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THE COLOR COMPUTER MONTHLY MAGAZINE

September 1990 Vol. X No. 2

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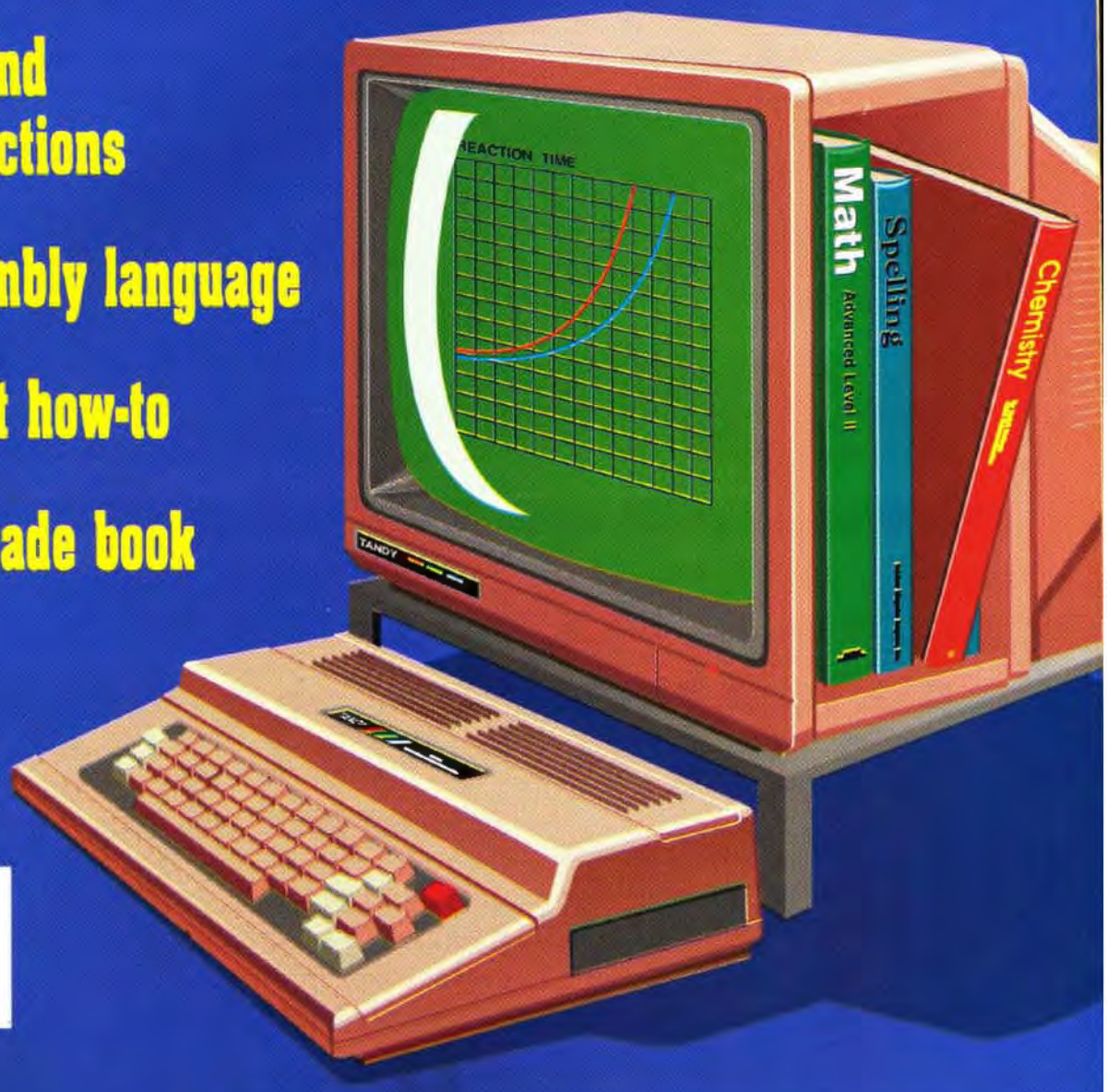

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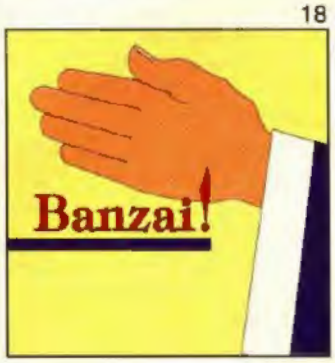

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Letters to the RAINBOW

Video and the CoCo

Editor:

In the July 1990 issue of THE RAINBOW, John Handis made a reference to a video-titling/graphics controller for the CoCo. When I read this, the light came on. *Radio Electronics* ran a series of articles on how to build a video-titler. With the help of those articles, I can build a titling interface.

The device featured was a stand-alone unit that could receive data from any computer, i.e. graphics or different characters. I hope to build a program pack, to be released sometime soon.

The CoCo is already equipped to control an "edit" VCR — if it has a remote/camera pause feature. To use this, wire the cassette relay as a switch on the remote pause.

Ricky Beam
Shelby, North Carolina

What a Pro!

Editor:

I had been trying to buy a hard drive system for my CoCo 3. After getting a hard drive, I found that three of your major advertisers would not assist me in deciding what software I needed to partition the hard drive. Most of them wanted me to buy a different interface (one that they sell). To tell you the truth, I was ready to buy an IBM. I finally called Dave Meyers at CoCo Pro!, and he helped me a great deal. Thanks, Dave, for all your help.

David Jones
Eldora, Iowa

Solitaire Lovers Are Not Alone

Editor:

This is a song in praise of THE RAINBOW, some contributors and a couple of software companies — sound familiar?

Before ever there was UNIVAC, I was a tireless and dedicated Solitaire card game fan, as were my father and grandfather. When I first got my CoCo, I played all kinds of computer games but still had a hankering for Solitaire.

THE RAINBOW came to my rescue in December 1986, with Tudor P. Jones' excellent *Klondike* game and its upgrades by George Quellhorst and Vincent Johnson (January and December '88).

There is yet more. No Solitaire addict plays just one kind of Solitaire. There are hundreds of them out there. At the '89 New Jersey RAINBOWfest, I got to talking with the Eversoft people about the need for more Solitaire games, and lo and behold an Eversoft ad appeared in THE RAINBOW for *Classic Solitaire*. I promptly bought it; they promptly sent it. It looks classy and plays great — all three games: *Klondike*, *Canfield* and *Pyramid*.

There must be more Solitaire addicts and games out there. Support Solitaire programmers and keep the games coming. Let mine not be a solo stand.

Nancy Ewart
Toms River, New Jersey

Eyes Open for Voice Synthesizer

Editor:

I hope you can help me with my problem! I am very much interested in finding and purchasing a voice synthesizer (a good one, with understandable speech) and a speech recognition unit for my CoCo 3. If there is anyone who can help me, please write.

Michael Holtry
695 Park Avenue, #216
Idaho Falls, ID 83402

Pure Mathematics

Editor:

Even though BASIC cannot extract the square root of negative numbers, it is a shame to exclude the roots of quadratic equations with imaginary parts as William Flinn does in the June issue (Page 49). Though engineers and architects may not implement them, imaginary and mixed numbers are important to pure mathematics. One simple change to the listing of QUADRATC and nine added lines do the trick.

First, change 190 to 210 in Line 81. Next add the following lines:

```
210 S=SQR(-L)
220 T=2*A
230 U=S/T
240 V=-B/T
250 PRINT
260 PRINT" 1ST SOLUTION:";V"+"U"
I"
270 PRINT" 2ND SOLUTION:";V"-"U"
I"
280 PRINT
290 GOTO 190
```

Note that Line 210 tricks BASIC into taking the square root of a negative number, as Line 90 gives the square root of a real number. The former cannot be combined

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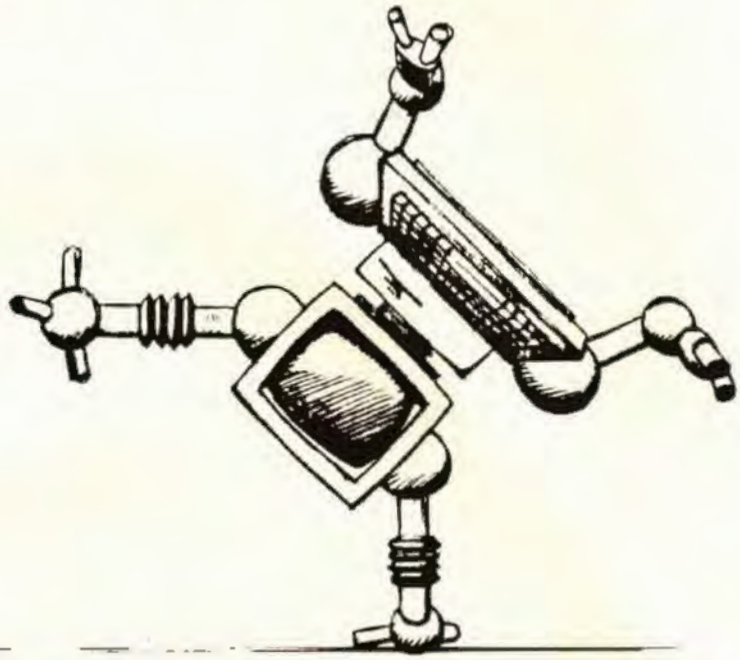

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COLORWARE

with -B, a real number, as in lines 100 and 130. They occur, divided by 2A, in the roots with the addition and subtraction indicated. "I" is not the proper mathematical *i* but will have to do. Also, I deliberately ignore the mathematician's demand for exact solutions rather than decimal approximations.

Line 200 may leave the program either in limbo or producing rubbish if a key other than Y or N is struck accidentally. I would prefer these two lines:

```
200 IF A$="Y" THEN 10
205 IF A$="N" THEN END ELSE GOTO
 190
```

This is protection in any event and essential with the added lines.

David F. Siemens, Jr., Ph.D.
Professor of Philosophy Emeritus
Los Angeles Pierce College

Clickity-Clack

Editor:

What would I do without THE RAINBOW? It's my teacher, guide, gospel, etc. I have all the back issues; what a mine of information!

Some time ago a reader asked you how to put a typewriter click in the keys of his CoCo. I have another problem. My CoCo 3 keys make a loud click, clack noise, which bothers members of my family. How can I silence my CoCo 3?

Lyone Boult
330 Metcalfe, Apt. 403
Ottawa, ON K2P 1S4
Canada

The Color Computer is not designed to provide audible feedback for the keyboard. The solution is to use software to allow the user to hear when a key is struck. There is no software solution for keys that clack by themselves, and we know of no simple mechanical solution. Maybe one of our other readers can help.

Wanted, Dead or Alive

Editor:

Since I've been subscribing to THE RAINBOW I've come across many useful and informative articles throughout the magazine. This includes vendors that support the CoCo both in Canada and the States. But the main problem is finding which companies still support the CoCo. It appears many companies have disappeared.

I'm looking for the following hardware and software packages:

1) A Super Voice Cartridge — I know Speech Systems no longer supports the CoCo, but is there a replacement for this package?

2) RASCAN Video Digitizer — Does MicroCom Software still sell these units, or have they been dropped?

3) *Color Max 3 Deluxe* — Is there anyone who still sells this package, or do I need to upgrade to *CoCo Max III*? I still have a copy of *Color Max III* 128K version and would like to upgrade it if possible.

4) SolidDrive — Has Vidicom Corporation stopped supporting the CoCo, or is there a supplier that carries this physical RAM disk?

If you could help me track down these products or know of someone who can help me do so, I'd be grateful.

Doug Fraser
Box 137
Burns Lake, BC V0J 1E0
Canada

Get Back to BASIC

Editor:

The CoCo is as good a computer in its class as can be bought, without a doubt. To those of us with no interest in OS-9 or machine language gibberish, THE RAINBOW is a waste of money and time.

I can remember when I looked forward to each month's issue, because I knew there would be some good useable material to copy and save. Now I go to the book store, thumb through the latest issue and leave empty-handed.

Those interested in OS-9 can let *Nine-Times Magazine* handle it and then THE RAINBOW can get back to the interesting magazine it once was.

THE RAINBOW used to contain from 160 to 180 pages. Since August '89 there has been barely enough material to fill 100 pages.

I can understand the cost to produce a magazine. If it takes a price increase to have the same quality RAINBOW that once was, so be it. I'm sure my feelings are shared by many more CoCo users.

Jim Price
Florence, Alabama

Actually, we see the inclusion of OS-9 as a part of our goal to keep an eye on areas of potential growth for the CoCo Community as a whole. This is called support but, then, we could all learn something about that, eh?

Kudos from Illinois to Dayton

Editor:

I was very pleased with the service and products of Dayton Associates, of W.R. Hall, Inc. I ordered the Star NX-1000 printer system from it on June 1. To my great surprise, I received the system on June 7.

Not only was I pleased with this quick shipment but with the product itself and the software support included with the system. The support informed me of what my new toy was capable of and aided me in setting up the printer.

Once again, thanks to Dayton Associates and THE RAINBOW.

Tim Keber
Wood River, Illinois

High-Speed Poker

Editor:

I don't recall reading anything about the high-speed poke creating problems with the CoCo 3. On several occasions, while I operated in the high-speed mode (`POKE 65497,0`) and forgot to return to normal speed, serious problems developed with the disk system.

On one occasion I had a long address file program in the computer, and I saved it to a disk file. Upon using the program the next time, I found the list completely jumbled with some parts missing.

On a couple of other occasions with game programs, I found the disk no longer useable and showing an I/O error, although the directory came up. Attempting to reformat was useless, and I had to throw away the disk.

I have no problem with `POKE 65495,0`.

Paul A. Scholz
Cotati, California

It has been a while since we published the contraindications of using the high-speed pokes. As you have found, `POKE 65497,0` *makes disk and tape I/O unreliable, and it doubles the printer output rate. If you are in the habit of using this high-speed poke, make sure you slow the system down using* `POKE 65496,0`*, manually or in a program, before trying to save/load files.* `POKE 65495,0` *has no effect on the CoCo 3.*

UltiMusE Printer Options

Editor:

I occasionally play accordion with a Scottish band and use *UltiMusE* with a digital keyboard as a tireless, uncomplaining practice partner. I'm able to do troublesome passages over and over until I get them right. The CoCo and *UltiMusE* let me play at the correct pitch and tempo — the ultimate luxury.

In a previous letter I wrote to your magazine, I agreed with your glowing story about *UltiMusE 3*, but pointed out that it had a hard-copy problem with the Gemini printer. I had difficulty getting details of this problem through the distributor to Mike Knudsen and asked you to forward my letter with samples of the hard-copy glitch

Continued on Page 87

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UPS 2ND DAY AIR

It All Started With Education

I got a letter from one of our subscribers the other day — Bill Benton in Tuscaloosa, Alabama — and just haven't had time to give him a personal reply. Bill is one of our double family members who has both a CoCo and a Tandy 1000-series computer and says he cannot do without both THE RAINBOW and PCM.

Bill and I, as it turns out, went to the same University — the University of Alabama — and had at least one teacher in common. He mentioned two of his professors in his letter to me, and one of them I had while the other was very well-known among many students.

This being our education issue, I thought it would be a good idea to answer Bill's letter and, at the same time, make some comments about education and teachers.

The oldest theme of THE RAINBOW is education. I suppose that in its first year, as it began to grow, there was enough material around September to actually have some sort of a theme for an issue, and education was it.

I have always thought education to be an integral part of computing and computers. The many things computers can do to help people learn are unending. In some ways we are just touching the surface of these areas. In the CoCo world, Steve Blyn of Computer Island and Fred Scerbo are full-time teachers who have contributed to this mass of information for years.

Let no one ever discount the impact of a teacher. I was talking with my daughter, Wendy, the other day and I asked her who she thought was the most influential teacher of her life. Wendy's considered opinion was her sixth grade teacher, Marsha K. Moore, of Tuscaloosa Academy. As Wendy put it, Ms. Moore shaped her up.

One of the teachers Bill Benton mentions in his letter is Walter Koch of the Department of Geography at Alabama. Dr. Koch is one of the most knowledgeable people I have ever met. He taught U.S. Geography and World Geography, and I do not think he ever referred to a note. He took us through New York City practically street by street, expecting us to know the garment district was in one area and the Avenue of the Americans was really Sixth Avenue.

He was very partial to fill-in-the-blank questions and I will never forget one of them. In United States Geography: "The _____ and _____ rivers meet at _____ and form the _____ River, and this area is called the _____ _____."

That was sort of typical. He expected you to learn it.

Gosh, I wish I had a CoCo back then. I must have made myself 1000 index cards with all this information on it.

By the way, I was extremely interested in this detailed look at the world and decided to tackle Dr. Koch on his area of expertise, geography of the Soviet Union. Oh, my. But he was a heck of a teacher and was always kind enough to spell out those multi-consonant Russian words.

I could go on talking about a list of teachers at the University of Alabama and elsewhere. There are, of course, many excellent ones. My point, however, is that teachers like Dr. Koch and Steve Blyn have greatly influenced our lives, and I am very pleased we can count our Educational Issue as the longest-running theme here at THE RAINBOW.

I really think that is appropriate.

—Lonnie Falk

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Align your text in 2 columns with a few keystrokes!

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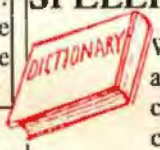
Playback up to 250 keystrokes with a single key! Automate multiple tasks with a single key! You'll love it!



SPELLING CHECKER

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

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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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UPS 2ND DAY AIR

Plot a Lot

by Matthew Hunt

Make abstract math formulas concrete

UltraGraph, for the CoCo 3, graphs almost any mathematical equation rapidly — especially considering it uses BASIC in the HSCREEN4 640-by-192 mode. The graphs are in full color and give you information such as *x* and *y* intercepts. The program graphs over almost any range, drawing the axis where $x=0$ and $y=0$ based upon the range. It has a title screen and a demo with four graphs that run if no key is pressed in 30 seconds. It also has a built-in screen dump for the Radio Shack DMP-130. *UltraGraph* graphs lines, parabolas, circles, ellipses, hyperbolas and the trigonometric functions such as sine, cosine and tangent.

Matthew Hunt is 17 years old and attends First Baptist Church School. He has been using Color Computers since 1981. He may be contacted at 84 Smith St., Charleston, SC 29401.

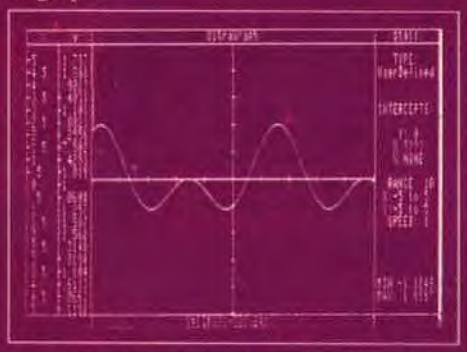
In addition, there is a user-definable function that graphs whatever is typed in, be it $300*x^2$ or RND(*x*). A description of each function is given after the option is selected. The program is useful, educational and above all, fun.

After the title screen appears, a menu with 10 choices is displayed. On the bottom of the screen is a timer that counts down from 30 seconds. If this timer reaches zero before you press a key, the program goes into the Demonstration mode. The BREAK key exits at any time and returns you to the beginning of the program, regardless of where you are. Keys 1 through 7 select the function listed beside the number.

For instance, pressing 1 selects a Line. A description of a line and its mathematical formula are shown, and you are asked for the slope and y-intercept or other information, depending on the graph you have chosen. Press 9 to exit the program.

Pressing 8 allows you to define the user-defined function, which works a little differently. You must have a disk with at least one free granule in the default drive (usually Drive 0). Type in the equation you want to graph, such as 1/*x*. Use asterisk (*) to multiply, slash (/) to divide, COS for the cosine function, SIN for the sine function, TAN for the tangent functions, and the up-arrow to raise a value to the specified number. Be careful: The program does not scan for Syntax errors but takes care of functions undefined at a point. When the function is entered, *UltraGraph* writes a line of code to the disk and merges with it. Run the program again and select A to graph the defined function.

Once a function has been entered, you are asked for some other information. First you are asked whether you want to erase the previous screen. If you want to graph the function you have selected over the function you graphed before it, press N. If you do not or you haven't graphed a function before, press Y. After that, you are prompted for the color you want the graph to be. 1=white, 2=yellow and 3=red. Then enter the range and the minimum *x* and *y* values to graph.



For instance, if you want to graph from *x*=-2 to *x*=12 and *y*=-4 to *y*=6, select a range of 10, a minimum *x* of -2 and a minimum *y* of -4. (If you don't know what this means, just press ENTER for the defaults to graph from -5 to 5.) Finally, enter the speed (1 through 4). Each number is twice that of the one before, but only half as many points are plotted. For instance Speed 1 takes about one minute, and about 400 points are plotted. Speed 2 takes about 30 seconds but only plots 200 points, and so on. Faster speeds result in bumpier graphs, making curves somewhat blocky.

Now for the graphing. On the left side of the screen, twenty *x* and *y* values are listed. On the right, the type of function, intercepts, range and maximum and minimum values encountered are printed. The function is on the window at the bottom of the screen. After the graph is completed, you are notified via a message in the bottom window. You'll also see the time it took to plot the graph. Press a key and you are asked if you want a screen dump to the

printer. Press N if you do not want a screen dump, and the program loops back to the beginning. If you do want a printout, press Y. The dump takes about 12 minutes; when it is done, the program starts back at the beginning.

Line 1180 sets the baud to 1200, but the CoCo is in the high-speed mode (Line 50). The effective rate is 2400 baud and you should set the DIP switches on the DMP-130 for this rate. ❑

CoCo 3

- MEANS DONE

40	204	620	105	1210	53
70	100	645	38	1270	6
91	128	690	191	20010	171
120	214	750	179	20040	78
170	155	800	156	30010	200
230	146	833	56	50000	16
270	192	910	182	50030	186
295	1	990	201	60001	231
330	144	1020	173	60220	128
400	114	1110	200	60300	201
460	144	1167	207	END	194
550	27				

The Listing: GRAPH

```
0 'COPYRIGHT 1990 FALSOFT, INC.
5 ON BRK GOTO 5
6 ON ERR GOTO 5'IF ERROR, THEN R
  UN INSTEAD OF CRASHING
10 'VERSION 3.7-4/23/89
15 'UltraGraph!
16 '(c) 1988 by Matthew Hunt
19 IF TA=0 THEN HBUFF 1,1800:HBU
  FF 2,1800:HBUFF 3,1800:TA=1
20 GOTO 40
30 GOTO 5
40 CLEAR 1000:TA=1:FI=1:WIDTH 80
  :ON BRK GOTO 30:GOSUB 1260:ATTR
  3,0:Q=23:Y$="<<< Press any key t
  o Continue >>>":GOSUB 1230:Q=0:T
  IMER=0
41 A$=INKEY$:IF A$="" AND TIMER/
  60<10 THEN LOCATE 76,23:PRINT ST
  R$(10-INT(TIMER/60));:GOTO 41
42 TA=1
50 POKE65497,0
60 R=1:D=1:Q=23:Y$=STRING$(78,"
  "):GOSUB 1230:Q=0:Y$="**** Ultra
  Graph! ****":GOSUB 1230:Y$=" -<
   By Matthew Hunt >-"+CHR$(13):G
  OSUB 1230:ATTR 3,2
70 RGB:PALETTE 0,0:PRINT"1. LINE
  S ":PRINT "2. PARABOLAS":PRINT"3
  . CIRCLES & ELLIPSES":PRINT "4.
  HYPERBOLAS":PRINT"5. COS(X)":PRI
  NT"6. SIN(X)":PRINT"7. TAN(X)"
75 LOCATE 39,12:PRINT"8.  Define
   function";:LOCATE 39,13:PRINT"9
  .  End program.";:LOCATE 39,14:P
  RINT"A.  Execute defined functio
  n";:LOCATE 0,19
80 PRINT STRING$(78,"-"):ATTR 3,
  0:PRINT CHR$(8);:ATTR 3,2:LOCATE
   79,19
89 LOCATE 0,23:ATTR 2,4:TIMER=0:
  TA=1
90 A$=INKEY$
91 LOCATE 0,23:ATTR 3,2:PRINT ST
  RING$(78," ");:ATTR 2,4:LOCATE 0
  1,23:PRINT " Hit number of choic
  e or wait "+STR$(30-INT(TI))" se
  conds";:TI=TIMER/60:IF TI>30 THE
  N GOTO 30000 ELSEQ1=Q1+F:IF Q1>3
  5 THEN F=-1 ELSE IF Q1<1 THEN F=
  1
92 IF A$="" THEN 90
93 IF A$="A" THEN JL=6:TYPE$="Us
  erDefined":GOSUB 50070:IF Y$="UN
  DEFINED" THEN PRINT"MUST DEFINE
  FUNCTION FIRST!!!":FOR X=0TO1000
  :NEXT:GOTO 5 ELSE UD=1:GOTO 290
94 UD=0
100 IF VAL(A$)<1OR VAL (A$)>9 TH
  EN 90
110 G=VAL(A$)
115 IF VAL(A$)=9 THEN CLS:PRINT"
  OK.":POKE65496,0:END
116 IF G=8 THEN 50000
120 IFG=1THENTYPE$="LINE"ELSEIFG
  =2THENTYPE$="PARABOLA"ELSEIFG=3T
  HENTYPE$="CIRCLE"ELSEIFG=4THENTY
  PE$="HYPERBOLA"ELSEIFG=5THENTYPE
  $="COSINE"ELSEIFG=6THENTYPE$="SI
  NE"ELSEIFG=7THENTYPE$="TANGENT"
130 JL=G:IF JL>4THENJL=JL-2
140 S=0:IF G>2 AND G<5THEN S=1:I
  F G=4 THEN B=-1 ELSE B=1
150 IF S=1THEN970
155 IF G>4 THEN GOSUB 20000
160 IF JL=1 THEN GOSUB 1240:Q=12
  :Y$="<<<< Lines >>>>":GOSUB 1230
  :Q=Q+1:LOCATE 0,Q:PRINT"An equat
  ion for a LINE is in the form [Y
  =MX+B], where M is the SLOPE (ho
  w steep it is), and B is the Y-I
  NTERCEPT, or where the line cros
  ses the Y(VERTICAL)AXIS."
170 IF JL=1 THEN GOSUB1220:GOSUB
  1240:Q=12:Y$="<<<LINE EQUATION I
  NPUT>>>":GOSUB1230:Y$="Y=M*X+B":
  GOSUB1230:Y$="SLOPE(M)":GOSUB123
  0:INPUT M:Y$="Y="+STR$(M)+"*X+B"
  :Q=13:GOSUB1230:Y$="Y-INTERCEPT(
  B)":GOSUB1230:INPUT B:FM$="Y="+S
  TR$(M)+"*X+"+STR$(B)
180 IF JL=1 THEN Q=13:Y$=FM$:GOS
  UB 1230
190 IF JL=1 THEN SE=M:HI=B:GOTO
  290
210 IF JL<>2 THEN 290
220 GOSUB1240:Y$=" <Parabolas an
  d power functions>"+CHR$(13):GOS
  UB 1230:PRINT"Parabolas are in t
  he form AX^2*BX+C(^=to the power
   of).  C is the Y-intercept,  or
   where the parabola intersects t
  he y-axis.  The program automati
  cally gives  the intercepts.
230 GOSUB1220:GOSUB1240:Q=12:Y$=
  "<Parabolas and power functions>
  ":GOSUB 1230:FM$="Y=A*X^??+B*X+C
  ":Y$=FM$:GOSUB1230
240 Y$="Power to raise X to(??)[
  MAX=10,MIN=-10]":GOSUB 1230:INPU
  T PO:IF PO>10 OR PO<-10 THEN Q=Q
  -1:GOTO 240:FM$="Y=A*"+STR$(PO)+
  "+B*X+C":Y$=FM$:Q=13:GOSUB 1230
250 Y$="Number to multiply X^??
  BY(A)[1000 MAX, -1000 MIN]":GOSU
  B 1230:INPUT NU:IF NU>1000 OR NU
  <-1000 THEN Q=Q-1:GOTO 250
260 Y$="Number to multiply the 2
  nd X by(B)":GOSUB 1230:INPUT SE:
  IF SE>10000 OR SE<-10000 THEN Q=
  Q-1:GOTO 260
270 Y$="Number to add on the end
  (c)":GOSUB 1230:INPUT HI:IF HI>1
  0000 OR HI<-10000 THEN Q=Q-1:GOT
  O 270
280 FM$="Y="+STR$(NU)+"*X^"+STR$
  (PO)+"+"+STR$(SE)+"*X+"+STR$(HI)
  :Q=13
290 GOSUB 1240:Q=15:Y$="Erase pr
  evious screen?(y/n)":GOSUB 1230
291 A$=INKEY$:IF A$="y" OR A$="Y
  " THEN CL=1:POKE &HE6E4,&HE7 ELS
  E IF A$="N" OR A$="n" THEN CL=0:
  POKE &HE6E4,&HE6 ELSE GOTO 291
292 Y$="Color of graph(1-3)?":GO
  SUB 1230
293 A$=INKEY$:IF A$="" THEN 293
  ELSE IF VAL(A$)<1 AND VAL(A$)>4
  THEN GOTO 293 ELSE CO=VAL(A$)
295 GOSUB 1240:Q=12:Y$="Range of
   numbers[MAX=200-]?":GOSUB 1230:
  INPUT RA$:IF RA$=""THEN RA=5 ELS
  E IF VAL(RA$)=0 OR VAL(RA$)<0 OR
   VAL(RA$)>200 THEN Q=Q-1:GOTO 29
  0 ELSE RA=VAL(RA$)/2
300 IFS=1THENLY=-RA:LX=-RA:GOTO3
  50
310 Y$="LOWEST X-VALUE TO GRAPH?
  ":GOSUB 1230:INPUT LX$:IF VAL(LX
  $)>10000 OR VAL(LX$)<-10000 THEN
   Q=Q-1:PRINT"OUT OF RANGE. REDO.
  ":GOTO 310 ELSE IF LX$="" THEN L
  X=-RA ELSE LX=VAL(LX$)
320 IF LX$="" THEN LX=-RA ELSE L
  X=VAL(LX$)
330 Y$="LOWEST Y-VALUE":GOSUB 12
  30:INPUT LY$:IF VAL(LY$)>10000 O
  R VAL(LY$)<-1000 THEN PRINT"OUT
  OF RANGE.  REDO":Q=Q-1:GOTO 330
  ELSE IF LY$="" THEN LY=-RA ELSE
  LY=VAL(LY$)
340 IF LY$="" THEN LY=-RA ELSE L
  Y=VAL(LY$)
350 MX=LX+RA*2:MY=LY+RA*2
```

