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# The RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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# RAINBOW

## Table of Contents

April 1990  
Vol. IX No. 9



20

### Features

12

#### **Icarus in Search of Wings**

Nick Bradbury

*Here's a penguin who believes icebergs will soon be yesterday's transportation*

20

#### **Reckoning With the CoCo**

Bill Minze

*A program that turns the CoCo into a printing calculator*

24

#### **The Golden Retriever**

Shane Messer

*A free-form program that lets you create unique databases*

44

#### **Predicting Profits**

David Macias

*A helpful program for those planning a career in business*

64

#### **Another Form**

Benjamin Brunotte

*Creating forms on IBM-compatible printers*

67

#### **Show the Facts**

Bryan Stephens

*A 3D bar graph program for charting information*

72

#### **Completing the Analyzer Project**

Dennis H. Weide

*A handy tool for testing low-speed logic circuits*

92

#### **Adding a Disk Drive to Your CoCo: Part 2**

Marty Goodman

*A guide to adding disk drives to the CoCo*

106

#### **The File Handler**

Richard Estrado

*A new routine for an old chore*

116

#### **The Price is Right**

Gordon E. Fouts

*A program to make routine number juggling less routine*

92



## Columns

35

**Barden's Buffer**  
William Barden, Jr.  
*Something to get your files circulating*

86

**BASIC Training**  
Joseph Kolar  
*More incentive to go forth and create*

113

**BreakPoint**  
Greg Law  
*Talking about conversions and diversions*

59

**CoCo Consultations**  
Marty Goodman, M.D.  
*Just what the doctor ordered*

62

**Database Report**  
Eddie Kuns  
*Name that tune with UltiMusE III*

85

**Education Notes**  
Steve Blyn  
*a, e, i, o, u*

52

**KISSable OS-9**  
Dale Puckett  
*A new look for OS-9*

10

**Print#-2**  
Lonnie Falk  
*Editor's notes*

110

**Turn of the Screw**  
Tony DiStefano  
*Part 3 of the digital lesson*

## Departments

Advertisers Index	128
CoCo Gallery	34
Letters to Rainbow	6
The Intercom	122
Racksellers	126
Received & Certified	105
Subscription Info	46

118

**Wishing Well**  
Fred B. Scerbo  
*A program that strikes a chord*

124

**Wrapping The Rainbow**  
Cray Augsborg  
*How many colors in a Rainbow?*

"BASICally Speaking" will return next month.



106

The cassette tape/disk symbols beside features and columns indicate the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE.

## Product Reviews

Big RAM Disk/Danosoft	101
M-Menu System/r3 Systems	99
Owl-Ware's Hard Drive/Owl-Ware	98
Slam Bam/Erich Sweeney	101
Super Backup Utilities/Carl England	102
UltraEd+/Supersoft	104

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## Novices Niche

48

**Keeping a Tab on Your Tap**  
Roger E. Severs

48

**And Along Came a Spider**  
Joseph Pendall

49

**What Is on the Agenda for Today?**  
Kerian Kenny

50

**Cutting Corners**  
John T. Wells

50

**Steady Aim Fire**  
Kathy Rumpel

51

**Title Screen Splashdown**  
Paul L. Olmstead

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## Local Access Express

Editor:

I would like to comment on the so-called local access phone numbers. I don't know about most folks, but to me local means not dialing a 1 and area code before the number. I live in a hub of over 300,000 people where there are no local access phone numbers. The least expensive way to connect to Delphi or any other service is to call a number that is local only if you drive north for an hour. I had to give up on Delphi because it cost me \$16.34 for 114 minutes of phone time. That doesn't include connect time for Delphi, which would have only cost around \$14 for 2 hours.

I would like to use the services on Delphi, but I can't even use Delphi Advantage because of the phone charge for the minimum 5-hour connect time. I know other people around here with the same problem. I'm sure we're not the only ones who feel this way.

I don't know what it would take to get Tymnet or Telenet to hook up something in our area, but until someone does, the computer services and people that could be using them will be missing out on a great deal of knowledge.

Hampton Thomas  
White Post, Virginia

*You can send a petition to Telenet and Tymnet to get a local access node installed. While it is not always successful, both Telenet and Tymnet will look into the matter if they receive enough requests. Send your petitions to Telenet, U.S. Sprint, Inc. 12490 Sunrise Valley Drive, Reston, VA 22096; and Tymnet, P.O. Box 49019, San Jose, CA 95161-9019.*

## Sprucing up My Stationery

Editor:

I would like to be able to run the program *Stationery Station* (RAINBOW, January 1989, Page 106) using a Star NX-1000 printer but do not know which lines to change and how to change them.

Jerry K. Wollin  
10918 W. Highland Rd.  
Mequon, WI 53092

## The Mystery of Phantomgraph

Editor:

I recently bought *Phantomgraph*, an OS-9 multiple-graph program, for my CoCo 3. I need a graphics representation for yearly sales figures on a weekly basis, so I need to include 52 pieces of information. This program has two print options, Tandy or IBM. Since I have an Epson RX-80, it should work in the IBM mode. For some mysterious reason it does not. All I get is a repetitive horizontal line. The program was written by Greg Zumwalt, so if he or someone else out there can help or suggest another program, please let me know.

J.K. Sinrod  
16 Scranton Ave.  
Lynbrook, New York

## DeskMate 3 on a Disk

Editor:

Here is a little addition to the letter that appeared in the May '89 issue of THE RAINBOW concerning putting *DeskMate 3* on one disk.

This applies to those who have 40-track disk drives and an RGB monitor. First boot OS-9 Level 2, put your custom *DeskMate 3* disk in Drive 1, then load the copy and edit commands. Next copy the montype and

modpatch commands to the commands directory of your *DeskMate* disk.

Now type `chd /d1` and press ENTER. Then type `edit startup` and type the following listing:

```
E:modpatch -s <patch  
E:montype r
```

Now quit the editor. Type `edit patch` and type in the following listing:

```
E:L d0  
E:C 14 00 03  
E:V  
E:L d1  
E:C 14 00 03  
E:V
```

Make sure that at the E: prompt you insert a space after the colon before you type in a line. Now quit the editor and reboot the computer. Your disk drives will run at six milliseconds, and the colors on your screen will look much better. Hint: don't be surprised if you have to go back to the Display icon to adjust the colors of the different screens under *DeskMate*.

Ernest Bazzinotti, Jr.  
Dorchester, Massachusetts

## Understanding the Interface

Editor:

If I wait long enough, THE RAINBOW comes through. Thanks to William Barden, Jr., I know how the Hi-Res Joystick Interface works. I had almost decided it was a \$10 mistake.

There is, however, one point of confusion in the article. The CoCo does not use either a D/A converter (which would be

## CIII Pages



by Walter Bayer

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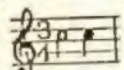
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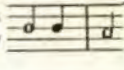
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useless) or an A/D converter (as the Tano does), but as Mr. Barden correctly states further on, the CoCo uses a comparator circuit, which is technologically inferior (and cheaper which no doubt accounts for its use).

Also, I have a hand scanner for entering programs using OCR software. What worries me is that the scanner may not be able to handle Ben Day and color backgrounds so the OCR software can read them. I'm still working on how to get the programs from my PC/XT to the CoCo, but I believe I can whip this problem. Anything beats all that typing.

I will be renewing my subscription to your magazine, after dropping six others because they were not cost-effective for my purposes. It is the practical, down-to-earth articles such as Mr. Barden's that keep me an avid reader.

*Billy R. Pogue  
Lake Havasu City, Arizona*

### **I Still Fit in With You CoCoists**

*Editor:*

Although I am no longer a CoCo user, I enjoy reading THE RAINBOW. As the owner of an IBM PC-compatible, I can program in BASIC and C and so your magazine contains information I can use. I just want to thank you for all the help your magazine has given me.

*Tim Collier  
Miami*

### **It's About Time**

*Editor:*

I have owned a Color Computer for nine years and for the past eight years I have subscribed to THE RAINBOW. It's about time I said thank you to the staff, contributors and advertisers without whom my computer would be useless.

Radio Shack has given us a nifty little jewel, but it takes the hard work and innovation by the many programmers, hardware hackers and writers like those found in the pages of THE RAINBOW to really make our favorite computer soar!

*Kevin Deneen  
Rhododendron, Oregon*

### **A Peculiar Call**

*Editor:*

The February issue of THE RAINBOW mentioned the `SS.FD GetStt` function call. I've been using it for a while. The same function will operate with the `SetStt` call to write the file descriptor back to the disk.

I've used this to change some of the contents of the file descriptor sector. The registers are used in the same manner as with `GetStt`.

Peculiarly, the `SetStt` allows changes to be made to the file owner bytes only by the super-user (user ID 0). No error occurs if another user tries to change the owner, but no change occurs either. It seems that other data can be changed by anyone with the proper access to the file.

*Steve Goldberg  
Bethpage, New York*

### **Beginner's Confusion?**

*Editor:*

I have owned a CoCo 3 for about a month and received my first RAINBOW this week. I copied several programs from your magazine but am continually having problems running them. Is this common with other beginners?

Also, why has Tandy discontinued the Multi-Pak Interface? Where can I purchase one?

*William Westendorf  
Bellville, Texas*

*You are not alone. Nearly all beginners feel frustrated and confused by the amount of information necessary to get their machines going the way they want. Hang in there and the knowledge will come. Both Howard Medical and Orion Technologies are offering Multi-Pak work-alikes.*

### **Cry for Nintendo**

*Editor:*

In recent issues of THE RAINBOW I've read about the CoCo receiving more games that are used with Nintendo. Although I enjoy using the CoCo for various book-keeping and educational reasons, my two girls would like to be able to play *Super Mario Brothers* on the CoCo. Will this game be made available for the CoCo? Is there anything available now that is similar to it?

*Al Parker  
Olean, New York*

*We don't know if Super Mario Brothers will make it to the CoCo. But if it does, you can be sure we'll get the word out.*

### **Looking for Multimedia Program**

*Editor:*

I have a CoCo 3, a Multi-Pak Interface, an FD-502 and a DMP-132 printer and am looking for a program for multimedia work.

Several software companies have programs for the Commodore 64 computer, which I also own, but the CoCo 3 is a much better computer and would be able to do more in this area. With such a great system as the CoCo, I can't understand why more software companies don't produce better software for this machine. Do you know if anyone makes a program like this?

THE RAINBOW is a top-notch magazine, and I hope it's around for a long time.

*Eddie G. Wilson  
Rt. 4 Box 198  
Galax, VA 24333*

### **Tell It Like It Is**

*Editor:*

I was very pleased and surprised to read Jim Issel's review of *C III Pages*. I was not surprised by his honest opinion of the program, but with the fact that you printed it. Your past program reviews have been too soft. There are usually no negative remarks.

Readers realize the pressure of not stepping on the toes of advertisers, but we need to know the true impressions reviewers have of products. They should not be obligated to give favorable reviews.

*J.K. Sinrod  
Lynbrook, New York*

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.



...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor...*Word Proc. Comparison*-April 1989 Rainbow; Pg 26.



# Word Power 3.3

## The Best Just Got Better!

...friendly...amazing execution speed...much easier to use than VIP software & 2 other systems I've tried...very user friendly...highest among word-processors\*-Rainbow Oct 88 Rev.



### SPEED

Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execution.



### MEMORY

Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.



### DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/Composite/Monochrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make it a breeze to use!



### EDITING

Powerful full-screen editor w/ word-wrap, 4-way cursor, scrolling; Line Positioning; Block Commands; Search, Replace; OOPS recall during delete, adjustable key-repeat, key-click, typeahead, Tabs, Word-Count and much more! . Built-in extensive **HELP** screen can be accessed anytime during edit.



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### SORTING

Sort lists in a flash!



### CALCULATOR

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### SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!



### GRAPHICS

Insert **graphics** in your documents! Allows you to import PMODE 3/4, HSCREEN and CoCo Max II/III pictures!



### MAIL MERGE

Type a letter, follow it with a list of names & addresses and have Word Power print out personalized letters. Its that easy!



### SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.



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Playback up to 250 keystrokes with a single key! Automate multiple tasks with a single key! You'll love it!



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Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.



### PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed 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 on the printer. You can view margins, page breaks, justification and more.



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This checker will proofread your text for punctuation errors such as capitalization, double-words, a/an usage, spaces and more. Its the perfect addition to any word-processor.



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# A Helping Hand



Just about everyone was delighted that I was reaching awkwardly for a cigarette when I pulled my fifth spinal vertebra out. Comments such as "I told you smoking was bad for your health" were abundant.

It took a combination of *tete-a-tete* with my friendly orthopedic man, something called a *magnetic resonance image scan* (I felt like a floppy disk because they checked me several times and asked a million questions to be sure I didn't have anything that might be grabbed by their magnet) and some physical therapy to put my neck back where it was supposed to be. However, some nerves caught some place or another. This caused pain.

I returned for more therapy and some traction, assuring the therapist that I had to be in New York for one show and in Las Vegas for COMDEX. This proved to be no problem. He fitted me up with a portable traction unit that looked like a cross between a gibbet and a guillotine. I think the maid at the New York Hilton was afraid to come into the room.

I hung from this contraption two times a day for a number of weeks until gradually the nerve went back to its proper location. This relieved the chronic pain in my shoulder, my arm and my hand. Even two of my fingers quit being numb.

It was during this time, of course, that I needed to write my column. I missed it, as you may have noticed. In my attempts to work on the computer, I tried all sorts of positions and angles, but nothing helped for long. So, no column.

And not much computing, for that matter. But it got me thinking.

THE RAINBOW has printed programs (about as many as we have received) for disabled users, and I have seen a few applications over the years that have made our Color Computer accessible for the handicapped. But my experience showed me that we can do much more, as a Community, to make the power of machines like our CoCo available to more people.

While incapacitated, I found the CoCo keyboard easier to use than my MS-DOS keyboard. In fact, operating the Color Computer was easier, which may have something to do with the way the machines are set up — my CoCo disk drives are closer to the keyboard (and the whole computer), so I didn't have to reach as far.

As I began to compare the two systems in this context, I noticed that the CoCo screen in its native format is easier to read than an MS-DOS screen. And so many of the applications for the CoCo, of course, use the regular screen.

Well, I am almost back to normal now, but I'd like my experience to help others. I want to encourage you to share programs you may have written to assist the handicapped in using the CoCo. THE RAINBOW is also interested in sharing with other members of the CoCo Community whatever insights and activities you may have experienced in this area.

All can benefit from this information exchange. So please share your experiences and ideas with us and the rest of the CoCo Community.

We'll print related letters and be on an extra-sharp lookout for programs. I look forward to hearing from you.

— Lonnie Falk

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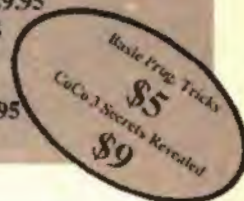
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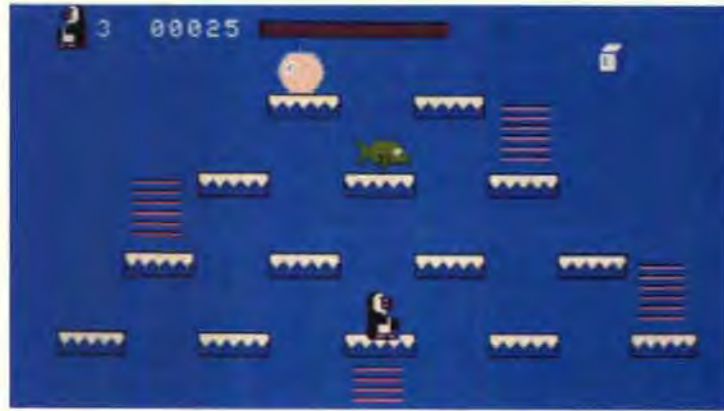
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Here's a penguin who believes icebergs will soon be yesterday's transportation

# Icarus in Search of Wings



by Nick Bradbury

**P**enguin *Icarus* is a unique arcade-style game for the CoCo 3. You play the role of Icarus, a thinking man's penguin who decides that life just isn't satisfactory when one is a flightless water fowl. No longer content with your useless wings, you set out on an unusual quest to find new and better ones. Every penguin, from emperor to Opus, yearns to fly.

## Game Play

After selecting your monitor type, you see the title screen. Press the fire button on the right joystick to begin play.

Screen 1 is set near Icarus' Antarctic home. Using the right joystick, you must guide Icarus up a series of polar bars connected by ladders to the ice ball to be transported to the next screen. Large ice cubes fall from the top of the screen to hamper your climb. Being hit by an ice cube causes you to lose one of your penguin lives (you have four) and starts the screen over again. You can gain extra points (25) by eating the mackerel that occasionally appear above the ice bars.

Screen 2 takes Icarus into the clouds. You must guide him up through the clouds to the second glowing ice ball by climbing the ladders and riding the elevators down to each new set of clouds. This would be simple if the clouds weren't electrified — unfortunately, they are. Touching or falling off an electrified cloud will cost you a penguin life.

---

*Nick Bradbury, a junior in advertising at the University of Tennessee, works as a cartoonist for the daily college newspaper there. His previous CoCo works include Moon Runner and Legend Quest. He can be contacted at 712 Forest View Road, Knoxville, TN 37919.*

Screen 3 is the magical location of Icarus' new wings. You must jump your penguin along each layer of balloons without falling and then walk along the thundercloud corridor to gain your wings. Short bolts of lightning fall from these thunderclouds, so be careful not to be hit by one.

Once you have gained your wings, a short burst of Icarus' favorite song is played, and then he tries out his wings (without your help) in a pleasant nature scene. It's a shame, though, that Icarus is such a clumsy penguin.

Controlling Icarus may take some getting used to. Instead of climbing ladders Mario-style, Icarus must jump from rung to rung. (Well, think about it — how else could a penguin climb a ladder?) When he jumps, he may be moved left or right as long as he is still in the upward part of his jump. Once he starts coming down, he cannot be moved left or right until he lands on something.

The top of each screen displays the number of penguin lives remaining, the score, and a red bar representing the timer. Points are awarded depending upon how quickly each screen can be completed. Failure to complete a screen before the timer runs out ends the game.

The technique used to animate the figures in *Penguin Icarus* is a relatively simple one. All shapes are created during set-up and then saved in HGET buffers. Before the program places a shape onscreen during game play, the area to be occupied is saved in a separate HGET. When a shape is to be moved, this area is returned to the screen (via an HPUT). Then the area about to be occupied by the shape is saved by the same HGET so the process can be completed. After the area is saved, the shape can then be placed onscreen in its new location. For a demonstration of this technique, enter and run Listing 2. For further information on HGET/HPUT, please refer to the CoCo 3 Extended BASIC manual. □

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✓	40	.....	5
	110	.....	252
	170	.....	0
	220	.....	113
	250	.....	192
	300	.....	65
	350	.....	24
	400	.....	51
	450	.....	195
	500	.....	171
	540	.....	54
	600	.....	218
	650	.....	40
	690	.....	41
	730	.....	8
	780	.....	16
	830	.....	102
	890	.....	36
	940	.....	79
	980	.....	107
	1020	.....	175
	1050	.....	169
	1090	.....	39
	1140	.....	96
	1190	.....	225
	1240	.....	18
	1290	.....	94
	1330	.....	166
	1380	.....	244
	1410	.....	165
	1450	.....	220
	1480	.....	4
	1540	.....	212
	1590	.....	72
	1620	.....	220
	1650	.....	111
	END	.....	51

### Listing 1: PENGUIN

```

0 * COPYRIGHT 1990 FALSOFT. INC
10 CMP:ONBRK GOTO1700:POKE65497.
0:POKE&HE6C6.0:DIMC(38),CX(20),C
Y(20),FX(16),FY(16)
20 CLS:PRINT@103."SELECT MONITOR
TYPE":PRINT@135.STRING$(20,"-")
):PRINT@195,"(1) RGB (2) COMPO
SITE/TV":PRINT:INPUTA:IFA<10RA>2
THEN20ELSEMT-A:GOSUB760
30 HBUFF1,560:HBUFF2,133:HBUFF3,
133:HBUFF4,133:HBUFF5,91:HBUFF6,

```

```

91:HBUFF7,91:HBUFF8,380:HBUFF9,3
96:HBUFF10,720:HBUFF11,396:HBUFF
13,276:HBUFF14,156:HBUFF15,60:HB
UFF16,60:HBUFF17,450:HBUFF18,993
40 HBUFF19,201:HBUFF20,201:HBUFF
21,101:HBUFF22,101:GOSUB780
50 PLAY"V31L255T255":GOTO1610
60 JM=0:FS=0:GL=0:LC=0
70 GOSUB730
80 GOSUB710:PALETTE6,RND(63):J0-
JOYSTK(0):IFLV=0THEN90ELSEIFFS=1
THEN190ELSEIFRND(18)=1THEN180
90 XX=X:YY=Y:IFJM=0ANDHPOINT(X+6
,Y+19)=7THENJ=2:Y=Y+5ELSEIFJ0<15
THENJ=1:PN=3:X=X-8ELSEIFJ0>48THE
NJ=1:X=X+8:PN=2
100 IFJ<>2THENIFJM=1THEN240ELSEI
FBUTTON(0)=1THENJM=1:JC=1:PLAY"0
3V20DEFG04V30CDE":GOTO240
110 IFX<12THENX=12ELSEIFX>280THE
NX=288
120 IFY>175THENY=175ELSEIFY<10TH
ENY=10
130 IFJ>0THENJ=0:HPUT(XX,YY)-(XX
+12,YY+18),4,PSET:HGET(X,Y)-(X+1
2,Y+18),4
140 HPUT(X,Y)-(X+12,Y+18),PN:IFL
V=2THEN300ELSEIFLV=3THEN530ELSEI
FLV=0THEN450
150 IFH1=1THEN260ELSEIFRND(5)=1T
HEN250ELSEFORI=1TO27:NEXTI
160 IFB0=0THENIFX<142ANDY<22THEN
220
170 GOTO80
180 FS=1:R=RND(4):FX=FX(R):FY=FY
(R):FC=0
190 HPUT(FX,FY)-(FX+29,FY+12),19
,PSET:FC=FC+1:IFFC>18THENFC=0:HP
UT(FX,FY)-(FX+29,FY+12),20,PSET:
FS=0:GOTO90
200 IFX>FX-4ANDX<FX+27ANDY>FY-20
ANDY<FY+8THENFS=0:HPUT(X,Y)-(X+1
2,Y+18),4,PSET:HPUT(FX,FY)-(FX+2
9,FY+12),20,PSET:SC=SC+25:PLAYP4
$:GOSUB730:HGET(X,Y)-(X+12,Y+18)
,4
210 GOTO90
220 TS=TM*5:SC=SC+TS:GOSUB730:HP
RINT(22,1),"BONUS":HPRINT(27,1),
TS:PLAYP2$:FORI=1TO750:NEXTI:GOS
UB1370:GOTO60
230 GOTO80
240 IFLV=2ANDY<43THENJM=0:JC=0:G
OTO110ELSEJ=3:JC=JC+1:IFJC>5THEN
JC=1:JM=0:GOTO110ELSEY=Y-5:GOTO1
10
250 H1=1:HY=0:HX=30+2*RND(117):H
GET(HX,HY)-(HX+12,HY+12),6:Z=8
260 HPUT(HX,HY)-(HX+12,HY+12),6:
HY=HY+Z+(DF*3):Z=Z+.3:IFHY>157TH
ENH1=0:PLAY"02V20CE":GOTO160ELSE
HGET(HX,HY)-(HX+12,HY+12),6:HPUT
(HX,HY)-(HX+12,HY+12),5
270 IFHX>X-9ANDHX<X+12ANDHY>Y-8A
NDHY<Y+18THEN290
280 GOTO160
290 PLAYP1$:NP=NP-1:GOSUB730:FOR
I=1TO750:NEXTI:GOSUB1230:GOTO60
300 IFY<38THENY=38:JM=0:JC=0ELSE
IFY>172THEN430
310 IFX<42ANDY<41THENTM=TM+10:SC
=SC+TS:GOSUB730:HPRINT(22,1),"BO

```

```

NUS":HPRINT(27,1),TS:PLAYP2$:FOR
I=1TO750:NEXTI:GOSUB1450:GOTO60
320 IFX<EX(EE)+18ANDY<EY(EE)+21A
NDY>EY(EE)+4THEN380
330 *
340 CT=CT+1:IFCT<3-DF THEN360ELS
ECT=0:C=C+1:PLAY"02G":IFC>15THEN
C=1
350 CX=CX(C-1):CY=CY(C-1):HPUT(C
X,CY)-(CX+43,CY+17),9,PSET
360 CX=CX(C):CY=CY(C):HPUT(CX,CY
)-(CX+43,CY+17),11,PSET:IFX<CX+3
8ANDX>CX-8ANDY<CY+15ANDY>CY-18TH
EN410
370 GOTO80
380 EX=EX(EE):EY=EY(EE):HGET(EX,
EY)-(EX+38,EY+35),10:EE=EE+1
390 FORI=EY TOEY+114STEP2:HPUT(E
X,I)-(EX+38,I+35),10,PSET:PLAY"0
3F":NEXTI:SC=SC+10:GOSUB730
400 Y=Y+114:GOTO330
410 NP=NP-1:HPUT(X,Y)-(X+12,Y+18
),PN:FORI=1TO18:PALETTE0,RND(63)
:PLAY"03E05C":NEXTI:PALETTE0,0:G
OSUB730:FORI=1TO800:NEXTI:GOSUB1
370
420 GOTO60
430 NP=NP-1:FORI=5TO1STEP-1:PLAY
"0"+STR$(I)+"FDEC":NEXTI:GOSUB73
0:FORI=1TO600:NEXTI:GOSUB1370:GO
TO60
440 J=3:JC=JC+1:IFJC>7THENJC=1:J
M=0:GOTO360ELSEY=Y-3:GOTO360
450 IFY>154THENNP=NP-1:FORI=5TO1
STEP-1:PLAY"0"+STR$(I)+"FDEC":NE
XTI:GOSUB730:FORI=1TO450:NEXTI:G
OSUB1690:GOTO60
460 IFX>259THENSX=SC+50:GOSUB730
:PLAYP2$:FORI=1TO500:NEXTI:GOSUB
1230:GOTO60
470 IFGL=1THEN500ELSEIFRND(8)=1T
HEN490
480 GOTO80
490 GL=1:GY=140:GX=262:PLAY"03V3
18AGFEDC"
500 HPUT(GX,GY)-(GX+12,GY+12),22
,PSET:GX=GX-8-(DF*2):IFGX<0THENG
L=0:GOTO80ELSEHPUT(GX,GY)-(GX+12
,GY+12),21,PSET
510 IFX<GX+12ANDX>GX-10ANDY<GY+1
2ANDY>GY-18THENPLAY"01V31CDEFG02
GFEDC0C0C":NP=NP-1:FORI=1TO600:N
EXTI:GOSUB730:GOSUB1690:GOTO60
520 GOTO80
530 IFY>172THENNP=NP-1:FORI=5TO1
STEP-1:PLAY"0"+STR$(I)+"FDEC":NE
XTI:GOSUB730:FORI=1TO600:NEXTI:G
OSUB1450:GOTO60
540 AX=20+RND(5)*40:AY=50+RND(3)
*40+RND(2)-2:HPUT(AX,AY)-(AX+23,
AY+22),13,PSET
550 IFL1=1THEN600ELSEIFRND(3)=1T
HEN580
560 IFX>242ANDY<44THEN640
570 GOTO80
580 L1=1:LY=17:PLAY"03V28E01A":L
C=LC+1:IFLC>10THENLC=0
590 LX=60+LC*18:HGET(LX,LY)-(LX+
5,LY+19),16
600 HPUT(LX,LY)-(LX+5,LY+19),16,
PSET:LY=LY+18+(DF*3):IFLY>192THE
NL1=0:GOTO560ELSEHGET(LX,LY)-(LX

```

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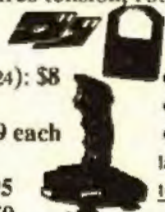
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```

+5,LY+19),16:HPUT(LX,LY)-(LX+5,L
Y+19),15,PSET
610 IFLX>X-3ANDLX<X+12ANDLY<Y+17
ANDLY>Y-9THEN630
620 GOTO560
630 NP=NP-1:FORI=30T05STEP-3:PLA
Y"V"+STR$(I)+"04FED03FED02FED01F
ED":NEXTI:GOSUB730:FORI=1T0400:N
EXTI:GOSUB1450:GOTO600
640 PLAYP2$:SC=SC+250:GOSUB730:F
ORI=1T0100:NEXTI:PLAYP3$:NP=NP+1
650 DF=DF+1:GOSUB1540:IFDF>3THEN
DF=3
660 FORI=234T030STEP-2:PALETTE6,
RND(63):A=RND(2):HPUT(1,96+A)-(I
+84,118+A),18,PSET:NEXTI:PLAY"01
V30GFEDV25ADEAV18EFAV12EFAAV6ED
AEV31"
670 HCOLOR7:HLINE(54,109)-(67,11
8),PSET,BF:HPUT(30,98)-(95,110),
17,PSET:X=58:Y=109:HGET(X,Y)-(X+
12,Y+18),4:A=1.4
680 PALETTE6,RND(63):FORI=1T095:
NEXTI:HPUT(X,Y)-(X+12,Y+18),4:Y=
Y+A:IFY>192THEN690ELSEHGET(X,Y)-
(X+12,Y+18),4:HPUT(X,Y)-(X+12,Y+
18),3:A=A+1:GOTO680
690 POKE65496,0:PLAY"01GFEDC":FO
RI=1T0450:NEXTI:PLAY"TL3FEDL2CL
255T255":POKE65497,0:FORI=1T0990
:NEXTI:GOSUB1230:GOTO600
700 GOTO700
710 TQ=TQ+1:IFTQ<3THENRETURNELSE
TQ=0:HCOLOR7:HLINE(112+TM,8)-(11
2+TM,15),PSET:TM=TM-1:IFTM<0THEN
HCOLOR9:HPRINT(15,10),"OUT OF TI
ME":GOTO1590
720 RETURN
730 IFNP<0THEN1590ELSEHCOLOR9,7:
HPUT(22,1)-(34,19),3,PSET:HLINE(
38,7)-(48,17),PRESET,BF:HPRINT(4
,1),NP:SC$=STR$(SC):S$="0":L=LEN
(SC$):SC$=RIGHT$(SC$,L-1)
740 IFLEN(SC$)<5THENS$=S$+SC$:G
OTO740ELSEHLINE(58,6)-(105,16),P
RESET,BF
750 HPRINT(8,1),SC$:RETURN
760 FORI=0T015:PALETTEI,0:NEXTI:
RETURN
770 FORI=0T015:PALETTEI,C(I):NEX
TI:RETURN
780 FORI=0T036:READC(I):NEXTI:IF
MT=1THENFORI=0T018:C(I)=C(I+19):
NEXTI
790 DATA 0,32,1,33,36,9,63,11,44
,63,7,40,20,4,38,16,10,11,9,0,56
,2,16,38,5,34,5,9,63,33,47,34,32
,38,7,10,11
800 FORI=1T03:READEX(I),EY(I):NE
XT
810 DATA 222,35,138,35,54,34
820 FORI=5T016:READFX(I),FY(I):N
EXTI
830 DATA 86,116,240,86,118,86,14
8,56,102,40,186,40,186,40,270,40
,98,80,58,118,180,118,220,158
840 P1$="02V31DEFV20DEFV15DEFV10
DEFV5DEF
850 P$="CDEFGAB":FORI=1T04:P2$=P
2$+"0"+STR$(I)+P$:NEXTI
860 P3$="02T3L8;D0#EL40+CO-L8EO+
L4CO-L8EO+L2C;LBEFF#GEFL4GL8DL4F
L2E;L255T255"
870 P4$="02CEDFEGFAGB"
880 HSCREEN2:HCLS7:0$="D3R10U3NL
10D1G1H1G1H1G1H1G1H1"
890 HDRAW"BM100,100S12C0:XD$":H

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```

PAINT(108,101),9,0:HPAINT(120,10
7),8,0
900 HGET(88,96)-(143,115),1
910 D$="U2R2D2NL2E1U2G1L2E1R2":H
DRAW"BM40,40;C8S16:XD$":HPAINT(
44,37),9,8:HPAINT(46,30),9,8:HPA
INT(50,34),8,8
920 HCOLOR8:HLINE(43,34)-(43,37)
,PSET
930 HCOLOR8:HLINE(43,34)-(43,37)
,PSET:HGET(40,28)-(52,40),5
940 HCLS7:HDRAW"BM100,100C9S12:E
1F1E1F1E1F1E1F1E1F1D3L12U3":
HPAINT(116,103),8,9
950 HCOLOR8:HLINE(100,98)-(100,1
09),PSET:HLINE(100,109)-(136,109
),PSET:HGET(100,90)-(136,109),8
960 HCLS7:D$="E1R1E1R2E1R2F1R1
R1F1D1L2G1L1H1G1L2H1G1L1H1L2U1:R
2F1R1R2NH1R1NE1R2R1E1R3"
970 HDRAW"BM100,100C8S12:XD$":H
PAINT(122,96),9,8:HPAINT(134,101
),8,8:HPAINT(118,104),8,8:HPAINT
(102,101),8,8
980 HCOLOR8:HLINE(100,99)-(100,1
03),PSET:HGET(100,90)-(143,107),
9
990 HGET(0,0)-(38,35),10
1000 HCLS7:HDRAW"BM100,100C6S12:
XD$":HPAINT(122,96),9,6:HPAINT(
134,101),6,6:HPAINT(118,104),6,6
:HPAINT(102,101),6,6
1010 HCOLOR6:HLINE(100,99)-(100,
103),PSET:HGET(100,90)-(143,107)
,11
1020 HCLS7:HCIRCLE(100,100),10,1
0:HPAINT(100,100),11,10
1030 HCOLOR7:HLINE(96,90)-(102,9
1),PSET,B:HLINE(96,109)-(102,110
),PSET,B:HSET(96,96,9):HSET(98,9
6,9):HSET(95,98,9):HSET(97,98,9)
:HGET(88,89)-(111,111),13
1040 HCLS7:D$="E1R1E1R3F1R1F1D1L
2H1G1L1H1G1L1H1D1F1R1E1F1R1E1F1R
1E1":HDRAW"BM100,100C0S12:XD$":
HPAINT(116,97),1,0:HPAINT(122,10
4),15,0
1050 HGET(102,94)-(125,106),14
1060 HCLS7:D$="R2F1L1D2R1E1NL2H1
R1D2L1D1F1D2R2U1H1L1D3NL3R1D1L2N
U1L3E1U2NH1R2U1H1L1H1U2E1L1G1D2G
104G1R3"
1070 HDRAW"S8C0BM100,100:XD$":
1080 HPAINT(99,114),0,0:HPAINT(1
01,102),9,0:HPAINT(106,115),9,0:
HPAINT(111,112),0,0:HPAINT(100,1
01),0,0
1090 HPAINT(108,117),11,0:HPAINT
(104,117),11,0:HPAINT(106,103),1
1,0:HPAINT(106,105),11,0:HSET(10
3,102,0)
1100 HCOLOR7:HLINE(96,106)-(96,1
26),PSET:HSET(98,118,7):HGET(98,
100)-(110,118),2
1110 XX=112:FORX=94T0112:FORY=10
0T0118:P=HPPOINT(X,Y):HSET(XX,Y+2
0,P):NEXTY:XX=XX-1:NEXTX
1120 HGET(96,120)-(108,138),3
1130 HCLS7:D$="R1D1R1D1G1F1G1D2H
1U1E1L1U1E1L1U2":HDRAW"BM100,100
C0S12:XD$":HPAINT(104,105),6,0
1140 HGET(100,100)-(105,119),15
1150 HCLS7:0$="F1D1G1L2H1L1H1L1H
2R5F1R2:F1R3D1L3U1BU1BR4;R2E1R5G
2L1G1L1G1L2H1U1E1":HDRAW"BM100,1
00C6S12:XD$":HPAINT(98,105),4,6
:HPAINT(116,105),4,6:HPAINT(108,

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104),6,6
1160 HGET(74,97)-(139,109),17
1170 HPUT(100,97)-(112,97+18),3,
PSET
1180 HGET(74,96)-(158,118),18:HG
ET(38,40)-(67,52),20
1190 D$="R1F1E1R3F2D1L3NU1G1U2D1
L1H1G1L1E1U1H1":HDRAW"BM40,40C2S
12:XD$":HPAINT(54,43),3,2:HC0LO
R9:HLINE(58,44)-(60,45),PSET,BF:
HSET(60,45,0)
1200 HGET(38,40)-(67,52),19
1210 HGET(194,14)-(206,26),22:HC
IRCL(200,20),6,0:HPAINT(200,20)
,6,0:HGET(194,14)-(206,26),21
1220 RETURN
1230 GOSUB760:HCLS7:LV=1:C(7)=C(
17)
1240 HCOLOR9,0:HLINE(0,164)-(320
,192),PSET,BF:FORI=1T030:HSET(RN
D(320),168+RND(24),7):NEXT:HLINE
(0,164)-(320,164),PRESET
1250 HCOLOR15:FORX=10T0280STEP62
:HPUT(X,127)-(X+55,146),1,PSET:N
EXTX
1260 FORX=40T0249STEP62:HPUT(X,9
6)-(X+55,115),1,PSET:NEXTX
1270 FORX=72T0218STEP62:HPUT(X,6
5)-(X+55,84),1,PSET:NEXTX
1280 HPUT(102,34)-(157,53),1,PSE
T:HPUT(164,34)-(219,53),1,PSET
1290 HCOLOR11,0:X=274:FORY=124T0
104STEP-4:GOSUB1360:NEXT:X=56:FO
RY=92T072STEP-4:GOSUB1360:NEXTY:
X=214:FORY=62T042STEP-4:GOSUB136
0:NEXTY
1300 X=150:FORY=156T0142STEP-4:G
OSUB1360:NEXTY
1310 HCIRCLE(128,29),10,9:0$="R1
G1D1L1U1E1":HDRAW"BM124,25C9S8:X
D$":HPAINT(128,29),6,9:HCIRCLE(
128,29),10,1:HSET(128,38,0)
1320 FORI=1T04:FX(I)=FX(I+4):FY(
I)=FY(I+4):NEXTI
1330 X=12:Y=145:PN=2:H1=0:H2=0
1340 HGET(X,Y)-(X+12,Y+18),4:GOS
UB770
1350 HCOLOR10,0:HLINE(112,9)-(21
2,14),PSET,BF:HLINE(111,8)-(213,
14),PRESET,B:TM=100:RETURN
1360 HLINE(X,Y)-(X+20,Y),PRESET:
HLINE(X,Y+1)-(X+20,Y+1),PSET:RET
URN
1370 GOSUB760:HCLS7:LV=2:C(7)=C(
16)
1380 I=1:FORX=50T0164STEP38:FORX
=10T0262STEP84:CX(I)=X:CY(I)=Y:I
=I+1:HPUT(X,Y)-(X+43,Y+17),9,PSE
T:NEXTX,Y:CY(0)=CX(15):CY(0)=CY(
15)
1390 HCOLOR0,11:FORX=22T0274STEP
84:FORX=70T0150STEP38:GOSUB1440:
NEXTY,X
1400 HCOLOR0,3:FORI=1T03:X=EX(I)
:Y=EY(I)+25:HLINE(X,Y)-(X+37,Y+3
),PSET,BF:HLINE(X,Y)-(X+37,Y+3),
PRESET,B:NEXTI:X=EX(3):Y=EY(3)+2
5
1410 HCIRCLE(32,42),10,9:0$="R1G
1D1L1U1E1":HDRAW"BM28,38C9S8:XD$
":HPAINT(32,42),6,9:HCIRCLE(32,
42),10,1
1420 FORI=1T04:FX(I)=FX(I+8):FY(
I)=FY(I+8):NEXTI
1430 C=1:EE=1:X=272:Y=152:PN=3:G
OTO1340
1440 FORI=Y TOY+16STEP4:HLINE(X,

```



## BIG BASIC

Full Power for your CoCo 3!

(From Danosoft)

Gives up to 92K User Memory in 128K CoCo and 476K in 512K CoCo from BASIC with any mix of program/variables. You can have one BIG program or 58 Separate ones running at once from computer memory in multiple windows! Big Basic also allows you to Disk Chain any size program. Step up to the full potential of your CoCo 3 with Big Basic. Only \$39.95

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- (1) **ZOOM 2400 Modem**: Fully Hayes Compatible 300/1200/2400 w speaker, Auto Dial/Answer & **Seven Year Warranty!**
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## XPort (From Orion Technologies®)

The extended multi-port interface for CoCo 1, 2 or 3.  
● 3 Cartridge Slots ● 12 Volts powers anything ● Use for disk, RS232 Pak much more ● Buffered I/O ● Perfect replacement for discontinued multi-pak. Intro Special. Only **\$74.95**

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**INTRONICS EPROM PROGRAMMER**: Programs 2516 to 27010 & more! Includes software & complete documentation. Latest version. Lowest Price Anywhere. CoCo 1,2,3. Only **\$137.95**

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## CABLES, Etc.

**Magnavox 8505/8515/8CM643 Analog RGB Cable: \$24.95**

**Serial-to-Parallel Interface**: Use your parallel printer at high speed (300-9600 baud) with the CoCo. Comes with all cables. No software compatibility problems. Only **\$44.95**

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**ECB Rom 1.1: \$29.95**

**68B09E Chip: \$14.95**

**68B21 Chip: \$5.95**

**GIME Chip for CoCo 3: \$39.95**

**Genuine RS Multipak PAL Chip** (Specify 26-3024 / 26-3124): **\$19.95**

**PAL Switcher**: Allows you to switch between CoCo 2 & 3 modes when using the Multipak. You need the OLDER & NEW PAL Chip for the 26-3024 Multipak. Only **\$39.95**. With NEW PAL Chip Only **\$49.95**

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# The CoCo Picture Show

Introducing CoCo Gallery On Disk! We've got the pictures. You supply the popcorn and beverages.

Enjoy the best from past issues of CoCo Gallery on your own CoCo. Volume 1 is available in a CoCo 1 or 2 version (25 pictures) and a CoCo 3 version (11 pictures). The pictures offered in each version are different. If you have a CoCo 3, get both versions for a total of 36 pictures.



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For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST

All other inquiries call (502) 228-4492.

```
I)-(X+20,I),PRESET:HLINE(X,I+1)-(X+20,I+1),PSET:NEXTI:RETURN
1450 HSCREEN2:GOSUB760:HCLS7:LV=3:IFMT<>1THENC(7)=C(18)ELSEC(7)=5
1460 FORX=20TO280STEP40:FORY=90TO186STEP40:HPUT(X,Y)-(X+23,Y+22),13,PSET:NEXTY,X
1470 HCOLOR13:HLINE(32,150)-(33,172),PSET,B:HLINE(272,110)-(273,132),PSET,B:FORY=155TO168STEP2:HLINE(26,Y)-(39,Y),PSET:NEXTY:FORY=115TO128STEP2:HLINE(266,Y)-(279,Y),PSET:NEXTY
1480 FORX=319TO600STEP-24:HPUT(X-23,56)-(X,68),14,PSET:HPUT(X-23,26)-(X,38),14,PSET:NEXTX
1490 HCOLOR13:HLINE(32,64)-(33,93),PSET,B:FORY=64TO89STEP2:HLINE(26,Y)-(39,Y),PSET:NEXTY
1500 HPUT(246,42)-(311,54),17,PS
ET
1510 FORI=1TO4:FX(I)=FX(I+12):FY(I)=FY(I+12):NEXTI
1520 X=272:Y=152:PN=3:L1=0:L2=0
1530 GOTO1340
1540 GOSUB760:HCLS7:GOSUB730:C(7)=C(17)
1550 FORX=0TO320STEP24:HPUT(X,180)-(X+23,192),14,PSET:NEXTX
1560 HCOLOR13:HLINE(0,55)-(28,192),PSET,8F:HCOLOR3:FORI=0TO28:HLINE(I,55)-(I,55-RND(3)),PSET:NEXTI
1570 HPUT(174,50)-(217,67),9,PSET:HPUT(54,134)-(97,151),9,PSET:HPUT(236,136)-(279,153),9,PSET
```

```
1580 GOSUB770:RETURN
1590 HCOLOR9,7:HLINE(124,94)-(202,104),PRESET,8F:HPRINT(16,12),"GAME OVER":FORI=1TO4:PLAY"V"+STR$(I*7):FORO=5TO1STEP-1:PLAY"O"+STR$(O)+"BGEC":NEXTO,I
1600 IFBUTTON(0)=1THEN50ELSE1600
1610 DF=0:GOSUB760:HSCREEN2:HCLS3
1620 D$="R3G1L1G1D3F2L2H1U4E2R3G1D2R2U1L1D1R1U1R1D1L1U2NH1U1F1D2R3F2L7:H1NR1N0F1R5G1L5H1U1E1G1D1F1R2G1L4H1U4E2"
1630 HCIRCLE(160,92),40,15,.75:HCIRCLE(160,92),50,15,.75:HPAINT(118,96),13,15:HPAINT(160,92),7,15:HDRAW"BM140,70C0S24:XD$:"
1640 HPAINT(140,107),0,0:HPAINT(180,95),14,0:HPAINT(146,89),9,0:HPAINT(164,79),8,0:HPAINT(172,79),8,0:HPAINT(166,84),15,0:HPAINT(174,84),15,0
1650 HCOLOR7:HLINE(142,68)-(143,72),PSET,8F:HLINE(140,70)-(145,70),PSET
1660 HCOLOR0:HPRINT(13,5),"PENGU IN ICARUS":HPRINT(16,17),"(C)1990":HPRINT(12,18),"by Nick Bradbury":HPRINT(10,20),"press 'fire' to begin":GOSUB770
1670 PALETTE13,RND(63):1FBUTTON(0)=0THEN1670
1680 NP=4:GOSUB1230:GOTO60
1690 SOUND20,4:RETURN
1700 CMP:POKE65496,0:HSCREEN0:END
```

CoCo 3

50 ..... 134  
 END ..... 102

## Listing 2: DEMO

