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October 1989

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RAINBOW

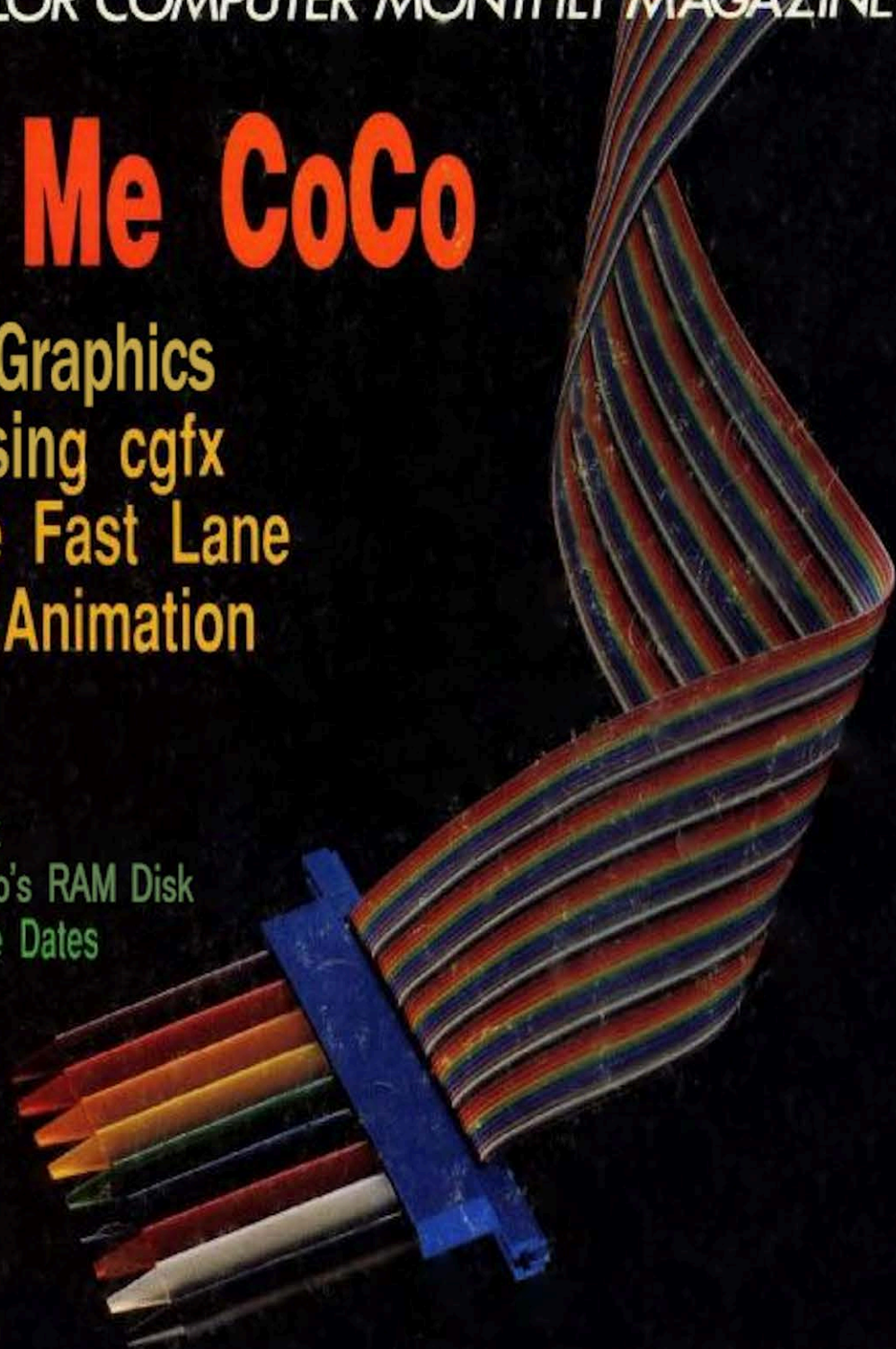
THE COLOR COMPUTER MONTHLY MAGAZINE

Color Me CoCo

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Compile Using cgfx
Life: In the Fast Lane
A Peek at Animation

Plus:

Take a Super Quiz
Part 2 of DiStefano's RAM Disk
Updating OS-9 File Dates
Maxic Returns



SUNDOG SYSTEMS

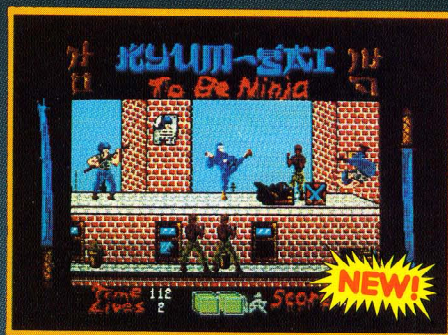
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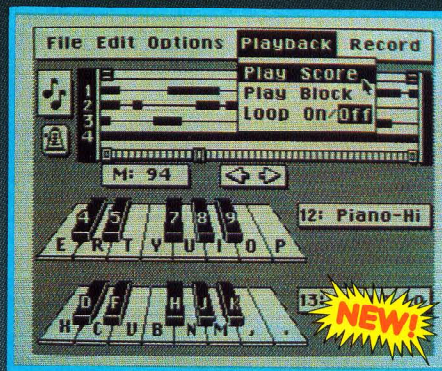
KYUM-GAI TO BE NINJA



Something is killing off the members of the legendary order of Kyum-Gai. In desperation, its leaders have called upon the powers of the life stone to resurrect you, their greatest hero: the NINJA GAI-DAN. Now, you must find and destroy the evil forces behind this dark plot. Use a multitude of martial arts moves to defeat your enemies, obtain treasure and weapons, and evade obstacles. *Kyum-Gai: to be Ninja* uses the most detailed 320x200 resolution, 16 color graphics, the highest quality digital sound effects, and spectacular animation to bring you the greatest martial arts game your CoCo III has ever seen. Created by the author of *Warrior King*, this incredible arcade game is a definite must for your CoCo III software collection. Join the ranks of the Kyum-Gai and find out what it means to be Ninja! Req. 128K CoCo III, disk drive, and joystick (2-button joystick supported).

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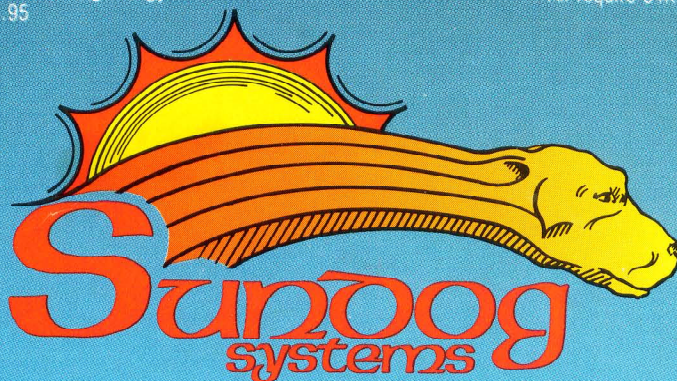
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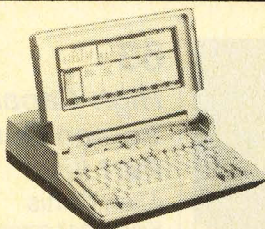
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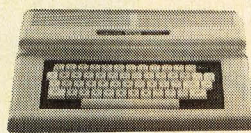
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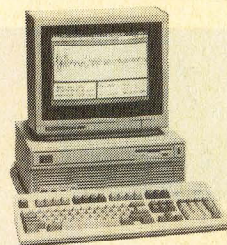
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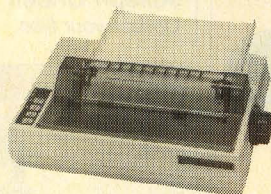
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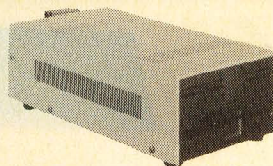
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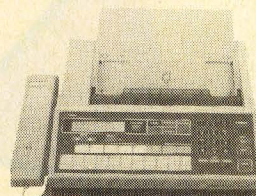
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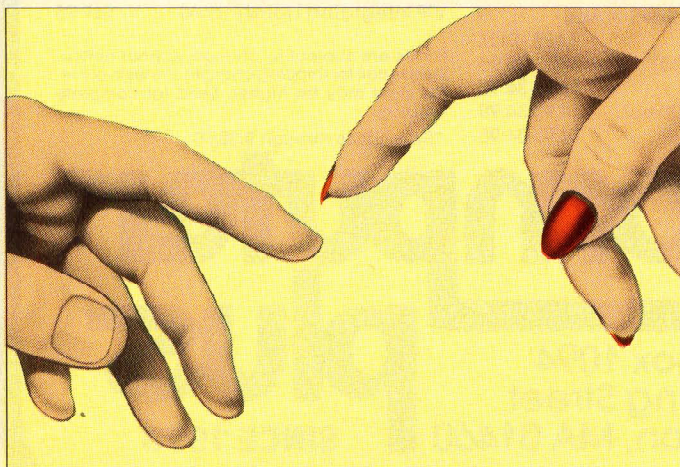
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Attention, Please

Editor:

I am quite upset at the lack of attention to all of us gamers out here. For the past year there has been a great decrease in the amount of games published in each issue — it's down to about one a month. The straw that broke the camel's back is the fact that you have not published a Game issue this year. I understand that we need more serious applications for the CoCo, and I need and use them also. But that's not the only reason I bought my CoCo. I bought it for recreational purposes as well. I'm sure other users agree with me. I recognize the fact that we need an OS-9 issue, but getting rid of the Game issue was a drastic measure that should not have been taken. I enjoy your magazine for all of the serious uses it presents, but we all need our share of fun too.

Peter Bott

Jim Thorpe, Pennsylvania

HINTS AND TIPS

Editor:

I was having difficulty saving my *Sub Battle Simulator* game. When I wrote to EPYX, I was informed the manual neglects mentioning that in order to save a game, you must first format a disk under the OS-9 operating system, using Level I or II.

