Those Missing Lines

The laser-writer gremlins zapped John Lind's listing, `Skipmuf.p` in the June issue. Lines 71 through 78 are missing. Lines 71 through 76 contained definitions, so you *definitely* need them. Here are the missing lines from `Skipmuf.p`:

```
70 mo :ARRAY [1..12] of real;
71 results :ARRAY [1..24] of
real;
72 moname, printpath :ARRAY
[1..12] of char;
73 call :ARRAY [1..12] of char;
74 ocntnt :ARRAY [1..12] of
char;
75 name, ocity, ocntry :ARRAY
[1..12] of char;
76 moarray :ARRAY [1..12] of
monthstr;
77 $PAGE
78 $SUBTITLE Procedure dwset
79 * 80 * DWset - procedure to
create a device in a window of
81 * type 'sty.'
82 *
```

John is presently working on a satellite orbit computation program. He's writing it in BASIC09 first and promises to share that version with you here. Thanks, John.

Double-Sided Disk Access

If OS-9 Level I users don't love Steve Goldberg, they will after they look at this month's listings. Goldberg has created an OS-9 procedure file that will patch your `CCDisk` driver and `Format` command to use double-sided disk drives with OS-9 Level I, Version 2.00. He asked me to pass it along.

`Diskfix` adds the new code to the end of the existing `CCDisk` module and leaves you with your new `CCDisk` module in a file on Drive `/d0`. After you run `Diskfix`, run `OS9Gen` to produce a new boot file. Once `OS9Gen` has created your new `OS9Boot` file, you'll be off and running on double-sided disks.

`Diskfix` is compatible with all previous patches to change the step rate of the drives. In fact, the other patches can be done either before or after you run `Diskfix`. However, you must remember to change `IT.SID` at an offset of $19 bytes in your device descriptors `/d0` and `/d1` from one to two, so that OS-9 will know that you have installed double-sided drives.

The day I was going to send a copy of `Diskfix` to RAINBOW, I got another

letter from Goldberg: "Hold the presses! Pull the front page! Here's the ultimate patch for CCDisk," he wrote. Goldberg's new version reads the track count, number of sides and the head step rate from the device descriptor. Now you can have several drives with different step rates, and numbers of tracks and sides on the same Level I, Version 2.0 system.

Set the step rate to your disk drives by patching your device descriptor modules at an offset of $14 hex from the beginning of the module. You can do this with debug or modpatch. An easier way, however, is to use a Dmode utility.

You will not be able to boot from a double-sided disk since the Boot module is hard-coded for one side only. However, you can boot up with a single-sided disk and then switch to a double-sided disk or keep the original drive as your system drive and use a double-sided drive for your data.

Steve's procedure, FormatFix, gives you the ability to format single-sided disks on double-sided drives. It uses a trick submitted by Ray Nicklas published in the May '84 issue of RAINBOW [Page 300].

Making Text Windows Fast

Let's review MakeGW, a procedure for making graphics windows first published in *The Complete Rainbow Guide to OS-9 Level II: A Beginners Guide to Windows*. I have been merging mgw ever since we wrote the book. Recently, I began thinking about being able to change a window to a text window *quickly*. With one small change and a few more OS-9 command lines, the change was complete. Here's the original MakeGW:

```
* First, kill the window we're
running in
display 1b 24
* Now, create a new window
* This one is the standard 80 X
24, four color one we use most
of the time
display 1b 20 7 0 0 50 18 1 0 4
* Set the window to the right
font
display 1b 3a c8 01
* And finally, select the win-
dow we just created
display 1b 21
```

Type the display commands above (You can skip the comment lines if you want) into an OS-9 file, using your favorite editor. Then put the output of the procedure file into a file using OS-9's merge abilities.

```
makegw > mgw
```

Any time you need to change any screen to a four-color, 80-by-24 graphics window, type merge mgw and press ENTER. Your new screen will appear like magic. After you make mgw, copy MakeGW to a new file named MakeTW (for Make Text Window). Use your editor to make the second display command line read:

```
display 1b 20 2 0 0 50 18 1 0 4
```

After you have edited MakeTW, run it and merge its output into a new file named mtw. Now when you want to change that slow graphics window into a fast text-only window, type merge mtw, and press ENTER.

That's it for October. Join me next month, and we will continue to explore the functions of OS-9 Level II and *Multi-Vue*. □