```
0 * COPYRIGHT 1990 FALSOFT, INC
10 ONBRK GOTO90
20 HBUFF1,235:HBUFF2,235
30 HSCREEN2:HCLS:PALETTE0,0:POKE65497,0
40 FORI=1TO300:HSET(RND(320),RND(192),RND(15)):NEXT:HCIRCLE(160,96),44,5:HPAINT(160,96),3,5
50 HGET(0,0)-(20,20),2:HCOLOR4:HLINE(0,0)-(20,20),PSET,8F:HGET(0,0)-(20,20),1
60 FORX=0TO298STEP6:HPUT(X,Y)-(X+20,Y+20),2:HGET(X+6,Y)-(X+26,Y+20),2:HPUT(X+6,Y)-(X+26,Y+20),1
70 NEXTX:HPUT(X,Y)-(X+20,Y+20),2:Y=Y+20:IFY>170THENY=0
80 GOTO60
90 HSCREEN0:POKE65496,0:END
```

# 7 GOOD REASONS TO BUY CoCo Max III & Max-10 NOW

- 1) Customer Satisfaction:** 10,000 Colorware customers can't be wrong.
- 2) Incredible performance:** CoCo Max is the best graphics software, and Max-10 is the best word processor.
- 3) Highly Recommended:** "The Rainbow" magazine stated "Max-10 takes a back seat to none" and "CoCo Max III is the ultimate program."

## WOW!

- 4) The following offer is unprecedented:** CoCo Max III and Max-10 together for not \$149.90, not \$79.95, but now only **\$59.95**. Unbelievable!
- 5) Bonus Offer!** Get any of the following "addons" for only \$14.95 each: Spellchecker, Max-10 Fonts, Max Fonts Set A, Max Fonts Set B, Color Printer Drivers, Max Edit.
- 6) Limited Time!** These unbelievable offers end March 31, 1990. Don't miss out!
- 7) They Agree!** These women don't agree on anything but all three love CoCo Max III and Max-10.



### System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

### Max-10...\$39.95

Max-10 is the ultimate word processor. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview with graphics. Without a doubt, Max-10 will add excitement to your word processing, and that's no small task!

**PRINTERS SUPPORTED:** EPSON FX, MX, RX, LX & COMPATIBLES; DMP 105, 106, 130; CGP-220 (B&W); OKI 182, 92, 192; STAR NX-10, NX-1000.

### Max-10 Add-ons

- **Max-10 Fonts.** 36 super fonts on 2 disks. **\$29.95**
- Max-10 and CoCo Max Fonts aren't interchangeable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. **\$29.95**

### CoCo Max III...\$49.95

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise. **Its major features include:** Huge picture area (2 full hires 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation.** Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. 2 color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.

**PRINTERS SUPPORTED:** EPSON RX, FX, MX, LX AND COMPATIBLES; STAR/GEMINI NX-10, NX-1000; DMP 100, 105, 106, 110, 120, 130, 200; OKI 82A, 182, 192; CGP-220 (B&W) **Color Drivers.** See below.

### CoCoMax 3 Addons

- **Max Fonts set A, Max Fonts set B.** Each set has two disks and over 40 fonts. **\$29.95**
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### Digitizers

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max 3 or Max-10. The above pictures of Barbara, Arnette and Sunny were taken with the DS-69B.

- DS-69.** Requires Multipak. 2 pictures per second. **\$99.95**
- DS-69B** Faster: 8 pix/sec. Multipak not required. **\$149.95**

### A-Bus

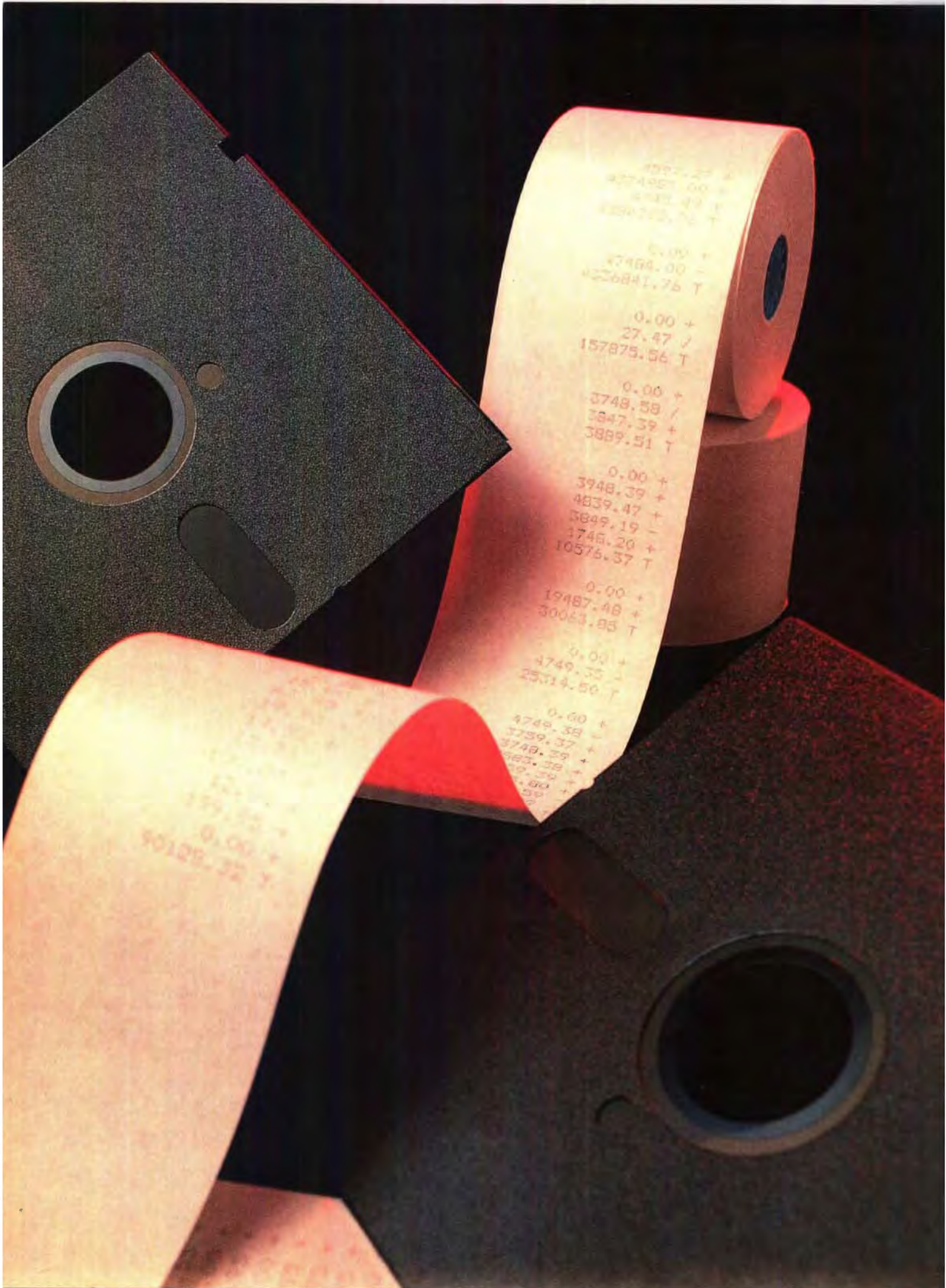
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3748.58 /  
3847.39 +  
3889.51 T

0.00 +  
3948.39 +  
4839.47 +  
3849.19 -  
1746.20 +  
10576.37 T

0.00 +  
19487.48 +  
30063.85 T

0.00 +  
4749.35 -  
25314.50 T

0.60 +  
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# Reckoning With the CoCo

by Bill Minze

**B**ecause of the high prices asked for printing calculators, I decided to make my Color Computer fill the need. *Calculate* runs on any CoCo with Extended BASIC and either tape or disk. A printer is optional. When the program starts, you go straight to the calculator if a printer is on line. If a printer is not on line, you are asked if you are going to use a printer. If you answer Yes, you should put the printer on line or *Calculate* will wait until the printer is ready. At any time during program execution, you can toggle the printer on and off by holding down the SHIFT key and pressing CLEAR.

The calculator screen displays letters that stand for the following:

- E - Current entry
- S - Subtotal
- T - Total
- L - Last entry you made

Negative numbers are displayed with a minus sign in front of them. If at some time you press an unacceptable key, you will

---

*Bill Minze, a New York city firefighter, started computing with the CoCo in 1981 and now uses a CoCo 3. He uses his CoCo for record keeping, and his three children use it for games. He may be contacted at 49 Frank Court, Brooklyn, NY 11229, (718) 332-0551.*

hear a two-tone sound, and the top line of the screen will tell you what to do. One of these instructions comes up if you try to divide by zero, which would ordinarily create a Divide By Zero Error. This can also happen if you press the division key twice in a row without a number in between. All you have to do to save your previous entries is enter the number 1 and continue. This divides your subtotal by one, which does not change the subtotal.

The SHIFT key is not needed to enter a plus sign (+) or an asterisk (\*). It can be used, but the keys will work unshifted. The equal sign (=) is used with SHIFT, and ENTER has the same effect as an equal sign. C clears one or all entries. If you accidentally press BREAK, type CONT and press ENTER twice. This puts you back where you were before BREAK was pressed. The display is a little messy, but all entries are correct.

The program allows eight digits to the left of the decimal point. This allows enough digits to cover most of my bank accounts. It also allows two digits to the right of the decimal; if a third digit is entered, *Calculate* will round off the second and not accept any more. If your total goes over eight digits to the left of the decimal, the screen and printer formats get messed up, but the answer will be correct. Also, after nine digits to the left of the decimal, the answer is displayed and printed in exponential notation format. □

Line	Description
7 - 13	Test for printer
14 - 16	Set the first screen,
17	PRINT USING string & start calculation
18 - 28	INKEY\$ and test for which key was entered
29 - 33	The calculation to be made
34 - 39	Addition routine
40 - 45	Subtraction routine
46 - 51	Multiplication routine
52 - 57	Division routine
58 - 63	Equal routine
64 - 67	Clear entry
68 - 70	Clear calculator
71	Test if a total was the last operation
72 - 75	Holds numbers until a math function
76 - 78	Inappropriate entry
79 - 80	Division by 0 routine
81 - 82	Switch printer on-off

#### List of Variables

N\$ -	Holds PRINT USING string
X\$ -	Holds Y or N print on-off
Z\$ -	Each character as entered
Z0\$ -	Holds Z\$
P -	Holds value of Z0\$
ST -	Holds subtotal & total
C -	To know if total was made
B -	Counts the number of digits

```

0.00 +
3948.39 +
4839.47 +
3649.19 -
1748.20 +
10576.37 T
0.00 +
19487.48 +
30065.85 T
0.00 +
4749.35 -
25314.50 T
0.00 +
4749.38 -
3759.37 +
3748.39 +
37583.38 +
74839.39 +
47493.80 +
47383.59 -
47584.39 -
93021.47 T
4.00 +
4873.48 -
17.49 +
88169.48 T
0.00 +
7.57 +
374.58 +
374.29 +

```

16K Extended

10	.....	9
19	.....	173
27	.....	55
35	.....	189
42	.....	80
49	.....	158
58	.....	87
68	.....	181
75	.....	135
END	.....	143

The Listing: CALCULAT

```

0 ' COPYRIGHT 1990 FALSOFT, INC
1 * *****
2 * * CALCULAT *
3 * * BY *
4 * * BILL MINZE *
5 * * BROOKLYN N.Y. *
6 * *****
7 X=PEEK(65314):IF INT(X/2)-X/2
THEN X$="Y"
8 IF X$="Y" THEN 14:CLS
9 CLS:PRINT@128,"**THERE IS NO P
RINTER ON LINE**"
10 PRINT@192,"*** ARE YOU USING
A PRINTER ***"
11 PRINT@267,"YES OR NO"
12 X$=INKEY$:IF X$=""THEN 12
13 IF X$="Y" OR X$="N"THEN 14 EL
SE PRINT@327,"ANSWER WITH Y OR N
":GOTO 12
14 CLS
15 PRINT@434,"S 0.00"
16 PRINT@480,"E 0.00"
17 N$="#####.##":GOTO 34
18 Z$=INKEY$:IF Z$=""THEN 18
19 IF Z$=CHR$(92)THEN 81
20 IF Z$>CHR$(47) AND Z$<CHR$(58
)THEN 71
21 IF Z$=CHR$(46)THEN 71
22 IF Z$=CHR$(43) OR Z$=CHR$(59)
THEN RETURN

```

```

23 IF Z$=CHR$(45) OR Z$=CHR$(47)
THEN RETURN
24 IF Z$=CHR$(42) OR Z$=CHR$(58)
THEN RETURN
25 IF Z$=CHR$(61) OR Z$=CHR$(13)
THEN 58
26 IF Z$=CHR$(67)THEN 64
27 IF Z$=CHR$(12) THEN 68
28 PRINT@0,"*USE NUMBERS OR MATH
SIGNS ONLY*":SOUND100,10:SOUND1
50,10:GOTO 18
29 IF Z$=CHR$(43) OR Z$=CHR$(59)
THEN 34
30 IF Z$=CHR$(45) THEN 40
31 IF Z$=CHR$(42) OR Z$=CHR$(58)
THEN 46
32 IF Z$=CHR$(47) THEN 52
33 IF Z$=CHR$(61) OR Z$=CHR$(13)
THEN 59
34 GOSUB 18:ST=ST+P
35 PRINT@434,"S":PRINT@437,USING
N$:ST
36 IF C=0 THEN PRINT@384,"L+":PR
INT@387,USING N$:P ELSE PRINT@384
,""
37 PRINT@480,"E 0.00"
38 IF X$="Y"THEN PRINT#-2,USING
N$:P:PRINT#-2,"+"
39 C=0:P=0:Z0$=""B=0:GOTO 29
40 GOSUB 18:ST=ST+P
41 PRINT@434,"S":PRINT@437,USING
N$:ST
42 IF C=0 THEN PRINT@384,"L-":PR
INT@387,USING N$:P ELSE PRINT@384
,""
43 PRINT@480,"E 0.00"
44 IF X$="Y"THEN PRINT#-2,USING
N$:P:PRINT#-2,"-"
45 C=0:P=0:Z0$=""B=0:GOTO 29
46 GOSUB 18:ST=ST+P
47 PRINT@434,"S":PRINT@437,USING
N$:ST
48 IF C=0 THEN PRINT@384,"L*":PR
INT@387,USING N$:P ELSE PRINT@384
,""
49 PRINT@480,"E 0.00"
50 IF X$="Y"THEN PRINT#-2,USING
N$:P:PRINT#-2,"*"
51 C=0:P=0:Z0$=""B=0:GOTO 29

```

```

52 GOSUB 18:IF P=0 THEN GOTO 79
53 ST=ST/P:PRINT@434,"S":PRINT@4
37,USING N$:ST
54 IF C=0 THEN PRINT@384,"L/":PR
INT@387,USING N$:P ELSE PRINT@384
,""
55 PRINT@480,"E 0.00"
56 IF X$="Y"THEN PRINT#-2,USING
N$:P:PRINT#-2,"/"
57 C=0:P=0:Z0$=""B=0:GOTO 29
58 RETURN
59 PRINT@434,"T":PRINT@437,USING
N$:ST
60 PRINT@384,"T":PRINT@387,USING
N$:ST
61 PRINT@480,"E 0.00"
62 IF X$="Y"THEN PRINT#-2,USING
N$:ST:PRINT#-2,"T"CHR$(10)
63 P=0:Z0$=""C=1:B=0:GOTO 34
64 PRINT@434,"S":PRINT@437,USING
N$:ST
65 PRINT@384,""
66 PRINT@480,"E 0.00"
67 Z0$=""P=0:C=1:GOTO 18
68 P=0:Z0$=""ST=0:C=0:B=0
69 IF X$="Y"THEN PRINT#-2,"
CLEAR"CHR$(10):PRINT#-2,USING N$
:P:PRINT#-2,"T"
70 GOTO 14
71 IF C=1 THEN 76
72 IF Z$=CHR$(46) THEN B=0
73 B=B+1:IF B=9 THEN PRINT@0,"*O
NLY 8 DIGETS LEFT OF DECIMAL*":S
OUND100,10:SOUND150,10:GOTO 64
74 Z0$=Z0$+Z$:P=VAL(Z0$)
75 PRINT@448,"E":PRINT@451,USING
N$:P:GOTO 18
76 PRINT@0," USE MATH SIGN FIRS
T + - * /"
77 SOUND100,10:SOUND150,10:C=0
78 GOTO 18
79 PRINT@0,"YOU CAN NOT DEVIDE B
Y ZERO ENTER NUMBER <1> NOW TO
SAVE YOUR PREVIOUS ENTRIES, A
ND CONTINUE"
80 SOUND100,10:SOUND150,10:GOTO 5
2
81 IF X$="Y"THEN X$="N"ELSE X$="Y"
82 GOTO 18

```

# OUR LATEST 30 ISSUES

**ISSUE #60, JUNE 1987**  
JOB COSTING  
LABELS  
CATCH A CAKE  
COCO MATCH  
ROBOTS  
STREET RACERS  
BOWLING3  
ELECTRONICS 3  
GRAFIX  
KRON

**ISSUE #61, JULY 1987**  
EZORDER  
SUBMISSION WRITER  
KEYS ADVENTURE  
WALL PAPER  
CHOPPER COMMAND  
UNDERSTANDING OPPS.  
BITCODE  
ELECTRONICS 4  
KINGPEDE  
RAIDER

**ISSUE #62, AUG. 1987**  
PENSION MANAGEMENT  
HERBS  
CATALOGER UTILITY  
RAIDERS  
ALPHABETIZING  
UFO  
ELECTRONICS 5  
RAMBO ADVENTURE  
BLOCKS  
CAVE

**ISSUE #63, SEP. 1987**  
GENEOLOGIST HELPER  
SMART COPY  
MAINTENANCE  
COCO3 - COCO2 HELP  
DIRECTORY PICTURE  
SUBSTANTIAL ATTACK  
SAVE THE MAIDEN  
CAVIATOR  
ELECTRONICS 6  
MONKEY SHINE

**ISSUE #64, OCT. 1987**  
GARDEN PLANTS  
FORT KNOX  
ELECTRON FORMULAS  
SNAKE IN THE GRASS  
CYCLE JUMP  
GEOMETRY  
WIZARD  
GAME OF LIFE  
ELECTRONICS 7  
FLIGHT SIMULATOR

**ISSUE #65, NOV. 1987**  
TAXMAN  
DAISY DOT  
CHILD STONE ADVENT.  
SIR EGGBERT  
CROWN QUEST  
GYM KHANA  
COCO 3 DRAWER  
FOOTBALL  
ELECTRONICS 8  
CHOP

**ISSUE #66, DEC. 1987**  
ONE ROOM ADVENTURE  
OS9 TUTORIAL  
RIVER CAPTAIN  
SOUNDS  
BETTING POOL  
ADVANCE  
MATH TABLES  
ELECTRONICS 9  
LOWER TO UPPER  
NOIS

**ISSUE #67, JAN. 1988**  
MEDIA MASTER  
SAVE THE EARTH  
WEIGHTS & MEASURES  
LOW RES GRAPHICS  
COAST TO COAST  
BACCARAT  
BATTLE SHIP  
ELECTRONICS 10  
TAPE CONVENIENCE  
DUEL

**ISSUE #68, FEB. 1988**  
COINFILE  
WORD COUNTER  
SQUIRREL ADVENTURE  
AREA CODES  
DRAW POKER  
TURTLE RACES  
ELECTRONICS 11  
MULTI-SCREEN  
CANON PRINT  
COCO TENNIS

**ISSUE #69, MAR. 1988**  
POLICE CADET  
STAMP COLLECTION  
BARRACKS ADVENTURE  
CITY/TIME  
HI-LO/CRAPS  
OLYMPICS  
HI-RES CHESS  
ELECTRONICS 12  
DOUBLE EDITOR  
DOUBLE BREAKOUT

**ISSUE #70, APR. 1988**  
BLOTTO DICE  
SUPER COMM  
GENESIS ADVENTURE  
PLANETS  
PHKAWAR  
SIGN LANGUAGE  
ARX SHOOTOUT  
ELECTRONICS 13  
MAGIC KEY  
SNAP PRINT

**ISSUE #71, MAY 1988**  
SUPER LOTTO  
RODOL ADVENTURE  
MAZE  
YAHTZEE3  
PHASER  
SHAPES/PLATES  
STAR WARS  
ELECTRONICS 14  
PRINTER CONTROL  
MAZE 2

**ISSUE #72, JUNE 1988**  
MARKET WATCHER  
3 STOOGES  
HOSTAGE ADVENTURE  
PROGRAM TRIO  
GLADIATOR  
U.S. & CANADA QUIZ  
JEOPARDY  
ELECTRONICS 15  
COCO 3 PRINT  
CTTY

**ISSUE #73, JULY 1988**  
FOREIGN OBJECTS  
CHESS FUNDAMENTALS  
WATER-FOWL QUIZ  
WHAMMY 3  
ADVENTURE TUTORIAL  
CIRCLE 3  
EDUCATION TRIO  
WRITE-UP EDITOR  
PICTURE PACKER  
AIR ATTACK

**ISSUE #74, AUG. 1988**  
VIDEO CAT 3  
1 EYE WILLIE  
JAVA  
GAME TRIO  
CRIONAUT WARRIOR  
ENVELOPE PRINT  
RAM DRIVE 3  
MODE 2  
XMODEM TRANSFER  
CAVE II

**ISSUE #75, SEP. 1988**  
DRACULA ADVENTURE  
HELP TRIO PROGRAM  
SHOWDOWN DICE  
TARZAR 1 ADVENTURE  
ARAKNON  
CASH FLOW REPORTING  
GRAPHICS LETTER  
GRAPHIC EDITOR  
ADDRESS BOOK  
SQUARES

**ISSUE #76, OCT. 1988**  
SUPER BLITZ 3  
CHAMBERS  
TRIO RACE  
EARTH TROOPER  
STARGATE  
BOWLING SECRETARY  
DISK TUTORIAL  
JOYSTICK > KEYBOARD  
KEYBOARD < JOYSTICK  
SAILOR MAN

**ISSUE #77, NOV. 1988**  
POLICE CADET #2  
STARSHIP SHOWDOWN  
MUSIC COMPOSER  
COUPONS/REBATES  
PROGRAM LIBRARY  
BOYSCOUT SEMAPHOR  
HOUSEHOLD CHORES  
MAXOMAR ADVENTURE  
CHUCK LUCK3  
BOZZARD BAY

**ISSUE #78, DEC. 1988**  
POLICE CADET #3  
TANK TURRET  
WAR OF THE WORLDS  
SPINSTER CAFE  
COCO SIZE  
SIGN MAKER  
LEGAL DEDUCTIONS  
BOOK KEEPING  
CAR LEASE 3  
WAREHOUS MUTANTS

**ISSUE #79, JAN. 1989**  
POLICE CADET #4  
DRAW POKER 3  
TILER TEX  
BATTLE  
INSIDE THE COCO  
COCO BULLETIN BOARD  
HOT DIRECTORY  
VCR TUTORIAL  
PRINTER CONTROL  
TIRE KONG

**ISSUE #80, FEB. 1989**  
SCRABBLE  
SPELLING CHECKER  
SANDSTONE ADVNT.  
THE FAMILY FEUD  
HARNESS3 HANDICAP  
MINIGOLF 3  
ULTIMATERM 3  
NETWORKING TUTORIAL  
A-MAZING PLACE  
MONEY TOPOLY

**ISSUE #81, MAR. 1989**  
MONSTERS  
SUPER CONCENTRATION  
TEN PROGRAMS COCO3  
FINANCE  
SNOWBALL FIGHT  
RULER  
POP-UP WINDOWS  
TARZAR2 - CASTLE  
SUPER LISTER  
DIACONIAN

**ISSUE #82, APR. 1989**  
DUNGEON MAZE  
DISK TRANSFER  
MAIL MERGE  
SUPER SPREADSHEET  
BLASTER  
TILER TWO  
DREAM TUNNEL  
DISK UTILITY 3  
EDUCATION TRIO  
BLUENCHINE

**ISSUE #83, MAY 1989**  
T&D FIRST 80  
MODEM BATTLESHIP  
CHURCH MANAGER  
SUPER FILE SORT  
BASEBALL STATS  
TARZAR PT. 3  
INVOICE  
CARD SQUEEZE  
SWORDPLAY 1 + 2  
BREWMASTER

**ISSUE #84, JUNE 1989**  
CROSSWORD PUZZLES  
MOUNT DEATH  
TERRON  
DISK/TAPE TRANSFER  
PAPER WORKS  
SUPER DATABASE  
CONNECT3  
BUSINESS MODEL  
MASS FORMAT  
CHAMBERS

**ISSUE #85, JULY 1989**  
5 PLAYER POKER  
RESUME WRITER  
CRAZY CHEMIST  
JOURNEY UP  
SUBMAINIA  
WORKBENCH  
VACATION PLANNER  
DISK EDITOR II  
NIGHT OF THE NINJA  
MARTIAN CRYPY

**ISSUE #86, AUG. 1989**  
TIME TRAP  
PHONE ACCOUNTANT  
ON TARGET  
NAME THAT TUNE 3  
LASER DEPENDCE  
CHECKBOOK BALANCER 3  
KROACH ADVENTURE  
SUPER BAR GRAPH  
EASY LETTER  
DEVIL ASSAULT

**ISSUE #87, SEPT. 1989**  
PURCHASE ORDER  
INVENTORY INVOICE  
AMERICAN TRIVIA  
KROACH2 ADVENTURE  
TETRA  
SOLO POKER  
GALAXY Q3  
IBM PICTURE VIEWER  
RGB PATCH  
KING OF THE

**ISSUE #88, OCT. 1989**  
SALES PROSPECTING  
VIRUS 3  
WILL MAKER  
JOURNAL-GEN. LEDGER  
POLICE CADET #5  
RED DOG  
MAD LIBS  
MACINTOSH PICT. SAVER  
FROG  
FAST FLIGHT SIMULATOR

**ISSUE #89, NOV. 1989**  
SPEECH INDEXER  
QUEST ADVENTURE  
EDUCATION TRIOS  
BIG LETTER  
PANGO  
ELEMENTS  
GARDEN PLANNER  
VIDEO SHOW  
WARP  
QUIN

**ISSUE #90, DEC. 1989**  
MUSIC-4 VOICE  
HONEYCOMB  
POINT OF SALE  
IBM - COCO  
CIVIL WAR  
LIST UTILITIES  
BREAK-IN COCO III  
LABYRINTH MASTER  
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5	13	21	29	37	45	53	61	69	77	85	
6	14	22	30	38	46	54	62	70	78	86	
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# The Golden Retriever

by Shane Messer

**A**fter looking at all of the database programs on the market, I have found only a few that satisfy my need to keep track of more than just phone numbers and addresses. I want a program to run on the CoCo 3, use the 80-column mode, print records and keep track of virtually any type of data. This narrows things down a bit.

Another inhibiting factor is the price tag. For me and probably for other CoCo users as well, \$60 is steep. This is why I decided to write *ColorBase*, the last database you will ever need. Here are a few of the program's features:

- Completely menu driven
- Field entry
- Up to 255 characters of data per record
- Up to 400 or more records per disk
- Compatibility with a RAM disk for extremely fast operation
- The ability to print one or all of the records
- More than one database per disk
- Choice of default startup colors

Some of you may be shaking your heads, thinking this project will be too hard. It's really not. You don't even have to know how to program. As long as you follow the guidelines, you can't mess up.

## Running the Program

After typing in listings 1 and 2, save them on a blank formatted disk. Then run the program in Listing 2. This program sets up the default color values for *ColorBase*.

---

*Shane Messer is 14 years old and has worked on the CoCo for two years. He enjoys studying math, science and playing soccer. He may be contacted at 3625 Orange Ave., Fort Pierce, FL 34947.*

After completing these steps, run the database program.

## The Main Menu

When you run *ColorBase*, the title screen appears and the default colors are loaded. When the computer is finished, a main menu appears that looks like this:

```
C - CREATE DATABASE
M - MAINTAIN DATABASE
S - SCREEN DEFAULT
X - EXIT TO BASIC
```

The X option simply lets you exit to BASIC. The computer checks with you before doing so.

## Designing Your Database

First of all, decide what you want to keep track of. *ColorBase* keeps track of anything you want as long as you allow enough room in the entry field. A field is simply a section on the form where you enter data. For example, if you want names to be in your records, type in NAME with the desired amount of mark spaces (explained later). When the records come on the screen, you are able to enter data. *ColorBase* allows entries to be as long as the entered number of mark spaces. Anywhere you put a mark space, the computer lets you enter data at that same place. When you decide what data you will track, select C from the main menu.

## C — Create Form

Selecting this option brings up the current data form you are working on. Use this data form to enter your field labels. Although not required on the disk, always save a copy using the S option in case you ever want to reorganize your records to include another field.

Once the form is brought up, a small cursor appears in the center of the screen. Use the arrow keys to move this cursor

around. For example, let's say you want a database that holds names and phone numbers. Use the arrow keys to move to a spot that you select and type in something like NAME. Under that you might enter PHONE. If you are making a receipt database, you may want to put stars around the whole thing and your address at the top. Dress it up—you can type any characters you want on the form.

Once you are finished putting in the items, go back and fill in the mark spaces. To create one, press CTRL. The output looks like a small dash. You will put these where you want, one for each character to be entered. For example, if you were still using the Name item and wanted to be able to enter up to 40 characters for the name, you would go next to NAME and put in 40 mark spaces by pressing CTRL 40 times.

The only thing the computer sees is the mark spaces and their positions. Keep in mind you can keep track of only 255 data characters. When you try to make your database, the computer gives you a message saying there are too many mark spaces if you have exceeded this limit.

Once you are finished with your form, press CLEAR to return to the CREATE menu.

## D — Directory

This function, also available in the Maintain Database menu, displays the directory. If you look at the REM statements in the program, you'll see you can change the value of one variable to select between a normal directory and a wide directory.

## V — Verify Disk

This verifies your disk and causes a System Error if the disk is faulty. Make sure your form is saved before using this option.

## K — Kill

Prompts you to enter a filename and kills that file.



### R — Rename

Allows you to input two names and then renames the first to the second.

### S — Save

Saves data form currently in memory to disk.

### L — Load

Loads a previously created data form from disk.

### E — Erase Form

If you are not happy with your current form and want to start over, press this key and answer Yes to the prompt. The computer erases the form so you can start over.

### M — Make Database

When you are ready to create your database from the form, press M. The computer converts your data form into a database form. The database form contains the data form and information about it, such as the location and size of entry fields. This process can take up to one minute so be patient.

If your form is legal (that is, having less than 255 entry characters), *ColorBase* responds with a prompt that asks you to enter the name of your database form. Remember, this is not your data form; you will need this file and your database file to run the database. The other form is for your records only. Type in the name and verify your save. The computer responds with a prompt asking if you want to create a database. From here you should answer Yes, and with the next prompt enter the actual name of your database. This is where your records will be held.

### X — Exit to Main Menu

Exits back to the Main menu.

### Maintaining Your Database

Once you have the database form and database files saved to disk, you are ready to start entering data. Press M from the Main menu and enter the name of your data form and data file that you have saved to disk. A new menu appears and the total number of records is displayed at the bottom.

### A — Add a Record

This is where you actually enter your data. Press A and the computer loads your form from disk and displays it on the screen.

You can see the cursor at the first entry field before your data is entered. Enter your data, keeping in mind the left arrow key can be used as a backspace. When you are finished with the first entry field, press ENTER and the computer goes to the next field. Continue this process until you are

done with the record.

If at any time you accidentally press ENTER or forget a character, you can use the up and down arrow keys to move the cursor around the different entry fields to correct the mistake.

When you are finished with the record, press CLEAR. The computer verifies your save and asks if you want to enter more records. Respond accordingly.

If you decide to continue adding records, the form reappears with empty entry fields awaiting entry of data again. Your first records, if you verified your save, are stored on disk.

If you answer No to the prompt to enter a new record, you are returned to the menu. If you verified your save of the previous record, the number of records is increased.

### S — Search Records

Whenever you decide to look through the records you have saved, just press S. Your form pops up again and you can start moving through the records. Most of the commands, seen by pressing ENTER at the Search mode, are pretty self-explanatory, so I will explain only one of them. When you kill a record, all succeeding records are moved back one to take its place.

The Search feature works a little differently from the Search features with which you might be familiar. First, the computer prompts you for the search string. After you enter the string of characters you want to find (such as a name), all the records beginning with the current record are searched for that string. When the string is found, the computer jumps to that record. If you want to find the next occurrence, press the space bar. If *ColorBase* cannot find the string, it will respond accordingly.

### P — Printing Your Records

If you have a printer and want to print your records, press P from the menu. The computer asks which record is to be printed. If you want all of them printed, enter an as-

terisk (\*). Next, it asks whether to send a line feed or not. If so, the computer prints one record per page. Each printed record is 24 lines long, even if you only have one entry field.

When typing in Listing 1, make sure to set the baud rate to half that expected by your printer (Line 120). To do this, use the next highest value for the poke to Location 150. *ColorBase* keeps the computer in the high speed during printing.

### X — Exit Back to Main Menu

This takes you back to the Main menu.

### Customizing Colors

If you don't like the colors set up by the customization files created by Listing 2, you can change them. This is also self-explanatory. Please make sure to save your changes to disk if you want to keep the new colors.

This may all seem a bit complicated to new computer owners. But if you follow these instructions, you should have no trouble setting up your database. Feel free to modify the program to add any features you want. If you add a really good feature, think about sending it to THE RAINBOW so the editors can share it with other users. □

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## Listing 1: COLRBASE

```

0 * COPYRIGHT 1990 FALSOFT. INC
1 CLEAR 5000
10 GOSUB 2300
20 GOTO 60
30 IF PEEK(341)=247 THEN Y=Y-1:R
ETURN:ELSE IF PEEK(342)=247 THEN
Y=Y+1:RETURN:ELSE IF PEEK(343)=
247 THEN X=X-1:RETURN:ELSE IF PE
EK(344)=247 THEN X=X+1:RETURN
40 IF CO=1 THEN RETURN
50 FOR TZ=1 TO 1:FOR TX=338 TO 3
45:POKE TX,255:NEXT TX,TZ:A$=INK
EY$:IF A$="" THEN 50 ELSE RETURN
60 ' Co
lorBase v1.00

```

Written by Shane Messe

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```

70 '
80 '
90 PCLEAR1:FILES 1,400:DIM CX(10
0),CY(100),CN(100),DF$(23),FM$(2
4),NS(100),S$(100),SF$(75),K$(10
0):DW=1 '0- REGULAR DIRECTORY, 1
- WIDE DIRECTORY WITH NAMES AND
EXTENSIONS
100 ON ERR GOTO 2990
110 FF$=CHR$(12) ' FORMFEED FOR
DMP-132
120 POKE 150,40 ' HALF YOUR BAUD
RATE
130 LO=65496:HI=65497:FW=32:'THI
S WILL BE THE WIDTH OF THE SCREE
N UPON EXITING
140 FORM2=1 TO 24:FM$(M2)=STRING
$(80," "):NEXTM2:KK=1:CMF:GOSUB
1960:FOR M1=32 TO 122:AC$=AC$+CH
R$(M1):NEXT:MID$(AC$,63,1)=CHR$(
127):GOSUB2340:WIDTH 80:CLSS1:AT
TR S2,S3:PALETTE 10,S4:PALETTE 4
,S5:IF KK=1 THEN PLAY"T255L25501
":K$="C":ELSE K$=""
150 '
-----

```

```

160 '
170 GOSUB 1980
180 GOSUB 2150:IF ASC(A$)=12 THE
N 220
190 GOSUB 2160:IF M1>0 THEN 200
ELSE 180
200 ON M1 GOTO 220,950,1670,1900
210 '
-----
220 'CREATE
230 POKE HI,0:GOSUB 2090
240 GOSUB 2150:GOSUB 2160:IF M1>
0 THEN 250 ELSE 240
250 IF M1=10 THEN 160
260 ON M1 GOTO 270,390,430,460,5
10,550,610,690,750
270 'CREATE FORM
280 CLS:FOR M1=0 TO 22:PRINT FM$
(M1+1);:NEXT:LOCATE 0,23:PRINT"
Use Arrow keys to move around
page. Press 'CLEAR' to ret
urn to menu.";
290 X=40:Y=11
300 GOSUB 30:IF ASC(A$)=12 THEN
220

```

```

301 IF A$=CHR$(13) THEN X=1:Y=Y+
1
310 IF PEEK(342)=191 THEN A$=CHR
$(127)
320 IF INSTR(AC$,A$)>0 THEN LPOK
E 442368+(X-1)*2+Y*160,ASC(A$):M
ID$(FM$(Y+1),X,1)=A$:X=X+1:PLAY
K$
330 IF X>80 THEN X=1
340 IF Y>22 THEN Y=0 ELSE IF Y<0
THEN Y=22
350 IF X<1 THEN X=80
360 LOCATE X-1,Y
370 GOTO 300
380 GOTO 230
390 'IRECTORY
400 IF DW=0 THEN CLS:POKE LO,0:D
IR:PRINT"Free ->";FREE(0):GOSUB
50:POKE HI,0
410 IF DW=1 THEN GOSUB 2770
420 GOTO 230
430 'VERIFY
440 POKE LO,0:FOR M1=0 TO 34:FOR
M2=1 TO 18:DSKI$ DR,M1,M2,M1$,M
2$:NEXT M2,M1:POKE HI,0
450 GOTO 230
460 'KILL FORM
470 M$="Kill Form":GOSUB 2140
480 GOSUB 2180:IF F$="" THEN 230
490 PRINT" Kill "F$" Are you
sure";:LINEINPUT"? Y/N ->":C$:I
F C$="Y" THEN POKE LO,0:KILL F$:
POKE HI,0:GOTO 230 ELSE 230
500 GOTO 230
510 'RENAME FORM
520 PRINT:PRINT" SOURCE
":GOSUB 2180:IF F$<>"" THEN 530
ELSE 540
530 J$=F$:PRINT:PRINT"
DESTINATION":GOSUB 2180:IF F$<>
" THEN RENAME J$ TO F$
540 GOTO 230
550 'SAVE FORM
560 M$="Save Form":GOSUB 2140
570 GOSUB 2180:IF F$="" THEN 230
580 POKE LO,0:OPEN "O",#1,F$
590 FOR T=1 TO 23:WRITE #1,FM$(T
):NEXT:CLOSE:POKE HI,0
600 GOTO 230
610 'LOAD FORM
620 M$="Load Form":GOSUB 2140
630 GOSUB 2180:IF F$="" THEN 230
640 POKE LO,0:OPEN "I",#1,F$
650 FOR T=1 TO 23:INPUT #1,FM$(T
):NEXT:CLOSE:POKE HI,0
660 GOTO 230
670 GOTO 230
680 GOTO 230
690 'ERASE FORM
700 M$="Erase Current form":GOSU
B 2140
710 PRINT" Do you
really wish to erase the curren
t form? Y/N"
720 GOSUB 2150:IF A$="Y" THEN 73
0 ELSE 230
730 FOR T=0 TO 22:FM$(T)=STRING$
(80," "):NEXTT:GOTO 230
740 GOTO 230
750 'MAKE DATABASE
760 FC=0:M$="Make Database":GOSU
B2140
770 PRINT" Conv

```

60	136
90	242
140	137
180	202
270	107
320	139
400	146
490	42
550	27
660	59
750	114
810	124
870	65
911	161
970	157
1040	139
1120	168
1170	105
1250	217
1300	206
1302	193
1340	135
1410	53
1470	246
1510	197
1580	144
1640	13
1750	175
1830	227
1920	239
2000	215
2060	55
2090	146
2140	33
2200	71
2290	247
2330	250
2350	52
2400	135
2450	134
2510	87
2580	43
2640	106
2690	242
2750	60
2800	149
2850	140
2890	107
2930	13
2990	192
END	215



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```

erting data to database form. Pl
ease wait ...
780 FOR T=1 TO 23
790 N=INSTR(FM$(T),CHR$(127)):IF
N=0 THEN DF$(T)=FM$(T):NEXT
800 IF N>0 THEN NI=NI+1:CY(C)=N
:CY(NI)-T:FOR WA=N TO 79:IF MID$
(FM$(T),WA,1)=CHR$(127) THEN CN(
NI)=CN(NI)+1:MID$(FM$(T),WA,1)=-
":NEXT WA:ELSE
810 IF T=24 THEN 830
820 GOTO 790
830 FOR T=1 TO NI:FC=FC+CN(T):NE
XT T:IF FC>255 THEN PRINT" Sorry
! You have too many entries! Ple
ase re-edit!":GOSUB 50:GOTO 230
840 PRINT:PRINT"
Done!"
850 PRINT:PRINT" You are read
y to save your database form. (D
EFAULT is DATAFORM.DAT)
860 GOSUB 2180:IF F$="" THEN F$=
"DATAFORM.DAT"
870 PRINT:PRINT" Save "F$"
to disk? Y/N ->":
880 LINEINPUT A$:IF A$="Y" THEN
890 ELSE 230
890 POKE LO,0:OPEN"O",#1,F$
900 WRITE #1,NI:FOR T=1 TO NI:WR
ITE #1,CX(T),CY(T),CN(T):NEXT:FO
R T=1 TO 23:WRITE #1,DF$(T):NEXT
:CLOSE:POKE HI,0
910 LINEINPUT" Use form to
create a database? Y/N ->":A$:IF
A$="Y" THEN POKE LO,0:OPEN"O",#
1,"MISC.DAT":WRITE #1,0:CLOSE:GO
SUB 912:GOSUB 2180:IF F$="" THEN
F$="DATABASE.DAT":OPEN"O",#1,F$
:CLOSE:GOTO 230:ELSE OPEN"O",#1,
F$:CLOSE:GOTO 230
911 GOTO 920
912 PRINT" You are ready to c
reate your database. (DEFAULT is
DATABASE.DAT)":RETURN
920 GOTO 230
930 GOTO 230
940 '-----
950 'MAINTAIN
960 SW=0:PRINT" Please enter
then name of your database form
(DEFAULT is DATAFORM.DAT)":GOSU
B2180:IF F$="" THEN D1$="DATAFOR
M.DAT" ELSE D1$=F$
970 PRINT" Please enter the
name of your database file (DEF
AULT is DATABASE.DAT)":GOSUB 218
0:IF F$="" THEN D2$="DATABASE.DA
T" ELSE D2$=F$
980 GOSUB 2350
990 CLOSE:GOSUB 2060
1000 PRINT:PRINT$"No. of
records ->":NF
1010 GOSUB 2150:GOSUB 2160:IF M1
>0 THEN 1020 ELSE 1010
1020 IF M1=6 THEN 160
1030 ON M1 GOTO 1040,1210,1370,1
540,1590
1040 'ADD
1050 GOSUB 2360
1060 CLS:FOR T=1 TO 23:PRINT DF$
(T):NEXT
1070 PRINT"
Press 'CLEAR' to leave."
;
1080 C=1
1090 IF C<1 THEN C=1:ELSE IF C>N
I THEN C=NI
1100 GOSUB 2380
1110 IF N$(C)>"" THEN PRINT N$(C
):
1120 GOSUB 50
1130 IF ASC(A$)=13 THEN LOCATE C
X(C)-1,CY(C)-1:PRINT STRING$(CN(
C)," "):LOCATE CX(C)-1,CY(C)-1:
PRINT N$(C):PRINTMID$(DF$(CY(C)
),CX(C)+CN(C),1):C=C+1:GOTO 109
0
1140 IF ASC(A$)=94 THEN C=C-1:GO
TO 1090
1150 IF ASC(A$)=12 THEN 2400
1160 IF INSTR(AC$,A$)>0 AND LEN(
N$(C))<RM THEN PRINT A$:N$(C)=N
$(C)+A$
1170 IF ASC(A$)=8 AND LEN(N$(C))
>0 THEN N$(C)=LEFT$(N$(C),LEN(N$
(C))-1):GOSUB 2380:PRINT STRING$
(CN(C)," "):GOSUB 2380:PRINT N$
(C):
1180 GOTO 1120
1190 GOTO 990
1200 '-----
1210 'SEARCH
1220 SW=0
1230 GOSUB 2360:CLS:GOSUB 2600
1240 IF XX<1 THEN XX=1 ELSE IF X
X>NF THEN XX=NF
1250 SW=SW+1:IF SW=1 THEN GOSUB
2570:ELSE GET #1,XX:V$(1)=K$(1):
GOSUB 2850:FOR T=1 TO NI:LOCATE
CX(T)-1,CY(T)-1:PRINT S$(T):NEX
T:POKE HI,0
1260 IF SW=1 THEN 1250
1270 LOCATE 0,23:PRINT"
<ENTER> for Commands. <Clear> T
o quit. Rec no. ->":XX;
1280 GOSUB 50
1290 IF ASC(A$)=94 THEN XX=XX+10
:GOTO 1240:ELSE IF ASC(A$)=10 TH
EN XX=XX-10:GOTO 1240:ELSE IF AS
C(A$)=8 THEN XX=XX-1:GOTO 1240 E
LSE IF ASC(A$)=9 THEN XX=XX+1:GO
TO 1240
1300 IF A$="S" THEN LOCATE 0,23:
PRINT STRING$(78," "):LOCATE 0,
23:LINEINPUT "Search for what st
ring? ->":S$:IF S$="" THEN A$="
":GOSUB 2880:GOSUB 5000:GOTO 130
2 ELSE IF S$<>"" THEN GOSUB 2880
:GOSUB 5000:IF REC > NF THEN 130
2
1301 IF Z>NF THEN 1302 ELSE IF A$
="S" THEN LOCATE 0,23:PRINT"Press <
SPACE> to go to next occurrence o
r <ENTER> to exit. RECORD:";Z:E
XEC44539:Z$=INKEY$:IF Z$=" " THEN X
=XX+1:IF XX>NF THEN 1302 ELSE G
OSUB 2880:GOSUB 5000:GOTO 1301
1302 LOCATE 0,23:PRINTSTRING$(75
," "):
1310 IF A$="K" THEN LOCATE 0,23:P
RINT STRING$(78," "):LOCATE 0,2
3:PRINT" Delete current
record? Are you sure?":GOSUB 50
:IF A$="Y" OR A$="y" THEN GOSUB
2570:IF T=NF THEN GOSUB 3000 ELS
E FOR T=XX TO NF-1:GET#1,T+1:PUT
#1,T:NEXT:NF=NF-1:GOSUB
1320 IF A$="F" THEN XX-1:GOTO 12
40:ELSE IF A$="L" THEN XX=NF:GOT
O 1240
1330 IF ASC(A$)=12 THEN 990
1340 IF ASC(A$)=13 THEN GOSUB 26
10:GOTO 1240
1350 GOTO 1240
1360 '-----
1370 'EDIT
1380 LOCATE 0,18:LINEINPUT"Which
record to edit? ->":E$:E=VAL(E$
):IF E<1 OR E>NF THEN 990
1390 GOSUB 2360:GOSUB 2570:GET #
1,E:V$(1)=K$(1):GOSUB 2850:FOR T
=1 TO NI:N$(T)=S$(T):NEXT
1400 CLS:FOR T=1 TO 23:PRINT DF$
(T):NEXT:FOR T=1 TO NI:LOCATE C
X(T)-1,CY(T)-1:PRINT N$(T):NEXT
T
1410 LOCATE 0,23:PRINT"
Press 'CLEAR
' to leave.":
1420 C=1
1430 IF C<1 THEN C=1:ELSE IF C>N
I THEN C=NI
1440 GOSUB 2380
1450 IF N$(C)>"" THEN PRINT N$(C
):
1460 GOSUB 50
1470 IF ASC(A$)=13 THEN LOCATE C
X(C)-1,CY(C)-1:PRINT STRING$(CN(
C)," "):LOCATE CX(C)-1,CY(C)-1:
PRINT N$(C):PRINTMID$(DF$(CY(C)
),CX(C)+CN(C),1):C=C+1:GOTO 143
0
1480 IF ASC(A$)=94 THEN C=C-1:GO
TO 1430
1490 IF ASC(A$)=12 THEN 00=1:GOT
O 2400
1500 IF INSTR(AC$,A$)>0 AND LEN(
N$(C))<RM THEN PRINT A$:N$(C)=N
$(C)+A$
1510 IF ASC(A$)=8 AND LEN(N$(C))
>0 THEN N$(C)=LEFT$(N$(C),LEN(N$
(C))-1):GOSUB 2380:PRINT STRING$
(CN(C)," "):GOSUB 2380:PRINT N$
(C):
1520 GOTO 1460
1530 GOTO 990
1540 'DIRECTORY
1550 IF DW=0 THEN PRINT POKE HI,0:CLS:
DIR:PRINT"Free ->":FREE(0):GOSUB
50:POKE LO,0:GOTO 990
1560 IF DW=1 THEN GOSUB 2770
1570 GOTO 990
1580 GOTO 990
1590 'PRINT
1600 CLS:M$="Print record(s)":GO
SUB 2140:PRINT:PRINT:PRINT:LINEI
NPUT"WHICH RECORD TO PRINT ('*
FOR ALL) ->":N$:IF N$="" THEN 1
620
1610 IF VAL(N$)<1 OR VAL(N$)>NF
THEN 1650
1620 LINEINPUT"FORMFEEDS? ->":YF
$:PRINT"PRESS ANY KEY TO BEGIN.
...":GOSUB 50
1630 IF N$="" THEN FOR FF=1 TO
NF:GOSUB 2900:NEXT FF:GOTO 1650
1640 FF=VAL(N$):GOSUB 2900
1650 GOTO 990
1660 '-----
1670 'SETUP
1680 GOSUB 2020
1690 GOSUB 2150:GOSUB 2160:IF M1
>0 THEN 1700 ELSE 1690
1700 IF M1=3 THEN 160
1710 ON M1 GOTO 1720,1850
1720 'SET DISPLAY
1730 CO=1:X=S4:Y=S5
1740 M$="Setup Display":GOSUB 21
40
1750 LOCATE 10,5:PRINT"Foregroun

```

```
d ->"S4
1760 LOCATE 10,6:PRINT"Background
d ->"S5
1770 LOCATE 15,8:PRINT"Press 'EN
TER' to exit."
1780 IF INKEY$=CHR$(13) THEN CO-
0:GOTO 1680
1790 GOSUB 30:S4=X:S5=Y
1800 IF S5>63 THEN S5=0 ELSE IF
S5<0 THEN S5=63
1810 IF S4>63 THEN S4=1 ELSE IF
S4<0 THEN S4=63
1820 X=S4:Y=S5
1830 PALETTE 4,S5:PALETTE 10,S4
1840 GOTO 1750
1850 'SAVE DEFAULT
1860 POKE LO,0:OPEN "0",#1,"SETU
P":WRITE #1,S1,S2,S3,S4,S5:CLOSE
:POKE LO,0
1870 GOTO 1670
1880 GOTO 160
1890 '-----
-
1900 'EXIT
1910 M$="Exit":GOSUB 2140:PRINT"
      Do you really
wish to exit? (Y/N) ->":GOSUB 2
150
1920 IF A$="Y" THEN CLS:WIDTH FW
:END:ELSE 160
1930 GOTO 160
1940 '-----
-----
```

```
1960 POKE LO,0:OPEN "I",#1,"SETUP
":INPUT #1,S1,S2,S3,S4,S5:CLOSE:
POKE HI,0:RETURN
1970 'PRINT MENU 1
1980 M$="Main Menu ":GOSUB 2140
1990 M$=STRING$(30," ")
2000 PRINT M$"C - Create Databas
e":PRINTM$"M - Maintain Database
":PRINTM$"S - Screen Dafault":PR
INTM$"X - Exit Program to BASIC"
:SL$="CMSX"
2010 RETURN
2020 'PRINT MENU 2
2030 M$="Setup Display":GOSUB 21
40:M$=STRING$(30," "):PRINTM$"C
- Customize Display":PRINTM$"S -
Save Default":PRINTM$"X - Exit
to Main Menu":SL$="CSX":RETURN
2040 RETURN
2050 'PRINT MENU 3
2060 M$="Maintain Database":GOSU
B 2140:M$=STRING$(30," "):PRINT
M$"A - Add Record":PRINTM$"S - Se
arch records":PRINTM$"E - Edit R
ecord":PRINTM$"D - Directory":PR
INTM$"P - Print Record":PRINTM$"
X - Exit to Main Menu":SL$="ASED
PX":RETURN
2070 RETURN
2080 'PRINT MENU 4
2090 M$="Create Database":GOSUB
2140:M$=STRING$(30," "):PRINTM$"
C - Create Form":PRINTM$"D - Dir
ectory":PRINTM$"V - Verify Disk"
```

```
:PRINTM$"K - Kill Form":PRINTM$"
R - Rename Form":PRINTM$"S - Sav
e Form":PRINTM$"L - Load Form":S
L$="CDVKRSLEMX"
2100 PRINTM$"E - Erase current f
orm":PRINTM$"M - Make Database":
PRINTM$"X - Exit to main menu":R
ETURN
2110 RETURN
2120 'PRINT MENU 5
2130 RETURN
2140 ATTR 2,4:CLS:M1=LEN(M$):M1=
80-M1:M1=INT(M1/2):ATTR 3,2:PRIN
TSTRING$(M1-1," "):ATTR S2,S3,U
:PRINTM$" "":ATTR 3,2:PRINT:PRIN
T:ATTR 2,4:PRINT:PRINT:RETURN
2150 EXEC 44539:A$=INKEY$:PLAY"TT
10L1004A":RETURN
2160 M1=INSTR(SL$,A$):RETURN
2170 '-----
-----
2180 LINEINPUT" PLEASE INPUT
THE FILENAME->":F$
2190 IF F$="" THEN RETURN
2200 IN=INSTR(F$,"."):IM=INSTR(F
$,"/")
2210 IF (IN OR IM)<1 AND LEN(F$)
>8 THEN 2280
2220 IF (IN OR IM)<1 THEN F$=F$+
".DAT"
2230 IF IM>1 THEN MID$(F$,IM,1)-
"."
2240 IF LEN(F$)-INSTR(F$,".")>3
```

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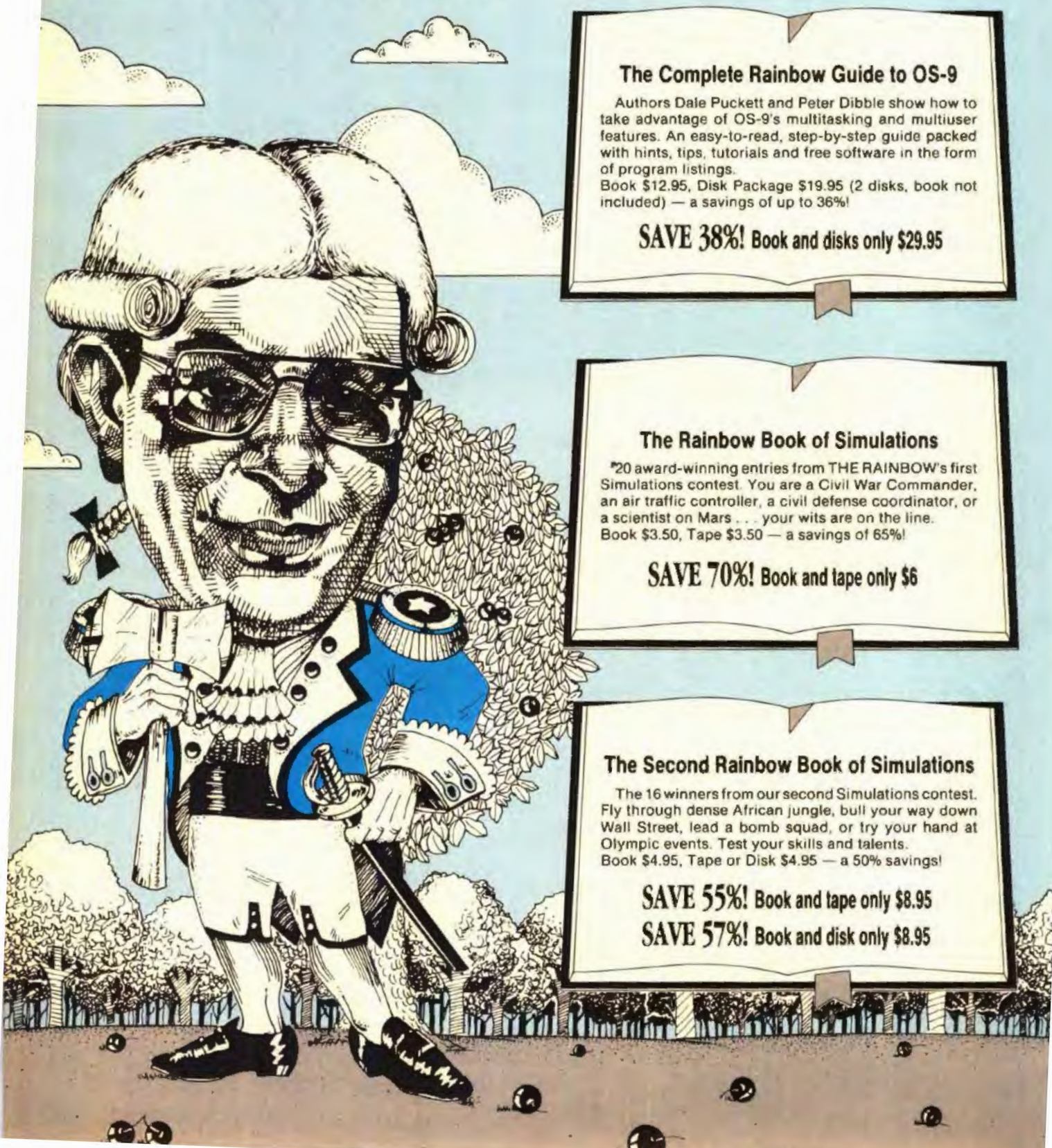
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```

THEN 2280
2250 IF INSTR(F$, "/") > 0 THEN 228
0
2260 RETURN
2270 RETURN
2280 PRINT " BAD FILENAME": SO
UND 1,2:GOTO 2180
2290 '-----