Also, there is a misprint in September's issue of "The Scoreboard." In *Pitfall 2* you can score a maximum of 199,000 points, which I've scored. I was disappointed that my score wasn't shown. You have mixed up *Pitfall 2* and *Super Pitfall*. *Pitfall 2* is made by Activision and *Super Pitfall* by Radio Shack.

Mike Alt

San Juan, California

Updnlist Update

Editor:

I am writing to inform you of a correction to my *Updnlist* program, published in the July issue of THE RAINBOW (Page 106).

In lines 70 and 80 the following corrections need to be made:

Change &H25 to &H74.

Change &H26 to &H75.

The original program works fine on a disk system but gives an FC Error on a tape system.

\$0074 and \$0075 hold the address of the end of memory, and this is where the ML code should be safely stored away. On a disk system \$0025 and \$0026 also contain this address, but the tape system has a zero there on startup. This gives the error in the program.

The corrected lines are shown below:

```
70 P=256*PEEK(&H74)+PEEK(&H75):P
=P-&H99: CLEAR200,P
80 P=256*PEEK(&H74)+PEEK(&H75):P
=P-&H99: FORX= 0 TO &H99: READ A$:
A=VAL("&H"+A$): POKE P+X,A: NEXT
```

Grahame Pollock

Minto, New South Wales

Australia

Manual Addendum

Editor:

The following is not in the users manual of Star NX-10 or Star NX-1000 Printers published by Star Micronics Co., Ltd.

In order to have a hard copy of the DIP switches setting, type:

```
PRINT #-2, CHR$(27); CHR$(0)
```

and you will have something of this kind:

```
DIP-SW
      1 2 3 4 5 6 7 8 1 2 3 4
ON   * * * * * * * * * *
OFF          * *
```

Yvon Levaque

Aylmer, Quebec

INFORMATION PLEASE

Editor:

I just bought a U.S. Robotics Autolink 1200 for \$5. The problem is, it doesn't have a manual or adapter. I would like to know what voltage and polarity it takes, as well as what the DIP switch settings mean (they are abbreviated), and what they should be set at for my 128K CoCo 3 system.

Also, there are four internal numbered DIPs; what function do they serve? Besides the DIPs, there are two buttons and seven lights on the front that I am unsure about using. The two buttons are labeled AL and OR, and the seven indicator lights I need

help with are RI, OH, TR, RD, AN and SD. There is also an On button and On and DC lights, which are pretty obvious.

Any help, including info on how I might obtain a manual, would be very much appreciated.

Jeff Byers

124 Elizabeth St.

East Peoria, IL 61611

Where Do We Go From Here?

Editor:

The Cornwall Color Computer Club would like your advice and help on starting a BBS. Right now we have a 128K CoCo 3, a triple Y cable, a DCM-6 modem (modified to auto-answer), a disk controller with one single-sided floppy drive, and a Deluxe RS-232 Pak. The board isn't up yet for lack of information, a hard drive (40-Meg) and an adequate BBS program.

We would like to start a BBS to increase interest in the club and telecommunications. We are just beginners in this, and we need lots of help. What 40-Meg hard drive kit or package and what BBS program would you recommend? Any other help or advice would be greatly appreciated.

Thanks in advance for all help. THE RAINBOW and its readers are the best source of information.

Robert L. LeBrun

451 Leitch Dr.

Cornwall, ON K6H 5P5

Canada

Screen Dump for the Oki

Editor:

I have a Color Computer 3 and an Okidata Microline 182 printer, and I need a screen dump for the thing. I do not program, but I do write a few short things with the help of THE RAINBOW. It really does help a lot. Keep up the good work.

Larry M. Gunion

1034 N. 7th St.

Lafayette, IN 47904

Any Booming Ideas?

Editor:

I own a TRS-80 Color Computer 2, and I've written a couple of programs that need good explosion effects. The only ways I know of are just drawing circles or flashing

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by Walter Bayer

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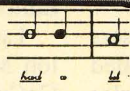
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By Kevin Berner

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colors. Could you give me some tips and some possible sound effects for a good explosion?

Michael Bales
584 105th Ave. N.
Naples, FL 33963

KUDOS

Editor:

I would like to tell you of a problem I had recently and how two of your advertisers bent over backward to solve it. I had ordered a C-DOS EPROM and a real-time clock and printer adapter from Microcom Software of Rochester, New York. Unfortunately, I received the wrong version (4.0), and it would not work. A quick call to C.R.C. Products in Quebec confirmed the problem. I needed Version 1.2. Microcom then shipped me Version 1.2M, which didn't work either. One more set of calls did the trick; this time all was right, and the EPROM and adapter worked as advertised.

In both cases the people in technical services at both Microcom and CRC were pleasant, helpful and knowledgeable. Doing business with these folks is a pleasure.

F. Armbrust
Caribou, Maine

The Illuminating Scoop

Editor:

I bought my first Color Computer in 1981 (one of the original gray ones) and about a year ago updated to a new CoCo 3. I have used the computer for most all applications imaginable and have written several dozen BASIC programs.

I have subscribed to THE RAINBOW off and on since 1981 and have read many articles about OS-9. Most of these articles have left me feeling puzzled and confused about what OS-9 could really do. After reading "The Big Scoop on OS-9" by Jeffrey S. Parker (August '89 issue, Page 66), I have finally decided that OS-9 is a must for me. Thanks for a fine, informative and well-written article.

Don A. Barker
Manhattan, Kansas

Tips From the Top

Editor:

I would like to inform you and the readers of THE RAINBOW of the wonderful assistance I received from Frank Hogg of Frank Hogg Laboratory, Inc.

I recently purchased two programs put out by this company, *Dynastar* and *DynaSpell*. Not having a total working knowl-

edge of OS-9 Level II, I was unable to install on my *Dynastar* working disk the proper files that would enable me to use the program. After two days of trying everything I could think of myself, I finally resorted to calling the number listed in THE RAINBOW for Frank Hogg Laboratory, Inc. Imagine my surprise when Frank Hogg himself came online to speak with me.

Not only did Frank (he asked me to call him this) bear with me, but he also told me what I was doing wrong by trying to copy files, etc. He recommended that I read *Start OS-9*, which I ordered from him.

Thanks for the help, Frank, and I hope your company is around for a long time to come. You can call me one satisfied customer.

Terry W. Alexander
St. John's, Newfoundland
Canada

PEN PALS

Editor:

The OS-9 Users Group in the States is well-known and you report its activity from time to time.

Are you aware there is an OS-9 Users Group in Europe too? It has been installed since 1985 when Martin Vernon of Wales started it. Its publication is *DiskNews*, and the 20th issue (SS, 40 tracks), full of programs, articles, letters, and questions and answers, came out in July 1989.

The group is well-known by European Dragon users. Now CoCo owners also join the group. The power of the operating system is the program's compatibility.

For Europeans the importance of *DiskNews* is comparable to that of the Users Group in the States before there were Delphi or similar devices. The phone contact to the States is beyond the financial capability of most OS-9 users in Europe, but we still want contact with OS-9 users in the U.S.

If your readers are interested in more information, they can write to me.

Burghard Kinzel
Leipziger Ring 22A
D-5042 Erftstadt
West Germany

Peculiar One-Liner

Editor:

Just thought I'd write and tell you how much I enjoy your magazine. It's great!

A friend of mine just purchased a CoCo 2, and we have been gleaming all the programs we can from the back issues at the library.

We are having a problem, though, with

the one-liner you had in the June 1989 issue called *Asteroid Dodge*. When you key in the program, the computer goes into a fast mode and remains there until the Reset button is pushed.

The program also either makes the V go across the screen to the left or prints it over and over down the middle of the screen. We don't have joysticks yet so we modified it for keyboard use. Do you think that could be the problem? If so, do you have any suggestions as to what to add to have keyboard control?

We are really having a hard time finding any information about the computer. The people at the Radio Shack stores tell us they have no books and very few programs for the CoCo 2 but plenty for the CoCo 3. We would appreciate any help you can give us.

I would also like to be put on the list for pen pals.

Charles B. Cox
401 S. Hancock St., Bldg. 35
Louisville, KY 40202-1103

Gathering Nuts

Editor:

I am a 13-year-old attending Southampton Middle School in Virginia. I own a CoCo 3 with 128K. I also own a DMP-105, CCR-81, touch pad and FD-501 disk drive. I have *Color Disk EDTASM* and *Disk Graphics*, and I wrote this letter with *DeskMate*. I just discovered THE RAINBOW a few months back and found a lot that I was missing.

I would like for any CoCo users in my area to notify me. I would like another CoCo nut to converse with.

Edward Gray
Rt. 1, Box 122-A
Sedley, VA 23878

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

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

Word Power 3.2

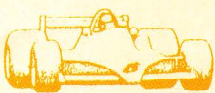
"... Just think of any word processing feature---chances are very likely that *Word Power* has it ... packs a lot of features ... excellent word processor..." - Rainbow's Word Processor Comparison Article "Deciding What's Right For You" April 1989 Rainbow: Page 26.

"... friendly...amazing execution speed...much easier to use than VIP software & 2 other word processing systems I've tried...very user-friendly...massive text storage capacity ...highest among word processors..." - Rainbow Oct. 88 Review for Word Power

More Versatile • More Powerful With Spooler • Calculator • Split-Screen • 2-Column Printing

Unparalleled Power packed in this 100% ML Word Processor written from scratch for the CoCo 3! **No other word processor offers such a wide array of features that are easy to learn & use.**

DISPLAY & SPEED



Word Power 3.2 runs at double-clock speed and uses the **true 80-column display** with lowercase instead of the graphics screen. The result is lightning fast screen reformatting and added speed! **All prompts are displayed in**

plain English in neat colored windows. The current column number, line number, page number, percentage of free memory is displayed at all times. Even the **page break** is displayed so you know where one page ends and the other begins. The Setup program allows you to change fore/background colors as well as (in)visible carriage returns. Word Power 3.2 can be used with RGB/Composite/Monochrome monitors as well as TV.