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```
360 IF JL=1 THEN SP=8:GOTO 390
370 PRINT"SPEED(1-4)-each # doub
les speed of previous# but halve
s resolution.(1-slowest)"
380 A$=INKEY$:IFA$=""THEN380ELSE
IFVAL(A$)=0THEN380ELSEIFVAL(A$)>
4THEN380ELSESP=2^(VAL(A$)-1)
385 '
386 '
390 D=1/(436/SP/(RA*2))
395 IF UD=1 THEN GOSUB 50070:FM$
="Y="+Y$
400 HSCREEN4:HCOLOR 1:HLINE(102,
184)-(538,191),PRESET,BF:PALETTE
 1,63:PALETTE 2,54:HLINE(102,191
)-(538,183),PSET,B:HGET(103,190)
-(537,184),3:C$="Graphing:"+FM$:
GOSUB 9999:TIMER=0
401 IF PEEK(&HE6E4)=&HE6 THEN HL
INE(1,9)-(99,183),PRESET,BF:HLIN
E(541,9)-(638,183),PRESET,BF
402 IF S=1 THEN 510
410 R=6:X$="INTERCEPTS:":GOSUB12
00
420 IFTYPE$<>"HYPERBOLA"ORTYPE$<
>"CIRCLE"THENR=8:X=0:ON JL GOSUB
 1090,1070,1110,1130,1150:X$="Y:
"+STR$(Y):GOSUB1200
450 IFJL>2 THEN IN$="X:":X$="X:?
???":GOSUB1200
460 IFJL>2 AND PO=2 THENGOTO510E
LSEX$="X:":G=SE^2-4*NU*HI:IFG<00
RNU=0THENX$=X$+"NONE":GOSUB1200E
LSEIFG=0THENF=SE/(2*NU):X$=X$+ST
R$(F):GOSUB1200ELSEF=(-SE+G^.5)/
(2*NU):B=(-SE-G^.5)/(2*NU):X$=X$
+LEFT$(STR$(F),4)+","+LEFT$(STR$
(B),4):GOSUB1200
470 MK=R+2:R=1
480 PALETTE 1,63
490 '
500 ' DRAW SCREEN
510 T1=(-LX)*436/(RA*2)+102:T2=(
2*RA+LY)*174/(RA*2)+9:IF T1>102
AND T1<538 THEN HLINE(T1,9)-(T1,
183),PSET
520 IF T2>9 AND T2<183 THEN HLIN
E(102,T2)-(538,T2),PSET
530 HLINE(0,0)-(639,191),PSET,B:
HPRINT(35,0),"UltraGraph":HLINE(
0,9)-(639,9),PSET:HLINE(0,183)-(
639,183),PSET
540 'PRINT X AND Y VALUES
550 HLINE(100,0)-(100,191),PSET:
HLINE(540,0)-(540,191),PSET
560 HCOLOR 2:HPRINT(3,0),"x":HPR
INT(9,0),"y":HPRINT(71,0),"stats
:":HCOLOR 1:HLINE(50,9)-(50,183)
,PSET:HCOLOR 2
570 IF TYPE$="ELLIPSE" OR TYPE$=
"HYPERBOLA" OR TYPE$="CIRCLE" TH
EN GOTO 637 ELSE AM=RA
580 IF RA<11 THEN ST=RA/10 ELSE
ST=(RA*2)/20
590 SN=599:X=LX:ON JL GOSUB 1090
,1070,1110,1130,1150,1165:MAX=Y:
MIN=Y
599 SN=610:N=2:TE=LX
600 FOR X=TE TO MX STEP ST:ON JL
 GOSUB 1090,1070,1110,1130,1150,
1165:IF Y>MAX THENMAX=Y
610 IF Y<MIN THEN MIN=Y
620 A$=LEFT$(STR$(Y),6):HPRINT(0
,N),LEFT$(STR$(X),6):IFND=1THENA
$=" ONE"
630 HPRINT(6,N),A$:N=N+1:IF ERNO
>-1 THEN IF TE<MX THEN TE=X+ST:G
OTO 600 ELSE ELSE NEXT X
637 X$="TYPE:":R=2:GOSUB 1200:X$
=TYPE$:GOSUB 1200
638 IF S<>1 AND DE<>1 THEN R=R+8
 ELSE IF DE=1 THEN R=R+7
639 HCOLOR 1:IF SP=4 THEN SP=3 E
LSE IF SP=8 THEN SP=4
640 HC=3:X$=" RANGE:"+STR$(RA*2)
:GOSUB1200:X$="X:"+STR$(LX)+" to
"+STR$(MX):GOSUB 1200:X$="Y:"+ST
R$(LY)+" to"+STR$(MY):GOSUB 1200
:X$="SPEED:"+STR$(SP):GOSUB 1200
645 IF DE=1 THEN HCOLOR 2:R=R+1:
X$="Demo mode:":GOSUB 1200:X$="T
o exit hit":GOSUB 1200:X$="<Brea
k>":HCOLOR 1:GOSUB 1200
650 G=436/RA/2:FOR X=320TO102STE
P-G:IF T2>9 AND T2<183 THEN HLIN
E(X,T2-2)-(X,T2+2),PSET:NEXT X:F
OR X=320TO539STEPG:HLINE(X,T2-2)
-(X,T2+2),PSET:NEXTX
660 G=174/RA/2:FORY=96TO9STEP-G:
IF T1>102 AND T1<538 THEN HLINE(
T1-2,Y)-(T1+2,Y),PSET:NEXTY:FORY
=96TO183STEPG:HLINE(T1-2,Y)-(T1+
2,Y),PSET:NEXTY
670 K=174/(RA*2):J=436/(RA*2)
680 M1=103-(RA+LX)*J:M2=(RA+LY)*
K+9
685 HGET(102,182)-(538,190),2:HG
ET(102,1)-(538,8),1
690 IF S=1 THEN GOTO 850
700 'START GRAPHING
710 SN=715:MK=19:R=19:X=-RA:ON J
L GOSUB 1090,1070,1110,1130,1150
:H=(X+RA)*J+102:R=R+1:MK=R:X$="M
IN:"+STR$(MIN):GOSUB1200:X$="MAX
:"+STR$(MAX):GOSUB1200:I=(-Y+RA)
*K+9:IFI<9THENI=9ELSEIFI>183THEN
I=183'SET UP FOR INITIAL POINT
715 HCOLOR CO:SN=740:TE=LX
720 FOR X=TE TO MX STEP D
730 ON JL GOSUB 1090,1070,1110,1
130,1150,1165
740 IFND=1THENIF ERNO>0 THEN H=(
X+RA)*J+M1:TE=X+D:GOTO 720 ELSE
NEXT X
750 IF Y=0 THEN IF JL>2 THEN IN$
=IN$+LEFT$(STR$(X),3):X$=IN$:R=M
K-3:GOSUB1200
760 IF Y>MAX THEN MAX=Y:X$="MAX:
"+STR$(Y):R=MK+1:GOSUB1200:HCOLO
R CO
770 IF MIN>Y THEN X$="MIN:"+STR$
(Y):R=MK:MIN=Y:GOSUB1200:HCOLOR
CO
780 T=(X+RA)*J+M1:Y=(-Y+RA)*K+M2
790 IFY<9 THEN IF I=183 THEN I=9
:Y=9:NEXT X ELSE Y=0:HLINE(H,I)-
(T,Y),PSET:HPUT(102,1)-(538,8),1
,PSET:I=9:Y=9:H=T:NEXT X
800 IFY>183 THEN IF I=9 THEN I=1
83:Y=183:H=T:NEXT X ELSE Y=191:H
LINE(H,I)-(T,Y),PSET:HPUT(102,18
2)-(538,190),2,PSET:I=183:Y=183:
H=T:NEXT X
810 HLINE(H,I)-(T,Y),PSET:H=T:I=
Y
820 IF X<MX THEN NEXT X
829 IF DE=1 THEN ON LN GOSUB 300
10,30020,30030,40000:GOSUB 40500
:GOTO 390  ELSE C$="Graph comple
ted("+MID$(STR$(TIMER/60),2,4)+"
 secs)-hit any key":GOSUB 9999
830 A$=INKEY$:IFA$=""THEN830
831 C$="Print Screen to printer(
Y/N)?":GOSUB 9999
832 IF A$="N" OR A$="n" THEN GOT
O 5 ELSE IF A$="y" OR A$="Y" THE
N GOTO 833 ELSE A$=INKEY$:GOTO 8
32
833 C$=FM$:GOSUB 9999:GOTO 1180
840 'GRAPH HYPERBOLAS,ELLIPSES,A
ND CIRCLES
850 FORX=LX TO MX STEP D
860 F=C*D2*(EO-B*(X^2/D1)):IFF<0
THENH=96:E=96:G=(X+RA)*J+M1:NEXT
X
870 IF F>0THENY=F^.5 ELSE IF X<R
A-D THEN NEXT X
880 IF F<9THENF=9ELSEIFF>183THEN
F=183
890 T=(X+RA)*J+M1:F=(Y+RA)*K+9:Y
=(-Y+RA)*K+M2
900 IFF<9THENF=0ELSEIFF>183THENF
=192
910 IFY<9THENG=T:E=9:H=F:V=1ELSE
IFY>183THENG=T:E=183:H=F:V=1ELSE
V=0
920 IFV=1THEN950
930 IF X>RA THEN GOTO830
940 HLINE(G,E)-(T,Y),PSET:HLINE(
G,H)-(T,F),PSET:G=T:E=Y:H=F
950 IF X<RA-D THEN NEXT X
960 GOTO 829
970 IF B=-1 THEN L$="-" ELSE L$=
"+"
980 GOSUB 1240:Y$=" CIRCLES/HYPE
RBOLAS/ELLIPSES"+CHR$(13):Q=12:G
OSUB 1230
990 PRINT"Hyperbolas, circles, a
nd ellipses are all quite simila
r.  Everyone knows what  a circ
le is.  An ellipse is just a sor
t of streched-out circle, and a
hyperbola looks like an ellipse
cut in two and fliped."
1000 Q=17:Y$="Enter in the form
[x/v1]^2+(- for hyperbola)[y/v2]
^2=v3":GOSUB 1230:GOSUB 1220
1010 GOSUB 1240:Y$="<<Circles,el
lipses, & hyperbolas>>":Q=12:GOS
UB 1230:Y$="[X/V1]"+L$+"[Y/V2]=V
3":GOSUB 1230:Y$="Value for v1":
GOSUB 1230:INPUT D1
1020 Y$="[X/"+STR$(D1)+"]"+L$+"[
Y/v2]=v3":Q=13:GOSUB 1230:Y$="Va
lue for v2?":GOSUB 1230:INPUT D2
:FM$="[X/"+STR$(D1)+"]"+L$+"[Y/"
+STR$(D2)+"]=":Y$=FM$+"v3":Q=13:
GOSUB 1230:Y$="Value for v3?":GO
SUB 1230:INPUT EO:FM$="[X/"+STR$
(D1)+"]"+L$+"[Y/"+STR$(D2)+"]=
1030 FM$=FM$+STR$(EO):IF EO=0 OR
 D1=0 OR D2=0 THEN Y$="Sorry, I
am unable to divide by zero!  Pl
ease enter again.":GOSUB 1230:GO
SUB 1220:GOTO 970
1040 C=1
1050 IF G=4 THEN IF D1>D2 THEN B
=1:C=-1
1060 GOTO 290
1070 IFPO>-1ANDPO<1ANDX<0THENH=3
19:I=96:ND=1:RETURNELSEY=NU*X^PO
+SE*X+HI:ND=0
1080 RETURN
1090 Y=M*X+B
1100 RETURN
```

RSDOS UTILITIES (for CoCo 1,2,3 unless otherwise specified)

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SUPER TAPE/DISK TRANSFER:$24.95. Copies Basic, ML and Data files from Tape-to-Disk, Disk-to-Tape, Tape-to-Tape and Disk-to-Disk.

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Copies 35/40 track single/double sided & 80 track single sided disks in a single pass. Supports up to 4 drives, variable step rates. Copies OS9 and RSDOS disks in less time than some disk formats! Req 512K. **$19.95**

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(ColorVenture)

Store from 44K to 437K (aprox 200 pages!) for output to printer with the fastest, most reliable print spooler for the CoCo 3. Compatible with ColorVenture Ramdisk in 512K. **$19.95**

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Add two more 40 track drives to your system without losing an inch of desk space! Reset protection and lightning access - a fraction of a second! Req 512K. **$19.95**

SUPER 88

88 favorites from CoCo-Times. File, screen and printer control utilities. Dumps, enhancements, Basic programming helpers and stand-alone programs for a variety of uses. Purchased seperately, a $792 value. Packaged for Only **$88.**

TELEWRITER 64

: THE word processor for CoCo2! Menu and key control for most major word processing features. Disk **$57.95** Tape **$47.95**

COCO UTIL

Transfer Standard Basic and ASCII files between CoCo & IBM. Req MSDOS 2.01-3.2 & 2 drive IBM compatible. $**39.95**

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```
1110 IF V3>-1 AND V3<1 AND X<0 T
HEN ND=1 ELSE ND=0:Y=V1*(COS(V2*
X)^V3)
1120 RETURN
1130 IF V3>-1 AND V3<1 AND X<0 T
HEN ND=1 ELSE ND=0:Y=V1*(SIN(V2*
X)^V3)
1140 RETURN
1150 IF V3>-1 AND V3<1 AND X<0 T
HEN ND=1 ELSE Y=V1*(TAN(V2*X)^V3
):ND=0
1160 RETURN
1165 ON ERR GOTO 1167:Y=RND(RND(
RND(RND(RND(X)))))*RND(X)
1166 ON ERR GOTO 5:ND=0:RETURN
1167 ND=1:IF SN=599 THEN GOTO 59
9 ELSE IF SN=610 THEN GOTO 610 E
LSE IF SN=715 THEN GOTO 715 ELSE
 IF SN=740 THEN GOTO 740
1170 'SCREEN PRINT ROUTINE
1180 POKE150,42:PRINT#-2,CHR$(27
)CHR$(14):PRINT#-2,CHR$(18)
1190 FOR X=0TO639STEP7:FORY=191T
00STEP-1:N=128:FORK=0TO6:IF HPOI
NT(X+K,Y)<>0 THEN N=N+2^K
1191 NEXT K:PRINT#-2,CHR$(N);:NE
XT Y:PRINT#-2:NEXT X
1195 C$="All done! Press any key
 to continue.":GOSUB 9999
1196 IF A$="" THEN GOTO 1196 ELS
E GOTO 5
1200 IF LEN(X$)>11 THEN X$=LEFT$
(X$,11)
1210 HLINE(541,R*8)-(638,(R+1)*8
-1),PRESET,BF:HCOLOR 3:HPRINT(74
-.5*LEN(X$),R),X$:HCOLOR 1:R=R+1
:RETURN
1220 Q=19:Y$="<< PRESS ANY KEY T
O CONTINUE >>":ATTR 3,2,B:GOSUB
1230:ATTR 3,2:EXEC 44539:Q=Q-1:Y
$=STRING$(78,"-"):GOSUB 1230:RET
URN
1230 IF Q<10 THEN Q=10:GOTO 1230
 ELSE LOCATE 40-(LEN(Y$)/2),Q:PR
INT Y$;:Q=Q+1:RETURN
1240 FOR CL=12 TO 18:LOCATE 0,CL
:PRINT:NEXT CL:LOCATE 0,19:PRINT
 STRING$(78,"-");:RETURN
1250 HLINE(102,190)-(538,182),PR
ESET,BF:HPRINT(40-(LEN(8$)/2),23
),B$:RETURN
1260 GOTO 60000
1270 '
9999 HCOLOR 1:HPUT(103,190)-(537
,184),3,PSET:GR=40-(LEN(C$)/2):I
F 68-GR>LEN(C$) THEN C$=C$+STRIN
G$(68-GR-LEN(C$)," "):GR=LEN(C$)
10000 FOR X=1 TO GR:A$=INKEY$:IF
 A$<>"" THEN HPUT(537,190)-(103,
184),3,PSET:HPRINT(67-GR,23),C$:
RETURN ELSE HPUT(537,190)-(103,1
84),3,PSET:HPRINT(67-X,23),LEFT$
(C$,X):NEXT X:RETURN
20000 Q=12:GOSUB 1240:Y$=" <<< T
rigonometric functions >>>"+CHR$
(13):GOSUB 1230
20010 PRINT"Trigonometry is base
d largely on the SINE,COSINE,and
 TANGENT functions.Sine and Cosi
ne are derived from the lengths
of the legs of a right triangle
inscribed  (drawn in) a circle
of radius 1.  As the angles of t
he legs change, so does";
20020 PRINT" the corresponding v
alue of SINE(x) or COSINE(x).  T
ANGENT(x) is SINE(x)/COS(x). The
 functions are useful in Geometr
y and engineering ; if you know
2 angles and the length of 1 sid
e, the measures of the other 2 s
ides can be determined.";
20030 GOSUB 1220:GOSUB 1240:Q=12
:Y$=" <<< Trig input >>>"+CHR$(1
3):GOSUB 1230:Y$="V1*("+TYPE$+"(
V2*X))^V3":GOSUB 1230
20040 Y$="Value for v1":GOSUB 12
30:INPUT V1:IF V1>10000 OR V1<-1
0000 THEN Q=Q-1:PRINT"OUT OF RAN
GE. REDO":GOTO 20040
20050 Y$="Value for v2":GOSUB 12
30:INPUT V2:IF V2>10 OR V2<-10 T
HEN Q=Q-1:PRINT"OUT OF RANGE. RE
DO":GOTO 20050
20060 Y$="Value for v3":GOSUB 12
30:INPUT V3:IF V3>10000 OR V3<-1
0000 THEN Q=Q-1:PRINT"OUT OF RAN
GE. REDO":GOTO 20050
20070 FM$=STR$(V1)+"*("+LEFT$(TY
PE$,3)+"("+STR$(V2)+"*X)^"+STR$(
V3)+")":Q=12:GOSUB 1240:RETURN
30000 CO=3:JL=2:TYPE$="PARABOLA"
:FM$="Y=X^2":RA=5:LY=-5:MY=5:LX=
-5:MX=5:DE=1:PO=2:NU=1:LN=1:SP=4
:GOTO 390
30010 CO=2:JL=3:V1=1:V2=1:V3=1:T
YPE$="COSINE":FM$="Y=COS(X)":LN=
2:SP=8:RETURN
30020 CO=1:JL=5:TYPE$="Tangent":
FM$="Y=TAN(X)":LN=3:SP=2:RETURN
30030 CO=3:TYPE$="Tangent":FM$="
Y=2[TAN(2X)]^2":V1=2:V2=2:V3=2:L
N=4:RETURN
40000 GOTO 5
40500 TIMER=0:HPRINT(73,23),"- 5
-"
40510 IF TIMER/60=INT(TIMER/60)
THEN HLINE(540,184)-(638,190),PR
ESET,BF:HPRINT(73,23),"-"+STR$(I
NT(6-TIMER/60))+" -"
40520 IF TIMER/60>4 THEN RETURN
ELSE GOTO 40510
50000 POKE65496,0:Q=12:GOSUB 124
0:Y$=" <<< User-Defined function
 >>>":GOSUB 1230:PRINT
50010 PRINT"User-defined functio
ns can use any function avaliabl
e to the color computer.    The
program does not screen for erro
rs in syntax - such as too many
parenthesis-but will accept the
undefined, such as 1/x at x=0.
After entering function,";
50020 PRINT"the computer will wr
ite an ASCII file and MERGE.  Th
en type RUN and A to execute
function.  *NOTE-USE CAPITAL LET
TER X!":GOSUB 1220
50030 Q=12:GOSUB 1240:Y$="  <<<
Define function >>>":GOSUB 1230:
PRINT:PRINT"Enter function and h
it <enter> when done.":PRINT"Y="
;:INPUT A$:PRINT"SAVING...":OPEN
"O",1,"TEMP/BAS":PRINT#1,"1165 O
N ERR GOTO 1167:Y="+A$:B$="50070
 Y$="+CHR$(34)+A$+CHR$(34)
50040 B$=B$+":RETURN":PRINT#1,B$
50050 CLOSE#1:PRINT"MERGING...ty
pe RUN and select A to graph fun
ction when done.":MERGE "TEMP/BA
S"
50060 ERNO=5:PRINT ERNO
50070 Y$="RND(RND(RND(RND(RND(X)
))))*RND(X)":RETURN
60000 WIDTH 80:POKE 65497,0:FOR
R=0 TO 15:READ A:POKE &HFFB0+R,A
:NEXT R:READ CA:C1=(CA AND 56)/8
:C2=CA AND 7:IF CA<64 THEN ATTR
C1,C2:CLS ELSE IF CA<128 THEN AT
TR C1,C2,U ELSE ATTR C1,C2,U,B
60001 LOCATE 20,12:PRINT"Title s
creen developed with Hi-Res Desi
gn":LOCATE 25,14:PRINT"Intrested
? Contact me through":LOCATE 0,1
5:PRINT"Delphi:MATTHEWHUNT
      Compuserve:73167,3212
     Echo-mail:Matt Hunt"
60002 LOCATE 20,18:PRINT"Or writ
e:":LOCATE 30,20:PRINT"Matthew H
unt":LOCATE 30,21:PRINT"84 Smith
 St.":LOCATE 30,22:PRINT"Charles
ton, SC 29401"
60010 DATA 64,118,73,100,127,91,
109,102,64,82,64,127,64,82,64,75
,24
60100 READ A:IF A=9999 THEN RETU
RN ELSE IF A>300 THEN LO=A+44200
0 ELSE LPOKE LO,A:LO=LO+2
60105 GOTO 60100
60170 DATA 691,27
60200 DATA 841,27,853,27
60210 DATA 915,30,30
60220 DATA 30,30,933,25,25,25,94
9,28,28,965,26,26
60230 DATA 26,979,29,987,29,999,
27,1015,27
60250 DATA 1073,30,1083,30,1091,
25,25,1099,25,1107,28,1111,28
60260 DATA 1121,26,26,1131,26,11
37,29,1145,29,1157,27
60270 DATA 1171,27,27,27,1183,27
,1189,27,1193,25,1203,82,82,82,1
213,28,28
60280 DATA 1221,29,1231,30,1251,
25,25,25,25,1265,28,28
60290 DATA 1273,28,1281,26,26,26
,26,26,1295,29,29,29,29,29,1317,
27
60300 DATA 27,27,27,1335,27,1343
,27,1349,27,1353,25,1365,82
60310 DATA 1371,28,1379,29,1383,
29,1389,30,1401,30,30,1409,25,14
13,25
60320 DATA 1423,28,1429,100,28,2
8,1439,26,1453,29,1461,29
60330 DATA 1477,27,1493,27,1503,
99,99,99,83,80,81,81,81
60340 DATA 81,80,80,82,1531,100,
1537,29,1541,32,1545,29,1551,30,
30,30,30,30,1567,25
60350 DATA 1575,25,1581,28,1589,
96,96,100,1597,26,1611,29
60360 DATA 1619,29,1639,27,1651,
27
60390 DATA 1801,27
60400 DATA 1825,27,27,27,27,27,2
7,27,27,27,27,27,27,27,27,27,27,
27,27,27,27,27,27
60410 DATA 27,27,27,27,27,27,27,
27,27,27,27,27,27,27,27,27,27,27
,27,27,27,27,27,27
60420 DATA 27,27,27,27,27,27,27,
27,27,27,27,27,27,27
60470 DATA 9999
```

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All Disto Products now carry a 1-Year Warranty. All Disto Add-Ons (& Super Controller II) include OS9 Driver Disks, unless otherwise specified.

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Low Kick: While holding the button down, pull the joystick back.

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High kick: With the button pressed, push the joystick forward.

Jump kick: Move the joystick forward, then center it and press the button. (If your opponent lands a punch while you are attempting a jump kick, you lose the round.)

Punch: Push the joystick lever away from your opponent and press the button.

Dale Harris is a self-taught programmer. He is 16 years old and has owned a CoCo 3 for four years. He enjoys writing games for his computer. He can be contacted at 45-47 45 Ave., Gibbons, Alberta T0H 1N0 Canada.

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Defense

Walk left: Hold the joystick to the left.

Walk right: Hold the joystick to the right.

Duck: Hold the joystick back (this will avoid a blow to the head).

Leg lift: Hold the joystick forward (this will avoid a blow to the knee).

Each blow to your opponent decreases his strength. The first player to run out of energy loses that round, and the winner moves up one belt level. The belt levels are: white, yellow, green, purple, blue, brown and black. The first player to attain a black belt wins the game.

Screen Description

The fight ring is located in the upper-left quarter of the screen. Below it is the time bar. When the bar reaches zero the round ends and the stronger player wins. To the right of the ring is the score panel. Points are awarded for each blow landed and for time and strength remaining at the end of a round. The more difficult the maneuver, the more points awarded for it. Below the score, each player's belt level is displayed. The energy level for each player is shown between the fight ring and the score (keep an eye on this, as you may want to take drastic measures if you grow too weak).

One person can play against the CoCo 3 or two players can compete against each other. To play the computer, plug a joystick into the right port. When the screen is displayed, press the button to fight. For two players, plug in both joysticks. When the screen is displayed, press the left joystick button.

To play *Karate*, a 128K CoCo 3 and one or two joysticks are all you need. Good fighting and Banzai! ❑

CoCo 3

```
80 ..... 59     1060 ..... 181    1850 ..... 117
150 ..... 109    1100 ..... 56     1920 ..... 2
200 ..... 88     1140 ..... 166    1990 ..... 36
270 ..... 180    1170 ..... 36     2090 ..... 122
320 ..... 28     1200 ..... 79     2160 ..... 138
390 ..... 205    1230 ..... 251    2230 ..... 129
480 ..... 232    1260 ..... 159    2310 ..... 46
560 ..... 177    1330 ..... 212    2390 ..... 70
630 ..... 105    1390 ..... 118    2450 ..... 26
700 ..... 118    1450 ..... 201    2520 ..... 142
770 ..... 85     1570 ..... 114    END ..... 79
850 ..... 243    1690 ..... 9
960 ..... 11     1790 ..... 108
```

The Listing: KARATE

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 '    **********************
       *    K A R A T E     *
       *        BY          *
       *   DALE M HARRIS    *
       *     (C) 1988       *
       **********************
20 CLEAR 800
30 POKE 65497,0
40 'title screen #1
50 PLAY"V31"
60 RGB:PALETTE14,48::PALETTE12,8
:PALETTE13,0
70 CLS4:PRINT@205,"KARATE";
80 PRINT@262,"HARRIS SOFTWARE 87
-88";
90 FORT=1TO30:PLAY"T255;L25501AB
CDEV-":PALETTE12,RND(8):PALETTE5
,63:NEXT:PALETTE6,12
100 PALETTE12,1:PALETTE13,0:FORT
=1TO3000:NEXT
110 'set up graphics
120 HSCREEN2:HCLS8:HDRAW"C0;BM30
,10;M40,15;D15;M25,35;R25H5U5RF1
0R10H15E10L5G10U10L15"
130 HDRAW"BM70,35;U10D10R3U5R4D5
R3U10H5G5BR3R4D3L4U3"
140 HDRAW"BM75,40;M85,35;U15R10B
D3D4L4U4R4D4BD3F5L5H5D10L15":HCI
RCLE(95,25),5,,1,.75,.25
150 HDRAW"BM105,35;U10D10R3U5R4D
5R3U10H5G5BR3R4D3L4U3"
160 HDRAW"BM115,35;E5U15L40M70,1
0R80F2D1G2L25D15F5L15"
170 HDRAW"BM135,35;U15R10D5L5R3D
5L3R5D5L10"
180 HDRAW"C0":HLINE(20,40)-(30,5
0),PSET,B:HLINE(140,40)-(150,50)
,PSET,B:HLINE(20,150)-(30,160),P
SET,B:HLINE(140,150)-(150,160),P
SET,B:HLINE(30,50)-(140,150),PSE
T,B
190 HPRINT(25,12),"ROUND : 1"
200 HDRAW"C0":HPRINT(24,14),"PLA
YER   BELT":HDRAW"C6":HPRINT(24,
16),"PURPLE":HDRAW"C5":HPRINT(24
,18),"WHITE":HDRAW"C0":HPRINT(24
,15),"------   ----"
210 HDRAW"C5":HLINE(263,128)-(30
0,133),PSET,BF:HCIRCLE(282,130),
4,8:HLINE(263,144)-(300,149),PSE
T,BF:HCIRCLE(282,146),4,8
220 HLINE(170,5)-(240,20),PSET,B
230 HDRAW"C5;BM180,30;L5G5R5F5L1
0BM190,30;G5F5;BM200,30;F5G5H5E5
;BM210,30;F5L5F5BL5U10;BM220,30;
D10R5L5U5R3L3U5R5L5"
240 HDRAW"BM200,45;F5G5H5E5"
250 HDRAW"C6;BM180,60;L5G5R5F5L1
0BM190,60;G5F5;BM200,60;F5G5H5E5
;BM210,60;F5L5F5BL5U10;BM220,60;
D10R5L5U5R3L3U5R5L5"
260 HDRAW"BM200,75;F5G5H5E5"
270 HDRAW"C3;BM5,165;D5U5R3L6;BM
10,165;D5;BM15,167;E2D5U5G2H2D5;
BM20,165;D5R3L3U3R3L3U2R3L3"
280 FORT=30 TO 220 STEP 3:HLINE(
T,165)-(T,170),PSET:NEXTT
290 PW$="F5L10E5BD5":HDRAW"C6":H
DRAW"BM160,75":FORT=1TO15:HDRAWP
W$:NEXTT
300 HDRAW"C5":HDRAW"BM175,75":FO
RT=1TO15:HDRAWPW$:NEXT
310 HDRAW"C3;BM31,149;E20M55,115
;BM139,149;H20M115,115;BM55,110;
C0;R60D10U10L60D10E5F5E5F5E5F5E5
F5E5F5E5F5"
320 HDRAW"C3;BM130,140;U30R5D35U
10C0E5U50H5G5D5M125,95;D10G5D10F
5D5F5C3D5U30R5D35U10C0R1U26L7D26
C3BM130,140;U30R5D35":HPAINT(135
,100),0,0:HPAINT(133,130),3,3
330 HDRAW"BM135,75;C0;U20;L5D5L5
U5L5D5L5U5L5D5L5U5L5D5L5U5L5D5L5
U5L5D5L5U5L5D5L5U5L5D5L5U5L5D5L5
U5L5D30"
340 HCIRCLE(40,100),15,0,1,.62,.
39:HDRAW"C3":HLINE(37,115)-(42,1
49),PSET,BF
350 HPAINT(35,75),2,0
360 HDRAW"C5;BM65,109;U5E5F5D5U5
H5U10F5R5L5H5G5D5U5E5R2E2U2H2L4G
2D2F2R2
370 HDRAW"C6;BM100,109;U5E5F5D5U
5H5U10F5D5U5H5G5L5R5E5R2E2U2H2L4
G2D2F2R2
380 HPRINT(22,1),"READY ?"
390 'title screen  #2
400 HDRAW"C3;BM75,87;R2BR3R2BR3R
2BR3R2BR3R2BR3
410 HDRAW"BM88,87;U3D6U3E3G3F3H6
F3G3"
420 FORA=1TO20
430 IF BUTTON(0)=1 THEN CM=1:GOT
O580 ELSE IF BUTTON(2)=1 THEN CM
=0:GOTO580
440 NEXTA
450 HDRAW"C8;BM88,87;U3D6U3E3G3F
3H6F3G3;C3;E6G3U3D6U3R3L6"
460 FORA=1TO20
470 IF BUTTON(0)=1THENCM=1:GOTO5
80ELSEIFBUTTON(2)=1 THEN CM=0:GO
TO580
480 NEXTA
490 HDRAW"C8;BM88,87;E3G6E3U3D6U
3R3L6;BM88,87;C3;R3L6R3E3G6E3F3H
6"
500 FORA=1TO20
510 IF BUTTON(0)=1THENCM=1:GOTO5
80 ELSE IF BUTTON(2)=1THENCM=0:G
```

```
OTO580
520 NEXTA
530 HDRAW"C8;BM88,87;R3L6R3E3G6E3F3H6;BM88,87;C3R3L6R3U3D6U3H3F6"
540 FORA=1TO20
550 IF BUTTON(0)=1 THEN CM=1:GOTO580 ELSE IF BUTTON(2)=1 THEN CM=0:GOTO580
560 NEXTA
570 HDRAW"C8;BM98,87;R3L6R3U3D6U3E3F6;C3":GOTO 410
580 HDRAW"C8":HLINE(75,80)-(101,90),PSET,BF
590 HLINE(170,5)-(240,20),PSET,BF:HDRAW"C0":HLINE(170,5)-(240,20),PSET,B:HPRINT(22,1),"FIGHT !"
600 ' set up variables
610 X1=65:X2=100:P1=15:P2=P1:S1=0:S2=0:TM=220:M1=1:M2=1:PW$="R5H5G5R5":RD=1:R1=0:R2=0
620 DIM MN$(2,9),NM$(10),BT$(5)
630 BT$(0)="WHITE":BT$(1)="YELLOW":BT$(2)="GREEN":BT$(3)="PURPLE":BT$(4)="BLUE":BT$(5)="BROWN":BT(0)=5:BT(1)=1:BT(2)=0:BT(3)=6:BT(4)=2:BT(5)=14
640 DATA U5E5F5D5U5H5U10F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,U5E5F5D5U5H5U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
650 '******** still
660 DATA U5E15G10U10F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,BR10U5H15F10U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
670 '******** head kick
680 DATAU5E5R5F5H5L5U10F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,BR10U5H5L5G5E5R5U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
690 '******** knee kick
700 DATA U5E5R10L10U10F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,BR10U5H5L10R10U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
710 '******** waist kick
720 DATA U5E5F5D5U5H5U10R10L10G5R7L7E5R2E2U2H2L4G2D2F2R2,U5E5F5D5U5H5U10F5L7R7H5L10R10R2E2U2H2L4G2D2F2R2
730 '******** punch
740 DATA U5E5R5D5U5L5U10F5R5L5H5G5O5U5E5R2E2U2H2L4G2O2F2R2,BR10U5H5L5O5U5R5U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
750 '******** jump
760 DATA BL5E5R10F5H5L5U5E5D5R5L5U5L5G5E5R5R2E2U2H2L4G2D2F2R2,BL5E5R10F5H5L5U5H5R5F5H5L5D5L5R5U5R2E2U2H2L4G2D2F2R2
770 '******** duck
780 DATA BR5E5H5G5F5E5H5U10F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,BR5E5H5G5F5E5H5U10F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
790 '******** walk
800 DATA BU20L7R12F5L5R5H5U5U5F5D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2,BU20R5L5G5R5L5E5R12L12U5U5F5R5L5H5G5D5U5E5R2E2U2H2L4G2D2F2R2
810 '*******jump kick
820 FORT=1TO8:READMN$(1,T):READMN$(2,T):NEXT:READ MN$(2,9),MN$(1,9)
830 DATA E5H5G5F5
840 DATA U10G3
850 DATA R5L10E5R5H5G5
860 DATA R5U5L3R3U5L5
870 DATA U10G5R7
880 DATA H5F5E5L5H5R10
890 DATA H5F5E5L10E5R5
900 DATA U5E5L10
910 DATA U5L5U5R5D5L5D5R5
920 DATA U10L5D5E5
930 FORT=1TO10:READ NM$(T):NEXTT
940 K1$="T255L255V31O1ADCFBAGEDV16ACGADV4EABCAEDB"
950 PLAY"V15T4L4O4ADEFA":HDRAW"C8":HLINE(170,5)-(240,20),PSET,BF:HDRAW"C0":HLINE(170,5)-(240,20),PSET,B:HPRINT(22,1),"FIGHT"
960 K2$="T4L255;V31;O1;1;2;3;4;5;V16;5;1;4;V4;1;6"
970 'fight routine
980 C1=0:C2=0:IF F1<>1 THEN A1=JOYSTK(0):B1=JOYSTK(1)
990 IF F2<>1 THEN IF CM=0 THEN A2=JOYSTK(2):B2=JOYSTK(3)
1000 IF F1<>1 THEN C1=BUTTON(0)
1010 IF F2<>1 THEN C2=BUTTON(2)
1020 IF F1=1 THEN T1=T1+1:IF T1=2 THEN F1=0:T1=0:
1030 IF F2=1 THEN T2=T2+1:IF T2=2 THEN F2=0:T2=0
```

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```
1040 IF CM=1 THEN GOSUB 2390
1050 HDRAW"C8":HLINE(TM,165)-(TM
-3,170),PSET,BF:HDRAW"C3":TM=TM-
3
1060 HDRAW"C5;BM"+STR$(X1)+",109
;XMN$(1,M1);":HDRAW"C6;BM"+STR$(
X2)+",109;XMN$(2,M2);":
1070 IF TM<30 THEN SOUND100,1:GO
TO2040
1080 IF D1=1 THEN IF A1<>63 AND
B1<>0 AND A1<>0 AND B1<>0 THEN D
1=1 ELSE D1=0:M1=1:HDRAW"BM"+STR
$(X1)+",109;C8;XMN$(1,7);BM"+STR
$(X1)+",109;C5;XMN$(1,M1);"
1090 IF D2=1 THEN IF A2<>63 AND
B2<>0 AND A2<>0 THEN D2=1 ELSE D
2=0:M2=1:HDRAW"BM"+STR$(X2)+",10
9;C8;XMN$(2,7);BM"+STR$(X2)+",10
9;C6;XMN$(2,M2);"
1100 IF J1=1 THEN IF A1<>63 AND
A1<>0 AND B1<>63 THEN J1=1 ELSE
J1=0:M1=1:HDRAW"BM"+STR$(X1)+",1
09;C8;XMN$(1,6);C5BM"+STR$(X1)+"
,109;XMN$(1,1);"
1110 IF J2=1 THEN IF A2<>63 AND
A2<>0 AND B2<>63 THEN J2=1 ELSE
J2=0:M2=1:HDRAW"BM"+STR$(X2)+",1
09;C8;XMN$(2,6);C6;BM"+STR$(X2)+
",109;XMN$(2,1);"
1120 IF A1<>0 AND A1<>63 AND B1<
>0 AND B1<>63 AND C1<>1 AND C2<>
1 AND A2<>0 AND A2<>63 AND B2<>6
3 AND B2<>0 THEN 980
1130 IF A1=0 AND X1<>56 THEN GOS
UB 1320:HDRAW"BM"+STR$(X1)+",109
;XMN$(1,8);":M1=8:GOSUB1320:X1=X
1-1:HDRAW"BM"+STR$(X1)+",109;XMN
$(1,1);":M1=1:J1=0:D1=0
1140 IF A2=0 AND X2<>X1+12 THEN
GOSUB 1330:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,8);":M2=8:GOSUB1330:X
2=X2-1:HDRAW"BM"+STR$(X2)+",109;
XMN$(2,1);":M2=1:J2=0:D2=0
1150 IF A2=63 AND X2<>108THEN GO
SUB 1330:HDRAW"BM"+STR$(X2)+",10
9;XMN$(2,8);":M2=8:GOSUB1330:X2=
X2+1:HDRAW"BM"+STR$(X2)+",109;XM
N$(2,1);":M2=1:J2=0:D2=0
1160 IF A1=63 AND X1<>X2-12 THEN
GOSUB 1320:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,8);":M1=8:GOSUB1320:X
1=X1+1:HDRAW"BM"+STR$(X1)+",109;
XMN$(1,1);":M1=1:J1=0:D1=0
1170 IF C1=1 AND J1<>1 AND A1<>0
AND A1<>63 AND B1<>0 AND B1<>63
THEN GOSUB 1320:HDRAW"BM"+STR$(
X1)+",109;XMN$(1,4);":PLAYK2$:M1
=4:GOSUB 2470:GOSUB 1340:M1=4:GO
SUB 1320:HDRAW"BM"+STR$(X1)+",10
9;XMN$(1,1);":M1=1:J1=0:D1=0
1180 IF C1=1 AND J1=1 AND A<>0 A
ND A1<>63 AND B1<>0THEN GOSUB 13
20:X1=X1+2:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,9);":M1=9:PLAYK2$:GOS
UB2060:GOSUB 1380:GOSUB 1320:X1=
X1+1:GOSUB 1320:HDRAW"BM"+STR$(X
1)+",109;XMN$(1,1);":M1=1:J1=0
1190 IF C2=1 AND J2=1 AND A2<>0A
ND A2<>63 AND B2<>0THEN GOSUB 13
30:X2=X2-2:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,9);":M2=9:PLAYK2$:GOS
UB2090:GOSUB 1400:GOSUB 1330:X2=
X2-1:GOSUB1330:HDRAW"BM"+STR$(X2
)+",109;XMN$(2,1);":M2=1:C2=0:J2
=0
1200 IF C2=1 AND J2<>2 AND A2<>0
AND A2<>63 AND B2<>0 AND B2<>63
THEN GOSUB 1330:HDRAW"BM"+STR$(
X2)+",109;XMN$(2,4);":PLAYK2$:M2
=4:GOSUB 2510:GOSUB 1360:M2=4:GO
SUB 1330:HDRAW"BM"+STR$(X2)+",10
9;XMN$(2,1);":M2=1:J2=0:D2=0
1210 IF C1=1 AND B1=0 THEN GOSUB
1320:HDRAW"BM"+STR$(X1)+",109;XM
N$(1,2);":PLAYK2$:M1=2:GOSUB2310
:GOSUB 1380:M1=2:GOSUB1320:HDRAW
"BM"+STR$(X1)+",109;XMN$(1,1);":
M1=1:J1=0:D1=0
1220 IF C2=1 AND B2=0 THEN GOSUB
1330:HDRAW"BM"+STR$(X2)+",109;XM
N$(2,2);":PLAYK2$:GOSUB2330:M2=2
:GOSUB 1400:M2=2:GOSUB1330:HDRAW
"BM"+STR$(X2)+",109;XMN$(2,1);":
M2=1:J2=0:D2=0
1230 IF C1=1 AND A1=0 THEN GOSUB
1320:HDRAW"BM"+STR$(X1)+",109;X
MN$(1,5);":PLAYK2$+K2$:M1=5:GOSU
B1380:M1=5:GOSUB1320:HDRAW"BM"+S
TR$(X1)+",109;XMN$(1,1);":M1=1:J
1=0:D1=0
1240 IF C2=1 AND A2=63 THEN GOSU
B 1330:HDRAW"BM"+STR$(X2)+",109;
```