```

```

2300 POKE 65497,0:WIDTH 40:CLS:3:
ATTR 2,4:CLS:LOCATE 0,3:FOR S=1
TO 8:READ C1$:GOSUB 2320:PRINT:N
EXT:POKE 65496,0
2310 RETURN
2320 L=LEN(C1$):L=40-L:L=INT(L/2
):PRINTSTRING$(L," "):C1$:RETURN
2330 DATA ColorBase v1.20,For 12
8k CoCo with disk drive,Written
By Shane Messer,"Copyright (c),
1989",Modified 1/16/90,All Right
s Reserved,Configuring Program,P
lease Wait ...
2340 LOCATE 0,17:PRINT:LOCATE 0,1
7:C1$="Done.":GOSUB 2320:PRINT:C
1$="Press any key to continue ..
.":GOSUB 2320:PLAY"L20T1003A":EXE
C 44539:RETURN
2350 CLOSE:POKE LO,0:OPEN "I",#1
,"MISC.DAT":INPUT #1,NF:CLOSE:PO
KE HI,0:RETURN
2360 CLOSE:POKE LO,0:OPEN "I",#1
,D1$:INPUT #1,NI:FOR T=1 TO NI:IN
PUT #1,CX(T),CY(T),CN(T):NEXT:FO
R T=1 TO 23:INPUT #1,DF$(T):NEXT
:CLOSE:POKE HI,0:RETURN
2370 '-----

```

```

2380 LOCATE CX(C)-1,CY(C)-1
2390 RM=CN(C):LM=1:RETURN
2400 LOCATE 0,23::PRINT"
Do you wish to save t
his record? <Y/N>":FOR TX=1 TO
10:FOR TY=338 TO 345:POKE TY,255
:NEXT TY,TX
2410 IF 00=1 THEN GOSUB 50:IF A$
="N" THEN FOR T=1 TO NI:N$(T)="":
:NEXT:GOTO 990
2420 IF 00=1 THEN GOSUB 2480
2430 IF 00=1 THEN 00=0:GOTO 990
2440 GOSUB 50:IF A$="N" THEN FOR
T=1 TO NI:N$(T)="":NEXT:GOTO 24
50 ELSE GOSUB 2480
2450 LOCATE 0,23:PRINT"
recordsDo you wish to keep
adding files? <Y/N>":
2460 FOR T=1 TO NI:N$(T)="":NEXT
2470 GOSUB 50:IF A$="N" THEN 990
:ELSE IF A$="Y" THEN 1060 ELSE 2
470
2480 IF 00<>1 THEN NF=NF+1
2490 CLOSE:POKE LO,0:OPEN "D",#1
,D2$,255
2500 S$="":FOR Q=1 TO NI:GOSUB 2
860:S$=S$+N$(Q):NEXT:FIELD #1,25
5 AS K$(1)
2510 LSET K$(1)=S$
2520 IF 00=1 THEN PUT #1,E:CLOSE:
POKE HI,0 ELSE PUT #1,NF:CLOSE:P
OKE HI,0
2530 '
2540 CLOSE:OPEN "O",#1,"MISC":WRI
TE #1,NF:CLOSE:POKE HI,0
2550 RETURN
2560 '-----

```

```

-----
2570 CLOSE:POKE LO,0:OPEN "D",#1
,D2$,255:FIELD #1, 255 AS K$(1)
2580 RETURN
2590 '-----
-----
2600 FOR T=1 TO 23:PRINT DF$(T):
:NEXT:RETURN
2610 '-----
2620 LOCATE 0,0
2630 FOR T=1 TO 23:PRINT STRING$(
80," "):NEXT:LOCATE 0,0:M$=STR
ING$(20," "):PRINT" "M$
"SEARCH COMMANDS":PRINT:PRINT
2640 PRINTM$<ENTER> -
Takes you to this menu"
2650 PRINTM$<CLEAR> -
To take you out of search mod
e"
2660 PRINTM$<DOWN ARROW> -
Takes you ten records backwar
ds"
2670 PRINTM$<UP ARROW> -
Takes you ten records forward
"
2680 PRINTM$<LEFT ARROW> -
Takes to back one record"
2690 PRINTM$<RIGHT ARROW> -
Takes you forward one record"
2700 PRINTM$<K> -
Delete the current record"
2710 PRINTM$<F> -
Takes you to first record"
2720 PRINTM$<L> -
Takes you to last record"
2730 PRINTM$<S> -
Searches for entered string"
2740 PRINT:PRINT:PRINT:PRINTM$
Press any key to return to sear
ch mode ...":
2750 GOSUB 50:GOSUB 2600:RETURN
2760 '-----

```

```

-----
2770 POKE LO,0:I=0:S=0:T=0:CLS:F
OR T=3TO11:DSKI$0,17,T,A$,B$:C$=
A$+LEFT$(B$,127):FORQ=1TO255STEP
32:IFMID$(C$,Q,1)=CHR$(0)THEN279
0ELSEIFMID$(C$,Q,1)=CHR$(255)THE
N2800
2780 SF$(I+T-3)=MID$(C$,Q,11):I=
I+1
2790 NEXT Q,T
2800 POKE HI,0:FOR S=0 TO I+3:SF
$(S)=LEFT$(SF$(S),0)+". "+MID$(SF
$(S),9,3):NEXTS:FOR S=0TOI+3:IF
LEN(SF$(S)) <> 1 THEN PRINT " "
;SF$(S):" "":ELSE 2810
2810 NEXTS:PRINT:POKE LO,0:PRINT
"Free ->":FREE(0):POKE HI,0
2820 FOR S=0 TO I+3:SF$(S)="":NE
XT
2830 GOSUB 50
2840 RETURN
2850 POKE 65497,0:PS=1:FOR T=1 T
O NI:S$(T)=MID$(V$(1),PS,CN(T)):
PS=PS+CN(T):NEXT:PS=0:POKE 65496
,0:RETURN
2860 IF LEN(N$(Q))<CN(Q) THEN N$(
Q)=N$(Q)+STRING$(CN(Q)-LEN(N$(Q
)), " ")
2870 RETURN
2880 GOSUB 2570:IF XX>NF THEN RE
TURN ELSEFOR Z=XX TO NF:GET #1,Z
:IF INSTR(K$(1),S$)>0 THEN XX=Z:
RETURN

```

```

2890 NEXT Z:LOCATE 0,23:PRINT ST
RING$(79," "):LOCATE 0,23:SOUND
1,1:ATTR 2,4,8:FOR T=1 TO 10:PR
INT:NEXT T:PRINT"
SPCIFIED STRING IS NOT ABL
E TO BE LOCATED!":EXEC 44539:ATT
R 2,4:A$=" ":RETURN
2900 'PRINT OUTS
2910 SF=1:GOSUB 2360:GOSUB 2570:
GET #1,FF:V$(1)=K$(1):GOSUB 2850
2920 POKE 65497,0:FOR T=1 TO 23
2930 IF CY(SF)>T OR SF->NI THEN
PRINT #-2,DF$(T):NEXT T:GOTO 297
0
2940 FOR K=1 TO LEN(DF$(T))
2950 IF CX(SF)=K AND CY(SF)=T TH
EN PRINT #-2,S$(SF):K=K+LEN(S$(
SF)):SF=SF+1:ELSE PRINT #-2,MID$(
DF$(T),K,1):
2960 NEXT:PRINT#-2:NEXT
2970 IF LEFT$(YF$,1)="Y" THEN PR
INT #-2,FF$
2980 RETURN
2990 WIDTH 40:CLS:PRINT"SYSTEM E
RROR!!":SOUND 1,1:PRINT"ERROR #
":ERNO" IN LINE #":ERLIN:LINEINPUT
"RERUN PROGRAM? ->":Y$:IF LEFT$(
Y$,1)="Y" THEN RUN ELSE END
3000 A$=STRING$(255," "):LSET K$(
1)=A$:PUT #1,1:CLOSE:NF=NF-1:GO
SUB 2540:RETURN
5000 POKE 65497,0:CLS:GOSUB 2600
:POKE 65496,0:IF XX>NF THEN REC=
NF+1:RETURN ELSE REC=NF-1
5001 GET #1,XX:V$(1)=K$(1):GOSUB
2850:POKE 65497,0:FOR T=1 TO NI
:LOCATE CX(T)-1,CY(T)-1:PRINT S$(
T)::POKE 65496,0:NEXT:RETURN

```

## Listing 2: CONFIG

```

0 ' COPYRIGHT 1990 FALSOFT, INC
10 ' CONFIG FILE CREATOR
20 WIDTH 32:POKE &H95C9,&H57:POK
E &HFF22,&H50
30 GOSUB 80
40 PRINT" Please insert disk t
o save the configuration file.
....":GOSUB 80:GOSUB 90:EXEC 445
39
50 GOSUB 80:PRINT"Thank you! Sav
ing configuration file now....":
GOSUB 80:GOSUB 90
60 OPEN "O",#1,"SETUP":WRITE #1,
3,2,4,0,63:CLOSE
70 GOSUB 80:PRINT"Done....":GOS
UB 80:END
80 FOR T=1 TO 8:PRINT:NEXT:RETUR
N
90 PLAY"TI0L1004A"
100 RETURN

```



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# CoCo Gallery

## 1st Place



**Cardinal**  
Howard Rouse

Howard, who is retired, finds the time to create wonderful graphics combining the best features of *CoCo Max III* and *Color Max 3*. He lives in Belleville, Florida.

## 3rd Place



**Snowscene**  
Mark Webb

This image was created with *CoCo Max III*. Mark lives in Gold River, British Columbia and works as a pulp mill operator. He has had various CoCos for several years. His favorite pastime is programming animation demos.

### SHOWCASE YOUR BEST!

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

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

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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.

—Tony Olive, Curator

## 2nd Place



**Snowpeak**  
James J. Gibbons

As a professional artist and art teacher, James uses a variety of graphics programs including *The Rat*, *Micro-Illustrator*, *Sketch*, *The Color Computer Artist*, *CoCo Max II* and *CoCo Max III*, which was used for this scene. He plans to continue working in this field until his pictures look like paintings. James lives in Watsonstown, Pennsylvania.

# Take Your Files for a Spin

by William Barden, Jr.  
Contributing Editor

**M**rs. Barden just went through dozens of agonizing hours learning *WordPerfect 5.0*. In the process I acquired a new vocabulary subset equal to that of a Chief Petty Officer. Some of you have struggled through OS-9. In spite of protestations from the OS-9 gang about how incredibly easy it is to learn, it usually takes dozens of "incredibly easy" hours. Every time I add a new piece of software or hardware to either my MS-DOS system or my CoCos, I spend anywhere from one or two days to the rest of my natural life trying to get the darned things to work. Isn't there any software or hardware that's intuitive? This question inspired me to write a new program.

I had in mind a *R\*L\*D\*X* program — you know, those revolving files of small cards that allow you to easily locate a name, telephone number and address. (I've referred to it without the full complement of letters because manufacturers get sticky about trademarks.)

My idea was to emulate a *R\*L\*D\*X* on the CoCo 3 by showing cards on the right half of the screen. By pressing the up arrow, you could flip through the cards in one

direction. By pressing the down arrow, you could flip through the cards in the other direction. At the end of the cards you'd come around again to the start in the circular list. To keep things simple, you'd be allowed to pull out one card from the stack and put it on the left-hand side of the screen. You could then edit the card and replace it anywhere you'd like; an example would be to change an address or to re-sequence the card. There are no fancy sorts here — if the card was out of sequence, you'd have to flip through the cards and insert it in the proper place. Such a file of cards could be used for telephone reference or Christmas card lists.

Anyway, that was the idea. I thought the whole project would be easy to program. As it turned out, I was wrong. I should have known that Old Programmer's Axiom Number 565 was in force — there are no easy programs. Let me tell you how my final program works.

## Running *R\*L\*D\*X*

To run *R\*L\*D\*X*, enter the program and type RUN. There is a single card on the right-hand side of the screen. The card displays:

```
STARTING CARD
FIELD 1
FIELD 2
```

This is just a sample card and can be deleted or modified.

The bottom line on the left-hand side of the screen shows the current mode: Command, Edit, Read or Write.

To add a new card, press N. A new card is displayed on the left-hand side of the

screen, which is used for editing only or for inserting new cards. You can enter text on ten lines of a card with up to 38 characters per line. Use the up and down arrow keys to move the cursor around the ten lines and change them as desired. To get out of Edit mode, press CLEAR; the edited card remains on the left-hand side of the screen. You have to insert the card at the proper place in the file.

To insert the card, select the proper place by using the up and down arrow keys to move through the file. Initially, with only one card displayed, you won't be able to sequence through the file, but as cards are added you can get to any card in the file by using the arrow keys. To speed up access you can also use the right and left arrow keys to move ahead or back 10 cards at a time. An insert is done by pressing I. The card on the left-hand side of the screen (initially a new card) is inserted *before* the card displayed on the screen. After you insert the card, it disappears from the left side of the screen and reappears on the right-hand side in the file.

As more cards are added, you see up to six cards displayed on the screen at one time. The first card is always shown as a full card with its ten fields displayed in their entirety. The remaining five cards show 38 characters of a single line in packed format, which I will describe later.

To re-sequence a card, first display it as the first card on the right-hand side of the screen. Then press P to pull the card. The card is pulled from the file and appears on the left-hand side of the screen. You can move through the file by using the arrow

---

*Bill Barden has written 35 books and hundreds of magazine articles about small computers. His newest Color Computer book is "Connecting the CoCo to the Real World", a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.*

keys. To reinsert the card, follow the Insert instructions above.

To delete a card, display it as the first card on the right-hand side of the screen and press D. The card is deleted and the next card in sequence becomes the front card.

To change a card's fields, pull the card by locating it and pressing P. Edit it by pressing E. Change the text on the screen

**Implementing such a program in CoCo BASIC is not simply a matter of "slinging down code". There are important design considerations to be made that affect the speed and capacity of the final result.**

and then press CLEAR to get out of Edit mode. Reinsert the card as above.

To save a card file, press W for Write. The current cards are saved as the file ROLDATA.DAT. To read in a saved file, press R three times. The ROLDATA.DAT file is read in and destroys any cards you have in memory. If you've mistakenly pressed R, you'll see READ? and then READ?? in the Mode display on the bottom left of the screen. Press ENTER to prevent a catastrophic read and return to the Command Input mode. For a recap of the keys see Table 1.

### Some Design Considerations

Implementing such a program in CoCo BASIC is not simply a matter of "slinging down code". There are important design considerations to be made that affect the speed and capacity of the final result.

### Memory Storage

First of all, consider the amount of storage in such a program. Let's say a  $R*L*D*X$  has 300 cards, a typical number of entries. Any text data could be on any card. For typical use, though, you'd probably have a name, address and phone number. An average entry is as follows:

Barden, Bill  
Post Office Box 3568  
Mission Viejo, CA 92692  
(714) 555-1212

This entry requires 73 characters. Other

entries will be shorter or larger, but for planning purposes, assume that 70 characters is a good average.

With 300 cards, the total capacity required is  $70 * 300$  or 21,000 characters. Each character requires a byte of memory. In addition, there's storage required for the BASIC  $R*L*D*X$  program. Let's say the program is about 300 lines long with an average of 25 characters per line. Even though the program will be tokenized, the program requires about 6000 bytes by itself. The amount of free memory with no program loaded in CoCo 3 BASIC with a disk drive is 22,824 bytes.

Right away there's a problem. How can 300 cards worth of data be stored in memory with the program and require 27,000 bytes when there's only 22,824 bytes to work with? Obviously, we'll have to set our sights a little lower. However, there are some things you might want to do to modify this program for a larger number of cards.

One solution is to put the cards on disk. However, with the cards on disk, the speed of the program will probably be downgraded considerably as cards are brought in from the disk file. You'd probably have to use assembly language to get acceptable scrolling speeds with a disk file.

Another solution is to take advantage of the 128K or 512K bytes in the CoCo 3. The CoCo 3 uses a 64K block of memory for BASIC. Another 64K is used for CoCo 3 high-resolution functions: the Hi-Res screen, HBUFF storage for HGETs and HPUTs, and so forth. Unfortunately, there's no memory left over for variables in a 128K system. However, in a 512K byte CoCo 3 system, there's another 384K bytes of memory just waiting to be used for storage. This block can be accessed by the special LPEEKs and LPKES in CoCo 3 Super Extended BASIC. However, to do this you need some kind of special memory allocation scheme that lets you store strings of varying size in an efficient manner. This is not an easy task.

For this version, we have to get by with about 15,000 bytes for storage — about 230 average cards or 500 cards with an average of 32 characters (enough for a name and phone number).

### Program Speed

Another consideration for  $R*L*D*X$  is speed of operation. The manner in which data is stored very much affects the speed of access. We could use an array of strings. Array Z\$ might have 300 entries, Z\$(0) through Z\$(299), that can be easily read or changed. However, there's a problem. An array such as this is fine if the data is fixed

and never changes. In  $R*L*D*X$ , though, cards need to be reshuffled. Cards are pulled out and changed, or new cards are added. Each time this is done, an array has to be reshuffled.

Suppose a card is to be inserted between two existing cards at Z\$(100) and Z\$(101). All array elements after Z\$(100) would have to be moved down to make room for the new card that replaces Z\$(101). The same thing would happen on card deletes. All cards after the deleted card would have to be moved up to fill the vacated spot. This movement of data takes an enormous amount of time and slows down the operation of the program considerably. Isn't there a more efficient way?

One way around this problem of moving data is to use a linked list. The following list is an example. Start with a list of names such as Jim, Bob, Mary, Grace, Tom, Son, and Carlos. Assign a number to each name as follows:

0	Jim
1	Bob
2	Mary
3	Grace
4	Tom
5	Son
6	Carlos

Now add a new entity called a *pointer* to each name that represents the next name in alphabetized order. First add a Head of List pointer that points to the first name in the alphabetized list:

Head of List: 1

0	Jim
1	Bob
2	Mary
3	Grace
4	Tom
5	Son
6	Carlos

This head of list pointer points to Bob, the first name in the alphabetized list. Now add a pointer to each name that points to the next name in the list:

Head of List: 1

0	Jim	2
1	Bob	6
2	Mary	5
3	Grace	0
4	Tom	-1
5	Son	4
6	Carlos	3

Now we can scan the list by starting with

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the Head of List pointer and then finding the number of each consecutive entry in this order: 1 - 6 - 3 - 0 - 2 - 5 - 4 to get Bob, Carlos, Grace, Jim, Mary, Son and Tom. The last entry, Tom, has no next entry and has a special -1 pointer to mark this fact.

Suppose we want to insert the new name Megan in the list. Since the list is unordered, we can just add it to the end:

```
Head of List: 1
0 Jim 2
1 Bob 6
2 Mary 5
3 Grace 0
4 Tom -1
5 Son 4
6 Carlos 3
7 Megan
```

To reorder the list, the only thing that needs to be changed is the pointers. Search until the insertion point is found.

```
Head of List: 1
0 Jim 2
1 Bob 6
2 Mary 5
(insert after Mary)
3 Grace 0
4 Tom -1
5 Son 4
(insert before Son)
6 Carlos 3
7 Megan
```

Next change the pointer associated with Mary (5) to 7, the location of Megan. Then move the 5 to the pointer associated with Megan.

```
Head of List: 1
0 Jim 2
1 Bob 6
2 Mary 7
3 Grace 0
4 Tom -1
5 Son 4
6 Carlos 3
7 Megan 5
```

The strings for the names remain in place. The only thing needed to reorder the list is to scan the list to find the insertion point, then change one pointer and add a new pointer. The reason this scheme works so well on computers is that a list of pointers can be scanned and changed very quickly — a great deal faster than moving entire character strings around.

Deleting an entry works in a similar

fashion. Suppose we wanted to delete Carlos. First, we scan the list to find Carlos and the name just before Carlos.

```
Head of List: 1
0 Jim 2
1 Bob 6
(points to Carlos)
2 Mary 7
3 Grace 0
4 Tom -1
5 Son 4
6 Carlos 3
7 Megan 5
```

Now we can delete Carlos by changing the 6 pointer associated with Bob to the 3 value found in the Carlos entry and putting a special flag with Carlos to indicate that it has been deleted:

```
Head of List: 1
0 Jim 2
1 Bob 3
(points to Grace)
2 Mary 7
3 Grace 0
4 Tom -1
5 Son 4
6 Carlos -2
(deleted)
7 Megan 5
```

This is the scheme we use with  $R*L*D*X$ , but I've added a new kink. Since we want to go both forward and backwards in  $R*L*D*X$  we have two sets of pointers, one that goes forward through the list, and one that goes *back* through the list. That way we can easily go back without having to start from the beginning of the list to find the previous card.

#### Implementing $R*L*D*X$

Now that the memory and speed aspects are out of the way,  $R*L*D*X$  can be implemented. Of course, it still might be slow or hog memory, but at least we've given the

program some thought and there's a better chance of success. Listing 1 shows the final version. This version packs BASIC statements into each line to speed up execution, but this makes it harder to decipher.

#### Card Storage

Each card has up to 10 fields of data on it, with each field on a separate line. A field can contain from 0 to 38 characters. You might use Field 0 for a last name, Field 1 for a first name, Field 2 for a street address, and so forth. You can put any text you want in the fields. *You* determine the order of the cards in the file.

Cards are stored in *packed* format in memory and in the ROLDATA.DAT disk file. (There is only one disk file of data, but you can easily expand  $R*L*D*X$  to include a file of any name.) Packed format concatenates the 10 fields together in one long string with a ! character used as a separator. AtypicalpackedentryisBarden!Bill!Post Office Box 3568!Mission Viejo!CA!92692. The packed format is unpacked for screen display and editing.

Packed strings are stored in the Z\$ array, an array of 500 entries numbered 0 through 499. String arrays are an efficient way to store data, as the strings can be variable sizes and there is no lost space at the ends of fields. There is a little overhead to hold data about the string name, size and so forth, but this is a small price to pay for the convenience of strings.

#### Field Storage

When cards are displayed on the screen for editing, the data on the cards is held in

- Down arrow — Move forward one card at a time.
  - Up arrow — Move back one card at a time.
  - Left arrow — Move forward ten cards at a time.
  - Right arrow — Move back ten cards at a time.
  - P — Pull front card for re-sequencing or editing.
  - I — Insert pulled or new card before front card.
  - E — Edit a pulled or new card.
  - N — Display a new card and enter Edit mode.
  - D — Delete front card.
  - R (three times) — Read the ROLDATA.DAT file.
  - W — Write the current file to ROLDATA.DAT.
- Edit mode —
- Up arrow — Move up one line.
  - Down arrow — Move down one line.
  - Right arrow — Move right one character position.
  - Left arrow — Move left one character position.
  - Text keys — Enter text.
  - CLEAR — End Edit mode.

Table 1: Key Commands for  $R*L*D*X$

an array called T\$. This is a string array of 10 entries, T\$(0) through T\$(9), representing the ten possible fields. Another similar array, F\$, holds field data for the card displayed on the right-hand side of the screen.

### Pointers

Pointers to the entries in Z\$ are kept in an integer array called P. Like Z\$, it has 500 entries. Both forward and backwards pointers are maintained to save storage space. These are designated as the *before* and *after* pointers, respectively. If before pointers are kept in one array and after pointers in a second array, the total storage is 500\*5\*2 or 5000 bytes, since CoCo BASIC uses five bytes per numeric variable. By packing two pointers in one array entry, however, 2500 bytes of storage are saved. Both the before and after pointers must be able to hold values from 0 to 499. The two pointers are packed by multiplying the after pointer by 1024 and adding the before pointer. The result can be held in a single numeric entry. (The result is  $value * 1024 + 499$  with a maximum of 511475.) The pointers are unpacked by obtaining the result of  $INT(value / 1024)$  (after pointer value) and  $value - INT(value / 1024) * 1024$  (before pointer value).

Pointer values of 1023 represent a *no following* or *no preceding* pointer just as

-1 represents those conditions in the linked list examples.

### Current Entry

Variable P1 is the pointer to the current entry, the card displayed in front on the screen. The Get Current Entry subroutine uses P1 to find the value for the after pointer (PA) and the before pointer (PB). The subroutine also returns the current packed string entry in Z\$ by using P1.

### Deletions and Insertions

Deletions and insertions work much the same as the linked list examples shown previously. The current entry pointed to by P1 is deleted by nulling out the string (Z\$(P1)=""). Both the after and before pointers replace the corresponding pointers in Array P. The P entry for the deleted item is set to -2 (never used or deleted). An insert searches the P array to find the first entry with a -2 indicating that it is available. When found, its location is used as the pointer values for the two pointers that bracket the insert point. The other pointers in the bracketing entries are also changed.

### Edit on Screen

Editing can take place for both a new

card and for a pulled card. The Edit mode reads the keyboard one character at a time. An arrow key causes the edit cursor to move up or down one line or one character position left or right. A text character is inserted on both the screen and in the T\$ edit array at the same time. Pressing CLEAR ends the edit; the edited text is in T\$(0) through T\$(9). A subsequent insert stores the edited text in an inserted record.

### Reads and Writes

Both the read and write functions use the same sequential file, ROLDATA.DAT. The Write first stores the head of list variable HD and then stores the 500 entries for the P and Z\$ arrays. The Read operation reads the data in the same order, essentially initializing a new file in memory. The ROLDATA.DAT file can be displayed or changed in many CoCo text editors.

### Summary

R\*L\*D\*X shows how you can emulate some real-world operations. Access time for any record is short, and the program provides quick and easy editing of any card from the screen. Feel free to bend and hammer to shape if you are so inclined. □



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1200	.....	200
1300	.....	127
1370	.....	1
1450	.....	213
1550	.....	245
1650	.....	244
1750	.....	48
1840	.....	212
1950	.....	31
2020	.....	149
2110	.....	15
2230	.....	134
2350	.....	151
2430	.....	248
2490	.....	212
2620	.....	213
END	.....	61

## The Listing: R\*L\*D\*X

```

100 * R*L*D*X PROGRAM
110 * COPYRIGHT 1990 WILLIAM BAR
DEN, JR.
120 * DATA DICTIONARY
130 * A$=WORKING STRING
140 * B$=WORKING STRING
150 * C=COLUMN FOR EDIT MODE
160 * F$( )=FIELD ARRAY
170 * HD=HEAD OF LIST
180 * I=WORKING INDEX
190 * J=WORKING INDEX
200 * K=WORKING INDEX
210 * MD$=MODE NAME
220 * NU=NUMBER OF ENTRIES
230 * P( )=POINTER ARRAY LINKS AH
EAD AND BEHIND
240 * PA=ENTRY AFTER CURRENT
250 * PB=ENTRY BEFORE CURRENT
260 * PI=CURRENT ENTRY (ONE DISP
LAYED COMPLETELY)
270 * PT=TEMPORARY POINTER
280 * R=ROW FOR EDIT MODE
290 * RC=REMOVE CARD, 1 IF CARD
REMOVED
300 * T$=FIELD ARRAY FOR EDIT MD
DE
310 * T1=TEMPORARY VARIABLE
320 * T2=TEMPORARY VARIABLE
330 * T3=TEMPORARY VARIABLE
340 * TL=TAIL OF LIST
350 * Z$( )=STRING ARRAY FOR CARD
S
360 CLEAR 10000
370 HBUFF 1,6500
380 HBUFF 2,680
390 DIM Z$(499)
400 DIM P(499)
410 HSCREEN 4
420 HCLS
430 HGET (321,88)-(639,167),1
440 HGET (321,72)-(639,79),2
450 NU=0
460 PI=1023: PA=1023: PB=1023
470 RC=-1
480 MD$="COMMAND"
490 FOR I=1 TO 499:P(I)--2:NEXT
500 P(0)=1023*1024+1023: Z$(0)="
STARTING CARD!FIELD 1!FIELD 2!":
HD=0: NU=1: TL=0
510 PI=HD: GOSUB 1060: GOSUB 125
0: GOSUB 1390
520 MD$="COMMAND": GOSUB 2710
530 C$=INKEY$: IF C$="" THEN GOT
O 530
540 IF C$<>"R" THEN GOTO 610
550 MD$="READ?": GOSUB 2710
560 C$=INKEY$: IF C$="" THEN GOT
O 560 ELSE IF C$<>"R" THEN GOTO
610
570 MD$="READ??": GOSUB 2710
580 C$=INKEY$: IF C$="" THEN GOT
O 580 ELSE IF C$<>"R" THEN GOTO
610
590 MD$="READ": GOSUB 2710
600 GOSUB 2300: GOTO 520
610 IF C$="W" THEN MD$="WRITE":
GOSUB 2710: GOSUB 2230: GOTO 520
620 IF C$<>CHR$(10) THEN GOTO 65
0
630 GOSUB 1060: IF PA=1023 THEN
PI=HD ELSE PI=PA
640 GOSUB 1060: GOSUB 1390: GOTO
520
650 IF C$<>CHR$(94) THEN GOTO 68
0
660 GOSUB 1060: IF PB=1023 THEN
PI=TL ELSE PI=PB
670 GOSUB 1060: GOSUB 1390: GOTO
520
680 IF C$="P" THEN GOSUB 1670: G
OTO 520
690 IF C$="D" THEN GOSUB 1830: G
OTO 520
700 IF C$="I" THEN GOSUB 1900: G
OTO 520
710 IF C$="N" THEN GOSUB 2120: G
OTO 520
720 IF C$="E" THEN GOSUB 2380: G
OTO 520
730 IF C$<>CHR$(8) THEN GOTO 760
740 FOR I=1 TO 10: GOSUB 1060: I
F PA=1023 THEN PI=HD ELSE PI=PA
750 GOSUB 1060: NEXT: GOSUB 1390
: GOTO 520
760 IF C$<>CHR$(9) THEN GOTO 790
770 FOR I=1 TO 10: GOSUB 1060: I
F PB=1023 THEN PI=TL ELSE PI=PB
780 GOSUB 1060: NEXT: GOSUB 1390
: GOTO 520
790 GOTO 520
800 *
810 * INSERT ENTRY
820 FOR I=0 TO 499: IF P(I)--2 T
HEN GOTO 840 ELSE NEXT
830 PI=1023: GOTO 930
840 P(I)=PA*1024+PB
850 IF PB=1023 THEN GOTO 870
860 T1=P(PB)-INT(P(PB)/1024)*102
4: P(PB)=I*1024+T1
870 IF PA=1023 THEN GOTO 900
880 T1=INT(P(PA)/1024): P(PA)=T1
*1024+I
890 P(PA)=T1*1024+I
900 Z$(I)=A$: NU=NU+1
910 IF HD=1023 THEN HD=I
920 PI=I: GOSUB 1060
930 RETURN
940 *
950 * DELETE ENTRY
960 PA=INT(P(PI)/1024): PB=P(PI)
-PA*1024: P(PI)--2: NU=NU-1
970 IF NU=0 THEN HD=1023
980 Z$(PI)=""
990 IF PB=1023 THEN GOTO 1010
1000 T3=P(PB)-INT(P(PB)/1024)*10
24: P(PB)=PA*1024+T3
1010 IF PA=1023 THEN GOTO 1030
1020 T3=INT(P(PA)/1024): P(PA)=T
3*1024+PB
1030 RETURN
1040 *
1050 * GET CURRENT ENTRY
1060 IF PI=1023 THEN PA=1023: PB
=1023: A$="": GOTO 1080
1070 A$=Z$(PI): PA=INT(P(PI)/102
4): PB=P(PI)-PA*1024
1080 RETURN
1090 *
1100 * PACK STRING
1110 A$=""
1120 FOR J=0 TO 9: A$=A$+F$(J)+
"!": NEXT
1130 RETURN
1140 *
1150 * UNPACK STRING
1160 B$=A$
1170 FOR J=0 TO 9: F$(J)="" : NEX
T
1180 FOR J=0 TO 9: K=INSTR(B$,"!

```



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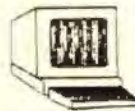
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")
1190 IF K=0 THEN F$(J)=B$: GOTO
1220
1200 F$(J)=LEFT$(B$,K-1): B$=RIG
HT$(B$,LEN(B$)-K)
1210 NEXT
1220 RETURN
1230 *
1240 * DISPLAY CARDS ON SCREEN
1250 IF NU=0 THEN GOTO 1360
1260 HCLS
1270 GOSUB 2710
1280 HLINE (0,0)-(639,191),PSET,
B
1290 HLINE (321,80)-(638,191),PS
ET,B
1300 HCIRCLE (420,184),6: HCIRCL
E (540,184),6
1310 IF NU>1 THEN HLINE (320,64)
-(638,191),PSET,B
1320 IF NU>2 THEN HLINE (320,40)
-(638,191),PSET,B
1330 IF NU>3 THEN HLINE (320,32)
-(638,191),PSET,B
1340 IF NU>4 THEN HLINE (320,16)
-(638,191),PSET,B
1350 IF NU>5 THEN HLINE (320,0)-
(638,191),PSET,B
1360 RETURN
1370 *
1380 * DISPLAY CARD TEXT
1390 TI=PI
1400 HPUT (328,88)-(631,167),1,P
SET
1410 HPUT (328,72)-(631,79),2,PS
ET
1420 HPUT (328,56)-(631,63),2,PS
ET
1430 HPUT (328,40)-(631,47),2,PS
ET
1440 HPUT (328,24)-(631,31),2,PS
ET
1450 HPUT (328,8)-(631,15),2,PSE
T
1460 GOSUB 1060
1470 GOSUB 1160
1480 FOR J=0 TO 9: HPRINT (41,11
+J), F$(J): NEXT
1490 IF NU<2 THEN GOTO 1640
1500 IF PA=1023 THEN PI=HD: GOSU
B 1060 ELSE PI=PA: GOSUB 1060
1510 HPRINT (41,9), LEFT$(A$,38)
1520 IF NU<3 THEN GOTO 1640
1530 IF PA=1023 THEN PI=HD: GOSU
B 1060 ELSE PI=PA: GOSUB 1060
1540 HPRINT (41,7), LEFT$(A$,38)
1550 IF NU<4 THEN GOTO 1640
1560 IF PA=1023 THEN PI=HD: GOSU
B 1060 ELSE PI=PA: GOSUB 1060
1570 HPRINT (41,5), LEFT$(A$, 38
)
1580 IF NU<5 THEN GOTO 1640
1590 IF PA=1023 THEN PI=HD: GOSU
B 1060 ELSE PI=PA: GOSUB 1060
1600 HPRINT (41,3), LEFT$(A$,38)
1610 IF NU<6 THEN GOTO 1640
1620 IF PA=1023 THEN PI=HD: GOSU
B 1060 ELSE PI=PA: GOSUB 1060
1630 HPRINT (41,1), LEFT$(A$,38)
1640 PI=TI: RETURN
1650 *
1660 * PULL CARD
1670 IF RC=1 THEN GOTO 1800
1680 IF PI=1023 THEN GOTO 1800
1690 GOSUB 1060: PI=PA: T$=A$: G
OSUB 960: PI=PT: GOSUB 1060
1700 IF NU<6 THEN GOSUB 1250
1710 GOSUB 1390: A$=T$: GOSUB 11
60
1720 FOR J=0 TO 9: T$(J)=LEFT$(F
$(J)+STRING$(38," "),38): NEXT
1730 HLINE (1,40)-(319,40),PSET
1740 HLINE (1,152)-(319,152),PSE
T
1750 HLINE (319,40)-(319,152),PS
ET
1760 HPUT (8,48)-(311,117),1,PSE
T
1770 HCIRCLE (100,144),6: HCIRCL
E (220,144),6
1780 FOR J=0 TO 9: HPRINT (1,6+J
),T$(J): NEXT
1790 RC=1
1800 RETURN
1810 *
1820 * DELETE CARD
1830 IF PI=1023 THEN GOTO 1870
1840 GOSUB 1060: PT=PA: GOSUB 96
0: PI=PT: GOSUB 1060
1850 IF NU<6 THEN GOSUB 1250
1860 GOSUB 1390
1870 RETURN
1880 *
1890 * INSERT CARD
1900 IF RC<>1 THEN GOTO 2080
1910 GOSUB 1060
1920 FOR I=0 TO 9
1930 IF T$(I)=STRING$(38," ") TH
EN F$(I)="" : GOTO 1990
1940 FB=-1
1950 FOR J=LEN(T$(I)) TO 1 STEP
-1
1960 IF MID$(T$(I),J,1)<>" " AND
FB=-1 THEN FB=J
1970 NEXT
1980 F$(I)=LEFT$(T$(I),FB)
1990 NEXT
2000 GOSUB 1110: PA=PI: GOSUB 82
0: GOSUB 1060: IF PB=1023 THEN H
D=PI
2010 GOSUB 1060: GOSUB 1250: GOS
UB 1390
2020 HLINE (1,40)-(319,40),PRESE
T
2030 HLINE (1,152)-(319,152),PRE
SET
2040 HLINE (319,40)-(319,152),PR
ESET
2050 HCIRCLE (100,144),6,0: HCIR
CLE (220,144),6,0
2060 HPUT (8,48)-(311,117),1,PSE
T
2070 RC=-1
2080 RETURN
2090 *
2100 RETURN
2110 * NEW CARD
2120 IF RC=1 THEN GOTO 2150
2130 FOR I=0 TO 9: T$(I)=STRING$
(38," "): NEXT: GOSUB 1730
2140 GOSUB 2380: RC=1
2150 RETURN
2160 *
2170 * EDIT MODE
2180 IF RC<>1 THEN GOTO 2200
2190 GOSUB 2380
2200 RETURN
2210 *
2220 * WRITE FILE
2230 OPEN "O", #1, "ROLDATA"
2240 WRITE#1, HD, NU, TL
2250 FOR I=0 TO 499: WRITE#1,P(I
),Z$(I): NEXT
2260 CLOSE
2270 RETURN
2280 *
2290 * READ FILE
2300 OPEN "I", #1, "ROLOATA"
2310 INPUT#1,HD, NU, TL
2320 FOR I=0 TO 499: INPUT#1,P(I
),Z$(I): NEXT
2330 PI=HD: GOSUB 1060
2340 GOSUB 1250: GOSUB 1390: CLO
SE
2350 RETURN
2360 *
2370 * EDIT ON SCREEN
2380 IF RC<>1 THEN GOTO 2510
2390 R=6: C=1: MD$="EDIT": GOSUB
2710
2400 GOSUB 2540: GOSUB 2630
2410 IF C$=CHR$(10) THEN IF R=15
THEN GOTO 2400 ELSE GOSUB 2580:
R=R+1: GOTO 2400
2420 IF C$=CHR$(94) THEN IF R=6
THEN GOTO 2400 ELSE GOSUB 2580:R
=R-1: GOTO 2400
2430 IF C$=CHR$(9) THEN IF C=38
THEN GOTO 2400 ELSE GOSUB
2580:C=C+1: GOTO 2400
2440 IF C$=CHR$(8) THEN IF C=1 T
HEN GOTO 2400 ELSE GOSUB 2580:C=
C-1: GOTO 2400
2450 IF C$=CHR$(13) THEN GOSUB 2
580: IF R=15 THEN C=1: GOTO 2400
ELSE R=R+1: C=1: GOTO 2400
2460 IF C$<CHR$(32) THEN IF C$=C
HR$(12) THEN GOTO 2510
2470 GOSUB 2670: HPRINT (C,R), C
$: MID$(T$(R-6),C,1)-C$
2480 C=C+1: IF C=39 THEN C=1: R=
R+1
2490 IF R=16 THEN R=15
2500 GOTO 2400
2510 RETURN
2520 *
2530 * CURSOR DISPLAY
2540 HPRINT (C,R), CHR$(127)
2550 RETURN
2560 *
2570 * CURSOR ERASE
2580 GOSUB 2670
2590 HPRINT (C,R),MID$(T$(R-6),C
,1)
2600 RETURN
2610 *
2620 * GET CHARACTER
2630 C$=INKEY$: IF C$="" THEN GO
TO 2630
2640 RETURN
2650 *
2660 * ERASE CP
2670 HPUT (C*8,R*8)-((C*8)+7,(R*
8)+7),1,PSET
2680 RETURN
2690 *
2700 * TITLE
2710 HPRINT (1,22),"R*L*D*X PROG
RAM"
2720 HPUT (144,176)-(318,183),1,
PSET
2730 HPRINT (18,22), MD$
2740 HPRINT (26,22), NU
2750 HPRINT (30,22), "CAROS"
2760 RETURN

```

# Color Computer Software

## Window Master V3.0

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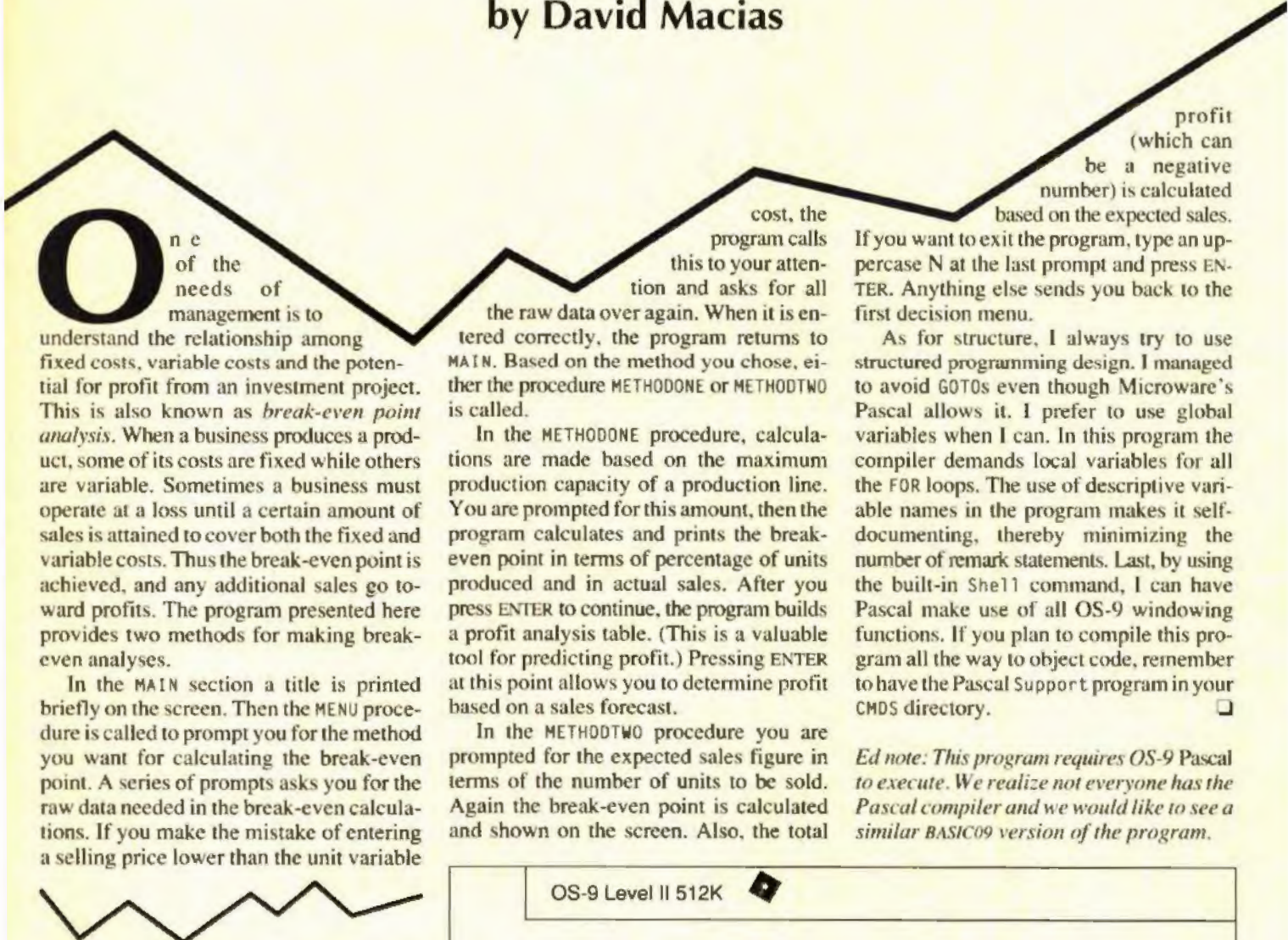
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# Predicting Profits

by David Macias



**O**ne of the needs of management is to understand the relationship among fixed costs, variable costs and the potential for profit from an investment project. This is also known as *break-even point analysis*. When a business produces a product, some of its costs are fixed while others are variable. Sometimes a business must operate at a loss until a certain amount of sales is attained to cover both the fixed and variable costs. Thus the break-even point is achieved, and any additional sales go toward profits. The program presented here provides two methods for making break-even analyses.

In the MAIN section a title is printed briefly on the screen. Then the MENU procedure is called to prompt you for the method you want for calculating the break-even point. A series of prompts asks you for the raw data needed in the break-even calculations. If you make the mistake of entering a selling price lower than the unit variable

David is attending Cerritos College where he studies business computer systems. He works as a computer operator in the data processing department and is a tutor for the music department in the MIDI lab. He is an advocate of the OS-9 operating system. He may be contacted at 11518 East Wimbley Court, Cerritos, CA 90701.

cost, the program calls this to your attention and asks for all the raw data over again. When it is entered correctly, the program returns to MAIN. Based on the method you chose, either the procedure METHODONE or METHODTWO is called.

In the METHODONE procedure, calculations are made based on the maximum production capacity of a production line. You are prompted for this amount, then the program calculates and prints the break-even point in terms of percentage of units produced and in actual sales. After you press ENTER to continue, the program builds a profit analysis table. (This is a valuable tool for predicting profit.) Pressing ENTER at this point allows you to determine profit based on a sales forecast.

In the METHODTWO procedure you are prompted for the expected sales figure in terms of the number of units to be sold. Again the break-even point is calculated and shown on the screen. Also, the total

profit (which can be a negative number) is calculated based on the expected sales.

If you want to exit the program, type an uppercase N at the last prompt and press ENTER. Anything else sends you back to the first decision menu.

As for structure, I always try to use structured programming design. I managed to avoid GOTOs even though Microware's Pascal allows it. I prefer to use global variables when I can. In this program the compiler demands local variables for all the FOR loops. The use of descriptive variable names in the program makes it self-documenting, thereby minimizing the number of remark statements. Last, by using the built-in Shell command, I can have Pascal make use of all OS-9 windowing functions. If you plan to compile this program all the way to object code, remember to have the Pascal Support program in your CMDS directory. □

*Ed note: This program requires OS-9 Pascal to execute. We realize not everyone has the Pascal compiler and we would like to see a similar BASIC09 version of the program.*

OS-9 Level II 512K

## The Listing: cost.pas

```
PROGRAM COST(INPUT,OUTPUT);
(* COST - VOLUME PROFIT ANALYSIS *)
VAR REVENUES, FIXEDCOSTS, VARIABLECOSTS,
    TOTALCOST, INCOME, CAPACITY,
    BREAKEVEN, SALES, PRICE:REAL;
```

```
N, C, X, PAUSE, SW:INTEGER;
RESPOND, ANSWER:CHAR;
```

```
PROCEDURE METHODONE;
```

```
VAR REMOVE:INTEGER;
```

```
BEGIN
```

```
X:=0;
N:=SHELL('DISPLAY 1B 22 01 14 0A 1E 02 01 00');
Writeln('MAXIMUM PRODUCTION CAPACITY?');
N:=SHELL('DISPLAY 1B 22 01 34 0A 08 02 01 00');
Readln(CAPACITY);
BREAKEVEN:= FIXEDCOSTS / ((PRICE - VARIABLECOSTS) * CAPACITY);
N:=SHELL('DISPLAY 1B 22 01 01 0B 28 0A 00 02');
Writeln;
Writeln(' BREAK EVEN POINT = ',(100 * BREAKEVEN):1:0,'%');
Writeln(' OF THE MAXIMUM PRODUCTION CAPACITY');
Writeln(' OR ',(BREAKEVEN * CAPACITY):1:0,' UNITS');
Writeln(' CORRESPONDING TO SALES REVENUES');
Writeln(' OF $',(BREAKEVEN * CAPACITY * PRICE):4:2);
Writeln;
Writeln(' -----<PRESS ENTER TO CONTINUE>-----');
Readln(ANSWER);
N:=SHELL('DISPLAY 1B 22 01 0F 00 35 18 02 03');
Writeln;
Writeln(' COST - VOLUME - PROFIT ANALYSIS TABLE');
Writeln;
Writeln(' -----');
Writeln(' UNITS SALES TOTAL COSTS PROFIT');
Writeln(' -----');
WHILE (X < CAPACITY) DO
  BEGIN
    X:= X + TRUNC(CAPACITY / 10);
    REVENUES:= X * PRICE;
    TOTALCOST:= FIXEDCOSTS + X * VARIABLECOSTS;
    INCOME:= REVENUES - TOTALCOST;
    Writeln(X,' $',REVENUES:8:2,' $',TOTALCOST:8:2,' $',
    INCOME:8:2);
  END;
Writeln(' -----');
Writeln;
Writeln;
Writeln(' -----<PRESS ENTER TO CONTINUE>-----');
Readln(ANSWER);
FOR REMOVE:= 1 TO 6 DO
  BEGIN
    N:=SHELL('DISPLAY 1B 23');
  END;
END;
```

```
PROCEDURE METHODTWO;
```

```
VAR REMOVE:INTEGER;
```

```
BEGIN
```

```
N:=SHELL('DISPLAY 1B 22 01 14 0A 1E 02 01 00');
Writeln('EXPECTED SALES (IN UNITS)? ');
N:=SHELL('DISPLAY 1B 22 01 34 0A 08 02 01 00');
Readln(SALES);
BREAKEVEN:= FIXEDCOSTS / (PRICE - VARIABLECOSTS);
N:=SHELL('DISPLAY 1B 22 01 20 B 2D C 00 01');
Writeln;
Writeln(' BREAK-EVEN POINT = ',BREAKEVEN:3:0,' UNITS');
Writeln(' OR $',(BREAKEVEN*PRICE):3:2);
Writeln;
Writeln;
Writeln(' TOTAL PROFIT = TOTAL REVENUE - TOTAL COSTS');
Writeln(' $',(SALES * PRICE - (FIXEDCOSTS +
(SALES * VARIABLECOSTS))):3:2,' - ',(SALES*PRICE):3:2,'
(FIXEDCOSTS + SALES * VARIABLECOSTS):3:2);
Writeln;
Writeln(' -----<PRESS ENTER TO CONTINUE>-----');
Readln(ANSWER);
FOR REMOVE:=1 TO 4 DO
  BEGIN
```

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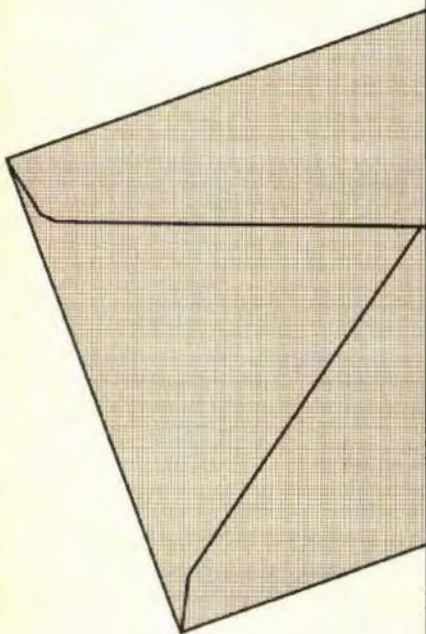
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```

N:=-SHELL('DISPLAY 1B 23');
END;
END;

PROCEDURE MENU;

VAR WAIT:INTEGER;

BEGIN
N:=-SHELL('DISPLAY 1B 22 01 0F 04 35 0D 01 01');
N:=-SHELL('DISPLAY 1B 22 01 0E 03 35 0D 02 03');
WRITELN;
WRITELN;
WRITELN('          BREAK - EVEN POINT ANALYSIS');
WRITELN('-----');
WRITELN;
WRITELN;
WRITELN;
WRITELN('          BASED ON PRODUCTION CAPACITY (1)');
WRITELN;
WRITELN('          BASED ON SALES FORECASTS (2)');
WRITELN;
WRITELN('          ENTER 1 OR 2 AND HIT <ENTER>');
N:=-SHELL('DISPLAY 1B 22 01 37 0E 02 01 00 01');
READLN(C);
N:=-SHELL('DISPLAY 1B 23');
N:=-SHELL('DISPLAY 1B 23');
N:=-SHELL('DISPLAY 1B 23');
IF (C > 2) THEN C:= 2;
IF (C < 1) THEN C:= 1;
WRITELN;
WRITELN;
REPEAT
IF (SW = 0) THEN
BEGIN
N:=-SHELL('DISPLAY 0C');
WRITELN;
WRITELN;
WRITELN('          TOTAL FIXED COST ?');
WRITELN;
WRITELN('          UNIT VARIABLE CDST ?');
WRITELN;
WRITELN('          UNIT SELLING PRICE ?');
SW:= 1;
END;
N:=-SHELL('DISPLAY 1B 22 01 28 02 08 06 01 00');
READLN(FIXEDCOSTS);
WRITELN;
READLN(VARIABLECOSTS);
WRITELN;
READLN(PRICE);
IF (VARIABLECOSTS >= PRICE) THEN
BEGIN
N:=-SHELL('DISPLAY 1B 22 01 01 01 2A 06 01 01');
N:=-SHELL('DISPLAY 1B 22 01 02 02 28 04 00 03');
N:=-SHELL('DISPLAY 1F 24');
WRITELN('          THE SELLING PRICE MUST BE');
WRITELN('          GREATER THAN THE UNIT PRICE!');
FOR WAIT:=1 TO 15000 DO
BEGIN
(* PAUSE LOOP*)
END;
N:=-SHELL('DISPLAY 1F 25');
N:=-SHELL('DISPLAY 1B 23');
N:=-SHELL('DISPLAY 1B 23');
N:=-SHELL('DISPLAY 1B 23');
END;
UNTIL (PRICE > VARIABLECOSTS);
END;

BEGIN (* MAIN *)

SW:=0;
RESPOND:='Y';
N:=-SHELL('DISPLAY 1B 32 01 1B 33 00');
N:=-SHELL('DISPLAY 05 20');
N:=-SHELL('DISPLAY 0C');

```

```

N:=SHELL('DISPLAY 1B 22 01 0F 04 35 09 01 01');
N:=SHELL('DISPLAY 1B 22 01 0E 03 35 09 02 03');
WRITELN;
WRITELN;
WRITELN('          THIS IS THE COST-VOLUME ANALYSIS PROGRAM');
WRITELN('          PROGRAMMED by David MacIas');
WRITELN('          12-26-89');
FOR PAUSE=-1 TO 18000 DO
  BEGIN
    (* LOOP DELAY *)
  END;
N:=SHELL('DISPLAY 1B 23');
N:=SHELL('DISPLAY 1B 23');
N:=SHELL('DISPLAY 05 21');
REPEAT
  MENU;
  IF C= 1 THEN
    METHODONE
  ELSE
    METHODTWO;
N:=SHELL('DISPLAY 05 20');
N:=SHELL('DISPLAY 1B 22 01 0A 02 20 07 00 01');
WRITELN;
WRITELN(' DO YOU WISH TO DO AN ANALYSIS?');
WRITELN;
WRITELN(' ENTER N TO END OR PRESS ENTER');
WRITELN('          TO CONTINUE');
READLN(RESPOND);
N:=SHELL('DISPLAY 1B 23');
N:=SHELL('DISPLAY 05 21');
UNTIL RESPOND= 'N';
N:=SHELL('DISPLAY 0C');
END.