MAXIMUM MEMORY



Word Power 3.2 gives you **over 72K on 128K and over 450K on 512K CoCo 3** for Text Storage - more memory than any other CoCo word-processor. Period.

EFFORTLESS EDITING

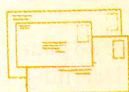
Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap.** All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

Insert/Overstrike Mode (Cursor Style Changes to indicate mode); OOPS Recall during delete; Type-ahead Buffer for fast typers; Key-Repeat (adjustable); Key-Click; 4-way cursor and scrolling; Cursor to beginning/end of text, beginning/end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, to beginning/end of line, complete line, text before/after cursor; Locate/Replace with Wild-Card Search with auto/manual replace; Block Mark, Unmark, Copy, Move & Delete; Line Positioning (Center/Right Justified); Set/Reset 120 programmable tab stops; Word-Count; Define Top/Bottom/Left/Right margins & page length. You can also highlight text (underline-with on-screen underlining, bold, italics, superscripts, etc.). Word Power even has a **HELP** screen which can be accessed any time during edit.

SPLIT-SCREEN EDITING

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

MAIL-MERGE



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

CALCULATOR

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

SAVING/LOADING TEXT

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

PRINTING

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

PRINT SPOOLER

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

TWO-COLUMN PRINTING

This unique feature allows you to print all or portion of your text in **two columns!** Create professional documents without hours of aligning text.

SPELLING CHECKER



Word Power 3.2 comes with spelling checker/dictionary which finds & corrects mistakes in your text. You can add words to /delete words from dictionary.

PUNCTUATION CHECKER

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

DOCUMENTATION

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



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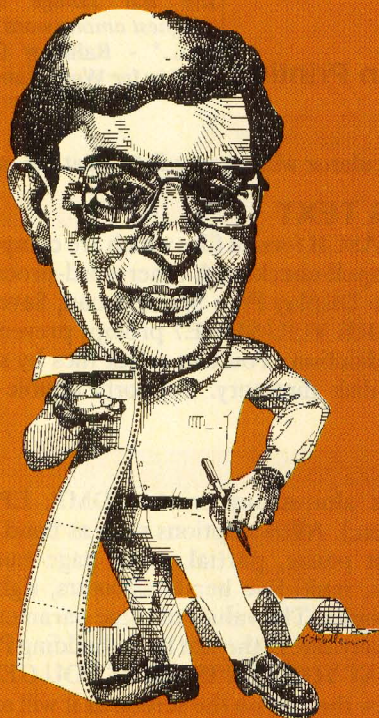
All Word Power 3.2 orders shipped by UPS 2nd Day Air at No Extra Charge in Continental US.

For Detailed Order Information, refer to Page 17 of our 6-page Ad series (Pgs 7-17).

To Place Credit Card Orders Call Toll Free 1-800-654-5244 (9am-8pm 7 days/week)

Technical Support (4-8pm), Order Status, Info, Technical Info; 716-383-8830





A Transition at THE RAINBOW

In August I mentioned that THE RAINBOW might be the second-longest continuously published computer magazine in the world (*Byte* is first), but now we have a new distinction. As of this month, THE RAINBOW is the only computer magazine whose managing editor is named after a computer.

Of course, that is not entirely true. Cray Augsburg was named long before the Cray computer came into being. Yet it has always been something of an in-house joke around here and I would be negligent not to mention it.

Cray assumes his new position with a vast background in and wealth of knowledge about the Color Computer. Those of you who have attended his seminars on OS-9 and other subjects at RAINBOWfest and the thousands of you who have obtained answers to questions by mail or phone can attest to that. Additionally and probably most importantly, Cray has a fine editing hand from his years as technical editor for THE RAINBOW.

"Wild Augsburg," as we sometimes call him, for some of his interesting ideas, is replacing Jutta Kapfhamer, who has become our advertising representative for *ScoreCARD*, a weekly sports tabloid we publish in support of the University of Louisville athletic program. Jutta's years of experience in the CoCo market will continue to be felt and seen here as we go through our transition and as we develop new plans and ideas.

Because *ScoreCARD* is published only monthly during the time between the end of the basketball and the beginning of the football season, Jutta is looking forward to some special projects in the computer area as her time permits. "I want to keep my hand in," she told me.

An example of this is a new product, which we will have available shortly, developed and championed by Jutta — disks of pictures from our CoCo Gallery. Many of you have written or called to ask that these be made available. Jutta initiated the project and has pushed it along. If the product is successful, you can expect to see more in the future.

With the ascension of Wild Augsburg to the helm, I think you will see THE RAINBOW move a little more into the technical things many of you have been asking about. At the same time, however, Cray's extensive knowledge of the entire CoCo product line will bring about easier-to-understand explanations of technical things, making the power of the CoCo more available to all of us.

Let me explain. As you know, one of the basic features of THE RAINBOW has always been its program listings. We present these listings for two reasons: First, so you can have ready-to-use CoCo programs; and secondly, so you can learn to modify them to your own needs and develop abilities to write your own programs.

It is not enough for us to simply list programs — our copy accompanying them should explain what some parts of the program are doing and how they work. I think you will see this sort of assistance increase as we go along, simply because of Cray's understanding of the programming process.

No, we will not be turning THE RAINBOW into a technical journal. However, we do plan to broaden its scope and depth a bit and to provide more hands-on experience and learning opportunities.

I know you join me in wishing both Cray and Jutta good luck in their new positions. The changes, I believe, will benefit all.

— Lonnie Falk

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Pokes, Peeks and Execs are your guides into the jungle of computer programming. These commands give you the power of Machine Language without leaving the security of BASIC. Each book is a collection of "inside" information, with explanations and examples to help you immediately put it to use. Everyone from the novice to the professional will find these handy books a wealth of information.

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Rainbow Guide To OS9 Level II: \$19.95

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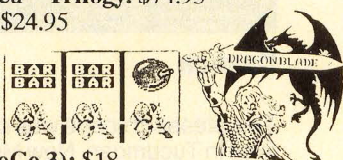
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CoCo Gallery

1st Place

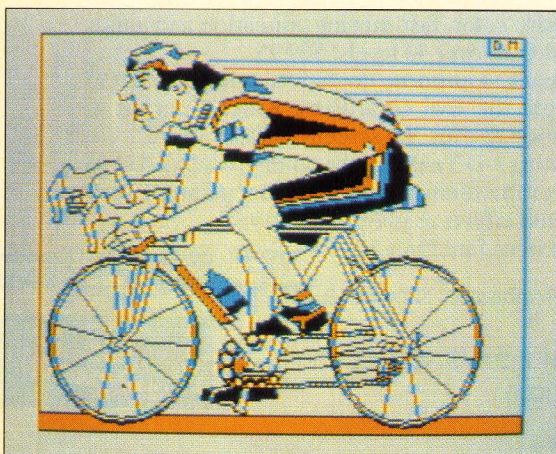


Witch

Ken Robinson

What is that up in the air? It's a bird, it's a mop — no, it's Wonder Witch casting another HEX\$. Ken, who lives in Port Colborne, Ontario, designed this picture using *The Rat* package.

3rd Place



Tour De Rainbow
Domingo Martinez

Domingo, of Miami, Florida, hopes to earn a bachelor's degree in computer and information systems. His creation was produced with a BASIC program he wrote on the CoCo 2.

SHOWCASE YOUR BEST!

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

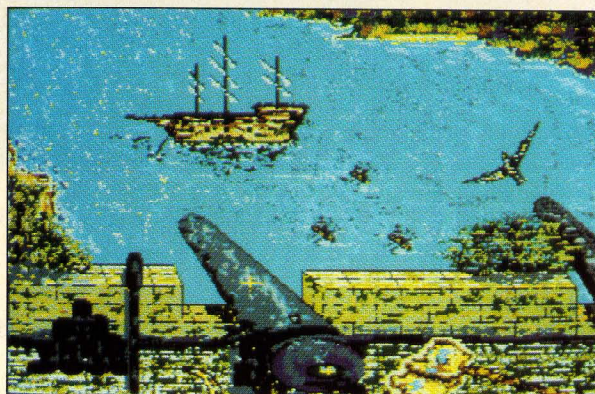
Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award one first prize of \$25, one second prize of \$15 and one third prize of \$10.

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

—Tony Olive, Curator

2nd Place



Cannon

Joel R. O'Rear

This pleasant scene was created with *CoCo Max III*. Joel lives in Tucumcari, New Mexico. He has enjoyed photography since his days in the Navy and now transfers pictures to the CoCo.

COCO UTILITIES GALORE

(For CoCo 1,2,3 RSDOS; Min 32K Unless Otherwise Specified)

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An excellent hands-on guide to OS9 Level II for the beginner. Req 512K, 2 Drives & Monitor. Book & Disk Only **\$32.95**

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XED: OS9 Full Screen Editor. Only **\$39.95**

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An Electronic Evolution

I bought my first Color Computer in October 1982 and my first issue of our magazine in January 1984. As enthusiastic as I was, at that time you couldn't have convinced me I was to become an integral part of THE RAINBOW. And as technical editor over the past three years, I could only dream of sitting behind the *managing editor's* desk. Yet here I am, full of ideas and rarin' to go!

Generally I'll be using this new column to discuss how changes in the CoCo Community affect publication of THE RAINBOW, but I want to address a couple of more local concerns this month. First we have received a number of letters regarding the listings in the August 1988 issue. They were fairly light. In fact some of them were downright hard to read. For this I offer an apology to those of you who tried to enter those listings by hand. If you succeeded, give yourself a pat on the back.

You see, we have gone into full swing with our electronic publishing. In the past RAINBOW listings were generated from a working copy of the program on an HP LaserJet printer using a Courier typeface. We then pasted the hard copy to a *board* (a ruled piece of posterboard) and took a negative transparent photograph of that board. A plate was created from the film and used to print the magazine.