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```
XMN$(2,5);":PLAYK2$+K2$:M2=5:GOS
UB1400:M2=5:GOSUB1330:HDRAW"BM"+
STR$(X2)+",109:XMN$(2,1);":M2=1:
J2=0:D2=0
1250 IF C2=1 AND B2=63 THEN GOSU
B1330:HDRAW"BM"+STR$(X2)+",109;X
MN$(2,3);":PLAYK2$:M2=3:GOSUB237
0:GOSUB 1420:M2=3:GOSUB1330:HDRA
W"BM"+STR$(X2)+",109;XMN$(2,1);"
:M2=1:J2=0:D2=0
1260 IF C1=1 AND B1=63 THEN GOSU
B1320:HDRAW"BM"+STR$(X1)+",109;X
MN$(1,3);":PLAYK2$:M1=3:GOSUB235
0:GOSUB1440:M1=3:GOSUB1320:HDRAW
"BM"+STR$(X1)+",109;XMN$(1,1);":
M1=1:J1=0:D1=0
1270 IF B1=63 AND C1=0 THEN GOSU
B 1320:M1=7:HDRAW"BM"+STR$(X1)+"
,109;XMN$(1,M1);":D1=1
1280 IF B2=63 AND C2=0 THEN GOSU
B 1330:M2=7:HDRAW"BM"+STR$(X2)+"
,109;XMN$(2,M2);":D2=1
1290 IF B2=0 AND C2=0 THEN GOSUB
 1330:M2=6:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,M2);":J2=1
1300 IF B1=0 AND C1=0 THEN GOSUB
 1320:M1=6:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,M1);":J1=1
1310 GOTO 980
1320 HDRAW"C8;BM"+STR$(X1)+",109
;XMN$(1,M1);C5":RETURN
1330 HDRAW"C8;BM"+STR$(X2)+",109
;XMN$(2,M2);C6":RETURN
1340 IF X1>X2-15 THEN S=S1:S1=S1
+50:HDRAW"BM"+STR$(X2)+",109;C3;
XMN$(2,M2);":PLAYK1$:GOSUB 1460:
GOSUB 1590
1350 RETURN
1360 IF X2<X1+15 THEN S=S2:S2=S2
+50:HDRAW"BM"+STR$(X1)+",109;C3;
XMN$(1,M1);":PLAYK1$:GOSUB 1620:
GOSUB 1750
1370 RETURN
1380 IF X1>X2-15 AND D2<>1 THEN
S=S1:S1=S1+125:HDRAW"BM"+STR$(X2
)+",109;C3;XMN$(2,M2);":PLAYK1$:
GOSUB1460:GOSUB1590:IFM1=9THENGO
SUB1590
1390 RETURN
1400 IF X2<X1+15 AND D1<>1 THEN
S=S2:S2=S2+125:HDRAW"C3;BM"+STR$
(X1)+",109;XMN$(1,M1);":PLAYK1$:
:GOSUB1620:GOSUB1750:IFM2=9 THEN
 GOSUB1750
1410 RETURN
1420 IF X2<X1+17 AND J1<>1 THEN
S=S2:S2=S2+100:HDRAW"C3;BM"+STR$
(X1)+",109;XMN$(1,M1);":PLAYK1$:
GOSUB1620:GOTO1750
1430 RETURN
1440 IF X1>X2-17 AND J2<>1 THEN
S=S1:S1=S1+50:HDRAW"BM"+STR$(X2)
+",109;C3;XMN$(2,M2);":PLAYK1$:G
OSUB1460:GOSUB 1590
1450 RETURN
1460 S$=RIGHT$(STR$(S),LEN(STR$(
S))-1):HDRAW"C8"
1470 SX=200
1480 FORT=1TOLEN(S$)
1490 HDRAW"BM"+STR$(SX)+",55"+NM
$(ASC(MID$(S$,T,1))-47)
1500 SX=SX+15
1510 NEXTT
1520 S1$=RIGHT$(STR$(S1),LEN(STR
$(S1))-1):HDRAW"C5"
1530 SX=200
1540 FORT=1TOLEN(S1$)
1550 HDRAW"BM"+STR$(SX)+",55;"+N
M$(ASC(MID$(S1$,T,1))-47)
1560 SX=SX+15
1570 NEXTT
1580 RETURN
1590 PW=P2*5:HDRAW"C8;BM155,"+ST
R$(150-PW)+";R10H5G5":P2=P2-1
1600 IF P2=-1 THEN 1780
1610 RETURN
1620 S$=RIGHT$(STR$(S),LEN(STR$(
S))-1):HDRAW"C8"
1630 SX=200
1640 FORT=1TOLEN(S$)
1650 HDRAW"BM"+STR$(SX)+",85"+NM
$(ASC(MID$(S$,T,1))-47)
1660 SX=SX+15
1670 NEXTT
1680 S2$=RIGHT$(STR$(S2),LEN(STR
$(S2))-1):HDRAW"C6"
1690 SX=200
1700 FORT=1TOLEN(S2$)
1710 HDRAW"BM"+STR$(SX)+",85;"+N
M$(ASC(MID$(S2$,T,1))-47)
1720 SX=SX+15
1730 NEXTT
1740 RETURN
1750 PW=P1*5:HDRAW"C8;BM170,"+ST
R$(150-PW)+";R10H5G5":P1=P1-1:
1760 IF P1=-1 THEN 1910
1770 RETURN
1780 HDRAW"C8":HLINE(170,5)-(240
,20),PSET,BF:HDRAW"C0":HLINE(170
,5)-(240,20),PSET,B:HPRINT(22,1)
,"STOP":HDRAW"C8;BM"+STR$(X2)+",
109;XMN$(2,M2);":
1790 FORT=1TO1000:NEXTT:HDRAW"C8
":HLINE(170,5)-(240,20),PSET,BF:
HDRAW"C0":HLINE(170,5)-(240,20),
PSET,B:HPRINT(22,1),"WHITE"
1800 HDRAW"C8":S=S1:FORT=TM TO 3
0 STEP-1:PLAY"O2L255T255GEF":S1=
S1+5:HLINE(T,165)-(T,170),PSET:N
EXTT:GOSUB 1460
1810 S=S1:FOR Z=P1 TO -1 STEP -1
:PLAY"O2L255;T255;GEF":S1=S1+25:
PW=Z*5:HDRAW"C8;BM170,"+STR$(150
-PW)+";R10H5G5":NEXT:GOSUB 1460
1820 HDRAW"C8":HPRINT(25,12),"RO
UND :"+STR$(RD):HDRAW"C0":HPRINT
(25,12),"ROUND :"+STR$(RD+1)
1830 RD=RD+1:R1=R1+1:GOSUB 2530
1840 IF R1=6 THEN 2270
1850 PW$="F5L10E5BD5":HDRAW"C6":
HDRAW"BM160,75":FORT=1TO15:HDRAW
PW$:NEXTT
1860 HDRAW"C5":HDRAW"BM175,75":F
ORT=1TO15:HDRAWPW$:NEXT
1870 IF RD=5 THEN GOSUB 2130
1880 HDRAW"C3":FORT=30 TO 220 ST
EP 3::HLINE(T,165)-(T,170),PSET:
NEXTT:P1=15:P2=15:TM=220:
1890 HDRAW"BM"+STR$(X1)+",109;C8
:XMN$(1,M1);":X1=65:X2=100
1900 M1=1:M2=1:GOTO 940
1910 HDRAW"C8":HLINE(170,5)-(240
,20),PSET,BF:HDRAW"C0":HLINE(170
,5)-(240,20),PSET,B:HPRINT(22,1)
,"STOP":HDRAW"C8;BM"+STR$(X1)+",
109;XMN$(1,M1);":
1920 FORT=1TO1000:NEXTT:HDRAW"C8
":HLINE(170,5)-(240,20),PSET,BF:
```


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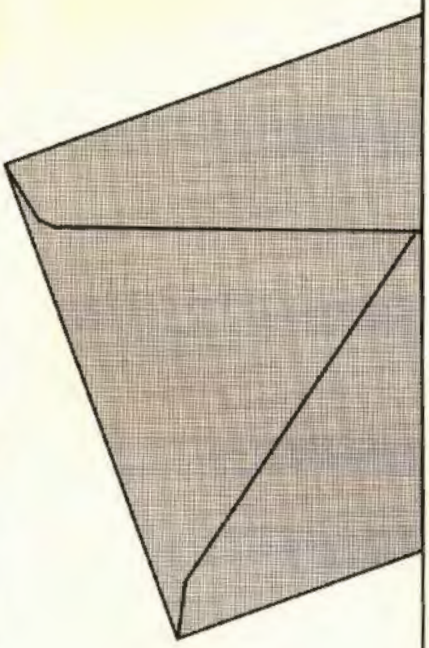

```
HDRAW"C0":HLINE(170,5)-(240,20),
PSET,B:HPRINT(22,1),"PURPLE"
1930 HDRAW"C8":S=S2:FORT=TM TO 3
0 STEP-1:PLAY"O2L255;T255GEF":S2
=S2+5:HLINE(T,165)-(T,170),PSET:
NEXTT:GOSUB 1620
1940 S=S2:FORT=P2 TO -1 STEP -1:
PLAY"O2L255T255GEF":S2=S2+25:PW=
T*5:HDRAW"C8;BM155,"+STR$(150-PW
)+";R10H5G5":NEXT:GOSUB1620
1950 HDRAW"C8":HPRINT(25,12),"RO
UND :"+STR$(RD):HDRAW"C0":HPRINT
(25,12),"ROUND :"+STR$(RD+1)
1960 RD=RD+1:R2=R2+1:GOSUB 2530
1970 IF R2=6 THEN 2220
1980 IF RD=5 THEN GOSUB 2130
1990 PW$="F5L10E5BD5":HDRAW"C6":
HDRAW"BM160,75":FORT=1TO15:HDRAW
PW$:NEXT
2000 HDRAW"C5":HDRAW"BM175,75":F
ORT=1TO15:HDRAWPW$:NEXT
2010 HDRAW"C3":FORT=30 TO 220 ST
EP 3:HLINE(T,165)-(T,170),PSET:N
EXTT:P1=15:P2=15:TM=220
2020 HDRAW"BM"+STR$(X2)+",109:C8
:XMN$(2,M2);":X1=65:X2=100
2030 M1=1:M2=1:GOTO 950
2040 IF P2>=P1 THEN 1910
2050 IF P1>P2 THEN 1780
2060 FORA=1TO2
2070 IF BUTTON(2)=1 AND JOYSTK(2
)=63 AND X1>X2-15 THEN P1=0:B2=0
:C2=1:GOTO 1220
2080 NEXTA:RETURN
2090 FORA=1TO2
2100 IF BUTTON(0)=1 AND JOYSTK(0
)=0 AND X1>X2-15 THEN P3=P2:P2=0
:B1=0:C1=1:GOTO1210
2110 NEXTA:RETURN
2120 GOTO 2120
2130 HDRAW"C8":HLINE(30,50)-(140
,150),PSET,BF:HDRAW"C0":HLINE(30
,50)-(140,150),PSET,B
2140 'screen 2
2150 HCIRCLE(30,140),5,2,1,0,.25
2160 FORT=40 TO 130 STEP 10:HCIR
CLE(T,140),5,2,1,0,.50!NEXTT:HCI
RCLE(140,140),5,2,1,.25,.50
2170 HDRAW"C2":HLINE(31,140)-(31
,149),PSET:HLINE-(139,149),PSET:
HLINE-(139,140),PSET:HPAINT(90,1
45),2,2
2180 HDRAW"C3":HDRAW"BM55,140;U3
0;C0;BH5L20D5F5E5F5E5F5U5C3R65BD
5L10L45BL5L5BD5R25BR10R30U5D10L6
5R65D15U25C0U5D5E5F5E5F5U10L15C3
E5U30H15R5F10U10C0R10U5L55F5R50L
45G5L60R5C3D5E5R10G10D25F10"
2190 HCIRCLE(50,110),5,0,1,.75,0
:HCIRCLE(125,110),5,0,1,.50,.75
2200 RETURN
2210 'purple wins
2220 WIDTH 32:CLS:PRINT"PURPLE H
AS WON THE ROUND,        THE MATC
H,                       AND HIS
BLACK BELT !":
2230 PRINT"WHITE  WAS AT HIS "+B
T$(R1)
2240 PRINT"WHITE SCORE :";S1:PRI
NT"PURPLE SCORE :";S2
2250 POKE65496,0:GOTO2560
2260 'white wins
2270 WIDTH 32:CLS:PRINT"WHITE  H
AS WON THE ROUND,        THE MATC
H,                       AND HIS
BLACK BELT !"
2280 PRINT"PURPLE WAS AT HIS "+B
T$(R2)
2290 PRINT"WHITE SCORE :";S1:PRI
NT"PURPLE SCORE :";S2
2300 POKE65496,0:GOTO2570
2310 IF CM=1 THEN 2430 ELSE IF J
OYSTK(3)=63 THEN GOSUB 1330:D2=1
:HDRAW"BM"+STR$(X2)+",109:C6:XMN
$(2,7);":M2=7:RETURN
2320 RETURN
2330 IF JOYSTK(1)=63 THEN GOSUB1
320:D1=1:HDRAW"BM"+STR$(X1)+",10
9:C5:XMN$(1,7);":M1=7:RETURN
2340 RETURN
2350 IFCM=1 THEN 2450 ELSEIF JOY
STK(3)=0 THEN GOSUB1330:J2=1:HDR
AW"BM"+STR$(X2)+",109:C6:XMN$(2,
6);":M2=6:RETURN
2360 RETURN
2370 IF JOYSTK(1)=0 THEN GOSUB13
20:J1=1:HDRAW"BM"+STR$(X1)+",109
:C5:XMN$(1,6);":M1=6:RETURN
2380 RETURN
2390 IF F2=1 THEN RETURN ELSEA2=
36:B2=36:C2=0:IF X2>X1+15 THEN A
2=0
2400 IF X1+17>X2 AND X1+15<X2 TH
EN C2=1:A2=36:B2=63:GOTO 2410 EL
SE IF X1+17>X2 THEN C2=1:A2=36:B
2=36:GOSUB 2420
2410 GOTO 1050
2420 IF D1=0 AND RND(4)=1 THEN B
2=63:RETURN ELSE IF J1=0 AND RND
(4)=2 THEN B2=0:RETURN ELSE IF R
ND(4)=3 THEN A2=63:RETURN ELSE R
ETURN
2430 IF RND(5)=5 THEN GOSUB1330:
D2=1:HDRAW"BM"+STR$(X2)+",109:C6
:XMN$(2,7);":M2=7:IF P2=0 THEN P
2=P3:GOTO2320 ELSE GOTO 2320
2440 GOTO 2320
2450 IF RND(5)=1 THEN GOSUB1330:
J2=1:HDRAW"BM"+STR$(X2)+",109:C6
:XMN$(2,6);":M2=6:GOTO2360
2460 GOTO 2360
2470 IF CM=1 THEN GOTO 2490 ELSE
 IF JOYSTK(2)=63 THEN F1=1:T1=0:
GOTO1180
2480 RETURN
2490 IF RND(5)=3 THEN F1=1:T1=0:
GOTO1180
2500 RETURN
2510 IFRND(5)<>4 THEN RETURN ELS
E IF JOYSTK(0)=0 THEN F2=1:T2=1:
GOTO1210 ELSE RETURN
2520 RETURN
2530 HDRAW"C=BT(R1);":HLINE(263,
144)-(300,149),PSET,BF:HCIRCLE(2
82,146),4,8
2540 HDRAW"C=BT(R2);":HLINE(263,
128)-(300,133),PSET,BF:HCIRCLE(2
82,130),4,8
2550 RETURN
2560 'end
2570 PRINT:PRINT"WOULD YOU LIKE
TO TRY AGAIN,    NINJA ? (Y/N)"
2580 A$=INKEY$:IF A$<>"Y" AND A$
<>"N" THEN GOTO 2580
2590 IF A$="Y" THEN RUN ELSE PRI
NT"GOOD BYE":END
```

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Reading and Writing

by Greg Law
Technical Editor

Despite some similarities between reading and writing data files with BASIC09 and reading and writing files with Disk BASIC, there are big differences between OS-9 and Disk BASIC. For example, the statement to open a file with Disk BASIC is:

```
OPEN #1,"R","DATAFILE/DAT"
```

One problem with using this statement is that the programmer is responsibile for making sure the same path number is not used more than once. A second problem is that you are forced to open a sequential file for reading *or* writing and a direct access file for reading *and* writing. BASIC09 handles these peculiarities quite elegantly:

```
DIM Path:BYTE
OPEN #Path,"datafile.dat":READ
```

The access mode can be READ, WRITE or UPDATE. The path number of the opened file is assigned to the variable Path. Also, the access mode specifies only the ability to read from and/or write to the file. Whether the file is accessed sequentially, randomly or a combination of the two is of no concern to BASIC09.

Sequential Access Files

A *sequential access* file is stored as a continuous stream of random length data. A text file is a common example of a sequential access file. A drawback with this type of file is that the data must be read and written in a continuous stream. There is no way to read any specific portion, or record, without reading all of the records preceeding it.

With BASIC09, there are three sets of I/O commands at your disposal: PRINT and INPUT, READ and WRITE, and PUT and GET. PRINT and INPUT are intended to be used with text files and character-based devices such as the keyboard, video and printer. READ and WRITE are intended to be used with binary files with random length records.

In each of this month's listings we have declared a data structure containing a string (Name) that can hold up to 10 characters and an integer (Number). Instead of using OPEN, which will open an existing file, we must use CREATE to create a new file. Even though Rec.Name is declared as a string of 10 characters, we will assign only eight characters to it. The reason for this will become apparent a little later.

To get a feel for sequential access files, enter Listing 1 and run it. When the program has finished running, use the dump command from OS-9 Level I or the *Developer's Package* to examine the contents of file1.dat. As you can see, each line of text is terminated with a carriage return ($0D). The file created is completely readable and doesn't contain any strange control characters except the carriage returns. The integer variable (Count) is stored in the file as an ASCII digit. The PRINT command is perfect for printing data on the screen or printer. It is also perfect for creating ASCII text files because the data written is a continuous stream of ASCII text — no control characters are imbedded in the file to separate the records.

There is, however, a problem with this method. A program cannot read each variable as it was written to the file. If we use INPUT, it will read the entire string RECORD #1 and assign it to Rec.Name. The program cannot easily tell the difference between the string (Rec.Name) and the digit (Rec.Number). To see this for yourself, enter and run Listing 2. Obviously PRINT and INPUT are impractical for use with files in which we want to store numbers as well as text items. But the pair works perfectly with ASCII text files in which all characters are to be interpreted as strings.

Contrast this with the WRITE command. Enter Listing 3 and run it. When the program has finished running, use the dump command to examine file2.dat. Unlike file1.dat, the stored variables, or fields, are separated with $00. Also, the end of each record is terminated with a carriage return, and Rec.Number is printed to the file in ASCII. For this reason, we can easily create a BASIC09 program to read and write sequential access files with random-length records. Since the WRITE command automatically puts a $00 at the end of each variable, it is easy to find any field within a record. And we already know each record is separated with a carriage return.

Look at Listing 3 again and compare it with the dump of file2.dat. The WRITE statement is used to write one entire record to the file. In Listing 3, the variables used to represent each field to be stored are separated with a semicolon. It is very similar to the PRINT statement except that $00 is written to the file each time a semicolon is encountered in the WRITE statement. This makes it very easy to read each variable exactly as it was written. Enter Listing 4 and run it. As you can see, we changed CREATE to OPEN and WRITE to READ. All the variables are assigned exactly as they were in Listing 3.

Sequential access files work well in many cases but are unsatisfactory in others. Since the length of each record in such a file can be different, we cannot read an individual record without reading all of the records up to that point.

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.

Direct Access Files

A *direct*, or *random access* file uses fixed-length records. That is, all records in the file contain the same number of bytes. This makes it easy to read or write any given record by specifying the record number. A drawback is that direct access files can cause wasted disk space since the data stored in each record may not completely fill that record. Enter Listing 5 and run it. Because we are using PUT, there is no need to tell BASIC09 to write each individual variable in the structure. All variables in the structure are written automatically.

Dump file3.dat when the program has finished running. In the printout you'll see that each record contains exactly 12 bytes. The first 10 bytes of each record hold the string for Rec.Name, and the last two bytes hold the binary value for Rec.Number. Examine the first 10 bytes in file3.dat closely. The first eight bytes are RECORD # as we expected. The ninth byte ($FF) is the string terminator character. The tenth byte is a "garbage" character used to *pad* the string so that it fills all 10 bytes of the field. This is the manner in which BASIC09 works with variable-length string data. It is important to remember that $FF is used to terminate strings less than the specified size. In this case, a string of exactly 10 characters would not have the $FF terminator at the end.

Now enter Listing 6 and examine it closely. You will notice that it is pretty much the same as Listing 5 except file3.dat is opened for READ and the program uses GET to read each record. We've set the loop to count backwards from 10 to 1 and inserted a SEEK statement. As you can probably guess, the program will read the records in reverse order.

Let's examine the SEEK statement a little closer. Records are numbered from zero and the loop starts with one. To account for this difference the program uses Count-1 to get the actual record number. But record numbers do not mean anything to BASIC09, so the offset is calculated by multiplying the record number by the size of each record, SIZE(Rec). To find the offset of any specific record, use (Count-1)*SIZE(Rec). Finally each record is read using GET and each of the variables is printed on the screen.

As stated before, because of the padding involved, direct access files can cause some wasted storage space. But it is easier and less time-consuming to find a specific record with direct access files than with sequential access files. Consider these trade-offs when writing your own programs.

Now that you understand the basic foundations of file I/O, create some programs of your own, or alter my listings to see what other discoveries you can make. We'll wrap it up next month with some hints, tips and a few traps to avoid.

❑

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Listing 1: Print_Test

```
PROCEDURE Print_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       CREATE #Path,"file1.dat":WRITE
 0043       Rec.Name:="RECORD #"
 0056
 0057       FOR Count:=1 TO 10
 0067         Rec.Number:=Count
 0073         PRINT #Path,Rec.Name; Rec.Number
 0087       NEXT Count
 0092
 0093       CLOSE #Path
 0099       END
```

Listing 2: Input_Test

```
PROCEDURE Input_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       OPEN #Path,"file1.dat":READ
 0043
 0044       FOR Count:=1 TO 10
 0054         INPUT #Path,Rec.Name
 0062         PRINT Rec.Name
 006A       NEXT Count
 0075
 0076       CLOSE #Path
 007C       END
```

Listing 3: Write_Test

```
PROCEDURE Write_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       CREATE #Path,"file2.dat":WRITE
 0043       Rec.Name:="RECORD #"
 0056
 0057       FOR Count:=1 TO 10
 0067         Rec.Number:=Count
 0073         WRITE #Path,Rec.Name; Rec.Number
 0087       NEXT Count
 0092
 0093       CLOSE #Path
 0099       END
```

Listing 4: Read_Test

```
PROCEDURE Read_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       OPEN #Path,"file2.dat":READ
 0043
 0044       FOR Count:=1 TO 10
 0054         READ #Path,Rec.Name,Rec.Number
 006A         PRINT Rec.Name; Rec.Number
 0079       NEXT Count
 0084
 0085       CLOSE #Path
 008B       END
```

Listing 5: Put_Test

```
PROCEDURE Put_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       CREATE #Path,"file3.dat":WRITE
 0043       Rec.Name:="RECORD #"
 0056
 0057       FOR Count:=1 TO 10
 0067         Rec.Number:=Count
 0073         PUT #Path,Rec
 007D       NEXT Count
 0088
 0089       CLOSE #Path
 008F       END
```

Listing 6: Get_Test

```
PROCEDURE Get_Test
 0000       TYPE Record-Name:STRING[10]; Numb
er:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Count:INTEGER
 0027       DIM Path:BYTE
 002E
 002F       OPEN #Path,"file3.dat":READ
 0043
 0044       FOR Count:=10 TO 1 STEP -1
 005A         SEEK #Path,(Count-1)*SIZE(Rec)
 006D         GET #Path,Rec
 0077         PRINT Rec.Name; Rec.Number
 0086       NEXT Count
 0091
 0092       CLOSE #Path
 0098       END
```

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by Kenneth Reighard, Jr.

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The Listing: RAID

```
0 ' COPYRIGHT 1990  FALSOFT, INC
1 GOTO32
2 P=0:M=4:Z=1:S=0
3 CLS0
4 X=0
5 PRINT@X,A$;
6 FORY=1TORND(Z):PRINT@RND(30)+449,B$;:NEXTY
7 PRINT@480,C$;
8 IFPEEK(1024+X)<>128ORPEEK(1024+X+1)<>128THEN21
9 POKE343,255:POKE344,255
10 Q$=INKEY$
11 IFQ$=CHR$(8)THENX=X-1:IFX<1THENX=1
12 IFQ$=CHR$(9)THENX=X+1:IFX>30THEN15
13 IFX>0THENP=P+.3*Z
14 GOTO5
15 SOUND200,1:S=S+1:P=P+50*Z
16 IFS<5THEN4
17 S=0:P=P+100*Z:PLAY"T302L4FLBAP32O+L4C#L2DO-L8AL4BO+CT2
18 IFZ/2=INT(Z/2)THENM=M+1:PLAY"P4T402L2AP100L8AGP100L4EGL2P100AT2
19 Z=Z+1:IFZ>4THENZ=4
20 GOTO4
21 PRINT@X,A$;:PLAY"L32O1FEFEGFAD
22 FORY=X TO X+448STEP32:PRINT@Y,A$;:FORQ=1TO50:NEXTO:PRINT@Y,D$::NEXTY
23 IFX>29THENX=29
24 Y=480+X:PRINT@Y,A$;:PLAYG$:PRINT@Y,F$;:PLAYG$:PRINT@Y,E$;:PLAYG$:PRINT@Y,D$;:PLAYG$
25 P=INT(P):PRINT@234,"SCORE="P;
26 M=M-1:IFM=0THEN29
27 PRINT@0,"";:FORY=1TOM:PRINTA$D$;:NEXTY
28 FORY=1TO2000:NEXTY:PRINT@224,C$;:GOTO4
29 PRINT@0,"GAME OVER!!!";
30 PRINT@480,"PLAY AGAIN (Y/N) ? ";
31 Q$=INKEY$:IFQ$="Y"THEN2ELSEIFQ$="N"THENPOKE65494,0:CLS:END:ELSE31
32 CLS4:PRINT@43," AIR RAID ";:PRINT@100," BY KENNETH REIGHARD JR.";:PRINT@454," PRESS KEY TO START ";
33 A$=CHR$(251)+CHR$(243):B$=CHR$(149):C$=STRING$(32,128):D$=STRING$(2,128):E$=STRING$(2,188):F$=STRING$(2,191)
34 G$="O1L32DCDCDCDC
35 POKE65495,0
36 IFINKEY$=""THEN36
37 GOTO2
```


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The Sound of the Touch

by William Barden, Jr.
Contributing Editor

What you can do with the CoCo without a lot of expensive external circuitry always amazes me. Would you believe there is a remote keypad with audio signal for under $15, complete with cable? The unit is pictured in Figure 1. It allows you to enter any amount of numeric data from locations as far away as hundreds of feet from your CoCo 3. The response to the data entered is a beep for each digit or string of digits, or you can even send special audio codes. Or, you can use the output of your CoCo 3 to activate a remote device in response to the digits input. Also, you may put together any number of these devices to allow entry of data from many locations. Here are some possibilities for use of this device:

- A combination entry lock that activates an electrical door opener based upon your code.
- A hand-held remote data entry system that allows you to enter inventory data in a stockroom or warehouse.
- A remote entry device that prompts you for a series of inputs and then replies with a coded audio response to indicate a "go/no-go" condition.

The Keypad Design

The keypad design shown in Figure 2 consists of 12 momentary-contact, push-button switches such as Radio Shack's 275-1547 switches. Any similar type of switch can be used in place of the Radio Shack switches. These are simple switches that are normally open but close when the button is pushed. The switches correspond to a normal telephone push-button keypad.

The output of the 12 switches feed into the four joystick inputs on the CoCo 3. The CoCo 3 allows for two joysticks, each with an up/down and right/left input. Output from the keypad is substituted for these four joystick inputs; more details about this in a moment.

In addition to the 12 switches, there is a small speaker in the unit. The speaker provides a short audio tone from your CoCo 3 to signal that a key has been pressed or to indicate other conditions. The speaker output comes from the AUDIO "RCA jack" of the CoCo 3. This output is in parallel to the sound output of any monitor connected to the system. Sound output is controlled by the SOUND command in BASIC. It should be noted that using the audio output of the CoCo 3 does not restrict this project from CoCo 1 and 2 users. If you are willing to forego audio feedback, or if you have the knowledge necessary to contrive feedback via other means, this project should work on the CoCo 1 and 2.

Joystick Inputs

The four joystick inputs are read by the JOYSTK command in CoCo 3 BASIC. For example, this code reads the four inputs:

```
100 A=JOYSTK(0)
110 B=JOYSTK(1)
120 C=JOYSTK(2)
130 D=JOYSTK(3)
```

Normally, each of the four variables — A, B, C and D — would hold a value of 0 through 63, representing the joystick position. In the keypad design, though, each of the four variables represents the key of a row. Variable A represents keys 1 through 3, Variable B keys 4 through 6, Variable C keys 7 through 9 and Variable D keys *, 0 and #. The value read for each of the four rows can be used to determine which of the three keys in a row has been pushed or if no key has been pushed.

Speaker signals are controlled by the SOUND statement in BASIC. For example, this BASIC line emits a one-twelfth-second high-pitched tone that signals a key press:

```
140 SOUND 200,1
```

The Keypad Hardware

The keypad hardware is simple and shouldn't pose any problems for most readers, even those not familiar with the horrors of hardware.

Drill twelve 5/16-inch diameter holes in

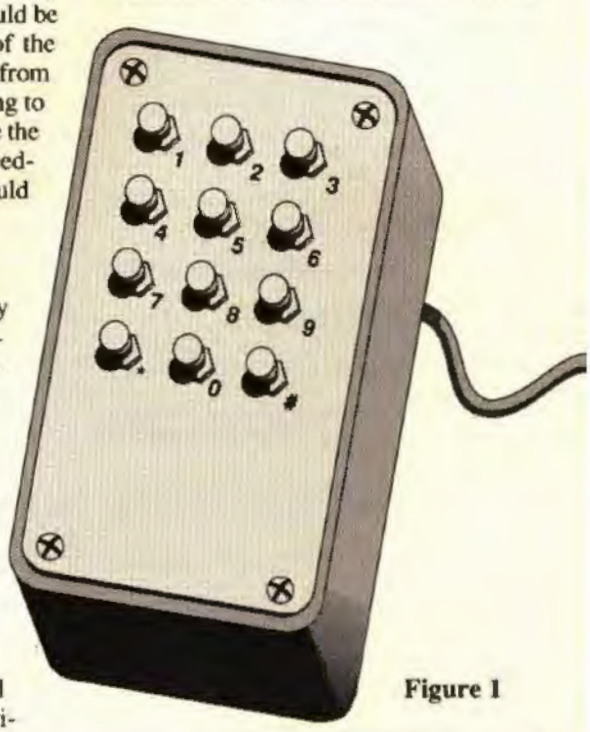

Figure 1

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

the cover of a Radio Shack 270-233 construction box. The thin aluminum drills very easily. Mount all 12 switches with the nuts that come with them.

Drill three 5/16-inch diameter holes in the back of the plastic box. Glue a small speaker (40-245) to the box with adhesive (64-2307). Then drill a single 5/16-inch diameter hole at the other end of the box. This hole is for the cable.

Connect all top switch contacts together with a single continuous wire. One easy way to do this is to thread a single bare wire through the switch contact holes and then solder the wire at each of the 12 contact holes. Leave one end of the wire dangling from the last switch.

Now solder twelve ¼-watt resistors to the remaining switch contacts. There are three different resistor values, 1K ohm (271-1321), 4.7K ohm (271-1330) and 22K ohm (271-1339). Connect the 1K ohm resistors to switches 1, 4, 7 and *, the 4.7K ohm resistors to switches 2, 5, 8 and 0, and the 22K ohm resistors to switches 3, 6, 9 and #. Note that the switches are reversed when viewed from the back.

Connect each set of three resistors together on the opposite end by soldering, leaving one lead for each of the four rows of switches.

Thread a six-conductor cable (278-374) through the hole in the back of the box. Strip off the insulation from the six wires. Connect one wire to each of the wires from the four rows of resistors, one wire to the common (ground) wire connecting all the switches, and the remaining wire to one terminal of the speaker. Connect a short length of unused wire from the second speaker terminal to the common (ground) lead. Note that the wires are color-coded. Make a note of colors versus connections so you'll be able to connect them properly at the other end of the cable.

Stuff all of the wires into the box and fasten the front cover with the screws provided. You may want to add electrical tape insulation (64-2340) between resistors and wires at appropriate places to make certain nothing shorts out. By the way, there will be no dangerous voltages present here to be concerned about.

You now have a box with connected cable, neatly packaged. The other end of the cable connects to *three cables* from the CoCo 3. The connection point should be close to the CoCo. The connections at this end involve eight resistors, seven wires from the CoCo and six wires of the cable. You can stuff these connections into a second construction box if you wish, or just make up a cable with connections neatly wrapped.

There are two joystick cables that connect to the right and left joysticks. These may be made using six-pin DIN plugs (274-020) and multi-conductor cable or by cannibalizing existing joystick cables. There is also a single "audio" type cable that con-

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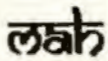

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William Barden Jr.
Color Computer Products

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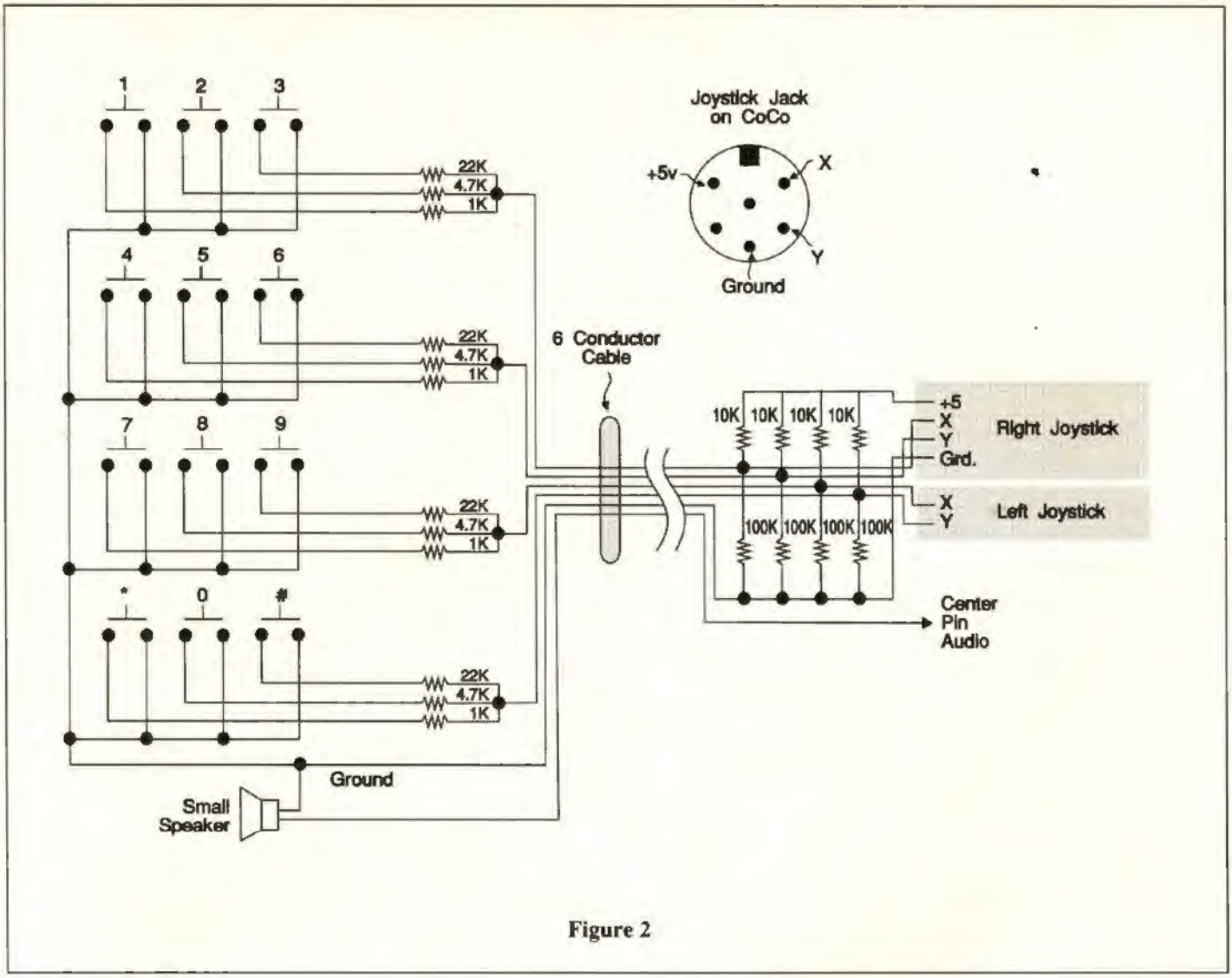

Figure 2

nects to the AUDIO output jack on the CoCo. Use a standard audio cable (43-2362) and cut and strip one end to expose two wires, the center conductor and shielded ground wire. Interconnect all wires and resistors as shown in Figure 2. You're now ready to test the keypad.

A Read Digit Subroutine

The BASIC subroutine shown in the listing reads the next digit from the keypad by using JOYSTK statements. The key pressed is returned as a numeric code of 1 through 12 in Variable R. Each time a digit is read, a short tone is output to the speaker. The subroutine may be used to read the proper digits for a variety of applications. Use the * and # keys to indicate special actions. You can change the code for additional audio signaling to the speaker. For example, you might want to beep a coded number of times to indicate received data and start of a new sequence.

Using the Relay Output

The keypad here can be used in conjunction with the cassette relay in the CoCo 3 to energize electrical solenoids for door locks or other applications. You'll need two more wires in the remote cable to accomplish this. (One caution here: It's best not to use the relay to control high-voltage devices — stick to battery-operated applications.) For more information on relay applications, see my book *Connecting the CoCo to the Real World*.

Using Multiple Keypads

There's no problem in ganging several different keypads at once, provided that no two are being used simultaneously. If you have several remote keypads and a chance that two people will be using them at the same time, consider some type of entry *protocol* that authorizes only one user to enter data at a time. You could, for example, receive the first identification digit, reply by a beep equal to the number of the station, and then read that data. All other users would wait an appropriate period of time until the first user was finished. Inva-

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lid data can be signaled to any keypad by a series of eight rapid beeps.

How the Keypad Works

The principle behind the keypad operation is relatively simple. The four joystick inputs read a voltage from about 0 to +5 volts. The 100K and 10K ohm resistors for each of the four inputs form a *voltage divider* that divides the five-volt difference in proportion to the resistance. The voltage at the junction point is about $^{10}/_{11}$ of +5 volts, which is read as a value of 63 for a JOYSTK input. Pressing a key switch connects a second resistance in parallel with the 100K ohm resistor, lowering the voltage at the junction point to about 3.2 volts, 1.6 volts or zero volts, depending upon which of the three keys in a row is pressed. These voltages correspond to joystick values of about 40, 20 or 0. The values can be read by the JOYSTK commands and translated to the correct key number, based on the input channel and value read.

An Educational Application

In keeping with the theme of this issue, consider this application for the keypad. Instead of momentary switches, substitute a sandwich of a plastic overlay sheet, ground plane of tinfoil, insulating cutout for 12 switch holes and a second set of 12 tinfoil contacts. You now have the workings for a keypad that can be used for interactive inputs and responses for educational applications. Simply use new overlays with appropriate symbols in place of the numeric labels for the keys.

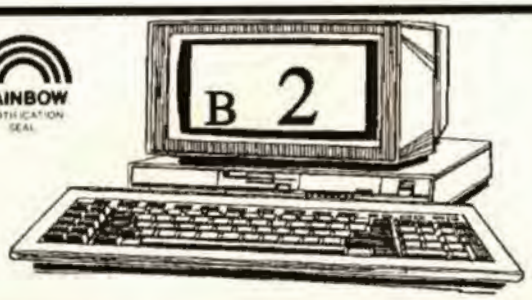
Real World Connections

Response has been good from readers interested in my book *Connecting the CoCo to the Real World*. I'd like to apologize to readers who experienced some delays in getting the book after printing problems, but there are plenty of copies available now and they should reach you five to ten days after an order is received. ❑

16K ECB

The Listing: KEYPAD