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Dr. Nibble

By Kelly Taylor

Listing 1: FMenu

```
PROCEDURE FMenu
0000    (* A demonstration program that shows you how to build a standard
0041    (* file handling menu into your Basic09 programs.  FMenu was
007E    (* written by WizPro author Bill Brady who is presently adding
00BD    (* mouse support.  Brady has released this code into
00F1    (* the public domain.  He plans on releasing the final version with
0134    (* full mouse support -- even in a text screen -- also.  Stay tuned!
0178
0179    (* First we must define a few data types that are built into WizPro
01BC    (* then we'll be on with the demo.  You may find many of these
01FB    (* equates useful in your own Basic09 programs.  They are similar
023C    (* to those used in the KISSDraw and MVShell code we published
027A    (* earlier this year.
028F
0290    TYPE wpaths=sp,spa,wpa,dpa,ppa:BYTE; siop,piop:STRING[3]; ho
         ,rxfile,host:STRING; spd(32),oldesc(32),newdesc(32):BYTE
02E5    DIM paths:wpaths
02EE
02EF    TYPE windows=flat1,flat,stat,bottom:STRING[9]; vt80,vt40,gwin
         ,main:STRING[12]; menu:STRING[63]; mes:STRING[42]; tmenu
         ,tmes:STRING[15]; ask,prmpt:STRING[9]
0356    DIM win:windows
035F
0360    TYPE commands=dwend,dwsel,owend,defcolor,ulon,uloff,pal,hdds
         :STRING[2]; DLpos,PRpos,ATpos,br,bufnum,group,revoff,
         rev,prop,propoff,bold,boldoff:STRING[3]; four,palette
         :STRING[4]
03D2    DIM cmds:commands
03DB
03DC    TYPE flg=acia6551,TEXT,gmode,roll,bufroll,chdfl,vt52,vtansi
         ,OPLOPEN,spopen,WPAOPEN,SPAOPEN,PSP,BLDF,conf,pfl,dfl
         ,exit,ex,dup,mu:BOOLEAN
0437    DIM flags:flg
0440
0441    TYPE calls=ststat,gtstat,cursr,screen,reed,wrt,wrtln,creat,
         sleep,pid,setpri,pag,bau,typ,pau,alf,ech,eor,endof,qut
         ,intrpt,opt,bsp,bso,bse:BYTE
04AC    DIM caw:calls
04B5
04B6    TYPE con=esc,cr,lf,bs,bl,home,cls,ptabl,lbrk,BK:STRING[1]; Mkey
         :BYTE
04F0    DIM cntrl:con
04F9
04FA    TYPE strings=ddir,crtc,aktc,pnr:STRING; ontime:STRING[8]; hh
         ,mm:INTEGER
0526    DIM strg:strings
052F
0530    TYPE PRNeq=forePRN,backPRN,menuforePRN,menubackPRN,otherforePRN
         ,otherbackPRN,curPRN,menucurPRN,othercurPRN:STRING[1]

0560    DIM PRNs:PRNeq
0569
056A    TYPE regs=ccode,a,b,dp:BYTE; x,y,u:INTEGER
058F    DIM s:regs
0598
0599    DIM menwin,point2,point,point1,box,box1,box2:STRING[6]
05BD    DIM windTYPE,borderPRN:STRING[1]
05CD    DIM dwset,owset,cwarea:STRING[2]
05E1    DIM comm:STRING
05E8
05E9
05EA    (* We must also initialize a few of the fields that are used in the
062D    (* demo program.  The data types above are just a few of the parameters
0674    (* passed to WizPro extension programs.
069B    cntrl.cls=CHR$($0C) \cntrl.home=CHR$(1)
06B4    cntrl.cr=CHR$(13) \cntrl.lf=CHR$(10)
06CC    cntrl.bs=CHR$(8) \cntrl.bl=CHR$(7)
06E4    cntrl.lbrk=CHR$(133)
06F0    cntrl.esc=CHR$(27)
06FC    cntrl.Mkey=3
0700    cmds.hdds="02"
0714    cmds.four=cntrl.cr+cntrl.cr+cntrl.cr+cntrl.cr
0738    strg.aktc=" Any Key to Continue"
0757    strg.crtc=" <ENTER> to Continue"
0776    strg.pnr="   Path not Ready "
0793    cntrl.ptabl=CHR$(127)
079F
07A0    (* System Equates
07B1    caw.screen=$8C \ \caw.reed=$89 \caw.cursr=$25
07D6    caw.ststat=$8E \caw.sleep=$0A \caw.gtstat=$8D
07FA    caw.wrt=$8A \caw.wrtln=$8C \
0813    caw.creat=$83
081F    caw.pau=8
082A    caw.eor=12 \caw.endof=13 \caw.qut=18 \caw.intrpt=17
0856    caw.opt=0 \caw.bsp=10 \caw.bso=3 \caw.bse=19
0882    caw.alf=6
088D    caw.bau=22 \caw.typ=21
08A3    caw.pag=9 \caw.ech=5
```

```
0B9      caw.pid=$0C \caw.setpri=$0D
0D1      cmds.defcolor=CHR$(27)+CHR$($30)
0E2
0E3      (* Screen Equates
0F4      cntrl.BK=STR$(15)
000      cmds.hdds="2"
00C      flags.TEXT=TRUE
016      cmds.owend=cntrl.esc+CHR$($23) \cmds.dwend=cntrl.esc+CHR$(24

          ) \cmds.pal=cntrl.esc+CHR$($31)
051      cmds.defcolor=cntrl.esc+CHR$($30) \cmds.dwsel=cntrl.esc+CHR$

          ($21)
079      cmds.DLpos=CHR$(2)+CHR$(32+16)+"!"
090      cmds.PRpos=CHR$(2)+" "+"!"
0A4      cmds.ATpos=CHR$(2)+CHR$(32+48)+"!"
0BB      cmds.rev=CHR$($1F)+CHR$($20)+CHR$(0) \cmds.revoff=CHR$($1F)
          +CHR$($21)+CHR$(0)
0E7      IF flags.TEXT THEN
0F3        cmds.bold=CHR$(0)+CHR$(0)+CHR$(0)
0A7        cmds.boldoff=cmds.bold
0A16       cmds.prop=cmds.bold
0A25       cmds.propoff=cmds.bold
0A34     ELSE
0A38       cmds.bold=cntrl.esc+CHR$($3D)+CHR$(1)
0A50       cmds.boldoff=cntrl.esc+CHR$($3D)+CHR$(0) \cmds.prop=cntrl.esc

            +CHR$($3F)+CHR$(1)
0A80       cmds.propoff=cntrl.esc+CHR$($3F)+CHR$(0)
0A98     ENDIF
0A9A     cmds.ulon=CHR$($1F)+CHR$($22) \cmds.uloff=CHR$($1F)+CHR$($23

          )
0BE
0BF      (* Window Equates
0D0      PRNs.forePRN=CHR$(0) \PRNs.backPRN=CHR$(1) \borderPRN=PRNs.backPRN
0F3      IF flags.TEXT THEN
0FF        windTYPE=CHR$(2)
107        PRNs.curPRN=CHR$(0) \PRNs.forePRN=CHR$(8)
11F        PRNs.backPRN=CHR$(1)
12B        PRNs.menucurPRN=CHR$(2) \PRNs.menuforePRN=CHR$(10)
143        PRNs.menubackPRN=CHR$(3)
14F        PRNs.othercurPRN=CHR$(4) \PRNs.otherforePRN=CHR$(12)
167        PRNs.otherbackPRN=CHR$(5)
173      ELSE
177        windTYPE=CHR$(5)
17F        PRNs.menuforePRN=PRNs.forePRN \PRNs.menubackPRN=PRNs.backPRN
19D        PRNs.otherforePRN=PRNs.backPRN \PRNs.otherbackPRN=PRNs.forePRN
1BB      ENDIF
1BD
1BE      cmds.owend=cntrl.esc+CHR$($23) \cmds.dwend=cntrl.esc+CHR$($24

          ) \cmds.dwsel=cntrl.esc+CHR$($21)
1FA      dwset=cntrl.esc+CHR$($20) \owset=cntrl.esc+CHR$($22) \cwarea

          =cntrl.esc+CHR$($25)
2C0
2C8      win.bottom=dwset+CHR$(0)+CHR$(0)+CHR$(23)+CHR$(80)+CHR$(1)+

          PRNs.otherbackPRN+PRNs.othercurPRN
359      win.stat=dwset+CHR$(0)+CHR$(0)+CHR$(0)+CHR$(80)+CHR$(2)+PRNs.othercurPRN

          +PRNs.otherbackPRN
387      win.main=cmds.dwend+dwset+windTYPE+CHR$(0)+CHR$(2)+CHR$(80)

          +CHR$(21)+PRNs.curPRN+PRNs.backPRN+borderPRN
3C0      win.ask=owset+CHR$(1)+CHR$(18)+CHR$(18)+CHR$(44)+CHR$(3)+PRNs.menucurPRN

          +PRNs.menubackPRN
3EE      win.prmpt=owset+CHR$(0)+CHR$(24)+CHR$(19)+CHR$(33)+CHR$(1)+

          PRNs.curPRN+PRNs.backPRN
41C
41D      (* Note here that everyone who purchases WizPro will receive a
45B      (* copy of the entire WizEquates file in source form.  WizEquates
49C      (* is so well done that it will make writing your own WizPro extensions
4E3      (* much easier.  All of the boring work of defining data
51B      (* types and other variables has been done for you.  WizPro can be
55D      (* told to pass the entire equates packet to your own WizPro extension
5A3      (* when you run them.  This means you can use all of the WizPro
5EE      (* definitions instead of starting from scratch and building your own.
629
62A      (* The next code sequence puts the windows on your Color Computer
66B      (* screen for FMenu.
67F
680      PRINT win.main;
689      PRINT cmds.dwsel;
692      OPEN #paths.wpa,"/w":UPDATE \flags.WPAOPEN=TRUE \ PUT #paths.wpa

          ,win.bottom
6BE      OPEN #paths.spa,"/w":UPDATE \flags.SPAOPEN=TRUE \ PUT #paths.spa

          ,win.stat
6EA      PRINT #paths.wpa," Wiz ";  \ PRINT #paths.spa,cmds.bold;  \

          PRINT #paths.spa,"  Wiz ";
720
721
722      (* Fmenu actually begins here !!!
743
744 1000 TYPE record=d(29):BYTE; lsn:BYTE
75D      DIM fmentry:record
766
```