In a constant effort to budget as best we can (one reason we have been able to hold the line on subscription rates for three years now), we found an easier, and more cost-efficient way of producing THE RAINBOW. Currently the listings are generated as ASCII

files, ported into Aldus *PageMaker* through our computer network, and placed on an electronic "page." To get the 32-column listings to line up properly, we selected a Letter Gothic font for its *mono-spaced* properties — in other words each character is the same width.

Our goal has been to create each page of the magazine electronically and, using a Linotronic typesetter, print those pages directly to the film. What we didn't realize is that the lines used to create characters in the Letter Gothic font are so narrow they don't reproduce well when the printing plate is created from the film.

As you may have noticed, the listings in the September issue are far more legible. As soon as we discovered the lightness of the August listings, we found another *mono-spaced* font and corrected the situation for future issues. (Incidentally the new font is Courier, just as we originally used with the LaserJet.)

On a somewhat related matter, most of you have no doubt noticed the size of THE RAINBOW. While it is easy to *say* the magazine should be bigger, the situation is a little more complex. Reality dictates the size of the magazine whether we like it or not. So in an attempt to provide you with the most bang for your buck, we will be experimenting with several different space-saving techniques as we continue our Color Computer journey.

One of the changes we are working with is running three-column listings. In future issues you will find some listings appearing just a little smaller so that we can pack

more into the magazine. When we tried this before, we received some complaints from readers having trouble reading the listings. We understand. Still, we must consider the trade-offs. Our goal is to give you the meaty magazine you want. And because of the clarity possible with our move to electronic publishing, you will find these listings far easier to read than those from the days of the LaserJet.

The long and short of this is that THE RAINBOW staff works hard to provide the best possible source of information on the Color Computer. We are willing to try new things — make changes for the better. And I believe you will see this more and more as we work to put out the magazine you want and deserve.

Ordinarily I would ask for your comments and suggestions at this point. While we still welcome your input, I am going to ask you to wait for the November issue, which will include a reader survey to allow us to more accurately interpret your feedback.

I have a million ideas for THE RAINBOW, but — as you will see in the coming months — implementing those ideas depends on you as well. The CoCo Community is self-perpetuating. And you have as much control over and responsibility for its existence as THE RAINBOW does. Tandy laid the foundation many years ago. Now it is up to all of us to top the structure out. I am delighted to be working with you as we forge ahead.

— Cray Augsburg

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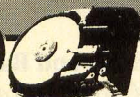
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DRIVES

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1 Drive Cable: \$16.95 2 Drive Cable: \$22.95 4 Drive Cable: \$34.95

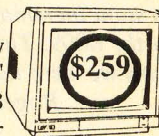
FD501 Upgrade Kit: Bare Drive, 2 Drive Cable & Instructions: \$109

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Razor Sharp picture quality for your CoCo! Has 14" Screen, Analog/TTL RGB & Composite Inputs for CoCo 2/3, Speaker, Text Display Switch, Tilt Stand & 2 Year Warranty. Compatible with CoCo, IBM & many other computers! Only \$259 (add \$12 S&H/\$40 in Canada) Lowest Price in the Rainbow!



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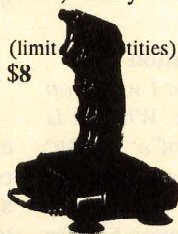
5 1/4" DS/DD Disks: \$.40 each

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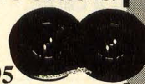


NX1000 Color Ribbon: \$12.95

NX1000 Black Ribbon: \$8.50

Seikosha, EPSON, DMP, Panasonic, Okidata

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ups
2ND DAY AIR

Lost Interrupts

Many OS-9 users who use a Multi-Pak and an RS-232 pack have now strapped the CART interrupt inside their Multi-Paks, in an effort to eliminate glitches caused by lost interrupts. However, when using the serial port, their systems still lock up. This problem is often due to two nearly adjacent interrupts arriving at the GIME chip, which fails to properly process both due to a curious idiosyncrasy in how it detects the CART interrupt. This can cause the RS-232 pack to lock up in some cases.

We both have developed similar fixes to cure this problem of lost interrupts. Roger Krupski uses a Germanium or Shotky (low-voltage drop) diode between the CART interrupt where it enters the GIME chip and the IRQ line as it leaves the GIME chip and is passed on to the 6809 itself. Bruce Isted accomplishes the same thing using a trace cut and a jumper at the 40-pin system port to stunt incoming CART interrupts directly to the 6809. This completely cures problems we were having with lost interrupts.

Roger Krupski and Bruce Isted

Thanks for alerting me to the diode/internal CART fix for GIME-related OS-9 interrupt handling problems. I hope to present more elaborate details on how to do this fix and the reasons for it in a future issue of THE RAINBOW.

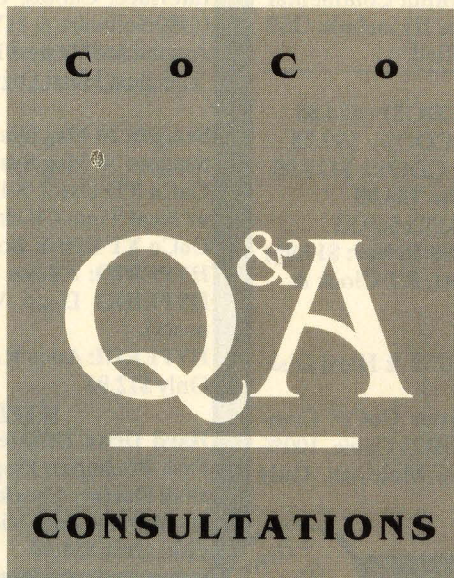
Texan Connection

How do I connect the monitor made by Texas Instruments for its TI 99 computer to my CoCo 3?

Gregg Stavinski
Kulpmont, Pennsylvania

The monitor you mention is a decent-quality composite video monitor and can be directly connected to the CoCo 3 using standard RCA-male-to-RCA-male phono plug cables. Radio Shack Catalog No. 42-2367 is a good example of such a cable.

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.



By Marty Goodman Rainbow Contributing Editor

Two are needed, one to connect the video output of the CoCo 3 (the red RCA jack on the back) to the video input of your monitor, and one to connect the audio output of the CoCo to the audio input of your monitor. Note that the audio cables I recommended above are not ideal: Actually 75-ohm video coaxial cables are better. But the Radio Shack cables are readily available and work adequately. Also note that because the monitor is being fed by a composite video signal, not an RGB signal (the monitor lacks RGB inputs), you are not able to adequately resolve 80-column text, and with some software you need to use options available to tell the software that you are using a composite video monitor, not an RGB monitor.

Exclamation Explanation

I have a BASIC program that I wrote on my CoCo 3 and saved to disk. When it is loaded into a CoCo 2, the CoCo 3 BASIC commands are replaced by exclamation marks. Why?

Clayton Shaffer
Visalia, California

When you save a BASIC program to disk in the normal fashion, the program is "tokenized." That is, critical commands and phrases in BASIC are not saved out as the full

text but as two-byte tokens. These tokens allow the program to take up less space on the disk and in memory and to be processed much faster during execution.

The CoCo 3, as you know, has more BASIC commands and keywords than does the CoCo 2. The BASIC in the CoCo 2 is set up so that if it sees a token it does not recognize, it puts an exclamation mark on the display of the token. Note that if the CoCo 3 encounters a token it does not recognize, it hangs up and crashes due to an oversight in the programming of its BASIC. If you want to use your CoCo 2 to edit BASIC programs written on the CoCo 3, you need to first save the CoCo 3 BASIC program to disk in ASCII form (using the command SAVE "FILENAME", A), then take the file and load it into a word processor on the CoCo 2.

Mouse and Ball

What sort of mouse or track ball can be used on the CoCo 2 and 3?

Henry Stiehl
Richey, Florida

Only mice and track balls specifically made for the CoCo 2 and 3 can be used with them. The vast majority of "bus mice" and "serial mice" used on IBM PCs and other type computers cannot be used with any model CoCo. This limits you to the mouse sold by Tandy and to the ancient Wico track ball, which may still be available from Zebra Systems. Note the mice and track balls made for the CoCo 2 and 3 work with any program that uses the joysticks — they just plug right in.

What's the Deal?

In the June 1989 RAINBOW Tony DiStefano said 80-track drives won't work as 40-track drives. I have two 3½-inch 80-track drives that I use under Disk BASIC, and they work perfectly. What is going on here?

Larry K. Williams
Athens, Georgia

Tony was saying that you can't properly use 5¼-inch 80-track (720K) drives to produce a disk that can be reliably read on a 40-track (360K) 5½-inch drive. You certainly can't write new files using a 5¼-inch 80-track (720K) drive to a 5¼ disk formatted on a 40-track (360K) disk drive. What you're doing is just using the first 35 tracks on one side of those 3½-inch drives (thereby wasting over three-quarters of their storage capacity).

BIG BASIC

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64K Upgrade (8 chip) for CoCo I, CoCo II's with Cat # 26-3026/3027/3134/3136: \$29.95

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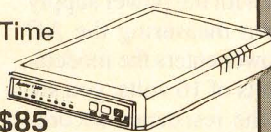
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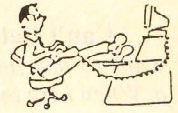
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GIME Chip for CoCo 3: \$39.95

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

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Can't Get It to Work

I want to use four disk drives on my CoCo. When I try to hook a given drive in as the fourth drive (Drive 3), it does not work. The motor goes on when I try to access it, but the drive select light does not. Can you help?

George Allen
Philadelphia

The CoCo accesses the fourth drive (Drive 3) in a somewhat different fashion from many other computers. Most other computers and disk drives are set up to have a drive select line for the fourth drive on Pin 6 of the 34-pin drive connector. But the CoCo's Drive 3 select line is on Pin 32. Pin 32 is used by most modern floppy drive systems as the Side Select line. (Note that the CoCo's disk controller hardware and software as supplied was never designed to use double-sided disk drives.)