```
100 CLS
110 GOSUB 1000
120 IF R<>0 THEN PRINT R;
130 GOTO 110
1000 'READ KEYPAD SUBROUTINE
1010 R=0
1020 A=JOYSTK(0)
1030 B=JOYSTK(1)
1040 C=JOYSTK(2)
1050 D=JOYSTK(3)
1060 IF A<50 THEN GOTO 1080 ELSE
  IF B<50 THEN GOTO 1130 ELSE IF
C<50 THEN GOTO 1160 ELSE IF D<50
  THEN GOTO 1190 ELSE GOTO 1070
1070 RETURN
1080 R=3: IF A<30 THEN R=2
1090 IF A<10 THEN R=1
1100 FOR I=1 TO 70: NEXT I
1110 SOUND 200,1
1120 GOTO 1070
1130 R=6: IF B<30 THEN R=5
1140 IF B<10 THEN R=4
1150 GOTO 1100
1160 R=9: IF C<30 THEN R=8
1170 IF C<10 THEN R=7
1180 GOTO 1100
1190 R=12: IF D<30 THEN R=11
1200 IF D<10 THEN R=10
1220 GOTO 1100
```

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Money 'n Math

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.*

Since this is the education issue, let's look at an educational program that takes advantage of most CoCo-compatible printers. I'm talking about the *Money Math Worksheet Generator*.

This program is actually the third worksheet generator I've written for the CoCo. The first, *MathGen1*, lets you create worksheets and coded answer sheets on standard tractor-feed paper for simple addition, subtraction, multiplication and division. The program provides an answer sheet to match your worksheet, which is a nice function. (Why bother having to figure out the problems yourself if you want to correct them for a student or child?)

MathGen2 lets you create written word problems. Neither *MathGen1* or *MathGen2*, however, allows an addition problem to be printed in a column of more than two numbers. Thus, you can only get

```
this:   23      and never this:   23
       +14                       19
                                 36
                                +14
```

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.

Therefore I came up with a program that does just that.

While using a computer is a good way to sharpen math skills, most children still need to learn these same skills with a pencil and paper at some point. Unfortunately, most math books only tend to have two or three pages on any given math skill. To really learn these math skills, it is necessary to have repeated exercises on the same skills. Teachers have often spent hours creating such random worksheets for this purpose without a computer. Using a computer, of course, is much easier.

While using a computer is a good way to sharpen math skills, most children still need to learn these same skills with a pencil and paper at some point. Teachers have often spent hours creating such random worksheets for this purpose without a computer. Using a computer, of course, is much easier.

With *MathGen3* I decided to stick solely with addition skills involving money. I wanted a program that would allow column problems of from two to five numbers. (Later I'll tell you how to print sheets that do not print your numbers as decimals.) I also thought it would be nice if the CoCo could keep track of the number of lines per sheet so that the tractor-feed paper could run smoothly through the printer without needing constant readjustment.

I accomplished this mainly by printing a full-sized answer sheet with the problems repeated above the answer. This also makes looking at the problems and answers a little more logical. As an added bonus, *MathGen3* lets the program run without constantly readjusting the tractor-feed paper.

Using the Program

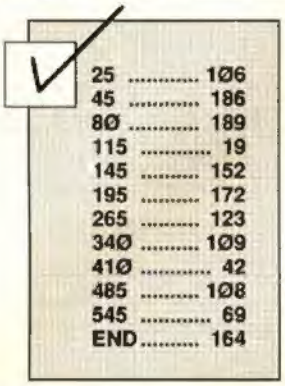
First line up the paper in your printer. The print head should be positioned about one-half inch below the top of the paper. The screen indicates whether or not you may choose from two to five numbers in each addition problem. When you have selected which you want by pressing the corresponding key, you are asked to type a number that will be the largest possible number generated by the computer. This controls the difficulty of the problems.

If your printer is already online, your papers will start printing. The program is designed to print using the enlarged print characters of most printers. On the printer I used with this program, the CHR$ for enlarged or expanded print is CHR$(14). Some printers use CHR$(31) for enlarged print, so change Line 65 to:

```
65 PRINT#-2,CHR$(31);: REM
INSERT ANY VALUE FOR ENLARGED
PRINT ON YOUR PRINTER
```

Check your printer manual to determine which value or values create the expanded mode and substitute whichever values are needed in order to get that result. Keep in mind the columns are already set up to use

16K Extended



The Listing: MATHGEN3

```
1 REM**************************
2 REM*       MONEY MATH        *
3 REM*   WORKSHEET GENERATOR   *
4 REM*    BY FRED B. SCERBO    *
5 REM*   COPYRIGHT (C) 1990    *
6 REM*      60 HARDING AVE.    *
7 REM*  NORTH ADAMS,MA Ø1247   *
8 REM**************************
1Ø DIM U(21,5)
15 NB$="####.##"
2Ø CLSØ:SCREEN0,1:LC$=CHR$(175)+
CHR$(17Ø):RC$=CHR$(165)+CHR$(175
):EB$=CHR$(175)+CHR$(175):GOSUB2
5:GOTO3Ø
25 CLS6:PRINTSTRING$(32,172);:PO
KE1Ø56,32:PRINT@33,"money";:POKE
1Ø62,32:PRINT@39,"math";:POKE1Ø6
7,32:PRINT@44,"worksheet";:POKE1
Ø77,32:PRINT@54,"generator";:POK
E1Ø87,32:PRINT@64,STRING$(32,163
);CHR$(175);:RETURN
3Ø FORI=ØTO8:PRINT@127+(I*32),EB
$;:NEXT:PRINT@133,CHR$(175):CHR$
(174);STRING$(18,172):CHR$(173);
CHR$(175);
35 PRINT@165,LC$;" (A) ADD TWO
    ";RC$;:PRINT@197,LC$;" (B) A
DD THREE    ";RC$;:PRINT@229,LC$
;" (C) ADD FOUR     ";RC$;:PRINT
@261,LC$;" (D) ADD FIVE     ";RC
$;:PRINT@293,LC$;" (E)XIT PROGRA
M   ";RC$;
4Ø PRINT@325,CHR$(175);CHR$(171)
;STRING$(18,163);CHR$(167);CHR$(
175);
45 PRINT@384,STRING$(32,172);:PO
KE1440,32:POKE1441,32:POKE1442,3
2:POKE1443,32:POKE1444,32:PRINT@
421,"press";:POKE1450,32:PRINT@4
27,"desired";:POKE1458,32:PRINT@
435,"category";:POKE1467,32:POKE
1468,32
5Ø POKE1469,32:POKE1470,32:POKE1
471,32:PRINT@448,STRING$(32,163)
;STRING$(31,128);:POKE1535,128
55 X$=INKEY$:KE=RND(TIMER):IFX$=
"A"THEN160ELSEIFX$="B"THEN270ELS
EIFX$="C"THEN370ELSEIFX$="D"THEN
475ELSEIFX$="E"THEN590ELSE55
6Ø GOTO2Ø
65 PRINT#-2,CHR$(14);:REM
INSERT ANY VALUE FOR ENLARGED
PRINT ON YOUR PRINTER
```


MVCanvas 2.0 - OS-9 Paint Program

Finally, a professional OS-9 Level II paint program is available for the Color Computer 3. **MVCanvas** not only supports true windows, **MVCanvas** is the **ONLY** Color Computer graphic editor that gives you **more choices than just a 320 by 200 pixel, 16 color graphic resolution.** ♦

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these characters, so any other type of print may throw off the columns.

Custom Changes

If you do not want the program to print these problems as dollars and cents, change Line 15, which reads:

```
15 NB$="####.##"
```

Change it to:

```
15 NB$="#######"
```

Also change Line 125 from:

```
125 WW=WW*100:RETURN
```

to

```
125 RETURN
```

You must also change lines 135 and 140 from:

```
135 FORI=1TO3:U(I+K,W)=RND(WW)/1
00:PRINT#-2," ";:PRINT#-2,USING
NB$;U(I+K,W);:PRINT#-2," ";:U(I+
K,0)=U(I+K,0)+U(I+K,W):NEXTI:PRI
NT#-2,"":RETURN

140 FORI=1TO3:U(I+K,W)=RND(WW)/1
00:PRINT#-2," +";:PRINT#-2,USING
 NB$;U(I+K,W);:PRINT#-2," ";:U(I
+K,0)=U(I+K,0)+U(I+K,W):NEXTI:PR
INT#-2,"":RETURN
```

to:

```
135 FORI=1TO3:U(I+K,W)=RND(WW):P
RINT#-2," ";:PRINT#-2,USING NB$;
U(I+K,W);:PRINT#-2," ";U(I+K,0)=
U(I+K,0)+U(I+K,W):NEXTI:PRINT#-2
,"":RETURN

140 FORI=1TO3:U(I+K,W)=RND(WW):P
RINT#-2," +";:PRINT#-2,USING NB$
;U(I+K,W);:PRINT#-2," ";:U(I+K,0
)=U(I+K,0)+U(I+K,W):NEXTI:PRINT#
-2,"":RETURN
```

In lines 135 and 140 you have eliminated the characters /100 from directly after RND(WW). This allows you to have problems that do not show a decimal. It also ensures the alignment remains correct.

Conclusion

Give *MathGen3* a try. In coming weeks I will introduce more programs that make use of a printer for educational purposes. Until then, keep your ideas and requests coming in. ❑

```
70 PRINT#-2,"NAME";STRING$(24,&H
5F);"DATE";STRING$(7,95)
75 PRINT#-2," "
80 PRINT#-2,"SHEET IDENTIFICATIO
N NO.";SN(NC):PRINT#-2," "
85 RETURN
90 PRINT#-2,"————ANSWE
R SHEET————":PRINT#-2,
" "
95 PRINT#-2,"SHEET IDENTIFICATIO
N NO.";SN(NC):PRINT#-2," "
100 RETURN
105 FORI=1TO3:PRINT#-2,"   —-
-   ";:NEXTI:PRINT#-2,"":RETURN
110 GOSUB25:FORI=127TO191STEP32:
PRINT@I,EB$;:NEXT:PRINT@192,STRI
NG$(32,172);
115 QK$(NC)="A":PRINT@133," ADDI
TION  WORKSHEETS ";:PRINT@224,"
      INPUT NUMBER SPAN":PRINTS
TRING$(32,32);:PRINT@256,"   (4
DIGITS-MAX.9999)";:INPUTWW:IF WW
>9999THEN115ELSEIF WW=0THENRUN
120 SN(NC)=TIMER
125 WW=WW*100:RETURN
130 FORS=1TO3:PRINT#-2,USING"##.
";S+K;:PRINT#-2,"          ";:NE
XTS:PRINT#-2,"":RETURN
135 FORI=1TO3:U(I+K,W)=RND(WW)/1
00:PRINT#-2,"   ";:PRINT#-2,USIN
G NB$;U(I+K,W);:PRINT#-2,"   ";:
U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI
:PRINT#-2,"":RETURN
140 FORI=1TO3:U(I+K,W)=RND(WW)/1
00:PRINT#-2,"  +";:PRINT#-2,USIN
G NB$;U(I+K,W);:PRINT#-2,"   ";:
U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI
:PRINT#-2,"":RETURN
145 FORI=1TO3:PRINT#-2,"   ";:PR
INT#-2,USING NB$;U(I+K,W);:PRINT
#-2,"   ";:NEXTI:PRINT#-2,"":RET
URN
150 FORI=1TO3:PRINT#-2,"  +";:PR
INT#-2,USING NB$;U(I+K,W);:PRINT
#-2,"   ";:NEXTI:PRINT#-2,"":RET
URN
155 FORI=1TO3:PRINT#-2,"   ";:PR
INT#-2,USING NB$;U(I+K,0);:PRINT
#-2,"   ";:NEXTI:PRINT#-2,"":RET
URN
160 REM ADD TWO
165 GOSUB110
170 GOSUB65
175 FORK=0TO18STEP3
180 GOSUB130
185 W=1:GOSUB135
190 W=2:GOSUB140
195 GOSUB105
200 FORI=1TO4:PRINT#-2," ":NEXTI
,K
205 FORI=1TO6:PRINT#-2," ":NEXT
210 GOSUB580
215 GOSUB90
220 FORK=0TO18STEP3
225 GOSUB130
230 W=1:GOSUB145
235 W=2:GOSUB150
240 GOSUB105
245 GOSUB155
250 FORI=1TO3:PRINT#-2," ":NEXTI
,K
255 FORI=1TO5:PRINT#-2," ":NEXT
260 RUN
265 REM ADD THREE
270 GOSUB110
275 GOSUB65
280 FORK=0TO15STEP3
285 GOSUB130
290 FORW=1TO2:GOSUB135:NEXT
295 W=3:GOSUB140
300 GOSUB105
305 FORI=1TO4:PRINT#-2," ":NEXTI
,K
310 GOSUB580
315 FORI=1TO8:PRINT#-2," ":NEXT
320 GOSUB90
325 FORK=0TO15STEP3
330 GOSUB130
335 FORW=1TO2:GOSUB145:NEXT
340 W=3:GOSUB150
345 GOSUB105
350 GOSUB155
355 FORI=1TO3:PRINT#-2," ":NEXTI
,K
360 FORI=1TO8:PRINT#-2," ":NEXT
365 RUN
370 REM ADD FOUR
375 GOSUB110
380 GOSUB65
385 FORK=0TO12STEP3
390 GOSUB130
395 FORW=1TO3:GOSUB135:NEXT
400 W=4:GOSUB140
405 GOSUB105
410 FORI=1TO5:PRINT#-2," ":NEXTI
,K
415 GOSUB580
420 FORI=1TO8:PRINT#-2," ":NEXT
425 GOSUB90
430 FORK=0TO12STEP3
435 GOSUB130
440 FORW=1TO3:GOSUB145:NEXT
445 W=4:GOSUB150
450 GOSUB105
455 GOSUB155
460 FORI=1TO4:PRINT#-2," ":NEXTI
,K
465 FORI=1TO8:PRINT#-2," ":NEXT
470 RUN
475 REM ADD FIVE
480 GOSUB110
485 GOSUB65
490 FORK=0TO12STEP3
495 GOSUB130
500 FORW=1TO4:GOSUB135:NEXT
505 W=5:GOSUB140
510 GOSUB105
515 FORI=1TO4:PRINT#-2," ":NEXTI
,K
520 GOSUB580
525 FORI=1TO7:PRINT#-2," ":NEXT
530 GOSUB90
535 FORK=0TO12STEP3
540 GOSUB130
545 FORW=1TO4:GOSUB145:NEXT
550 W=5:GOSUB150
555 GOSUB105
560 GOSUB155
565 FORI=1TO3:PRINT#-2," ":NEXTI
,K
570 FORI=1TO7:PRINT#-2," ":NEXT
575 RUN
580 CLS5:PRINT@192,STRING$(32,17
2);"now";:POKE1251,32:PRINT@228,
"printing";:POKE1260,32:PRINT@23
7,"coded";:POKE1266,32:PRINT@243
,"answer";:POKE1273,32:PRINT@250
,"sheets";STRING$(32,163);
585 RETURN
590 CLS0:SCREEN0,0:END
```

OS-9 Gets the Grades

by Dale L.Puckett
Contributing Editor

School bells are ringing and it's time for students and teachers to start keeping records for the new semester. *GradeBook* is designed to introduce you to practical BASIC09 application programming and help you keep all those records during the school year.

GradeBook is for teachers who need to keep track of students' grades on various assignments during the school year. Each file can keep track of 30 individual assignments for 24 students. If you record grades for more than 30 assignments in a semester, you can use separate files for each six week period. With a few changes in the names of the data fields, students can rewrite the *GradeBook* to keep a record of their performance in all of their classes.

Starting *GradeBook*

One design goal of most programmers today is to provide an application that can be used by anyone, with or without knowledge of computers and without reading a manual. *GradeBook* comes very close to meeting this goal, but I'll pass along a few hints to make sure you aren't led astray.

GradeBook is completely menu driven. It runs on a text-only screen — for speed — and does not use any code that requires you to have *Multi-Vue* installed. You should be able to run this program with OS-9 Level II fresh out of the box.

You can run the program from within BASIC09, or you can pack the code and run it from any OS-9 prompt. To take the first approach, enter the lines below:

```
OS9: load basic09
OS9: basic09 #32k
B: load gradebook
B: run
```

Note that you must request 32K of memory to run *GradeBook* because of the size of the data structure we are using. Also note that the source file named `GradeBook` must be located in your current data directory when you start BASIC09. If you would rather run a packed version of *Gradebook*, type the following line after you have loaded the *GradeBook* source into BASIC09:

```
B: pack
```

BASIC09 stores the packed version in a file named `GradeBook` in your current execution directory `/dd/CMDS`. After you have run the `pack` command, you can exit BASIC09 by typing `bye`. You may run the packed program by typing the following commands at any OS-9 prompt:

```
OS9: chd /dd/GRADES
OS9: gradebook
```

The above sequence tells OS-9 that you have stored your grade book files in a directory named `/dd/GRADES`. You must always change your current data directory to the directory containing your grade book files before you run *GradeBook*.

Running *GradeBook*

The first thing you see when you run *GradeBook* is a small dialog window in the middle of your screen. It asks you for the name of the class. Because the program uses the name you enter as part of an OS-9 filename, it can contain no spaces and no more than 12 characters.

For example, Math 101 must be typed as `Math101` or `Math_101`. If you type the latter, the program creates and initializes a file named `GradeBook.Math_101` in your current data directory.

After the grade book file is created or opened, the main menu pops up in the center of the screen. At this point you may chose one of these options: Add a student, Enter grades, Display a student's progress, Print the Gradebook, Edit or Delete a grade, or Quit. You select your choice by typing a number between 1 and 5. To quit, type 0.

For example, if you type 1 to add a student, the main menu disappears and another dialog box asks you for the student's last name. If you want to stop adding names, press ENTER in response to this prompt. Otherwise, type the student's last name and the program asks for the first name, address and other vital information. You may also add a 40-character comment to the student's record.

Each time you complete a student's entry, the program displays that information on screen briefly and then shows the dialog box again to take information for the next student. When you finish adding students to your gradebook and press ENTER at the Last Name prompt, the dialog box disappears and the main menu pops up again.

Each of the other menu functions works in a similar manner. For example, when you ask to enter grades, display a student's progress or edit a grade, the program uses one dialog box to ask you for the student's last and first name before moving you to another dialog box to prompt for additional information.

Because of the need to conserve memory, there is a finite limit to the length of the data that may be entered. For example, the street address may be only 20 characters long; the city is limited to 12 characters; and the description of each item graded may contain up to 14 characters. You may deter-

---

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mine the exact length limit of other data fields by looking at the TYPE statements at the beginning of the program listing.

Modifying *GradeBook*

As with most "KISSable OS-9" programs, *GradeBook* is a functional shell that gets you started. From this point you may add as much or as little as you want. For example, you might write a small utility program that copies an existing grade file for a class into a file for the next six week period. That utility would leave all the information about the student intact but would delete the grades entered during the previous six week period. This would eliminate the need to manually delete the records after copying a grade book file. With this utility in hand, you would only need the following two commands to move each class file into the new period:

```
OS9: copy Math_101 Math_101a
OS9: stripgrades Math_101a
```

You could even put these functions in a subroutine and add a Create New Period item to the main menu. Then you wouldn't need to run a separate program.

Another project to consider is one that would allow you to weigh individual scores. Essentially, we have given you the framework to do this by providing the data field type in each grade record. Enter the type of item, i.e., homework, quiz, exam, etc., in this field now. You can easily add another data field to hold a weighted score based on the type of the item. The weighted value can be computed and stored in the new data field in a subroutine. Another handy subroutine creates a student entry named Summary and stores the item description, type and class average for each item.

Students may want to modify the data types and printing routines so they can track all of their classes. The present version lets teachers track students; however, it's all a matter of names since the same data must be stored in either case. A proposed data type for student use is shown below:

```
TYPE vitals=used:BOOLEAN; stunam
:STRING[12]; classname, teachnam
e:STRING[12]; schoolname:STRING[
20]; city:STRING[12]; st:STRING[
2]; zip:STRING[[5]; teachphone:S
TRING[12]; comments:STRING[40]
```

The data type grades would remain the same as in the original program. In the sample change mentioned I make the number of items and the size of each field in the data

OS-9 Level II 512K

The Listing: GradeBook

```
PROCEDURE GradeBook
0000      (* To help you keep track of your grades during the year
0038      (* Copyright 1990 DaleSoft
0052      BASE 1
0054
0055      TYPE vitals=used:BOOLEAN; class:STRING[12]; lname,fname:STRING
           [12]; street:STRING[20]; city:STRING[12]; st:STRING[2
           ]; zip:STRING[5]; phone:STRING[12]; comments:STRING[40
           ]
00BC      TYPE grades=empty:BOOLEAN; item:STRING[14]; score,avg:BYTE; itype
           :STRING[8]
00E7      TYPE sturecs=info:vitals; grade(30):grades
0101      TYPE gbook=sturec(24):sturecs
0113
0114      DIM found:BOOLEAN
011B      DIM work:sturecs
0124      DIM gradebook:gbook
012D      DIM numstudents,numgrades:BYTE
0138      numstudents:=24 \numgrades:=30
0146
0147      DIM action,average,gbpath,numitems,numavgs,newgrade:BYTE
0162      DIM index,gindex,runningtotal,count,printer,avgcount:INTEGER
017D      DIM key:STRING[1]
0189      DIM classname:STRING[14]
0195      DIM title:STRING[64]
01A1      DIM pathname:STRING
01A8
01A9      (* Open database
01B9      ON ERROR GOTO 9000
01BF
01C0      (* Get name of Class first
01DA      RUN gfx2("OWSet",1,20,10,40,2,0,2)
01FC      INPUT "Name of the class? ",classname
0217      RUN gfx2("OWEnd")
0224      pathname:="GradeBook."+classname+":UPDATE"
0243      OPEN #gbpath,pathname
024D 10   SEEK #gbpath,0
0259      GET #gbpath,gradebook
0263      ON ERROR
0266
0267      LOOP
0269        key:=""
0270        RUN gfx2("OWSet",1,20,6,40,13,0,2)
0292        PRINT CHR$(12) \(* Clear Screen
02A6        PRINT "      The Rainbow Gradebook"
02C4        PRINT "=================================="
02E8        PRINT
02EA        PRINT "1 -- Add a student"
0300        PRINT "2 -- Enter grades"
0315        PRINT "3 -- Display a student's progress"
033A        PRINT "4 -- Print Gradebook"
0352        PRINT "5 -- Edit <or Delete> a grade"
0373        PRINT "0 -- Quit"
0380        PRINT  \ PRINT " Select by typing a number: ";
03A3        REPEAT
03A5          RUN inkey(key)
03AF        UNTIL key<>""
03BA        action:=ASC(key)-$30
03C7      EXITIF action=0 THEN
03D3        RUN gfx2("OWEnd")
03E0        GOTO 999
03E4      ENDEXIT
03E8        RUN gfx2("OWEnd")
03F5        ON action GOSUB 1000,2000,3000,4000,5000
0410      ENDLOOP
0414
0415 999  RUN gfx2("OWSet",1,20,10,40,4,0,2)
043A      PRINT  \ PRINT "Saving GradeBook file to disk."
045E      SEEK #gbpath,0
0467      PUT #gbpath,gradebook
0471      CLOSE #gbpath
0477      RUN gfx2("OWEnd")
0484      RUN gfx2("clear")
0491      END
0493
0494 1000 (* Enter student names
04AD      (* Move to first unused record
04CB      index:=1
04D2      WHILE gradebook.sturec(index).info.used=TRUE DO
04E9        index:=index+1
04F4      ENDWHILE
04F8
04F9      work:=gradebook.sturec(index)
```

```
0507        work.info.class:="WORKING"
051C
051D        LOOP
051F          RUN gfx2("OWSet",1,10,10,60,12,0,2)
0541          PRINT "Strike <ENTER> at Last Name prompt to quit"
056F          PRINT  \ INPUT "Student's Last Name? ",work.info.lname
0595
0596        EXITIF work.info.lname="" THEN
05A8          RUN gfx2("OWEnd")
05B5        ENDEXIT
05B9
05BA          work.info.class:=classname
05C9          INPUT "Student's First Name? ",work.info.fname
05EE          INPUT "Student's Street Address? ",work.info.street
0617          INPUT "Student's City? ",work.info.city
0636          INPUT "Student's State? ",work.info.st
0656          INPUT "Student's Zip Code? ",work.info.zip
0679          INPUT "Student's Phone Number? ",work.info.phone
06A0          INPUT "Comments about this student? ",work.info.comments
06CC          work.info.used:=TRUE
06D9          gradebook.sturec(index):=work
06E8          RUN gfx2("OWEnd")
06F5          GOSUB 1600
06F9          index:=index+1
0704        ENDLOOP
0708        RETURN
070A
070B 1600 (* Print Vital Stats
0722        RUN gfx2("clear")
072F        title:="Rainbow Gradebook: "+classname
074D        PRINT USING "S80^",title
075A        RUN gfx2("CurXY",2,4) \ PRINT "Student: "; gradebook.sturec
             (index).info.lname; ", "; gradebook.sturec(index).info.fname
079F        RUN gfx2("CurXY",2,5) \ PRINT "Address: "; gradebook.sturec
             (index).info.street
07CF        RUN gfx2("CurXY",11,6) \ PRINT gradebook.sturec(index).info.city
07F3        RUN gfx2("CurXY",11,7) \ PRINT gradebook.sturec(index).info.st
             ; " "; gradebook.sturec(index).info.zip
082B        RUN gfx2("CurXY",2,8) \ PRINT "Phone:    "; gradebook.sturec
             (index).info.phone
085B        RUN gfx2("CurXY",2,14) \ PRINT "Comments: "; gradebook.sturec
             (index).info.comments
088C        RETURN
088E
088F 2000 (* Enter grades
08A1        GOSUB 8000 \(* Go find student's entry
08BF        IF found=FALSE THEN
08CA          RETURN
08CC        ENDIF
08CE
08CF        (* Get copy of record
08E4        work:=gradebook.sturec(index)
08F2
08F3        (* Move to first unused Grade Entry
0916        gindex:=1
091D
091E        WHILE gradebook.sturec(index).grade(gindex).empty=FALSE DO
0938          gindex:=gindex+1
0943        ENDWHILE
0947
0948        (* Put anything in "item" field for later test
0976        work.grade(gindex).item:="WORKING"
098E
098F        LOOP
0991          RUN gfx2("OWSet",1,10,10,60,9,0,2)
09B3          PRINT "Strike <ENTER> for Item entry to quit"
09DC          INPUT "Describe item graded? ",work.grade(gindex).item
0A04        EXITIF work.grade(gindex).item="" THEN
0A19          RUN gfx2("OWEnd")
0A26        ENDEXIT
0A2A
0A2B          INPUT "Student's grade (0 to 100) on this item? ",work.grade
               (gindex).score
0A66          INPUT "Type of item (e.g., homework,quiz, exam, etc.)? ",
              work.grade(gindex).itype
0AA8
0AA9          (* Calculate average here
0AC2          runningtotal:=0 \numitems:=gindex
0AD1
0AD2          FOR count:=1 TO numitems
0AE3            runningtotal:=runningtotal+work.grade(count).score
0AF8          NEXT count
0B03
0B04          average:=runningtotal/numitems
0B10          work.grade(gindex).avg:=average
0B22          work.grade(gindex).empty:=FALSE
0B32          gindex:=gindex+1
0B3D          RUN gfx2("OWEnd")
0B4A        ENDLOOP
```


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type the same as in the original program. This makes conversion easier if you are just learning to use BASIC09's powerful data-typing capabilities.

After you change this data type, you must go through the program and edit the lines that access those data types. For example, the line that sets the pathname used when opening the file would read:

```
pathname:="GradeBook."+stuname:UPDATE
```

A slightly more complex change is needed in the routine that prints the vital statistics. For example you need to change the line that reads:

```
PRINT "Student: "; gradebook.stu
rec(index).info.lname; ", "; gra
debook.sturec(index).info.fname
```

to

```
PRINT "Class: "; gradebook.sture
c(index).info.classname; "/";gra
debook.sturec(index).info.teachn
ame
```

Since the data type that holds the grades is exactly the same, the subroutines that deal with the grades do not need to be changed. The subroutine at Line 8000 that searches for the student's name, however,

As with most "KISSable OS-9" programs, *GradeBook* is a functional shell that gets you started. From this point you may add as much or as little as you want.