```

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# Novices Niche



THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

## Home Help

### Keeping a Tab on Your Tap by Roger E. Severs

16K  
Extended

This program can be used to figure personal water bills or can be used as the core of a billing system for a small water company. It was written on a CoCo but also runs on an MS-DOS computer under GW-BASIC.

Most small water companies start their computations with a fixed rate. In this example I set the Base (B) at 3000 gallons and the dollar amount for the base (D) at \$16.50. Then R is the rate per gallon above the base, which in this example is .175 cents per gallon, or \$1.75 per thousand gallons. Also, I set LC to .1 for a 10 percent late charge. If your water company doesn't use a fixed base rate, set B and D to zero, and R and LC to the rates your company uses.

#### The Listing: WATER

```
0 ' COPYRIGHT 1990  FALSOFT, INC
10 'WATRBIL BY ROGER SEVERS 9/89
20 B=3000'BASE AMOUNT OF CONSUMPTION
30 D=16.5'DOLLAR AMOUNT FOR BASE
40 R=.00175'RATE PER GALLON
50 LC=.1'LATE CHARGE RATE
60 CLS
70 INPUT" PREVIOUS READING":P
80 INPUT" PRESENT READING":PR
90 C=PR-P:PRINT" CONSUMPTION":C
100 CT=C+CT:IF C<B GOTO 120
110 IF C>=B GOTO 130
120 FC=0:GOTO 140
130 C=C-B:FC=C*R
140 T=D+FC:PRINT" NET CHARGE IS
```

```
":T
150 PRINT" TOTAL CONSUMPTION IS
":CT
160 INPUT" IS THERE A LATE CHARGE
Y/N":L$
170 IF L$="Y" THEN 180 ELSE 60
180 INPUT" ENTER LAST MONTH'S WATER
BILL ":LT
190 FC=LT*LC:PRINT" 10% LATE CHARGE
IS ":FC
200 INPUT" WAS LAST MONTH'S WATER
BILL PAID Y/N":M$
210 IF M$="N" THEN 250 ELSE 220
220 PRINT" TOTAL CHARGE IS ":T+FC
C
230 INPUT" TO START A NEW BILL ENTER
A":G$
240 IF G$="A" THEN GOTO 60 ELSE
END
250 INPUT" ENTER UNPAID BILL":U
260 NT=T+FC+U
270 PRINT" TOTAL CHARGE IS":NT
280 INPUT" TO START A NEW BILL ENTER
A":G$
290 IF G$="A" THEN 60 ELSE END
```

## Graphics

### And Along Came a Spider by Joseph Pendell

CoCo 3

*Spiders* is a small graphics program that requires a CoCo 3. It draws five spiders with different faces, which move down the screen hanging by their webs. The spider that makes it to the bottom of the screen first is put in the center of the screen and turns many colors. To use the program, just type in and run the listing.

The variable *Q* in Line 10 is the speed at

which the spiders move down the screen. It can have a value between two and nine. The numbers in Line 30 are the colors of the CoCo's palette I chose for the spiders. The loop from Line 70 to Line 180 draws the five spiders and stores them in buffers to be put onto the screen later. Lines 200 through 230 make the spiders move down the screen. The movement for the spider is to have it

move down *Q* positions, Line 210, then have it move back up one position, Line 220. This gives a bouncing effect.

#### The Listing: SPIDERS

```
0 ' COPYRIGHT 1990  FALSOFT, INC
1 'SPIDERS
2 'BY JOSEPH PENDELL
10 Q=5:'SPEED OF SPIDERS
20 FORI=1TO5:H$=H$+1:700:NEXTI
30 DATA 0,47,25,61
40 DATA"BM122,99;R2;BR2;R2;BR2;R
2;BR2;R2","BM122,99;NU1;M+6,+1;R
2;M+6,-1;U1","BM124,100;U1;R8;D1
;L8","BM122,100;M+6,-1;R2;M+6,+1
```



```

". "BM124,99;R8"
50 FORI=0T03:READC:PALETTE 1,C:N
EXTI
60 HSCREEN4
70 FORI=1T05:D(1)=RND(3):HDRAW"C
"+STR$(D(1))
80 HCIRCLE(128,96),15:'BODY
90 HDRAW"BM140,91;M+15,-5;M+15,+
2;BM142,94;M+12,-3;M+15,+3;BM142
,97;M+12,-2;M+15,+4;BM140,100;M+
15,-1;M+15,+5":'RIGHT LEGS
100 HDRAW"BM116,91;M-15,-5;M-15,
+2;BM114,94;M-12,-3;M-15,+3;BM11
4,97;M-12,-2;M-15,+4;BM116,100;M

```

```

-15,-1;M-15,+5":'LEFT LEGS
110 HDRAW"BM124,94;NU1;NR1;NL1;N
D1":'LEFT EYE
120 HDRAW"BM131,94;NU1;NR1;NL1;N
D1":'RIGHT EYE
130 HDRAW"BM128,96;D1":'NOSE
140 HDRAW"BM128,89;U13":'WEB
150 READ M$:HDRAW M$:'MOUTH
160 HGET(85,76)-(172,105),I
170 HCLS
180 NEXTI
190 FORI=1T05:A(I)=0:HPUT((I-1)*
130,0)-((I-1)*130+88,29),I,PSET:
NEXTI

```

```

200 I=RND(5):A(I)-A(I)+Q:IFA(I)>
162 THEN 240
210 HPUT((I-1)*130,A(I)+1)-((I-1
)*130+88,A(I)+30),I,PSET
220 HPUT((I-1)*130,A(I))-((I-1)*
130+88,A(I)+29),I,PSET
230 GOTO200
240 HCLS:HDRAW"C"+STR$(D(1))+BM
320,90;U90":HPUT(276,85)-(364,11
4),I,PSET:FORK=1T010:J=RND(63):F
ORL=1T04:PALETTE L,J:PLAY"L255T2
55CDEFGB":NEXTL,K:PALETTE CMP:E
ND

```

## Home Help

### What Is on the Agenda for Today? by Kerian Kenny

32K  
Extended

A scratch pad for the things you have to remember can come in quite handy. *Agenda* helps you remember dates such as birthdays and appointments with the dentist. When you run the program, you see a menu with a pointer ">" positioned at the top choice (LOAD). Use the up/down arrow keys to position the pointer next to the option of your choice and press ENTER.

To enter your first reminder, choose ADD. Enter the date to be remembered in whatever form you like (e.g., 2/3/90) and then enter the reminder. Enough space has been dimensioned and string space cleared for about 366 items of 60 characters in length (including the date). Items can be shorter or longer. The maximum length of an item is 249 characters less the length of the date entered. The screen position above the up-arrow is the limit.

Long items will necessarily reduce the number of items you can enter, but some items will probably be very short and there will probably be enough days for which no entry is required. Consistent use of abbreviations is recommended. You can use the same data for more than one entry.

Reminders can be entered as they come, and date order is not required. You can neatly format your entry on the screen, but that will require entering more spaces and using more memory. As I said, it's a scratchpad.

After each entry you are returned to the menu. Choose ADD for further entries until all your reminders have been entered. Then choose SAVE and give your file a name (e.g., 1990).

If a disk drive is plugged in, your file

will be saved to or loaded from disk. Otherwise it will be saved or loaded to or from tape. The value DV=1 or DV=-1 is established in Line 30.

Next time you have a reminder to enter, load 1990, choose ADD on the menu, and enter your reminder as above. Then save the whole file again as 1990.

If you want to find an entry, load 1990 and select SEARCH. You can enter any string or part of a string you know to be in an entry. So if you want to check on your appointments with Dr. Pillpopper, type PILLPOPPER, and all files in which that name appears will be displayed on the screen in their order of entry. Most frequently you will want to enter the day's date (2/3).

The Search routine is quite fast because the complete file is in memory. The high-speed poke is in effect except when you are actually saving or loading a file. Line 40 establishes the poke values SP=65497 and SL=65496 if you are using a CoCo 3, or SP=65495 and SL=65494 if you are using a CoCo 1 or CoCo 2. If your CoCo will not take the high-speed poke, delete or omit Line 40 and the pokes in lines 160, 240, 470 and 550.

You might find the menu choice routines starting in Line 60 useful for your own programs. Type your choices as in lines 170 through 210. The value of UP is one less than the print position of the first option on the screen and the value of DN is one less than the position of the last option. If your first item is at print position 66, you can have up to thirteen choices on the screen — (UP=65 and DN=449).

#### The Listing: AGENDA

```

0 'AGENDA' by Keiran Kenny,
  Sydney, 1989.
1 * COPYRIGHT 1990 FALSOFT, INC
10 GOTO560
20 DIMOY$(366)
30 IFPEEK(&H15F)=196THENDV=1ELSE
DV=-1
40 IFPEEK(&HFFFE)*256+PEEK(&HFFF
F)=&H8C1B THENSP=65497:SL=65496
LSESP=65495:SL=65494
50 GOTO160
60 Q=UP:PK=1
70 PRINT@Q,CHR$(62);
80 K$=INKEY$:IFK$=""THEN80
90 IFO&UP THENQ=UP
100 IFK$=CHR$(10)ANDQ=DN THEN140
110 IFK$=CHR$(10)THENPRINT@Q,CHR
$(143);:Q=Q+32:PK=PK+1:PRINT@Q,C
HR$(62);
120 IFK$=CHR$(94)ANDQ>65THENPRIN
T@Q,CHR$(143);:Q=Q-32:PK=PK-1:PR
INT@Q,CHR$(62);
130 IFK$=CHR$(13)GOTO150
140 GOTO80
150 RETURN
160 POKESP,0:CLS:PRINT"USE UP/DN
ARROW:ENTER TO SELECT"
170 UP=65:PRINTTAB(2)"LOAD AGEND

```

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```

A"
180 PRINTTAB(2)"ADD ENTRIES"
190 PRINTTAB(2)"SEARCH"
200 PRINTTAB(2)"SAVE AGENDA"
210 PRINTTAB(2)"END PROGRAM"
220 DN=193:GOSUB60
230 PRINTPK:ONPK GOTO240,330,410
,470,550
240 POKESL,0:CLS:INPUT"LOAD AGEN
DA NAME:";F$:IFDV=-1THENPRINT"PO
SITION TAPE. PRESS PLAY. PRESSAN
Y KEY.":EXEC44539:GOTO260
250 F$=F$+"/DAT"
260 OPEN"I".#DV,F$
270 INPUT#DV,RN
280 FORT=1TORN
290 LINEINPUT#DV,DY$(T)
300 NEXT
310 CLOSE#DV

```

```

320 GOTO160
330 CLS:LINEINPUT"ENTER REMINDER
DATE: ";DT$
340 CLS:PRINT"ENTER REMINDER FOR
"+DT$
350 PRINT@249-LEN(DT$)+35,"^"
360 PRINT@32,"":
370 RN=RN+1
380 LINEINPUTRN$
390 DY$(RN)-DT$+"": "+RN$
400 GOTO160
410 CLS:LINEINPUT"SEARCH FOR: ";
S$
420 CLS:FORT=1TORN:IFINSTR(1,DY$
(T),S$)THENPRINTDY$(T)
430 FORP=1386TO1417:IFPEEK(P)<>9
6THENPRINTTAB(8)"PRESS ANY KEY."
:;EXEC44539:CLS:GOTO440ELSENEXTP
440 NEXTT

```

```

450 E$="**END OF FILE "+CHR$(34)
+S$+CHR$(34)+"**":PRINTTAB(16-LE
N(E$)/2)E$
460 PRINTTAB(2)"**FOR MENU. PRES
S ANY KEY**":;EXEC44539:GOTO160
470 POKESL,0:CLS:INPUT"SAVE AGEN
DA NAME:";F$:IFDV=-1THENPRINT"PRE
SS PLAY AND RECORD. PRESS ANYKEY
.":EXEC44539
480 OPEN"O".#DV,F$
490 PRINT#DV,RN
500 FORT=1TORN
510 PRINT#DV,DY$(T)
520 NEXT
530 CLOSE#DV
540 GOTO160
550 POKESL,0:CLS:END
560 PMODE0:PCLEAR1:CLEAR24000:GO
T020

```

## Games

### Cutting Corners

by John T. Wells

Here is a familiar game consisting of a rectangle with a moving line inside it, which is controlled by the arrow keys. The object of the game is to keep the line moving as long as possible without the line intersecting or hitting the wall of a rectangle. The game is over when two lines intersect or you touch a wall. Your score is printed when the game is over.

**The Listing:** CHASE  
0 \* COPYRIGHT 1990 FALSOFT, INC  
1 POKE65497,0  
2 HSCREEN2:HCLS8  
3 HLINE(60,20)-(260,171).PSET,8  
4 HLINE(62,22)-(257,168).PSET,8  
5 HPAINT(61,21),1,1  
6 X=160:Y=95:XX=160:YY=95:FL=1:I  
N=9:CT=0  
7 IN\$=INKEY\$:IF IN\$<>" " THEN IN=  
ASC(IN\$)

CoCo 3

```

8 XX=X:YY=Y:IF IN=94 THEN Y=Y-1
ELSEIF IN=10 THEN Y=Y+1 ELSEIF I
N=9 THEN X=X+1 ELSEIF IN=8 THEN
X=X-1
9 IF FL=0 THEN IF HPOINT(X,Y)-1
THEN 14
10 FL=0
11 HSET(X,Y,6):HSET(XX,YY,1)
12 CT=CT+1
13 GOTD7
14 HCOLOR2,8:HPRINT(9,10),"THAT"
S IT"
15 HPRINT(9,15),"SCORE IS ":HPRI
NT(20,15).CT
16 HPRINT(9,20),"PRESS <ENTER> T
O END":LINE INPUT IN$
17 HCOLOR1,8
18 POKE65496,0
19 END

```

### Steady Aim Fire

by Kathy Rumpel

*Bird Hunt* is a challenging shoot-'em-up game for the CoCo 3. A bird sits on a telephone wire and you control the BB gun at the bottom on the screen with the left and right arrow keys. To shoot at the bird, just press the up arrow key and a BB will be fired. If you hit the bird in the heart, it chirps and you receive 100 points and a new victim appears. If you miss, the bird flies away and another one arrives. Don't take too long to aim because time will run out and the game will be over. Happy hunting!

**The Listing:** BIRD

```

0 * COPYRIGHT 1990 FALSOFT, INC
1 *BIROHUNT
2 *KATHY RUMPEL
3 *ROUTE 1 BOX 67-A

```

```

4 *ARCADIA, WI 54612
5 RGB:ON BRK GOTO 39
6 POKE 65497,0:SC=0:TIMER=0
7 HSCREEN2:HCLS8:HCOLOR4,8
8 HLINE(10,55)-(305,55),PSET
9 A$="S12R5F2D3GF3E3DRDRDL5G2L7H
2U2EHU3E2BF2BD2FGHEBD2RF2D2GL2HU2
ERBH2LBR5R"
10 B$="S4R2BR2R2BRBDL7DR7DL7BDBRR
5BDBLL3BDBRR"
11 C$="U25E2R2F2D25L6"
12 IF TIMER>1900 THEN GOSUB39
13 HO=150:VE=200
14 HDRAW"BM=HO;,-VE:C6"+C$
15 H=RND(250):V=20
16 IF H>250 THEN H=250 ELSE IF H
<50 THEN H=50
17 HDRAW"BM=H;,-V:C2"+A$
18 H=H+4:V=V+22
19 HDRAW"BM=H;,-V:C3"+B$
20 I$=INKEY$:IF I$="" THEN 20
21 HDRAW"BM=HO;,-VE:C8"+C$
22 IF I$=CHR$(8) THEN HO=HO-10

```

CoCo 3

```

23 IF I$=CHR$(9) THEN HO=HO+10
24 IF I$=CHR$(94) THEN GOSUB 31
25 IF HO>300 THEN HO=300
26 IF HO<10 THEN HO=10
27 HDRAW"BM=HO;,-VE:C6"+C$
28 GOTO 20
29 HCOLOR4,8:HLINE(10,55)-(305,5
5),PSET:HDRAW"BM=H;,-V:C8"+B$
30 GOTO 12
31 FOR SH=VE-10 TO 35 STEP-35:HS
ET(HO+5,SH,4)
32 HLINE(10,55)-(305,55),PRESET
33 H=H-4:V=V-22
34 HDRAW"BM=H;,-V:C8"+A$
35 H=H+4:V=V+22
36 IF HPOINT(HO+5,SH)=8 THEN GOS
UB 38 ELSE HSET(HO+5,SH,8):NEXT
37 GOTO 29:GOTO12
38 HCLS8:PLAY"T25504DCAE":SC=SC+
100:HCOLOR4,8:HPRINT(12,1),"SCOR
E:";HPRINT(20,1).SC:HCOLOR4,8:RE
TURN
39 FORX=1TO5:PLAY"T25504DCAE":NE
XTX:HCOLOR3,8:HPRINT(9,15),"ANOT
HER ROUND? (Y/N)"
40 I$=INKEY$:IF I$="" THEN 40
41 IF I$="Y" THEN RUN ELSE POKE6
5496,0:CLS:END

```

## Title Screen Splashdown by Paul L. Olmstead

Want to add a little animation to the title screen of your BASIC program? Just type in and run FALLING. This short routine can be appended to any BASIC program and used as a title screen that clears a little bit differently than BASIC's CLS command.

There are four lines you may use for text or graphics characters on a 32-column text screen.

After you've typed in the short listing, save it to disk or tape. Then, type RUN and press ENTER. The title will appear. Press ENTER again and watch the title and its border fall apart into the water. Have fun and don't get wet.

**The Listing:** FALLING  
© ' COPYRIGHT 1990 FALSOFT, INC

16K  
Extended

```

10 *****
12 *** FALLING LETTERS **
14 *** BY PAUL OLMSTEAD **
16 *** AN ALTERNATIVE TO "CLS"***
18 *** (C) 1990 FALSOFT, INC. **
20 *****
22 POKE &HFFD9,0
24 DIM T(128)
26 GOSUB 64
28 CO=0
30 Y=RND(128):X=T(Y)
32 IF X<>0 THEN CO=CO+1:GOTO 38
34 IF CO>128 THEN 30
36 POKE &HFFD8,0:END
38 X=PEEK(1151+Y):T(Y)=0
40 N=Y+1151:POKE N,223
42 FOR M=1 TO 11
44 P=PEEK(N+32)
46 POKE N+32,X
48 IF N+32>1471 AND N+32<1503 TH
EN POKE N+31,175:POKE N+33,175:X
1-1:X=223
    
```

```

50 IF X1=1 THEN FOR D=1 TO 4:NEX
T D
52 IF X1=1 THEN X1=0:POKE N+31,2
23:POKE N+33,223
54 IF N+32>1535 THEN 62
56 IF N+32>1503 THEN POKE N+32,1
75:POKE N,175:FOR D=1 TO 8:NEXT
D:POKE N,223
58 POKE N+32,P:N=N+32
60 NEXT M
62 GOTO 34
64 CLS6
66 PRINT @128,STRING$(33,201);
68 PRINT @161," FALLING LETTERS
TITLE SCREEN ";
70 PRINT @191,CHR$(201);CHR$(201
)
72 PRINT @197,"(C) 1990, FALSOFT
INC.";
74 PRINT @223,STRING$(33,201);
76 FOR L=1504 TO 1535:POKE L,175
:NEXT L
78 PRINT @329,"PRESS ANY KEY.";
80 EXEC &HADFB
82 FOR L=1353 TO 1366:POKE L,223
:NEXT L
84 FOR L=1 TO 128:T(L)=99:NEXT L
86 RETURN
    
```

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"...will blow your socks off...impossible to give Extended ADOS-3 anything other than a rave review." — Rainbow, October 1989.

"Flawless, compatible operation with just about everything under the sun...by far the most USEFUL product ever devised for the Color Computer." — CoCo Clipboard, Sept/Oct 1989.

### ADOS-3 (reviewed July 1987)

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**FOROS-9:** SmartWatch real-time clock with driver \$30.00; in Rompack \$40.00.

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# A New Look for OS-9

by Dale L. Puckett  
Contributing Editor

**T**his month, *MVFinance* brings *Finance* (March 1984, Page 298) into a new decade of mice and windows — just in time for the business issue. The OS-9 Spotlight features Eric Chrichlow's *ShellMate*, a program that helps you manage OS-9 files with ease.

As you probably guessed from last month's column, we can expect to see some improvements in OS-9 Level II. The BASIC09 tutorial code provided here shows how the new gfx2 routines make it much easier to write OS-9 windowing programs. When you compare the set-up code required by *MVFinance* to the same sequence from *DoMenu* in our November '88 column, you'll notice it is only one-third the length of the original. The code is also much easier to read and understand. Do keep in mind, however, the code presented here will not run using the currently available gfx2 module.

## Defining the Environment

Many programmers often skip an essential step when they begin a new project. They sit down at a keyboard and start entering code before planning the program. If the program is short, there's usually no problem. However, once the program grows beyond a page or two of code, they pay the price in frustration.

I prefer to make decisions concerning program flow and determine the variables and constants I'll need before I start typing. This lets me use BASIC09's DIM statement to

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OS-9 Level II



## The Listing: MVFinance

```

PROCEDURE MVFinance
0000  (* Adding windows to Finance
001C  (* Copyright 1990 Dale L. Puckett
003D
003E  (* Window type defs.
0052  DIM WT_NBox,WT_FWin,WT_FSWin:INTEGER
0061  DIM WT_SBox,WT_DBox,WT_PBox:INTEGER
0070  WT_NBox:=0 \WT_FWin:=$0301 \WT_FSWin:=$0302
0087  WT_SBox:=3 \WT_DBox:=4 \WT_PBox:=5
009D
009E  (* Menu defs
00AA  DIM MN_Move,MN_Clos,MN_Grow,MN_Uscl:INTEGER
00BD  DIM MN_Dscr1,MN_Rscr1,MN_Lscr1:INTEGER
00CC  DIM MN_Tndy,MN_File,MN_Edit:INTEGER
00DB  DIM MN_Styl,MN_Font,MN_Char:INTEGER
00EA  DIM MN_Invest,MN_Deprec,MN_Loan:INTEGER
00F9  MN_Move:=1 \MN_Clos:=2 \MN_Grow:=3
010E  MN_Uscl:=4 \MN_Dscr1:=5 \MN_Rscr1:=6
0123  MN_Lscr1:=7 \MN_Char:=8 \MN_Tndy:=20
0138  MN_File:=21 \MN_Edit:=22 \MN_Styl:=23
014D  MN_Font:=24 \MN_Invest:=33 \MN_Deprec:=34 \MN_Loan:=35
0169
016A  (* Buffer defs
0178  DIM Grp_Font,Grp_Clip,Grp_Ptr:INTEGER
0187  DIM Grp_Pat2,Grp_Pat4,Grp_Pat6:INTEGER
0196  Grp_Font:=200 \Grp_Clip:=201 \Grp_Ptr:=202
01AB  Grp_Pat2:=203 \Grp_Pat4:=204 \Grp_Pat6:=205
01C0
01C1  (* Font Buffers
01D0  DIM Fnt_S8x8,Fnt_S6x8,Fnt_G8x8:INTEGER
01DF  Fnt_S8x8:=1 \Fnt_S6x8:=2 \Fnt_G8x8:=3
01F4
01F5  (* Mouse Pointers
0206  DIM Ptr_Arr,Ptr_Pen,Ptr_Lch,Ptr_Slp:INTEGER
0219  DIM Ptr_Ill,Ptr_Txt,Ptr_Sch,Ptr_None:INTEGER
022C  Ptr_Arr:=1 \Ptr_Pen:=2 \Ptr_Lch:=3 \Ptr_Slp:=4
0248  Ptr_Ill:=5 \Ptr_Txt:=6 \Ptr_Sch:=7 \Ptr_None:=8
0264
0265  (* Pattern Buffers
0277  DIM Pat_Sld,Pat_Dot,Pat_Vrt,Pat_Hrz,Pat_Xhtc:INTEGER
028E  DIM Pat_Lsnt,Pat_Rsnt,Pat_Sdot,Pat_Bdot:INTEGER
02A1  Pat_Sld:=0 \Pat_Dot:=1 \Pat_Vrt:=2 \Pat_Hrz:=3 \Pat_Xhtc:=4
02C4  Pat_Lsnt:=5 \Pat_Rsnt:=6 \Pat_Sdot:=7 \Pat_Bdot:=8
02E0
02E1  (* Window regions for Mouse
02FC  DIM WR_Cntnt,WR_Cntrl,WR_DfWin:INTEGER
030B  WR_Cntnt:=0 \WR_Cntrl:=1 \WR_DfWin:=2
0320
0321  (* Data type to hold mouse packet

```

```

0342 DIM valid,fire,mx,my,area,sx,sy:INTEGER
0361
0362 (* Mouse settings
0373 DIM scanrate,timeout,follow:INTEGER
0382 scanrate:=3 \(* update rate (1/60th sec ticks) for the mouse
0388 timeout:=1 \(* # ticks till packet goes into quiet mode
03EA follow:=1 \(* update cursor when mouse moves, 0 = no follow.
0422
0423 DIM ButtonDown,ButtonUp:INTEGER
042E ButtonDown:=1 \ButtonUp:=0
043C
043D (* Dim a variable to hold the 6809 stack during a SysCall
0476 TYPE registers=cc,a,b,dp:BYTE: x,y,u:INTEGER
049B DIM stack:registers
04A4
04A5 (* SysCall constants
0489 DIM I_Dup,I_Getstt,I_Setstt,F_Sleep:BYTE
04CC I_Dup:=$B2 \I_Setstt:=$8E \I_Getstt:=$BD \F_Sleep:=$0A
04EC
04ED DIM pathnum,oldpath(3),newpath:BYTE
0501 DIM key:STRING[1] \ DIM programname:STRING
0514
0515 (* Dimension arrays for window and menus
053D DIM Finwin(6):STRING \(* Window Descriptor
055D DIM TanMen(8):STRING \(* Tandy Menu
0576 DIM FilMen(1):STRING \(* File Menu

```

reserve memory and describe a program's environment for the reader — often it's me, six months later. When you write code this way, you can always refer back to the beginning of the program's listing to find the value of a constant or determine what a particular variable is being used for.

Additionally, you'll find that once you have written a solid shell for one *Multi-Vue* program, you can use that code over and over again in many other programs, with only simple modifications. If you define often used constants, you can refer to them by name throughout the remainder of the coding. I dislike code that forces me to remember what an esoteric value like \$CA will do for me.

I reorganized the code that initializes the windows for *MVFinance* to make it easier to read and understand. In *DoMenu*, I grouped all the DIM statements together — more than 100 of them — and initialized all the variables. With this approach I had to

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# OS-9 Spotlight: ShellMate

*ShellMate*, the commercial version of Eric Crichlow's PD file management program was released by Hyper-Tech Software in February. This point-and-click program is similar to the *DiskMaster* program on the Amiga.

*ShellMate* is essential first fare for the OS-9 beginner and a productivity booster for old timers. It is one of the first commercial programs to fully use the *Multi-View* windowing system and is both friendly and powerful. Beginners will find it much easier to copy or move files by pointing and clicking. Old timers will love the ability to select a large number of files and perform a given task on them with one click of the mouse button. However, you will need a minimum of 256K of memory in your CoCo 3 to use *ShellMate*.

The package from Hyper-Tech, 4341 Gannet Circle, No. 174, Las Vegas, NV 89103, also contains an AIF and icon file. The AIF file goes in your applications folder. The icon file should be moved into the /DD /CMDS/ICONS folder. You'll need at least 40K of free memory when you run *ShellMate*.

*ShellMate* divides your Color Computer screen into three sections: Overlay windows display both source and destination directories; all available commands are listed in the center; and the standard *Multi-View* menu bar appears along the top of the screen. You start by selecting a file or files in the source directory. You then perform a command selected from the list in the center of the screen. If you are copying or moving a file, it is placed in the destination directory list on the right. While selecting, you can move down the directory tree by clicking on the name of a subdirectory (displayed in a different color than a standard file). To move back up the tree, click on the Parent button in the center. Other buttons let you select or clear all files in a directory. You can even create new directories

```
058E DIM InvMen(3):STRING \(* Investment Menu
05AC DIM DepMen(3):STRING \(* Depreciation Menu
05CC DIM LonMen(5):STRING \(* Loan Menu
05E4
05E5 DIM menu_id,menu_item:INTEGER
05F0 DIM Enable,Disable:INTEGER
05FB Enable:-1 \Disable:-0
0609
060A DIM stype,xsiz,ysize,fore,back,bord:INTEGER
0625 DIM window,wtype:INTEGER
0630 window:-WT_FSWin \wtype:-window
0640
0641 DIM row,col:INTEGER \row:-0 \col:-0
065A
065B (* Dimension variables for Finance procedures
0689 DIM invest,deposit,rate,value,interest,period,years:REAL
06AB DIM pricepaid,pricesold,depreciation,salvagevalue:REAL
06BB DIM months,periods:INTEGER
06C6
06C7 (* Operating Program starts here
06E7 SHELL "tmode -pause"
06F7 ON ERRDR GOTO 9000
06FD
06FE (* Check for proper window type and size and fix
072E RUN gfx2("Winfo",stype,xsiz,ysize,fore,back,bord)
0759 IF stype<>7 THEN
0765 RUN gfx2("DWEnd") \RUN gfx2("DWSet",7,0,0,80,24,1,0,2)
0797 xsiz:-80
079E ENDIF
07A0 IF xsiz<80 THEN
07AC RUN gfx2("DWSet",0,0,0,80,24,1,0)
07CE ENDIF
07D0
07D1 (* Set up palettes
07E3 RUN gfx2("Palette",0,$3F) \RUN gfx2("Palette",1,$0A)
080F RUN gfx2("Palette",2,$00) \RUN gfx2("Palette",3,$1D)
0838
083C (* Turn on mouse, use arrow cursor
085E RUN gfx2("SetMouse",scanrate,timeout,follow)
087D RUN gfx2("GCSet",Grp_Ptr,Ptr_Arr)
0894
0895 (* Display Menu Bar
08AB RUN gfx2("Title",Finwin,"Multi-View Finance",80,24,5)
08D7
08D8 (* Set up each menu and items
08F5 RUN gfx2("Menu",Finwin,1,"Tandy",MN_Tndy,10,8,TanMen,Enable)
0926 RUN gfx2("Item",TanMen,1,"Calc",Disable)
0946 RUN gfx2("Item",TanMen,2,"Clock",Disable)
0967 RUN gfx2("Item",TanMen,3,"Calendar",Disable)
098B RUN gfx2("Item",TanMen,4,"Control",Disable)
09AE RUN gfx2("Item",TanMen,5,"Printer",Disable)
09D1 RUN gfx2("Item",TanMen,6,"Port",Disable)
09F1 RUN gfx2("Item",TanMen,7,"Help",Enable)
0A11 RUN gfx2("Item",TanMen,8,"Shell",Enable)
0A32
0A33 RUN gfx2("Menu",Finwin,2,"File",MN_File,6,1,FileMen,Enable)
0A63 RUN gfx2("Item",FileMen,1,"Quit",Enable)
0A83
0A84 RUN gfx2("Menu",Finwin,3,"Investments",MN_Invest,18,3,InvMen,Enable)
0ABC RUN gfx2("Item",InvMen,1,"One Investment",Enable)
0AE6 RUN gfx2("Item",InvMen,2,"Regular Deposits",Enable)
0B12 RUN gfx2("Item",InvMen,3,"Desired Value",Enable)
0B38
0B3C RUN gfx2("Menu",Finwin,4,"Depreciation",MN_Deprec,16,3,DepMen,Enable)
0B75 RUN gfx2("Item",DepMen,1,"Annual Rate",Enable)
0B9C RUN gfx2("Item",DepMen,2,"Total Amount",Enable)
0BC4 RUN gfx2("Item",DepMen,3,"Salvage Value",Enable)
0BED
0BEE RUN gfx2("Menu",Finwin,5,"Loans",MN_Loan,18,5,LonMen,Enable)
0C1F RUN gfx2("Item",LonMen,1,"Regular Payments",Enable)
0C4B RUN gfx2("Item",LonMen,2,"Last Payment",Enable)
0C73 RUN gfx2("Item",LonMen,3,"Term",Enable)
0C93 RUN gfx2("Item",LonMen,4,"Balance",Enable)
0CB6 RUN gfx2("Item",LonMen,5,"Cost of Loan",Enable)
0CDE
```

with the MakDir button.

*ShellMate* has several bells and whistles that let you do much more than a standard file manager providing only copy, delete, rename, list and print services. For example, additional *ShellMate* commands let you list files contained in a standard OS-9 archive file, dearchive those files, or create a new archive. To use these buttons the Ar module must be resident in your current execution directory.

If you create or download a lot of VEF graphics files, you'll love *ShellMate*. By pushing a single button after selecting a picture file, you can run VEFShow to display a picture. GIF pictures can be displayed with another button that runs the GIF0S9 command. As with any excellent *Multi-View* application, *ShellMate* gives you full access to all Desk Accessories under the Tandy menu. You'll find this new OS-9 application is well thought-out and useful — an excellent first release for Eric Crichlow. □

```
00DF      (* Setup the window: Turn off text cursor first
000E      RUN gfx2("CurOff") \RUN gfx2("WnSet",WT_FSWin,Finwin)
0033      RUN gfx2("CurOn")
0040
0041      (* Main Loop
004D      LOOP \(* Do this forever
0061      REPEAT
0063          RUN gfx2("Mouse",valid,fire,mx,my) \ UNTIL fire=ButtonUp
0090
0091          RUN gfx2("OnMouse",0)
00A3          RUN gfx2("Mouse",valid,fire,mx,my,area,sx,sy)
00D3          IF valid<>0 AND fire=ButtonDown AND area=WR_Cntrl THEN
00EF              GOSUB 1000
00F3          ENDF
00F5          ENDLOOP
00F9
00FA 1000 RUN gfx2("GetSel",menu_id,menu_item)
0E15
0E16      IF menu_id=MId_Gro THEN
0E24          wtype:=window
0E2C          GOSUB 8000
0E30          RETURN
0E32      ENDF
0E34
0E35      IF menu_id=MId_Mov THEN
0E43          wtype:=window
0E4B          GOSUB 8000
0E4F          RETURN
0E51      ENDF
0E53
0E54      IF menu_id=MN_Clos THEN GOTO 9010 \ ENDF
0E66      IF menu_id=MN_Tndy THEN GOSUB 2000 \ ENDF
0E78      IF menu_id=MN_File THEN
0E85          IF menu_item=1 THEN
```

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leaf through several pages of code each time I wanted to determine which data type a variable contained. To make things easier, this time I have grouped the DIM and initialization statements for like objects. You'll find the window types, buffer definitions and mouse pointers, etc., together.

### Commands That Make It Possible

Examine the code that sets up the window and menu bar for *MVFinance*, and compare it to the same code in *DoMenu*.

**Multi-View** is finally something the beginning BASIC09 programmer can approach without fear. Three new gfx2 commands make this possible.

*Multi-View* is finally something the beginning BASIC09 programmer can approach without fear. Three new gfx2 commands make this possible. For example, the following line sets up the title bar:

```
run gfx2("Title",FinWin,"Multi-V
ue Finance",72,20,5)
```

Likewise, a single line is required for each menu as well as each item under a menu:

```
run gfx2("Menu",FinWin,1,"Tandy"
,MN_Tndy,10,8,TanMen,Enable)
run gfx2("Item",TanMen,1,"Calc",
Disable)
```

A major gfx2 enhancement makes it much easier to handle the mouse. Special long-winded data-typing statements are no longer needed. For example, this line initializes the mouse:

```
run gfx2("SetMouse",scanrate,tim
eout,follow)
```

To read the position and status of the mouse, you can use one of the following

```

0E91      GOTO 9010
0E95      ENDIF
0E97      ENDIF
0E99
0E9A      IF menu_id=MN_Invest THEN GOSUB 3000 \ ENDIF
0EAC      IF menu_id=MN_Deprec THEN GOSUB 4000 \ ENDIF
0EBE      IF menu_id=MN_Loan THEN GOSUB 5000 \ ENDIF
0ED0      RETURN
0ED2
0ED3 2000 (* Tandy Menu routines from DoMenu go here
0F00      IF menu_item=7 THEN
0F0C          RUN gfx2("OWSet",1,50,8,30,8,3,2)
0F2E          RUN gfx2("WnSet",WT_DBox,Finwin)
0F45          PRINT \ PRINT " Use DoMenu code"
0F5C          PRINT " from November, 1988"
0F75          PRINT " Rainbow to run items"
0F8F          PRINT " from Tandy Menu."
0FA5          FOR count=-1 TO 7000 \NEXT count
0FC3          RUN gfx2("OWEnd")
0FD0      ELSE IF menu_item=8 THEN
0FDF          GOSUB 6000 \(* Open a window
0FF4          SHELL "" \(* Start a Shell
1000          RUN gfx2("OWEnd")
1015      ENDIF
1017      ENDIF
1019      RETURN
101B
101C 3000 (* Investment Programs
1035      IF menu_item<>0 THEN
1041          ON menu_item GOSUB 3100,3200,3300
1054      ENDIF
1056      RETURN
1058
1059 3100 (* Single Investment
1070      GOSUB 6000 \(* Open Window
1083      PRINT "Future Value of One-Time Investment" \ PRINT
10A8      INPUT "Initial Investment? ",invest
10C7      INPUT "Nominal Interest Rate? ",rate
10E6      INPUT "Term in Years, Months? ",years,months
1109      INPUT "Number of compounding periods/year? ",periods
1135      PRINT
1137      rate:=rate/periods/100 \years:=(12*years+months)/12
115D      value:=invest*(1+rate)^(periods*years)
1176      value:=INT(value*100+.5)/100 \interest:=value-invest
119A      GOSUB 6100 \(* Print report
11AD      RETURN
11AF
11B0 3200 (* Regular Deposits
11C6      GOSUB 6000 \(* Open window
11D8      PRINT "Future Value of Regular Deposits" \ PRINT
11FE      INPUT "Amount of each deposit? ",deposit
121E      INPUT "Nominal interest rate? ",rate
123D      INPUT "Term of investment (Years,Months)? ",years,months
126C      INPUT "Number of deposits per year? ",periods
1291      rate:=rate/periods/100 \years:=(12*years+months)/12
12B7      value:=deposit*((1+rate)^(periods*years)-1)/rate
12D8      value:=INT(value*100+.5)/100 \invest:=deposit*years*periods
1301      interest:=value-invest
130D      GOSUB 6100 \(* Print report
1320      RETURN
1322
1323 3300 (* Desired Value
1336      GOSUB 6000 \(* Open window
1348      PRINT "Required regular deposits" \ PRINT
1367      INPUT "Desired final amount? ",value
1385      INPUT "Nominal interest rate? ",rate
13A4      INPUT "Length of investment (Years,Months)? ",years,months
13D5      INPUT "Number of deposits each year? ",period
13FB      rate:=rate/period/100 \years:=(12*years+months)/12
1420      deposit:=value*rate/((1+rate)^(period*years)-1)
1440      invest:=deposit*years*period \interest:=value-invest
145C      GOSUB 6100 \(* Print report
146F      RETURN
1471
1472 4000 (* Depreciation Programs
148D      IF menu_item<>0 THEN
```



```

1499      ON menu_item GOSUB 4100,4200,4300
14AC      ENDIF
14AE      RETURN
14B0
14B1 4100 (* Annual Rate
14C2      GOSUB 6000 \>(* Open window
14D4      PRINT "Depreciation Amount" \ PRINT
14ED      INPUT "Original price of item? ",pricepaid
150D      INPUT "Selling price? ",pricesold
1524      INPUT "Depreciation term (Years,Months)? ",years,months
1552      years:=(12*years+months)/12
1567      rate:=(1-(pricesold/pricepaid)^(1/years)
157F      rate:=-INT(rate*100+.5)
1593      PRINT CHR$(12) \>(* clear screen
15A7      PRINT "Depreciation rate (Percent): ";
15C9      PRINT USING "T40,R12.2>".rate
15DC      GOSUB 6200 \>(* close
15E8      RETURN
15EA
15EB 4200 (* Total depreciation
1603      GOSUB 6000 \>(* open window
1615      PRINT "Depreciation Amount" \ PRINT
162E      INPUT "Original price of item? ",pricepaid
164E      INPUT "Depreciation rate? ",rate
1669      INPUT "Year of depreciation? ",years
1687      rate:=rate/100
1693      depreciation:=pricepaid*rate*(1-rate)^(years-1)
16AF      PRINT CHR$(12) \>(* clear screen
16C3      PRINT \ PRINT "Current depreciation: ";
16E0      PRINT USING "T40,R12.2>".depreciation
16F3      GOSUB 6200 \>(* close
16FF      RETURN
1701
1702 4300 (* Salvage Value
1715      GOSUB 6000 \>(* Open window

```

lines. However, the second line does not tell you the horizontal and vertical size, the area of the screen or the location of the pointer.

```

run gfx2("Mouse",valid,fire,mx,m
y,area,sx,sy)
run gfx2("Mouse",valid,fire,mx,m
y)

```

While you are waiting for the user to click the mouse button, you can put the mouse to sleep and let other processes running in your Color Computer have more time by using this line:

```
run gfx2("OnMouse",0)
```

Another gfx2 command that you're sure to love is Winfo, which lets you examine the type, size and colors in a window. Check the line I use to make sure I am running *MVFinance* in a window of the proper type.

#### Subroutines and Forked Processes

I used two separate approaches within *MVFinance* to illustrate two different solutions to the same problem. When a user clicks a mouse on a menu item, he is

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essentially telling the computer to perform the task advertised under the menu bar. It is up to your program to make this possible.

I used subroutines to run the tasks under the Investment and Depreciation menus. Items under the Loan menu are run by forking a task in a new window. The subroutine approach is easy to follow. In fact two techniques can be used: The Investment menu uses a decision tree, and the Depreciation menu uses an ON Menu\_Item GOSUB 4100, 4200, 4300 statement.

The Loan menu uses both the ON Menu\_Item GOTO statement and forks a process in a new window. I needed the SysCall statements in the subroutine at 9000 to duplicate the input, output and error paths on the fly and to use the F\$Sleep system call.

A new gfx2 command named WnSet is used to display a new window and menu bar. To bring up the *MVFinance* window, use the statement:

```
run gfx2("WnSet",WT_FSWin,FinWin)
```

FinWin is the array that defines the window. WT\_FSWin is an integer variable that actually contains two parts: The lower significant byte contains the window type, and the upper byte tells the system if the window can be either moved or resized or both.

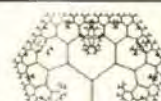
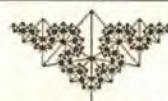
By combining this feature with a menu that forks a process in a new window, you can start more than two calculation subroutines going in two or more windows on the same screen. You can experiment when I present the four additional procedures for the Loan menu next month.

That's it for April. I hope to have more information about OS-9 Level II on the Color Computer in May.