Those people using double-sided drives with the CoCo must content themselves to using no more than three physical drives unless they want to do significant custom hardware and software modifications. If you want to hook up four single-sided drives, you must do the following to the fourth drive:

- Cut the trace leaving Pin 6 of the drive's 34-pin connector, and cut the trace leaving Pin 32 of the drive's 34-pin connector.
- Tie the trace that used to go to Pin 32 to a source of +5 volts on the drive via a 4.7K pull-up resistor. Now route the trace you freed up from Pin 6 to Pin 32 via a wire jumper.
- Jumper the drive so it is selected as Drive 3.

If you own double-sided drives, the best thing to do is just use no more than three of them on one system.

ADOS 3 and BASIC

What can ADOS 3 do for me regarding full use of 80-track, double-sided drives under BASIC?

Gary Carter
Liberty, Kentucky

ADOS 3 allows you to use up to two double-sided 80-track drives as if they were four single-sided 80-track drives. It does not allow you to mix 80- and 40-track drives in a convenient way, though you can use it to get data over from your 35- and 40-track drives to your new 80-track system. I

know of no software for Color BASIC that allows you to use a double-sided 80-track drive as a single 720K drive.

Modem But No Power

I obtained a TRS-80 DC-2212 modem, but no power supply for it. I cannot get one through Radio Shack because they are no longer available. I am told it requires a source of 16.2 VAC. I have a 20-VAC .51 amp power supply. Can I use that?

Paul-Joseph de Werk
Pittsburg, California

Devices that specify a given AC voltage for their power input can usually run perfectly well from power supplies within two or three volts of the rated value. If you put too much voltage into them, an internal voltage regulator may run too hot. Your 20 VAC .51 amp power supply might be a little high. I'd consider using a dropping resistor in series with your supply. Modems like those often draw between a quarter and a half an amp.

I suggest dropping the voltage by about 4 volts. Using the appropriate version of Ohm's law ($R=E/I$, where $E=4$ volts and I =between .25 and .5 amps), it seems you can try a dropping resistor in series with the power supply of a value between eight and 16 ohms. Use 5-watt or higher wattage resistors for this dropping resistor.

To get the right value, all you need is an AC volt meter and a bunch of 5- or 10-watt resistors. You can buy the resistors at Radio Shack. (See the listing of wire-wound resistors on Page 130 of the 1989 U.S. Cat. No. 432.)

I suggest getting two of the 10-ohm, 10-watt resistors (Cat No. 271-132) and hooking both up in series with the power supply and the modem, then measuring the AC voltage where the power enters the modem. If it is within two volts of 16 volts, you are fine. If not, adjust the resistance accordingly. Note that two 10 ohm resistors in parallel amount to a 5-ohm resistor and that two 10 ohm resistors in series amount to a 20-ohm resistor.

Burned Out

Can you give me any advice on repairing a burned out CoCo 3 and Multi-Pak? I hear replacement GIME chips cost \$50 and are available only from Tandy. What about hooking a non-CoCo type switch matrix keyboard to the CoCo 3?

John H. Opheim

Most of the time when you fry a CoCo 3,

it is just the 6B809E chip (the central processor chip) that has died. This 40-pin chip is relatively inexpensive (\$6 or so) and widely available (Jameco and JDR, for example, usually stock it). Unfortunately, it is soldered directly into the CoCo 3 motherboard, so some degree of hacking skill is required to remove the old one and place a socket there in which to put the new chip. This must be done without damaging the CoCo 3 motherboard. Less frequently a RAM or PIA chip blows on the CoCo 3. Curiously, the GIME chip does not often get fried. And, you will be happy to learn that when it does, the replacement GIME chip from Tandy national parts now is available for around \$25.

As far as using a non-CoCo 3 keyboard, I'd advise you not to bother. Seven years ago when the only CoCo-type keyboard was the chicklet type, I totally rewired the matrix on some non-CoCo keyboards for my CoCo. It was a tedious matter. I'd never do it again with replacement keyboards available so inexpensively.

Tape Trouble

When my CoCo is on for a long time, I find my cassette tape programs have trouble loading. What is the problem?

Fred J. Slagle
Morristown, Tennessee

Your CoCo may benefit from the addition of a small fan over the power supply. While there are other ways of dealing with problems relating to mild overheating, the addition of a fan is by far the easiest to accomplish.

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" on line form which has complete instructions.

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CoCo Max III: now a classic and probably the most popular CoCo program ever. If the price was the reason that stopped you before, this *special* will delight you. Listen (*Rainbow* 3/88): "There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. CoCo Max III is the ultimate program for the CoCo 3." Check any *Rainbow* (up to 4/89) for complete info on CoCo Max.

To top it off, we include a free **Demo Disk** plus the super **CoCo Show** program, which lets you make your own "slide shows".

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NOTE: Max-10 and CoCo Max Fonts aren't interchangeable.

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System Requirements

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

About CoCo Max III

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise.

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PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX 10,NX-1000; DMP100,105,106,110,120,130,200; OKI 82A,182,192; CGP 220(B&W)

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CoCo Max I and II



- **CoCo Max I on tape.** See previous ads or write for info. For CoCo 1 or 2. Order #C-7..... **\$59.95**
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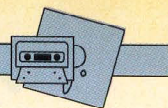
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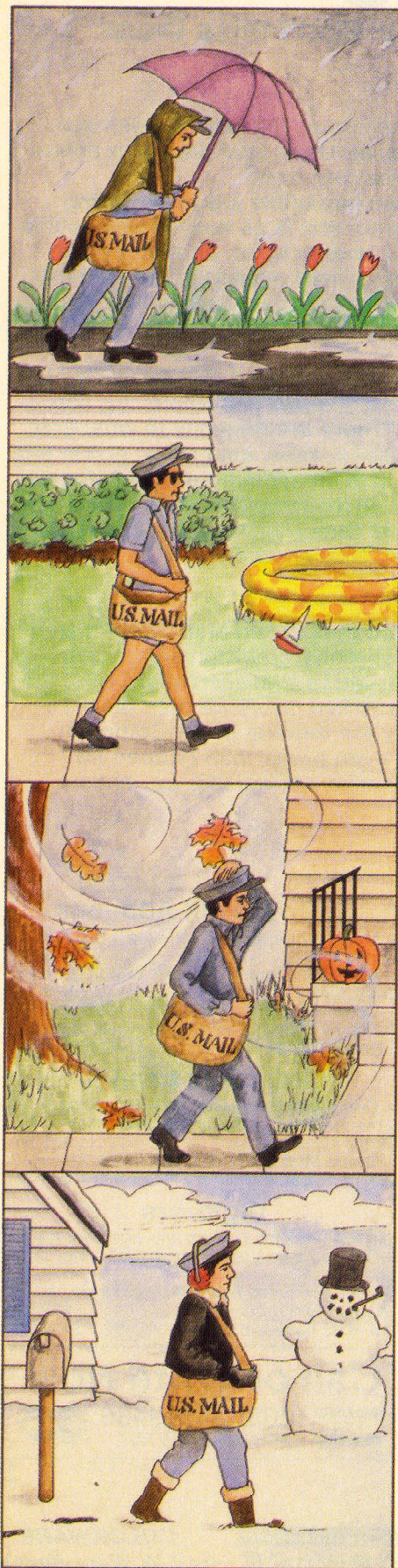
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Neither rain, sleet, snow nor hail . . .

Tricky Graphics

By Jim Bennett



How would you like to learn some neat tricks for programming graphics on the CoCo 3? *Letter Carrier* is a fairly short game that demonstrates three techniques very useful to anyone interested in graphics programming. It shows how you can create graphics invisibly and then either make them instantly pop into view fully drawn or store them in memory for future use. It also shows a way to animate letters of the alphabet on the graphics screen.

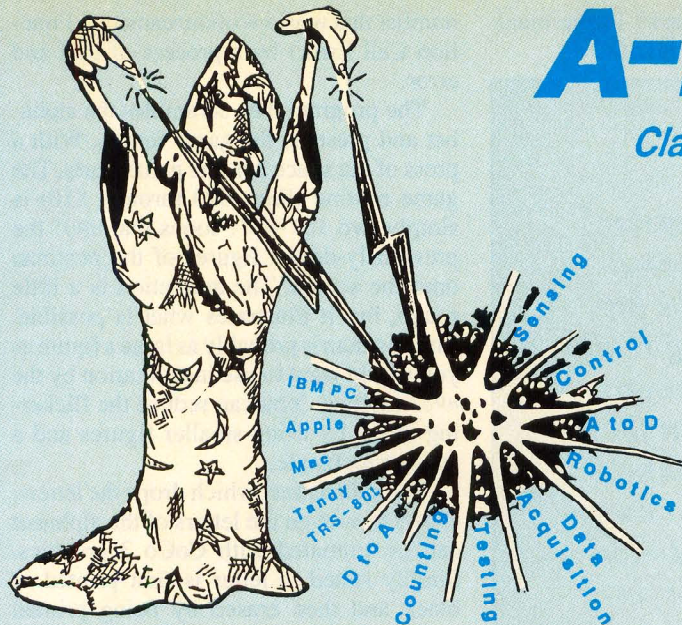
Letter Carrier is an easy-to-play, non-violent game that presents a degree of challenge. The object of the game is to drop letters of the alphabet, arranged in random order at the top of the screen, down to the little postman who scampers back and forth across the bottom of the screen. Letters are

dropped by pressing the keys on the keyboard. Points are earned for every letter the postman catches. The game is over either when the time limit is up or when all the letters have been dropped, whichever occurs first. This game might be used for developing keyboard skill, but its primary purpose is to demonstrate some special graphics techniques that can be used with other game scenarios as well as non-game programs.