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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.

WHAT TO WRITE: We are interested in what you may wish to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs which can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: 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 and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included on the tape or disk using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: 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: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```
1067      DIM ent(88):STRING[19]
1078
1079      DIM fmii,kk,lll,xx,yy:INTEGER
1090      DIM aa,cch:BYTE
109B      DIM dirpopen,more:BOOLEAN
10A6      DIM char:STRING[1]
10B2      DIM search:STRING
10B9 1092 fmii=0
10C3      comm=""
10CA 1010 OPEN #aa,".":READ+DIR
10D9      dirpopen=TRUE
10DF      ON ERROR GOTO 1060
10E5      SEEK #aa,0
10EE      PUT #1,cntrl.cls
10FB      FOR kk=1 TO 88 \ent(kk)="." \NEXT kk
1122      more=FALSE
1128      kk=1
112F 1020 REPEAT
1134        SEEK #aa,fmii \ GET #aa,fmentry
1148        IF fmentry.d(1)>0 THEN  \xx=0
1160          ent(kk)=""
116B
116C          (* scrub the entry, files can be made invisible here with a filter
11AE          (* like if you see a "." an dont want files with extension
11E8          (* let fmii go ahead back up kk
1207
1208          REPEAT  \xx=xx+1
1215            ent(kk)=ent(kk)+CHR$(LAND(fmentry.d(xx),127))
1232          UNTIL fmentry.d(xx)>127 OR xx=18
124A
124B          ent(kk)=ent(kk)+""
125D          IF kk=88 THEN more=TRUE \fmii=fmii-32 \ GOTO 1030 \ ENDIF
127F          kk=kk+1
128A        ENDIF
128C        fmii=fmii+32.
129D      UNTIL EOF(#aa)
12A6
12A7 1030 (* print the suckers!
12BF      CLOSE #aa \dirpopen=FALSE
12CB      lll=kk \kk=1
12DA      FOR yy=1 TO 111 STEP 8
12F0        PRINT USING "s8<,x2,s8<,x2,s8<,x2,s8<,x2,s8<,x2,s8<,x2,s8<,x2,s8<,x2,s8<"