```
0B4E
0B4F        gradebook.sturec(index):=work
0B5E        GOSUB 1600 \(* Display Student Info
0B79        GOSUB 2600 \(* Display Grade Info
0B92        RETURN
0B94
0B95 2600   (* Display grade list
0BAD        RUN gfx2("CWArea",33,2,47,21)
0BC7        RUN gfx2("clear")
0BD4        RUN gfx2("CurXY",1,1) \RUN gfx2("undlnon")
0BF6        PRINT "#  "; "ITEM";
0C05        RUN gfx2("CurXY",26,1) \ PRINT "SCORE "; "AVG "; "TYPE"
0C30        RUN gfx2("undlnoff")
0C40
0C41        (* Now print grades
0C54        gindex:=1
0C5B        WHILE gradebook.sturec(index).grade(gindex).empty=FALSE DO
0C75          RUN gfx2("CurXY",1,gindex+1) \ PRINT gindex;
0C92          RUN gfx2("CurXY",4,gindex+1)
0CA9          PRINT gradebook.sturec(index).grade(gindex).item;
0CBE          RUN gfx2("CurXY",27,gindex+1)
0CD5          PRINT gradebook.sturec(index).grade(gindex).score;
0CEA          RUN gfx2("CurXY",33,gindex+1)
0D01          PRINT gradebook.sturec(index).grade(gindex).avg;
0D16          RUN gfx2("CurXY",36,gindex+1)
0D2D          PRINT gradebook.sturec(index).grade(gindex).itype
0D41          gindex:=gindex+1
0D4C        ENDWHILE
0D50        key:=""
0D57        RUN gfx2("OWSet",1,6,21,30,1,0,2)
0D79        PRINT "Strike any key to continue";
0D98        REPEAT
0D9A          RUN inkey(key)
0DA4        UNTIL key<>""
0DAF        RUN gfx2("OWEnd")
0DBC        RUN gfx2("CWArea",0,0,80,24)
0DD6        RETURN
0DD8
0DD9 3000   (* Check a student's progress
0DF9        (* Get students record
0E0F        GOSUB 8000
0E13        IF found=FALSE THEN
0E1E          RETURN
0E20        ENDIF
0E22        work:=gradebook.sturec(index)
0E30        GOSUB 1600 \(* Display Student Info
0E4B        GOSUB 2600 \(* Display Student Grades
0E68        RETURN
0E6A
0E6B 4000   (* Print the Gradebook
0E84        OPEN #printer,"/p":WRITE
0E91
0E92        index:=1 \gindex:=1
0EA0        WHILE gradebook.sturec(index).info.used=TRUE DO
0EB7          title:="Rainbow Gradebook: "+classname+" -- "+gradebook.sturec
               (index).info.fname+" "+gradebook.sturec(index).info.lname
0F00          PRINT #printer USING "S80^",title
0F11          PRINT #printer \ PRINT #printer \ PRINT #printer
0F23          PRINT #printer,"Item No. ";  \ PRINT #printer,TAB(14); "Description"
                ;
0F4F          PRINT #printer,TAB(30); "Score";  \ PRINT #printer,TAB(40
               ); "Average";
0F77          PRINT #printer,TAB(50); "Type of Assignment"
0F96          PRINT #printer
0F9C          WHILE NOT(gradebook.sturec(index).grade(gindex).empty) DO

0FB5            PRINT #printer,TAB(4); gindex;
0FC4            PRINT #printer,TAB(10),gradebook.sturec(index).grade(gindex
                 ).item;
0FE2            PRINT #printer,TAB(32); gradebook.sturec(index).grade(gindex
                 ).score;
1000            PRINT #printer,TAB(43); gradebook.sturec(index).grade(gindex
                 ).avg;
101E            PRINT #printer,TAB(50); gradebook.sturec(index).grade(gindex
                 ).itype
103B            gindex:=gindex+1
1046          ENDWHILE
104A          PRINT #printer,CHR$($0C)
1055          index:=index+1
1060          gindex:=1
1067        ENDWHILE
1068        CLOSE #printer
1071        RETURN
1073
1074 5000   (* Edit or Delete a record
1091        GOSUB 8000 \(* Find the Student
10A8        IF found=FALSE THEN
10B3          RETURN
10B5        ENDIF
```

```
10B7
10B8        (* Get record number to change
10D6        RUN gfx2("OWSet",1,10,10,60,2,0,2)
10F8        INPUT "Type the number of the grade you want to change: ",action
1131        RUN gfx2("OWEnd")
113E
113F        IF action<=numgrades OR NOT(gradebook.sturec(index).grade(gindex
             ).empty) THEN
1160          gindex:=action \(* Action is Pointer to record to edit
118E        ELSE
1192          RUN gfx2("OWSet",1,20,10,50,2,0,2)
11B4          PRINT "This record not in database!"
11D4          FOR count:=1 TO 5000 \NEXT count \(* Delay to read Message
1208          RUN gfx2("OWEnd")
1215          RETURN
1217        ENDIF
1219
121A        RUN gfx2("OWSet",1,20,10,60,8,0,2)
123C        PRINT "Type 0 at next prompt to delete record!"
1267        INPUT "What is the new grade for this item? ",newgrade
1294        IF newgrade=0 THEN
12A0          (* First find out how many entries in student's record
12D6          count:=1
12DD          WHILE NOT(gradebook.sturec(index).grade(count).empty) DO
12F6            count:=count+1
1301          ENDWHILE
1305          numitems:=count-1
1310
1311          FOR count:=action TO numitems-1
1326            gradebook.sturec(index).grade(count):=gradebook.sturec(
                 index).grade(count+1)
134A          NEXT count
1355
1356          gradebook.sturec(index).grade(count).empty:=TRUE
136C          GOSUB 5500 \(* Go update averages
1385          PRINT "This item has been removed from Gradebook."
13B3          FOR count:=1 TO 5000 \NEXT count
13CF          RUN gfx2("OWEnd")
13DC          RETURN
13DE        ELSE
13E2          gradebook.sturec(index).grade(gindex).score:=newgrade
```

needs to be changed to search for the class name instead. You don't even need to check the field holding the instructor's name.

You will need to change the names of several variables. For example, `numstudents` must become `numgrades`, and `classname` should be `myname`.

One last thought. We chose to handle the entire database in memory so we could get it from the disk or put it back with one simple statement. You may modify *GradeBook* so it handles only one student's record in memory at any one time. By doing this you can increase the number of grades for each student dramatically. If you do this, use a loop to read the student records from or write them to the disk.

With these hints, your conversion project should be just enough of a challenge to make it a valuable learning experience. I hope *GradeBook* helps you learn BASIC09 and gives you a handy tool at the same time. After you hone your skills with the language, you may convert *GradeBook* into a database program that handles data for an entirely different application.

Next month is the Graphics issue. Until then, keep on hacking!

❑

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WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```
13FA          INPUT "What is the new item Description? ",gradebook.sturec
               (index).grade(gindex).item
1434          INPUT "What is the new assignment type? ",gradebook.sturec
               (index).grade(gindex).itype
146D          GOSUB 5500 \(* Scores have changed, update averages
1498          PRINT "Record has been updated."
14B4          FOR count:=1 TO 5000 \NEXT count
14D0          RUN gfx2("OWEnd")
14DD          RETURN
14DF        ENDIF
14E1
14E2 5500   (* Update the average
14FA        runningtotal:=0 \count:=1 \avgcount:=1
150F
1510        WHILE NOT(gradebook.sturec(index).grade(count).empty) DO
1529          count:=count+1
1534        ENDWHILE
1538
1539        numitems:=count-1 \numavgs:=numitems
154C
154D        (* Recompute each average in student record
1578        WHILE avgcount<=numavgs DO
1585          runningtotal:=0 \numitems:=avgcount
1594
1595          FOR count:=1 TO numitems
15A6            runningtotal:=runningtotal+gradebook.sturec(index).grade
                 (count).score
15C1          NEXT count
15CC
15CD          average:=runningtotal/numitems
15D9          gradebook.sturec(index).grade(avgcount).avg:=average
15F1          avgcount:=avgcount+1
15FC        ENDWHILE
1600        RETURN
1602
1603 8000   (* Find Student Name and move to record
162D        RUN gfx2("OWSet",1,10,10,60,3,0,2)
164F        INPUT "What is the student's last name? ",work.info.lname
167F        INPUT "What is the student's first name? ",work.info.fname
16B0        RUN gfx2("OWEnd")
16BD
16BE        index:=0
16C5        REPEAT
16C7
16C8        EXITIF index=numstudents THEN
16D5          RUN gfx2("OWSet",1,20,10,40,3,0,2)
16F7          PRINT "Record for "; work.info.fname; " "; work.info.lname
               ; " not found!"
172C          FOR count:=1 TO 5000 \NEXT count \(* Delay to read Message
1760          found:=FALSE
1766          RUN gfx2("OWEnd")
1773          RETURN
1775        ENDEXIT
1779
177A          index:=index+1
1785        UNTIL gradebook.sturec(index).info.fname=work.info.fname AND
             gradebook.sturec(index).info.lname=work.info.lname
17BD        found:=TRUE
17C3        RETURN
17C5
17C6 9000   (* Initialize gradebook, student info first
17F4        PRINT "Creating file GradeBook."; classname
1814        CREATE #gbpath.pathname
181E        work.info.used:=FALSE
1828        work.info.class:=classname
183A        work.info.lname:="              "
1854        work.info.fname:="              "
186E        work.info.street:="                      "
1890        work.info.city:="              "
18AA        work.info.st:="  "
18BA        work.info.zip:="     "
18CD        work.info.phone:="              "
18E7        work.info.comments:="                                          "
191D
191E        (* Initialize individual items in student record
194E        FOR gindex:=1 TO numgrades
195F          work.grade(gindex).empty:=TRUE
196F          work.grade(gindex).item:="                "
198E          work.grade(gindex).score:=0
199F          work.grade(gindex).avg:=0
19B0          work.grade(gindex).itype:="        "
19C9        NEXT gindex
19D4
19D5        (* Store individual data in Grade Book array
1A01        FOR index:=1 TO numstudents
1A12          gradebook.sturec(index):=work
1A21        NEXT index
1A2C
1A2D        (* Now put the entire GradeBook into the file
1A5A        PUT #gbpath.gradebook
1A64        GOTO 10
1A68        END
```

Corrections

"Do-It-Yourself Database"(July 1990, Page 36): The table of contents incorrectly shows this as Part IV of the series. It is actually Part V; Part IV appeared in the May 1990 issue on Page 12.

"VEGAS at Your Fingertips"(June 1990, Page 12): The following modifications have been provided by the author for those users who would like to use the program on a CoCo 3 without a disk drive.

```
50 PCLEAR 8
60 FOR T=&HD00 TO &HD00+78
160 POKE &HD06,&H31:POKE &HD07,0
:POKE &HD0F,&H31:POKE &HD10,0:PO
KE &HD19,0:POKE &HD28,&HA4:POKE
&HD2D,&HB4
170 Z=1:FOR O=&HE TO &H31 STEP &
H5
180 POKE &HD18,Q
200 EXEC &HD00
220 POKE &HD28,&H84:POKE &HD2D,&
HA4:HCLS 15:GOSUB 640:GOTO 820
830 POKE &HD06,&HE:POKE &HD0F,&H
E:POKE &HD18,&HE:EXEC &HD00:GOSU
B 790
840 X=&HE00:Y=&HE00:Z=&HE00:S=2
940 J=(E-1)*&H500+&HE00:K=(F-1)*
&H500+&HE00:L=(G-1)*&H500+&HE00
1540 IF X>&H35FF THEN X=X-&H2800
1550 IF X>&H35FF THEN Y=Y-&H2800
1560 IF Z>&H35FF THEN Z=Z-&H2800
1565 A$=HEX$(X):IF X<&H1000 THEN
 A$="0"+A$
1566 B$=HEX$(Y):IF Y<&H1000 THEN
 B$="0"+B$
1567 C$=HEX$(Z):IF Z<&H1000 THEN
 C$="0"+C$
1580 POKE &HD06,D1:POKE &HD07,D2
:POKE &HD0F,D3:POKE &HD10,D4:POK
E &HD18,D5:POKE &HD19,D6
1590 EXEC &HD00:RETURN
```


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The Melting Pot

by Steve Blyn
Contributing Editor

When I was a student many years ago, I learned that America was a melting pot. This meant that all races, religions and cultures were encouraged to blend into one uniform people. This, in the theory current then, was what made America a strong nation.

Today, the emphasis has turned toward appreciating the diversity of America's peoples. The theory is that the differences in our many cultures add to our strength and greatness. A new emphasis is being placed on the contributions of minority groups. Positive role models are thought to be very important to minority students. Although many cultures are represented in traditional American history tests, few specialize in the contributions of specific minority groups.

This month's article is a blueprint for computer programs that teaches and reviews information about famous minority heroes and heroines. I have chosen 15 famous people from the group Black Americans. There are many other groups I hope you will include in versions of this program.

You may choose to use this program as it stands or add to it or use another minority group. If you want to add names and deeds, add new DATA lines with the information. Alter Variable X on Line 30 since it keeps track of the number of information pairs entered in the DATA statements.

The program operates by randomly choosing one of the famous people. The student presses ENTER until the correct choice for the person's accomplishments appears. When the student believes the answer matches the question, he or she should press C instead of ENTER. A short, happy tune indicates a correct answer, and the next person's name appears on the screen.

Today, the emphasis has turned toward appreciating the diversity of America's peoples. The theory is that the differences in our many cultures add to our strength and greatness.

If an incorrect response is chosen, a suitable sound is issued and the next choice for that person's accomplishment appears. A short tune and the clue Next Round appears when the entire list has been viewed. This is the reason for the last DATA statement. The choices then continue until the correct answer is chosen.

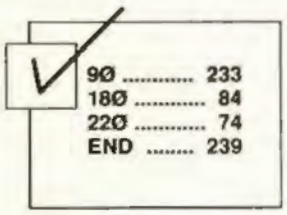
I do not include scoring in this program, because I don't want to introduce any element of competitiveness or negativism. Because the program can be used by a wide range of students covering many grade levels, I thought all items would sooner or later be mastered. You, of course, may want to include a scoring counter that should be placed within Line 160.

To construct additional programs and possibly make them into a series, start by saving the original. Load the program again and change the DATA statements to suit any other group of people. Save the new version and proceed in this manner with as many programs as you want to create.

By becoming familiar with famous people from any minority group, all children should benefit. Children from that particular group gain additional knowledge and self-respect. Other children learn that all peoples have contributed to building our country.

The students that tested this program enjoyed compiling a list of famous people and their accomplishments. Several students were interested in learning more about some of the famous people, and others were interested in researching different minority groups for additional programs. ❑

16 K Extended



The Listing: AMERICAN

```
10 REM"FAMOUS BLACK AMERICANS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1990"
```

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.

```
30 G=RND(-TIMER):X=16:DIM B$(X),
A$(X)
40 FOR T=1 TO X:READ A$(T),B$(T)
:NEXT T
50 CLS0:SOUND 230,3:T=0:PRINT@19
2,"":R=RND(X-1)
60 PRINT@34,"  famous  black  am
ericans  ";:PRINT@192,A$(R);
70 FOR A=1120 TO 1151:POKE A,255
:NEXT A
80 EN$=INKEY$
90 IF EN$=CHR$(13) THEN T=T+1:GO
TO 130
100 IF EN$="C" THEN 160
110 IF EN$="Q" THEN 260
120 GOTO 80
130 PRINT@224,"":PRINT@224,B$(T)
;
140 IF T=X THEN T=0:PLAY"O2L6GFE
DC"
150 GOTO 80
160 IF B$(T)=B$(R) THEN PLAY"03L
50FEDCCC":PRINT@362," correct !
";:FOR H=1 TO 1000:NEXT H:GOTO 5
0
170 IF B$(T)<>B$(R) THEN PLAY"01
L5B-B-":GOTO 80
180 DATA PETER SALEM,REVOLUTIONA
RY WAR HERO,BENJAMIN BANNEKER,ON
E OF THE FIRST CLOCKMAKERS
190 DATA JAMES BECKWOURTH,SCOUT
WHO RODE WITH KIT CARSON,SOJOURN
ER TRUTH,FAMOUS SPEAKER AGAINST
SLAVERY
200 DATA HARRIET TUBMAN,RAN THE
UNDERGROUND RAILWAY,NAT WOOD,FAM
OUS COWBOY-DEADWOOD DICK
210 DATA BILL PICKETT,INVENTED T
HE MODERN RODEO,LEWIS LATTIMER,W
ORKED ALONG WITH THOMAS EDISON
220 DATA MATHEW HENSON,WENT WITH
 PEARY TO NORTH POLE,DORIE MILLE
R,WORLD WAR II HERO
230 DATA RALPH BUNCH,WINNER OF N
OBEL PEACE PRIZE,DR. CHARLES DRE
W,INVENTED BLOOD PLASMA STORAGE
240 DATA PERCY JULIAN,INVENTED T
REATMENT FOR ARTHRITIS,A. PHILIP
 RANDOLPH,EARLY LEADER IN LABOR
MOVEMENT
250 DATA INMAN PAGE,PRESIDENT OF
 4 BLACK COLLEGES,END,NEXT ROUND
260 CLS:END
```

Two-Liner Contest Winner . . .

This program simulates a stop watch. It continues until 12:60:60:26. Press RETURN to stop the watch.

The Listing:

```
1 CLS:PRINT@107,"STOP WATCH":PRI
NT"          PRESS <S> TO STOP":F
DRO=1TO650 :NEXTO:FORW=1TO12:FOR
X=1TO60:FORY=1TO60 :FORZ=1TO26:C
LS:PRINT@135,W-1;":";X-1;":";Y-1
;":";Z-1:A$=INKEY$:IFA$="S"THENG
OSUB2ELSENEXTZ:NEXTY:NEXTX:NEXTW
:END
2 CLS:PRINT@322,"STOPPED: TIME-"
;W-1;":";X-1;":";Y-1;":";Z-1:FOR
E=1TO1500:NEXTE:END
```

Eric Flailes
Hobe Sound, Florida

For this winning two-liner contest entry, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and the accompanying tape.

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Simulating movement and change

The Assembly Line,

Part IV: The Moving Feast

by William P. Nee

This month we look at a simple simulation and see how to graphically portray the results over a period of time.

Simulations are great projects for a computer. You define a set of rules and show the result, usually within a one- or two-dimensional array. The computer really helps to demonstrate results over a long period of time; where it may take several minutes to go from one generation to the next, the computer can do this in seconds. The result is more like a movie, or an old-time flicker, and we can interpret and understand the meaning more easily.

Rules may be as simple or complex as you want. You can simulate movement, birth, death, food supply — whatever your imagination allows. These rules may be based on scientific principles such as the movements of planets or just "what ifs." The random feature of computers is most helpful in assigning probabilities to different events; you can experiment with the odds, see which ones work best and which ones wipe out everything.

In a future article I'll discuss a large scale simulation with life, birth, death, hunter and hunted, but for now let's look at a simple example.

Our rules were first developed by David Griffith of the University of Wisconsin. In this simulation the cells of a two-dimensional array are given a random state or value between 0 and 15. In each generation period every cell checks its neighbors (to the top, bottom, right and left); if any cell has a value exactly one higher than its neighbor, it eats that cell, replacing it with its own state. A cell of value 10 replaces a cell with a value of 9, or a cell of value 1 replaces a cell with a value of 0. Everything wraps around so that a cell of value 0 replaces a cell of value 15. This wrap-around also applies to all the borders. A cell on the right edge that wants to check its right neighbor actually winds up looking at the first cell on the left in that row.

In summary, our rules are:

```
VALUE=CELL(H,V)+1
IF CELL(H,V-1)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE

or

IF CELL(H-1,V)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE

or

IF CELL(H+1,V)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE

or

IF CELL(H,V+1)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE
GOTO NEXT CELL
```

Listing 1 is a BASIC program using these rules within a 31-by-31 array. Notice that increasing the cell value by 1 is actually a wrap-around (15+1=0) and that cell locations are also wrapped ((31+1)AND 31=0). It is also necessary to use a second array to store the new states while checking old states. And since there are only four colors (0-3), every cell's status is AND 3 to get its color before plotting.

If you run this simulation long enough, one of two things happens — about 25 percent of the time the screen finally fills up with one color, or large chunks of color begin to form, eat up the debris and finally form a series of spirals. Run Listing 1 and see which effect you get. If you wait all night, you may begin to see those spirals. It's just taking too long to do all that computing, and the array size isn't really large enough to insure a good random display.

Now how about a program that fills a 128-by-96 array and only takes about two seconds to compute and display each generation. Of course this is only possible with machine language. Follow along with Listing 2. I used high RAM starting at #$8000 for ARRAY1, and ARRAY2 is always #$3000 higher. The bridge to high RAM is Location $FFDF. Variables are stored in locations $BD through $C0. Lines 270 through 600 assign a state of RND(16)-1 to each cell, store this in ARRAY1 and ARRAY2 and then color each point.

I used a color table of 16 colors (Lines 2930 through 3000) since it's quicker to look up a color than multiply its value by #$55. Lines 670 through 790 set up alternating pages to compute and show each generation. Because speed was critical, I didn't include any key-press check for terminating the program. You have to press the Reset button when you want to stop.

Computing the wrap-around locations for every cell's neighbors is very time-consuming. So I divided the array into five

---

Bill Nee bucked the snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of his 13-part series "Machine Language Made Basic" (THE RAINBOW, July 1988 to July 1989) prompted him to continue writing articles on machine language programming.

parts: the top row, bottom row, left column, right column and center rectangle. Once the first four parts have been checked, the neighbors for the center rectangle don't wrap-around, and the program can zip right through them. So let's get some of those first parts out of the way.

Lines 800 through 880 get the status of the first cell, add 1 to it, AND with 15 (15+1=0), then save this value. The top neighbor of any cell in the top row is actually the cell in the bottom row 128*95 cells away, so check this location and compare it to VALUE. If it's the same, store this in the new array #$3000 away and go on to the next cell over; if it's not the same, check the neighbor to the left. The cells to the left and right are -1 and +1 from the current location; AND this with 127 to accomplish the wrap-around and then compare the status in those locations to VALUE. Again, if either one is the same, store it in the new array and go on to the next cell (lines 890 through 1090). Finally, check the bottom neighbor 128 cells or bytes away. This procedure continues for the whole top row.

Next, look at the bottom row (lines 1190 through 1580). This is done in almost the same manner as the top row except that the top neighbor is now -128 bytes back and the bottom neighbor is on the top row or -128*95 bytes away. Left and right neighbors are computed and checked in the same way.

Now for the easy part — the center rectangle (lines 1590 through 1970). Each neighbor is quickly located; top is -128 bytes away, left is -1, right is +1, and the bottom is +128 bytes. The important thing is to keep track of where we are. The very first location is over one row and down one row or +129 from the array start. Since we'll be checking the left and right columns later, the center rectangle is 1 to 126 across. After the first row has been checked, jump over two bytes to get to the next row. And we'll only be going down 1 to 94 rows.

Now there's just the columns (Lines 1980 through 2530) and we've already checked the top and bottom cells of each one, so start 128 bytes from the array beginning. The top neighbor for both columns is always -128 bytes away and the bottom neighbor always +128 bytes. The left neighbor of the left column is on the right side or +127 bytes and the right neighbor of the right column is on the left side or -127 bytes. The other neighbors are +1 and -1 bytes away. Check the first value in the left column and then move over +127 to get the first value in the right column. After doing this 1 to 94 times, both columns have been checked.

Finally, it's time to see the results. Again since speed is critical, I've decided to show each value on a byte-for-byte basis instead of setting each point according to its state. The first value in the new array is the two left-most color bits; the next value is the next two bits, and so on until every four values become one byte (lines 2540 through 2900).

AND the first value with 3 to put it in the 0-3 color range, then multiply by 64 to force it to the left-most two bits; save this in a temporary location. AND the next array value with 3 and multiply it by 16 so it becomes the next two bits; OR this with the temporary value.

The next array color value is multiplied by 4 then ORd and the fourth value just added. The resulting color byte is stored at the start of graphics. When the end of the graphics page is reached (from locations $B7/B8), the computation portion is finished and the main program displays the screen — all in just under two seconds.

After you've typed in the program, check for errors with A/NO/NS/WE; save the source code as W EATING2.ASM, then assemble it with A EATING2.BIN /NS/WE. Listing 3 is a BASIC driver that loads the machine language program if necessary and executes it. Save it as EATING3.BAS. Now run it. The screen fills with random color, then slowly begins to converge. With any luck, you will see large chunks of color beginning their stately march across the screen, sweeping up debris as they move along. As more and more blocks collide and merge, they form spirals at various locations that eventually fill the screen. Put on some "Pomp and Circumstances" and enjoy your moving feast.

In the next article we'll get away from graphics and learn how to modify a BASIC program from within the program and use a calculus problem to demonstrate this. Let me know about any suggestions you have for future articles. ❑

64K Disk

Listing 1: EATING1

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 X=RND(-TIMER)
20 L=31:DIM N(L,L),NN(L,L)
30 PMODE1,1:PCLS:SCREEN1,1
40 FOR X=0 TO L:FOR Y=0 TO L
50 V=RND(16)-1
60 N(X,Y)=V:NN(X,Y)=V
70 PSET(X+X,Y+Y,V AND 3)
80 NEXT Y,X
90 FOR X=0 TO L:FOR Y=0 TO L
100 V=N(X,Y):V=(V+1)AND 15
110 IF N(X,(Y-1)AND L)=V THEN NN
(X,Y)=V:GOTO 150
120 IF N((X-1)AND L,Y)=V THEN NN
(X,Y)=V:GOTO 150
130 IF N((X+1)AND L,Y)=V THEN NN
(X,Y)=V:GOTO 150
140 IF N(X,(Y+1)AND L)=V THEN NN
(X,Y)=V
150 NEXT Y,X
160 FOR X=0 TO L:FOR Y=0 TO L
170 V=NN(X,Y):N(X,Y)=V
180 PSET(X+X,Y+Y,V AND 3)
190 NEXT Y,X:GOTO 90
```

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Listing 2: EATING2

```
00100           ORG     $2A00
00110 PAGE      EQU     $9653
00120 PCLS      EQU     $9542
00130 SCREEN    EQU     $95AA
00140 CSET      EQU     $9682
00150 HIGH      EQU     $FFDF
00160 LOW       EQU     $FFDE
00170 DOWN      EQU     $BD
00180 ACROSS    EQU     $BE
00190 VALUE     EQU     $BF
00200 TEMP      EQU     $C0
00205
00210 START     LDY     #$8000
00220           ORCC    #$50
00230           CLRA
00240 ALOOP2    STA     DOWN
00250           CLRB
00260 ALOOP1    STB     ACROSS
00270           LDB     #16
00280           JSR     $BC7C
00290           JSR     $BF1F
00300           JSR     $B3ED
00310           DECB
00320           CLR     HIGH
00330           STB     $3000,Y
00340           STB     ,Y+
00350           CLR     LOW
00360           LDU     #COLORS
00370           LDB     B,U
00380           STB     $B5
00390           LDA     DOWN
00400           LDB     $B9
00410           MUL
00420           ADDA    $BA
00430           TFR     D,X
00440           LDB     ACROSS
00450           LSRB
00460           LSRB
00470           ABX
00480           LDA     ACROSS
00490           ANDA    #3
00500           LDU     #TABLE
00510           LDA     A,U
00520           TFR     A,B
00530           COMA
00540           ANDA    ,X
00550           ANDB    $B5
00560           STB     TEMP
00570           ORA     TEMP
00580           STA     ,X
00590           LDB     ACROSS
00600           INCB
00610           CMPB    #127
00620           BLS     ALOOP1
00630           LDA     DOWN
00640           INCA
00650           CMPA    #95
00660           BLS     ALOOP2
00665
00670 PAGE3     LDB     #3
00680           JSR     PAGE
00690           JSR     PCLS
00700           BSR     COMPUT
00710           LDB     #1
00720           JSR     SCREEN
00725
00730 PAGE1     LDB     #1
00740           JSR     PAGE
00750           JSR     PCLS
00760           BSR     COMPUT
00770           LDB     #1
00780           JSR     SCREEN
00790           BRA     PAGE3
00795
00800 COMPUT    LDU     #$8000
00810           LDX     #$8000
00820           CLR     HIGH
00830 TOPROW    CLRB
00840 TR1       STB     ACROSS
00850           LDA     ,U
00860           INCA
00870           ANDA    #15
00880           STA     VALUE
00890 TRTOP     LDA     128*95,U
00900           CMPA    VALUE
00910           BNE     TRLEFT
00920           STA     $3000,U
00930           BRA     CONTTR
00940 TRLEFT    LDB     ACROSS
00950           DECB
00960           ANDB    #127
00970           LDA     B,X
00980           CMPA    VALUE
00990           BNE     TRRI
01000           STA     $3000,U
01010           BRA     CONTTR
01020 TRRI      LDB     ACROSS
01030           INCB
01040           ANDB    #127
01050           LDA     B,X
01060           CMPA    VALUE
01070           BNE     TRBOT
01080           STA     $3000,U
01090           BRA     CONTTR
01100 TRBOT     LDA     128,U
01110           CMPA    VALUE
01120           BNE     CONTTR
01130           STA     $3000,U
01140 CONTTR    LEAU    1,U
01150           LDB     ACROSS
01160           INCB
01170           CMPB    #127
01180           LBLS    TR1
01185
01190 BOTROW    LDU     #$8000
01200           LEAU    128*95,U
01210           LDX     #$8000
01220           LEAX    128*95,X
01230           CLRB
01240 BR1       STB     ACROSS
01250           LDA     ,U
01260           INCA
01270           ANDA    #15
01280           STA     VALUE
01290 BRTOP     LDA     -128,U
01300           CMPA    VALUE
01310           BNE     BRLEFT
01320           STA     $3000,U
01330           BRA     CONTBR
01340 BRLEFT    LDB     ACROSS
01350           DECB
01360           ANDB    #127
01370           LDA     B,X
01380           CMPA    VALUE
01390           BNE     BRRI
01400           STA     $3000,U
01410           BRA     CONTBR
01420 BRRI      LDB     ACROSS
01430           INCB
01440           ANDB    #127
01450           LDA     B,X
01460           CMPA    VALUE
01470           BNE     BRBOT
01480           STA     $3000,U
01490           BRA     CONTBR
01500 BRBOT     LDA     -128*95,U
01510           CMPA    VALUE
01520           BNE     CONTBR
01530           STA     $3000,U
01540 CONTBR    LEAU    1,U
01550           LDB     ACROSS
01560           INCB
01570           CMPB    #127
01580           LBLS    BR1
01585
01590 CENTER    LDU     #$8000
01600           LEAU    129,U
01610           LDA     #1
01620 CLOOP2    STA     DOWN
01630           LDB     #1
01640 CLOOP1    STB     ACROSS
01650           LDA     ,U
01660           INCA
01670           ANDA    #15
01680           STA     VALUE
01690 TOP       LDA     -128,U
01700           CMPA    VALUE
01710           BNE     LEFT
01720           STA     $3000,U
01730           BRA     CONT
01740 LEFT      LDA     -1,U
01750           CMPA    VALUE
01760           BNE     RIGHT
01770           STA     $3000,U
01780           BRA     CONT
01790 RIGHT     LDA     1,U
01800           CMPA    VALUE
01810           BNE     BOTTOM
01820           STA     $3000,U
01830           BRA     CONT
01840 BOTTOM    LDA     128,U
01850           CMPA    VALUE
01860           BNE     CONT
01870           STA     $3000,U
01880 CONT      LEAU    1,U
01890           LDB     ACROSS
01900           INCB
01910           CMPB    #126
01920           LBLS    CLOOP1
01930           LEAU    2,U
01940           LDA     DOWN
01950           INCA
01960           CMPA    #94
01970           LBLS    CLOOP2
01975
01980 COLUMN    LDU     #$8000
01990           LEAU    128,U
02000 LEFTCL    LDA     #1
02010 LC1       STA     DOWN
02020           LDA     ,U
02030           INCA
02040           ANDA    #15
02050           STA     VALUE
02060 LCTOP     LDA     -128,U
02070           CMPA    VALUE
02080           BNE     LCLEFT
02090           STA     $3000,U
02100           BRA     CONTLC
02110 LCLEFT    LDA     127,U
02120           CMPA    VALUE
02130           BNE     LCRI
02140           STA     $3000,U
02150           BRA     CONTLC
02160 LCRI      LDA     1,U
02170           CMPA    VALUE
02180           BNE     LCBOT
02190           STA     $3000,U
02200           BRA     CONTLC
02210 LCBOT     LDA     128,U
02220           CMPA    VALUE
```

```
02230           BNE     CONTLC
02240           STA     $3000,U
02245
02250 CONTLC    LEAU    127,U
02260 RICOL     LDA     ,U
02270           INCA
02280           ANDA    #15
02290           STA     VALUE
02300 RCTOP     LDA     -128,U
02310           CMPA    VALUE
02320           BNE     RCLEFT
02330           STA     $3000,U
02340           BRA     CONTRC
02350 RCLEFT    LDA     -1,U
02360           CMPA    VALUE
02370           BNE     RCRI
02380           STA     $3000,U
02390           BRA     CONTRC
02400 RCRI      LDA     -127,U
02410           CMPA    VALUE
02420           BNE     RCBOT
02430           STA     $3000,U
02440           BRA     CONTRC
02450 RCBOT     LDA     128,U
02460           CMPA    VALUE
02470           BNE     CONTRC
02480           STA     $3000,U
02490 CONTRC    LEAU    1,U
02500           LDA     DOWN
02510           INCA
02520           CMPA    #94
02530           BLS     LC1
02535
02540 SHOW      LDU     $BA
02550           LDX     #$8000
02560 CSHOW     LDA     $3000,X
02570           STA     ,X+
02580           ANDA    #3
02590           LSLA
02600           LSLA
02610           LSLA
02620           LSLA
02630           LSLA
02640           LSLA
02650           STA     TEMP
02660           LDA     $3000,X
02670           STA     ,X+
02680           ANDA    #3
02690           LSLA
02700           LSLA
02710           LSLA
02720           LSLA
02730           ORA     TEMP
02740           STA     TEMP
02750           LDA     $3000,X
02760           STA     ,X+
02770           ANDA    #3
02780           LSLA
02790           LSLA
02800           ORA     TEMP
02810           STA     TEMP
02820           LDA     $3000,X
02830           STA     ,X+
02840           ANDA    #3
02850           ORA     TEMP
02860           STA     ,U+
02870           CMPU    $B7
02880           BLO     CSHOW
02890           CLR     LOW
02900           RTS
02905
02910 TABLE     FDB     $C030
02920           FDB     $0C03
02930 COLORS    FDB     $0055
02940           FDB     $AAFF
02950           FDB     $0055
02960           FDB     $AAFF
02970           FDB     $0055
02980           FDB     $AAFF
02990           FDB     $0055
03000           FDB     $AAFF
03010           END     START
```

Listing 3: EATING3

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 PCLEAR4:CLEAR200,&H2A00-1
20 IF PEEK(&H2A00)<>16 THEN LOAD
M"EATING2":POKE &HFF40,0
30 X=RND(-TIMER)
40 PMODE1,3:PCLS
50 PMODE1,1:PCLS:SCREEN1,1
60 EXEC&H2A00
70 GOTO70
```


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Programming the PIAs

by Marty Goodman
Contributing Editor

Where can I find information about how to access the PIAs of the CoCo and how to use its interrupts?

Michael Duggan
Ashland, Kentucky

The best references for directly accessing the hardware of the CoCo are included in the Tandy Service Manual for the model of Color Computer in question. This manual can be ordered directly from your local Radio Shack store or via one of a number of RAINBOW advertisers. It contains information on which bits of which bytes in the input/output area of the memory map control particular functions. It also contains a schematic of the Color Computer, an essential aid for dealing with the hardware.

Another excellent reference is the four-book series *BASIC Unravelled*. The first three books are extensively commented disassemblies of Color BASIC, Extended Color BASIC and Disk BASIC for the CoCo 1 and 2. The fourth book has an extensive, commented disassembly of the Extended Color BASIC ROM inside the CoCo 3. There are some chapters on the hardware, but these books' main value is in giving you examples of how Microsoft and Microware addressed the hardware in question. Microcom sells both the *BASIC Unravelled* series and the service manual.

Bill Barden has a new book on how to use the CoCo for simple control applications, using minimal extra hardware. His book may provide some excellent examples of assembly language programming. Similarly, you may find some of the articles in Tony DiStefano's book *Complete Turn of the Screw* helpful.

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.

Converting the DC Modem Pak

I'm having problems converting my Direct Connect Modem Pak into a general purpose RS-232 pack. I severed the connections between the 6551 chip and the on-board modem chip and sent the relevant lines (DCD, CTS, TXD, RXD, DSR and DTR) through a hex inverter/buffer before sending them to a connector. Yet the pack still does not work with my DC-212 modem using either /T2 or /T3 under OS-9.

George Spears
Pinole, California

Instead of using a hex inverter/buffer, you need to use RS-232 level converter chips. These chips not only invert the signal, but convert from the 0 to 5 volts used by TTL logic to the -12v to +12v levels used in RS-232. The Tandy RS-232 Pak uses 1488 and 1489 chips to do this conversion, but the 1488 requires separate sources of plus and minus 12 volts in addition to the usual +5 volt supply. Alternatively, you can use a MAX232 chip, which is a single chip that has two RS-232 to TTL converters and two TTL to RS-232 converters and can be powered from a single, regulated +5 volt source.

The Direct Connect Modem Pak is addressed at $FF6C through $FF6F, and it is the /T3 descriptor under OS-9 that looks for it there. The /T2 descriptor that addresses the RS-232 Pak looks for the cartridge at addresses $FF68 through $FF6B. Both the /T2 and /T3 descriptors look for the cartridge to be in Slot 1 of the Multi-Pak, though if you have strapped the interrupt line on the Multi-Pak, the RS-232 Pak or Modem Pak is no longer slot dependent.

Printer Baud Rates

How can I change the baud rate of the printer from 600 to 2400 on the various programs I use?

Ralph McCormic
Keno, Oregon

Changing the baud rate for BASIC programs is easy; just poke the appropriate value into Location (decimal) 150. To set the baud rate to 2400 on a CoCo running at 1MHz, the value is 18 (`POKE 150,18`). If you are using a CoCo 3 at 2MHz, the constant to use is 41 (`POKE 150,41`). Most machine language programs for the Color Computer include a means of setting the baud rate as some part of the setup for that program. For those that do not, it may be difficult or impossible to set the baud rate to a value you desire. An example of this is the *Scripsit* cartridge. Even when *Scripsit* is transferred to disk, changing the baud rate is difficult because *Scripsit* uses its own printer port driver that does not go through the code used by BASIC.

Undeleting Disk Files

I've observed that when a file is killed on a disk, the first letter of that file is changed to CHR$(0) in the directory. Yet, when I use a simple BASIC program to restore the letter to what it was after I killed a file, I still get an error message when trying to access that file. Please explain why this is so.