The program is short, but contains a lot of HDRAW commands that must be keyed in exactly as listed. The series of letters and numbers in these commands can be confusing and make it very easy to make typing errors. So be careful. Also, take the precaution of saving the program or any portion of the program *before* you try to run it.

The program has five main parts: The first part (lines 60 through 400) creates a really eye-catching title. The second part (lines 410 through 590) creates four versions of the postman used later for animation. Part 3 (lines 600 through 660) sets up

Jim Bennett lives on the Hudson River in upstate New York with his wife and four children. He is deeply involved in education and owns E.Z. Friendly Software.



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Reed Relay Card: 8 reed relays (20mA at 60VDC, SPST). Individually controlled and latched, with status LEDs. **RE-156: \$109**

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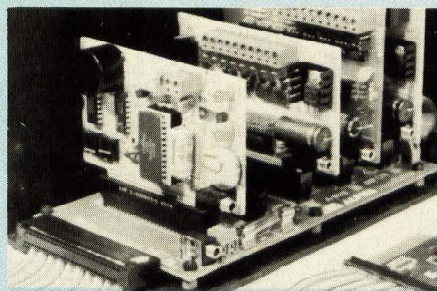
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A large A-BUS system with two Motherboards
Adapter in the foreground plugs into PCXT/AT type slot.

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TRS-80 Model 102, 200 Uses 40 pin "System bus". **AR-136: \$76**

Model 100 (Tandy portable) Plugs into socket on bottom. **AR-135: \$75**

TRS-80 Model 3, 4, 4D Y-Cable available if 50 pin bus is used. **AR-132: \$54**

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Tandy Color Computers Fits ROM slot, Multipack or Y-Cable **AR-138: \$49**

A-BUS Cable: Necessary to connect any parallel adapter to one A-BUS card or to first motherboard. 50 pin, 3 ft. **CA-163: \$24**
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the game screen with the letters at the top. Part 4 (lines 670 through 810) is the actual game routine. The fifth part (lines 820 through 880) is a subroutine for dropping the letters.

The title shows how graphics can be created invisibly and then made to pop instantaneously into view. First, I created a black screen with a simple statement written across the center (Line 70). While the user is reading this message, the computer produces more graphics (lines 80 through 140). However, the graphics are invisible because they are also done in black. Lines 140 and 150 erase the intro message and switch the colors in PALETTE slots 0 and 15 to reveal the drawing for the first time. This gives the impression that we switch from one screen to another.

The remaining lines in this routine (160 through 400) use the "pop into view" trick to create a dramatic effect of shapes magically "popping" onto the screen one by one. What you can't see is that each shape is first drawn and then painted the same color as the background. When done, the appropriate PALETTE command makes the shape appear. Add a little sound effect (Subroutine 890) and the effect is even more dramatic.

I'm not going to spoil the visual impact of the title design by being specific in my description. You'll just have to run the program to see exactly what I mean.

The routine (lines 410 through 590) that draws the figures to be used in animation, again uses the trick of working invisibly; however, this time the figures are not made to pop into view. Instead, they are stored in memory with HGET commands. Where are

the figures drawn, you ask? In the blank spaces on either side of the title!

*Letter Carrier
provides some
useful ideas for
programming really
eye-catching
graphics on the
Color Computer 3.
The tricks shown
here have a wide
application in
writing game
programs.*

In order to use HGET, the HBUFF (Line 30) must appear at the start of the program. The first number following HBUFF identifies the buffer, and the second number identifies the amount of memory needed. I confess, the method given in the instruction manual for calculating the second number seemed awkward. I arrived at 1350 (the lowest

number that works without causing a Function Call Error) by a process of trial and error.

The program then scrambles the alphabet and presents the game screen. With a press of the space bar, the game starts. The game routine (lines 670 through 810) is simply two FOR-NEXT loops that HPUT the previously-drawn figures of the postman onto the screen. The animation is a little rough, but it illustrates what is possible. The postman is probably as large a figure as you would want to use in animation by the HPUT method. You can reduce the flickering effect by using smaller figures and a smaller rectangle.

The subroutine, which drops the letters, shows how even the letters of the alphabet can be animated with CoCo 3 graphics. Simply stated, a letter is first printed in black and then erased by being printed again in the same spot in white. To specify the color to HPRINT, the HCOLOR function is used. HPOINT checks to see if the postman is under the falling letter.

Letter Carrier provides some useful ideas for programming really eye-catching graphics on the Color Computer 3. The tricks shown here have a wide application in writing game programs. They can also be used in any kind of program where you might want to add professional-looking, attractive graphics.

(Questions or comments concerning this program may be addressed to the author at Hutton and Orchard Sts., Rhinecliff, NY 12574. Please enclose an SASE when requesting a reply.)

✓	90	107	540	244
	140	66	660	213
	220	193	810	35
	330	5	END	146
	460	191		

The listing: CARRIER

```
0 ' COPYRIGHT 1989  FALSOFT, INC
10 ' *****
    THE LETTER CARRIER GAME
    BY
    JIM BENNETT, 1989
    *****
20 ONBRKGOTO900
30 HBUFF1,1350:HBUFF2,1350:HBUFF
3,1350:HBUFF4,1350:RX=RND(-TIMER
)
40 CLS:PRINT@32*7+6,"RGB MONITOR
? (Y/N)":EXEC44539:IFINKEY$="Y" T
```

```
HENC=56ELSEC=32
50 FORX=1TO14:PALETTE63:NEXT:C
LS:PALETTE13,0:PALETTE0,0:PALETT
E15,0
60 '*****CREATE TITLE*****
70 HSCREEN2:HCLS0:HCOLOR14:HPRI
N(2,12),"Now presenting for your
amusement..."
80 HDRAW "BM7,4:S4C15R3BLD4GLBR6
U3BU2UBR4BD2D4BU2E2RD4BU2E2RD4BR
6U5R2FGF2GL2BR7BU2R2U2L2D4R2BR4U
4D2E2RD4BR4U4BD2BUBDE2RD4BR4BU2R
2U2L2D4R2BR5U5BR5D5BL2BU3BL4BUBL
R9BD7BL6D5BR5U5BR5DF2D2L2U2E2UL
2BR13L2GD3FR2BR4R2U2L2D2BR6U3DER
BR4BUUD5BR5U3BU2UBR5
90 HDRAW "BD4R2U2L2D4R2BR4R2UH2U
R2BR7BD4U5ER3FD5BL2BU2BL3R4BR4BU
F3E3BR3BDBRR2U2L2D4R2BR4RBD3BL89
D6BU6R2FDGBLLBR5D3R2U4L3BR6D4R2U
4BR6L2D4R2U4D6L3BR6BU8D6BU3R3D3B
R3U6BD4E3G2F3BR3BU2R2U2L2D4R2BR4
BU2R2U2L2D4R2BR4BU4D7BU4R2U3L2BR
```


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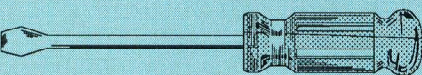
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- GA2 - Chess, Motojump, Rider, Slots, +
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M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
	GR9	H4		GA9
A1	GR10			GA10
A2	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