              ,ent(yy),ent(yy+1),ent(yy+2),ent(yy+3),ent(yy+4),ent

              (yy+5),ent(yy+6),ent(yy+7)
1376      NEXT yy
1381      IF more THEN PRINT " ** Overflow, 88 or more files in this directory:  type + for mor
e **"

            ;
13D3      ENDIF
13D5 1040 (* make selection
13E9      PRINT #paths.wpa,cntrl.cls
13F9      PRINT #paths.wpa,TAB(34); ">";
140B      PUT #paths.spa,cntrl.home
141C      PRINT #paths.spa,"DnArrow=next UpArrow=back ALT-Up=Top ALT-Dn=Bottom Space=find next
lower case"

          ;
1476      PUT #1,win.ask
1483      olays=olays+1
148F      PRINT USING "s42^","Select name hit <Enter>"
14B2      PRINT
14B4      PRINT USING "s42^","<filename> or </full/pathname>";
14DF      (* enable keysense
14F1      s.a=0 \s.b=$27 \s.x=1 \RUN s9scall(cav.ststat,s)
1525      PUT #1,win.prmpt
1532      olays=olays+1
153E      PRINT USING "s28^",ent(1);
154E      search=""
1555
1556      REPEAT
1558
1559        (* software key bounce filter
1576 1042   s.a=0 \s.b=$27 \RUN s9scall(cav.gtstat,s)
15A2        IF s.a>4 THEN
15B1          fmentryo=s.a
15BD          s.x=5 \RUN s9scall(cav.sleep,s)
15DA          s.a=0 \s.b=$27 \RUN s9scall(cav.gtstat,s)
1603          IF s.a<>fmentryo THEN 1042
1617
1618          (* Space Bar
1625          IF LAND(s.a,$80)=$80 THEN
1639            REPEAT  \ IF kk<lll THEN kk=kk+1 \ ENDIF  \ UNTIL kk=

                lll OR ASC(ent(kk))>97
166B            GOTO 1044
166F          ENDIF
1671
1672          (* up arrow
167D          IF LAND(s.a,$08)=$08 THEN
1691            IF kk<>1 THEN kk=kk-1 \ ENDIF
16A9          ENDIF
16AB
16AC          (* down arrow
16B9          IF LAND(s.a,$10)=$10 THEN
16CD            IF kk<lll THEN kk=kk+1 \ ENDIF
16E6          ENDIF
16E8
16E9          (* alt-up
```

```
16F2          IF LAND(s.a,12)=12 THEN
17Ø4            kk=1
17Ø8          ENDIF
17ØD
17ØE          (* alt-down
1719          IF LAND(s.a,$14)=$14 THEN
172D            kk=111
1735          ENDIF
1737
1738          (* print current selection
1752 1Ø44     PUT #1,cntrl.cls \ PRINT USING "s3Ø^",ent(kk);
1773
1774        ENDIF
1776
1777        (* end of keysense processing
1794
1795        (* do a regular key
17A8        RUN gtkey(char) \ IF char>"" THEN
17BE          PUT #paths.wpa,char
17CB          IF char="+" OR char="-" THEN GOSUB 2ØØØ \ GOTO 1Ø1Ø \ ENDIF


17E9          IF char<>cntrl.cr AND char<>"/" THEN
18Ø1            PUT #1,cntrl.cls
18ØE            (* user is typing filename
1828            search=search+char \kk=1
183B            REPEAT  \ IF kk<111 THEN kk=kk+1 \ ENDIF
1856            UNTIL kk=111 OR LEFT$(ent(kk),LEN(search))=search
1872            IF kk=111 THEN PRINT #paths.wpa,cntrl.bl; cntrl.cls \

                   PRINT #paths.wpa,TAB(34); ">";  \search="" \ ENDIF


18BØ            GOTO 1Ø44
18B4          ENDIF
18B6        ENDIF
18B8
18B9        s.x=4 \RUN s9scall(caw.sleep,s)
18D6
18D7      UNTIL char=cntrl.cr OR char="/"
18EE      PUT #1,cntrl.cls
18FB
18FC      (* user wants to type a pathname
191C      IF char="/" THEN INPUT "/",comm
1931        comm="/"+comm
193D        GOTO 1Ø58
1941      ENDIF
1943      comm=ent(kk)
194E
194F      (* Find out if our selection is a Dir or a file
197E      (* If a Dir make it our new DDIR (current working dir)
1984 1Ø58 ON ERROR GOTO 1Ø59 \en=Ø \ CHD comm
19CA 1Ø59 en=ERR \ IF en=Ø THEN IF comm<>"." THEN strg.ddir=comm \ ENDIF

             \ GOSUB 2ØØØ \ GOTO 1ØØØ \ ENDIF
1AØ4      ON ERROR GOTO 1Ø7Ø
1AØA 1Ø6Ø en=ERR
1A14      IF en=211 THEN 1Ø3Ø
1A24      IF en>Ø AND en<>195 THEN PRINT #paths.wpa,"*err"; en;  \ ENDIF