```

1727 PRINT "Salvage Value" \ PRINT
173A INPUT "Original price of item? ",pricepaid
175A INPUT "Depreciation term (Years,Months)? ",years,months
178B INPUT "Depreciation rate? ",rate \rate:=rate/100
17AF salvagevalue:=pricepaid*(1-rate)*years
17C3 PRINT CHR$(12) \>(* clear screen
17D7 PRINT \ PRINT "Salvage value: ";
17E0 PRINT USING "T40,R12.2>".salvagevalue
1800 GOSUB 6200 \>(* close
180C RETURN
180E
180F 5000 (* The subroutine to Fork Loan programs
1839 (* as a separate processes appears next month
1866 RETURN
1868
1869 6000 RUN gfx2("OWSet",.1,10,10,60,12,2,3)
188E RUN gfx2("WnSet",WT_DBox,Finwin)
18A5 RUN gfx2("Select") \RUN gfx2("CurOn")
18C0 RETURN
18C2
18C3 6100 PRINT CHR$(12) \ PRINT "Amount invested: ";
18E1 PRINT USING "T40,R12.2>".invest
18F4 PRINT "Value of accumulated interest: ";
1918 PRINT USING "T40,R12.2>".interest
192B PRINT "Final Value of Your Investment: ";
1950 PRINT USING "T40,R12.2>".value
1963
1964 6200 (* close the window on mouse click
1989 PRINT
198B PRINT "Click Mouse to continue!"
19A7 REPEAT
19A9 RUN gfx2("Mouse",valid,fire,mx,my)
19CA UNTIL fire=1
19D5 RUN gfx2("Dwend")
19E2 RETURN
19E4
19E5 8000 (* Display window after its been moved
1A0E RUN gfx2("CurOff") \RUN gfx2("WnSet",wtype,Finwin)
1A33 RUN gfx2("CurOn") \row:=0 \col:=0
1A4E IF wtype=$0302 THEN
1A5B RUN gfx2("SBar",col,row)
1A71 ENDIF
1A73 RUN gfx2("GCSet",Grp_Ptr,Ptr_Arr)
1A8A RETURN
1A8C
1A80 9000 (* All errors come here
1AA7 PRINT "Error="; ERR
1AB3 PAUSE
1AB5 9010 SHELL "tmode echo"
1AC6 RUN gfx2("GCSet",Ptr_None,Ptr_None)
1ADD RUN gfx2("CurOn")
1AEA END

```



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**THE ADDENDUM** - Picks up where the BOOK left off. Describes ALL the CoCo 3 enhancements & how to use them with assembly language. The most complete GIME spec. **WOW** - Super-Res Graphics, Virtual Memory, New Interrupts, and more information not available elsewhere. Find out what the CoCo 3 can really do. \$12.00 + \$1.00 s/h.

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# Looking for Connectors

by Marty Goodman,  
Contributing Editor

*Where can I get 34-pin female dual-row connectors for 3½-inch disk drives? Radio Shack just told me they don't carry 34-pin connectors. How can I get software to allow me to use more than 35 tracks? Can this be done for CoCo Max 3?*

*Michael F. Trombley, Jr.  
Ware, Massachusetts*

Page 141 of the 1990 Radio Shack catalog indicates that Radio Shack does sell the proper 34-pin connector (Cat. No. 276-1525) for use with 3½-inch disk drives. The 276-1564 connector is the proper one to use with 5¼-inch drives. These items are not new and have been in the catalog for years. If you replace the original Disk ROM with ADOS burned into an EPROM (see ad in THE RAINBOW), most disk-based programs will work with 40- and 80-track drives. *CoCo Max 3* may be an exception, however, because it does not go through the disk ROM for its disk access, and so a modified ROM does not affect its disk operation.

## Bruce Replies

*Several folks have asked me about using 80-track, TEAC 55F, 5¼-inch floppy drives to read 40-track disks. Older versions of those drives (the ones with a single TI 1922-00 flatpack chip surrounded by 74LS-series, TTL DIP chips) can be set to double step (skip every other track when stepping) if you install R14 (a 150 ohm, ¼-watt resistor). When set in this fashion, they can reliably read disks written with 40-track drives. They can also format a disk in such a way that a 40-track drive can read the disk. However, it's not a good idea to try to use these drives to write to a disk that has been formatted on a true 40-track drive. A user can install a switch that hooks R14 in and out to put the drives in normal- and double-step/40-track modes.*

*Bruce Isted  
Calgary, Alberta  
Canada*

Thanks, Bruce, for the tip. Older TEAC 5¼-inch 80-track drives

---

*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.*

are the only ones I know of that allow for such hardware-based double-step control. Of course, you can accomplish the same thing with proper driver software. Art Flexser incorporated this into ADOS3 and Extended ADOS3. Modifying the OS-9 device driver for Disk I/O to allow double-stepping should not be difficult.

## Atari Compatible?

*Can I use an Atari drive on my Color Computer?*

*Bruce Bell  
Rockmart, Georgia*

Older 5¼-inch drives used by the Atari 400, 800 and 130ST cannot be used on a Color Computer; the logic board on the drive mechanism is completely different than the IBM standard-type used by CoCo drives. However, the drive and logic board used by the Atari 520ST, 1040ST and their successors is standard and can be used with a Color Computer. These are double-sided, 80-track, 3½-inch drives. Apart from setting the drive select properly and using proper cabling, you must also be careful to alter the terminating resistors when using an Atari 520ST-type drive on the CoCo, because the Atari ST systems use peculiar terminating resistances.

## How to Make Y

*How can I make a Y cable for my Color Computer's expansion port?*

*Jocelyn Girard  
Quebec*

Y cables for the CoCo expansion port are made using Kell AM brand male and female IDC edge card connectors along with 40-conductor ribbon cable. These connectors cost \$3 to \$5 each, and they must be used with Kell AM female row-reversing connectors because their means of hooking to the ribbon cable is a mirror image of most ordinary female edge card connectors.

The male connectors are tricky to crimp on the cable. If you don't have the special crimping die used for mass production, you must push each of the contacts in, one at a time, with a small nail after the usual crimping operation is done; otherwise unreliable contact results. This is why making such Y cables is usually outside the scope of the average do-it-yourselfer; it's better to get them from a RAINBOW advertiser. I don't readily recommend the use of such Y cables because they can cause unreliable system operation, especially with disk access.

It is possible to make a male-to-male edge-card adaptor if you have access to double-sided printed circuit board fabrication

technology. Every trace must be run through the board on its way to the other edge-card connector. Such an adaptor can turn a female 40-pin IDC edge-card connector into a male, allowing its use with standard 40-pin female edge-card connectors. CRC/Disto used this trick to make an adaptor for 34-pin edge-card connectors used in disk drives. To my knowledge they have not made one for 40-pin edge card connectors.

#### **Tandy External on CoCo**

*How do I use a Tandy external 3½- or 5¼-inch drive package designed for use with a 1000 EX or HX on a Color Computer?*

Dick Reitz  
Houston

The external drives for the 1000EX and HX are standard 5¼- and 3½-inch drives that are compatible with the Color Computer. They are packaged in a plastic box without a power supply. Tandy uses a custom 30-pin cable that supplies power to the drive from the main computer.

I recommend opening up the box, discarding the Tandy cable and making your own ordinary 34-pin cable for use with the CoCo disk controller. You will also have to provide power to the drive (+5 and +12 volts, regulated), then properly jumper and terminate your CoCo drive system.

#### **Need Modem to Fit Budget**

*What kind of modem should I buy? I've been advised to purchase the DC Modem Pak and a Multi-Pak Interface, but these are too expensive. I have DeskMate.*

Tim Arview  
West Frankfort, Illinois

I recommend purchasing a generic, external, 1200-baud modem, which should be available from computer mail-order houses for under \$65. Such modems can be connected to the 4-pin serial port on the back of the CoCo3. When used with any of a number of shareware or commercial disk-based terminal programs (*Delphitem*, *Vterm*, *GregETerm*), these modems allow you to download from any Color Computer bulletin board to your disk.

*DeskMate* and other OS-9 software is another matter. OS-9 software requires a hardware RS-232 pack and a Y cable or Multi-Pak Interface. RS-232 packs are available from Orion and CRC/Disto (see ads in THE RAINBOW) and Multi-Pak substitutes are available from Orion and Howard Medical.

#### **Multi-Pak Interface Problem**

*My Multi-Pak will not recognize the disk controller in Slot 4, and moving the selector switch to the slot occupied by an auto-execute ROM Pak causes the computer to crash. I have upgraded this Multi-Pak according to your instructions in the October 1988 RAINBOW and have determined that the power supply is OK. I have not jostled the Multi-Pak or CoCo and have been using a Locking Plate from Gimmesoft to keep the CoCo and Multi-Pak together. My disk controller works fine when plugged directly into the CoCo. What suggestions can you offer?*

Leroy Guse  
Greenleaf, Wisconsin

It would help to know what kind of Multi-Pak you have. I suggest using a schematic of the Multi-Pak and an oscilloscope to check for a bad chip on each address and data line on both sides of the buffer chips. Check the functioning of the CTS line since it is used in recognizing the disk ROM and ROM Paks.

Also, type POKE &HFF40,1 and see if the disk drive light on Drive 0 comes on. If it does, it means the SCS line is working. Both Multi-Paks use the same buffer circuitry on the address and data lines. The older Multi-Pak uses small-scale logic plus one small PAL chip to handle slot selection, where the new Multi-Pak uses a large, custom chip. The most common problem I've encountered with bad Multi-Paks is a blown address or data buffer chip. I've also seen the power supplies go bad. However, I've not seen a Multi-Pak with a dead PAL or custom-slot select chip, though I suppose it could happen.

#### **Act Like a Dragon**

*How can I make my CoCo operate as if it were a Dragon 32/64 computer? I want to run Dragon programs on my CoCo. I've tried to put my CoCo into 64K mode and load Dragon BASIC into it, but it doesn't work.*

Edmund Sobon  
Brampton, Ontario

You're most likely wiping out the very code that allows the computer to use the tape recorder as you are using it! You need to load the Dragon BASIC into lower memory and use a program written in assembly language that turns off the interrupts and moves that code into upper memory where you want it. I'm still not sure the result will be an environment in which Dragon software will run on the CoCo, but it's worth a try. The old Dragon computer was very similar to the CoCo 1, but featured a built-in hardware serial port and a clever addition to the keyboard circuitry that created a parallel printer port.

#### **Creating Variables**

*Page 16 of the CoCo 3 manual states "You can use any two characters from A to Z for a variable." Why can I not use FN for FN\$ as a variable? Are there any other combinations I cannot use?*

Charles Gibson  
Edwardsville, Illinois

The CoCo 3 manual does have some errors. You cannot use, as a variable, any name whose first two letters are the same as the first two letters of an official BASIC function such as IF, ASCII, FN, etc. BASIC recognizes functions by the first two letters of the function name.

#### **Lockups in CoCo Max 3**

*My CoCo 3 locks up whenever I use the Set Colors or the Cycle Colors options in CoCo Max 3. It also seems to have problems with other ML software. Do you have any idea what the problem is?*

Gary Hough  
Stephens City, Virginia

My best guess is that you have a problem with your GIME chip. You might want to order a new one from National Parts (\$25) and see if replacing the old one fixes the problem.

#### **CoCo With a Mind of Its Own**

*Since I upgraded my CoCo 3 to 512K, some of the graphics screens don't work properly. When I use low-resolution PMODE screens, a few pixels are set randomly even when the picture is cleared. Sometimes my computer locks up entirely or the disk drive motors turn on spontaneously. What do you think is wrong?*

Brian O'Neil  
Kirkland, Washington

First I suggest downgrading to 128K to see if the problem persists. If it does, I'd say you have a damaged GIME chip and/or even a bad 68B09E. If the problem goes away, it seems the problem is due to bad DRAM on the 512K upgrade board. Test this by replacing the sixteen 256K DRAMs with new chips or by replacing, one at a time, each 256K DRAM on that board with a good DRAM.

256K-by-1 120 ns or faster DRAMs are inexpensive. Pricing is down to \$2.50 or less per chip. Because I don't know the results of your test after downgrading, I assume that either you have one or more bad DRAMs on the 512K upgrade board, or there is a cold solder joint on the upgrade board. You might want to reflow all solder joints on that board. Other possibilities include a bad contact between the 512K upgrade board and the sockets on the CoCo 3, including that due to a cold solder joint between the CoCo 3 board and those 512K memory upgrade sockets. I assume, of course, that you properly installed your 512K board and cut the indicated capacitors and/or added the required resistor.

### Printer Shopper

*What sort of color and black-and-white printers do you recommend for the Color Computer? What kind of interface do you recommend for use with them?*

Leslie Morgan  
Bryant, Alabama

For most CoCo users, I recommend a low- to medium-priced 9-pin dot matrix printer. Values in the \$150 to \$250 price range can be found with the Panasonic KX-P1180 and KX-P1190 series of printers, as well as the Star NX-1000 printers. These printers offer decent, near-letter-quality printing, relatively fast draft print speed and a proven record of reliability. Each comes with tractors, usually push tractors that offer more flexible paper handling. Epson also sells a decent printer in this price range.

These printers support the Epson standard for graphics codes and should work with most CoCo graphics programs. The NX-1000 also comes in a color-ribbon-capable version. I advise against using a color printer unless you have a very specific application for it and have ascertained that the program you are using supports that printer. I must admit I have seen some nice results with *CoCo Max 3* and *Color Max* using color printers.

Among the more expensive 24-pin printers, I find the Panasonic KX-P1124 to be an excellent value, although the layout of its front panel controls is confusing. It sells for about \$300 from mail-order outlets. 24-pin printers offer much greater speed and near-letter-quality printing. The delicate print-head, however, is more vulnerable to accidents such as snagging a pin in the ribbon and ruining the head. Replacement heads tend to cost \$150 or more.

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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The Label Designer is simply the most powerful, flexible, and easiest-to-use label program ever written for the CoCo.

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May 89 Rainbow

**The CoCo Graphics Designer Plus, produces beautiful greeting cards, banners, and signs.**

The CGDP features an easy-to-use point and click graphical interface with windows, scroll bars, radio buttons, and joystick or mouse control. Text can be used in up to 4 sizes and 16 fonts per page. Picture, Font, and Border collections are included. Signs and cards can be previewed on screen. ... Rave review in May 89 Rainbow (pages 110 - 113).

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**Above programs require a CoCo II 64K or CoCo III,** disk drive, RSDOS, joystick or mouse. Printers supported include: Epson RX/FX/LX, Gemini 10X, SG10, NX10, NX1000, DMP105/106/110/120/130/132/133/200/400, Panasonic KXP1080 / 90 /91/92, Prowriter, C.Itoh 8510, Okidata 92/93/182/183 & more.

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April 1990 THE RAINBOW 61

# Name That Tune With UltiMusE

by Eddie Kuns  
OS-9 SIGop

**G**eneral Information (in the OS-9 SIG): Stephen Macri (DRACMAN) posted a 24-question non-computer-related quiz. An example question (not from the quiz) is: 16=O. in a P. Answer: Ounces in a pound. Eddie Kuns (EDDIEKUNS) submitted a 512-question "Hacker Test" to test your knowledge of obscure computer lore.

**Applications:** Paul Jerkatis (MITHELEN) contributed a program to generate random, syntactically correct sentences. Kelly Thompson (KMTOMPSON) posted a graphics font designed for *Sokoban*.

**Utilities:** Tim Koonce (TIMKOONCE) released *UnTC* (including C source), a program that dearchives TC12, TC3 and TC31 archive files. Roger Krupski (HARDWAREHACK) contributed a group of programs to read and set a Tandy SmartWatch chip. Bruce Isted (OS9UGVP) posted an assembly language Line Input subroutine for BASIC09. Ken Heist (MKJ) submitted a program to setup an unused window. Randy Longshore (RANDYE) posted a collection of OS-9 utilities from the #19 NewsDisk of the European OS-9 Users Group. The utilities were written by R. J. Telkman of England. Source code is included.

**Device Drivers:** John Wesson (DOCBEAR) contributed a collection of additional VDG and window descriptors that use memory in the range \$07FFA0

through \$07FFCF. Bruce Isted released an update to The Eliminator's DACIA device driver.

**Patches:** John Wesson posted a patch to allow 25 or 28 row text screens and 200 or 225 row graphics screens.

**Telcom:** Eric Bursley (BACCHANALIAN) submitted a stand-alone program to send a true line break through the RS-232 Pak.

**Graphics & Music:** Glen Hathaway (COMPER) contributed a goofy little graphics program called bounce4. Christian Michaud (SUPERCHRIS) posted an erotic GIF image of a woman in a mink coat. Mike Knudsen (RAGTIMER) submitted the latest version of *JukeBox Player* for *UltiMusE III*. This version plays up to 32,767 notes and can filter out instrument changes. Doug Fraser (LDF) posted an MGE picture of the Cutty Sark, one of the last tea clippers built. Mike Huskey (KINGTRENT) posted a program to patch OS-9 Level I Version 2.00.00 to simulate artifact colors on an RGB monitor, and several graphics images. Hank Walters (COCOHAM) contributed a play file of Billy Fernando sampled from Billy Crystal's "Mahvelous!" tape. John Kou (BAMBOO) posted ten *UltiMusE* songs including "Up Where We Belong," "Africa," and "We've Got Tonight." John Donaldson (VAXELF) submitted a digitized GIF picture of a Kawasaki Ninja. Jim Buck (COCOROGUE) posted *Ricochet Rock*, a rock blues song for *UltiMusE III*. Jim also submitted "When the Saints go Marching In" and J.S. Bach's "Minuet." Brian White (BRIANWHITE) contributed the newest version of *Play*, which plays digitized sound files of up to 2 Meg. Brian also posted a fancy screen-saver program called *Maze* that creates and solves random mazes while preventing phosphor burn of your monitor. Zack Sessions (ZACKSESSIONS) released Larry Olsen's *PacOS9*, an arcade-style game

that should be very familiar. Mike Schneider (MSCHNEIDER) posted a digitized sound file from the movie *Animal House*; drop and give me twenty! Kelly Thompson submitted two sound files — one was from *Batman*.

**Programmers Den:** Eric Stringer (NES) posted utilities to convert files from the MS-DOS world. Eric also posted the C source to a 3-D graphics plotting program. Philip Brown (THEFERRET) submitted a BASIC09 terminal program that supports some ANSI codes and an open invitation for anyone to continue with the project. Greg Law (GREGL) resubmitted Carl Kreider's C libraries, which have been archived to prevent linker errors. Brian Wright (POLTERGEIST) contributed an archive of C functions from UNIX systems.

## CoCo SIG

**General Information:** Marty Goodman (MARTYGOODMAN) posted a report on the '89 Somerset RAINBOWfest.

**CoCo 3 Graphics:** Randy Cassel (BBTROLL) submitted a graphics collection of teenage heart-throbs, including one of Patrick Swayze. Jason Becker (JAYDEF) posted three digitized album covers and some natural and unnatural landscapes. Charles Phillips (DEORE) contributed a *Max-10* picture of a modified 1911-A1 45 automatic. Christian Michaud submitted three erotic pictures in *Color Max 3* format. John Malon (JOHNLM) posted a GIF picture of jet aircraft in battle. Donald Ricketts (STEVEPDX) contributed an MS-DOS program to view graphics files generated by the DS69B digitizer on a CGA card. Richard Trashorg (TRAS) and Matthew McGinnis (MATTCGINNIS) were very busy uploading dozens of graphics files! Richard posted an animation of Katey Sagel in 640 format and two IMG pictures of

*Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.*

Christina Applegate in a bikini. Richard also submitted quite a few erotic pictures including Loni (in 16-level greyscale and color). Matt posted a number of erotic IMG files including the Budweiser gals and a collection of mythical creatures.

**Utilities & Applications:** Eric Parish (ERICPAR) submitted a collection of two-dimensional Turing machine programs. Alan Bell (ABELLS) posted a list of common PEEK, POKE and EXEC addresses for the CoCo. Wellie Chao (WELLIECHAO) contributed a set of programs to help you learn the periodic table of elements. Tom Schaefer (TASCHAEFER) submitted a patch to prevent DynaCalc from accessing memory above \$FE00 on a CoCo 3. Michael Kearny (WTVD) posted the shareware version of Home-Pac, which includes a check register and mailing list database for the CoCo 3. Bryan Stephens (BRSTEPHENS) submitted a machine language program for the CoCo 3 to try differ-

ent screen colors. Roger Carlson (PERCH) contributed a program to convert decimal numbers to fractions. Frances Calcrafft (FRANCALCRAFT) posted a program dealing with the Rh system of blood typing and the three main systems of nomenclature. He also posted a monitor program for the CoCo 3 to examine or change any area of memory including the source. Fred Mittermiller (BIGFRED) contributed a program to set up the Panasonic KX-P1124's fonts and pitches. Don Joyce (REDCOAT) contributed a program to keep track of bowling averages. Donald Ricketts posted a patch to allow VIP Writer III 2.0 to access Extended ADOS-3 RAM Drives.

**Hardware Hacking:** John Weidman (SKYLINE) uploaded a text file explaining how to put two DOSs in one EPROM for the Disto SC-1 or SC-2 disk controllers.

**Games:** Stephen Macri posted a CoCo 3 text-style football game (you play against the computer) and an Acey Ducey card

game. John Malon contributed a trivia game using initials and numbers and a BASIC program for solving Rubik's Cube. Eric Stringer submitted ROBOTZAP.BAS. Can you escape the evil robots before they zap you?

**Classic Graphics:** Dennis McMillan (COCOKIWI) posted the Art Gallery from the March, May, July and September '89 issues of THE RAINBOW.

**Music & Sound:** Hank Walters contributed a sound sample of Billy Crystal. This is the same sample he posted on the OS-9 SIG.

**Telecommunications:** Mike Ward (MIKEWARD) posted RLETerm, a graphics oriented terminal program. It will receive and display RLE pictures and save them to tape or disk. He also included three sample RLE pictures. Rick Adams (RICKADAMS) posted a program to create a login macro for DELPHIterm that will log you into Delphi via Telenet. □

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### 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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A program for creating forms on  
IBM-compatible printers

# Another Form

by Benjamin Brunotte

TEST PATTERN

Today's date  
Mo. Day Yr.

Social Security Number

NAME: Last	FIRST	Middle
ADDRESS		
CITY	STATE	ZIP CODE

TELEPHONE NUMBER

Area Code

FORM MAKER

by Ben Brunotte  
COPYRIGHT 1987

Creating forms gets boring with a paper and pencil, so let *Form Maker* take some of the tedium out of it. The program generates forms using the IBM line characters available on IBM graphics and compatible printers. *Form Maker* requires a Color Computer 3 with one disk drive.

I used the technique for storing the line characters described in "Barden's Buffer" in the March '88 issue of *THE RAINBOW*. The only drawback is that changing character sets slows the program down. The printer prints the forms at normal printing speed.

Since bidirectional printing produces a wavy look, Line 860 sets the printer for unidirectional printing. This line may need to be changed to reflect control codes for the printer being used.

The control keys for the program are:

**BREAK** — goes to a menu to save/load on disk or to exit.

**CLEAR** — clears entire form to start over.

**ALT** — toggles the Repeat function on and off. A red cursor indicates whether or not Repeat is on. Use the arrow keys to move the cursor. When Repeat is turned on, the character under the cursor is repeated. A new character can be entered, and the new character is repeated as the cursor moves. The black cursor indicates Repeat is off.

**CTRL** — moves to another section of the page. The page is divided into nine overlapping sections. Use the arrow keys to select the direction of the move.

**F1** — activates the line characters. Use the right and left arrow keys to scroll through the character set. Press **ENTER** when the character you want is displayed.

**F2** — prints the form. A preview option is provided. During the preview the full width is displayed, but the page is divided into three overlapping sections for the length. Baud rate is selectable. The printer should be set to IBM-compatible mode before the program is run.

**ARROW** — moves the cursor on the section of the page being displayed. If the repeat is on, a character is repeated as the red cursor moves. Pressing a key on the keyboard puts that character on the form at the cursor position. The black cursor is nondestructive as it moves. □

*Ben Brunotte, who works in operations at a large oil refinery, is a self-taught programmer. The Color Computer is his hobby. He may be contacted at 3221 N. Twin city Hwy., #6, Nederland, TX 77627.*





70	25	360	230	790	223
120	45	430	66	880	133
150	42	500	171	960	61
190	39	580	48	1080	133
210	178	600	21	1170	232
250	143	650	42	1280	154
280	189	690	175	END	28
310	250	750	60		

```

CHARACTER #";STR$(ASC(Z$)):STOP
140 FOR L=0 TO 44:FOR B=0 TO 7:N
=ASC(MID$(CS$(L+OF),B+1,1)):POKE
(61605+(L*8)+B),N:NEXT B,L
150 IF Z$=" " AND Z$<="z" THEN
HPRINT(CL-XO,RW-YO),Z$ ELSE HPRI
NT(CL-XO,RW-YO),CHR$(ASC(Z$)-146
)
160 RETURN
170 POKE 65497,0:PALETTE0,63:PAL
ETTE1,0:PALETTE2,63:PALETTE3,36
180 WIDTH40:CLS5:CLEAR7000:DIM L
T$(66),CS$(90):VERIFYON:HBUFF1,1
6:ON BRK GOTO 580:LOCATE0,7:PRIN
T" ";STRING$(36,"*");PRINT "*"
:STRING$(12,32);"FORM MAKER";STR
ING$(12,32);""
190 PRINT "*" :STRING$(12,32);"=
-----";STRING$(12,32);"" :PR
INT" *";STRING$(8,32);"for IBM
Graphic and";STRING$(7,32);"" :P
RINT" *";STRING$(8,32);"compati
ble printers";STRING$(7,32);""
200 PRINT" * by BENJAMIN W
. BRUNOTTE *";PRINT" *";STR
ING$(10,32);"COPYRIGHT 1989";STR
ING$(10,32);"" :PRINT" *";STRING
$(36,"*");LOCATE0,0
210 FOR L=1 TO 90:CS$(L)="" :NEXT
L:FOR L=0 TO 44:FOR B=0 TO 7:N=
PEEK(61605+(L*8)+B):CS$(L+1)=CS$
(L+1)+CHR$(N):READ N:CS$(L+46)=C
    
```

**The Listing:** FORMAKER

70 \*\* COPYRIGHT 1989

```

0 ' COPYRIGHT 1990 FALSOFT, INC
10 '*****
*****
20 ** FORM MAKER
*
30 ** -----
*
40 ** for IBM Graphic and
*
50 ** compatible printers
*
60 ** by BENJAMIN W. BRUNOT
TE *
    
```

```

80 '*****
*****
90 GOTO170
100 HCOLOR1,4:IF Z$=" " THEN 150
110 IF Z$>" " AND Z$<="z" AND CS
=0 THEN 150 ELSE IF Z$>" " AND Z
$<="z" AND CS=1 THEN CS=0:OF=1:G
OTO 140
120 IF Z$=>CHR$(179) AND Z$<=CHR
$(223) AND CS=1 THEN 150 ELSE IF
Z$=>CHR$(179) AND Z$<=CHR$(223)
AND CS=0 THEN CS=1:OF=46:GOTO 1
40
130 HSCREEN0:CLS5:LOCATE0,11:PRI
NT"CHARACTER ERROR !!!!":PRINT"
    
```



### Overlord

Peace through superior firepower is the catch phrase in this sophisticated wargame simulator. Victory shall not fall to the who is the mightiest, oh no, but to be who can plan ahead and develop the better strategy. You must ensure that all your troops are brought into battle at the right moment, and for that you must set your most industrialized cities to producing troop transporters. Other cities will build Aircraft carriers, fighter jets, paratroop regiments, submarines, spy planes, battleships, destroyers, and cruisers. Up to three people can play the game simultaneously, each starting out at his own base city, each knowing nothing about the strengths and locations of his enemies' forces. The player's own combat troops will head out, exploring the world as they go, capturing towns that lie waiting, or engaging the enemy face to face. You can set any or all of the three players to be operated by the simular silicon brain of your CoCo3, and battle them or let them battle each other.

**Price: \$29 US / \$34 Cdn. (Now shipping v1.1)**  
 Overlord requires: 128k CoCo3, 1 drive and a mouse or joystick.

### Studio Works Professional: *New!*

**Studio quality digital audio is here!**




A new hardware pack developed by Oblique Triad allows our new software to record at 35kHz at eight bits wide! Your CoCo3 is now a serious, professional quality digital sampling system. The optional MIDI slave mode (cable required) lets you 'play' your CoCo from your MIDI computer or synthesizer. The built-in rigid tempo sequencer will let you lay down a useful, studio quality rhythm section. New 'scale' feature lets you play any of up to 55 (512k) sounds effects directly from CoCo's keyboard, one on each row, low to high from left to right. Two zoom windows allow for perfect loop setting down to the byte. Support for Disto/CRC's 1 meg RAM card, our 8-bit output option (built into the pack), Orchestra 90CC, hires mouse. 25 seconds of CD-quality in 1 Meg! Point-and-click operation, clipboards, too many features to list! (Call for SWPro FX discs!)

**Requires: 128k CoCo3, 1 drive.**

**Hint Books!**  
 Caladuril 1 and 2 books: 20 pp, \$3.50.  
 Seventh Link books are 40 pages, \$5.50

**Price: \$95 US/\$110 CDN (incl. software, demo samples, ADC pack) (Call for prices on 8-bit output, MIDI cable, SW Pro with just cable) Req.: 128k CoCo3, (512k rec'd), multi-pak/Y-cable, mouse/joystick**



### the Seventh Link

The Seventh Link is still the best fantasy role-playing adventure the CoCo has ever seen. bar none. 3 discs are filled with worlds, towns, castles, and spectacular 3D dungeons filled with full colour, hi-res monsters, ladders, doors and pits, chests, pools, lava and flooded rooms. You would not believe that a CoCo3 could produce such high-speed detailed graphics. In the wild lands above, you'll find mountains, towns and castles. The towns will reveal merchants, learned locals, even friends who will join your quest. Look no further for the best in hard-core adventure.

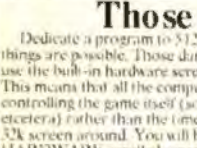
**\$38 US/ \$48 Cdn. Req: CoCo3, 40 track drive**



### Caladuril II: Weatherstone's End

Some of the best graphics to be seen on a CoCo3 will amaze you as you attempt to discover the fate of the Weatherstone. Smooth scrolling 16 colour graphics and a sophisticated command interpreter lend realism and enjoyment to one of the most extensive adventures to be found on a CoCo. Package includes 2 discs, an 11x17 map, a velvet pouch of powerstones and a 20 page booklet.

**Price: \$32 US/ \$38 Cdn (Caladuril 1: \$18/\$24, CoCo2: drive)**



### Those Darn Marbles

Dedicate a program to 512k machines only, and all sorts of new things are possible. Those Darn Marbles is the first CoCo3 game to use the built-in hardware screen scrolling features of the CoCo3. This means that all the computer's time can be dedicated to controlling the game itself (sound effects, moving objects around, etcetera) rather than the time-intensive chore of scrolling an entire 32k screen around. You will be amazed to see how smoothly a HARDWARE-screened screen can move. Compare Those Darn Marbles with any other 3D marble type game on any computer, and you will be convinced that your CoCo3 really can stand with the best of them. (One of our playtesters remarked, upon seeing the pre-release version of TDM: "My Amiga isn't that smooth!") 50k of multi-tasking sound, nearly 1 meg of graphics add excitement!

Our new 2-voice-compression routine squeezes 1.1M onto 1 disc!

It's been said many times, but this time it's true. Your CoCo3 game library is not complete without a copy of Those Darn Marbles. Your 512k CoCo3 never looked so good.

**Price \$32 US / \$38 Cdn. Requires: 512k CoCo3, 1 drive, joystick.**

### Oblique Triad

Come and see us at Rainbowfest Chicago!

**32 Church St., Georgetown, Ontario, CANADA, L7G 2A7 (416) 877-8149**

We accept: MasterCard, Amex, Personal cheques and Money Orders. COD in Canada only. Please add \$2.50 shipping to all software orders, \$1 to all book-only orders. Ontario residents please add 8% tax. Call or write for a free catalogue.

```

S$(L+46)+CHR$(N):NEXT B,L
220 HCOLOR1,4:HSCREEN1:HGET(0,0)
-(7,7),1
230 HCOLOR1,4:HSCREEN1:X0=1:Y0=1
:DP=0:FOR B=1 TO 66:LT$(B)=STRIN
G$(80,32):NEXT B:X=0:Y=0:Z$=""
:GOTO 250
240 HCOLOR1,4:HSCREEN1:FOR RW=Y0
TO Y0+23:FOR CL=X0 TO X0+39:Z$=
MID$(LT$(RW),CL,1):GOSUB 100:NEX
T CL,RW:X=0:Y=0:DP=0
250 SOUND255,1:NX=0:NY=0:XX=X*8:
YY=Y*8:IF DP=1 THEN PALETTE3,36:
HPUT(XX,YY)-(XX+7,YY+7),1,NOT EL
SE PALETTE3,0:HPUT(XX,YY)-(XX+7,
YY+7),1,NOT
260 IF PEEK(341)=191 THEN IK$=IN
KEY$:SOUND110,5:IF DP=0 THEN DP=
1:Z$=MID$(LT$(Y0+Y),X0+X,1):GOTO
510 ELSE DP=0:GOTO510
270 IF PEEK(342)<>191 THEN 330
280 HSCREEN0:CLS5:PRINT"PRESS AN
ARROW KEY TO MOVE TO ANOTHER":P
RINT"SECTION OF THE FORM OR":PRI
NT"PRESS <ENTER> TO STAY IN SAME
SECTION"
290 IK$=INKEY$:IF IK$=CHR$(13) T
HEN 240
300 IF IK$=CHR$(8) THEN X0=X0-20
ELSE IF IK$=CHR$(9) THEN X0=X0+
20 ELSE IF IK$=CHR$(10) THEN Y0=
Y0+21 ELSE IF IK$=CHR$(94) THEN
Y0=Y0-21 ELSE 290
310 IF X0<1 THEN X0=1 ELSE IF X0
>41 THEN X0=41 ELSE IF Y0<1 THEN
Y0=1 ELSE IF Y0>43 THEN Y0=43
320 GOTO 240
330 IF PEEK(343)<>191 THEN 390 E
LSE Z=179
340 HCOLOR1,4:HPUT(XX,YY)-(XX+7,
YY+7),1,PSET:Z$=CHR$(Z):CL=X0+X:
RW=Y0+Y:GOSUB100
350 IF INKEY$=CHR$(13) THEN 380
ELSE IF PEEK(343)=247 THEN Z=Z-1
ELSE IF PEEK(344)=247 THEN Z=Z+
1 ELSE 350
360 IF Z<179 THEN Z=223 ELSE IF
Z>223 THEN Z=179
370 GOTO 340
380 Z$=CHR$(Z):GOTO 490
390 IF PEEK(344)=191 THEN HCOLOR
1,4:GOTO 670
400 IF PEEK(343)=247 THEN NX=-1
ELSE IF PEEK(344)=247 THEN NX=1
ELSE IF PEEK(342)=247 THEN NY=1
ELSE IF PEEK(341)=247 THEN NY=-1
410 IF NX<>0 OR NY<>0 THEN 510
420 IK$=INKEY$:IF IK$="" THEN 26
0
430 IF IK$="g" AND PEEK(343)=191
THEN 330
440 IF (IK$="@" AND PEEK(341)=19
1) OR IK$="^" THEN 260
450 IF IK$<>CHR$(12) THEN 480
460 HSCREEN0:CLS5:PRINT"DO YOU W
ANT TO CLEAR FORM (Y/N)?"
470 IK$=INKEY$:IF IK$="Y" OR IK$
="y" THEN 230 ELSE IF IK$="N" OR
IK$="n" THEN 240 ELSE 470
480 IF IK$<" " OR IK$>"z" THEN 2
60 ELSE Z$=IK$
490 IF DP=0 THEN NX=1
500 MID$(LT$(Y0+Y),X0+X,1)=Z$
510 HPUT(XX,YY)-(XX+7,YY+7),1,PS
ET:CL=X0+X:RW=Y0+Y:GOSUB 100:X=X
+NX:Y=Y+NY
520 IF X<0 THEN X=39:Y=Y-1

```

```

530 IF X>39 THEN X=0:Y=Y+1
540 IF Y<0 THEN Y=23
550 IF Y>23 THEN Y=0
560 IF DP=1 THEN MID$(LT$(Y0+Y),
X0+X,1)=Z$ ELSE Z$=MID$(LT$(Y0+Y
),X0+X,1)
570 CL=X0+X:RW=Y0+Y:GOSUB100:GOT
O250
580 HCOLOR1,4:HSCREEN0:CLS5:PRIN
T:PRINT" S = SAVE TO DISK":PRINT
" L = LOAD FROM DISK":PRINT" R =
RETURN TO SAME FORM":PRINT" N =
START NEW FORM":PRINT" X = EXIT
FROM PROGRAM":PRINT"PRESS
S, L, R, N, OR X KEY.":
590 IK$=INKEY$:IF IK$="R" OR IK$
="r" THEN POKE 65497,0:GOTO 240
ELSE IF IK$="N" OR IK$="n" THEN
POKE 65497,0:GOTO230 ELSE IF IK$
="X" OR IK$="x" THEN POKE 65496,
0:PALETTE CMP:CLEAR 500:PRINT:PR
INT:PRINT" GOODBYE":END
600 IF IK$<"S" AND IK$<"L" AND
IK$<"s" AND IK$<"l" THEN 590
ELSE CLS
610 PRINT:PRINT"ENTER FILENAME:
":LINEINPUT F$:IF LEN(F$)>8 THE
N PRINT" TOO LONG - REDO":GOTO6
10
620 POKE 65496,0:F$=F$+"/FMI":OP
EN"D",#1,F$,1:FIELD#1,1 AS A$:R=
1:IF IK$="L" OR IK$="l" THEN 650
630 PRINT"SAVING ":F$:FOR B=1 TO
66:LOCATE0,4:PRINT"LINE":B
640 FOR I=1 TO 80:LSET A$=MID$(L
T$(B),I,1):PUT#1,R:R=R+1:NEXT I,
B:CLOSE:GOTO580
650 PRINT"LOADING ":F$:FOR B=1 T
O 66:LOCATE0,4:PRINT"LINE":B
660 FOR I=1 TO 80:GET#1,R:R=R+1:
MID$(LT$(B),I,1)=A$:NEXT I,B:CLO
SE:X0=1:Y0=1:DO=0:POKE 65497,0:G
OTO240
670 HCOLOR1,4:HSCREEN0:CLS5:PRIN
T:PRINT"DO YOU WANT TO PREVIEW F
ORM (Y/N)?"
680 IK$=INKEY$:IF IK$="N" OR IK$
="n" THEN 750 ELSE IF IK$<"Y" A
ND IK$<"y" THEN 680
690 PRINT:PRINT"PRESS <ENTER> TO
CONTINUE AFTER EACH SECTIO
N OF THE FORM.":FOR B=1 TO 250*5
:NEXTB
700 X0=1:FOR Y0=1 TO 43 STEP21:H
SCREEN4
710 FOR Y=0 TO 23:RW=Y0+Y:IF LT$(
RW)=STRING$(80,32) THEN 730
720 FOR X=0 TO 79:CL=X0+X:Z$=MID
$(LT$(RW),CL,1):GOSUB100:NEXTX
730 NEXTY:SOUND10,5:SOUND150,3
740 IK$=INKEY$:IF IK$<>CHR$(13)
THEN 740 ELSE NEXT Y
750 HSCREEN0:CLS5:PRINT:PRINT"PR
INT FORM (Y/N)?:":X0=1:Y0=1:DP=0
760 IK$=INKEY$:IF IK$="N" OR IK$
="n" THEN 240 ELSE IF IK$<"Y" A
ND IK$<"y" THEN 760
770 CLS5:PRINT:PRINT"READY PRIN
TER AND SELECT BAUD RATE.":PRINT"
1) 300 BAUD":PRINT" 2)
600 BAUD":PRINT" 3) 1200 BAUD
":PRINT" 4) 2400 BAUD":PRINT"
5) 4800 BAUD":PRINT" 6) 9
600 BAUD"
780 IK$=INKEY$:IF IK$<"1" OR IK$
>"6" THEN 780
790 POKE 65496,0:ON VAL(IK$) GOT

```

```

0 800,810,820,830,840,850
800 POKE150,180:GOTO860
810 POKE150,87:GOTO860
820 POKE150,41:GOTO860
830 POKE150,18:GOTO860
840 POKE150,7:GOTO860
850 POKE150,1
860 PRINT#-2,CHR$(27):"U1":UNDI
RECTIONAL PRINTING
870 FOR B=1 TO 66:PRINT"PRINTING
LINE":B
880 IF LT$(B)=STRING$(80,32) THE
N PRINT#-2,CHR$(13): ELSE PRINT#
-2,LT$(B)
890 NEXTB:GOTO580
900 DATA 24,24,24,24,24,24,24,24
910 DATA 24,24,24,24,248,24,24,2
4
920 DATA 24,24,248,24,248,24,24,
24
930 DATA 54,54,54,54,246,54,54,5
4
940 DATA 0,0,0,0,254,54,54,54
950 DATA 0,0,248,24,248,24,24,24
960 DATA 54,54,246,6,246,54,54,5
4
970 DATA 54,54,54,54,54,54,54,54
980 DATA 0,0,254,6,246,54,54,54
990 DATA 54,54,246,6,254,0,0,0
1000 DATA 54,54,54,54,254,0,0,0
1010 DATA 24,24,248,24,248,0,0,0
1020 DATA 0,0,0,0,248,24,24,24
1030 DATA 24,24,24,24,31,0,0,0
1040 DATA 24,24,24,24,255,0,0,0
1050 DATA 0,0,0,0,255,24,24,24
1060 DATA 24,24,24,24,31,24,24,2
4
1070 DATA 0,0,0,0,255,0,0,0
1080 DATA 24,24,24,24,255,24,24,
24
1090 DATA 24,24,31,24,31,24,24,2
4
1100 DATA 54,54,54,54,55,54,54,5
4
1110 DATA 54,54,55,48,63,0,0,0
1120 DATA 0,0,63,48,55,54,54,54
1130 DATA 54,54,247,0,255,0,0,0
1140 DATA 0,0,255,0,247,54,54,54
1150 DATA 54,54,55,48,55,54,54,5
4
1160 DATA 0,0,255,0,255,0,0,0
1170 DATA 54,54,247,0,247,54,54,
54
1180 DATA 24,24,255,0,255,0,0,0
1190 DATA 54,54,54,54,255,0,0,0
1200 DATA 0,0,255,0,255,24,24,24
1210 DATA 0,0,0,0,255,54,54,54
1220 DATA 54,54,54,54,63,0,0,0
1230 DATA 24,24,31,24,31,0,0,0
1240 DATA 0,0,31,24,31,24,24,24
1250 DATA 0,0,0,0,63,54,54,54
1260 DATA 54,54,54,54,255,54,54,
54
1270 DATA 24,24,255,24,255,24,24,
24
1280 DATA 24,24,24,24,248,0,0,0
1290 DATA 0,0,0,0,31,24,24,24
1300 DATA 255,255,255,255,255,25
5,255,255
1310 DATA 0,0,0,0,255,255,255,25
5
1320 DATA 240,240,240,240,240,24
0,240,240
1330 DATA 15,15,15,15,15,15,15,1
5
1340 DATA 255,255,255,255,0,0,0,
0

```



by Bryan Stephens

**B**usiness tools come in all shapes and sizes, and the ability to view financial data in graphics form is a tool few businesses can do without. The three-dimensional bar graph program *3DGraph* is one in which up to 52 bars can be plotted. The width of the bars varies in size according to the total number of bars created. The program includes an option that expands the graph, giving it greater resolution; this too depends upon the variables. Also provided is a means to print the graph on your printer.

Operation of *3DGraph* is straightforward. It does three things:

Plots up to 52 points -- type a number and then press ENTER to go on to the next number. When finished, enter -1. The program then transfers control to the plotting routine. There is an automatic cut-off point at 52 bars.

Expands the graph -- the results you get depend upon the numbers plotted, but the lowest number is reconfigured to 0 with the others scaled appropriately.

Prints out either or both graphs (as in the sample printout). You will need a printer with graphics capabilities. If you have

a Radio Shack DMP (I have a DMP-130), there should be no errors. For those of you with other printers, the codes used are in the following lines:

102 -- tells the printer to repeat the subsequent **CHRS** code six times.

104 -- **CHRS(18)** sets the Graphics mode, **CHRS(30)** resets the printer for WP mode, and **CHRS(20)** tells the printer to use the Condensed mode.

106 -- positions the print head to a particular column.

108 -- the line feed code. In this case the linefeed is set to equal  $1/216$  inch.

#### Programming Notes

Line 100 contains the slow-down poke and sets the baud rate (the speed at which the computer sends data to the printer). In this program 18 (2400 baud) is used, but if the high-speed poke is left set, just divide the baud rate in half, i.e., 40 (1200 baud). Further information on baud rates can be found on Page 24 in the April 1987 issue of *THE RAINBOW*.

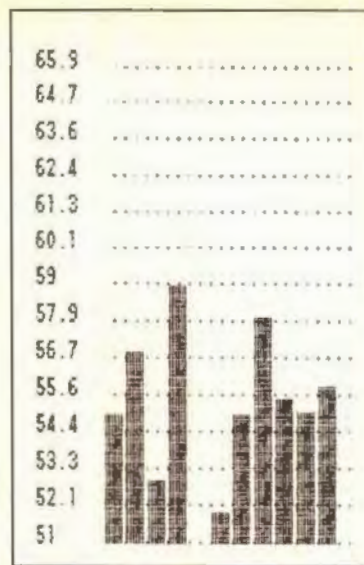
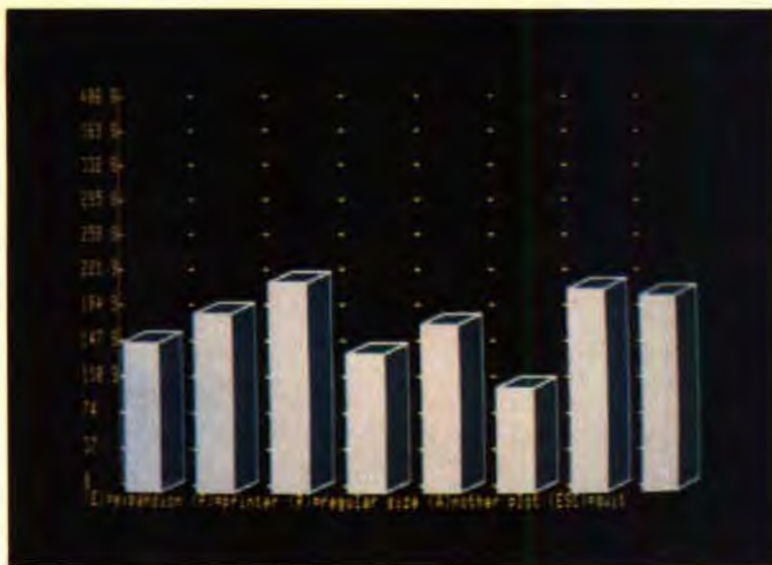
Lines 110 through 114 contain an error trap to see if the printer is online and also a routine to change screens and return without clearing the **HSCREEN** (taken from Page 52 in the May 1987 issue of *THE RAINBOW*).

#### Hardware Needed

This program was designed using a CoCo 3, a CM-8 monitor, a DMP-130 printer and a disk drive. You'll need everything but the disk drive to run *3DGraph*. The program can be adapted for other CoCos using **PMODE4** graphics, but the number of bars will be reduced.

---

*Bryan Stephens lives on the west coast of Canada. Working as a self-employed handyman gives him time to pursue his interest in computers. He has been working with the CoCo 3 for three years. He may be contacted at 43140 Government Road, Apt. 303, Brackendale, B.C., V0N 1H0 Canada.*



CoCo 3



16	.....	0
30	.....	210
52	.....	189
70	.....	157
82	.....	160
98	.....	41
114	.....	121
124	.....	220
136	.....	179
END	.....	49

**The Listing: 3DGRAPH**

```

0 * COPYRIGHT 1990 FALSOFT, INC
2 CLEAR7000
4 DIM P(52),V$(13)
6 ON BRK GOTO144
8 RGB:WIDTH40:CLS4:ATTR3,3
10 PRINT"This is 3-D Graphing pr
ogram. There are three main opti
ons to it."
12 PRINT:PRINT"1)Regular size gr
aph":PRINT"2)Expanded scale grap
h"
14 PRINT"3)Printing of either ty
pe of graph"
16 PRINT:PRINT"***Note that you c
an plot from 1-31 points (r
ange=0 to 99999) use -1 to end"
18 A=1
20 LOCATE0,15:PRINT"Enter numbe
r ":LOCATE13,15:PRINTA:LOCATE16,
15:PRINT"to plot":INPUT P(A):LO
CATE24,15:PRINT"
22 IF P(A)<0AND A=1THEN20
24 IF P(A)=-1 THEN A=A-1:GOTO30
26 IF P(A)>99999 OR P(A)<0THEN 2
0
28 A=A+1:IF A>52THEN A=A-1:GOTO3
0ELSE20
30 ***** INITIALIZING *****
32 SM=P(1):LG=P(1):FOR Q=1TO A:I
F P(Q)>LG THEN LG=P(Q)
34 IF P(Q)<SM THEN SM=P(Q)

```

```

36 NEXT Q=0-1:FL=1
38 EX=0:Z=-2:IF LG=0THEN RUN
40 Y2=(53-Q)*2:SC=(180-Y2)/LG:PC
=(182-Y2)/LG
42 G=(295/Q)*2:G2=G/2
44 ***** SET SCREEN *****
46 HSCREEN4:HCOLOR1:PALETTE3,63:
PALETTE2,3:PALETTE0,0
48 ON BRK GOTO 144
50 POKE65497,0
52 HLINE(40,0)-(40,180),PSET
54 FOR L=180 TO 0 STEP-16
56 V=(180-L)/SC+EX:IF V<1000THEN
V=INT(V/.1+.5)*.1ELSE V=INT(V+.
5)
58 V$=STR$(V):U=LEN(V$):V$=RIGHT
$(V$,U-1):A=A+1
60 HPRINT(0,L/8),V$
62 FOR B=44TO630STEP G:HLINE(B-4
,L)-(B,L),PSET:NEXT
64 NEXT
66 HPRINT(0,23),"<E>-expansion <
P>-printer <R>-regular size <A>n
other plot <ESC>-quit"
68 ***** PLOT BARS *****
70 A=1
72 FOR X=44TO630STEP G:Y=INT(180
-P(A)*SC+.5):HCOLOR3
74 IF X>630THEN08
76 HLINE(X,183)-(X+G2,Y),PSET,BF
78 HLINE(X,Y)-(X+G2*.66,Y-G2*.13
),PSET:HLINE(X+G2,Y)-(X+G2+G2*.6
6,Y-G2*.13),PSET:HLINE(X+G2,183)
-(X+G2+G2*.66,183-G2*.13),PSET'/
//lines
80 HLINE(X+G2*.66,Y-G2*.13)-(X+G
2+G2*.66,Y-G2*.13),PSET:HLINE(X+
G2+G2*.66,183-G2*.13)-(X+G2+G2*.
66,Y-G2*.13),PSET
82 HPAINT(X+G2,Y-1),2,3
84 HPAINT(X+G2+1,181),2,3
86 A=A+1:NEXT
88 A$=INKEY$:IF A$="P"THEN98ELSE
IF A$="R"THEN96ELSE IF A$="A"TH
EN HSCREEN0:RUN
90 IF A$<>"E"THEN88
92 IF FL=2THEN88ELSE HCLS:FOR A=
1TO Q:P(A)=P(A)-SM:NEXT:LG=LG-SM
:EX=SM:IF LG=0THEN LG=1

```