John Musumeci
Ozone Park, New York

When you kill a file, not only is the first letter wiped out in the listing of directory names in Track 17, Sector 3 of the disk, but more importantly, all of the granules assigned to that file in the file allocation table in the first 64 bytes of Sector 2 of Track 17 are reset to $FF.

To restore a killed file, you must not only restore the directory entry, but restore

the entries in the file allocation table allocating the granule(s) that were part of that file. All this must be done *before* any new files are written to that disk, or else the granules that contained the information of that file might get written over, and all the data will then be truly lost. I strongly recommend a careful study of Chapter 11 of the Disk Extended Color BASIC manual that comes with Tandy disk drives. This manual can also be ordered from Tandy via any Radio Shack store. In it is an excellent detailed description of the way file entries are made in the directory and file allocation table. More information can also be found in Bill Daniel's article, "Back From the Dead," in the June 1990 issue (Page 26).

Blown Multi-Pak

I accidently shorted some contacts on my Multi-Pak (pins 1 and 2 of Slot 4, I believe), and now U15 (a 7912CT transistor) smokes whever I turn the Multi-Pak on. I also need a source for a forty-pin edge connector, PC board mount of the sort used in the Multi-Pak. I broke a pin on one of mine. The Multi-Pak in question is an older, gray-case Multi-Pak (26-3024).

Kerry Moline
Denver

The 7912 is not a transistor, but a monolithic, negative 12-volt power regulator. The part is available at most electronic supply houses and Radio Shack stores. The 40-pin connector you seek is listed as manufacturer's part number 194210110A or 194210120A in the service manual for the current Multi-Pak. You can order it from National Parts via your local Radio Shack store. Just specify that part number and give the catalog number of the Multi-Pak.

You might want to say you have a 26-3124 Multi-Pak; the connector in question is the same. You should also order the service manual for the 26-3024 Multi-Pak, so you can properly test and fix the power supply.

You could have a bad 7912, but you may have some other problem in the supply that is cooking the 7912. It seems possible that you might have a blown bridge rectifier (CR2 — a little square item with four leads). You might want to look for this.

Missing Parts

Can I convert a Magnavox 8CM652 monitor so that it can be properly used with the CoCo 3? This monitor is similar to the Magnavox 8CM515 but lacks an analog RGB input.

Dennis McMillian (COCOKIWI)
Pittsburgh, California

It seems that the Magnavox 8CM652 (and its successor, the Magnavox 8CM762) uses the same main circuit board as does the Magnavox 8CM515. You *can* add analog input to a Magnavox 8CM762 monitor, and I have actually made such a conversion. The process is tedious and involves cleaning over 100 solder holes and adding over fifty "missing" components to the printed

One-Liner Contest Winner . . .

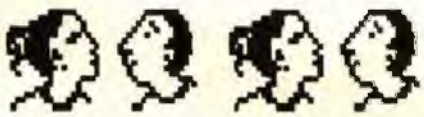
This program factors any given number. All you have to do is enter a number. Remember, if a number has only one and itself as factors, it is a prime number.

The Listing:

```
1 CLS:INPUT"ENTER NUMBER ";N:FOR
X=1TOSQR(N):A=N/X:B=INT(A):IFA=B
 THENPRINTX;"X";A:NEXTX:PRINT"PR
ESS A KEY":EXEC44539:GOTO1:ELSE
NEXTX:PRINT"PRESS A KEY":EXEC445
39:GOTO1
```

Hinh Phansavath
Buena Park, California

For this winning one-liner contest entry, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and the accompanying disk.



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circuit board. The bright side of this is that the components are all very inexpensive — I paid under $10 for all of them.

Those interested in making such a conversion should obtain a service manual for the Magnavox 8CM515/8CM652 series of monitors, compare the schematics and printed circuit board layout for the 8CM515 to that of the 8CM652, and add the needed components. (You do need to be a reasonably competent hardware tinkerer to do this sort of thing.) If you write me in care of THE RAINBOW, I may be able to provide more specific information.

Sega Sync

Several people on Delphi have asked me about using Color Computer type monitors with their Sega Genesis system. There is an 8-pin DIN connector on the Sega Genesis system for both RGB and composite video output. The pinouts are as follows:

Pin	*Function*
1	*audio*
2	*ground*
3	*video*
4	*+5*
5	*Green*
6	*Red*
7	*composite H&V sync*
8	*Blue*

Unfortunately, the 8-pin connector used by Sega has an unusual pin spacing, and the ordinary 8-pin male DIN connectors sold by many electronic supply houses will not fit. Hackers may want to open the unit and install their own connector. I recommend a DB9 or other similar connector.

It should be easy to use a Magnavox 8CM515 monitor with the Sega, because the Magnavox accepts any kind of sync signal (separate or composite, positive or negative). If you are trying to use a CM-8 or Atari monitor, you not only have to contend with odd connectors, but you have to devise a suitable sync separator circuit to convert the combined sync from the Sega Genesis into a separate sync the monitor can use. If you are using a composite video monitor, a standard 5-pin DIN plug is all you need. Just take the line level audio off Pin 1, ground from Pin 2 and composite video from Pin 3 of the 5-pin male DIN plug and plug it right into the 8-pin female socket on the Genesis.

Steve Bjork (6809ER)
Los Angeles

Thanks Steve. I've talked to a chap on Delphi who, using your information and some sync separator circuits I sent him, managed to get his Sega Genesis working with his CM-8. He says the CM-8 image is outstandingly sharp — significantly superior to the image he got using either RF or composite video. Tinkerers who have some experience fooling with minor circuit design changes may want to write to me for copies of those suggested sync conversion circuits.

The CoCo/Model III Connection

I have an FD-502 disk drive system and an old 16K TRS-80 Model III that has no drives. Can I connect the FD-502 to the system bus slot on the Model III so I can use it with that computer?

Tika Carr
Rochester, New York

No. The system bus of the Color Computer and that of the Model III are too different. Read/Write, control and master-clock pulses are different between the 6809 and the Z80, as are the means of addressing input/output ports. You probably do not have the ROM firmware needed to boot the operating system for the TRS-80 Model III. You *can* use the physical drive of the FD-502 with the Model III, but you first need to get a Model III style disk controller and would likely want to upgrade the memory of the Model III too. It is not worth the time and expense to do this.

Extra Pins on SmartWatch

I've found it fairly simple to add a SmartWatch to CoCo disk controllers that have only a 24-pin socket. You must jumper Pin 26 of the SmartWatch to Pin 28, then plug it into the 24-pin socket with pins 1, 2, 27 and 28 of the SmartWatch overhanging the top of the 24-pin ROM socket. Apparently pins 1, 2 and 27 are not used on the SmartWatch, and the jumper from Pin 26 to 28 supplies power to the chip. When putting in the jumper, note that Pin 26 must still be able to be inserted into the 24-pin socket.

Roger Krupski
Rochester, New York

Locating Hard-Disk Controllers

Where can I find the disk controllers you mentioned in your article on hard drives? Many no longer seem to be offered in the catalogs I have. Also, what RGB monitors do you recommend in the under-$400 price range?

Guy B. Meredith (GMEREDITH)
Costa Mesa, California

The Western Digital 8-bit hard drive controller (WX2A) can still be found at many local area computer swap meets. They are often sold for under $30. SCSI hard drive boards are a bit harder to find. Get a copy of *Nuts and Volts* (often given away at such flea markets) and check the ads of various surplus dealers. There are a number of such in the San Jose and Santa Clara area, which from time to time advertise SCSI controller boards of various sorts.

As far as monitors are concerned, the Magnavox 1CM135 (the replacement for the Magnavox 8CM515, which has been discontinued) remains the most economical high-quality monitor for the CoCo 3, Amiga or Atari ST. If you plan on moving up to one of the OS9/68000 engines (such as the Frank Hogg Tomcat or the Kenneth Leigh MM/1), shop around for a low-end, Multisync-type monitor. Multisync monitors with a dot pitch of .31mm and which support only up to 640-by-480 displays are sometimes available at computer swap meets, often for under $400. Such a monitor works well with the CoCo 3 and is usable with either one of the new OS9/68000 engines or with a PC clone in some of the VGA modes. Be sure not to get a VGA-only monitor, as it would be useless with a CoCo 3 and newer OS-9 engines.

Such VGA-only monitors are usually called VGA monitors, as opposed to Multisync (also called Multiscan, Varisync and other copyrighted trade name variants) type monitors.

Plug 'n Power — Plug 'n Go

How can I use the Plug 'n Power unit with the CoCo 3?

Timothy P. Kovalcik (TIMK)
Phoenix

The ROM pack that provides the software controller for the Plug 'n Power unit is the problem. It uses a graphics mode not supported by the CoCo 3's GIME chip. I've heard rumors that Bill Barden may provide software that runs on the CoCo 3 and works with the Plug 'n Power hardware. Keep your eyes open for it in THE RAINBOW.

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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When the program starts, the computer draws a random maze, makes an exit in the lower right-hand corner, and places you in the upper left-hand corner of the maze. The object is to get to the exit in the least amount of time, using the right joystick. You can only move diagonally.

The Listing:

```
0 POKE&HFFD9,0:PMODE0,1:PCLS:SCR
EEN1,1:FORX=20TO220STEP10:FORY=2
0TO160STEP10:DRAW"BM"+STR$(X)+",
"+STR$(Y)+MID$("DULR",RND(4),1)+
"10":NEXTY,X:DRAW"BM10,10D160R21
0BR10U160L218":X=12:Y=12:TIMER=0
1 FORI=1TO2000:PSET(X,Y,1):DX=2*
SGN(JOYSTK(0)-32):DY=2*SGN(JOYST
K(1)-32):IFPPOINT(X+DX,Y+DY)=0TH
ENPRESET(X,Y):X=X+DX:Y=Y+DY:IFY>
170THENCLS:PRINT@200,"TIME=";TIM
ER:ENDELSENEXTI:CLS:PRINT@200,"T
OO MUCH TIME!":ENDELSENEXTI:CLS:
PRINT@200,"TOO MUCH TIME!"
```

Francois Dubuc
Quebec

For this winning two-liner contest entry, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and the accompanying tape.

Two-Liner Contest Winner . . .

Want your name or message to travel across a marquee, like at Times Square? Here's your chance!

The Listing:

```
10 CLS(0):LINE INPUT "TITLE:";W$
:L=LEN(W$):IFL>30 THEN 10 ELSE C
LS(0)
20 FORP=191TO160STEP-1:L$=LEFT$(
W$,W):PRINT@P,L$:FORY=1TO100:NEX
TY:W=W+1:NEXTP:FORWW=1TOL+1:M$=M
ID$(W$,WW,L):PP=160:PRINT@PP,M$:
FORY=1TO100:NEXTY:NEXTWW:W=0:GOT
020
```

Elizabeth Ligon
Miami

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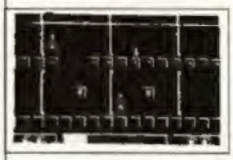

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Reviewed July '90

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Reviews August '88, July '89, September '89

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Novices Niche

Color Ball

by Jay Braxmaier

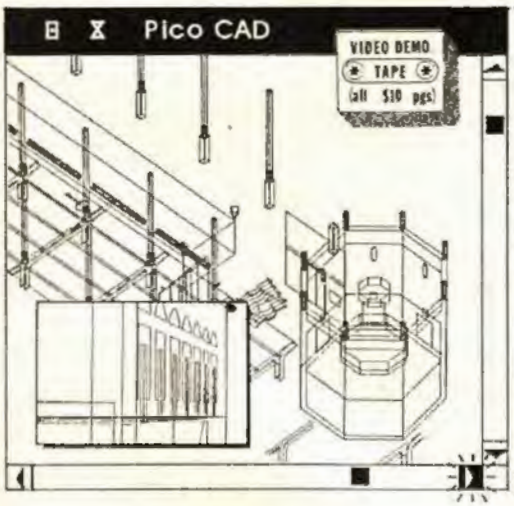
This is a Lo-Res graphics game that lets you play pinball with a paddle instead of flippers. Line 480 lets you get different points for different color bumpers. Because of the way the Set/Reset graphics work, you see some interesting things happen to the bumpers and side walls.

Lines 170, 180 and 190 contain the data for setting up the bumpers. You can make this anything you want. I have increased the speed of the game with POKE 65945,0 and by adding lines to jump over other lines — for instance, the program reprints the paddle if it hasn't been moved.

Once you understand the way the program operates it should be easy to convert it to a Hi-Res screen.

The Listing: COLRBALL

```
0 ' COPYRIGHT 1990  FALSOFT, INC
10 '***************
20 '**COLOR  BALL**
30 '**     BY    **
40 '*JAY BRAXMAIER*
50 '*(616)453-1011*
60 '***************
70 CLS0
80 POKE65495,0
90 FOR J=10 TO 54:SET(J,3,4):NEX
 T J
100 FOR J=3 TO 28:SET(10,J,4):NE
 XT J
110 FOR J=3 TO 20:SET(54,J,4):NE
 XT J
120 FOR J=20 TO 28:SET(11,J,4):N
 EXT J
130 FOR J=22 TO 28:SET(13,J,4):N
 EXT J
140 FOR J=1 TO 6:SET(13+J,22+J,4
 ):NEXT J
150 FOR J=1 TO 9:SET(54-J,19+J,4
 ):NEXT J
160 FOR J=1 TO 48:READA,B,C:SET(
 A,B,C):NEXT J
170 DATA 26,4,3,27,4,8,29,4,2,30
 ,4,7,35,4,1,36,4,6,38,4,3,39,4,4
 ,15,6,1,14,7,2,15,8,3,16,7,5,23,
 9,6,26,9,7,29,9,8,32,9,1,35,9,2,
 38,9,3,42,9,5
180 DATA 48,6,6,47,7,7,49,7,8,48
 ,8,1,11,10,2,11,11,3,11,12,5,11,
 13,6,53,10,7,53,11,8,53,12,1,53,
 13,2,20,16,3,20,17,5,21,17,6
190 DATA 32,15,7,31,16,8,33,16,1
 ,32,17,2,44,16,3,44,17,5,43,17,6
 ,19,21,7,21,23,8,25,23,4,32,23,4
 ,39,23,4,43,23,1,45,21,2
200 FOR J=1 TO 5:SET(13+J,23+J,4
 ):NEXT J
210 FOR J=1 TO 8:SET(53-J,19+J,4
 ):NEXT J
220 PRINT@5,"SCORE:";
230 E$=CHR$(227)+CHR$(227):F$=CH
 R$(128)+CHR$(128):PD=23:DP=23:BA
 =5:SC=0:BX=12:BY=28:SX=0:SY=-1:Z
 =5
240 PD=INT(JOYSTK(0)/2)
250 IF PD>19 THEN PD=19
260 IF PD<11 THEN PD=11
270 IF DP=PD THEN 310
280 PRINT@448+DP,F$;
290 PRINT@448+PD,E$;
300 DP=PD
310 IF BY=4 THEN GOTO 460
320 IF BX=11 OR BX=53 THEN SX=-S
 X
330 IF BY<>29 THEN 380
340 SOUND 100,8:RESET(BX,BY):BX=
 12:BY=28:SX=0:SY=-1:BA=BA-1:Z=RN
 D(5):RESET(12,21)
350 IF BA<>0 THEN 440
360 IF BA=0 THEN IF INKEY$<>"" T
 HEN RUN
370 GOTO 360
380 RESET(BX,BY):BX=BX+SX:BY=BY+
 SY
390 IF BX>53 THEN BX=53
400 IF BX<11 THEN BX=11
410 IF BX=12 AND BY=20 THEN SET(
 12,21,4)
420 IF SX=0 AND POINT(BX,BY+SY)<
 >0 THEN X=POINT(BX,BY+SY):GOTO 4
 60
430 IF SX<>0 AND POINT(BX+SX,BY+
 SY)<>0 THEN X=POINT(BX+SX,BY+SY)
 :GOTO 460
440 SET(BX,BY,Z)
450 GOTO 240
460 SOUND 100+(RND(10)*5),1:SY=-
 SY:BY=BY+SY:A=RND(3):IF A=1 THEN
  SX=-1 ELSE IF A=2 THEN SX=1 ELS
 E SX=0
470 SET(BX,BY,Z)
480 IF X=4 THEN 240 ELSE IF X=3
 THEN SC=SC+10 ELSE SC=SC+1
490 PRINT@11,SC;:GOTO 240
```

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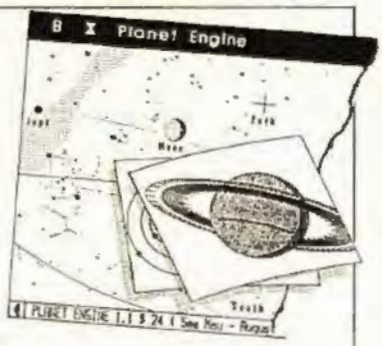
* Also Included: Sample Object Library, Pico Setup, and Sample Drawings
* Mvdvg is available separately for $ 7 (see August 1990).



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Warming up to spreadsheets

Spread a Sheet for Heat Loss

by Francis M. Walters

I took a long time getting acquainted with computer spreadsheets because I thought they were just a tool for accountants and money managers. The surprise is that computer spreadsheets also have non-accounting uses. And the great thing is that they do all the calculations and much of the work of setting up the calculations.

A spreadsheet is basically a sheet of paper ruled into columns and rows. Accountants fill them up with numbers that might represent expenses and receipts. Managers use them to break down jobs into smaller tasks so as to estimate time and cost to do a job. Spreadsheets can be used for making a personal budget or — as described here — for insulating a house.

The BTU-loss spreadsheet presented here was created using *DynaCalc* on a CoCo 3 with OS-9 Level II and 512K. Other spreadsheet programs should work as well, although you may have to change the format of some formulas. The significant technique I present is the application of heat flow calculation, which may be new to computer users. Once you understand the idea and include all the surfaces separating inside from outside, you can expand the spreadsheet to houses with more rooms and/or floors.

A computer spreadsheet does better in several respects than a pencil-and-paper spreadsheet. For instance, the computer allows you to select the column widths with narrow columns for some items and wide columns for text labels. Extra blank rows or columns can be inserted if you find you missed something. Or if you would like to rearrange the page, whole rows or columns can be interchanged, taking all the numbers along to the new location. Each block, or cell, can have a label, a number value or an associated instruction of how to evaluate the number value for that cell using information in other cells. Instructions are kept in a phantom page you don't see, but the instructions can be examined one cell at a time. I call the instruction page a *phantom* because in *DynaCalc* you never see it, and the manual does not name it. Veteran computer spreadsheet users may refer to my phantom page as a *template*.

As you fill in the data cells, the instructions go to work and fill in the associated cell on the displayed data page. While you can see all the spreadsheet data your computer screen allows, only the instruction at the cursor location is brought out to a special location on the screen. The spreadsheet can be much larger than the 80-by-24 screen size. In fact, you can move the screen window around the spreadsheet. Column and row headings are kept on the screen border as you move the viewing window around a larger spreadsheet.

You can instruct the computer to add the numbers in a column or to multiply numbers in Column B by Column C for each row and put the result in Column H. It might seem like a lot of drudgery to fill in all those instructions, but where similar things are to be done, you can call up a Replicate function that will copy the function into another cell or block, either relatively or exactly. More on this later. Labels can also be copied, plus there's a wide variety of available math and logic functions. It is easy to erase, write over or edit a number, label or instruction.

Now let's use a spreadsheet to see what various home insulation improvements can

Fran Walters has taught high school physics and is now a retired electronics engineer. He leads a Swiss folk dance group, plays analog accordian, digital piano, keeps bees and does volunteer work with Quest for Peace. He may be contacted at 5704 Kingswood Road, Bethesda, MA 20814

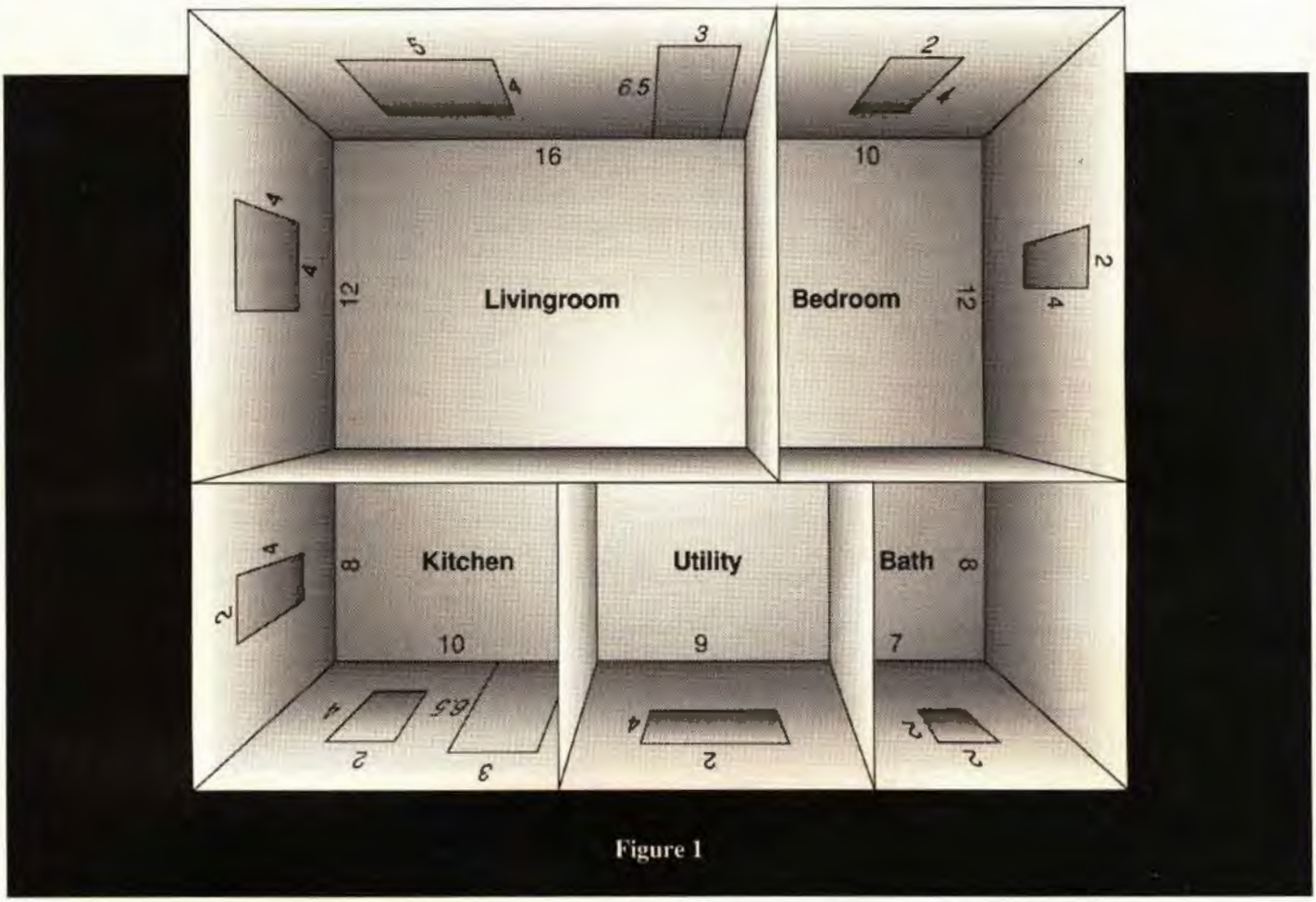

Figure 1

do. You've heard about the R value and know that the bigger it is, the less the amount of heat that goes through the insulation. More specifically, the temperature difference (degrees Fahrenheit) between inside and outside divided by the total R value gives the number of BTU per hour that is lost through a square foot of material. I said total R value because you generally have several layers; an outside wall has maybe four inches of brick, 3/4 inch of wood or fiber, three inches of fiberglass and one-half an inch of wallboard, so you add the separate R values. A ceiling would have just the wallboard and then the fiberglass.

Suppose you would like an additional six inches of insulation in the attic. It's easy with a computer spreadsheet. My single-floor house sits on a concrete slab, so I add the R value of carpets to the R value for three inches of concrete and 1/8 inch of asphalt tile. You can find tables of R values for building materials in various books. The R value for insulation is often printed on the roll; you'll just have to measure temperature.

Setting Up the Spreadsheet

Figure 2 shows the spreadsheet arrangement I used for the sample house plan of Figure 1. Data columns are at the left on Figure 2; the derived columns are at the right. Locations marked with -- indicate cells in which you must enter data once the phantom page is ready. *DynaCalc* does not replicate simple instructions like Fn, which just repeat a number value. These must each be typed in where needed.

The rows are numbered; the columns are lettered. Each room is considered separately. I listed windows and doors before walls because a correction (subtracting window and door areas) must be made to the wall area. Spreadsheet programs work down and across the page in a particular order, so have the information available before it is needed. The table implies that the rooms have two exposed walls at most. If there are two outside walls, I enter both width and length. The computation adds length and width to get total outside exposed wall. For the utility room with one outside wall I enter only width.

I save time entering data by entering room height just once at Cell B7 and use B7 as the instruction wherever room height is needed. The computer copies the data from Cell B7 into every other cell where B7 is the instruction. In each room the floors and ceilings are the same size, so enter those numbers just once (unless you have cathedral ceilings). Outdoor temperature is probably the same for all outside walls, doors and windows. It can be entered once at G5 and copied by the computer where needed. So I write G5 into cells G6, G7, G12, G13, G14, etc. That allows me to change the outdoor temperature with just one entry. I've made floor and ceiling temperatures different from the walls, because they are different (unless you run a ceiling fan).

I do each room separately so I can shut off a room to save heat. Consequently Column F allows different temperatures for each room. Windows and doors have different R values than the wall, and the heat loss is different; therefore I subtract the door and window areas from the wall area. This leaves the portion that uses the R

	A	B	C	D	E	F	G	H	I	J
1	ITEM	height	width	length	R	t(in)	t(out)	area	loss	total
2		ft	ft	ft		deg F	deg F	sqft	BTU/hr	BTU/hr
3										
4	Living Room									@SUM(I5...I9)
5	windows	--	--		--	--	--	(B5*C5)	(F5-G5)*H5/E5	
6	door	--	--		--	(F5)	(G5)	(B6*C6)	(F6-G6)*H6/E6	
7	wall	--	--	--	--	(F5)	(G5)	((B7*(C7+D7)-H5-H6)	(F7-G7)*H7/E7	
8	ceiling		--	--	--	(F5+3.5)	--	(D8*C8)	(F8-G8)*H8/E8	
9	floor		(C8)	(D8)	--	(F5-3.5)	--	(D9*C9)	(F9-G9)*H9/E9	
10										
11	Kitchen									@SUM(I12...I16)
12	window	--	--		--	--	(G5)	(B12*C12)	(F12-G12)*H12/E12	
13	door	--	--		--	(F12)	(G5)	(B13*C13)	(F13-G13)*H13/E13	
14	wall	(B7)	--		--	(F12)	(G5)	((B14*(C14+D14)-H12-H13)	(F14-G14)*H14/E14	
15	ceiling		(C14)	(D14)	(E8)	(F12+3.5)	(G8)	(D15*C15)	(F15-G15)*H15/E15	
16	floor		(C15)	(D15)	--	(F12-3.5)	(G9)	(D16*C16)	(F16-G16)*H16/E16	
17										
18	Bedroom-1									@SUM(I19...I22)
19	windows	--	--		--	--	(G5)	(B19*C19)	(F19-G19)*H19/E19	
20	wall	(B7)	--		--	(F19)	(G5)	((B20*(C20+D20)-H19)	(F20-G20)*H20/E20	
21	ceiling		(C20)	(D20)	(E8)	(F19+3.5)	(G8)	(D21*C21)	(F21-G21)*H21/E21	
22	floor		(C21)	(D21)	--	(F19-3.5)	(G9)	(D22*C22)	(F22-G22)*H22/E22	
23										
24	Bath									@SUM(I25...I28)
25	windows	--	--		--	--	(G5)	(B25*C25)	(F25-G25)*H25/E25	
26	wall	(B7)	--		--	(F25)	(G5)	((B26*(C26+D26)-H25)	(F26-G26)*H26/E26	
27	ceiling		(C26)	(D26)	(E8)	(F25+3.5)	(G8)	(D27*C27)	(F27-G27)*H27/E27	
28	floor		(C27)	(D27)	--	(F25-3.5)	(G9)	(D28*C28)	(F28-G28)*H28/E28	
29										
30	Utility									@SUM(I31...I34)
31	window	--	--		--	--	(G5)	(B31*C31)	(F31-G31)*H31/E31	
32	wall	(B7)	--		--	(F31)	(G5)	((B32*(C32+D32)-H31)	(F32-G32)*H32/E32	
33	ceiling		(C32)		(E8)	(F31+3.5)	(G8)	(D33*C33)	(F33-G33)*H33/E33	
34	floor		(C33)	(D33)	--	(F31-3.5)	(G9)	(D34*C34)	(F34-G34)*H34/E34	
35										
36	TOTAL HOUSE HEAT LOSS									@SUM(J4...J30) BTU/hr
37										

Notes: The -- indicates cells where data is required. Parenthesis show instructions that are on the phantom page. They also force DynaCalc *to consider the cell references as formulas. Column I was replicated from the formula contained in Cell I5. Column H was replicated from the formulas in the range H5...H9, followed by some deletions. Actual spreadsheet columns need only be wide enough for the column headings and generated data.*

Figure 2: BTU Loss Spreadsheet

for the wall. Window heat loss uses the area of the window and the window R value. This is important because more heat may go through the window than the entire wall.

Temperature in the attic over the ceiling first appears in Cell G8, so I tell the spreadsheet to copy it into cells G15, G21, etc. Inside temperatures for walls, windows and doors in each room need to be entered separately for each room, because some rooms are shut off, not heated or are naturally warmer or cooler. I found that my ceiling temperature was 3.5 degrees warmer and the floor 3.5 degrees cooler than the middle level room temperature, so I let the computer and spreadsheet handle those for me in Column F. You might prefer to actually measure those temperatures. With *DynaCalc*, entering a value displaces the previous value or the hidden instruction (and not just the result of that instruction) for that cell.

Figure 2 shows how the values of area, heat loss and the summation of losses are computed. In some instances every cell in a column needs a calculation instruction, but a similar instruction can be used for all rows in that column (the replication feature allows me to instruct the computer spreadsheet to make the subscripts relative to what row they are in). The calculation appears on the spreadsheet when there is information for making the calculation or whenever you change the information.

The instruction for window area, `Bn*Cn`, goes in Cell H*n*. With the cursor at H5 enter the instruction using 5 instead of *n* (`B5*C5`). Figure 2 shows which cells can be replicated and where. The instruction associated with the cursor location on the screen shows on the screen in a special location reserved for it.

The replicate function takes a formula from a specified location, or group of locations, and repeats it either to one location or to a range of locations. That allows doing selected spots here and there or a whole column at one time. When you give the replicate command, the instruction for the cell at the spreadsheet cursor is shown at the special location with a cursor pointing in turn at each subscript. The computer asks whether you want a relative subscript or the same one. A relative subscript makes the subscript correspond to the line in which the replicated instruction goes. Use the same subscript to put a constant in several places.

To get the correct wall area you must make a modification to the wall area instructions at rows 7, 14, 20, 26 and 32 to allow for windows and doors in the wall. I like to let the replicate function do most of the work and then edit the cell to make the slight change needed. In this case the correction was subtracting the window (and door) area calculated in the previous line(s).

After replicating the instruction down the column, you should blank out the instructions in the dead cells of blank lines and opposite room name labels. Otherwise you could get a divide-by-zero fault when you start using the spreadsheet.

The instruction in Cell I*n*, `(Fn-Gn)*Hn/En`, computes heat loss. It represents temperature difference times area divided by R. So the instruction at Location I5 is `(F5-G5)*H5/E5`, and it is replicated all the way down the column using the relative option. After typing in the instruction at I5, the keystrokes `/R I5 <CR> I6 . I34 <CR> R R R R` do all the remainder of the column! Then you blank out the few locations that aren't needed.

The last column provides subtotal heat loss for each room. The living room subtotal in Cell J4 is given by `@SUM(I5...I9)`. The grand total by `@SUM(J4...J32)` appears at the bottom of the sheet. (*DynaCalc* uses @ to indicate a function.) The actual spreadsheet column widths need only be wide enough to accommodate the column heading or numbers that result.

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Using the Heat Loss Spreadsheet

Until you enter data, the computer screen is blank except for column headings and row labels. A 0 appears in cells with formulas unless the computation involves a division by zero. Until you fill in R values it looks like you have trouble in Column I, but after entering proper values the error condition clears. Some results may look negative until all the values are entered.

Figure 4 shows the spreadsheet after all the data has been entered. That's not really a nine-foot window in the living room, but the sum width of several windows. The R value for single-pane glazing is 0.9. Carpet adds about 2 to the R for the floor. If there is an attic above the ceiling, then the outside temperature for the ceiling is not the same as for an outside wall. (My attic is relatively warm, because the rafters are insulated.)

Temperature over the ceiling inside the attic was measured by putting a thermometer up there. Temperature under the concrete slab floor was estimated by putting the thermometer on the floor inside a closed room with the heat shut off and covering the thermometer with a large fat pillow and waiting until the reading stabilized. The idea is that the pillow keeps room heat from getting to the thermometer and area of concrete floor under it. The floor inside temperature under the pillow eventually equals the floor underside temperature as the heat flows to the cold dirt under the concrete. That's because concrete is such a poor insulator.

The kitchen window has a thermal shutter of R = 5.8 If I want to know what good it does to shut off the rooms I'm not using, I can't just omit listing them, because heat still escapes through the walls and windows. Even if I shut off the heat to the room, heat goes through interior walls that are not as well-insulated as outside walls. The closed room's inside temperature is different from the heated rooms. So what I do is shut the door and measure the room temperature after it stabilizes.

One of Radio Shack's digital thermometers with a remote sensor is good for this work. It's good for measuring ceiling and floor temperatures that are different from room temperature. Because of calibration error between different thermometers, the same thermometer should be used for each measurement. But if you use two thermometers, you should provide a correction between them by comparing the readings of the two thermometers measuring at the same place. Even though it reads tenths of degrees on a digital readout, this digital thermometer may have a Degree Zero Error when compared to another thermometer. When using a single thermometer the Zero Error doesn't cause trouble, because the calculation uses temperature differences.

As you examine the sample printout in Figure 3, you see how much heat goes out the kitchen and bathroom floors without rugs. (Wood floors are much better than concrete!) I show an insulated shutter on the kitchen window (R=5.8), which doesn't do a lot of good with all that heat leaking out the floor. It looks like I should put a fat carpet in the bathroom and kitchen and then try thermal shutters on the living room windows for nighttime. The utility room ought to have an insulated wooden floor. There's already enough attic insulation until other losses are corrected.

This spreadsheet calculation only tells how much heat goes through the walls, windows, doors, ceilings, floors — for the temperatures that you specify. If you have air leaks around doors, windows and electrical receptacles, better fix them because they can easily nullify good insulation elsewhere. We don't have a way to calculate draft losses, because the amount of air entering is unknown; it's best to eliminate the air leaks. (Heathkit NE2112 Heat Sniffer kit uses a probe with a thermistor bead to sense drafts.) Unfortunately, the spreadsheet can't tell how long it takes to heat the house, because part of the heat input goes to heating the air, water vapor, walls, ceiling and contents of the house. And more heat escapes up the chimney. But you do know that the less heat lost through walls and windows to the outside, the better off you (and your pocketbook) are.

Once the spreadsheet is set up you can change insulation, add double glazing to the windows, add insulating shutters over windows and put up storm doors and new wall-to-wall carpet, with and without pad — all free; just change the R values. Want to know what setting back the thermostat at night does for you? Change the indoor temperatures on the spreadsheet! It couldn't be easier or cheaper. A good book for helping you warm up your home is *The Super Insulated Retrofit Book* by Brian Marshall and Robert Argue. (Renewable Energy in Canada, 107 Amelia St., Toronto, M4X 1E5 Canada; Fran Walters, 5704 Kingswood Road. Bethesda, MD 20814; 301-530-5643)

As you can well imagine, calculating heat loss is only one application for spreadsheet programs. You can use spreadsheets for just about anything from balancing checkbooks or handling a paper route to calculating component parameters for complex electronic circuits. The example shown here actually uses very little of the power provided in most spreadsheet programs. Just think what problems you could solve with a little imagination and foresight. What if . . .