1A4F      ON ERROR GOTO 1Ø7Ø
1A55
1A56      (* keysense off
1A65      s.a=Ø \s.b=$27 \s.x=Ø \RUN s9scall(caw.ststat,s)
1A99      IF dirpopen THEN CLOSE #aa \ ENDIF
1AA9
1AAA      GOSUB 2ØØØ
1AAE      PUT #1,cntrl.cls
1ABB      PRINT #1,"You have selected a file named, "; comm
1AE7      PRINT #1,"Let's call the Shell and find its attributes!"
1B1C      PRINT
1B1E      SHELL "attr "+comm
1B2B      PRINT
1B2D      PRINT "Type 'CONT' to try for another file!"
1B55      PAUSE
1B57      GOTO 1ØØØ
1B5B      END
1B5D
1B5E      (* This is the normal exit of FMenu.
1B82      (* 5ØØØ is the FMenu's normal error exit.
1BAB
1BAC 1Ø7Ø en=ERR \ ON ERROR GOTO 5ØØØ
1BBC      GOSUB 2ØØØ
1BCØ      IF en>2 THEN
1BCD        PRINT #paths.wpa," Directory Error"; en;
1BEE        GOTO 5ØØØ
1BF2      ENDIF
1BF4      RETURN
1BF6
1BF7 2ØØØ (* close windows
1CØA      ON ERROR GOTO 2ØØ4
1C1Ø      PUT #1,cmds.owend
1C1D      olays=olays-1
1C29      PUT #1,cmds.owend
1C36      olays=olays-1
1C42 2ØØ4 en=ERR \en=Ø \ RETURN
1C56
1C57 5ØØØ PRINT "You have exited with error number "; en
1C84      END
```

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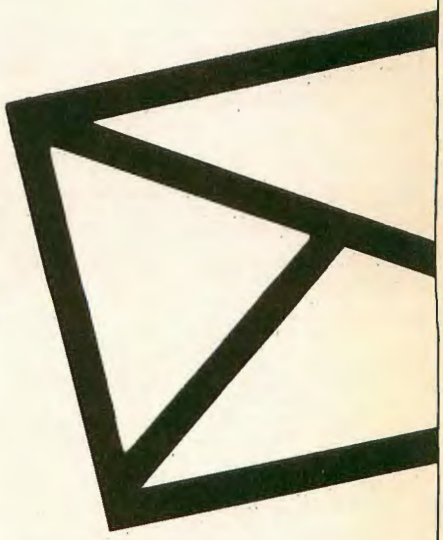

Listing 2: Mod1

```
(* Insert this code in MVShell from the August Issue of
(* KISSable OS-9.  It should follow the line that reads
(* "RUN Gfx2(StdOut,"CurOff")

(* First, we'll make a SysCall with the Set Window function
(* code to prove that it works.

CallCode:=$8E \(* Set Status Code
Regs.a:=StdOut
Regs.b:=$86 \(* SS.WnSet function code
Regs.x:=ADDR(WndScr)
Regs.y:=WT_FWin

RUN SysCall(CallCode,Regs)

(* We must turn on the mouse and set its global parameters
(* Here we tell the system we are using a high resolution
(* mouse plugged into the right joystick port.

Regs.a:=StdIn
Regs.b:=SS_GIP
Regs.x:=$Ø1Ø1 \(* HiRes, Right Joystick
Regs.y:=$FFFF \(* Do not change timing
CallCode:=I_SetStt
RUN SysCall(CallCode,Regs)

(* Now we must tell the mouse how often to update itself
(* and when it should timeout.  We also must tell the
(* graphics cursor to follow the mouse.  We do the latter
(* by setting the 68Ø9 Y-register to "Follow" or "1" before
(* the call.  This parameter is undocumented in early versions
(* of the OS-9 Level II documentation.

Regs.a:=StdIn
Regs.b:=SS_Mouse
Regs.x:=$Ø3Ø1 \(* Update / timeout info
Regs.y:=Follow
CallCode:=I_SetStt
RUN SysCall(CallCode,Regs)

(* Now we can set up the 68Ø9 registers and make the call
(* to set up the intercept.

CallCode:=F_Icpt
Regs.x:=ADDR(IceptCode)
Regs.u:=ADDR(IceptCode)+4
RUN SysCall(CallCode,Regs)

(* We'll turn on the Graphics Cursor so you can
(* watch mouse movement on the screen.  We'll make
(* it an arrow.

RUN Gfx2("gcset",Grp_Ptr,Ptr_Arr)

(* The main loop of our future program will start here

LOOP  \(* Do this forever

PRINT
PRINT "Type <Control E> or <BREAK> to stop !!!"
IceptCode.IntResult:=Ø \(* Initialize Signal Report

(* Tell mouse which signal you want
(* it to return when the button is pushed.  Do
(* this with the SS_MsSig set status call

Regs.a:=StdIn
Regs.b:=SS_MsSig
Regs.x:=MouseSig
CallCode:=I_SetStt
RUN SysCall(CallCode,Regs)

(* Now we must tell the process to go to sleep until
(* it receives a signal to wake up.

CallCode:=F_Sleep
Regs.x:=Ø \(* Sleep forever -- at least till signal
RUN SysCall(CallCode,Regs)

(* After a signal or interrupt wakes up the system, we
(* should be able to find out if it was the mouse
(* that generated the signal by looking at IceptCode.Result
(* When we arrive here, the process has just awakened
(* and we will test to see if the signal came from the
(* mouse.