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```

9L3DF2DL3BR7BUU3
100 HDRAW "BU2UBRBF3BDR2U2L2D4R2
BR4RDGBR5BUBRBUU5RF5U5BR4F3G2E5B
D10BL89D5BR9L4E3U2L2GBR4BUBR5GD2
F2REU2L3BR8DF2RE2UH2LG2BR10BU2D5
110 HDRAW "BM254,4;S4C15RFRERFRE
RFRERFRERFRERFRERFRERFRERFRERFRE
RFRERFRERF2GDFDGDGDFDGDGDFDGDGDFD
DGDGDFDGDGDFDGDGDFDGDGDFDGLHLGLHL
GLHLGLHLGLHLGLHLGLHLGLHLGLHLGLHL
GLHLGLHLGLH2UEUHUUEUHUUEUHUUEUHU
EUHUEUHUUEUHUUEUHUUEUHEUBF5D33R3
9U34L39
120 HPAINT(260,10),15,15:HDRAW"C
0BF9D4L2GD4FR2
130 HDRAW "U4D6FDFRFRDR3FR3ER2ERU
EU2EU5BD3REU3L2U2EU2H3LGLHUL4G2L
2GL2GBD3RE2R3E2F2RE2F5BD2BGBLBUB
LBHL3D4L2BU4BLL4BDBRRBR8RDBG2BF
BR3G2LH2L5G2LH3BR7BD4BLRERF2BR5F
3R8BL20BH2BL2BGBLHGLDL6BLBR9RDF5
BR5RE6BUBL3BG4L5
140 FORDL=1T0600:NEXTDL:PALETTE1
4,63:HPRINT(2,12),"Now presentin
g for your amusement..."
150 PALETTE0,63:PALETTE15,C:
REVEAL 1ST PART OF TITLE
160 HDRAW "BM103,69;S4C1E5H3LHL5
G5D19G6L3G5R4FR5FR4FR2FR3FR3FR3F
RFRFRFRFRFRFR2FRFRFR2FRFR2BRBFBR
BF2R3FR4FR4FR5FR7FR8ER6ER5ER2ERE
R2ERERE4UEU2EU3HUH2L2HL3HL15GL4G
L3GLGL2GL2GL3GL2GLGLGLGLGLGLGBG4
BL4L2GLGL4GL5GL4HL2HL2HLH2LH2LHU
HU2DG4F2RF3RFRFR2FR2
170 HDRAW "FR9ER5ER4ERER2EBEBR3B
E2BRBERERERERERERERER2ER2ER2ER3
ER6ER12FRFRF3D2FD2GDG2LGL3DL2DL3
GL14HL5HL5HL4HL2HL3HBHBL3BHL3HL2
HL2HLHLHLHL2HL2HL2HL2HLHLHLHLHL
L2HL2HL3HL3HL2E8U17E2F2DFG2
180 HPAINT(103,63),1,1:HPAINT(20
3,102),1,1:HPAINT(167,102),1,1:H
PAINT(168,102),1,1:HPAINT(170,10
1),1,1:HPAINT(194,116),1,1:HPAIN
T(197,115),1,1:HPAINT(200,114),1
,1:P=1:MN=0:GOSUB890
190 HDRAW "BM110,80;S4C2EUE4RERE
R2FRFDFD2GDG2DGLGLGL4DF3RF2RERER
E2UBD2BG2G3LG2L2HLH2LH2UHU3L2E3U
EBR3D2R4EREUEUH3L2GLGD3
200 HPAINT(123,75),2,2:P=2:GOSUB
890
210 HDRAW "BM129,80;S4C3R3D12F3R
3ERERE2UE2G4L2HLHU10R15D11F4R4E4
UEUEG5H3U9R8E3L10U6G6L15U5G7
220 HPAINT(135,81),3,3:P=3:GOSUB
890
230 HDRAW "BM167,85;S4C4RFDFDF3R
FR2FR2ERERERE2UEG3L2GL2H3LHU2R4E
REREUEUEU3H3L2GLGLGLG2DG4LG3BE4B
R6R5E2UH2LGLG3D
240 HPAINT(171,84),4,4:P=4:GOSUB
890
250 HDRAW "BM190,79;S4C5E4RE2RFD
3E3RER9G4L6G3D10G3LU14HL2
260 HPAINT(199,78),5,5:P=5:GOSUB
890
270 HDRAW "BM101,121;S4C6DGDGDGHL
L3HL3HL3HL2HLG2LG2DGD2GD2FD3FD2F
DF5RFR7ER2ER2E4DGDGDG2DG2LGL2GL5
HLHL2H6UHU2HU2HU8EUEUEUE5RER5FR3
FR3FR3FR
280 HPAINT(83,120),6,6:P=6:GOSUB
890
290 HDRAW "BM118,132;S4C7L9GLG2D
GD3GD6FD2F2RE6D5FR2ERE4G3L2HU14E
3BG7U3L4G2D5FDRE4U2
300 HPAINT(111,135),7,7:P=7:GOSU
B890
310 HDRAW "BM119,138;S4C9E4RE2RF
D3E3RER9G4L6G3D10G3LU14HL2
320 HPAINT(131,135),9,9
330 HDRAW "BM139,138;S4C9E4RE2RF
D3E3RER9G4L6G3D10G3LU14HL2
340 HPAINT(155,135),9,9:P=9:GOSU
B890
350 HDRAW "BM159,138;S4C10E7RD17
RERE2G6L3HU12L2BU9BR2R2E5G3L2G3
360 HPAINT(164,128),10,10:HPAINT
(164,137),10,10:P=10:GOSUB890
370 HDRAW "BM171,142;S4C11RFDPDF
3RFR2FR2ERERERE2UEG3L2GL2H3LHU2R
4EREREUEUEU3H3L2GLGLGLG2DG4LG3BE
4BR6R5E2UH2LGLG3D
380 HPAINT(173,141),11,11:P=11:G
OSUB890
390 HDRAW "BM194,135;S4C12E2R2FD
17E5U9E2R2ER4FR2FR2ERERE3U3H3G3F
2DG2H2L3HL5GLG2LU2HL4G5
400 HPAINT(198,132),12,12:P=12:G
OSUB890
410 'DRAW 4 MEN FOR ANIMATION
420 POKE65497,0
430 PALETTE13,63:PALETTE14,63
440 HDRAW "BM35,97;S4C8R10G3F2L4
HL5U4BD4D5R8U2R2HNNHBL4LBF3F5E5F2
E2H2GH2E3F6G3H2BH2GBF2G6L3D5BH10
BU3G8D2F4E2F2G2H2BE2H2E4D9BU7RER
EU3HLHL22D12FDF2RFR2FR5ER2E2
450 HDRAW "BM34,121;S4C8D8L8D5L2
U5RDBRBD2R13U9D16R6U2LNL4U20
460 HPAINT(20,110),13,8:HPAINT(3
2,116),13,8:HPAINT(36,98),14,8:H
PAINT(32,110),14,8:HPAINT(32,110
),14,8:HPAINT(40,113),14,8
470 HGET(5,95)-(63,139),1
480 HDRAW "BM35,147;S4C8R10G3F2L
4HL5U4BD4D5R8U2R2HNNHBL4LBF3F5E5F
2E2H2GH2E3F6G3H2BH2GBF2G6L3D5BH1
0BU3G8D2F4E2F2G2H2BE2H2E4D9BU7RE
REU3HLHL22D12FDF2RFR2FR5ER2E2
490 HDRAW "BM44,167;S4C8D3NL3R8F
5DG2LF2E5HLG4H4L14UH3D3BF2BR4D4G

```



```

6H2G2F4E2H5E4U3HU2
500 HPAINT(20,160),13,8:HPAINT(3
2,166),13,8:HPAINT(40,148),14,8:
HPAINT(32,160),14,8:HPAINT(40,16
0),14,8:HPAINT(36,178),14,8
510 HGET(5,145)-(63,189),2
520 HDRAW "BM285,97;S4C8L10F3G2R
4ER5U4BD4D5L8U2L2ENEBR4RBG3G5H5G
2H2E2FE2H3G6F3E2BE2FBG2F6R3D5BE1
0BU3F8D2G4H2G2F2E2BH2E2H4D9BU7LH
LHU3ERER22D12GDG2LGL2GL5HL2H2
530 HDRAW "BM286,121;S4C8D8R8D5R
2U5LBDBLBD2L13U9D16L6U2RNR4U20
540 HPAINT(298,110),13,8:HPAINT(
287,116),13,8:HPAINT(283,98),14,
8:HPAINT(279,110),14,8:HPAINT(28
7,110),14,8
550 HGET(258,95)-(316,139),3
560 HDRAW "BM285,147;S4C8L10F3G2
R4ER5U4BD4D5L8U2L2ENEBR4RBG3G5H5
G2H2E2FE2H3G6F3E2BE2FBG2F6R3D5BE
10BU3F8D2G4H2G2F2E2BH2E2H4D9BU7L
HLHU3ERER22D12GDG2LGL2GL5HL2H2
570 HDRAW "BM276,167;S4C8D3NR3L8
G5DF2RG2H5ERF4E4R14UE3D3BG2BL4D4
F6E2F2G4H2E5H4U3EU2
580 HPAINT(298,160),13,8:HPAINT(
287,166),13,8:HPAINT(279,148),14
,8:HPAINT(279,160),14,8:HPAINT(2
87,160),14,8:HPAINT(283,178),14,
8
590 HGET(258,145)-(316,189),4
600 '****SET UP GAME SCREEN****
610 POKE65497,0:U$="":PS=0
620 A$="ABCDEFGHIJKLMNPOQRSTUVWXYZ"
630 NA$="":FORL=1TO26
640 L$=MID$(A$,RND(26),1):IFINST
R(NA$,L$)=0THENNA$=NA$+L$ ELSE64
0
650 NEXTL:PLAY"V7":FORMN=1TO12:F
ORNN=1TO2:PLAY"T20;02;"+STR$(MN)
+"V+":NEXTNN,MN:HCLS0:PALETTE0,6
3:PALETTE8,0:PALETTE13,38:PALETT
E14,11:HCOLOR8:HPRINT(6,0),NA$
660 POKE65496,0:HPRINT(8,10),"TH
ESE ARE YOUR LETTERS":HPRINT(7,1
1),"PRESS SPACE BAR TO START":EX
EC44539:HCOLOR0:HPRINT(8,10),"TH
ESE ARE YOUR LETTERS":HPRINT(7,1
1),"PRESS SPACE BAR TO START"
670 '*****PLAY THE GAME*****
680 FORNT=1TO4:N=1
690 FORH=1TO260STEP8
700 POKE65497,0:HPUT(H,147)-(H+5
8,191),N,PSET:POKE65496,0:FORDL=
1TO10:NEXTDL:IFN=1THENN=2ELSEIFN
=2THENN=1
710 GOSUB820
720 NEXT
730 IFLEN(U$)=26THEN810
740 N=3

```