	A	B	C	D	E	F	G	H	I	J
1	ITEM	height	width	length	R	t(in)	t(out)	area	loss	loss
2		ft	ft	ft		deg F	deg F	sqft	BTU/hr	BTU/hr
3										
4	Living room									3534
5	windows	4	9		.9	68	32	36	1440	
6	door	6.5	3		3	68	32	20	234	
7	wall	8	15	12	13	68	32	161	444	
8	ceiling		15	12	20	71.5	37	180	311	
9	floor		15	12	2.2	64.5	51	180	1105	
10										
11	Kitchen									4907
12	window	4	4		5.8	65	32	16	91	
13	door	6.5	3		3	65	32	20	215	
14	wall	4	10	8	13	65	32	109	275	
15	ceiling		10	8	20	68.5	37	80	126	
16	floor		10	8	.2	61.5	51	80	4200	
17										
18	Bedroom 1									1755
19	windows	4	4		.9	65	32	16	587	
20	wall	8	17	10	13	65	32	160	406	
21	ceiling		12	10	20	68.5	37	120	189	
22	floor		12	10	2.2	61.5	51	120	573	
23										
24	Bath									4062
25	window	2	2		.9	67	32	4	156	
26	wall	8	7	8	13	67	32	116	312	
27	ceiling		7	8	20	70.5	37	56	94	
28	floor		7	8	.2	63.5	51	56	3500	
29										
30	Utility									6236
31	window	2	4		.9	70	32	8	338	
32	wall	8	9		13	70	32	64	187	
33	ceiling		9	8	20	73.5	37	72	131	
34	floor		9	8	.2	66.5	51	72	5580	
35										
36	TOTAL HOUSE HEAT LOSS									20493
37										BTU/hr

Figure 3: BTU Loss Results for Sample House

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EPROM Programmer, Part II

by Tony DiStefano
Contributing Editor

Last month I gave you the schematic and parts list for an EPROM programmer. By now, you probably have the board together and are ready to test it. This is a substantial project and care must be taken to ensure that you do not burn out the EPROMs when you try them out. Therefore we will go through a battery of tests to make sure everything is working as it should.

As always, the first test is a visual check. To wire up something, using the same method as I use, check off every wire you do on the schematic and check to make sure all wires are soldered. To visually check the board, look at each chip one by one. First check for shorts, then check for cold solder joints. Also make sure there is a wire for each pin on the socket. If there are wires missing, check the schematic to make sure there is not supposed to be one there.

Before you plug in all the chips, check for the basics. Did you connect the power and ground lines? The easiest way to check if all chips will be powered is to use an ohm meter with a continuity option. I recommend getting one if you don't already have one. Besides, you will need a voltmeter later anyway. Before continuing with the continuity and resistance checks, make sure no power is applied to the circuit! Put one side of the checker to the positive voltage pin of the connector. With the other end of the probe, check every socket that is supposed to have positive voltage. Do the same with all the ground connections.

The next test is simple; check the resistance between +5 volts and ground. It should show a somewhat low resistance at first, but then the resistance should rise. This is because it takes a certain voltage in order to measure ohms. Different meter companies use different voltages, but all have some. And if you remember Ohm's law; R = V/I, you see how its done. If you place a known voltage across a resistor, the current has a direct relation with the resistance. So measure current with a known voltage and you have resistance. The point I'm trying to make here is that as soon as you put your ohmmeter to the circuit, voltage is introduced into the circuit.

There are a lot of capacitors on your board. What happens when you introduce a voltage across a capacitor? The capacitors start to charge; at first, the resistance is low and slowly starts to climb. This is normal, and if you do not get this, check your circuit again. There should not be a short between +5 volts and ground.

Okay, enough for the visuals, plug in all the chips and make sure none are in backwards. Check for Pin 1 polarity. Before you plug the circuit into your controller or CoCo, check the power regulator. Plug in the power adapter into JP1. With the help of Figure 1 of the first part of this project, measure the voltage at Pin 3 of the LM317. It should be somewhere beween 25 and 39 volts — if it's too low, you won't be able to program EPROMs that require 21.5 volts. If the voltage is too high, you may burn out the regulator.

Now, with the jumper on JP2 set to 1 and 2, measure the voltage on the output of the

Address	Function
$FF50	Read/Write EPROM DATA 8 - Bits
$FF51	Write Only Control Byte D0 = A12 D1 = A13 D2 = *OE Active Low D3 = *PGM Active Low D4 = *CE Active Low D5 = V_{pp} (0=Off, 1=On) D6 = V_{cc} (0=Off, 1=On) D7 = Write Data Enable (1=Write, 0=Hi-Z)
$FF52	Write Only Address Stepper A write to this location increments A0 to A11.
$FF53	Write Only Address Reset A write to this location resets A0 to A11 to Low.

Table 1: Memory Map

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

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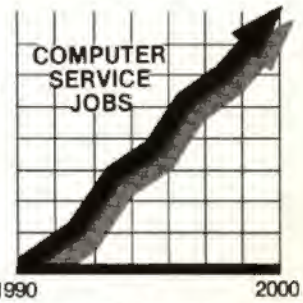

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regulator. That is Pin 2 of the LM317. It should be 21.0 volts, give or take not more than .3 volts. In other words, it should be between 20.7 and 21.3 volts. If not, you should change the value of R4. The resistance should go up if the voltage is too low and down if too high. This may require that you use a combination of resistors. This is normal, as not all values of resistors exist and most likely not the ones you need. Murphy's Law! Do the same with the other side; jumper JP2 set to 2 and 3. This time the voltage should be 12.5 volts.

After you have the proper voltages, it's time for the "smoke test." Plug the board into your computer and power it up.

After you have the proper voltages, it's time for the "smoke test." Plug the board into your computer and power it up. If your computer does not come up as usual, turn it off right away and check the board again. If all is well, start checking the circuit. Before you start, however, know where the EPROM programmer is memory-mapped and what each byte does. Table 1 is a memory map for the EPROM programmer.

Using the information in Table 1, you should be able to test all the functions of the EPROM programmer before trying it out. The only tool you need to make these tests is a logic probe. It is impossible to do without one. At different stages of the test you must type in a BASIC program, usually only one line long. It is necessary to test the hardware.

The first test we will make is the counter. Type in this one-line program and run it:

```
10 POKE &HFF52,0 : GOTO 10
```

This should pulse the address counter. Properly connect the logic probe and place your probe on Pin 13 of U4. You should see a pulse. If not, check all the connections to U4. Next check the other output pins of U4; there should be no other pulses. On the ZIF socket check that all address lines from A0 to A11 are changing between High and Low. Start from A0 and work your way up. Notice that as you go up in address lines, the pulse is longer and longer. This is because each address is doubled in time. Make sure all address lines change. If they do not, check the wiring from U5 to U7. If not, see that Pin 10 of U5 has a pulse and Pin 11 is Low. Next change the BASIC line above from &HFF52,0 to &HFF53,0 and run it. With the probe make sure Pin 11 of U5 is pulsing. That is the Reset line to the address counter.

The object of the next set of tests is to make sure the Control byte controls all the right things. When I tell you to poke a new value into the control byte, use the following line:

```
POKE &HFF51, &Hxx
```

Note that there is no line number, and *xx* should be substituted with the actual value needed to test that particular area. Using the line above, poke the value &HFF. With the probe, check the following to make sure they are all High. On U7 (ZIF socket) check A12, A13, *OE, *PGM and *CE. Poke &HFE. A12 should be Low, and the other four should be High. Next poke &HFD and check A13; it should be Low and the rest High.

For the third test, poke &HFB and check *OE for a Low and the rest High. For the fourth test, poke &HF7 and test *PGM for a Low and the rest High. As a last test, poke in &HEF and test *CE for a Low and the rest High. If all of those check out, you are well on your way to EPROMing.

Now poke &HFF. Check that Pin 1 of U2 is High. This is the Write Data Enable pin. Now, poke &H7F. Check Pin 1 of U2 again. It should now be Low. If not, see that pins 8 and 9 of U6 are wired properly.

In order to test the last two outputs of the Control byte, you need a small load to properly test the voltage. Using an EPROM as a load is not recommended, because if there is something wrong, chances are you will burn out the EPROM. A 1K resistor works just as well and is much cheaper. Besides, you won't burn a 1K resistor even with 21 volts.

Using the ZIF socket, insert the resistor from ground on Pin 14 to V_{CC} on Pin 28. Poke &HFF. With a volt meter, measure the voltage across the resistor. It should be 0 volts or real close. Now poke &HBF. Again measure the voltage across the resistor. It should be close to five volts but not less than 4.6; if not, check the circuit wiring of Q2, R3, R8 and U6C. This circuit turns the EPROM on and off.

After that is working okay, change the resistor from Pin 28 to V_{pp}, which is Pin 1. Poke &HFF and with the volt meter check that there is 0 volts across the resistor. Poke &HDF and check the voltage again. This time it should be either 21 or 12.5, depending on what JP2 is set to. If you don't get either of these voltages, measure the voltage between the emitter of Q1 and ground. There should be 21 or 12.5 volts; if not, check the voltage regulator U8. If there is improper voltage, check Q1, R2, R7 and U6D for improper wiring. Once you get that working, there is only one more set of tests to do.

To check if the write data latch is wired properly, these tests are necessary. To use the write data latch you must first enable it. This is done by poking D7 of the control latch to a 1. Therefore, enter:

```
POKE &HFF51, &HFF
```

The write data memory location is $FF50; therefore whenever I tell you to write data to that location, the new command you must enter is as follows:

```
POKE &HFF50, &Hxx
```

Again, the *xx* value depends on what I tell you to put in there. To see if the latch is working, first poke &H00. With the probe, check U7 (ZIF socket) pins 11 to 19. They should all be Low. Now poke &H01. Pin 11 (D0) should be Low and all other data lines High. If not, check the wiring to U2 and the wires between U2 and U7. Poke &H02, check D1 for a High and all others Low. Make six other tests using &H04 for D2, &H08 for D3, &H10 for D4, &H20 for D5, &H40 for D6 and finally &H80 for D7.

To test if you can read this latch, all you have to do is poke a value to the write data latch and read it back at the same location. When the write data latch is enabled, you can read back your own data, providing that the EPROM is not enabled. If it is, there will be a data conflict. (Never have the write data latch and the EPROM enabled at the same time.) To test the ability to read the EPROM correctly, poke a variety of numbers into $FF50 and peek at them. The value you read should be the same value you put in. If not, check the wiring to U1. To peek at Location $FF50, type:

```
PEEK(&HFF50)
```

If all the above tests pass, you are ready to put in some software and try to program an EPROM. Next month I'll give you a fully commented listing of the program to make this programmer work. It is in assembly language, but I will also include a BASIC loader program that you can type in if you don't have an assembler.

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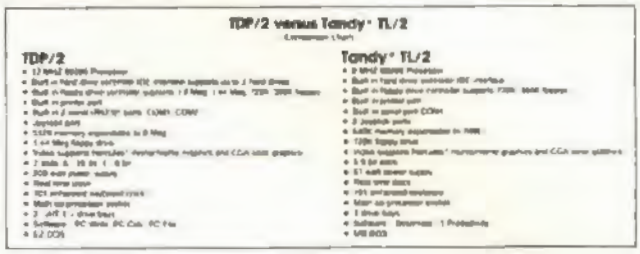
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Online Interactions

by Eddie Kuns
CoCo SIG Database Assistant

You'll notice the format of "Database Report" has changed this month. It now looks like a directory listing; it is part of "Delphi Bureau." The new format should give you more information in fewer words. Most of the filenames listed are pretty self-explanatory; only uploads with nondescriptive names or uploads of special interest are mentioned in the editorial.

One posting worthy of note is Rick Adams' TSEdit patch. This upload in the OS-9 Patches database adds many new features to the TSEdit text editor. It allows it to work on OS-9 Level II windows as well. Also in the OS-9 Patches database are the *GShell+* patches mentioned by Dale Puckett in "KISSable OS-9;" they were posted by Zack Sessions.

In the OS-9 Telecommunications database, Wayne Laird submitted a list of Color Computer OS-9 BBSs. Mike Knudsen posted the long-awaited documentation of the *UltiMusE* file format in the OS-9 Graphics & Music database. Tim Koonce released *View* Version 3.1, which displays several graphics formats. He also collected information on various graphics formats together under one heading — "Graphics Formats."

Zack Sessions released the agfx.l graphics library for OS-9 assembly programmers into the OS-9 Programmer's Den, which goes along with Bob van der Poel's RMA function library `alib.l`. In Tutorials & Education, Albert Semeluk contributed a long and detailed explanation of how you can change a module's name in OS-9.

In the CoCo SIG General Information database, Kelly Thompson released an article detailing his first few months of using OS-9 as a guide for others. Donald Ricketts wins the uploading endurance award this month with his large number of uploads in the CoCo 3 Graphics database, including a program to view DS69-generated pictures. Alvin Kimball posted a different viewer — one to view pictures generated with *MacPaint*. He also posted CCDial, a pull-down, button-driven application for dialing the phone and organizing disks.

Frank Hogg released information about the new Tomcat computer from Frank Hogg Laboratories in the Product Reviews and Announcements database. Wayne Laird posted a slightly different version of his list of BBSs in the CoCo SIG Telecommunications database.

New Database and Forum Areas

Three new database areas (and forum areas) have been added to the Delphi SIGs. The OS-9 SIG has gained New Uploads and Grits & Gravy. New uploads will be placed

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.

Database Report

OS-9 SIG Database:

Applications:

Calculator Program	
JSHERMAN	Joel A. Sherman
Simple Menuing System	
VAXELF	John Donaldson
Revised SMenu	
SEBJMB	Jeff Blower

Utilities:

Attr with Wildcards!	
ZACKSESSIONS	Zack Sessions
Winfo.pak	
MAREK	Mike Weigel
Wdir.pak	
JMLSOFT	Jim McDowell
Cursive	
TRIX	John Farrar

Patches:

TSEdit Patch for Device Windows	
RICKADAMS	Rick Adams
GSHell+ Patches	
ZACKSESSIONS	Zack Sessions
MFree Patch	
OS9UGPRES	Kevin Darling

Telcom:

CoCOS9er BBS List	
WAYNELAIRD	Wayne Laird

Graphics & Music:

Candy2.gif	
SUPERCHRIS	Christian Michaud
Glorious.ar	
BAMBOO	John Kou
Praise1.ar	
BAMBOO	John Kou
Playit.ss	
MKJ	Ken Heist
Ballade Pour Adeline	
MIKEHAALAND	Mike Haaland
Umeformat.ar	
RAGTIMER	Mike Knudsen
View 3.1	
TIMKOONCE	Tim Koonce
Graphics Formats	
TIMKOONCE	Tim Koonce
Swimwear.vf3	
TIMKOONCE	Tim Koonce
Looney Tunes	
HAZE	Hadley Hazen
Stairway to Heaven	
COCOROGUE	Jim Buck
Inv_5.bach	
PDUNC	Paul Duncan

in the New Uploads database area for at least one month to aid those who logon to Delphi only occasionally. This saves those persons from having to search each topic area separately.

The Grits & Gravy topic is used in the forum for non computer-related topics like Kevin Darling's many cats and the resulting pile of used cat-food tins (is it really visible from the airport?), whether or not grits are a foodstuff, and just how thoroughly you need to ground yourself when installing a memory upgrade. (You might think that last one is related to computers. Well, you'd have to read the thread to understand!)

The Soapbox (chitchat) forum and database topic is the new addition to the CoCo SIG. People had been complaining about the amount of Forum traffic unrelated to computers, some of it silly and humorous and some of it about philosophic issues. All of those non-computer-related forum messages now have an official home. The latest issues discussed (sometimes heatedly) include fourth amendment rights and the death penalty. Articles dealing with such emotional and non-computer related issues are posted in the corresponding database area, which contains silly and humorous files as well.

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Conferences

There are currently three monthly conferences. All three occur at 10 p.m. eastern time. The topics, hosts and dates are:

- Games Programming — Steven Bjork, first Monday each month
- Using Delphi — Eddie Kuns and Tim Koonce, second Monday each month
- The CoCo Publisher — Jeff Parker, third Wednesday each month

Please drop in on these scheduled conferences with any questions. Remember that no question is too small, and the only stupid question is the one you don't ask. ❑

CoCo SIG Database:

Programmers Den:

RMA Graphics Library	
ZACKSESSIONS	Zack Sessions

Tutorials & Education:

Monapatch.txt	
ASEM	Albert Semeluk

General Information:

Considering OS-9? Read This	
KMTHOMPSON	Kelly Thompson
CoCo4txt	
DSRTFOX	Francis Swygert

CoCo 3 Graphics:

Flamingo.cm3	
SUPERCHRIS	Christian Michaud
Cocodemo.bin	
SUPERCHRIS	Christian Michaud
Janet Jackson - DS69 4096	
TRAS	Richard P. Trasborg
Lyn Part 1	
TRAS	Richard P. Trasborg
Lyn2	
TRAS	Richard P. Trasborg
More CM3 Pix	
JAYDEF	Jason Becker
Nature Pix	
JAYDEF	Jason Becker
DS69View - A Real "Viewer"	
STEVEPDX	Donald Ricketts
Pretty Actresses	
STEVEPDX	Donald Ricketts
Living Dolls	
STEVEPDX	Donald Ricketts
More Living Dolls	
STEVEPDX	Donald Ricketts
Views of Christina Applegate	
STEVEPDX	Donald Ricketts
SI Swimsuits I	
STEVEPDX	Donald Ricketts
Sports Illustrated Swimsuits II	
STEVEPDX	Donald Ricketts
Sports Illustrated Swimsuits III	
STEVEPDX	Donald Ricketts
Julie's Legs	
DAVIDMILLS	David Mills
Viewmac	
ALKIMBALL	Alvin Kimball

Utilities & Applications:

CCDial	
ALKIMBALL	Alvin Kimball
Clock	
DENNISH	Dennis Hennen
Printer Works	
DENNISH	Dennis Hennen

Games:

Four Wheeler	
DENNISH	Dennis Hennen
Pan-Galactic Life Simulator	
ALANDEKOK	Alan DeKok

Classic Graphics:

The Three Amigos	
DENNISH	Dennis Hennen
Blocks.bas	
MSCHNEIDER	Michael Schneider

Product Reviews & Announcement:

TomCat	
FHOGG	Frank Hogg

Telecommunications:

CoCOS9er BBS List	
WAYNELAIRD	Wayne Laird
Configure GeTerm V2.5	
RICKMAC	Richard McNabb

Word Processor | CoCo 3

Word Power 3.3— Making a Good Thing Even Better

RAINBOW readers from way back may remember Thomas Poor's review of *Word Power 3.1* in October 1988. All the features mentioned in Mr. Poor's review are retained in *Version 3.3*. If you can't dig up the old review, take a look at Microcom Software's full-page advertisement for a listing of *Word Power Version 3.3*'s features.

Version 3.3 is designed for the Color Computer 3 with at least one disk drive. An 80-column monitor is desireable but not necessary because this version supports the CoCo 3's 40-column text mode. *Word Power* is not copy protected and comes in a four-disk set. One disk contains the main program, another is supplemental programs, and two are dictionaries.

What's new in *Version 3.3*? Well, the ability to sort lists has been added. You can take a list (one line of text with each line terminating in a carriage return), mark it with block markers, and issue a sort command. Also, the number keys 1 through 5 can be programmed to issue macros of up to 50 keystrokes each. This means if you have a series of commands you frequently use, you can program *Word Power* so the entire sequence is issued by pressing CTRL and the appropriate macro key.

What else? *Version 3.3* adds the ability to save parts of a text file and to incorporate graphics from *CoCo Max III* into a text file. *Version 3.3* can also make automatic backups and comes with an 80,000 word spelling checker on two separate disks (more on this later).

Other enhancements, which actually originated in *Version 3.2*, include a 115K printer spooler, automatic reformatting of text and a two-column format. Automatic reformatting is a nice feature. In many word processors, including some MS-DOS programs, when you change a line of text you must issue a format command to realign all subsequent lines. There is no good reason why the user should be forced to reformat the text. That's what computers are for. *Version 3.3* takes care of that problem by reformatting lines automatically.

I had only a short amount of time to experiment with the graphics feature and two-column print feature but I was suitably impressed. Newsletter publishers will find some uses here, especially those with good dot-matrix printers.

Other features include a handy pop-up calculator and a split screen function that lets you freeze a selected portion of text on the top half of the screen while you continue working on text in the active window on the bottom half of the screen. One thing in particular that I liked was the set-up program explained in Mr. Poor's review. It lets you set many of *Word Power 3.3*'s default parameters, thereby minimizing much of the startup litany one goes through on every power up.

The real appeal of *Word Power 3.3* is in Microcom's continued commitment to ease of use and employment of the CoCo 3's added memory and enhanced graphics capabilities. Functions like file saving, file loading, centering, block manipulation and locate/replace all use colorful pop-up windows and permit the user to select from a

menu using the arrow and ENTER keys.

I believe *Word Power 3.3*'s approach to printer codes may be a bit more manageable than some I've had experience with. Once the printer codes are entered into the permanent set-up file, printer features like underlining, bold face and italics can be selected by their names from a menu. All this is done without embedding a patchwork of confusing codes into the body of the text. While *Word Power* does not reproduce the fonts on the screen, it color codes the selected text on the screen so that the embedded codes are apparent but not distracting. This approach is more organized and it looks nice.

I was very surprised to learn that even with the abundance of *Word Power* features, you cannot disable the word-wrap feature. For many this doesn't mean much, but if you program and edit your programs with a word processor, the lack of this feature could be a major inconvenience.

In the tales of terror department, on one occasion I was disappointed to learn that *Word Power* had no Reset protection. Thus I was unable to recover my text in one of those out-of-control moments when I had apparently used an incorrect code.

The locate/replace function automatically masks the case of a character; therefore, *Word Power* does not permit one to distinguish between upper- and lowercase characters during a search. Sometimes I like to make that choice.

Another potential shortcoming is the fact that *Word Power* has a maximum line width of 120 characters (80 columns on the screen at one time). For almost all purposes this is fine and probably 40 more than necessary; however, it is not good for previewing spreadsheet dumps or other applications that use condensed, 136-character-per-line printing format.

Earlier I mentioned that *Word Power* comes with a spelling checker program. While quite comprehensive (having the ability to suggest alternate word spellings), the spell checker is slow to the point of being intolerable. It would take approximately one hour to spell check a file the size of this review.

In spite of these last items, I found *Word Power 3.3* to be a thoroughly enjoyable program to use, as well as fast and visually appealing. I think it must be the most full-featured of the CoCo 3 word processors. It passed my tests with flying colors and earned itself a place along side those programs I call my work horses.

(Microcom Software, 2900 Monroe Avenue, Rochester, NY 14618, 1-800-654-5244; $79.95)

— Ernest F. Zore

Meet Chris Santwani, Author of *Word Power 3.3*

What kind of response have your Word Power *programs generated?*

The response has been terrific! In fact, customer suggestions have helped to shape each new version of *Word Power*.

Is there one feature in particular that many people requested?

Yes, the ability to import graphics.

A feature that caught my eye was the 80,000-word spell checker. Did you create the spell checker or seek outside help?

I received license from Dale Pucket to use the spell checker. It was originally on eight disks. It has been compressed to fit on two disks.

Using the 80,000-word spell checker can be time-consuming. Is there a way to speed up the process of spell-checking?

There is an alternative. *Word Power 3.3* has a built-in 150-word spell checker consisting of conjunctions, pronouns and commonly used words. Another approach would be to load the larger spell checker onto a RAM disk, for faster execution.

What future endeavors are you planning for the CoCo or other machines for that matter?

I'm programming on the IBM and MAC and am interested in the Tomcat and the MM/1. The enhanced 68020 16-bit processor has its similarities with the CoCos 6809 8-bit processor.

Is there any particular aspect of programming for the CoCo that you haven't tried, yet would like to?

Graphics manipulation possibly.

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Communications | OS-9 Level II

OS-9 Level II BBS, Version 3.0

In the past few years, more and more bulletin board systems have sprung up. Large users groups sponsor and support them; clubs, adults and kids from all over the world own and operate them. Each BBS varies in size, sophistication and success.

To operate *OS-9 Level II BBS*, you need the following:

- 512K CoCo 3
- At least two floppy drives
- Auto-answer modem (2400 baud preferably, but 1200 baud is okay)
- RS-232 port
- Telephone line
- BBS software package
- An operating system, in this case OS-9 Level II

The *OS-9 Level II BBS* is powerful and full-featured. If you are familiar with OS-9 Level II and have experience working in the OS-9 environment, there is very little this BBS system cannot do for you. There is a saying among hackers that the quality of the BBS depends on the quality of the SysOp.

It is refreshing to see a product with so much potential — ANSI graphics and downloads to special interest groups as well as conferences.

This BBS, however, might be a little tough for beginners — the package includes a rigorous manual that assumes the reader has a working knowledge of OS-9. If you are a novice, be patient and rely on friends for support. The system comes with a model BBS that you can tinker with while learning. There is even a game included for your first callers to download.

I called a number of OS-9 Level II BBSs around the country and was pleased and surprised at the variety I found. No two BBSs are exactly alike. In fact, I recommend visiting a number of BBSs before starting one of your own.

A few of the outstanding features of *OS-9 Level II BBS* from Alpha Software Technologies are: The system comes ready to run as is; it is generic, but ready to go online so you can get your feet wet; and it has built-in menus, or you can create your own.

There are a number of typographical errors and misprints in the manual, some of which may throw you off. If you are familiar with OS-9, the mistakes are fairly visible, and the corrections can be noted in the manual. A minor annoyance is that the manual is printed in very small print, and several of the pages were out of order. Alpha Software Technologies agreed to rush me a new manual and it arrived promptly. (The correct telphone number and address for technical support appears at the end of this review; they are incorrect in the manual.)

This BBS also supports Xmodem, Xmodem CRC, Ymodem and ASCII file transfers, and it offers download validation and keyword searches. There is no capacity to broaden or narrow a search, but there are keyword searches.

Another terrific plus is the EMail system and special interest group areas. Here you can leave a forum message, chat with the SysOp, or talk with other users if you have a multi-channel modem.

The menu program is actually the heart of this program because it runs the different command files and scripts used to create the user interface. Moving around the system is as easy as a single key press.

Security is important for any BBS, and this one has a good security provision. It assumes a default of four user levels; these are expandable and definable, so you can have as many as you want. Initially the system is set for *SysOp*, with all the required privileges needed to maintain the BBS, the *new user* who has few privileges, the *standard user* with access to most everything, and the *elite user* who can do everything but be SysOp.

Another way to judge the quality of a BBS is by its accessibility for daily maintenance. The Alpha OS-9 BBS has an excellent set of built-in utilities that allow the SysOp to perform every function necessary to maintain the bulletin board. A unique device driver, called the double driver, lets the SysOp monitor the system while it is in use. The SysOp can also dry run the BBS by having it interact with an OS-9 window. This way the operator can test new additions and enhancements to the system as well as maintain it from the keyboard. The SysOp can also log in from a remote terminal to perform maintenance on the system.

One factor the manual does not address is that the system really bogs down when it is run from a floppy drive. There are times when a disk access might take up to 20 seconds just to find a password. This can be avoided by using very fast floppies or a RAM disk. If you are serious about running a BBS with SIGs and EMail and file transfers, you need a lot of space and speed, which requires a hard drive. Don't be dissuaded by this; start small and grow into it, but if you are serious about running a board, plan on purchasing a hard drive at some point.

In conclusion, the *OS-9 Level II BBS* is a full-featured, sophisticated system. It operates under OS-9 Level II and supports all the major features common to BBSs, including file transfers with multiple protocols, conference modes, EMail, Special Interest Groups, ANSI graphics editor, encoding and filtering programs, a BBS monitoring program, and BBS operation by a SysOp, as well as a security scheme with password protection and one-touch menu operation.

If you are considering a BBS and want to use OS-9 as an operating base, I recommend this package. At $29.95, you are not likely to find a better bargain. If you want to see for yourself, Alpha Software Technologies offers a free demonstration. Just call (504) 649-5761 and log onto an actual operating *OS-9 Level II BBS*.

(Alpha Software Technologies, 210 Bluefield Road, Slidell, LA 70458; 504-649-5176 or 504-649-5761 [BBS orders]; $29.95, $3 S/H)

— Jeffrey Parker

Communications | CoCo 3

CIII D-Link

Imagine you are home from work, sick with the flu. There is, however, some business correspondence you must get out. Fortunately, you have a CoCo 3 at the office and one at home, and you also have *CIII D-Link*. With *CIII D-Link*, this chore is as easy as turning on the CoCo, grabbing your mouse, calling the office and sending the file.

This type of program has recently become popular on MS-DOS computers. It is a convenience that allows the user the capability of file transfer and remote control from one computer to another.

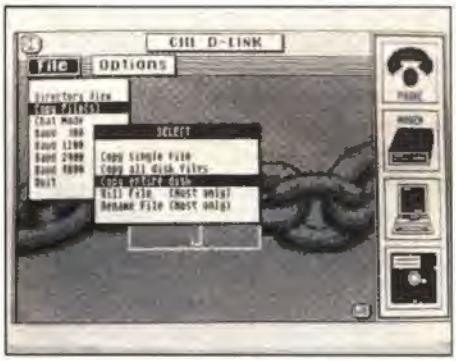
CIII D-Link is really a file transfer utility. Rather than completely controlling all functions of the remote computer, the user is limited to performing file functions on the remote CoCo or chatting with a user via a modem link with the remote CoCo.

What do *remote*, *host* and *local* mean? A remote is a computer you call (and its operator by inference). A host is you and your computer. Local refers to functions—in this case file management — on your computer.

CIII D-Link requires a disk drive and mouse (highly recommended) or joystick. A modem or null-modem is also required. The modem is connected to the serial I/O port and reliably works with this program in the 300 to 4800 baud range. It may be possible to run the modem faster with the CoCo, but higher speed can cause errors. *CIII D-Link* does not support the Deluxe RS-232 Pak or the Direct Connect Modem Pak.

Although *CIII D-Link* is called a mini-host BBS in the manual, the program cannot be used as a BBS system. BBS features such as E-Mail, forum, bulletin board, security and others are not supported by the current version.

CIII D-Link allows you to copy, move, kill and rename files on the CoCo using a graphics user interface (also known as point-and-click when referring to the mouse) and perform all of these functions on a remote computer as well, although file rename and



file kill are limited to the host computer and cannot be used with the remote.

CIII D-Link has some interesting and unique features. The whole program is based on icons and pull-down menus; the only real typing comes when it is time to rename a file or chat with the remote computer. The system is based in RS-DOS, but can handle backing up OS-9 disks as long as they are 35-track disks. Another feature of *CIII D-Link* is the calendar look-up option, which features a calendar window for the years 1989 through 2000.

CIII D-Link comes with a nice manual with more than 34 actual screen shots and clearly written text. It is one of the easiest file transfer programs ever devised for the CoCo. *CIII D-Link* runs on the CoCo 3 and can use any display.

CIII D-Link has a good set of error-trapping routines. It stops before overwriting an existing file with a file of the same name, and it beeps at you until you correct the problem. If you run into a problem during a host to remote transfer, the program picks up where it left off and does not redo all the files. You can copy one file at a time or all files but no provision is made for picking a group of files to copy. Please note also that *CIII D-Link* does not format disks, so have formatted disks on hand.

Although the error-trapping routines are sound, every once in a while I encountered an error not readily replicable; an error

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occurred and the program crashed. I talked with program author Walter Bayer, and he assured me that this problem has already been corrected. Mr. Bayer immediately shipped me a new release of *CIII D-Link* and a newly updated manual, which arrived promptly, so you can count on good service from this company.

During our telephone conversation, I also pointed out to Mr. Bayer that for the program to be used for communications, (since *CIII D-Link* can only communicate with another computer using *CIII D-Link*), the user would need to buy two copies to use it at home or work. Mr. Bayer explained that since the product carries a single-user license, single users could use the program in one or two machines simultaneously, but they would be limited to that. Use with other users requires that they also purchase the program. He pointed out that updates and upgrades can only be provided to single licensed and registered users.

CIII D-Link is fast, easy to use and very useful. It is a good program for file transfers and includes a terminal mode. While I do not agree that it is a BBS mini-host because of its limitations, it is handy to have and an interesting step in the right direction for CoCo users.

(Coless Computer Design, 1917 Madera St. No. 8, Waukesha, WI 53186; 414-549-0750; $24.95, two complete packages for $29.95; plus $3 S/H)

— Jeffrey Parker

Game	CoCo 1, 2 & 3

The Arcade Factory

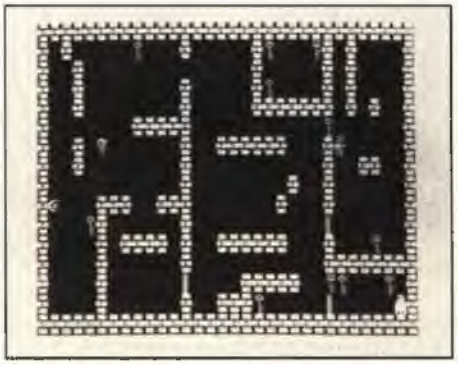
A name like *The Arcade Factory* evokes visions of designing the arcade games I've only dreamt about. I felt let down when I realized *Factory* is a utility package for a certain type of game. But once I spent some time with *The Arcade Factory*, I realized the unexpected was happening — I was having fun!

Factory lets you create, edit and store on disk any number of *Pacman* or *Dig Dug* type game modules. There are several restrictions in the construction of these modules but enough built-in variations for several dozen interesting distractions.

The object of these games is for your character to travel around the game screen, picking up goodies while avoiding creeps and booby traps. Sometimes, though, this can get rather complicated.

One sheet of instructions is supplied with *Factory*, and the menu-driven editor takes you through the construction process. The onscreen instructions are marred, however, by poor grammar, missing punctuation and misspellings.

First you are asked if you want to edit a previously saved game. Next, you set the speed of play and sound, followed by information such as the number of goodies your character must collect, whether or not the creeps can eat the goodies, game control adjustments and speed. All of these are changeable using the editor program, and altering them changes the difficulty of the games.



There are always four creeps on the screen (one of the parameters you have no control over) starting in the corners. You decide if they will chase your character, follow a path, move randomly or stand still. I found four still monsters to be extremely dull, while four fast creeps chasing me was a bit more than I could handle.

The next nine steps require most of your time. You must use the graphics screen to design the appearances of your character, creeps, goodies, booby traps, filler and the all-important wall. (Filler is an area you can walk through, but the creeps can't.)

The drawing routine is extremely easy to use, especially with the Zoom feature, but it suffers one drawback. All of the characters are too small. At eight pixels wide and 12 pixels high, the characters are sometimes difficult to find or distinguish on screen. If you are using a CoCo 3 with an RGB monitor, this may not be a problem.

Due to the character size, not much detail can be put into each. My sister and I resorted to using graph paper to design nice looking hereoes and creeps before we committed them to the computer screen.

The final design stage, as it is called, is to make a map of the playing area. Using the keyboard, you place filler, walls, goodies and booby traps. Once again, graph paper is helpful in building a good maze. Now just save the game and play it.

As mentioned before, the rules to all of the games you create are the same. Your character, which starts in the center of the screen, must pick up the required number of goodies while avoiding creeps and booby traps. A cleverly designed maze with enough walls and not too many goodies can make each game interesting.

Each game session begins by loading the saved game module, followed by loading and executing the driver program ARCADE. Use the arrow keys to control your character in his sojourn around the maze.

In addition to the small characters there are a few things that bothered me about *The Arcade Factory*, one of which is the lack of a record of precious choices when editing a saved game. You must keep a written record of your game choices.

Another problem is exiting a game. You must reset the computer each time you want to load another game or return to the editor. Pressing any key after a game has ended restarts the game. All programs should have a way of exiting without resetting.

Because there is no game exit routine, I had to discard one of my ideas. I had planned to chain together several different games featuring the same characters and goodies, but with progressively harder mazes and faster creeps. *The Arcade Factory* as it stands, however, does not allow this.