EXITIF IceptCode.IntResult=2 THEN
ENDEXIT

IF IceptCode.IntResult=MouseSig THEN
GOSUB 1ØØØ \(* Go Read Mouse
IF msret.stat=WR_Cntrl AND msret.cbsa<>Ø THEN
DoMenuItem:=TRUE
ELSE
DoMenuItem:=FALSE
ENDIF
ENDIF
GOSUB 2ØØ \(* Go Check Menu
IF Menu_ID<>Ø THEN
RUN DoMenu
ENDIF
IF DoMenuItem=TRUE THEN
PRINT "The Menu ID is: "; Menu_ID
PRINT "The Menu Item No. is "; Menu_Item
ENDIF
ENDLOOP

(* Always turn off graphics cursor before leaving program

RUN Gfx2("gcset",Ø,Ø)

END

2ØØ (* Subroutine to check Menu

Regs.a:=StdIn
Regs.b:=SS_MnSel
CallCode:=I_Getstt
RUN SysCall(CallCode,Regs)
Menu_ID:=Regs.a
Menu_Item:=Regs.b
RETURN

1ØØØ (* Subroutine to get mouse packet
Regs.a:=StdIn
Regs.b:=SS_Mouse
Regs.x:=ADDR(msret)
CallCode:=I_Getstt
RUN SysCall(CallCode,Regs)
RETURN
```

Listing 3: Mod2

```
(* Insert this code in the file MVShell from the August
(* issue of KISSable OS-9.  It should replace everything
(* after the line that reads: "RUN Gfx2(StdOut,"CurOff")

(* Now we'll make a SysCall with the Set Window function
(* code to prove that it works.

RUN gfx3(StdOut,"ss.wnset",ADDR(WndScr),WT_FWin)

(* We must turn on the mouse and set its global parameters
(* Here we tell the system we are using a high resolution
(* mouse plugged into the right joystick port.

RUN gfx3(StdIn,"ss.gip",$Ø1Ø1,$FFFF)

(* Now we must tell the mouse how often to update itself
(* and when it should timeout.  We also must tell the
(* graphics cursor to follow the mouse.  We do the latter
(* by setting the 68Ø9 Y-register to "Follow" or "1" before
(* the call.  This parameter is undocumented in early versions
(* of the OS-9 Level II documentation.

RUN gfx3(StdIn,"ss.mous",$Ø3Ø1,Follow)

(* Now we can set up the 68Ø9 registers and make the call
(* to set up the intercept.

CallCode:=F_Icpt
Regs.x:=ADDR(IceptCode)
Regs.u:=ADDR(IceptCode)+4
RUN SysCall(CallCode,Regs)

(* We'll turn on the Graphics Cursor so you can
(* watch mouse movement on the screen.  We'll make
(* it an arrow.

RUN Gfx2("gcset",Grp_Ptr,Ptr_Arr)

(* The main loop of our future program will start here

LOOP  \(* Do this forever

PRINT
PRINT "Type <Control E> or <BREAK> to stop !!!"

IceptCode.IntResult:=Ø \(* Initialize Signal Report

(* Tell mouse which signal you want
(* it to return when the button is pushed.  Do
(* this with the SS_MsSig set status call

RUN gfx3(StdIn,"ss.msig",MouseSig)

(* Now we must tell the process to go to sleep until
(* it receives a signal to wake up.

CallCode:=F_Sleep
Regs.x:=Ø \(* Sleep forever -- at least till signal
RUN SysCall(CallCode,Regs)
(* After a signal or interrupt wakes up the system, we
(* should be able to find out if it was the mouse
(* that generated the signal by looking at IceptCode.Result
(* When we arrive here, the process has just awakened
(* and we will test to see if the signal came from the
(* mouse.

EXITIF IceptCode.IntResult=2 THEN
```

```
ENDEXIT

IF IceptCode.IntResult=MouseSig THEN
GOSUB 1ØØØ \(* Go Read Mouse
IF msret.stat=WR_Cntrl AND msret.cbsa<>Ø THEN
DoMenuItem:=TRUE
ELSE
DoMenuItem:=FALSE
ENDIF
ENDIF

IF DoMenuItem=TRUE THEN
GOSUB 2ØØ \(* Go Check Menu
PRINT "The Menu ID is "; Menu_ID
PRINT "The Menu Item is "; Menu_Item
IF Menu_ID<>Ø THEN
RUN DoMenu
ENDIF
ENDIF
ENDLOOP

(* Always turn off graphics cursor before leaving program

RUN Gfx2("gcset",Ø,Ø)

END

2ØØ (* Subroutine to check Menu

RUN gfx3(StdIn,"ss.mnsel",Menu_ID,Menu_Item)
RETURN

1ØØØ (* Subroutine to get mouse packet

RUN gfx3(StdIn,"gs.mous",ADDR(msret))
RETURN
```

Listing 4: DiskFix

```
* Patches Level I Ver. 2
* CCDisk to read, write
* and format both single
* and double sided disks
t
tmode .1 -pause
save /dØ/ccdisk ccdisk
debug
lccdisk
. .+7
=8Ø
$load /dØ/ccdisk
lccdisk
. .+3
=82
lccdisk
. .+1c9
=16
=Ø1
=84
lccdisk
. .+1f8
=5f
=17
=Ø1
=76
lccdisk
. .+2ae
=e6
=c9
=ØØ
=a9
=16
=ØØ
=8c
=12
=23
=Ø2
lccdisk
. .+2dd
=4Ø
=12
=12
=12
=17
=ØØ
=9Ø
. .+3
=5f
=16
=ØØ
=81
lccdisk
. .+341
=a6
=Ø7
=85
=Ø1
=26
=Ø2
=ca
=4Ø
=a6
=Ø9
=81
=15
=16
=ff
=66
=a6
=88
=1Ø
=85
=Ø1
=27
=Øe
=64
=e4
=24
=Øa
=a6
=c9
=ØØ
=a9
=8a
=4Ø
=a7
=c9
=ØØ
=a9
=35
=Ø2
=81
=15
=16
=fe
=61
=ea
=a8
=22
=16
=ff
=Ø1
=cb
=1Ø
=ea
=a8
=22
=34
=Ø2
=17
=fe
=f7
=35
=Ø2
=39
q
del /dØ/ccdisk
save /dØ/temp ccdisk
verify u </dØ/temp >/dØ/ccdisk
del temp
tmode .1 pause
-t
```

Listing 5: FormatFix