```

94 FL=2:GOTO40
96 IF FL=1THEN88ELSE FOR A=1TO Q
:P(A)=P(A)+SM:NEXT:LG=LG+SM:FL=1
:GOTO38
98 ***** PRINTER ROUTINE *****
100 POKE65496,0:POKE150,18
102 R$=CHR$(28)+CHR$(6)
104 G$=CHR$(18):N$=CHR$(30)+CHR$
(27)+CHR$(20)
106 P$=CHR$(27)+CHR$(16)
108 L$=CHR$(27)+CHR$(51)
110 SP=PEEK(65314)AND1
112 IF SP=0THEN PLAY"V2:L100:C":
POKE &HE6E4,&HE6:HSCREEN0:POKE &
HE6E4,&HE7:WIDTH40:ATTR2,3:PRINT
"TURN THE PRINTER ON !!!":GOTO11
0ELSE116
114 A$="" :POKE &HE6E4,&HE6:HSCRE
EN4:POKE &HE6E4,&HE7
116 D=0:FOR A=182TO0STEP-14:V=(1
82-A)/PC:IF V<1000THEN V=INT(V/.1
+.5)*.1ELSE V=INT(V+.5)
118 V$=STR$(V+EX):U=LEN(V$):V$(0
)=RIGHT$(V$,U-1):D=D+1:NEXT
120 D=14:FOR A=0TO26
122 IF A/2=INT(A/2)THEN D=D-1:PR
INT#Z,N$::PRINT#Z,USING"% %"
:V$(D)::PRINT#Z,STRING$(Q*2+1,"
");
124 T=1:FOR J=45TO(Q*14+35)STEP1
4
126 IF J>255THEN F1=INT(J/256):F
=J+1-F1*256ELSE F1=0:F=J
128 YY=INT(182-P(T)*PC+.5):IF A*
7<YY OR YY>181THEN NN=0:GOTO138
130 IF A*7=YY THEN NN=128:GOTO13
6
132 IF A*7>YY+7 THEN NN=255:GOTO
136
134 NN=0:D2=7-(A*7-YY):FOR K=D2
TO 6:NN=NN+INT(2^K):NEXT:NN=NN+1
28
136 PRINT#Z,N$,P$:CHR$(F1):CHR$(
F):G$:R$:CHR$(NN):
138 T=T+1:NEXT:PRINT#Z,G$:L$:
140 T=0:NEXT
142 POKE65497,0:GOTO88
144 HSCREEN0:RGB:WIDTH40:POKE654
96,0:END

```

NEW!

# Window Writer 1.2

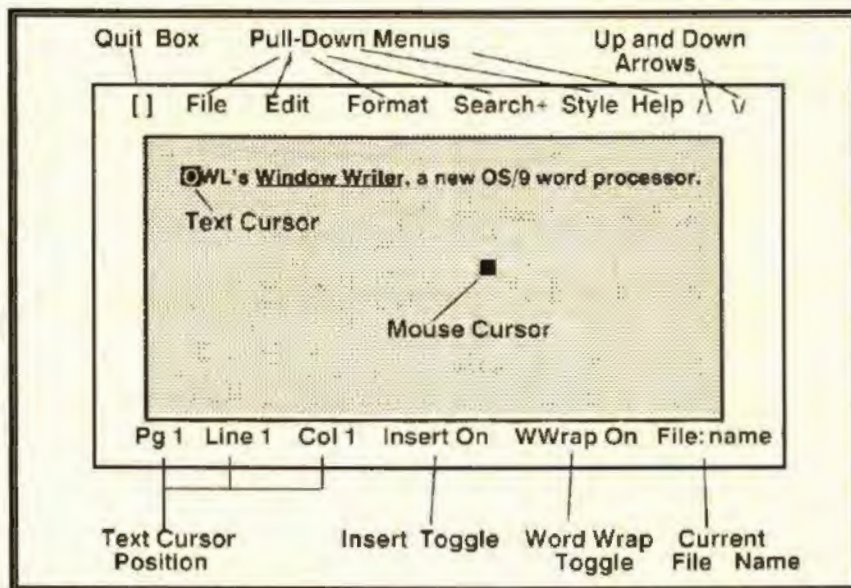
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(or joystick) or can be accessed by control keys.

(or joystick) or can be accessed by control keys.

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## Hi-Res Display

Window Writer uses an 80-column monitor display screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

## Ram Disk

A RAM disk is set up in Window Writer to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. Window Writer's clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

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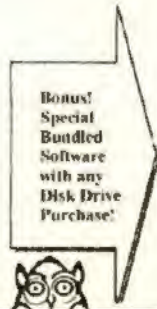
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# Completing the Analyzer Project

by Dennis H. Weide

**L**ast month we covered the design of the CoCo Digital Logic Analyzer and started its construction. This month we'll finish up with the final construction, testing and programming of it. Let's start with the input and the memory circuit.

## Input and Memory Circuit

The input and memory circuit (shown in Figure 1) consists of three chips. IC11 (74LS244) buffers the input from the circuit under test. It is controlled by the HALT lead connected to pins 1 and 19. When the HALT lead goes high, IC11 goes to the high impedance state to prevent overwriting memory.

IC12 and IC13 are 8-bit by 2048-byte static random access memories (SRAMs). Although more costly than dynamic RAM, SRAM is much easier to use when designing your own peripheral circuitry. The 40-pin DIP socket shown in Figure 1 connects the analyzer to the interface circuit by means of a ribbon cable.

Figures 1 and 2 show the address and data buses as single lines to simplify the drawings. The data bus is actually eight separate wires designated D0 through D7. The address bus is actually 13 separate



**Photo 1. Top View of Analyzer Circuit Board**

A. 40-pin DIP socket; B. IC12 Lo RAM; C. IC13 Hi RAM; D. TTL crystal oscillator; E. Resistors mounted on board; AA. Input, trigger and indicator connector.

wires designated A0 through A12. When wiring the circuits, connect all D0 leads together, all D1 leads together, etc. Do not connect D0 lines to any other data lines. This holds true for all data and address bus lines.

As with the interface circuit, construction of the input and memory circuit should be easy. Use the same method you chose for the interface circuit and follow the same rules for supply and ground leads. Figures

1 and 2 should be constructed on the same circuit board. Photo 1 shows the input and memory circuit and the timing and trigger circuit mounted on the circuit board inside the analyzer case. Photo 2 shows the same view with the ribbon cable installed. Photo 3 shows a close-up view of the test probes connected to the eight data inputs, three trigger inputs, and analyzer ground. Table 1 is the parts list for the input and memory circuit.

*Dennis Weide is a communications technician for AT&T. His hobbies include designing, building and programming computer peripherals for disabled persons. He may be contacted at 14201 Marquette N.E., Albuquerque, NM 87123. Please enclose an SASE when requesting a reply.*



# DIGITAL LOGIC ANALYZER INPUT & MEMORY CIRCUIT

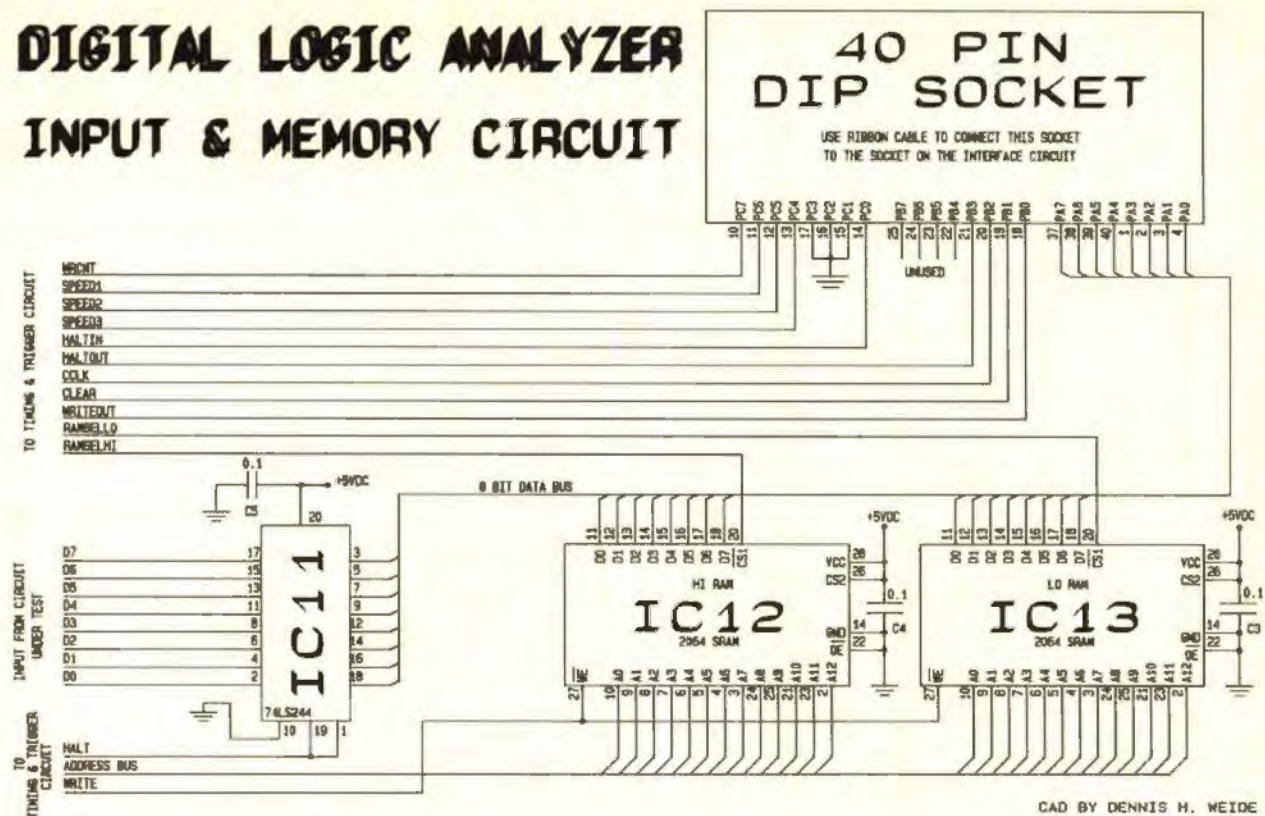


Figure 1



Photo 2. Top View of Analyzer Showing Ribbon Cable

## Timing and Trigger Circuit

The timing and trigger circuit is shown in Figure 2. Again, use the same methods and guidelines previously mentioned when constructing this circuit. All LED indica-

tors are shown in this figure. The address bus is shown as a single line in this schematic also. Table 2 shows the bus-to-chip assignments for the timing and trigger circuit address bus.

After you've built the circuits shown in Figure 3 from last month (the interface circuit) and figures 1 and 2, your analyzer is ready for testing. You may have noticed that the schematics for figures 1 and 2 have no power provided to them. I used an inexpensive AC-to-DC adapter with an output of 5 volts at 500 milliamps. If you can't find one, you can use a 9-volt adapter with a 7805 regulator chip to provide the proper voltage. Four C size nicad batteries will also work very well and may be your best choice. Table 3 is the parts list for the timing and trigger circuit.

When the analyzer is completely wired and inspected, you can test it. With all ICs and the TTL oscillator removed from their sockets, apply power to the circuit and measure the voltage at pins 14 (+5VDC) and 7 (GND) of IC1. A reading greater or less than +5 volts indicates a wiring error. Recheck all your work before proceeding. Once you measure the proper voltage, follow the steps below to test the clock circuit, clock rate selector, clock source selector, and address generator. This test also does a check of the HALT and RAM SELECT leads. The hardware tested consists of the TTL oscillator and IC4 through IC9.





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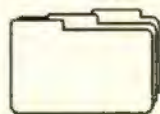
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Part #	Description
IC11	74LS244
IC12-IC13	2064 Static RAM
C3-C5	.1 MFD
Misc	PC board, wirewrap sockets, wire, 40-pin DIP wirewrap socket

Note: For 10 MHz operation, SRAM chips must have an access speed of 100 ns or faster.

Table 1. Input & Memory Circuit Parts List

Bit	IC#	Pin
A0	6	3
A1	6	2
A2	6	6
A3	6	7
A4	7	3
A5	7	2
A6	7	6
A7	7	7
A8	8	3
A9	8	2
A10	8	6
A11	8	7
A12	9	3

Table 2. Address Bus-to-Chip Connections for Figure 2.

Part #	Description
IC1	74LS20
IC2,IC3	74LS00
IC4	74161
IC5	74151
IC6-IC9	74193
C1-C6	.1 MFD
C7	1 MFD
C8-C13	.1 MFD
CR1-CR8	Red LED
R1-R6	330 ohm, 1/4 Watt
R7	10 megohm, 1/4 Watt
R8	330 ohm, 1/4 Watt
Misc	PC board, IC sockets, wire, TTL oscillator (10MHz; available from Jameco)

Table 3. Timing & Trigger Circuit Parts List

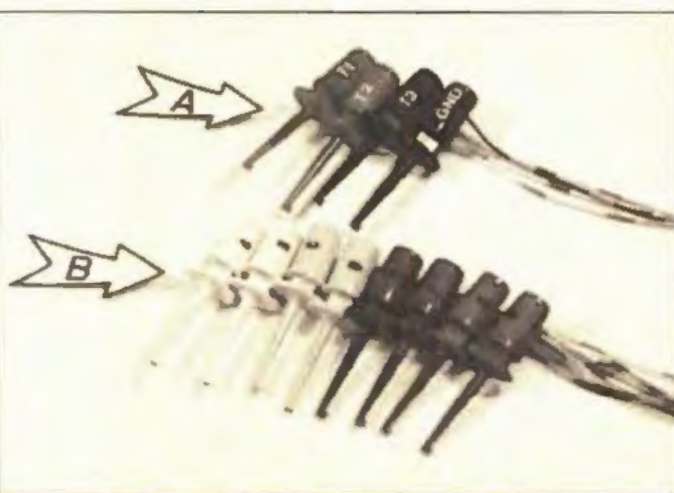


Photo 3. Analyzer Test Inputs

A. Trigger inputs 1 through 3 and ground; B. Data inputs A through H (bits 0 through 7).

### Test 1

1 — Be sure power is off. Plug the TTL oscillator and IC4 through IC9 into their respective sockets.

2 — Connect the logic indicator (from last month) to the analyzer board per Table 4.

3 — Connect Pin 4 of IC2 to logic High.

4 — Connect Pin 8 of IC2 to Pin 5 of IC6.

5 — Connect Pin 14 of IC9 to logic High.

6 — Plug the interface circuit into the CoCo ROM port. (Be sure power is off.)

7 — Connect interface circuit to the analyzer using 40-pin ribbon cable.

8 — Turn CoCo power on.

9 — POKE &HFF43, 145 and press ENTER to program the 8255 PPI chip.

10 — POKE &HFF42, X (where X is the value listed in Table 5).

11 — Refer to Table 5 for LED indications. H designates High. L designates Low.

12 — If results obtained in Step 11 are

correct, remove the logic High from Pin 14 of IC9. The following sequence of events should occur:

A. Probes 4, 5 and 6 should remain in the same state as shown in Table 5.

B. Probes 2 and 3 should flash until Probe 1 goes High.

C. When Probe 1 goes High, probes 2 and 3 should go Low.

Repeat the procedure from step 10 for each value of X shown in Table 5. Each successive test should cause probes 1, 2 and 3 to flash at a rate slower than the previous test.

After the analyzer has passed this test, proceed to the address generator and trigger circuit test shown below:

### Test 2

1 — With all power off, unplug the ribbon

Probe	IC#	Pin#
1	9	6
2	9	2
3	9	3
4	5	9
5	5	10
6	5	11
7	n/c	
8	n/c	
+5v	12	26
GND	12	7

Table 4. Logic Indicator Connections to Analyzer Circuit for Test 1

X Value	Probes								Freq KHZ
	1	2	3	4	5	6	7	8	
0	L	L	L	L	L	L	X	X	1000 (1MHZ)
16	L	L	L	L	L	H	X	X	500
32	L	L	L	L	L	L	X	X	250
48	L	L	L	L	L	H	X	X	125
64	L	L	L	L	L	L	X	X	62.5

Note: X=DON'T CARE

**Table 5. Logic Indicator Results When Value X is Poked into Address \$FF42**

cable from the analyzer board.

2 — Connect the logic indicator to the analyzer board as shown in Table 6.

3 — Connect Pin 11 of IC4 to Pin 5 of IC2 using a clip cord.

4 — Set the clock source switch to the OCLK position.

5 — Remove the following ICs from their sockets: IC1, IC3, IC11, IC12, IC13.

6 — Connect Pin 2 of IC10 to a logic High.

7 — Connect Pin 14 of IC9 to ground.

8 — Turn the analyzer power on. All logic indicators should be Low. If not, momentarily remove the ground from Pin 14 of the IC9.

9 — When all logic indicators indicate Low, momentarily ground Pin 2 of IC13.

10 — Probe 8 should go High and probes 7 through 1 should count in binary (each LED should flash once for every two flashes of the LED to its right). When Probe 1 goes High, probes 2 through 7 should go Low. Then Probe 8 should go High.

11 — Repeat from Step 8 until satisfied that the circuit works correctly.

This test checks the ENABLE gate generated by the 555 timer (IC10), the TTL oscillator, the countdown circuit (IC4), the address generator (IC6-IC9), and the HALT

circuit, which is part of IC2.

### The Programs

Now that you've built and debugged your analyzer hardware, it's time to tackle the software. Program Listing 1 is the BASIC program required to use the analyzer. I'll just cover it briefly.

Line 140 clears the necessary string memory and protects the addresses where the machine language programs will be located. It also sets the printer baud rate and programs the 8255 PPI internal register for use by the analyzer. The value poked into the internal register determines which ports are inputs and which are outputs.

Lines 180 through 200 contain the data for the three machine language programs used to speed up data processing. Program listings 2, 3 and 4 are the source code for these programs. It's not necessary to type them into the computer. Lines 210 through 290 poke the machine language data into memory. The program listings are shown here for your information only.

Lines 300 through 320 create the strings necessary for drawing the screen reference information.

Several commands (listed in Table 7) are included in the program. They are shown below with a brief explanation. Each com-



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Logic Probe	IC#	Pin#	Lead Desig.
1	8	3	A8
2	8	2	A9
3	8	6	A10
4	8	7	A11
5	9	3	A12
6	9	2	A13
7	9	6	A14
8	10	3	ENABLE
+5V	10	8	VCC
GND	10	1	GND

Table 6. Logic Indicator Connections

Key to Press	Function
A	Again - start a new test
C	Cursor - add cursor to screen
E	Erase - erase last cursor increment
I	Increment - select cursor increment
T	Timeslot - select a new time slot
X	Exit - exit basic program
Left Arrow	Move Left - move cursor left
Right Arrow	Move Right - move cursor right

Table 7. Commands

Test Lead	ROM Pin	Lead Desig.
T3	36	SCS
A	36	SCS
B	18	R/W
C	6	E CLK
D	19	A0
E	20	A1
F	10	D0
G	11	D1
H	12	D2
GND	33	GND

Table 8. Analyzer Test Connections

FACTOR Variable	\$3BAD
TIMESLOT Variable	\$3BAE - \$3BAF
ZEROBUF.ASM	\$3BBO - \$3BBB
MOVESRAM.ASM	\$3BCO - \$3BDF
FACTOR.ASM	\$3BE6 - \$3BFA
Display Buffer	\$3COO - \$3CEF
DRAM Buffer	\$3DOO - \$7CFF

Table 9. Program, Variable and Buffer Locations

mand requires pressing only a single key to execute it.

The Again command allows you to start a complete new test by pressing the A key once. All analyzer and CoCo buffers are erased and the analyzer is reset for a new test. You are prompted for all the necessary information again.

The Cursor command places a cursor (vertical line) at the center of the screen when the C key is pressed. The cursor can be used to compare traces or for measuring timeslots. Multiple cursors can be placed on the screen by pressing C once for each new cursor.

The Erase command erases the last cursor displayed on the screen when the E key is pressed. Once an additional cursor has been placed on the screen, all cursors previously displayed cannot be moved or erased.

The Increment command toggles the cursor increment value. The initial increment value is set at 1. Each time the arrow key is pressed, the cursor moves one timeslot. When the I key is pressed, the increment value changes to 10. Therefore, each time the cursor is moved, it moves ten timeslots. The increment value can be toggled back and forth by pressing I.

The Timeslot command returns the program to the text screen and prompts you for the new timeslot each time the T key is pressed. This allows you to view different areas of the collected data. The timeslot command only affects the screen display and has no effect on data already collected.

The Exit command exits the BASIC program by pressing the X key. You can restart the program where you left it by typing CONT and pressing ENTER.

The left arrow moves the cursor left by the amount of the increment value each time the key is pressed. The right arrow moves the cursor to the right in a similar fashion.

### A Sample Display

Now let's see what a screen display looks like. Figure 3 is a printout of the actual screen display for the final test of the Digital Logic Analyzer. Eight traces of data are displayed on the screen at one time. The lead that corresponds to each trace is shown on the left of the screen (letters A through H). The values 0 and 1 shown indicate the Low (0) and High (1) logic levels. As an example, on the A trace, the trace starts out low then almost immediately jumps high for one pulse and returns low again for a longer period.

The bottom line of the screen displays the starting timeslot (shown as 00000), the cursor increment value (shown as 01), the cursor timeslot (shown as 00144) and the end timeslot (shown as 00239). The vertical line from the top to the bottom of the screen is the cursor position, currently at Timeslot 144.

### Final Testing of the Analyzer

Before we can assume the analyzer is useful, it must be tested on a circuit that produces known results. Therefore, we'll test it using another CoCo and compare the results with information provided in the CoCo service manual.

Addresses \$FF40 through \$FF5F are for use with the ROM port. Whenever the CoCo reads or writes to any address in this range, it sets the SCS lead low during the operation. To test the analyzer circuitry, we'll use a program that repeatedly writes all ones (255) to Address \$FF40. Since BASIC is an extremely slow language, the test program must be written in machine language. Program Listing 5 is a BASIC program that pokes a short ML program into memory and executes it. Program Listing 6 is the source code for the BASIC version in Listing 5.

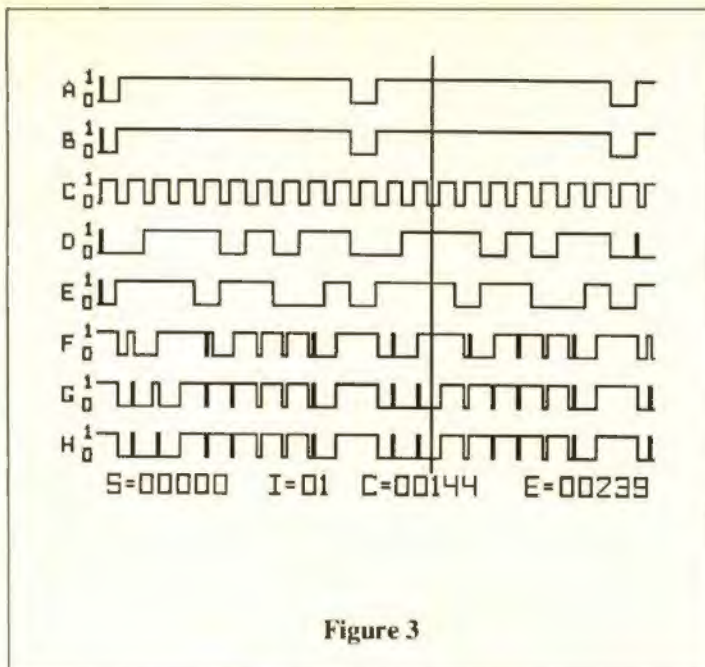


Figure 3

### Analyzer Verification Tests

If you don't have a second CoCo available to you, you can use any TTL circuit that will produce known results for comparison. Follow the steps listed below if you want to verify your analyzer using my method.

- 5 — Connect the analyzer trigger and data leads to the ROM port pins of CoCo B as per Table 8.
- 6 — Turn on CoCo B power.
- 7 — Key Listing 5 into CoCo B. Do not run it yet.
- 8 — Run the program in CoCo A and select

### Analyzer Test Procedure

Note: For the purpose of this test, the CoCo used as the analyzer processor is called CoCo A. The CoCo used as the test circuit is called CoCo B.

- 1 — All power should be off. Plug the analyzer ROM pack into the CoCo A ROM port.
- 2 — Turn on analyzer power.
- 3 — Turn on CoCo A power.
- 4 — Load analyzer program from cassette into CoCo A.

- zero (0) for the clock speed prompt if you are using a 10 MHz TTL oscillator chip.
- 9 — Set the analyzer clock source selector switch to the OCLK position per the CoCo A prompt. On the analyzer, the OCLK, CLEAR and LO RAM LEDs should be lighted.
- 10 — On CoCo A, press ENTER. The OCLK, Write and LO RAM LEDs should now be lighted on the analyzer.
- 11 — Run the program in CoCo B. The analyzer will trigger when the SCS lead goes Low. The following LED indications will take place. This may happen very fast and you may have to execute several tests to verify all conditions.

- Enable will light
- Lo RAM will extinguish
- Hi RAM will light
- Halt will light
- Clear will light
- Hi RAM will extinguish
- Lo RAM will light
- Enable will light
- CoCo A will display a System Halt Detected message

- 12 — On analyzer, set clock source selector to CCLK per CoCo A prompt. CCLK, CLEAR and LO RAM should be lighted.



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*Editor's Note: The assembly language listings presented are for reference only and will not appear on RAINBOW ON DISK/TAPE.*

✓	190	.....	40
	290	.....	72
	350	.....	220
	410	.....	119
	530	.....	78
	600	.....	34
	720	.....	148
	800	.....	206
	920	.....	230
	1030	.....	102
	1160	.....	220
	1320	.....	142
	1450	.....	82
	1580	.....	122
	1710	.....	29
	1830	.....	205
	END	.....	210

### Listing 1: ANALYZER

```

0 * COPYRIGHT 1990 FALSOFT, INC
100 * DIGITAL LOGIC ANALYZER
110 * BASIC PROGRAM
120 * WRITTEN BY DENNIS H. WEIDE
130 *
140 CLEAR 150, &H3800: POKE 150, 1: PO
KE &HFF43, 145: 'PROGRAM 8255
150 CLS: PRINT "DIGITAL LOGIC ANA
LYZER PROGRAM"
160 PRINTTAB(7) "BY DENNIS H. WEI
DE"
170 DIM GR(20), BL(5), B1(13)
180 DATA 4F, 8E, 3D, 0, A7, 80, 8C, 7C,
FF, 2F, F9, 39
190 DATA 8E, 3D, 0, 4F, B7, FF, 41, B6,
FF, 40, A7, 80, 86, 4, B7, FF, 41, 4F, B7,
FF, 41, B6, FF, 40, A7, 80, 8C, 7C, FF, 2F
, ED, 39
200 DATA BE, 3B, AE, 10, 8E, 3C, 0, B6,
3B, AD, A4, 80, A7, A0, 10, 8C, 3C, EF, 2F
, F3, 39
210 FORX=&H38B0 TO &H38BB
220 READ A$: A$="&H"+A$
230 POKE X, VAL(A$): NEXT X
240 FORX=&H38C0 TO &H38DF
250 READ A$: A$="&H"+A$
260 POKE X, VAL(A$): NEXT X
270 FORX=&H38E6 TO &H38FA
280 READ A$: A$="&H"+A$
290 POKE X, VAL(A$): NEXT X
300 FORX=0 TO 9: READ N$(X): NEXT
310 DATA UBR5D8NL5BR3, R2LU8NGBR4
8D8, NR5UE5U2L5NDR5BR3BD8, NUR5U4N
L4U4L5DUBR8BD8, BU4NU4R5U4D8BR3
320 DATA UDR5U5L5U3R5BR3BD8, R5U4
L5D4UR5D8BR3BD7, UE5U2L5NDR8BD8,
NR5U4NR5U4R5D8BR3, NUR5U8L5D4R5BR
3BD4
330 EXEC &H38B0: POKE &HFF41, 2: 'ZER
OBUF & CLR FF
340 PRINT: PRINTTAB(7) "ENTER CLOC
K SPEED": PRINT
350 PRINTTAB(10) "0. DIV BY 1": PR
INTTAB(10) "1. DIV BY 2": PRINTTAB
(10) "2. DIV BY 4": PRINTTAB(10) "3
. DIV BY 8": PRINTTAB(10) "4. DIV
BY 16"
360 PRINTTAB(10) "": INPUT "SPEED
>": S
370 S$="&H"+HEX$(S)+"0": S=VAL(S$
): POKE &HFF42, S+128
380 PRINT: PRINTTAB(7) "SET SWITCH
TO OCLK"
390 PRINTTAB(5) "": LINEINPUT "PRE
SS <ENTER> TO BEGIN": B$
400 POKE &HFF41, 9: 'ENABLE FF & SR
AM WRITE
410 I$(1)="BM104,190:NR5U8R5D8BR
3R2LU8G"
420 I$(2)="BM104,190:R2LU8NGBR4R
5D8L5U8"
430 '
440 ' CALCULATE START OF TRACE
450 '
460 FORX=0 TO 7
470 P$(X)="BM15, "+STR$(22*X+20)+
", "
480 NEXT X
490 '
500 ' WAIT FOR HALT & ENTER INFO
510 '
520 IF PEEK(&HFF42) AND 1 THEN 530 ELSE
520: 'CHECK FOR HALT
530 POKE &HFF42, S: CLS: PRINT: PRINT
TAB(6) "SYSTEM HALT DETECTED": PRI
NT: PRINT
540 POKE &HFF41, 2: FORX=1 TO 1000: NE
XT: 'CLR SRAM WRITE & FF
550 PRINTTAB(7) "SET SWITCH TO CC
LK"
560 PRINTTAB(9) "PRESS <ENTER>":
570 LINEINPUT B$: EXEC &H38C0: 'MOVE
SRAM TO DRAM
580 PRINT: PRINTTAB(6) "": LINEINP
UT "ENTER TIME SLOT>": TS$: TS=VAL(
TS$)
590 IFTS<0 OR TS>16144 THEN TS=16144
600 PMODE4, 1: PCLS5: COLOR0: POKE 65
495, 0
610 GET(10, 10)-(23, 20), BL, G
620 GET(143, 181)-(182, 191), B1, G
630 '
640 ' DRAW A-H INPUT DESIGNATION
S
650 '
660 DRAW "BM0, 18: U4E2F2D4U2L4"
670 DRAW "BM0, 40: U6R3D3NL3RD3L4"
680 DRAW "BM0, 62: R4NUL4U6R4D"
690 DRAW "BM0, 84: U6R3FD4GL3"
700 DRAW "BM0, 106: NR4U3NR3U3R4"
710 DRAW "BM0, 128: U3NR3U3R4"
720 DRAW "BM0, 150: R4U2NLD2L4U6R4D
"
730 DRAW "BM0, 172: U6BR4D3NL4D3"
740 DRAW "BM20, 190: NR5U4L5U4R5DB
D2BR3R3BD2L3"
750 DRAW "BM90, 190: R4L2U8NL2R2BR3
BD3R3BD2L3"
760 DRAW "BM200, 190: NR5U4NR4U4R5B
R3BD3R3BD2L3"
770 DRAW "BM130, 190: R5UDL5U8R5DBR
3BD2R3BD2L3"
780 DRAW "BM144, 190: " : T=0: GOSUB 13
90
790 DRAW "BM34, 190: " : T=TS: GOSUB 13
90
800 DRAW "BM215, 190: " : T=TS+239: GO
SUB 1390
810 I=-1: DRAW "XI$(1): "
820 '
830 ' DRAW LOGIC LEVEL INDICATOR
S
840 '
850 A$="R2LU5G"
860 B$="U5R3D5L3"
870 FORX=0 TO 7
880 C$="BM10, "+STR$(22*X+12)+": "
+A$
890 D$="BM9, "+STR$(22*X+22)+": "+
B$
900 DRAW "XC$": DRAW "XD$":
910 NEXT
920 '
930 ' CALCULATE TIME SLOT OFFSET
940 '
950 TS=TS+15616: T1=INT(TS/256): T
2=(TS/256)-INT(TS/256): T2=T2*256
960 '
970 ' LOAD MEMORY WITH ML PARAME
TERS
980 '
990 POKE &H38AE, T1: POKE &H38AF, T2:
'PASS TIMESLOT
1000 FORX=0 TO 7
1010 POKE &H38AD, 2^X: 'PASS POWER
OF 2
1020 EXEC &H38E6: 'FIND BIT SET
1030 SCREEN 1, 1
1040 IF PEEK(&H3C00) > 0 THEN LA=1 ELSE
ELA=0
1050 DRAW "XP$(Y): "
1060 '
1070 ' READ BUFFER AND DRAW TRAC
E
1080 '
1090 IFLA=1 THEN DRAW "BU10"
1100 FORX=&H3C00 TO &H3CEF
1110 A=PEEK(X)
1120 IFA=0 THEN A=1
1130 IFA=1 AND LA=1 THEN DRAW "R"
1140 IFA=1 AND LA=0 THEN DRAW "U10R"
1150 IFA=0 AND LA=0 THEN DRAW "R"
1160 IFA=0 AND LA=1 THEN DRAW "D10R"
1170 LA=A
1180 NEXT X, Y: POKE 65494, 0
1190 '
1200 ' COMMAND INPUT SECTION
1210 '
1220 I$=INKEY$
1230 IF I$="" THEN 1220
1240 IF I$="C" THEN 1500
1250 IF I$="CHR$(8)" THEN 1590
1260 IF I$="CHR$(9)" THEN 1680
1270 IF I$="A" THEN CLS: GOTO 330
1280 IF I$="T" THEN PRINT: GOTO 580
1290 IF I$="E" THEN 1820
1300 IF I$="X" THEN STOP
1310 IF I$="I" THEN 1320 ELSE 1220
1320 IF I=-1 THEN I=10 ELSE I=-1
1330 PUT(103, 180)-(116, 190), BL, 0
R
1340 IF I=-1 THEN DRAW "XI$(1): " E
LSE DRAW "XI$(2): "
1350 GOTO 1220
1360 '
1370 ' PRINT TIMESLOTS
1380 '
1390 M$=STR$(T): M=LEN(M$)-1
1400 M$=RIGHT$(M$, M)

```



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13 — On CoCo A, press ENTER. Data is now being transferred from the analyzer to CoCo A. ENABLE, CCLK and HI RAM should be lighted. Data transfer is complete when CoCo A displays the Enter Timeslot prompt.

14 — Enter the timeslot you want to view. For this test, enter 0. Data is processed and the screen display is drawn.

### Analyzing Test Results

Now that our data is displayed on the

screen, we must analyze it. Let's look again at Figure 3, the screen display for this test. First we must know what to look for in our results. We know the SCS lead only goes low when the CoCo reads or writes to Address \$FF40. The test program repeatedly writes a 255 to that address. Test lead A and trigger lead T3 are connected to the SCS lead. The T3 trigger lead requires a low signal when active. When SCS goes low, the analyzer triggers and data collection begins.

In Figure 3, we can see that test lead A starts low, goes high and then low again. We have to disregard this first occurrence because the analyzer circuits are in transition when first triggered so the data is not accurate. Since we're looping through the test program, we can use all subsequent occurrences. Around the middle of the screen display, we can see that the SCS lead again goes low, indicating the CoCo is writing to Address \$FF40. We'll use this as our first valid test.

```

1410 M$="0000"+M$
1420 M$=RIGHT$(M$,5)
1430 FORR=1T05
1440 V=VAL(MID$(M$,R,1))
1450 DRAW"XN$(V);"
1460 NEXTR:RETURN
1470 '
1480 ' DISPLAY CURSOR ON C COMMA
ND
1490 '
1500 G1=127:G2=129:L1=128
1510 GET(G1,0)-(G2,180),GR,G
1520 LINE(L1,0)-(L1,180),PSET
1530 PUT(143,181)-(182,191),B1,0
R
1540 GOSUB1770:GOTO1220
1550 GOTO1220
1560 '
1570 ' MOVE CURSOR LEFT
1580 '
1590 PUT(G1,0)-(G2,180),GR,OR
1600 G1=G1-I:G2=G2-I:L1=L1-I
1610 IF G1<14 THEN G1=14:G2=16:L
I=15
1620 GET(G1,0)-(G2,180),GR,G
1630 LINE(L1,0)-(L1,180),PSET
1640 GOSUB1770:GOTO1220
1650 '
1660 ' MOVE CURSOR RIGHT
1670 '
1680 PUT(G1,0)-(G2,180),GR,OR
1690 G1=G1+I:G2=G2+I:L1=L1+I
1700 IF G1>253 THEN G1=253:G2=25
5:L1=254
1710 GET(G1,0)-(G2,180),GR,G
1720 LINE(L1,0)-(L1,180),PSET
1730 GOSUB1770:GOTO1220
1740 '
1750 ' UPDATE CURSOR LOCATION
1760 '
1770 PUT(143,181)-(182,191),B1,0
R
1780 T=TS+G1-15616-14:DRAW"BM144
.190;":GOSUB 1390:RETURN
1790 '
1800 ' ERASE CURSOR
1810 '
1820 PUT(G1,0)-(G2,180),GR,OR
1830 T=0:G1=127:G2=129:L1=128:PU
T(143,181)-(182,191),B1,OR:DRAW"
BM144,190;":GOSUB1390:GOTO1220
1840 POKE65497,0:FORX=&H3D00 TO
&H7CFF
1850 POKEX,PEEK(&HFF40)
1860 POKE&HFF41,4:POKE&HFF41,0
1870 NEXT:POKE65496,0:RETURN
1880 POKE&HFF41,0:FORX=&H3D00 TO
&H7CFF
1890 PRINTPEEK(X),PEEK(&HFF40)
1900 POKE&HFF41,4:POKE&HFF41,0
1910 NEXT

```

### Listing 2: ZEROBUF

```

00100 *** ZEROBUF/ASM ***
00110 *** PROGRAM TO ZERO OUT ***
00120 *** THE DRAW BUFFER ***
00130 *** WRITTEN BY ***
00140 *** DENNIS H. WEIDE ***
00150
00160
00170
00180
00190 BUFFER EQU $3D00
00200 ENDBUF EQU $7CFF
00210
00220
00230 ORG $3BB0
00231
00232
00233
00240 CLRA SET AREG TO ZERO
00250 LOX #BUFFER GET START ADDR OF BUFFER
00260 LOOP STA ,X+ ZERO BUFFER OUT
00270 CMPX #ENDBUF IS THIS END OF BUFFER?
00280 BLE LOOP IF NO-BRANCH TO LOOP
00290 RTS IF YES-RETURN TO BASIC
00300 END

```

### Listing 3: MOVESRAM

```

00100 *** MOVESRAM/ASM ***
00110 *** PROGRAM TO MOVE ***
00120 *** SRAM MEMORY TO ***
00130 *** DRAM BUFFER ***
00140 *** WRITTEN BY ***
00150 *** DENNIS H. WEIDE ***
00160
00170
00180
00190
00200 ORG $3BC0
00210
00220
00230
00240 START LDX #33000 START OF DRAM BUFFER
00250 CLRA ZERO AREG
00260 STA $FF41 SET TRIGGER LOW
00270 LDA $FF40 GET 1ST BYTE OF SRAM
00280 STA ,X+ STORE IN 1ST BYTE OF DRAM
00290 LOOP LOA #54 SET TRIGGER HIGH
00300 STA $FF41
00310 CLRA SET TRIGGER LOW
00320 STA $FF41
00330 LDA $FF40 GET NEXT SRAM BYTE
00340 STA ,X+ STORE IT IN NEXT DRAM BYTE
00350 CMPX #7CFF CHECK FOR LAST DRAM BYTE
00360 BLE LOOP
00370 RTS
00380 END

```



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Note that the R/\*W lead (Trace B) goes low. At the same time, the address bits A0 and A1 (traces D and E) are low and data bits D0, D1 and D2 (traces F, G, H) are high. These are the correct lead states for Address \$FF40 and a data value of 255. Test lead C was connected to the E clock lead and should show a square wave pattern throughout the 16,384 timeslots. You can continue to test the analyzer by changing the values of the data and address. Editing Line 20 of the test program in CoCo B allows you to change the screen display and verify the test data.

#### Example:

```
20 DATA 86,FF,B7,FF,40,20,F9 *WR
ITES 255 DEC. TO $FF40
20 DATA 86,00,B7,FF,40,20,F9 *WR
ITES 0 DEC. TO $FF40
20 DATA 86,00,B7,FF,41,20,F9 *WR
ITES 0 DEC. TO $FF41
```

#### Analyzer Errors

Because the analyzer is a simple test set, it should not be considered highly accurate. When data is collected in the analyzer SRAM, the memory is constantly enabled so data can be written into SRAM during the entire clock cycle. Since data leads may be in the high-to-low or low-to-high transition state in the middle of the clock cycle, data states may be incorrect for a single timeslot. This can be seen when looking at the E clock (Trace C) signal. It doesn't always appear to be symmetrical, even though it is. A higher analyzer clock speed reduces the amount of such an error. Overall, however, I think the accuracy of the Digital Logic Analyzer more than meets the requirements for designing and testing CoCo applications and other low-speed TTL circuits.

#### And Finally

While the analyzer may not be an appropriate piece of test equipment for testing the multi-million dollar computers on the space shuttle Discovery, it is useful for most low-speed logic circuit testing you may have to do. By adding an additional CMOS buffer to the input circuit, the analyzer can be used for CMOS testing as well.

I'm sure a lot of you will find this project too complicated for your current skill levels. Why not set this article aside until such time that you have gained the necessary knowledge and skills to understand and build this project?

#### Listing 4: FACTOR

```
00100 *** FACTOR/ASM ***
00110 *** PROGRAM TO FIND WHICH ***
00120 *** MEMORY BITS ARE SET ***
00130 *** AND STORE RESULTS IN ***
00140 *** BUFFER FOR GRAPHICS ***
00150 *** PROGRAM ***
00160 *** WRITTEN BY ***
00170 *** DENNIS H. WEIDE ***
00180
00190
00200 BUFFER EQU $3C00
00210 BUFEND EQU BUFFER+$EF
00220 FACTOR EQU $3BAD
00230 TIMSLT EQU $3BAE
00240
00250
00260 ORG $3BE6
00261
00262
00263
00270 START LDX TIMSLT GET TIMESLOT FROM BASIC
00280 LDY #BUFFER GET START OF ORAM BUFFER
00290 LOOP LDA FACTOR GET POWER OF 2 FROM BASIC
00300 ANDA ,X+ DETERMINE IF THIS
00310 STA ,Y+ BIT IS SET AND SAVE RESULTS
00320 CMPY #BUFEND IS THIS END OF BUFFER?
00330 BLE LOOP
00340 RTS
00350 END
```

#### Listing 5: TESTBAS

```
0 * COPYRIGHT 1990 FALSOFT, INC
1 * BASIC ANALYZER TEST PROGRAM
2 * BY DENNIS H. WEIDE
3 *
10 CLEAR 200,16000
20 DATA 86,FF,B7,FF,40,20,F9
30 FOR X=16384 TO 16390
40 READ A$:A$="&H"+A$
50 POKE X,VAL(A$)
60 NEXT X
70 FOR X=1 TO 1000:NEXT X
80 EXEC 16384
```

#### Listing 6: TESTBIN

```
00100 *** ANALYZER TEST PROGRAM ***
00110 *** THIS PROGRAM LOOPS ***
00120 *** THROUGH A ROUTINE TO ***
00130 *** WRITE 255 TO ADDRESS ***
00140 *** $FF40 ***
00150 *** BY DENNIS H. WEIDE ***
00160
00170
00180
00190 ORG $4000 PROGRAM RAM LOCATION
00200 DATA EQU $FF40 ADDRESS TO WRITE
00210 START LDA #$FF LOAD AREG WITH 255
00220 STA DATA STORE AREG AT $FF40
00230 BRA START LOOP AND DO AGAIN
00240 END
```

# a, e, i, o, u

by Steve Blyn  
Contributing Editor

**T**his month's article presents a short program in game format that helps students review elements of phonics. The study of phonics is often dry and somewhat boring to many students, and using the computer is usually more fun than using paper and pencil. I have chosen to illustrate this program by having the student choose correct vowels and then decide whether they are long or short.

The program contains a series of sentences on a specific level. One word in each sentence has a missing letter represented by a dash. The student is first asked to type the vowel that belongs at the dash. The program does not proceed until this is answered correctly. Then the student is asked to indicate whether the vowel is long or short.

The program proceeds in this manner, randomly selecting from among the sentences keyed into the data statements. Each data statement has three components: the sentence, the correct vowel and an L or S to indicate whether the vowel is long or short. The sentences I used are on the third-grade level. You may want to use sentences from a different level or permit the students to write their own sentences for practice. There are 15 sentences in this program. You may add more by changing the value of A on Line 40 to the same amount as the number of sentences you want to work with.

I did not include any scoring in this program because I think most students will soon master all the questions. I did, however, include a small extra when correct answers are given. In addition to happy sounds, the screen alternates quickly several times between SCREEN 0, 1 and SCREEN

*Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.*

0, 0. It is a quick way to add a little pizzazz.

Although vowels are the topic of our program, they are not the only phonic elements that can be reviewed. With relatively few modifications, selected initial conso-

nants, blends or digraphs can be the missing elements from your sentences. The question or questions need to be altered to reflect what is missing. □

## 16K Extended

✓	100	.....	3
	180	.....	132
	270	.....	119
	330	.....	43
	END	.....	13

### Listing 1: VOWELS

```

10 REM"CHOOSING VOWEL SOUNDS"
20 REM "STEVE BLYN,COMPUTER ISLA
ND,STATEN ISLAND,NY,1990"
40 A=15:DIM A$(A),B$(A),C$(A)
50 FOR B= 1 TO A:READ A$(B),B$(B
),C$(B):NEXT B
60 CLS:PLAY"04L70GEGFEDC":RR=RN
O(-TIMER):R=RND(A)
70 FOR N= 1 TO 3:PRINT@37,"choos
ing vowel sounds";
80 PRINT@96,A$(R):NEXT N
90 PRINT@198,"which vowel is it
?";
100 PRINT@262,"PRESS a,e,i,o OR
u ";
110 ENS=INKEY$
120 IF ENS="A" OR ENS="E" OR ENS
="I" OR ENS="O" OR ENS="U" THEN
140
130 IF ENS="" THEN 110
140 SOUND 100,1:IF ENS=B$(R) THE
N 150 ELSE 110
150 PLAY"04L30CEDCEODD":GOSUB 26
0
160 PRINT@323,"IS THE ";B$(R):"
LONG OR SHORT?";
170 ENS=INKEY$
180 IF ENS="L" OR ENS="S" THEN 2
00
190 IF ENS="" THEN 160
200 IF ENS=C$(R) THEN PLAY"L70GF
EDCCC" ELSE SOUND 10,2:GOTO 160
210 GOSUB 260:PRINT@384,STRING$(

```