B&B Software has supplied two sample games on the disk: *Digit* and *Dungeon*. *Digit* is a *Dig Dug*-type game, while *Dungeon* (complete with skull and cross bones) is more like *Pacman*. I confess to not being able to complete either one as of yet. I may have to edit both games slightly.

Summing it up, *The Arcade Factory* is well worth the $8 price, which includes postage and handling. For your money you get an almost endless variety of games, limited only by your imagination.

Jay Braxmaier of B&B Software has indicated that there may be a game design contest sometime in the future, followed by a "best of" disk.

The Arcade Factory runs on any Color Computer 1, 2 or 3.

(B&B Software, 1637 Hanchett NW, Grand Rapids, MI 49504; $8 includes S/H)

— James Walton

Disk Utility	CoCo 1, 2 & 3

Master Catalog

This cataloger is just what most disk users need. As the documentation suggests, I do have hundreds of disks and have spent a lot of time searching for particular programs. *Master Catalog* changes all that.

The first thing that caught my eye was the documentation — three pages of easy-to-read type. After a brief introduction, the documentation explains the commands and

recommends the best sequence in which to use them.

The Search feature works with lightning speed.

The menu is self-explanatory, but those with double-sided disk drives must read the instructions. Both Disk BASIC 1.0 and 1.1 are supported and 32K is required, but all 64K will be used if available. The memory is automatically checked.

There are actually two programs offered separately: *Master Catalog* (for the CoCo 1, 2 and 3) and *Master Catalog III* (for the CoCo 3 with monitor). *Catalog III* can be used with a TV set, but it is suggested that the CoCo 2 version is more satisfactory. You must specify the CoCo number and Disk BASIC version when ordering.

I used some of my T & D Subscription software disks for the test run. The program read the directories as fast as I could insert the disks and type the identification number (four characters allowed). The identification is required to use the Delete feature mentioned later. The total number of files copied is shown at the bottom of the screen. This verifies that the directory has been copied. After cataloging, I saved the list before proceeding to other features.

After each command, I used LIST to see what had happened. If the list is longer than one screen, there is a prompt to get the next screen or go back to the menu at the end. If you want to quit sooner, press BREAK.

The next feature I tried was Sort. My list had over three-hundred files and took a bit longer to sort than to read. The documentation states that the maximum list of 3000 files takes about an hour to sort on the CoCo 2 or thirty minutes with the CoCo 3. I do not suppose sorting is needed often; but you can add to shorter lists (limited by memory) and will want to re-sort at that time. Again I saved the list.

The Search feature works with lightning speed in the usual fashion — every program with the search string in its title is listed.

A directory is available with Info, in case you forget your catalog names. This feature works with any disk, so you don't have to exit to check out a disk.

Clear erases memory for the start of a new list. Be sure to use Save first. Of course, the saved files may be loaded.

Delete is a nice feature, but limited. All programs on the designated disk are erased quickly, but no single program can be erased. To do this, you must first delete the entire disk (remember the need for an ID number) and then add the revised disk to the catalog, effectively erasing unwanted programs.

Having a catalog to search on screen is good, but there is more. Print produces a beautiful hard copy suitable for use in a binder. Set the paper at the right place and type in your title (31 characters allowed) and away you go. The pages are titled, numbered and proper headings used showing filename, grans used, disk ID# and Side A or B. Ninety files are listed per page in groups of five, in two columns, nicely centered with top and bottom margins that skip the perforations.

This is a great program for people who want a fast, easy-to-use catalog of their

STUDENTS and TEACHERS

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that Tandy *should* have made!

Tomcat, the computer of the 90's.

Tomcat is the affordable, logical upgrade path for your CoCo 3. And it is from a company which has a long and proven track record in the CoCo market -- Frank Hogg Laboratory.

This is the new Color Computer Tandy should have built! And it is *your* computing answer for the 90's.

Here's why.

Power and Performance

Tomcat 's TC9 CPU is more than 25 percent faster that the CoCo 3. It has two *real* serial ports, a parallel printer port. It supports a serial mouse. **Tomcat** has 512K on its main board and can be upgraded to 1 megabyte. More important, you can use your present CoCo 3 512k memory upgrade. No additional cost if you've already bought this upgrade.

Your new **Tomcat** has 8 bit D to A and 8 bit A to D for better sound and a higher joystick resolution. In fact, your same CoCo joystick will give you 256 pixel resolution instead of the 64 they now support!

It uses a PC-AT style keyboard and a PC-style power supply. If it is just the board you want, it will fit in any PC clone case.

What is *significantly* important is that you can use a large amount of your present software with the **Tomcat**! Right. You don't have a major expenditure for new software.

The Software Advantage

Your new **Tomcat** is compatible with Radio Shack DOS. It will run most of the programs you use every day. As an OS-9 machine as well, it will also work with all OS-9 software you either own now or plan to buy in the future. All of your CoCo cartridges like those from Disto and Burke & Burke except for ROMpaks will work with your new **Tomcat** as well.

But there are even greater advantages to the **Tomcat** system -- and an affordable path to upgrade your CoCo without losing *any* of the value you have in your CoCo system today.

Tomcat is also compatible with the FHL K-Bus, which means you can interface it to a 68000 CPU, or even the 68030. While that sounds very technical, the truth is it is as easy as plugging in a couple of boards. And once it is done, the **Tomcat** becomes just like two computers in one -- your own, reliable (but faster and more powerful) CoCo, and a 68000-based computer which will run OS-9 programs 30 times faster than before.

Its a New World

With a 68000 or 68030 CPU, you have the whole world of OSK available to you. This means a whole world of new software, a whole world of additional memory (up to 16 megabytes, of which 14 is RAM), and even the opportunity to further increase performance.

Most important to you, this is upgrading without throwing anything away! Much of your present software will work. Many of your cartridges, disk drives, printers will just connect into place. New horizons open with new software and new boards which will make your own CoCo continue to be your cost-effective, friendly helper and companion as computing moves into the 90's.

The Future

The **Tomcat** is the upgrade path designed for you.

Take it at your own pace -- as your time, needs and pocketbook permit. If you currently own a CoCo 3 and use it in either the Radio Shack DOS or OS-9 Level II mode, **Tomcat** will operate your software faster and better. It will also give you powerful new features and performance at a modest cost.

If you decide to switch to a 68000 CPU-based computer completely, **Tomcat** is still the answer. You use your present hardware and gain the advantage of using the heart of the **Tomcat**, the **TC9** main board, as a multi-function graphics processor!

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For a system with a rugged metal case, power supply, **TC9** board and 101-key keyboard, prices start at only $499.95. The **TC9** board alone is $299.95 if you want to do some of the connection work yourself. Either way, this is the CoCo 4 you have always wanted.

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disks. Those who want to add comments need to find a different program. Some of the files are pictures or subroutines used by a master program; if the name is different, it appears on the list in a separate place that could be confusing. It might be a good idea to check the directories for these programs at the time the catalog is made and then mark them on the printout.

(Second City Software, P.O.Box 72956, Roselle, IL 60172; 312-653-5610; $19.95 each, $2.50 S/H)

— Audrey De Lisle

Miscellaneous | CoCo 1, 2 & 3

Keyboard Template

Picture if you will, a novice programmer hunting through the CoCo manual to find the correct functions and commands to use in his/her latest creation. There is a scrap piece of paper laying on the desk with commands and definitions scribbled on both sides.

It would be great to have all the commands in view for quick reference. P & M Products offers a keyboard template to solve this very problem: a laminated 15-by-6 inch poster board template cut out to fit onto the CoCo keyboard.

Printed on the template are all of the commands, with short definitions, for the CoCos 1, 2 and 3. Commands are grouped into the following categories: Lo-Res graphics operations, Hi-Res graphics operations, math and trig operations, housekeeping, miscellaneous operations, print operations, screen commands, string commands, loading and program operations.

This product does not supersede the CoCo manual; although, once you have read and understand the manual, the template serves as a handy reference for those easy-to-forget commands.

After using this product, I immediately thought of programs that would be easier to use with templates: word processors, spreadsheets, and the various alternative DOSs for the CoCo.

Keyboard Template is proof that a simple idea, as useful as it may be, often goes overlooked.

(P & M Products, 1003 Shalimar Drive, High Point, NC 27262, 919-887-2236; $6.95, plus $2 S/H)

— Tony Olive

Hardware

Star Micronics XB-2415 Printer

Dot-matrix printers have definitely come a long way in little over a decade. When I saw the first compact, inexpensive computer printers (like the Tandy Line Printer II and Epson's original MX-80), I remember saying that they were great for program listings and invoices but would never do for word processing. But people did indeed print letters, memos and class work on the "cheap" printers. Manufacturers put out

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

- Low- and high-resolution graphics
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- All available commands offered with BASIC
- Floating point functions and expressions
- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer," said David Gerald in the December 1987 RAINBOW.

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newer models with more features, faster printing, friction feed and — most importantly — higher resolution to provide better print quality.

The printer market has reached a point where 9-pin printers are being sold to novice computer buyers at under $200; more experienced users are quickly moving up to 24-pin printers that can form characters almost indistinguishable from the output of the best office typewriters. After making a big splash a few years back with the Gemini series of low-priced 9-pin printers, Star Micronics has continued to expand its line; the Star XB-2410 and 2415 are 24-pin, color-ready printers that not only hold their own at the high end of the 24-pin market but add a wide array of built-in fonts and sizes that can really perk up a printed page.

In terms of text operation, the biggest attraction is probably the wide range of fonts available

The XB-2410 handles 10-inch wide forms, while the XB-2415 is a wide-carriage (15-inch) printer; both can handle tractor (pin) feed and friction feed, so you can use almost any paper you want — "computer paper," forms, labels, letterhead or what have you. As with several of the latest 24-pin printers, the tractor is located before the platen — not above it — which lets you load the printer without wasting a form. The printer automatically feeds a single sheet of paper when you drop it into place and press the Set/Park Eject button; if you have pin-fed paper loaded and want to use a single sheet, you can easily park the tractor paper and re-feed it later. A paper guide snaps into place to make it easy to insert a sheet at the right place along the platen, and a sheet feeder unit is available as an option.

As with most Star printers, the XB-24XX series normally emulates an Epson printer, in this case the 24-pin LQ-1050; a DIP switch change sets the printer to emulate IBM's Proprinter X24 and XL24, so between these two there should be no problem using existing applications. The DIP switches only affect the emulation mode, default character set and page length; everything else is stored in non-volatile memory and can be changed from the front panel using a series of menus.

The printer really shines when a program has been written to use its special features, because there are a number of things available here that aren't available on the emulated Epson or IBM printers.

In terms of text operation, the biggest attraction is probably the wide range of fonts available. In addition to the draft font, fourteen letter-quality fonts are also built into the printer. Courier, Prestige and TW Light are typewriter-style faces, as is the Script font. Letter Gothic and Orator are useful for special applications. The Tms Romn, Helvet, Blippo, Optimo and Cinema fonts add a typeset look to your document. A Greek typeface is also available.

For special applications, there are OCR-A and OCR-B fonts for character recognition and a Code 39 bar code function. Each of these fonts can be selected by an escape code sequence, as described in the printer manual. You can set any one of these to be used as a default font in the printer setup mode. The Tms Romn, Helvet, TW Light, Courier, Prestige, Script and Cinema fonts can also be selected from the front panel of the printer, so these fonts can be accessed without worrying about print codes.

The many typefaces become even more useful when combined with the different sizes available. As with most printers the XB-2410 and 2415 can do things like compressed or expanded printing. But here the ranges goes all the way from half-width and half-height to quadruple width and height. (As you might expect, the resolution of the large print modes is somewhat coarse, because a character is formed with the same number of dots regardless of the selected size.)

In addition to the now common italic and underline modes, these printers can also perform outline and shadow printing. All these modes can be accessed using control codes. The front panel allows selection of the 10 cpi (pica), 12 cpi (elite), 15 cpi, proportional and condensed modes.

Text printing can be done in any of three modes, depending on your needs. The draft mode prints at a rate of 200 characters per second while providing better quality than most 9-pin printers. When you switch to the LQ mode, allowing access to the different fonts, printing slows down to "only" 67 cps, which isn't that much slower than the older 9-pin models. With the Tms Romn and TW Light fonts, a special super LQ mode using two passes to print each line provides even higher resolution.

The XB-2410 and 2415 have graphics capabilities that are easily a match for the superb text modes. Bit-image graphics resolution ranges from the standard 60 dpi up to 180 dpi, and with some restrictions a resolution equivalent to 360 dpi can be obtained.

This brings us to the other big advantage of these printers — they can print in color by installing a stepper motor adapter that just drops into a slot under the ribbon cartridge. Once this is in place you can install an X24CL color ribbon to print in multiple colors, using one pass for each of the four ink colors: black, yellow, magenta and cyan. A simple code sequence sets the printer to print in red, blue, violet, yellow, orange or green as well as black. With special software you can print in even more color combinations by printing overlapping dot patterns in different colors.

Dayton Associates' packages for the XB-2410 and 2415 include the color stepper motor and a color ribbon, the Blue Streak Ultima serial-to-parallel interface and a special support disk. The disk includes two different full-color screen dump programs — one for the CoCo 1 and 2, the other for the CoCo 3 — that can print anything saved in the normal screen memory areas. The other noteworthy features are a step-by-step guide to setup and configuration of the printer for use with the Color Computer, an interactive tutorial on the use of the control codes that can also be used as a menu-driven mode-changing utility, and a test program for the serial-to-parallel interface. I'd say that the Star XB-2410 and 2415 are a really hot pair of printers.

(Dayton Associates, 9644 Quailwood Trail, Spring Valley, OH 45370, 513-885-5999; 10" model $499.95 + $15 S/H, 15" model $699.95 plus $20 S/H)

— Ed Ellers

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MULTI-FONT PRINTER XB-2410

A professional 240 cps 24 wire color printer system. With 15 LQ typestyles and 2 Super Letter Quality styles, built in micro justification and letter shadowing - color desktop publishing can be done with a simple word processor. 11 color graphics modes. Absolutely hundreds, possibly thousands, of output combinations. Star's best dot matrix printer ready to go for you CoCo 1, 2 or 3.

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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.

VED, a full-featured, screen-oriented text editor. Can process files up to 55K in length. Features all the standard editing functions (read, append, save, block commands, etc.) as well as some specialized OS-9 options. Written in assembler and very fast. Comes complete with extensive manual. Requirements are 128K CoCo 3 and OS-9 Level II. *Bob van der Poel Software, P.O. Box 57, Wynndel, B.C. V0B 2N0 Canada or P.O. Box 355, Porthill, ID 83853-0355, (604)866-5772; $24.95 plus $2 S/H.*

VPRINT, a full-featured text formatter. Reads files produced by any text editor via both "dot" and "embedded" commands, and formats and prints documents. Has standard features such as margin control, justification, headers and footers; also supports footnoting and indexing. Works with any printer and comes with initialization files for many common printers. Has complete support for proportional fonts and can be used with the new laser printers. 124-page user's manual included. Requires OS-9 Level II with at least 56K of available memory. *Bob van der Poel Software, P.O. Box 57, Wynndel, B.C. V0B 2N0 Canada or P.O. Box 355, Porthill, ID 83853-0355, (604)866-5772; $29.95 plus $2 S/H.*

◆ **NFL Helmets Scrapbook**, a picture disk for use with Colorware's *CoCo Max III*. Has six picture files saved in scrapbook format, each containing a different division of the National Football League with the helmets of each team in that division. A total of 28 helmets included on the disk. *Kathy Rumpel, Route 1 Box 67-A, Arcadia, WI 54612, (608)323-7046; $10.*

KJV on Disk #9, chapters 30 through 34 of the Book of Deuteronomy and Joshua in the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312)998-1656; $3.*

KJV on Disk #10, Judges and Ruth from the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312)998-1656; $3.*

◆ **CoCothello 1.4**, plays like the popular board game, *Othello*. Includes an 8-by-8 playing board with red and blue tokens. Capture board square by outflanking your opponent. Require a 128K CoCo 3 color monitor (TV acceptable), mouse/joystick, OS-9 Level II, and the `Windint` module from your *Multi-Vue* disk. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; $10.*

◆ **Pyramid Solitaire 2.2**, a variation of solitaire. Cards are dealt in a pyramid. The object is to remove free cards from the pyramid in pairs that equal thirteen. Minimum requirements; CoCo 3 256K, color monitor (TV acceptable), single-button mouse/joystick (keyboard mouse supported), OS-9 Level II, and the `Windint` module from *Multi-Vue*. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; $10.*

◆ **CoCoYahtzee 1.2**, the popular dice game now available for OS-9 users. Minimum requirements are CoCo 3 256K, 80-column monitor; mouse/joystick recommended (keyboard mouse supported), OS-9 Level II and the `Windint` module from your *Multi-Vue* disk. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; $10.*

Spectral Forces, an interactive Adventure for the CoCo 3 and disk drive. Players assume the role of Lab, a reluctant Adventurer who has been commissioned to rid the land of an ancient evil. Features an original scenario, dozens of creatures and various displays. Hard copy feature allows Adventurers who own printers to make a printout of all room descriptions encountered and commands issued. *Marc Cambell Innovations, 266 Riverview Drive, Ephrata, PA 17522; $24.95 plus $2 S/H.*

CEBBS 2.1, an updated version of CEBBS (CoCo Electronic Bulletin Board System) with added features. Includes an IBM ANSI graphics option and a completely new file transfer section including Xmodem and Ymodem (checksum and CRC), ASCII downloading, keyword searches, filetypes, full filenames and more. Compatible with all older versions of the program in terms of file structures for message base, userlog, etc. *KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, (407)799-3253; $49.95 plus $3 S/H.*

Word Power 3.3, a word processor with a number of enhancements and modifications to *Word Power 3.2* such as graphics, sorting, macros, 80,000 word spelling checker, mail merge, 40-or 80-column display, partial save feature, split-screen editing and much more. Requires a CoCo 3 and disk drive. *Microcom Software, 2900 Monroe Avenue, Rochester, NY 14618, (716)383-8830; $79.95.*

◆ **MVCanvas 2.0.2**, a simple-to-use, VEF format graphics editor for use under the OS-9 Level II *Multi-Vue* environment. Features include clip functions, palette switching, multiple-font support, digitized picture importing and editing of four different screen resolutions. Print drivers provided for a wide range of dot-matrix printers. *Hyper-Tech Software, 4341 Gannet Circle, #174, Las Vegas, NV 89103, (702)362-5346; $49.95 plus $3 S/H.*

Print7-R, a color print driver for the Star Micronics NX-1000 Rainbow printer with OS-9 Level II on the CoCo 3. Pull-down menus, simple to use. *G.T.T.D. Software, P.O. Box 187, Pablo, MT 59855, (406)883-2306; $7.95 plus $2 S/H.*

◆ **Planet Engine**. A program that plots the position of planets, stars, moons and the Sun. Users can request orbits, precise data, planet drawings or skip around to any past or fntnre time or location. Moon and all planets are shadowed to their proper phase. Requires OS-9 Level II and 128K. 512K ; *Multi-Vue* recommended. *Gravity Studio, Box 791, Belton, TX 76513-0791, $24 plus $2 S/H. $15 Introductory offer.*

◆ **First product received from this company**

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.

Produce personalized documents with this handy mail-merge utility.

If Wife = "Sue," Bring Your Potato Salad

by Christopher Jackson

OS-9

The Listing: TSMail

```
PROCEDURE TSMail
 0000       (* TSMail interpretive mail-merge *)
 0024       (* (C) 1990 C.K.Jackson           *)
 0048       (* PO Box 31                      *)
 006C       (* West Farmington, Me 04992      *)
 0090
 0091       PARAM Template:STRING
 0098       TYPE fldstr=name:STRING[20]; text:STRING[100]
 00B3       DIM Field(50):fldstr
 00C1       DIM STDIN,STDOUT,WordCount,Count,x,y,z:INTEGER
 00E0       DIM Path:BYTE
 00E7       DIM Char:STRING[1]
 00F3       DIM record:STRING[20]
 00FF       DIM EvalStr:STRING[465]
 0108       DIM EvalSub(12):STRING[100]
 011C       DIM Boo1,Boo2,Boo3:BOOLEAN
 012B       STDIN:=0
```

TSMail is an interpretive mail-merge utility that uses standard input and standard output to combine a database-like input file with a form letter template file to produce a series of personalized documents. It was created to compensate for the lack of mail-merge capabilities in Tandy's *TSWord* word processor package. Because *TSMail* uses stdin and stdout, it should work with any OS-9 text editor. The command line for *TSMail* looks like:

tsmail ("*templatefile*") <*inputfile* >*outputfile*

The template file consists of two parts:

Chris is a student at the University of Maine at Farmington where he studies biology. His interests include computer modeling of biological systems, artificial intelligence, the Gospels and pizza. He may be contacted at P.O. Box 31, W. Farmington, ME 04992. His Delphi username is CKICKJACKSON.

the input and output template. The input template assigns field names to each field in a record from the input file. If an input file made up of two records looked like this:

```
Jones
Bill
Sue
123 Oak Drive
Somewhere, USA

Doe
John

101 Single's Ave.
Elsewhere, USA
```

the input portion of the template file might look like this:

```
{lastname}
{husband}
{wife}
{address}
{town}
{blank}
{}
```

Each record consists of six fields with a blank line between it and the next record ({blank} isn't necessary, but it helps make the input file more readable). Notice that in the second record John Doe doesn't have a wife, so a blank line is left for that field. The input template is separated from the output template by an empty set of {} marks.

Unlike many mail-merges I've seen, *TSMail* is capable of interpreting a single level IF/THEN/ELSE statement to select a field to print. Constants can also be used instead of field names. Some examples of possible replacement fields to use in a letter are:

```
{field name}

{"constant"}

{IF field1 = field2 THEN field3 ELSE
"constant"}

{IF field1 <> field2 OR field3 = ""
THEN "constant" ELSE field1}
```

An example of a form letter output template might look like this:

```
{husband} {IF husband <> "" AND wife
<> "" THEN " and " ELSE ""}
{wife}
{lastname}
{address}
{town}

Dear {IF husband <> "" AND wife <> ""
```

```
0132      STDOUT:=1
0139
013A      (* load fieldnames from template-out *)
0161      OPEN #Path,Template:READ
016D      Count:=1
0174      LOOP
0176        READ #Path,record
0180        Field(Count).name=record
018F        Field(Count).text=""
019D      EXITIF record="{}" THEN
01AB      ENDEXIT
01AF
01B0        (* chop "{}" off fieldnames *)
01CE      Field(Count).name=RIGHT$(LEFT$(Field(Count).name,LEN(Field
            (Count).name)-1),LEN(Field(Count).name)-2)
01FF        Count=Count+1
020A      ENDLOOP
020E
020F      (* load a record into fieldnames *)
0232      WHILE NOT(EOF(#STDIN)) DO
023D        FOR x=1 TO Count-1
0251          READ #STDIN,Field(x).text
0262        NEXT x
026D
026E        (* look for {} in template-in *)
028E        WHILE NOT(EOF(#Path)) DO
0299          GET #Path,Char
02A3          IF Char="{" THEN
02B0            EvalStr=""
02B7            WHILE Char<>"}" DO
02C4              GET #Path,Char
02CE              EvalStr=EvalStr+Char
02DA            ENDWHILE
02DE            EvalStr=LEFT$(EvalStr,LEN(EvalStr)-1)
02EE
02EF            (* look for "IF" then chop evalstr$ into words *)
0320            FOR x=1 TO 12
0330              EvalSub(x)=""
033B            NEXT x
0346          IF LEFT$(EvalStr,2)="IF" OR LEFT$(EvalStr,2)="if" THEN

0363            WordCount=1
036A            FOR z=1 TO LEN(EvalStr)
037C              Char=MID$(EvalStr,z,1)
038A              EvalSub(WordCount)=EvalSub(WordCount)+Char
039D              IF Char=" " OR Char=")" THEN
03B2                EvalSub(WordCount)=LEFT$(EvalSub(WordCount),LEN
                      (EvalSub(WordCount))-1)
03CC                WordCount=WordCount+1
03D7              ELSE IF Char=CHR$(34) THEN
03E7                  REPEAT
03E9                    z=z+1
03F4                    Char=MID$(EvalStr,z,1)
0402                    EvalSub(WordCount)=EvalSub(WordCount)+Char
0415                  UNTIL Char=CHR$(34)
0421                ENDIF
0423              ENDIF
0425            NEXT z
0430
0431            (* replace fieldnames with field text *)
0459            FOR x=2 TO WordCount STEP 2
046F              IF LEFT$(EvalSub(x),1)=CHR$(34) THEN
0482                EvalSub(x)=RIGHT$(LEFT$(EvalSub(x),LEN(EvalSub(
                      x))-1),LEN(EvalSub(x))-2)
04A7              ELSE
04AB                FOR y=1 TO Count-1
04BF                  IF EvalSub(x)=Field(y).name THEN
04D5                    EvalSub(x)=Field(y).text
04E7                  ENDIF
04E9                NEXT y
04F4              ENDIF
04F6            NEXT x
0501
0502            (* evaluate logic in "IF/THEN" string *)
052A            IF EvalSub(3)="=" THEN
0539              IF EvalSub(2)=EvalSub(4) THEN
```

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THEN "Mr. & Mrs." ELSE ""}{IF husband <> "" AND wife <> "" THEN lastname ELSE "" }{IF husband <> "" AND wife = "" THEN husband ELSE ""}{IF wife <> "" AND husband = "" THEN wife ELSE ""},

I hope you {IF husband <> "" AND wife <> "" THEN "both" ELSE ""} will be attending the company picnic this year. See you there!

Signed,
The Boss

TSMail supports up to 50 fields per record with each field being 100 characters or less.

{IF wife = "Sue" AND lastname = "Jones" THEN "P.S. Remember to bring your special potato salad, Sue!" ELSE ""}

As you might have noticed from the examples, *TSMail* supports AND, OR and XOR as well as "=" and "<>" comparisons.

There are some important concepts to remember when writing the input and template files. Each word or symbol in the IF/THEN/ELSE string must be separated by a space. The words IF, THEN, ELSE, AND, OR and XOR can be in upper- or lowercase but not a mix of both — i.e., Then or Else.

The field name given in the input template must match the field names given in the output template exactly, including capitalizations. If the input field name is "FirstName," the output field can't be "firstname."

TSMail supports up to 50 fields per record with each field being 100 characters or less. The number of lines in the input file must be equal to the number of fields described in the input template times the number of records. Empty fields must be represented by a blank line. ❑

```
054A                Bool=TRUE
0550              ELSE Bool=FALSE
0559              ENDIF
055B            ELSE IF EvalSub(3)="<>" THEN
056E                IF EvalSub(2)<>EvalSub(4) THEN
057F                  Bool=TRUE
0585                ELSE Bool=FALSE
058E                ENDIF
0590              ENDIF
0592            ENDIF
0594            IF EvalSub(5)="AND" OR EvalSub(5)="and" OR EvalSub(
                 5)="OR" OR EvalSub(5)="or" OR EvalSub(5)="XOR"
                 OR EvalSub(5)="xor" THEN
05DF              IF EvalSub(7)="-" THEN
05EE                IF EvalSub(6)=EvalSub(8) THEN
05FF                  Boo2=TRUE
0605                ELSE Boo2=FALSE
060E                ENDIF
0610              ELSE IF EvalSub(7)="<>" THEN
0623                  IF EvalSub(6)<>EvalSub(8) THEN
0634                    Boo2=TRUE
063A                  ELSE Boo2=FALSE
0643                  ENDIF
0645                ENDIF
0647              ENDIF
0649              IF EvalSub(5)="AND" OR EvalSub(5)="and" THEN
0666                Boo3=Bool AND Boo2
0672              ELSE IF EvalSub(5)="OR" OR EvalSub(5)="or" THEN
0690                  Boo3=Bool OR Boo2
069C              ELSE IF EvalSub(5)="XOR" OR EvalSub(5)="xor" THEN

068C                    Boo3=Bool XOR Boo2
06C8                  ENDIF
06CA                ENDIF
06CC              ENDIF
06CE              IF Boo3=TRUE THEN
06D9                PRINT EvalSub(10);
06E1              ELSE
06E5                PRINT EvalSub(12);
06ED              ENDIF
06EF            ELSE IF Bool=TRUE THEN
06FD                PRINT EvalSub(6);
0705              ELSE
0709                PRINT EvalSub(8);
0711              ENDIF
0713            ENDIF
0715          ENDIF
0717
0718          (* print fields or "constants" *)
0739          IF LEFT$(EvalStr,1)=CHR$(34) THEN
0749        PRINT RIGHT$(LEFT$(EvalStr,LEN(EvalStr)-1),LEN(EvalStr
              )-2);
075F          ELSE
0763            FOR x=1 TO Count-1
0777              IF EvalStr=Field(x).name THEN
078A                PRINT Field(x).text;
0796              ENDIF
0798            NEXT x
07A3          ENDIF
07A5
07A6          (* send char to stdout *)
078F        ELSE
07C3          IF Char=CHR$(13) THEN
07D0            PRINT CHR$(13)
07D5          ELSE
07D9            PUT #STDOUT,Char
07E3          ENDIF
07E5        ENDIF
07E7      ENDWHILE
07EB      SEEK #Path,0
07F4      FOR x=1 TO Count
0805        READ #Path,Template
080F      NEXT x
081A    ENDWHILE
081E    END
0820
```

Continued from Page 6

to him. He assures me that the distributor's post office was the impediment.

Mike has since added a Gemini-10 option and provided a test copy. I tried it and returned the results in the afternoon mail. Also added since then is a wide Epson Print option and several new items in the tool box. All the *UltiMusE* data files have been concentrated in the SYS directory, which helps keep the data directory clean.

The new version of *UltiMusE* recognizes the older music files as such but nevertheless accepts them. There will undoubtedly be a new manual telling about all the new goodies. It looks like you have plenty of material for a follow-up story on this even better *UltiMusE*.

Fran Walters
Bethesda, Maryland

From English to German

Editor:

A friend of mine, a college German teacher, is looking for word-processing software with the capability of printing German and other European modified characters on the screen (without using the clumsy PRINT CHR$). Are you aware of such software for the CoCo? The CoCo 3 has such characters built in (see Page 293 of the Color Computer 3 Extended BASIC Manual), but *Telewriter-64* with TW-80, the only word processor I know, doesn't access them.

James English
Kansas City, Kansas

Simply Better, *currently sold by Dano-soft, is available in a French version. Also, the IBM extended character set includes many European characters and* Simply Better *supports them for printers that include the set. You won't get single-key control of the characters, but you won't have to play with* CHR$*'s either.*

Support-Line Blues

Editor:

After I accidentally crashed my OS-9 System Master disk, I called Radio Shack about getting a replacement. The woman who answered said Tandy couldn't help me because OS-9 has been discontinued. She also told me the CoCo was becoming obsolete. There goes support from Tandy!

Chris Wynn
Monterey, California

As you have found, Tandy does have an exchange policy for disks damaged during the warranty period. In addition, if you can't locate a discontinued Radio Shack software product, contact Tandy's Express Order System at (800) 321-3133. [We called Chris and learned he finally did get a replacement.]

At this point in time, your support counts more than anything else. You'll get as much (or as little) out of the CoCo Community as you put into it.

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.

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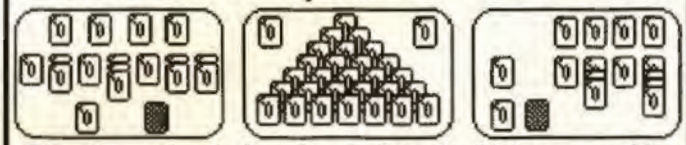

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Novices Niche

Game 16K Extended

Addition

by Jerome Ebacher

Here's a program I wrote to give my son and daughter practice timing drills for addition and multiplication. My son and daughter had fits trying to learn their tables. I think it was the stress of being timed while trying to get the right answers more than anything else.

Addition uses a timing routine to approximate the teacher's clock, plus it gives positive rewards for speed. The program keeps track of cumulative earnings so the child can show on the screen just how much dear old Dad owes.

The display portion of the program comes from a one-liner I found in a RAINBOW a few years back. I'd give proper credit but I can't seem to locate that issue anymore.

Anyway, the kids like the program (or rather the reinforcement) and it has helped them overcome timing fright. But watch out, while my kids practiced and improved I had to adjust the level of rewards a few times to avoid going broke! All you have to do is change the statements in lines 110 through 140 and the amount of the S variable in each to correspond to the written statements. (i.e. S=S+.25)

My second grader had to do 36 random problems in under two minutes. Your child's requirement may vary. This can be adjusted by changing the value of P in Line 20. It is also easy to convert this program to multiplication by changing the appropriate +'s to *'s in lines 50 and 60. CoCo 1 and 2 users must remove Line 10 before running the program.

The Listing: ADDITION

```
0 ' COPYRIGHT 1990  FALSOFT,INC
10 ONBRKGOTO30
20 CLS:PRINT@96, "NAME";:INPUT N
$
30 P=36
40 CLS:PRINT@355,"PRESS <ENTER W
HEN READY>"
50 TIMER=0:Y=0
60 Q=0:R=0:PRINT@234,"ADDITION":
PRINT@297,"FLASH CARDS":EXEC4453
9:FORQ=1TO50:CLS:PRINT@0,Q:A=RND
(8)+1:B=RND(8)+1:IFA<->B THENPRI
NT@240,USING"##";A:PRINT@271,"+"
;:PRINTUSING"##";B:C=A+B:ELSEPRI
NT@240,USING"##";B:PRINT@271,"+"
;:PRINTUSING"##";A:C=B
70 PRINT@303,"——":PRINT@334,"";
:INPUT D:IFD=C THENPRINT@448,"CO
RRECT":SOUND200,1:R=R+1:IF R=P T
HEN 90 ELSENEXT:PRINT@456,R:ELSE
PRINT@448,"TRY AGAIN":SOUND10,4:
GOTO80:PRINT@448,"CORRECT  ":R:G
OTO90
80 Y=Y+1:IFQ=P THEN 90ELSE 70
90 CLS:PRINT@32*4,"NUMBER WRONG
OUT OF "P"="Y:PRINT((P-Y)/P)*100
"%"
100 PRINTN$" YOU DID IT IN:":PRI
NT USING"###.#";INT(TIMER/3640):
PRINT"MINUTES":PRINT USING"##.#"
;(TIMER/3640-INT(TIMER/3640))*60
:PRINT "SECONDS"
110 IF TIMER<3640*1.5 THEN PRINT
N$" YOU DID IT IN LESS THAN 1.5
MINUTES!!!! FOR THAT YOU GET FIF
TY CENTS$$$$$$":S=S+.50:GOTO150
120 IF TIMER<3640*2 THEN PRINTN$
" YOU DID IT IN LESS THEN TWO MI
NUTES!!! FOR THAT YOU GET 25 CEN
TS $$$$$$":S=S+.25:GOTO150
130 IF TIMER<3640*2.5 THEN PRINT
N$" YOU DID IT IN LESS THAN 2.5
MINUTES!!!! FOR THAT YOU GET 10
CENTS$$$$$$$$$$":S=S+.10:GOTO150
140 IF TIMER<3640*3 THEN PRINTN$
 " YOU DID IT IN LESS THAN THREE
 MINUTES!!!!!! FOR THAT YOU GET
TEN CENTS!!!!!!":S=S+.10:GOTO150
150 FORX=1TO1800:NEXT:PRINTN$" ,
 YOUR TOTAL WINNINGS THIS SESSIO
N ARE":S*100"CENTS"
160 PRINT "PRESS <ENTER> TO CONT
INUE";:INPUT A$:GOTO40
```


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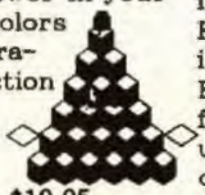

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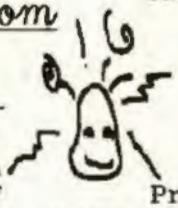

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- Disto DC-7 controller and cable **$158.45**
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*requires 512K upgrade

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- replacement for multipack
- 3 slots, 2 switchable
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GR2 - Objects, Wargame, Worldmap, +
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
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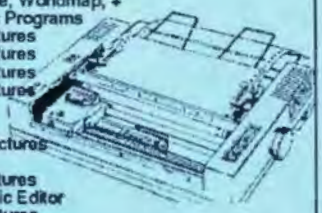
GR11 - 8 Mge Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures



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M7	GR7	H2	U7	GA7
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