```
* Patches the Format utility to
* permit formatting single sided
* disks on double sided drives and
* provides for a choice of number
* of tracks. Use * (asterisk) as an
* option for single sided formatting.
* Use number of tracks in parentheses
* as option to change track count.
t
load format
debug
lformat
. .+1a3
=49
. .+4
=2a
=Ø1
. .+1
=Øf
lformat
. .+a85
=aØ
=8c
=39
q
del -x format
save /dØ/cmds/format format
unlink format
-t
```

Racksellers

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA
- Birmingham — Jefferson News Co.
- Brewton — McDowell Electronics
- Florence — Anderson News Co.
- Greenville — M & B Electronics
- Madison — Madison Books
- Montgomery — Trade 'N' Books
- Tuscaloosa — Injun John's, Inc.

ALASKA
- Fairbanks — Arrow Appliance/Radio Shack; Electronic World

ARIZONA
- Cottonwood — A & W Graphics Co.
- Lake Havasu City — Book Nook
- Phoenix — TRI-TEK Computers
- Tempe — Books, Etc.; Computer Library
- Tucson — Anderson News Co.

ARKANSAS
- Fayetteville — Vaughn Electronics/Radio Shack
- Ft. Smith — Hot Off the Press Newsstand
- Little Rock — Anderson News Co.

CALIFORNIA
- Berkeley — Lyon Enterprises
- Citrus Heights — Software Plus
- Grass Valley — Advance Radio, Inc.
- Hollywood — Levity Distributors; Stef-Jen, Inc.
- La Jolla — Butler & Mayes Booksellers
- Los Angeles — Circus of Books (2 Locations)
- Marysville — Bookland
- Napa — Bookends Bookstore
- Oakland — DeLauer's News Agency
- Rancho Murieta — Software Plus
- Sacramento — Deibert's Readerama; Tower Magazine
- San Francisco — Booksmith; Bookworks; Castro Kiosk
- Santa Monica — Midnight Special Bookstore
- San Jose — Computer Literacy Bookshops
- Santa Rosa — Sawyer's News, Inc.
- Stockton — Harding Way News; Paperbacks Unlimited
- Sunnyvale — Computer Literacy
- Torrance — El Camino College Bookstore

COLORADO
- Aurora — Aurora Newsstand
- Colorado Springs — Hathaway's
- Denver — News Gallery
- Glenwood Springs — The Book Train
- Grand Junction — Readmore Book & Magazine
- Longmont — City Newsstand

DELAWARE
- Middletown — Delmar Co.
- Newark — Newark Newsstand
- Wilmington — Normar, Inc.—The Smoke Shop

DISTRICT OF COLUMBIA
- Washington, DC — Chronichles; News Room; World News, Inc.

FLORIDA
- Boco Raton — Great American Book Co.
- Clearwater — The Avid Reader
- Cocoa — The Open Door
- Dania — Dania News & Books
- Davie — Software Plus More
- Ft. Lauderdale — Bob's News & Book-Store; Clarks Out of Town News; Mike's Electronics Distributor
- Gainesville — Paper Chase
- Jacksonville — Book Co.
- North Miami Beach — Almar Bookstore
- Panama City — Boyd-Ebert Corp.
- Pensacola — Anderson News Co.
- Pinellas Park — Wolf's Newsstand
- South Pasadena — Poling Place Bookstore
- Starke — Record Junction, Inc.; Radio Shack Dealer
- Sunrise — Sunny's at Sunset
- Tallahassee — Anderson News Co.; DuBey's News Center
- Titusville — Computrac

GEORGIA
- Atlanta — Border's
- Bremen — Bremen Electronics/Radio Shack
- Forest Park — Ellers News Center
- Jesup — Radio Shack
- Thomasville — Smokehouse Newsstand
- Toccoa — Martin Music Radio Shack

IDAHO
- Boise — Book Shelf, Inc.
- Moscow — Johnson News Agency

ILLINOIS
- Belleville — Software or Systems
- Champaign — Bookmark
- Chicago — B. Dalton Booksellers
- Decatur — Book Emporium; K-Mart Plaza; Northgate Mall
- East Moline — Book Emporium
- Evanston — Norris Center Bookstore
- Kewanee — Book Emporium
- Lisle — Book Nook
- Lombard — Empire Periodicals