```

32,255);
220 PRINT@448,"press ENTER to go
on or E to end";
230 ENS=INKEY$
240 IF ENS=CHR$(13) THEN 60 ELSE
IF ENS="E" THEN 250 ELSE 230
250 CLS:END
260 FOR T=1TO500:NEXT T:SCREEN0,
1:FOR T=1TO100:SCREEN0,0:SCREEN0
,1:NEXT T
270 FORT=1TO3:SOUND1,1:NEXT T:SC
REEN 0:RETURN
280 DATA I ASKED THEM TO STAY FO
R D-NNER ON FRIDAY,..I,S
290 DATA HIS MOTHER ASKED HIM TO
BUY H-R SOME MILK,..E,S
300 DATA HER GRANDFATHER BOB C-M
E TO THISCOUNTRY FROM ENGLAND,..A
,L
310 DATA MANY PEOPLE WENT TO SEE
THEIR CHERRY TR-ES IN BLOOM,..
E,L
320 DATA WE VISITED THE Z00 ON A
CL-SS TRIP LAST SPRING,..A,S
330 DATA THE TEACHER READ TO -S
A STORY ABOUT GIANTS,..U,S
340 DATA PAPER CAN BE M-DE FROM
WOOD AND RAGS,..A,L
350 DATA ONE POLICEMAN WR-TE A N
OTE TO THE OTHER,..O,L
360 DATA NEW YORK IS A CITY ON T
HAT M-P ON THE WALL,..A,S
370 DATA ONE GOOD H-LIDAY IN NOV
EMBER IS THANKSGIVING,..O,S
380 DATA MY LITTLE D-G IS VERY S
MART AND VERY CUTE TOO,..O,S
390 DATA I BIT INTO A N-T AND IT
HURT MY TEETH A LOT,..U,S
400 DATA THE RAILROAD STATION IS
ON THE OTHER S-DE OF OUR TOWN.
,I,L
410 DATA THE HOUSE IS B-TWEEN A
LARGE AND A SMALL TREE,..E,L
420 DATA YOUR MOTHER WANT-D YOU
TO COME HOME AT 5:00 TODAY,..E,S

```

# Go Forth and Create!

by Joseph Kolar  
Contributing Editor

**D**uring this session you will be shown a few new ideas and concepts, offered hints, given a good working program that can be used as a guide to create whatever design you envision, and encouraged to go forth and create.

Time's a-wasting. You have two options: If you are impatient, type in the listing and run it, or if you want to explore this together, type in lines 9 through 280 of Listing 1. This segment of the program creates a peculiar sample design. Please understand that the design element is an entirely random choice. You will be surprised at how it develops within a few minutes.

Mask Line 101 with a REM. The cross-hairs in Line 102 allow us to see in which quadrants a design unit resides and how it evolves around a point (128,96). We will examine the A0 presentation only. There are various ways to do this. One way is to retype Line 220, which causes the rotation, by typing A=0 and deleting ,A from the end of Line 260, destroying the loop. This is a pain in the neck. Now run the program and restore the lines to the original condition when you are finished.

Another way is to change the 3 to 0 in Line 220. FOR A=0 TO 0 effectively becomes A=0 because the loop allows no other possibility. Yet it is an operational loop. Unmask Line 101 and run the program. Let's study this design unit. It is a surprise to find that most of the design is in the fourth quadrant

(upper left region), and the balance is in the first quadrant (upper right region). An interesting point is that we have three nicely delineated triangles, but there is one annoying line in Quadrant 1 that stands out like a sore thumb.

Return Line 220 to its former state, then run the program. The line in Quadrant 1 is irritating and serves no purpose. Use your graph paper to create the design element A\$. It reveals why most of the design resides in Quadrant 4. It also reveals the offending line, G3 in Line 100 of the program. If we made it invisible, would the integrity of the design unit hold up? To make G3 invisible, all we need do is insert a B in front of G3. Make the insertion and run the program.

If we add D3 to Line 100, we can close up those loose lines to make it a bounded triangle. If you consult your sketch, you see that it has to be D6H3. Do you see how easy it is to run off target?

Restore Line 100 to its original state. I thought, "What would happen if I began Line 100 with BL3?" D6 was added at the end because the open wing bugged me. Another interesting design resulted. Try it!

The next idea I had was to remove D6, change BL3 to BH3, and see what happened. Make the changes in Line 100, then run the program. Now that has possibilities! The clue is that the design is too large. The furthest line of the wing is distorted in both the second and forth quadrants. Notice the two glitches. We discovered in a previous tutorial that when the CoCo draws a line that runs off screen, it does the best it can and moves to the right at the top border until it reaches the required length E3 (in this case, 44 spaces long). Then it connects the two ends of the line.

One way to eliminate the glitches re-

quires that the design be made smaller. In lines 230 and 105, change 44 to 40, then run the program. Why not make it more distinct by changing the steps to -2 in Line 105 and 2 in Line 230? Then run the program to see the result.

Unmask Line 270 and mask Line 280 if you feel like it. I call this Swazicross.

If you want to fool around, add D6 at the end of Line 100. Then run the program. Now remove STEP 2 from Line 230 and change -2 to -1 in Line 105 and run the program. It looks even nicer if you remove D6 from the end of Line 100. Now change BH3 to BR4 and run the program. I call this Wildflower.

Do you see how easy it is to get caught up in a creative frenzy? You may want to stop this tutorial and work late into the night making variations of a theme.

When you are ready to resume, mask Line 270 and unmask Line 280. Edit Line 230 to read FOR S=4 TO 40 STEP 2 and Line 105 to read FOR S=40 TO 4 STEP -2. Before you restore Line 100, run the program. Now that's a flower! A bee would go nuts if he came across such a wonder. Change BR4 to BH3 in Line 100. This is the final demo that evolved before I staggered down the primrose detour.

If you want to get a different, slower effect when removing the design, change -2 in Line 105 to -1. This sweep also stops between each visible line, drawn by STEP +2 of Line 230, and sweeps up sweet nothings. Now run the program. To use the gimmick effectively, divide whatever STEP value you have in the On line by two and use that value. If the result is not a whole number, use the next lowest whole number. On the other hand, some leftover residue might be desirable on the Off screen. Do

---

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

not hesitate to try other values that may partially clear the screen and leave a nice residual pattern.

Back to the drawing board!

Type in Line 5 (unmasked), lines 500, 510, 520 (unmasked) and 529 through 533. At this stage we are only concerned with the first design unit and whatever quadrants it occupies.

Mask Line 100. Restore Line 105 and 230 as in Listing 1, then run the program. We see the A0 option of an old friend, A\$, from the last tutorial. Note that it is equally divided between quadrants 1 and 2. After the first go-around the cross-hairs fall away.

When you have finished looking, unmask Line 521 and 532 so only the A0 design unit is exposed. It is not noteworthy so we unmask Line 532 to check it out in its entirety. Now run the program. Unmask lines 522 and 532 and run the program. Then mask Line 532 and run the program.

Unmask lines 523 and 532 and run the

program again. This is the first example where we encounter the M movement option. The sharp point gives the game away because we know we can't generate such an acute point using E and F. Mask Line 532 and run the program. In SCREEN1,1, the horizontal spear tips tend toward blue and yellow while the vertical tips tend toward red and blue. This seems to be the nature of the beast. I have observed that lines drawn in a horizontal direction lean toward blue and yellow and green. Lines drawn in a vertical direction tend to be another shade of blue, while lines drawn diagonally tend to be a pinkish color.

An unusual arrowhead design is created if BL3 is inserted at the beginning of Line 523. Try it and run the program. Now change BL3 to BL6. Can you guess what you've drawn? Run the program. You really have arrowheads. If you had plotted out the design on graph paper, you would count the horizontal length, 6. Thus, if you

jump left six spaces, the CoCo must begin at the tip of the arrowhead. Let's change BL6 to BL9 and run the program. What will be drawn? It looks like jewel-encrusted daggers. Notice how the design drifted so it is balanced between the third and fourth quadrants. The design began at (125,96) because we jumped three spaces past the end of the design. Thus the visible part of A\$ is created in a left direction along the horizontal plane.

Suppose we changed BL9 to BR9. What would be drawn? Are you sure? Run the program and watch the arrows as they hurtle to the edge of the screen and crash. BR5 crashes the two vertical ones. Just for meanness, add a rock to the end of Line 523, + "BE4EFGH" with predictable crash. But it looks neat.

Here is a really unusual concoction: Add to the end of Line 523 + "BH4EFGH" and watch the second rock change direction. Then run the program. It's great! I think the

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first rock bouncing off the wall deflected the path of the second rock.

You should want to investigate this case. Reduce the size until all the design units are undistorted, then increase the size to see what happens as the arrow and rocks slam into the wall.

Unmask Lines 524 and 532, then run the program. This design is loaded with M options. Did you sketch it out? Mask Line 532 and run the program. Add BR inside the quote before M+4 at the beginning of Line 524, and change Line 220 FOR A=0 TO 2 STEP 2 and Line 104 FOR A=2 TO 0 STEP -2 to get a kissing gourami fish. Then run the program. Restore lines 220, 104 and 524 to their original state.

Unmask lines 532 and 525, then run the program. Mask 532 and run the program. If you plot this one out and are confused, you can see it develop best in SCREEN1,0. This mish-mash design doesn't seem to have any redeeming features.

Remove BR2 from Line 525 and run the program. This is an example of a design unit in all four quadrants.

Unmask lines 526 and 532 and run the program. This one looks full of possibilities. Mask 532 and run the program. Note that the design crashed along the vertical axis. Watch it a few times and you can see it hit the wall and bend, searching for room to get out of its confinement.

Remove BR from Line 526 and run the program. There is still a slight bump. Insert 80 in Line 526 and run the program. This looks as if it just skidded to a halt in time. The design is too bulky. Either A\$ should be redrawn or Size 44 and maybe Size 40 should be discarded in lines 105, 230 and 529. We must learn to not be too ambitious.

Unmask lines 532 and 527 and run the program again. Mask 532, then run the program. This is an example of an overly complex design. It has so many points of interest that it is overpowering. Try not to go to extremes in your enthusiasm.

Extract BR from Line 527, then run the program. It is within the bounds of sensibility and is acceptable. Now if you insert BR2 and run the program, it looks like four bugs in a spider's nest. Change BR2 to BR3, then run the program. It *really* looks like bugs in a spiderweb. Try BL3. If you use BL6, it looks like Dracula rising from his coffin.

Unmask lines 528 and 532 and run the program. Mask Line 532, then run the program. This design is massive and overwhelms the screen. Here is a trick to make it a bit smaller, but it alters the design. Insert M as the first character in Line 528. Now run the program. If you sketched this design on graph paper, here is an exercise to

try. Keep advancing N, one character at a time, in Line 28. Guess what effect it has and check it out. Advance N until it falls in front of the first M in Line 528. Did you anticipate this design?

Mask Line 5 and unmask lines 6, 600 and 620. Then run the program. Thus far, we have been concerned with design units that go in the four directions — up, down, left and right. Now we will consider those that run along the diagonal. If you extended a line along the line that points out its border at (128+96,0) instead of (255,0).

Edit Line 610 and press ENTER. Type 24, press the space bar, type I followed by N, press the up arrow and SHIFT keys together, then the space bar until the cursor is under " and type H followed by E128". Then press ENTER and run the program. This is the ideal direction.

To Line 610, add :LINE (224,0)-(128,96), PSET, then run the program. This is the line along which the diagonal lines build. The trick is to move the diagonal line so it heads to 255,0. Mask Line 632 and run the program. We can move A\$ in Line 620 to advance along this desired line if we insert BR at the beginning. But we modify the heart of the design unit. Unmask Line 632 and run the program. Let's see how it looks in all A options. Mask Line 632 and run the program. The design is tipped to the right.

There is a trade-off. We can move the design in the desired diagonal direction but sacrifice part of the design. Often the trade-off is acceptable. Here is "Escape of the Design's Soul." First Mask Line 610, and in Line 630 change 96 to X so we can use the X values in Line 629, both to move and change the design. Then run the program.

Unmask Lines 632, 610 and 621. Change X to 96 in Line 630 and run the program. If we introduce BR at the beginning of Line 621, the design units become equidistant, (the ideal attitude). The design is altered but not too significantly, and the tilt to the right does not assault our artistic taste and sensibilities.

You might comment that this is a failed experiment if you mindlessly run from one display to the next. But if you stop to study each presentation, it is a new ball of wax.

A final thought on some of the by-ways you will travel in CoColand: You will evoke an occasional design that is so unique that it has never been seen by a human eye in all eternity. After you kill it, it may never be duplicated in the future.

16K Extended

✓	115 .....	137
	500 .....	183
	528 .....	97
	END .....	127

### The Listing: WINDMILL

```

0 'LISTING1
5 'GOTO500'ON THE LINE
6 'GOTO600'ON THE BIAS
9 T-RND(2): ON T GOT010,11
10 PMODE4,1:PCLS:SCREEN1,0:GOTO100
11 PMODE4,1:PCLS:SCREEN1,1
100 A$="U3R3G3L3U3E3"
101 GOT0220
102 DRAW"BM0,96R128NR128ND96U96":GOT0220
104 FOR A=3 TO 0 STEP-1
105 FOR S= 44 TO 4 STEP -4
110 B$="S"+STR$(S)
115 D$="A"+STR$(A)
120 DRAW "C48M128,96"+D$+B$+A$
130 NEXT S,A
200 FOR Z= 1 TO 200:NEXT
205 PCLS:GOTO 9
220 FOR A= 0 TO 3
230 FOR S= 4 TO 44 STEP4
240 B$="S"+STR$(S):D$="A"+STR$(A)
)
250 DRAW"BM128,96"+D$+B$+A$
260 NEXT S,A
270 'FOR Z= 1 TO 2000: NEXT:PCLS:GOTO 9
280 FOR Z= 1 TO 600:NEXT:GOTO 104
500 PMODE4,1:PCLS:SCREEN1,1
510 DRAW"BM128,96NL128NR128NU96096"
520 "A$="EFRE2F2G2H2LGH"
521 "A$="E2F2REFGHLG2H2"
522 "A$="EFE2F2EFGHG2H2GH"
523 "A$="EFEM+3,1M-3,1HGH"
524 "A$="M+4,-2R2M-1,2M+3,-1FGM-3,-1M+1,2L2M-4,-2"
525 "A$="BR2U2H2M+6,2G2GHL4F2M-6,2E2U2BL2"
526 "A$="BRHM+1,-2M+6,2NM-3,1M+3,1M-3,1NM-3,-1M-6,2M-1,-2EBL"
527 "A$="BRUHM+2,-1BD2R3FGL3BD2M-2,-1EUBR"
528 "A$="REFERULDRM+4,1M-4,1LDRU LHGL"
529 FOR X=4 TO 44 STEP4
530 DRAW"S=X;BM128,96"+A$
531 NEXT X:FOR Z=1TO2000:NEXT
532 GOT0532
533 GOT0100
600 'PMODE4,1:PCLS:SCREEN1,1
610 DRAW"BM0,96R128NR128NU96D96"
620 "A$="UREU2R2D2L2GDL"
621 "A$="EU2RU2FRDFL2DL2G"
629 FOR X=44 TO 4 STEP-4
630 DRAW"S=X;BM128,96"+A$
631 NEXT X:FORZ=1TO2000:NEXT
632 GOT0632
633 GOT0100

```



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- M7 - 23 .Bin Files Ready To Run

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### ADVENTURES 1,2

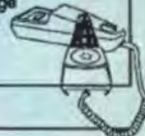
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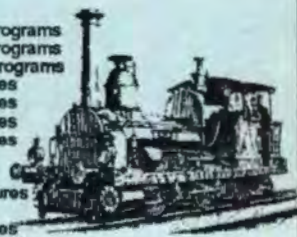
### TELECOMMUNICATIONS 1-3

- T1 - Haysae, Kormit, Mikoyform, TeleTerm
- T2 - Cobbe BBs Terminal Package
- T3 - GETERM Communications



### GRAPHICS 1-14

- GR1 - 12 Basic Graphic Programs
- GR2 - 12 Basic Graphic Programs
- GR3 - 9 Coco 3 Graphic Programs
- GR4 - 22 Coco Max Pictures
- GR5 - 22 Coco Max Pictures
- GR6 - 22 Coco Max Pictures
- GR7 - 15 Coco Max Pictures
- GR8 - 22 .Bin Pictures
- GR9 - 22 .Bin Pictures
- GR10 - 14 Large .Bin Pictures
- GR11 - 8 Mge Pictures
- GR12 - Coco Max 3 Pictures
- GR13 - Macpaint Graphic Editor
- GR14 - 5 Macintosh Pictures



\*\* See Our Ad Containing 250 Graphic Pictures Elsewhere in This Magazine

### EDUCATION 1-4

- E1 - 12 Programs For Young Kids
- E2 - 12 Programs For High School Kids
- E3 - 11 Programs Teaching The Coco'S Commands
- E4 - 5 Graphics Programs About Australia



### HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

- H1 - Bargraph, Calendar, Financial Advice, +
- H2 - Charts, Last Will, Planets, +
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### GAMES 1-11

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- GA1 - CarRace, Horses, RoBo Dice, StarTrek, +
- GA2 - BoBo, Chess, Rubic, Yahtzee, +
- GA3 - Backgammon, Gremlin, Python, Robots, +
- GA4 - Hawks, Saucer, Shootem, Trek, +
- GA5 - Battleship, Chicken, Raceway, Squash, +
- GA6 - Fly, Navy Guns, ShipSub, Tanks, +
- GA7 - Connect4, F-16, Pizza, Trek, +
- GA8 - Football, Leaky Tap, Poker, SubHunt, +
- GA9 - Battle, Chick, Flight, Prix, +
- GA10 - Blockade, Fly, Missile2, Pong, +
- GA11 - Bunker3, Guadal, Martians, Traders, +



### UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

- U1 - Dir32, DiskZapper, RomCopy, Snap Edit, +
- U2 - Backup, Diskfix, Labeler, Multback, +
- U3 - Convert ML, MLdata, PlayMac, SendDisk, +
- U4 - Bin-Bas, PixConv, Unarc, VuMaster, +
- U5 - Assemblr, Graph, McBase, Recover, +
- U6 - Clock, List 32, MiniDos, Pixcomp, +
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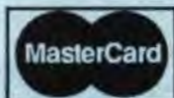
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M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

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**R**AINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

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RAINBOWfest is a **great opportunity** for commercial programmers to show off new and innovative products for the first time. Chicago, Illinois is the show to get information on capabilities for the CoCo, along with a terrific selection of the latest CoCo 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.

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 Somerset, New Jersey, why don't you make plans now to join us in Chicago, Illinois?

For members of the family who don't share your affinity for CoCo, there are many other attractions in the Chicago area.

The The Hyatt Regency Woodfield — Schaumburg, Illinois, 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 ticket 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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Memory Methods for Large Programs

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**Art Flexser**  
SpectroSystems  
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**Dale Puckett**  
RAINBOW Contributing Editor  
BASIC09



## COCO COMMUNITY BREAKFAST

### Frank Hogg — Key Note Speaker

Frank Hogg, entrepreneur, gives us insight into the future as we move progressively towards the 680x0 and OS9/68K. Frank's background, known well to RAINBOW readers, covers all the computers from the old WWTPC 6800 thru the CoCos to the 68030 based multi-megabyte QT computers he makes today. Frank's talk explores ways to bridge from the CoCo to the 680x0 computers with OS9/68000. He explores ways to run CoCo applications on OS9/68000 and the exciting possibility of running both a 6809 and 68000 in the same machine. Join Frank for this glimpse into the future.

### Don't forget ...

If yours is one of the first 500 ticket orders, a coupon for a complimentary issue of The Third Rainbow Book of Adventures will be enclosed with your tickets — if yours is one of the first five orders received from your state, a coupon for a complimentary RAINBOWfest T-shirt will be enclosed with your tickets. So hurry up and place your order to take advantage of this offer.



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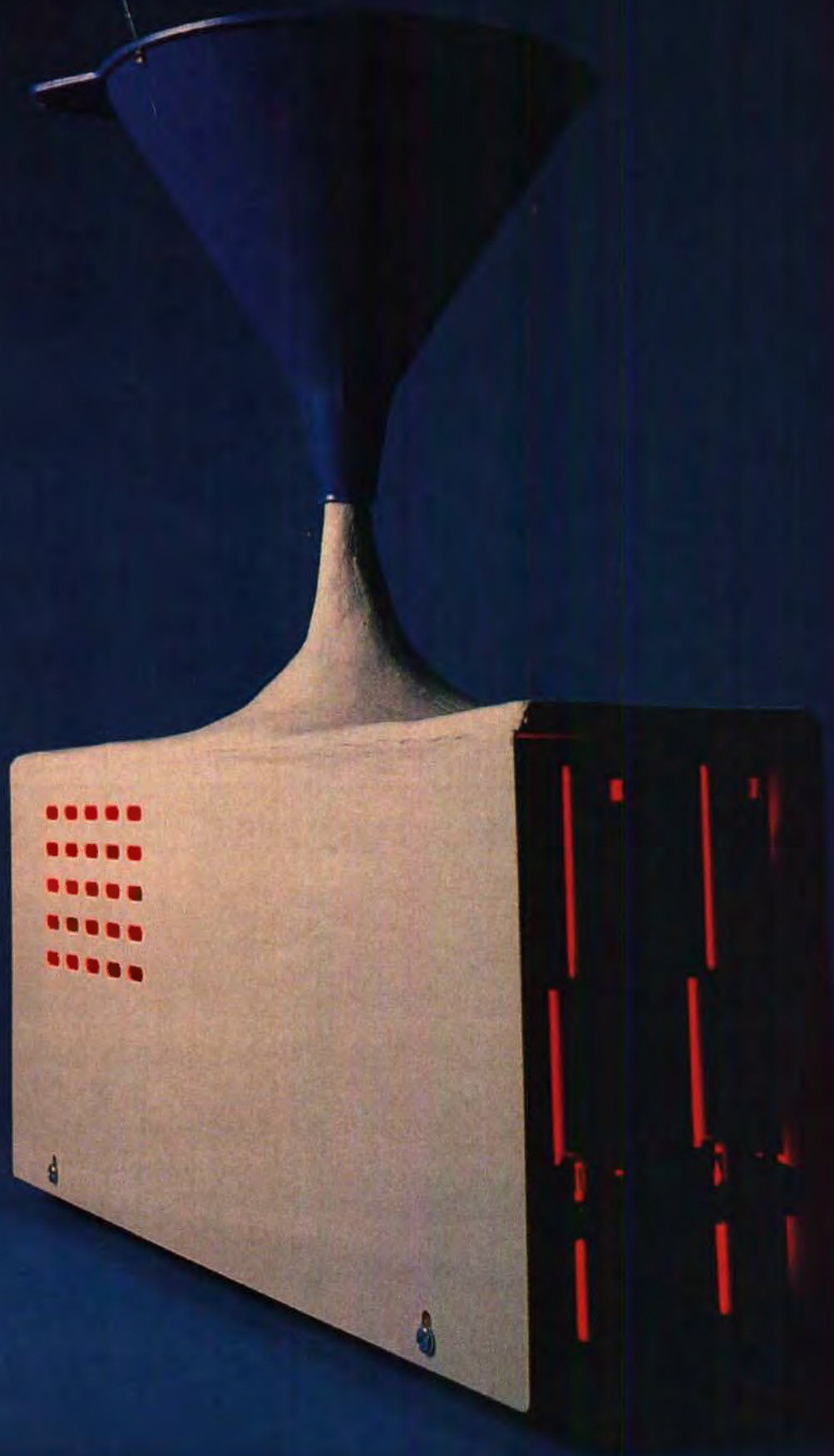
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Make checks payable to: THE RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.



bersome to use. I figure if I have to call the shell 90 percent of the time I may as well work directly with the shell instead of having another program do it for me.

However, *M-Menu System* is a good value for the price. It is an excellent system for setting up a personalized menu system. If you're looking for a small, easy-to-use menu system under OS-9, this program fits the bill.

(r3 Systems, 4072 E. 22nd St., Suite 178, Tucson, AZ 85711, 602-745-2327; \$19.95 plus \$3 S/H)

—Jim Manning

## Software

128K CoCo 3

### Slam Bam— Dunk It, Ma'am

*Slam Bam* lets the armchair athlete slam dunk a basketball without having to work up a sweat or even lace up the sneakers that have been sitting in the back of the closet since last summer's company picnic. This graphics game allows numerous ways to dunk a basketball including one- and two-handed dunks, normal and backhanded slams or the showoff-and-spin-360-degrees and stuff-that-sucker-through-the-hoop dunks. It is even possible to break the backboard — a goal in life I'm sure we all have. All these shots are carefully scrutinized by three judges whose accumulative ratings produce a point value for each successful dunk which are then displayed on a scoreboard.

The game comes with two pages of instructions — the weakest part of the package. Even disregarding the numerous typos and grammatical errors, it is difficult at best to decipher the author's intent. Therefore, the best way to get the hang of the game is through trial-and-error. For instance, to attempt a dunk coming down the middle, you would start with the joystick held to the right and press the 2 key. You then watch as the animated player approaches a line beneath the basket at which point you press the firebutton to make him jump. At the same time, move the joystick to the left. If the dunk is successful you see the ball drop through the basket, and then you receive a score from each of the three judges. If the shot is missed, the player returns to the foul line for the next shot.

To play, whether alone or against a human opponent, a 128K CoCo 3 (not a 512K CoCo 3) and a joystick are required. To really enjoy *Slam Bam*, however, you have to be a basketball glutton because the game only allows four shots in the Game mode and three shots in the Practice mode, after which the player has to sit through the cycling of the title screen, credits, opt for Solo or Two-player mode, choose to practice or play a game and enter his or her name again. This gets quite tedious after a short period of time. And even at a listed price of \$10, this is not likely to be a game that you will return to play time after time.

(Erich Sweaney, P.O. Box 45434, Tacoma, WA 98445, 206-535-9733; \$10)

—George Aftamonow

## Software

512K CoCo 3

### Big RAMDisk— Big Things in Small Packages

Well, you did it. You got that 512K RAM upgrade you requested as a Christmas present, and now you're ashamed to admit that you only wanted it to see the nifty graphics in *Rogue*. Or that you'd like to learn OS-9 for its memory-usage capabilities but just haven't got the time to sit down with it. Take heart, Danosoft has what you're looking for.

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Last October at the RAINBOWfest in New Jersey, I had the pleasure of meeting Bill Daniels, the genius behind Danosoft. Judging from the titles of his software packages (*Big BASIC*, *Big Disk* and now *Big RAMDisk*), I had expected a large man with hands that barely fit on the keyboard (rather like myself). Instead Mr. Daniels resembles his work: compact and brilliant. He operates an accounting firm in Canada, so his software business is a second line. He is the only person I have met so far, however, who doesn't bother with an assembler when he writes machine-language programs: He has memorized most of the instruction codes and so types them directly into RAM, using Danosoft's *Memory Master*.

*Big RAMDisk* is not just another RAM disk program — it is a complete package in its own right, containing eight different configurations for most any assignment of drives, real or "imaginary." There are utilities to back up the physical drives to and from the RAM drives and to relocate the program in memory, should it interfere with some machine language application. It is also usable in combination with any of Danosoft's pantheon of *Big* utilities.

The program is a breeze to run. You decide which configuration to use based on two criteria: first, your DOS version, and second, which physical drives you want to use and how you want to number your RAM drives. Because I have Disk BASIC 2.1 and am using *Big Disk* from the utilities package, I have converted my physical drive to one 360K, 40-track Drive 0. I configured *Big RAMDisk* to "real" Drive 0, RAM Drive 1 by typing `LOADM"RAMDISK/113"`. Different configurations are made just by changing the extension. Then you can `DSKINI` the RAM drive just like any drive. A BASIC program supplied on the disk called `COPYDISK` will copy the entire disk from the physical drive to the RAM disk or vice versa. Since it is a GAT (Granule Allocation Table) backup, it is quite fast — it copies only the files it finds on the directory, instead of all 35, 40 or 80 tracks, used or not. The manual also states that this is a good way to optimize disk access speed because the program copies to the physical disk in the most economical order, so the files aren't scattered around on the disk.

If the RAM disk isn't fast enough for you (my word processor saves a three-granule file in less time than it takes me to realize it's done), you can use the high-speed poke, `POKE 65497, 0`. While this can be disastrous with a physical drive ("Kids! Don't try this at home!"), it really blasts off with the RAM drive, which, being software, isn't affected by the slow reaction time of motors and controllers. No more waiting while the drive cranks and grinds to

load and save huge files.

When you're through with a session, you can save your RAM disk's contents back to a floppy by running `COPYDISK` again. Don't forget — I lost a program I was working on because I did a cold start before backing up to a floppy. Even that was no disaster, because a cold start clears only the normal 64K "shadow" RAM, preserving your RAM disk. Reloading and executing the control program restores the RAM drive, and if you haven't `DSKINI`ed them, your files are still there, untouched! Saved the day for me.

Danosoft's *Big RAMDisk* is a thoroughly useful utility that combines a great product with the ease of use that marks a winner. The documentation is deceptively simple for being so thorough; it left no doubts or questions in my mind after the first read-through; and if you forget something, it's easy to find on just three pages. *Big RAMDisk* is more thorough and flexible than RAM drive programs that come with some memory upgrades. At \$12.95 it will also be one of the best values in your software collection. And at one granule, it's small enough to fit on your most-used disks — this just proves that good things do come in small packages.

(Danosoft, P.O. Box 124, Station A, Mississauga, ON L5A 2Z7, Canada, 416-897-0121; \$12.95 U.S., \$14.95 Cnd., add \$2.50 S/H)

—Fred Toon

## Software

CoCo 1, 2 & 3

### *Super Backup Utilities— A Time-Saving Copier*

If you're like me, the first thing you do with that brand new disk is *back it up!* For every computer user there are at least two horror-story accounts of the "trashed disk." You know, that one report you worked on for days — the one on the floppy disk you discovered in the affectionate embrace of your former favorite pet. Now, don't you wish you had made a backup of that disk?

You say with one disk drive and Disk BASIC it takes five full minutes and numerous swaps, so that the task ranks right up there with weeding the garden as your favorite pastime? Carl England's *Super*

*Backup Utilities* won't be able to help you with your garden, but it is sure to change your mind about making those backups.

*Super Backup Utilities* is a single-disk set of three configuration programs written in BASIC with matching machine-language (ML) programs that perform the necessary task of keeping ole Spot out of the doghouse. The utilities are totally adjustable to just about any and all configurations of CoCo systems. Each set of BASIC and matching ML programs is based on available system memory. The 64K utility reduces a single-drive, verified, full 35-track disk backup from five minutes and seven arm-tiring disk swaps to a most acceptable three minutes, with four swaps.

Now, for those with a 128K CoCo 3 and one drive, the backup of a full 35-track disk takes two minutes with only two disk swaps. For those of us who enjoy a 512K CoCo 3 single-drive system, the entire disk is backed up with only a single disk swap and a mere two minutes of time. However, there is yet another benefit from the 512K utility.

With the 512K backup utility you have the option of making multiple copies of a disk without having to reinsert the original disk. The utility loads the entire contents of the disk into memory and holds it there until you no longer need it.

Starting with a copy of the utility disk, just run the appropriate configuration program based on the total amount of your CoCo's memory. The configuration program automatically customizes the matching ML program. After this, all you do is `LOADM` the ML utility and *voila* — instant copies. Well, maybe not that simple, but almost.

The utility presents you with a menu screen that allows you to select one of the following: 1) Make a Backup, 2) Return to DOS or 3) Change Number of Tracks to be backed up. One point must be emphasized: The source disk (the disk to be copied) must be in the drive *before* you make the selection to do a backup. This requirement holds true for the target disk as well.

The documentation provided with this package is very professionally laid out in an eight-page booklet. Each of the utilities are fully explained in easy-to-understand, non-technical language that is actually enjoyable to read. It's quite obvious that Mr. England spent a great deal of time with attention to detail in preparing his documentation. Are any other manufacturers reading this?

Each of the *Super Backup Utilities* programs work in the same way. They copy the disk track by track, without regard to the file allocation table. This allows for a track-by-track duplicate of the original disk. The utilities do not abort if a disk error occurs.

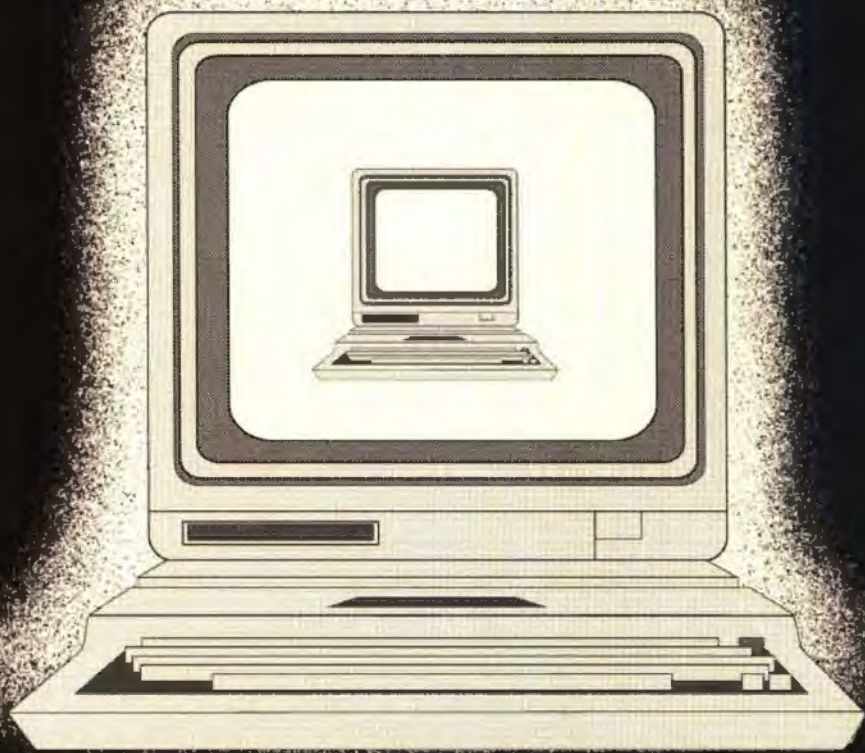
# In the Beginning . . .

Your CoCo is the longest-lived, most innovative and, surely, best-loved Computer ever to hit the market. In constant use by millions of us for a decade now, its story is both an interesting and fascinating one. And now you can relive it all — all the fun, the people, the frustrations — in *CoCo: An Affectionate History of the Tandy Color Computer*.

This anecdotal history of the CoCo, by well-known authors Dale and Esther Puckett, tells the stories of those people at Tandy who brought us the Color Computer; the programmers who've put the 6809 through its paces; the hardware gurus with their electronic marvels; and the many vendors who have made these innovations available to us. You'll also read about people like you who have supported

the Color Computer with countless hours at the keyboard and by attending CoCo functions. You never know — you might even read about yourself. And this says nothing of the many pictures you'll see.

*CoCo: An Affectionate History* is scheduled for release early in the fall of 1990. Prior to publication it will be available in an attractive limited-edition hardcover version for only \$45. A softcover version will also be available for \$15.95. But if you order now, you can reserve copies of the softcover version for a pre-publication price of just \$13.50 apiece. Reserve a copy of *CoCo: An Affectionate History* for yourself. Or order several for those you care about — and take a walk down Memory Lane together.



*Yes!* I want to reserve: \_\_\_\_\_ hardcover copies of *CoCo: An Affectionate History* for \$45.00 apiece.  
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Instead, an informative error message is displayed onscreen along with track and sector numbers where the error occurred. This allows for the additional option of recopying only the affected area of the disk using the provided ZAP utility.

You get a sector-by-sector view of the disk as it is copied. This view is provided at the top half of the monitor/TV screen while the lower half cues you for any necessary disk swaps or error information. Each backup utility allows you to alter the number of tracks to back up. I tried the 512K backup utility with ADOS-3 and it did a beautiful job of backing up a full 40-track disk without any interference from, or with, ADOS-3. By the way, my ADOS-3 is not on an EPROM — yet. Support is also provided for 80-track disks.

The ZAP utility that comes with this package is a small program offering the user the ability to copy any single sector on a disk simply by typing in the track and sector number. It could very well spell the difference between just a sharp scolding or a trip to the humane society for good ole Spot! With the ZAP utility, you no longer have to run another backup just because of one stubborn granule.

*Super Backup Utilities* could prove very useful to any single-drive CoCo user who finds the backup routine provided under Disk BASIC a real pain. I tried all of these utilities with a two-drive system and found a savings of almost a full 60 seconds off the Disk BASIC time on each configuration. At just \$15, it's a very good deal.

(Carl England, 128 Shepherd Drive N.E., Calhoun, GA 30701, 404-629-7197; \$15)

—Terry Parks

## Software

CoCo 3

### UltraEd+— Disk-Based Assembly With the EDTASM+ ROM Pack

If you are a person who never throws anything out because someday you will find a use for it, your day has come. Or maybe your Aunt Ginny was so excited that she finally found something you could use that you couldn't bring yourself to tell her you use only disk software. In either case,

that Tandy EDTASM+ ROM pack just increased in value.

*UltraEd+* is a set of instructions and a patch for upgrading the CoCo EDTASM+ ROM pack to work with the features of the Color Computer 3. It also adds several nice features for those of us who aren't content with BASIC and off-the-shelf solutions. It is not, on the other hand, for those of you who think CoCo assembly involves solder and funny little devices with wires.

The package makes several improvements in both EDTASM+ and its built-in debug program, ZBUG. By incorporating the *SuperPatch* program published in THE RAINBOW as well as other features, *UltraEd+* adds disk support, a directory (up to four columns with Disk BASIC 2.1), support for the CoCo 3's 80-column screen, two different buffer sizes, automatic append and the ability to suppress "FCC" printing.

Disk support is provided by changing the cassette commands to access the disk drives instead. This means that the cassette files you have will need to be transferred to disk prior to using them with the patched assembler. The cassette V (verify) command is exchanged for the disk V (view directory). With Disk BASIC 2.1 this gives a four-column directory in the 80-column mode.

The L command (load) can be used to merge a number of small assembly modules into a larger program by appending each loaded file to the end of code already in memory. This allows the creation of a library of common code that can then be merged into a program when needed. Line numbers can duplicate numbers already in memory without overlaying the existing line. The N command is used to clean up any numbering conflicts.

The program supports two different buffer sizes, a 16K buffer and a larger one that will hold about 3000 lines of assembly code. These two buffers overlap and are toggled by the 0 menu (which also toggles "FCC" printing and exits to BASIC). The primary benefit of having the smaller buffer is to allow testing with BASIC and Disk BASIC mapped into memory. The larger buffer, of course, allows you to have much bigger programs in memory.

ZBUG makes use of these two buffers as well. With the small buffer mapped in, debugging can be performed on code that calls the ROM routines in BASIC or Disk BASIC. Without this option, the process of debugging ROM calls is very difficult and tedious (translation: a real pain). The large buffer is used by the patches to ZBUG to allow for disassembly.

This disassembly feature is one of the best features of this package. It is toggled

on when in the debug mode with the large buffer and disassembles any code present in that buffer. The generated code can then be edited or saved in the same manner as any other code. It is limited to about 4K at a time, but most of us will find that to be adequate. Larger modules can be handled in sections. Most important is the fact that the disassembled code reassembles (after editing origins) into exactly the same machine code. Now I can do something about bumping up the number of lives in *Downland* (for my daughter, of course).

I found very few problems with *UltraEd+*. An "End of Buffer" warning, which is documented, is one of them. Another is with the instructions for making the patch — they left out the fact that after saving EDTASM+ to disk, a power off/on reset is probably needed before running the BASIC patch program. No combination of commands or resets seemed to be able to get around this problem. But this is not a big deal, because it occurs only in the patch process and not when using *UltraEd+*.

The documentation consists of a few pages outlining the patching process and the changes to the EDTASM+ commands. It states that if you are a legal owner of the ROM pack, you will get the rest of the information you need from its manual. The instructions for patching the program are easy to follow and, except for the problem mentioned above, complete. The page describing the new features and their use contains the information you need but is hard to read and could stand some better examples as well as reformatting.

If you have the EDTASM+ ROM pack, this is a good way to upgrade to a disk-based assembler for less than the cost of Tandy's Disk EDTASM+. If you already have the disk version, the patch provides some features not found in it. If you don't have the ROM pack already, its list price plus the cost of this package is a little higher than Disk EDTASM+.

*UltraEd+*, which is not copy-protected, requires the Tandy EDTASM+ ROM pack, at least one disk drive, a cassette recorder with cable and a Color Computer 3 with 128K. Disk BASIC 2.1 (1.1) is preferred but 2.0 (1.0) is supported.

A special thanks to Terry Morrow of Sandbox Micro Systems in Fairborn, Ohio, for the loan of the EDTASM+ ROM pack used in this review. I had switched to Disk EDTASM+ and given mine away.

(Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, 517-787-3610; \$22.50 plus \$2.50 S/H)

—Jesse R. Strawbridge



# Received and Certified

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.

**C.R.T. Connection Disk G14**, one disk in a 114-disk public domain library. Disk G14 is a freeware CoCo 3 game by Shane Messer called *Color Wheel*, based on the TV game *Wheel of Fortune*. *C.R.T. Connection*, 3625 Orange Ave., Fort Pierce, FL 34947, (407) 464-9873; \$3.50 plus \$2 S/H.

**C.R.T. Connection Disk GR25**, the *McPaint* graphics editor by the Milliluk Partnership of Greg Miller and Eric Gavriluk. It includes fonts and animation features. The program is public domain/shareware, and a donation is requested. For the CoCo 1, 2 and 3, requiring 64K and a disk drive. *C.R.T. Connection*, 3625 Orange Ave., Fort Pierce, FL 34947, (407) 464-9873; \$3.50 plus \$2 S/H.

**KJV on Disk #6**, the book of Numbers, chapters 1 through 18, of the King James version of the Bible on disk in ASCII files for the CoCo 1, 2 and 3. *BDS Software*, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; \$3.

**Paladin's Legacy**, a fantasy role-playing Adventure game featuring animated, scrolling graphics. The land of Tarinth has been overrun by vile, evil creatures who have captured the king and are running amok in the cities and villages. Only one, pure of heart, who can master the five magics of the legendary Paladin, can hope to rescue the King and restore order to the realm. The player does battle with supernatural forces and explores cities, castles and cathedrals. For the CoCo 1, 2 or 3, requiring 64K and

a disk drive. It comes on a flippy disk. *Sundog Systems*, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; \$24.95 plus \$2.50 S/H.

**Sinistaar**, a machine-language arcade game for 512K CoCo 3s, featuring digitized voices and sound effects. When the evil Sinistaars invade the peaceful galaxy of Ursula, it falls to you, the best pilot in the galaxy, to man the ship *Marauder* and fight against them. You will mine a special ore from an asteroid belt; this ore is made into Sini-bombs that destroy the Sinistaars. The game comes on two flippy disks, requiring a disk drive and a joystick (Tandy's deluxe two-button joystick recommended). *Sundog Systems*, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; \$34.95 plus \$2.50 S/H.

**C.R.T. Connection Disk M1**, a collection of 16 *Musica* files, along with a player. No hardware required to hear the multi-voice, machine language files. *C.R.T. Connection*, 3625 Orange Ave., Fort Pierce, FL 34947, (407) 464-9873; \$3.50 plus \$2 S/H.

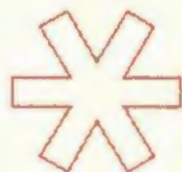
**Star XB-2415 Multi-Font Printer**, a 24-pin printer that does color printing. Features include three print modes (draft, letter quality and super letter quality), built-in typefaces, paper parking, an IC card slot and Epson, NEC and IBM Proprinter compatibility. Requires a serial-parallel converter or the optional serial interface for use with the CoCo. *Star Micronics*, 420 Lexington Ave., #2702, New York, NY 10170, (212) 986-6770; \$999.

**Supersound 1.2**, an upgraded CoCo 3 sampling program that records sound in one and two tracks and also supports graphics and animation. New features include a new manual and support for up to 2 Meg of memory (as well as 128K and 512K). The package includes a play-only utility that users can give to their friends. Upgrades to Version 1.2 are provided for owners of the original version who return the original disk and the green manual cover, along with \$2.50 S/H. *Supersoft, Inc.*, 363 Oakwood Ave., Jackson, MI 49203, (517) 787-3610; 39.95 plus \$2.50 S/H.

The *Seal of Certification* 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 program 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.

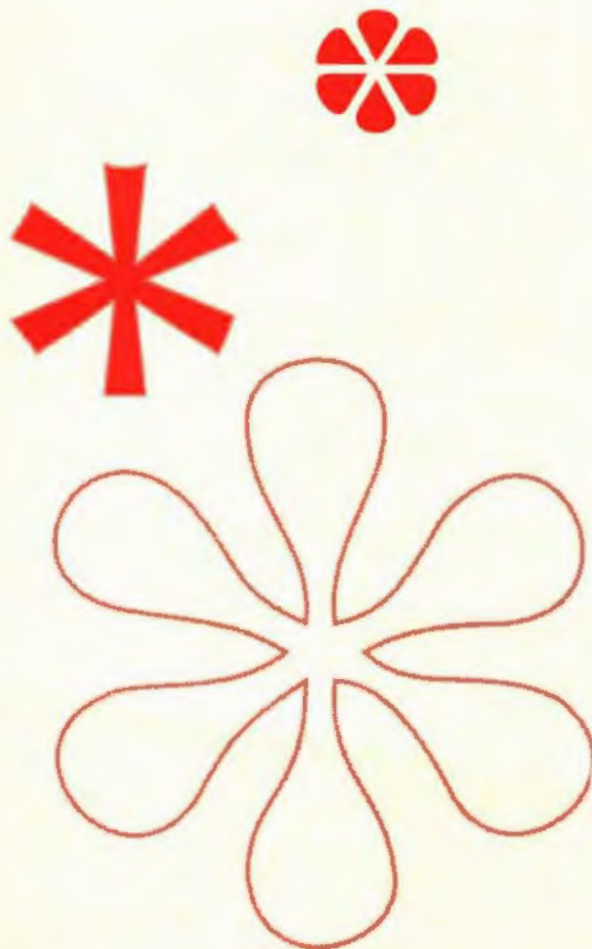
—Lauren Willoughby



*A new routine for an old chore*

# The File Handler

by Richard Estrado



**T**his program is especially for those who enjoyed the new experience and freedom of using wildcards to obtain selective directory listings (RAINBOW, June 1989, Page 122). However, I am sure that all disk drive users will herald the advent of this new routine.

I am pleased to introduce a COPY command that uses wildcards to add versatility to file handling on the Color Computer.

This long-overdue utility enables you to copy groups of files from one disk to another using a one- or two-drive system. Your Tandy Color Computer 1, 2 or 3 must be equipped with Disk BASIC Version 1.1 or 2.1, at least 64K of RAM, and one or more disk drives.

The wildcard used by this program is an asterisk (\*) representing the group of characters that succeed it in the filename or extension. For example LE\*.BAS represents all the files on the disk with LE as the first two letters in the filename and an extension of .BAS. Using the same principle, F\*. \* represents all files on a disk with F as the first letter in the filename and with any extension.

Now that we all have an understanding of how wildcards are used, let's look at the syntax for the new COPY routine. When the routine is active, the COPY command can be used just as before for single file copies:

---

*Richard Estrado has studied and taught computer science for the past five years at Fatima College. He may be contacted at 43 Sapphire Crescent, Diamond Vale, Diego Martin, Trinidad, West Indies.*



`COPY "filename.ext:c" TO "filename.ext:d"`

Please note that no wildcards can be used when you use the old syntax.

When you want to copy a group of files using dual drives, use the following syntax:

`COPY "filename.ext:c" TO d`

where *c* and *d* are numbers from 0 to 3, which represent the source and destination drives, respectively. A wildcard must be included in either the filename, the extension or both.

To copy a group of files using a single disk drive, simply use this syntax:

`COPY "filename.ext"`

No drive specification is necessary here since a single disk copy is being performed. But again you must include a wildcard in the filename, the extension or both. Therefore a command such as `COPY "*.BIN:0" TO 1` copies all the files on Drive 0 with the extension .BIN to Drive 1.

Whenever you copy a group of files, each filename copied is displayed on the screen as it is being processed. At the end of the procedure a summary of the number of files copied is printed at the bottom of the files list, and control is returned to BASIC.

### How to Obtain a Working Copy

If you choose to type in the assembly language listing using `EDTASM+`, do as follows: After a successful assembly (no errors), exit from the assembler and type in the following BASIC statement:

`SAVEM "COPY",&H5581,&H5731,&H5581`

These numbers refer to the start, end and execute addresses of the code. Subsequently, whenever you want to use the routine, type in these BASIC statements:

`CLEAR 450,&H5581:LOADM "COPY":EXEC`

After you enter this line, a Syntax Error should occur. This indicates that after the routine was executed, control was passed to the `COPY` procedure without the correct syntax. It is not necessarily an indication that you incorrectly entered the commands. The `COPY` procedure is now active.

Alternatively, you can type in the BASIC program and run it, but remember that an error will occur in the last line of the program (the `EXEC` statement) for the reason stated above. Whatever method you choose, remember that it is necessary to execute the program only once. You can use the routine as many times as you want just by entering the appropriate `COPY` command.

There is one important prerequisite for all CoCo 1 and 2 users: As with the `DIR` routines, you have to put the computer into the all-RAM mode before you attempt to run `COPY`. The all-RAM program that accompanies this article also appeared on Page 97 of the July 1987 `RAINBOW`.



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64K Disk

## Listing 1: COPYASM

```

00010 * USING WILDCARDS
00020 *
00030 * BY RICHARD ESTRADO
00040 * DN 89-10-27
00050 *
00060 *
00070 START CLRA
00080 LDX #COPY
00090 STX $C211
00100 COPY LBSR $C935
00110 CLR UCOUNT
00120 CLR TCOUNT
00130 CLR DRIVE
00140 CLR SDCF
00150 LDA $EB
00160 STA SDRIVE
00170 STA DRIVE
00180
00190 LDY #094C
00200 LOOK LDA .Y+
00210 CMPA #*
00220 BEQ GTPARM
00230 CMPY #0957
00240 BNE LOOK
00250 LBRA $03BC
00260 GTPARM CLRA
00270 CLR B
00280 JSR $A5
00290 BEQ SKIP
00300 CLRA
00310 COMA
00320 STA SDCF
00330 LDB #A5
00340 JSR $B26F
00350 JSR $A5
00360 SUBB #2
00370 SUBA #0
00380 LBLO END
00390 CMPA #3
00400 LBHI END
00410 STA DRIVE
00420 JSR $9F
00430 SKIP JSR $A5C7
00440 EXTRAC LDX #TABLE
00450 STX PLACE
00460 SETUP JSR $C79D
00470 JSR $B958
00480 LDD #1102
00490 STA $00EC
00500 STB $EA
00510 LDB #3
00520 STORE STB $ED
00530 LDX #1600
00540 STX $EE
00550 JSR $D6F2
00560 COMP TFR X,U
00570 LDA .X
00580 BEQ ADVAN
00590 COMA
00600 LBEQ GETNAM
00610 * COMPARE THE FILE NAME
00620 SERCH1 LDY #094C
00630 COMP1 LDA .Y
00640 CMPA #*
00650 LBEQ SERCH2
00660 CMPA .U+
00670 BNE ADVAN
00680 CMPY #953
00690 BEQ SERCH2
00700 LEAY 1,Y
00710 JMP COMP1
00720 SERCH2 LEAX 8,X
00730 TFR X,U
00740 LDY #954
00750 COMP2 LDA .Y
00760 CMPA #*
00770 LBEQ DUMP
00780 CMPA .U+
00790 BEQ COMP3
00800 LEAX -8,X
00810 BRA ADVAN
00820 COMP3 CMPY #956
00830 BNE NEXT
00840 BRA DUMP
00850 NEXT LEAY 1,Y
00860 JMP COMP2
00870 * ADVANCE THE DIR POINTER
00880 ADVAN LEAX 32,X
00890 CMPX #700
00900 BNE COMP
00910 INCB
00920 CMPB #11
00930 BLS STORE
00940 RTS
00950 * DUMP THE FILE NAME TO BUFFER
00960 DUMP LEAX -8,X
00970 PSHS B
00980 PSHS X
00990 PSHS Y
01000 LDB #12
01010 LDY PLACE
01020 REP DECB
01030 CMPB #0
01040 BEQ QUIT
01050 LDA .X+
01060 STA .Y+
01070 BRA REP
01080 QUIT STY PLACE
01090 PULS Y
01100 PULS X
01110 PULS B
01120 BRA ADVAN
01130 * PERFORM THE REPEATED COPY
01140 GETNAM LDX #TABLE
01150 STX PLACE2
01160 LOOP LDY PLACE2
01170 CMPY PLACE
01180 BEQ SUMARY
01190 LDX #094C
01200 LOAD LDA .Y+
01210 STA .X+
01220 CMPX #0957
01230 BNE LOAD
01240 STY PLACE2
01250 JSR OUTNAM
01260 LDA UCOUNT
01270 CMPA #10
01280 BNE UNIT
01290 TEN INC TCOUNT
01300 CLR UCOUNT
01310 UNIT INC UCOUNT
01320 JSR COFI
01330 LDA SDCF
01340 BNE REPT
01350 JSR $D326
01360 REPT JMP LOOP
01370 COFI LDA SDRIVE
01380 STA $EB
01390 LBSR $D399
01400 LDA SDCF
01410 PSHS A
01420 LDA DRIVE
01430 STA $EB
01440 LBSR $D399
01450 JSR $CAE9
01460 LBRA $D3D6
01470 * OUTPUT COPIED FILENAME
01480 OUTNAM LDX #094C
01490 LDB #8
01500 JSR $B9A2
01510 LDA #32
01520 JSR [$A002]
01530 LDB #3
01540 JSR $B9A2
01550 LDA #13
01560 JSR [$A002]
01570 RTS
01580 MSG FCC "FILE(S) COPIED
!"
01590 SUMARY LDX #MSG
01600 LDA #13
01610 JSR [$A002]
01620 LDA TCOUNT
01630 ADDA #30
01640 JSR [$A002]
01650 CLR TCOUNT
01660 LDA UCOUNT
01670 ADDA #30
01680 JSR [$A002]
01690 CLR UCOUNT
01700 LDA #1
01710 JSR [$A002]
01720 LDB #16
01730 PRT LDA .X+
01740 JSR [$A002]
01750 DECB
01760 CMPB #0
01770 BNE PRT
01780 END RTS
01790 TABLE RMB 748
01800 PLACE RMB 2
01810 PLACE2 RMB 2
01820 DRIVE RMB 1
01830 SDRIVE RMB 1
01840 SDCF RMB 1
01850 UCOUNT RMB 1
01860 TCOUNT RMB 1
01870 END

```

# Conversions and Diversions

by Greg Law  
Technical Editor

**H**ave you stumbled across the `rma` assembler and wondered just how it differs from the standard assembler? Judging by the letters I have received, quite a number of you have. The `rma` assembler is included with the `C` compiler under the name `c.asm`, and an updated version is included with the *OS-9 Development System*. The primary difference is that `asm` is designed to assemble system modules and utilities, whereas `rma` is designed for high-level language support and large applications programs.

Put another way, `asm` requires all source code to be assembled at once as a single file. Although you can put the source code into separate files for easier editing, the files must be either merged into a single file or merged at the assembly step using the `use` directive. This places a limitation on the file size that may be assembled as well as the number of labels that may be used. This also means that any function in any of the files may call any other function and directly manipulate any variable in the data area, whether by accident or otherwise.

---

*In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.*

One advantage of `rma` is that the source code may be contained in any number of files, and only one file needs to be assembled at a time. For example, if you are developing an application and modify only one file, there is no need to assemble any of the other source files. You can simply assemble the modified file and link it with the other object files to create the executable program. Another advantage of `rma` is that, by default, all labels are local to the `psect` in which they are defined. This means that no function can call any other functions or manipulate any variables that are defined in other files unless you explicitly allow it to do so by making the label global. This might not make you a better programmer overnight, but it allows greater flexibility in creating modular code.

One of the disadvantages of `rma` is that, unlike `asm`, it does not give you control over the exact byte placement of data and code. The linker allocates space for your symbols on a first-come, first-served basis, and the offset given to a label can vary depending upon the order in which the files are linked. Normally you don't need explicit byte placement, so this isn't a major concern. However, there are certain instances where this can be an important factor, such as when writing device descriptors.

## Converting Source

The process of converting `asm` source code to `rma` source isn't difficult at all. As you browse over the listing of `nice`, you

will see that most of it is the same as the listing shown last month. The first modification is to add a few equates for those without the `os9defs.a` file. Note that we have removed the `rmb 200` statements for the stack and parameters and placed them into the equates section. This is done because the memory size required for the stack is defined in the `psect` statement.

The `mod` statement is changed to a `psect` that defines the beginning of the program code section. The variables defined here include the name, module type and language, attributes and revision level, edition, stack size, and the entry point for the program. Note that the name is the actual string itself and not a label referencing a string. Each source file should have only one `psect`, and only the source file with the actual entry point of the program defines all fields. All other source files should contain zero for all fields except the name, edition and stack requirements. The primary difference here is that the definitions in the `psect` are used to define the object file header used by the linker and do not have any direct relation to the module header.

The `vsect` statement defines the beginning of the variables section. The variables are defined in almost exactly the same manner as with `asm`, with one minor difference—the statement `dsiz equ .` has been replaced with an `ends` statement, which is shorthand for `endsect`. This defines the end of the data section, and `rma` automatically calculates the number of bytes re-

quired. Also, it is mandatory that the `vsect` be placed inside the `psect`. You can have any number of `vsects` within a `psect`, but you can have only one `psect` per source file.

The remainder of the source file is exactly the same, except that `len equ *` has been replaced with an `ends` statement. As above, this defines the end of the `psect`, and `rma` automatically calculates the code size generated for you. The secret formula here is that the `endssect` statement defines the end of a section much the same as `ENDIF` works with nested `IF` statements in `BASIC09`. As you have seen, converting source code from `asm` to `rma` is relatively painless for small source files.

### Programming Principles

For larger files you will probably want to split the source into multiple files, with each file containing a logical unit. For example, in the listing shown, the ASCII-to-hexadecimal conversion routine can be put into a separate `psect` since it can be considered a separate entity from the mainline code. The idea here is to create your programs as a sequence of subroutines with explicit entry and exit conditions much the same as a library. Indeed, it is much easier to write and debug a routine to put characters on the screen and perform screen scrolling operations than it is to write an entire word processor from scratch.

With this technique you can quickly and easily create the routines used by the application as you gradually build up to the master program. Later on, these same routines can be reused in many other applications such as a relational database, terminal emulator, etc. A common mistake is to sit down with a large application in mind and attempt to write it from scratch without giving much thought to the underlying procedures that are required.

It should be mentioned that `rma` is well-suited for this type of programming. It allows you the flexibility to create the subroutines as separate modules. You can assemble each file as you modify it, then link it with mainline code that will test the routine as necessary. There is no need to reassemble every module because one routine was altered, as is the case with `asm`.

Another bonus is that the screen updating routine doesn't need to concern itself with the variables used in the other routines. With `rma` you can declare the variables used in each routine within its `psect`, and they will be hidden from any other routines. You will quickly realize that modular code is definitely easier to create and maintain. □

### Listing 1: nice.a