- Newton — Bill's TV Radio Shack
- Paris — Book Emporium
- Peoria — Book Emporium; Sheridan Village; Westlake Shopping Center; Illinois News Service
- Springfield — Book Emporium; Sangamon Center North; Town & Country Shopping Ctr.
- Sunnyland — Book Emporium
- West Frankfort — Paper Place
- Wheeling — North Shore Distributors

INDIANA
- Angola — D & D Electronics; Radio Shack
- Berne — White Cottage Electronics
- Bloomington — Book Corner
- Columbus — Micro Computer Systems, Inc.
- Crawfordsville — Koch's Books
- Dyer — Miles Books
- Franklin — Gallery Book Shop
- Ft. Wayne — Michiana News Service
- Garrett — Finn News Agency, Inc.
- Indianapolis — Bookland, Inc.; Borders Bookshop; Delmar News; Indiana News; Southside News
- Lebanon — Gallery Book Shop
- Martinsville — Radio Shack
- Richmond — Voyles News Agency, Inc.
- Wabash — Mitting's Electronics

IOWA
- Davenport — Interstate Book Store
- Des Moines — Thackery's Books, Inc.
- Fairfield — Kramers Books & Gifts

KANSAS
- Hutchinson — Crossroads, Inc.
- Topeka — Palmer News, Inc.; Town Crier of Topeka, Inc.
- Wellington — Dandy's/Radio Shack Dealer
- Wichita — Lloyd's Radio

KENTUCKY
- Hazard — Daniel Boone Gulf Mart
- Henderson — Matt's News & Gifts
- Hopkinsville — Hobby Shop
- Louisville — Hawley-Cooke Booksellers (2 Locations)
- Middletown — Software City
- Paducah — Radio Shack

LOUISIANA
- Baton Rouge — City News Stand
- Lockport — TV Doctor/Radio Shack
- New Orleans — Sidney's News Stand Uptown
- Monroe — The Book Rack

MAINE
- Bangor — Magazines, Inc.
- Brockton — Voyager Bookstore
- Caribou — Radio Shack
- Oxford — Books-N-Things
- Sanford — Radio Shack

MARYLAND
- College Park — University Bookstore

MASSACHUSETTS
- Boston — Eastern Newsstand
- Brockton — Voyager Bookstore
- Cambridge — Out Of Town News
- Ipswich — Ipswich News
- Littleton — Computer Plus

MASSACHUSETTS (cont'd)
- Lynn — North Shore News Co.
- Swansea — Newsbreak, Inc.

MICHIGAN
- Allen Park — Book Nook, Inc.
- Birmingham — Border's Book Shop
- Durand — Robbins Electronics
- E. Detroit — Merit Book Center
- Harrison — Harrison Radio Shack
- Hillsdale — Electronics Express/Radio Shack
- Holland — Fris News Company.
- Kalamazoo — The Book Raft
- Lowell — Lowell Electronics
- Muskegon — The Eight Bit Corner
- Niles — Michiana News Service
- Perry — Perry Computers
- Riverview — Riverview Book Store
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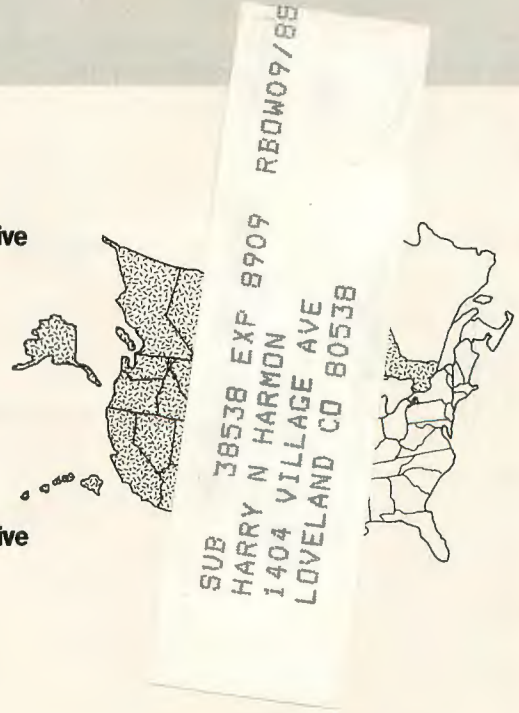

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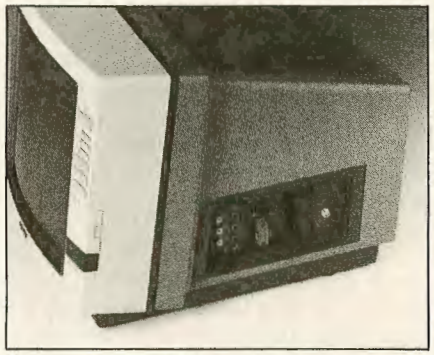

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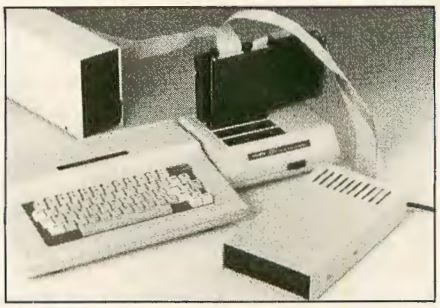

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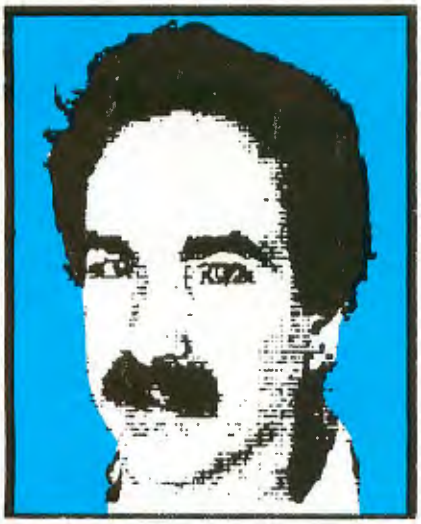

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The first waves of flying, diving, bloodthirsty bats are arriving. Move, fire, and move again. It's a never ending battle. If you are lucky enough to defeat the bats, be ready for a much greater challenge, The *Evil Demons* themselves. Destroy a wing and another takes its place. Only a direct hit can save you now. It will take great skill to triumph. If you do, then you better be ready for the *End*. The Demon Flag Ship descends to destroy your remaining ships. Your only hope is to penetrate the hull, break through the shield, and destroy the dreaded Gargoyle.

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