```
*****
*
* NICE - (C)1989 by STEPHEN B. GOLDBERG
*
* Use: nice [priority] <command> [parameters]
*
* Run a command at the indicated priority (1-255)
* If the priority is omitted it defaults to 100
*
        ifpl
        use /dd/defs/os9defs.a
        endc
*
prgrm equ $10      module type
objct equ $01      language
reent equ $80
rev equ 1          revision number
edition equ 1      edition number
stack equ 200
params equ 200
*
        psect nice,prgrm+objct, reent+rev,edition,stack+params,entry
*
        vsect
priority rmb 1      process priority
npoint rmb 2        command name address
ppoint rmb 2        command parameter address
*
        ends
*
        fcc /(c)1989 S.B.Goldberg/
*****
* CONVERT DECIMAL TO BINARY
*****
bin      clr a
        sta priority zero priority
        bsr bin2    convert digits
bin2     bsr convert convert digits
convert  ldb .x      get character
        subb #0     make binary
        cmpb #9     valid digit?
        bhi back   no, return
        pshs d     save it
        ldb priority get previous total
        lda #10    multiply by 10
        mul
        addd .s++  add current digit
        tsta      more than 255?
        bne syntax yes, prompt and quit
        stb priority save total
        leax 1,x   bump pointer
back     rts      return
*****
* INITIALIZE
*****
entry   bsr bin      get priority
findcmd lda .x+      parameter character
        cmpa #$20    command name?
        beq findcmd  not yet, look again
        blo syntax   no command, prompt and quit
        leax -1,x    reset pointer
        stx npoint   save command name address
endloop ldd .x+      command name character
        cmpb #$20    end of command name?
        bhi endloop  no, keep looking
        ora #$80     set ms bit
        sta .-x     terminate command name
findpram ldd .x+      get character
        cmpb #$20    command parameter?
        beq findpram no, keep looking
        stx ppoint  save parameter address
*****
* SET PRIORITY
```

\*\*\*\*\*

```

os9  F$ID      get process ID
bcs  out       exit with error
ldb  priority  priority?
bne  setprior  yes, set it
ldb  #100     no, use 100
setprior os9  F$SPrior  set priority
bcs  out       exit with error

```

\*\*\*\*\*

\* EXECUTE THE COMMAND

\*\*\*\*\*

```

ldb  npoint   command name
ldy  #200     maximum parameter length
ldb  #10003   type/lang and data size
leas 200,u    move stack to direct page
ldu  ppoint   parameter address
os9  F$Chain  chain command

```

\*\*\*\*\*

\* SYNTAX ERROR PROMPT

\*\*\*\*\*

```

syntax leax <sprompt.pcr syntax prompt
print  ldy #200 maximum length
        lda #2 standard error path
os9    I$WritLn prompt to screen
bcs    out exit with error
clrb   clrb clear error
out    os9 F$Exit quit
*
sprompt fcc /Use: nice [priority] <command> [parameters]/
fdb     $070a
fcc     / priority = 1 - 255/
fcb     $0d

```

\*

ends  
end



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A program to make routine number juggling less routine

# The Price is Right

by Gordon E. Fouts

**R**ecently I had a need to mark down four pages of prices for musical instruments. A calculator would have worked fine, but this seemed to be a job for CoCo. Just load *Markup/Discount*, turn on your line printer (the little TP-10 is great for this job), and type in each number as it is requested.

First the program asks whether you want to mark up or discount numbers (prices or whatever). This is followed by the question ARE YOU SURE?, asking you to verify your input with a Y (yes) or N (no). Press the appropriate response and then press ENTER. Next the program asks for the percentage of increase or decrease and instructs you to type it as a decimal (4% = .04 and 40% = .40). Let's say you want to discount prices by 30 percent (.30). After you enter this value and respond to another ARE YOU SURE?, the printer writes DISCOUNTING BY ---.3. Here you will have reached the heart of *Markup/Discount*.

Either routine — mark-up or discount — repeats over and over as many times as you have numbers to change (remember my four pages of prices?). You are asked to

*Gordon Fouts, a free-lance musician who works at a music store, also operates a word processing service with his wife. He may be contacted at 3469 St. Albans Road, Cleveland Heights, OH 44121.*

input your numbers one by one in response to DISCOUNTING WHAT AMOUNT?. If you input 100, for example, the screen displays:

```
DISCOUNT FROM 100
DISCOUNT PERCENTAGE .3
AMOUNT OF DISCOUNT 30
NEW REDUCED AMOUNT 70
```

HIT ANY KEY TO GO ON

and the printer gives you 100 --- 30 = 70. If you ask to mark up numbers by 30 percent (.3), the screen displays:

```
MARK-UP FROM 100
MARK-UP PERCENTAGE .3
AMOUNT OF MARK-UP 30
NEW MARKED-UP AMOUNT 130
```

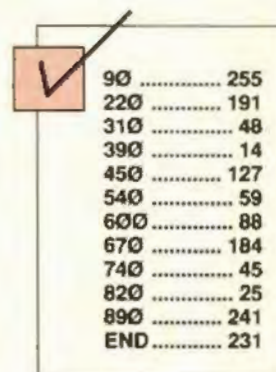
HIT ANY KEY TO GO ON

and the printer produces 100 +++ 30 = 130. The screen instructs you to input four zeros and press ENTER if you want to quit the present function in order to go to the other routine.

The introductory graphics require extended BASIC, but the working part of the program uses only text screens. Just start the program by typing RUN270 and press ENTER if you have standard BASIC. Or if you want, simply delete lines 60 through 260.

*Markup/Discount* is a simple and handy tool to take the negative out of routine number juggling and even make it fun. □

CoCo 3



90	.....	255
220	.....	191
310	.....	48
390	.....	14
450	.....	127
540	.....	59
600	.....	88
670	.....	184
740	.....	45
820	.....	25
890	.....	241
END	.....	231

## The Listing: MARKUP

```
0 * COPYRIGHT 1990 FALSDF, INC
10 *MARK-UP ++++ DISCOUNT*
20 *BY GORDON E. FOUTS*
30 *THIS PROGRAM WAS WRITTEN FOR
  *THE TRS-80 COLOR COMPUTER*
40 *FOR NON-EXTENDED BASIC,
  *DELETE LINES 60 THRU 260*
50 *FOR THE MC-10 COMPUTER
  *CHANGE "PRINT#-2" TO
  *LPRINT" IN LINES: 470, 600,
```



```

720, AND 850'
60 'GRAPHIC SCREEN (+%-)'
70 PMODE4,1:PCLS:SCREEN1,1
80 CIRCLE(100,50),11,..75
90 FOR T=0T01000:NEXT T
100 CIRCLE(102,45),3,..1..25,..75
110 CIRCLE(115,24),50,..5..05,..3
120 FOR T=0T01000:NEXT T
130 LINE(165,30)-(95,135),PSET
140 FOR T=0T01000:NEXT T
150 CIRCLE(155,125),11,..75
160 FOR T=0T01200:NEXT T
170 FOR D=62T097STEP1
180 LINE(50,D)-(50,D),PSET
190 NEXT D
200 FOR T=0T0700:NEXT T
210 FOR A=32T067STEP1
220 LINE(A,79)-(A,79),PSET:NEXT
A
230 FOR T=0T02000:NEXT T
240 FOR M=183T0218STEP1
250 LINE(M,79)-(M,79),PSET:NEXT
M
260 FOR T=0T03000:NEXT T:PCLS
270 'MARK-UP +%- DISCOUNT'
280 CLS:FOR T=0T01000:NEXT T
290 PRINT@134,"MARK-UP +%- DISCO
UNT"
300 FOR T=0T01000:NEXT T
310 PRINT@224,"WHICH DO YOU WANT
TO DO?"
320 PRINT@290,"MARK-UP":PRINT@32
3,"OR"
330 INPUT" DISCOUNT <M/D>":
MD$
340 PRINT
350 INPUT" ARE YOU SURE <Y/
N>":YNS
360 IF YNS="Y"THEN380ELSE370
370 CLS:GOTO310
380 CLS:IF MD$="M"THEN390ELSE640
390 FOR T=0T02000:PRINT@106,"MARK
ING-UP":NEXT T
400 PRINT@192,"WHAT PERCENTAGE O
F MARK-UP?":PRINT
410 PRINT@258,"TYPE THE PERCENTA
GE":PRINT@290,"AS A DECIMAL":PRI
NT
420 INPUT" - 4%-.04 - 40%-.40
- ":MP
430 PRINT:INPUT" ARE YOU SURE
<Y/N>":YNS
440 IF YNS="Y"THEN470ELSE450
450 CLS:GOTO400
460 'FOR MC-10 COMPUTER, CHANGE
THE TWO "PRINT#-2"'S TO
"LPRINT" IN THE NEXT LINE'
470 PRINT#-2,"MARKING-UP BY +++
+ ":MP:PRINT#-2,"
480 CLS:PRINT@42,"MARKING-UP"
490 PRINT
500 PRINT"INCREASING WHAT AMOUNT
?":PRINT
510 PRINT"TYPE <0000>"
520 INPUT"AND <ENTER> TO QUIT -
- ":M:PRINT
530 IF M=0000THEN890
540 AM=M*MP:MS=M+AM
550 PRINT"MARK-UP FROM:
":M
560 PRINT"MARK-UP PERCENTAGE:
":MP
570 PRINT"AMOUNT OF MARK-UP:

```

```

":AM
580 PRINT"NEW MARKED-UP AMOUNT:
":MS
590 'FOR MC-10 COMPUTER CHANGE
THE "PRINT#-2" TO "LPRINT"
IN THE NEXT LINE'
600 PRINT#-2,M:"+++":AM:"-":MS:M=
0:AM=0:MS=0
610 PRINT:PRINT"HIT ANY KEY TO G
O ON"
620 G$=INKEY$
630 IF G$=" "THEN620ELSE480
640 FOR T=0T02000:PRINT@106,"DISC
OUNTING":NEXT T
650 PRINT@192,"WHAT PERCENTAGE O
F DISCOUNT?":PRINT
660 PRINT@258,"TYPE THE PERCENTA
GE":PRINT@290,"AS A DECIMAL":PRI
NT
670 INPUT" - 4%-.04 - 40%-.40
- ":DP
680 PRINT:INPUT" ARE YOU SURE
<Y/N>":YNS
690 IF YNS="Y"THEN720ELSE700
700 CLS:GOTO650
710 'FOR MC-10 COMPUTER CHANGE
THE TWO "PRINT#-2"'S TO
"LPRINT" IN THE NEXT LINE'
720 PRINT#-2,"DISCOUNTING BY -
- ":DP:PRINT#-2,"
730 CLS:PRINT@42,"DISCOUNTING"
740 PRINT
750 PRINT"DECREASING WHAT AMOUNT
?":PRINT
760 PRINT"TYPE <0000>"
770 INPUT"AND <ENTER> TO QUIT -
- ":D:PRINT
780 IF D=0000THEN890
790 AD=D*DP:DS=D-AD
800 PRINT"DISCOUNT FROM: "
:D
810 PRINT"DISCOUNT PERCENTAGE: "
:DP
820 PRINT"AMOUNT OF DISCOUNT: "
:AD
830 PRINT"NEW REDUCED AMOUNT: "
:DS
840 'FOR MC-10 COMPUTER CHANGE
THE "PRINT#-2" TO "LPRINT"
IN THE NEXT LINE'
850 PRINT#-2,D,"-":AD:"-":DS:D
=0:AD=0:DS=0
860 PRINT:PRINT"HIT ANY KEY TO G
O ON"
870 O$=INKEY$
880 IF O$=" "THEN870ELSE730
890 CLS
900 PRINT@134,"MARK-UP +%- DISCO
UNT"
910 PRINT@290,"DO YOU WANT TO ST
ART AGAIN?"
920 PRINT:INPUT" - <Y/N> --
":RS
930 IF R$="Y"THEN270ELSE940
940 CLS
950 PRINT@134,"MARK-UP +%- DISCO
UNT"
960 PRINT@320,"TO BEGIN AGAIN -
"
970 PRINT"TYPE <RUN> AND <ENTER>
"
980 PRINT:PRINT:PRINT

```

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# It Strikes a Chord

by Fred B. Scerbo  
Contributing Editor

*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.*

**T**wo months ago the CoCo took a dive into the world of music education with the listing of *Music 101*. As I predicted, there are more music programs coming down the pipeline.

This month I present *Music 102*, another educational musical program that helps new music students learn to read music.

### The Program

*Music 101* was designed to introduce the user to the structure of simple music theory. Before you can delve deeply into this area, you need to know basic terms such as whole note, half note, quarter note, etc. *Music 101* covers that territory quite nicely.

Now *Music 102* goes one step further. After drawing a staff with the G clef on it, the program draws a set of octave notes from C-natural to B-natural. Using our standard PMODE1 educational screen and format from previous educational listings, each note is displayed with its identifying name.

In music theory there are some notes

*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.*

that can be presented in two different ways. For example, C-sharp is the same note as D-flat, yet both are drawn on the staff differently and in different line locations. (Without going into too much detail, whether you use the sharp or flat depends on what key your song is written in.) With this in mind, I have drawn both versions of each note so the user can learn all the notes on the staff.

I took accordion lessons as a child, and reading music was always difficult for me. I was one of those students who tended to play by ear. In preparing this listing I had my nephew, Christopher, draw out all the notes and positions I needed to display. I was not going to let my faulty memory cause me to leave something out.

### Running the Program

If you have used any of my recent educational listings, most of this will be old hat. After the title card appears, press ENTER to see the menu.

Selection A lets you review all the material by pressing ENTER. Quiz B and Quiz C are the same, except the information requested (the note or the name) is reversed. Use the space bar to advance through the choices. Press ENTER when you have a match. If you are not correct, the screen flashes. If you are correct, the match is shown again. Pressing the @ key gives your score at any time, and pressing C allows you to continue if any tries are still left. There are a total of 17 notes to view, counting all the sharps and flats.

### A Bonus

Next month, *Music 103* will show the same skill using the bass clef or F clef, which is read differently from the G clef. For more advanced students, I have changed the listing so when the time comes, you can merge the two programs and quiz all the material at once.

In the meantime, keeping the programs separate is much more logical since music education must proceed slowly at first.

Let me know if there are any topics you would like to see in future months. (A game is in the works!) See you next month. □

32K Extended

	<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 5px;"> <input checked="" type="checkbox"/> </div>	
15 .....	28	
40 .....	86	
65 .....	47	
85 .....	47	
120 .....	93	
140 .....	179	
185 .....	118	
225 .....	199	
260 .....	59	
305 .....	72	
335 .....	23	
365 .....	207	
390 .....	87	
405 .....	254	
420 .....	230	
435 .....	201	
455 .....	157	
465 .....	0	
480 .....	65	
495 .....	77	
510 .....	83	
525 .....	83	
540 .....	174	
1000 .....	61	
END .....	177	

**The Listing: MUSIC102**

```

1 REM*****
2 REM* MUSIC 102:READING G CLEF*
3 REM* COPYRIGHT (C) 1990 *
4 REM* BY FRED B. SCERBO *
5 REM* 60 HARDING AVENUE *
6 REM* NORTH ADAMS, MA 01247 *
7 REM*****
8 CLEAR5000:XX-RND(-TIMER):NN=17
    
```

```

9 CLS:PRINTSTRING$(32,220);STRING$(32,204);:FORI=1TO224:READA:P
RINTCHR$(A+128);:NEXT
10 PRINTSTRING$(32,195);STRING$(32,211);
15 PRINT@390," READING G CLEF
";
20 PRINT@422," BY FRED B.SCERBO
";:PRINT@454," COPYRIGHT (C) 1
990 ";
25 DATA61,60,60,62,60,61,48,61,,
,62,48,62,60,60,60,61,48,61,56,
53,60,60,60,61,48,....
30 DATA53,53,53,53,53,53,58,48,
58,....,53,53,....
35 DATA53,53,53,53,53,53,58,48,
58,....,53,53,53,71,78,76,77,68
,76,77
40 DATA53,53,53,53,53,53,58,60,
,60,60,60,61,53,53,69,74,6
9,69,76,76
45 DATA53,53,53,53,53,53,58,60,
,53,53,53,76,72,76,76,76,68
,76,76
50 DATA53,53,53,53,53,53,58,50,
,53,53,53,49,....
55 DATA60,56,56,60,56,52,60,60,6
0,56,60,60,60,60,60,60,56,52,6
0,60,60,60,....
60 X$=INKEY$:IFX$<>CHR$(13)THEN6
0
65 NN=NN+1:DIM P$(NN,3),A$(6),B$(
NN),C$(NN),A(NN),N(NN),B(4),C(4
),D(4),E(4),F(4),AO(NN):NN=NN-1
70 CLS="BR14BD14NR98BD10NR98BD10
NR98BD10NR98BD10NR98R14ND10U50F6
D8G18DBF10R6E8U8H4L10G404F4R4E4U
2"
75 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO NN:READP$(I,1),P$(I
,2):P$(I,1)=CLS+P$(I,1):NEXT
80 COLOR1,0
85 CLS:PRINT:PRINTSTRING$(32,"-")
;:PRINT@102,"AN INTRODUCTION TO
":PRINT@137,"G CLEF NOTES":PRINT
@199,"A) REVIEW NOTES":PRINT@263
,"B) QUIZ NOTES":PRINT@327,"C) R
EVERSE NOTES"
90 PRINT@388,"<<<<SELECT YOUR CHO
ICE>>>"
95 PRINT:PRINTSTRING$(32,"-")
;:100 X$=INKEY$:X=RDND(-TIMER):IFX$
="A"THEN35ELSEIFX$="B"THEN105EL
SEIFX$="C"THEN100ELSE100
105 CLS:PMODE0,1:PCLS1
110 LINE(0,0)-(254,170),PRESET,B
115 LINE(6,4)-(122,82),PRESET,BF
120 LINE(128,4)-(248,82),PRESET,
B
125 LINE(6,86)-(122,164),PRESET,
B
130 LINE(128,86)-(248,164),PRESE
T,B
135 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
140 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
145 PAINT(2,2),0,0:PCOPY1TO3
150 PMODE0,4:PCLS1
155 LINE(0,0)-(254,170),PRESET,B
F
160 LINE(8,6)-(120,80),PSET,BF
165 PCOPY4TO2:PMODE0,1:SCREEN1,1
170 DATA"BM2,8C1","BM130,8C0","B
M2,90C0","BM130,90C0","BM2,48C0"
,"BM130,48C0"
175 FORI=1TO NN
180 A(I)=RDND(NN):IFN(A(I))-1THEN
180
185 N(A(I))-1:NEXTI:FORY=1TO NN:
COLOR1,0
190 FORI=2TO4
195 B(I)=RDND(3)+1:IFN(B(I))-0THE

```

## ALPHA SOFTWARE TECHNOLOGIES

### COMM - 4

**ATTENTION!!!** Alpha software technologies has teamed up with COCO devices to bring you the incredible COMM - 4 part! 4 parts in one slot! That's right, up to 4 users at one time! Special pulsed IRQ line helps to prevent lockups! External IRQ line allows you to connect to an IRQ hack mod. Totally compatible 8551 technology, no special drivers needed! Comes complete with networking software that allows multiple computers to share peripherals! A must for any BBS user! A perfect match for OS9 Level II BBS! ..... \$124.95

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This is what you have been waiting for! Finally RAM-Resident software for your COCO 3! Runs in the background while you do other work! Includes a note-pad that does automatic number calculations, a calendar with alarm, a phone book that can auto-dial your phone, a real-time clock and much, much, more! This program will organize your entire life! 512k OS9 Level II Required (Hayes compatible modem required for auto-dial) 512k OS9 Level II Required ..... \$ 29.95

### Level II Tools

Without the right tools OS9 is difficult...These ARE the right tools! With these great utilities anyone can use OS9 like a pro! Complete wildcard, tree and windowing commands make OS9 easy to use! If you want to start using OS9, this is what you need! If you already use OS9, these tools will save you hours of time and headaches! 25 great utilities in one package ..... \$ 24.95

### Disk Manager Tree

This versatile utility makes your OS9 life a breeze! No more fighting with complex directory structures! No more searching for files and typing long path names! Everything is displayed using windows! Allows you to change, create, and delete directories with single keystrokes! Also allows you to copy, view and delete files just as easily! A must for the OS9 beginner. A great time saver for the experienced OS9 user. Save hours of time and headaches! 512k OS9 Level II Required ..... \$ 29.95

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This great Multi-View utility allows you to easily create your own pop-down menus! No programming experience is required, because no programming is done! You will be able to run any OS9 command or program from a menu! Menu creation is super simple, super easy! Actually see the menu as it develops. A must for Multi-View users! Make that non Multi-View software run in Multi-View! 512k OS9 Level II and Multi-View required ..... \$ 19.95

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```

N195
200 N(B(I))-0:NEXTI:FORI=1TO4:N
(I)-1:NEXT
205 B=RND(NN):IFB=A((Y))THEN205
210 C=RND(NN):IFC=B OR C=A((Y))T
HEN210
215 DRAW A$(1):DRAW$(A(Y),1)
220 DRAW A$(B(2)):DRAW$(B,2):DR
AW$(B,3)
225 DRAW A$(B(3)):DRAW$(C,2):DR
AW$(C,3)
230 DRAW A$(B(4)):DRAW$(A(Y),2)
:DRAW$(A(Y),3)
235 COLORI,0
240 Z=0
245 PMODE0,4
250 DRAW A$(1)+"C0":DRAW$(A(Y),
1)
255 DRAW A$(B(2))+"C1":DRAW$(B,
2):DRAW$(B,3)
260 DRAW A$(B(3))+"C1":DRAW$(C,
2):DRAW$(C,3)
265 DRAW A$(B(4))+"C1":DRAW$(A(
Y),2):DRAW$(A(Y),3)
270 PMODE0,1:SCREEN1,1
275 LINE(B,6)-(120,80),PSET,B
280 X$=INKEY$:IFX$="" THEN290ELS
EIFX$="@ "THEN1010
285 COLORI,0:LINE(8,6)-(120,80),
PRESET,B:GOTO275
290 Z=Z+1:IFZ=4THENZ=1
295 COLORI,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
300 X$=INKEY$:IFX$="" THEN290ELS
EIFX$="CHR$(13)THEN310ELSEIFX$="@
"THEN1010
305 COLORI,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO295
310 IFZ=1-B(4)THEN320
315 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND1,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO295
320 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
325 DRAW A$(5):DRAW$(A(Y),1)
330 DRAW A$(6):DRAW$(A(Y),2):DR
AW$(A(Y),3)
335 SCREEN1,1
340 X$=INKEY$:IFX$<>CHR$(13)THEN
340
345 PMODE0,1
350 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO1010
355 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
360 FORI=1TO NN:DRAW A$(5):DRAWP
$(I,1)
365 DRAW A$(6):DRAW$(I,2):DRAWP
$(I,3)
370 X$=INKEY$:IFX$<>CHR$(13)THEN
370
375 COLORI,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
380 RUN
385 DATA"BR64BD24NU36R4L24R2E6R6
F4D4G4L6H4BL22BU4U34E4R6F4D2G4L6
H4U2"

```

```

390 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48L8U12R8"
395 DATA"BR64BD24NU36R4L24R2E6R6
F4D4G4L6H4BL22BU4U34E4R6F4D2G4L6
H4U2BH6BL2D14BL4U14D4L4R12L4D6R4
L12BD24BR30D14BL4U14D4L4R12L4D6R
4L12"
400 DATA"BR26BD50R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8BU18BL22L8U
12R8"
405 DATA"BR64BD18NU36ND2BL14E4R6
F4D4G4L6H4U2BL22BU2U36E4R6F4D4G4
L6H4U2BH6BL4D14E4U2H4BD30BR24D14
E4U2H2"
410 DATA"BR36BD50U6NR8U6R8BR6D12
R8BR7U12R8D6NL8D6BR10U12L4R8BL32
BU12R8NU12L10R2U12L2R10"
415 DATA"BR64BD18NU36ND2BL14E4R6
F4D4G4L6H4U2BL22BU2U36E4R6F4D4G4
L6H4U2"
420 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6U12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48NU12L10R2U12L2R
10"
425 DATA"BR64BD18NU36ND2BL14E4R6
F4D4G4L6H4U2BL22BU2U36E4R6F4D4G4
L6H4U2BH6BL2D14BL4U14D4L4R12L4D6
R4L12BD24BR30D14BL4U14D4L4R12L4D
6R4L12"
430 DATA"BR26BD50R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8BU18BL30R8N
U12L10R2U12L2R10"
435 DATA"BR64BD14NU36R4L24R2E6R6
F4D4G4L6H4BL22BU4U34E4R6F4D2G4L6
H4U2BH6BL4D14E4U2H4BD30BR24D14E4
U2H2"
440 DATA"BR36BD50U6NR8U6R8BR6D12
R8BR7U12R8D6NL8D6BR10U12L4R8BL26
BU12L8U6NR8U6R8"
445 DATA"BR64BD14NU36R4L24R2E6R6
F4D4G4L6H4BL22BU4U34E4R6F4D2G4L6
H4U2"
450 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48L8U6NR8U6R8"
455 DATA"BR64BD8NU36ND2BL14E4R6F
4D2G4L6H4BL22BU2U36E4R6F4D4G4L6H
4U2"
460 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL56U6NR8U6R8"
465 DATA"BR64BD8NU36ND2BL14E4R6F
4D2G4L6H4BL22BU2U36E4R6F4D4G4L6H
4U2BH6BL2D14BL4U14D4L4R12L4D6R4L
12BD24BR30D14BL4U14D4L4R12L4D6R4
L12"
470 DATA"BR26BD50R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8BU18BL30U6N
R8U6R8"
475 DATA"BR64BD4NU36R4L24R2E6R6F
4D4G4L6H4BL22BU4U34E4R6F4D2G4L6H
4U2BH6BL4D14E4U2H4BD30BR24D14E4U
2H2"
480 DATA"BR36BD50U6NR8U6R8BR6D12
R8BR7U12R8D6NL8D6BR10U12L4R8BL26
BU12NU6L8U12R8BD6L2"

```

```

485 DATA"BR64BD4NU36R4L24R2E6R6F
4D4G4L6H4BL22BU4U34E4R6F4D2G4L6H
4U2"
490 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48NU6L8U12R8BD6L2
"
495 DATA"BR64BD4NU36R4L24R2E6R6F
4D4G4L6H4BL22BU4U34E4R6F4D2G4L6H
4U2BH6BL2D14BL4U14D4L4R12L4D6R4L
12BD24BR30D14BL4U14D4L4R12L4D6R4
L12"
500 DATA"BR26BD50R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8BU18BL22NU6
L8U12R8BD6L2"
505 DATA"BR64BU2NU32ND2BL14E4R6F
4D2G4L6H4BL22BU2U32E4R6F4G4L6H4N
L6NR18BH6BL4D14E4U2H4BD30BR24D14
E4U2H2"
510 DATA"BR36BD50U6NR8U6R8BR6D12
R8BR7U12R8D6NL8D6BR10U12L4R8BL26
BU12U12L8D6NR8D6"
515 DATA"BR64BU2NU32ND2BL14E4R6F
4D2G4L6H4BL22BU2U32E4R6F4G4L6H4N
L6R18"
520 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48U12L8D6NR8D6"
525 DATA"BR64BU2NU32ND2BL14E4R6F
4D2G4L6H4BL22BU2U32E4R6F4G4L6H4N
L6NR18BH0BL2D14BL4U14D4L4R12L4D6
R4L12BD24BR30D14BL4U14D4L4R12L4D
6R4L12"
530 DATA"BR26BD50R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8BU18BL22U12
L8D6NR8D6"
535 DATA"BR64BU6NU30R4L24R2E6R6F
4D4G4L6H4BL22BU4U30E4R6F4G4NR6L6
NL8H4BH6BL4D14E4U2H4BD30BR24D14E
4U2H2"
540 DATA"BR36BD50U6NR8U6R8BR6D12
R8BR7U12R8D6NL8D6BR10U12L4R8BL26
BU12L10R2U6NR8U6L2R10D12"
545 DATA"BR64BU6NU30R4L24R2E6R6F
4D4G4L6H4BL22BU4U30E4R6F4G4NR6L6
NL8H4"
550 DATA"BR12BD50U12F12NU12BR6U1
2R8D6NL8D6BR10U12L4R8BR6D12R8NU1
2BR6U12R8D6L8R2F6BR6U12R8D6NL7D6
BR6NU12R8BU24BL48NU12L10R2U6NR8U
6L2R10"
1000 CLS0:FORI=1TO NN:TEMS=P$(I,
1):P$(I,1)-P$(I,2):P$(I,2)-TEMS:
NEXT
1005 GOT0105
1010 CLS:PRINT@101,"YOU TRIED"NC
+NW"TIMES &":PRINT@165,"ANSWERED
"NC"CORRECTLY"
1015 PRINT@229,"WHILE DOING"NW"W
RONG."
1020 NO=NC+NW:IF NO=0THEN NO=1
1025 MS=INT(NC/NO*100)
1030 PRINT@293,"YOUR SCORE IS"MS
"%."
1035 PRINT@357,"ANOTHER TRY (Y/N
/C) ?":
1040 X$=INKEY$:IFX$="Y"THEN RUN
1045 IFX$="N"THENCLS:END
1050 IFX$="C" AND Y<=17 THEN270
1055 GOT01040

```

### Expanding Horizons

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### OS-9 Online

In OS-9 Online, DELPHI's interest group for fans of the OS-9 operating system, you'll meet other members, download files, and get tips to help you make the most of your CoCo.



# What your CoCo was really meant for.

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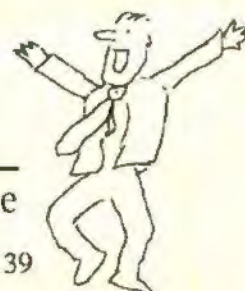
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An important link in the CoCo community is its ability to communicate with fellow users. If questions arise, a fresh source of information can be invaluable. We here at *THE RAINBOW* have decided to create "Intercom," an information exchange point for Pen Pals, CoCo Clubs and BBSs.

If you would like a Pen Pal or are running a CoCo Club or BBS, send us a letter including the information listed here to: *The Rainbow Intercom*, P.O. Box 385, Prospect, KY 40059.

Only those parties who have signed our non-piracy "agreement form" will appear in listings of Intercom. Also, please notify us if you wish to add or delete any names on this list.

## Pen Pals

● I am 12 years old and would like to have a pen pal close to my age. I enjoy most games and have a CoCo 3, one disk drive and a DMP-105. I have only had my computer one year. I speak English but I can also speak French fluently.

*Amy McFadden*  
Box 731

*Cochrane, AB T0L 0W0*  
Canada

● I am a 20-year-old graduate of John Abbot College in Montreal and am looking for pen pals of any age. I have a CoCo 1, a CoCo 2, a DMP-105 and a cassette recorder. I have been using the CoCo for eight years, and I'm interested in

both BASIC and assembly language. I also enjoy good Adventure and action games.

*Michael Mattsson*

7 Fairwood St.  
Pointe Claire, PQ H9R 2S1  
Canada

● I am 13 years old and in the eighth grade. I would like a pen pal from anywhere. I own a 64K CoCo 2, an FD-502, a DMP-130A and a CCR-81 cassette recorder. I would like a person who could help me with different programs.

*Heather Yurkovich*

75 Chesnut St. Box 493  
Ellsworth, PA 15331

● I am 15 years old and own a 64K CoCo 2, an FD-501 drive, a DMP-105 and a DCM modem. If anyone would like to be pen pals, please write. I will answer all letters.

*Joe Ahern*  
65 Oak Road  
Canton, MA 02021

● I am looking for a pen pal. I'm 13 years old. I have a CoCo 2, two disk drives, a CCR-82, a DMP-132 and a lot of games.

*Daniel Collins*  
P.O. Box 108  
Orrington, ME 04474

## CoCo Clubs

### ARIZONA

Tucson Color Computer Club, Bruce Smith, 3030 Mustang Dr., Tucson, 85708, (602) 747-7859

### CALIFORNIA

Citrus Color Computer Club, Orville Beaver, P.O. Box 6991, San Bernardino, 92412-6991, (714) 685-6334

Color America Users Groups, Jack W. Eizenga, 3811 N. Foster Ave., Baldwin Park, 91706-3912, (818) 960-8010

Marysville\Yuba City Area CoCo Club, Jim Vestal, P.O. Box 5126, Marysville, 95901, (916) 742-5499

### CONNECTICUT

Southeastern Connecticut Color Computer Users Group, Larry Donovan, 25 Stony Brook Road, Stonington, 06378, (203) 535-4211

### GEORGIA

Atlanta Computer Society, Inc., Alan R. Dages, 4290 Bells Ferry Road, Suite 10639, Kennesaw, 30144, (404) 469-5111(voice), (404) 636-2991(modem)

### IDAHO

Snake River Color Computer Club, Emil Franklin, 1750 Carmel Drive, Idaho Falls, 83403, (208) 522-0220

### ILLINIOS

Motorola Micro Computer Club, Steve Adler, 1301 East Algonquin Road, Schaumburg, 60196, (708) 576-3044

Cook County Color Computer Club, Howard Luckey, 10 McCarthy Road, Park Forest, 60466-2122, (708) 747-0117

Chicago OS-9 Users Group, Roger C. Halvorsen, 1598 Ardmore Ave., Glendale Heights, 60139, (708) 469-8174

Starved Rock Color Computer Club, Neal Roberts, 1250 E. Bluff, Marseilles, 61341, (815) 795-4894

Quincy Color Computer Club, Steve Wellman, 1600 Highland Lane, Quincy, 62301, (217) 224-8307

### IOWA

Metro Area Color Computer Club, Joe Cavallo, 2425 Ave. A, Council Bluffs, 51501, (712) 322-2438

Mid Iowa CoCo, Terry Simons, 1328 48th, Des Moines, 50311, (515) 279-2576

### LOUISIANA

The CoCo Sig, Christopher Mayeux, 20 Gibbs Drive, Chalmette, 70043, (504) 277-6880 (voice) or (504) 277-5135 (modem)

### MARYLAND

Arkade, John M. Beck, 3513 Terrace Drive, #D, Suitland, 20746, (301) 423-8418

### MICHIGAN

Greater Lansing Color Computer Users Group, E. Dale Knepper, P.O. Box 14114, Lansing, 48901, (517) 626-6917

### NEW YORK

The Island CoCo Club, Dennis Zobel, P.O. Box 426, Massapequa, 11762

Kings Byte CoCo Club, Morty Libowitz, 1063 E. 84th St., Brooklyn, 11236, (718) 763-4233

### NORTH CAROLINA

Norca Users Group, Matthew Royal, Rt. 21, Box 906, Fayetteville, 28304, (919) 484-1230

### OHIO

Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Drive, Dayton, 45439, (513) 299-3060

Tri County Computer User Group, Ron Potter, 10914 Oliver Road, Cleveland, 44111, (216) 476-2687

### PENNSYLVANIA

Cumberland Valley Users Group, Thomas Martin, 9085 Newburg Road, Newburg, 17240, (717) 423-5525

Pittsburgh Color Group, Ralph Marting, 309 Frazier Drive, Pittsburgh, 15235, (412) 823-7607

#### RHODE ISLAND

New England "CoCoNuts" Color Computer Club, Arthur J. Mendonca, P.O. Box 28106 North Station, Providence, 02908, (401) 272-5096(Sig3)

#### SOUTH CAROLINA

Spartanburg CoCo Club, Jesse W. Parris, 152 Bon Air Ave., Spartanburg, 29303, (803) 573-9881

#### SOUTH DAKOTA

Empire Area Color Computer Users Group of South Dakota, Carl Holt, P.O. Box 395, Brandon, 57005, (605) 582-3862

#### TEXAS

The Codis CoCo Symphony, William C. Garretson, 2902 Harvard St., Irving, 75062, (214) 570-0823

Mid Cities TRS-80 Users Group, Rob Yoder, P.O. Box 171566, Arlington, 76003, (817) 535-7931

#### VIRGINIA

Southwestern Virginia Color Computing Club, Ricky Sutphin, Route 1, Box 20, Henry, 24102, (703) 365-2018

Richmond Area Color Computer Organization, William T. Mays Jr., 6003 Westbourne Drive, Richmond, 23230, (804) 282-7778

#### WASHINGTON

Spokane Color Computer Club, Richard Bay-singer, 2217 W. Sanson, Spokane, 99205, (509) 326-2793 or BBS#(509) 325-6787

#### WEST VIRGINIA

Huntington Area Color Computer Symposium, Jim Bush, P.O. Box 391, Lesage, 25537-0391, (304) 736-5314

#### AUSTRALIA

Australian National OS-9 Users Group, Gordon Bentzen, C/- 8 Odin Street, Sunnybank, Queensland 4109, (07)345-5141

Brisbane Southwest Colour Computer Users Group, Bob Devries, 21 Virgo St., Inala, Queensland 4077, (61)-7-3727516

#### CANADA

Halifax Dartmouth Color Computer Users Group, David H. Haley, Comp. #7 Greenforest Subdivision, RR#1 Lower Sackville, NS B4C 2S6, (902) 864-0454

Les CoCophiles Du Sud-Ouest, Jean Labrose, 20 Ste-Julie #A, Vaudreuil, PQ J7V 1B5, (514) 455-0486

#### PUERTO RICO

Puerto Rico Color Computer Club, Luis R. Martinez, P.O. Box 2072, Guaynabo, 00657-7004, (809) 799-8217 or (809) 728-2314

## BBSs

State/City	BBS Name	Access Number	Parameters (Baud rate-Parity-Word Bits-Stop Bits)	SysOp
<b>Arizona</b>				
Peach Orchard	Communications Central BBS HST	(501)249-3814	300/19,200-N-8-1	Perry Parsons
<b>California</b>				
Marysville	09-Online BBS	(916)742-6809	300/1200-N-8-1	Jim Vestal
<b>Florida</b>				
Miami	A Little R S R	(305)266-1099	300/1200-N-8-1	Robert Jones/Robert Caraballo
<b>Kansas</b>				
Beloit	Kansas Konnektion BBS <sup>1</sup>	(913)738-5613	300/1200-N-8-1	Gary N. McCarty
<b>Massachusetts</b>				
Worcester	Gosub BBS	(508)756-1442	300/1200/2400-N-8-1	Richard Bostock
<b>Minnesota</b>				
Brainerd	Brainerd 4-Way <sup>2</sup>	(218)828-1144	300/1200/2400-N-8-1	Mike Lowe
<b>New Hampshire</b>				
Allenstown	The CoCoBean BBS	(603)485-8682	300/1200/2400-N-8-1	David Bean
<b>New Jersey</b>				
High Bridge	Hilltop BBS	(201)638-5698	300/1200/2400-N-8-1	Guy Silliman
Mercerville	TAO BBS	(609)587-2672	300/1200/2400-N-8-1	Bob Watson
<b>Ohio</b>				
Bellaire	The Phantasm BBS	(614)676-2505	300/1200/2400/9600-N-8-1	Dave Roth
<b>Pennsylvania</b>				
Palmer	ASCII =80=	(215)252-1608	300/1200/2400-E-7-1	Nevin Keller
<b>Tennessee</b>				
South Pittsburg	Base-Net BBS	(615)837-8352	300/1200/2400-N-8-1	Howard Bacon
<b>Virginia</b>				
Henry	Public Access <sup>3</sup>	(703)365-2018	300/1200-E-7-1 or N-8-1	Ricky Sutphin
<b>Wisconsin</b>				
Gays Mills	CoCo BBS	(608)735-4509	300/1200/2400-N-8-1	Robert & Daven Howard
Marshall	Madison Tandy Users BBS	(608)655-3806	300/1200/2400-N-8-1	Fran Selje

Notes:  
<sup>1</sup>Kansas Konnektion BBS is up from 10 p.m. to 7 a.m.  
<sup>2</sup>Brainerd 4-Way is up from 8 p.m. Saturday to 5 p.m. Friday  
<sup>3</sup>Public Access is up from 12:30 a.m. to 9 a.m. Monday through Sunday

# How Many Colors In a Rainbow?

**C**ongratulations to Heidi Nelson, RAINBOW's art director, and her husband Greg on their new arrival. Their daughter Merrill was born January 25. She was 20½ inches tall and tipped the scales at 10 pounds and one ounce. Heidi's son Timmy is adjusting well to his new sister, and the whole Nelson family, though somewhat tired, is very excited. We're happy for them, too.

Needless to say, Heidi will be taking some time off to care for the baby and herself, so you may be seeing a little different look in THE RAINBOW for the next three months or so. During this time, O'Neil Arnold will be acting in Heidi's capacity. Now, O'Neil is the first to admit he is not an illustrator. But he is an artist in his own right — what he lacks with an airbrush and colored pencils, he more than makes up for with a camera and a vivid imagination. For examples of O'Neil's work, look at the photos on pages 20 and 92.

Another change we are working on is the ability to separate four-color artwork in-house. Many of you are probably wondering just what this means. I'll give you a brief overview of the color process in magazine production.

Each page in THE RAINBOW is made up of one or more pieces of photographic film. Sometimes several sheets of film are *overlaid* (placed one on top of another) to achieve the final page. The resulting films for each page are used by the printer to create a 32-page *signature* (we call this a sig but it has nothing to do with Delphi) for the magazine pages. That's right — the press prints 32 pages at one time.

In the case of black-and-white pages, this process is not too difficult. The press operator needs to use only black ink in the press. But when we put, say, a color photograph of a CoCo screen on a page, the process becomes infinitely more complicated. It would be cumbersome to provide all shades of green, purple, etc., in the press. A printing press does not contain an infinite number of colors, so colors are not printed directly. Then how are they printed?

Before a color photo or drawing can be printed, it must be separated into four primary colors to be used by the press: black, yellow, cyan (blue) and magenta (red). These four colors are combined to create any color in the rainbow and then some. For example, a given shade of green can be made using a mixture of yellow and cyan dot patterns. So what we get from the company

that separates our photos is four pieces of film, each containing various dot patterns for one of the above colors. These films are combined with the other elements of the page to create films for each individual color. These *composited* films are then used to burn an image into a printing plate. Then the magazine paper is run through four presses, each printing the information on its plate in a single color whether black, yellow, cyan or magenta. The result is the color you see.

An ongoing problem with this is that having a color photo or drawing separated into its color components costs a heck of a lot of money. Very recently we began looking into various software packages, designed to work with our network and typesetting system, that will allow us to do our own color separations. Our artists are testing these packages by creating on their computers artwork that can then be printed on four-color films. The idea is that we will soon be able to create whole pages of THE RAINBOW, complete with color, electronically. As decisions are made about which packages we'll use, you'll see more and more examples of color in the magazine.

Within the last two weeks we have gained the ability to transfer a Color Computer MGE graphics file to MS-DOS, view the image, grab it from the screen, and then combine it with text to make a page. We are taking our first steps with these new time- and money-saving techniques. For this reason we have yet to develop a means of viewing other CoCo graphics formats. We also have a little work to do before we can actually separate color photographs. Still these projects are in the works, and you can expect to see the results as we try new things.

The upshot of all this is two-fold. First, I wanted to let you know what is involved with the color process in THE RAINBOW. Perhaps you'll have a new appreciation for the work involved as you see color images in THE RAINBOW and other magazines. Second, you will gain an advantage as a result of our using these techniques. Not long ago, Art Flexser of SpectroSystems suggested we use more screen shots in our feature articles. His suggestion is based on the idea that you can learn more if you can see what the program is really supposed to do. Well, that's where we are headed. And our move into the area of in-house color separations will allow us to provide this to you in a cost-effective manner.

— Cray Augsburg



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B & B Software .....	49	Rainbowfest .....	90	T & D Software .....	89
Burke & Burke .....	97	Rainbow CoCo History Book .....	103	T & D Software .....	109
Cer-Comp, Ltd. ....	43	Rulaford Research .....	47	Tandy/Radio Shack .....	33
CoCo Pro .....	25	Second City Software .....	129	Tandy/Radio Shack .....	115
CoCo Gallery on Disk .....	18	Spectrosystems .....	51	Tepeco.....	58
Colorware.....	19	SPORTSWARE .....	107	True Data Products .....	81
Compuserve .....	79	Sugar Software .....	95	Try-O-Byte .....	77
Computer Island.....	115	Sundog Systems .....	IFC	Wasatchware .....	29
Computer Plus .....	3	Supersoft, Inc. ....	45	Zebra Systems .....	61
CRC/Distro .....	53	T & D Software.....	23		
Danosoft .....	41				
Dayton Associates of W.R. Hall, Inc.	101				
Delphi .....	121				
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JWT Enterprises .....	29				
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NRI Schools .....	Insert				
Oblique Triad .....	65				
Orion Technologies .....	39				
Owl-Ware .....	69				
Owl-Ware .....	70				
Owl-Ware .....	71				
PCM .....	83				
Perry Computers .....	117				
Puritas Springs Software .....	87				
r3 Systems .....	87				



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# UltiMusE III

The Ultimate Music Editor for the CoCo 3

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UltiMusE III is a MIDI 'Notation Sequencer'. It lets you write and edit sheet music on a 640x192 graphics screen using the mouse, play it on ANY MIDI-equipped synthesizer(s), and print out the score... Written by an experienced computer professional who is also a serious amateur musician and composer. With UltiMusE III, there is no more 'faking' to play what you want to hear! Perfect for the trained musician, UltiMusE III's natural notation also helps a beginner to copy a favorite piece of sheet music just as it looks. Why should your music sound like a machine? UltiMusE III has a wide pitch range, from 4 octaves below Middle C to over 3 above. Each staff has a 4-octave range centered on one of four clefs - Treble, Guitar, Bass, and Double Bass. Staff placement, clefs, and part and MIDI channel assignments can ALL be edited... Professional software should use a professional Operating System. UltiMusE III uses the advanced features of OS-9 Level II and does not interfere with its windowing and printing in any way.

**SYSTEM REQUIREMENTS:** CoCo 3 with at least 256K memory, OS-9 Level 2, Mouse or Joystick (Hi-Res Joystick Adapter recommended), Synthesizer(s) with MIDI-In jack, plus a Serial to MIDI cable. Tandy's DMP printer, a MIDI Interface Pak, and a Multi-Pak are optional equipment.

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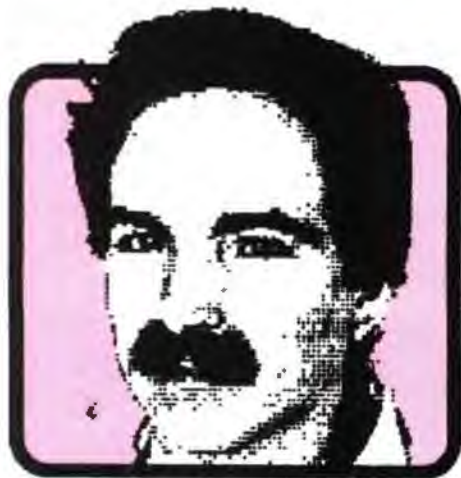
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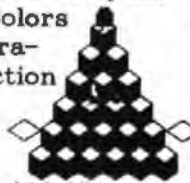
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See Rainbow Reviews 8/89

(9 ship)

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