```

750 FORH=260TO1STEP-8
760 HPUT(H,147)-(H+58,191),N,PSE
T:IFN=3THENN=4ELSEIFN=4THENN=3
770 GOSUB820
780 NEXT
790 IFLEN(U$)=26THEN810
800 NEXTNT
810 HCLS14:HCOLOR0:HPRINT(11,10)
,"***GAME OVER***":HPRINT(9,11),
"FINAL SCORE IS"+STR$(PS):HPRINT
(5,12),"PRESS ANY KEY TO PLAY AG
AIN":EXEC44539:SOUND90,1:I$=INKE
Y$:GOTO50
820 '*****DROP THE LETTERS*****
830 I$="":I$=INKEY$:IFI$=""THEN8
80
840 IFI$<"A"ORI$>"Z"THEN880
850 IFINSTR(U$,I$)=0THENU$=U$+I$
ELSE830
860 PL=INSTR(NA$,I$)+5:FORL=0TO1
8:HCOLOR8:HPRINT(PL,L),I$:HCOLOR
0:HPRINT(PL,L),I$:NEXT
870 IFHPOINT((PL*8)+1,164)<>0THE
NPS=PS+100:FORS=1TO5:SOUND50*S,1
:NEXTS
880 RETURN
890 PALETTEP,RND(47):PLAY"O3V31"
:MN=MN+1:FORX=1TO6:PLAY"T100;"+S
TR$(MN)+";V-;V-;V-":NEXTX:RETURN
900 POKE65496,0:HSCREEN0:RGB:END

```

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Converting artwork into BASIC code

Graphics in a Hurry

By Michael J. Vandall

The most time-consuming part of programming graphics using BASIC is converting artwork on the graphics screen worksheet into BASIC code and then entering the code. *Graphics Programmer* speeds up this process considerably by converting artwork drawn on the screen into BASIC code. The program runs much like a graphics editor. But instead of the graphics screen memory being saved, a BASIC subroutine, around which a BASIC program can be written, is created on disk.

Graphics Programmer uses commands almost identical to those used to program graphics in BASIC. The commands supported are LINE, DRAW, ELLIPSE (also used for circles), PAINT, COLOR, and TEXT. GRID, COORDINATE, REDRAW, ERASE LAST and HELP functions, available through the editor, do not affect the BASIC subroutine created.

Type in the program in Listing 1 and

Michael Vandall, a mechanical engineering student at the University of Washington, learned to program in BASIC on the CoCo 1 when both he and the CoCo were very young. Now he also programs in Pascal and FORTRAN, and away from the computer he likes to ski and motorcycle.

save it. Due to the shortage of space in some lines, be sure to type in the program exactly as listed. A default palette file must be created the first time the program is run. When a prompt for a new or old file appears, press N for new file. Next enter the filename (up to eight characters). The screen clears and a prompt reading "New Palette (Y/N)" appears. Press Y for yes. Since the editor uses the high-resolution Screen 2, the palette holds 15 colors. The program then asks for a color code number for each of the 15 palette slots. The 16th slot is used for the background color of the editor screen. A sample palette is shown in Figure 1 on the following page. These eight colors are a good starting palette. Complete the palette's remaining seven slots with colors of your choice.

After entering a color code for each slot, the "Save New Palette? (Y/N)" prompt appears. Press Y for yes. A default palette file is saved on disk as PALETTE.DBL. This file can be used as a default palette any time the program is run, or a new palette can be created by repeating the process again. A palette can be created for an individual program by following the steps above, but press N for no when asked to "Save New Palette? (Y/N)."

Once the palette has been set up, the graphics screen appears and the color prompt is displayed. Using the arrow keys, position the cursor over the desired color and press C. The color chosen appears in the upper right corner.

The editor is now ready for use. The commands are well supported with prompts and require most of the same variables used by the BASIC commands. Cursor movement is controlled with the arrow keys. The cursor speed can be increased by pressing an arrow key while pressing the CLEAR key. For a quick review of the commands and functions available, press the question-mark key (?). (See Figure 2, following page.)

LINE: First mark the starting point for the line by pressing S. Then mark the end point by pressing E. Enter the appropriate line option (None, B or BF) by pressing the corresponding number. If the B or BF options are to be used, the start and end points of the line should be the upper left and lower right corners of the box.

ELLIPSE: Mark the center point by pressing X, then move the cursor right or left and mark the radius by pressing R. Next enter the ellipse color, height/width ratio, and the start and end points. At this point the ellipse appears.

DRAW: Mark the starting point by press-

ing M. Next enter the direction you want to travel by pressing the appropriate letter, then enter the number of pixels to move in that direction. Press Q to exit.

Slot	Color	CMP	RGB
1	Yellow	36	54
2	Blue	11	9
3	Red	7	36
4	Buff	63	63
5	Cyan	31	27
6	Magenta	9	45
7	Orange	38	38
8	Green	18	18

Figure 1: Sample Palette

COLOR: Place the cursor over the desired color and press C.

PAINT: Mark the edge of the area to be painted by placing the center of the cursor exactly on the edge of the area so that the color where the painting is to stop appears in the center of the cursor. Then press E. Next mark the interior of the area to be painted by moving the cursor somewhere inside the area and press I. Enter the number of the color to be painted, and the area is filled. Note: As in BASIC, the area to be painted must have a complete border of the same color.

TEXT: Move the cursor to the desired location and mark the starting point for the text by pressing P. Enter the text desired, press ENTER, and the text appears. You can use alternate fonts created with Eric Wolf's *Font Master* (October '88, Page 41).

GRID: Key F2 toggles on and off a grid of dots spaced 10 dots apart.

COORDINATES: x,y cursor coordinates can be displayed in the upper right corner of the screen. Toggle on and off with CTRL.

ERASE LAST: Erases last command completed by pressing F1.

REDRAW: Redraws the entire display as saved on disk by pressing ALT.

HELP: Reviews commands and functions on the top of the screen by pressing the question-mark key (?).

QUIT: Quits and saves the drawing in memory to disk. Enter a Y or an N at the "Are You Sure (Y/N)" prompt accordingly. If Y is chosen, the listing of the program created is displayed.

EXIT: Pressing the asterisk key (*) exits the editor without saving the drawing. For a complete demonstration of the program in action, type in the listing for DEMO and save it in the ASCII format (SAVE

"DEMO.BAS", A). Run *Graphics Programmer* and enter an O for old file, then enter DEMO for the program name and watch it being drawn on the screen. You can now add to the DEMO drawing and, by pressing the asterisk key, exit the editor without updating the disk file.

Hints and Tips

Redraw the screen after turning off the grid. This refills any holes left behind from the grid and keeps the "paint" from leaking out around areas you paint after removing the grid. It may also be necessary to redraw the screen after using the ERASE LAST function on a PAINT command. If the paint does not disappear after you use the ERASE LAST function, press the REDRAW key. The drawing should be redrawn without the erased paint. This usually occurs when the paint color is the same as the edge color. The ERASE LAST function has no effect if the REDRAW function is the last function used.

The upper part of the screen is frequently cleared to display the status line. Although part of the drawing may be erased on the screen, the final disk file is not affected.

A directory can be displayed during startup by entering a ? for the program name.

The editor can be aborted without saving the BASIC subroutine by pressing the * key. This should only be used when you don't want your drawing saved or updated.

A command may be aborted at any time by pressing the BREAK key. This allows you to escape from an uncompleted command without affecting the disk file.

All command inputs must be in capital letters.

Due to the use of INKEY\$ and INPUT commands throughout the program, the ENTER key may need to be pressed after some user inputs. If nothing happens after answering a prompt with a key press, try pressing ENTER.

These commands are not supported:

- Color option for HLINE
- Background color for HCOLOR
- Angle, blank move, no update and scale options for HDRAW
- HSET
- HCLS

If a CMP monitor is to be used, change the PALETTE RGB command in lines 10 and 380 to PALETTE CMP.

Disk File

The BASIC subroutine saved on disk is in ASCII format. The subroutine begins with Line 100, which sets up the palette. Line 110 contains the screen mode and color. The last line in the subroutine keeps the screen displayed until you press BREAK.

Any old drawings loaded must be in ASCII and must be free of any commands other than those supported by the editor. The program must have line numbers in increments of 10 and begin at 100. Lines 100 through 120 must be identical in format to those created by the editor.

Graphics Programmer creates a total of four disk files used by the editor: PALETTE.DBL, the default palette file; filename.BAS, the BASIC subroutine created; filename.DAT, the data file used during REDRAW and space removing routines (deleted after use); and EL.DAT, the ERASE LAST data file (deleted after use). Although the last two files are normally deleted after use automatically, they may appear in the disk directory if the editor has been aborted by pressing * or the Reset button. If this happens, these files should be killed to reserve disk space.

(Questions and comments concerning this program may be directed to the author at 20985 Cindy Court, Poulsbo, WA 98370. Please enclose an SASE when requesting a reply.) □

Commands		Functions	
LINE	(press L)	GRID	(press F2)
ELLIPSE	(press E)	COORDINATES	(press CTRL)
DRAW	(press D)	ERASE LAST	(press F1)
COLOR	(press C)	REDRAW	(press ALT)
PAINT	(press P)	HELP	(press ?)
TEXT	(press T)	QUIT	(press Q)
EXIT	(press *)		

Figure 2: Commands and Functions Available in *Graphics Programmer*

W

GAME POINT

SOFTWARE

This Month's Feature

NEW
For CoCo 3

Z'89

by Steve Bjork

A hostile space fortress has been spotted at the outer edge of our galaxy. Destroy this menacing battle platform by navigating your spacecraft with the utmost skill to scale walls; dodge force fields; blow up fuel tanks; dog fight defense ships; evade comets and ultimately disable the powerful robot overlord!

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DONUT DILEMMA

NEW
For CoCo 1, 2

by Nickolas Marentes

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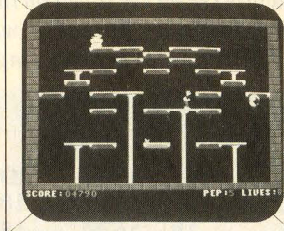
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Rupert Rythm

by Nickolas Marentes

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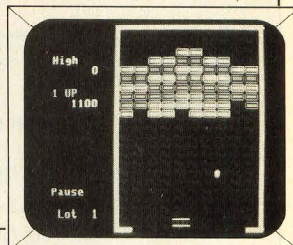
NEW
For CoCo 1, 2, 3

baSh

by Steve Bjork

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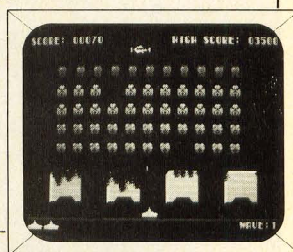


SPACE INTRUDERS

by Nickolas Marentes

Enemy alien creatures have been identified entering our solar system, their destination: our home planet! Their goal: the total annihilation of our race. They must not be allowed to land!

An action arcade game featuring high quality 16 color graphics and sound effects. \$24.95

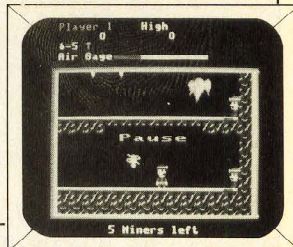


MINE

R E S C U E by Steve Bjork

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Editors Note: RAINBOW ON TAPE/DISK users will need to save both listings together on a separate disk before using Graphics Programmer. Keep in mind, while DEMO is saved on this month's tape and disk in binary format, it will need to be saved in ASCII format before using.

✓	80	.....52	1200	.... 204
	200	.....122	1330	.... 188
	380	.....19	1470	.... 186
	450	.....46	1640	.... 212
	580	.....183	1760	.... 235
	670	.....149	1890	.... 57
	800	.....75	2020	.... 48
	860	.....72	2130	.... 233
	950	.....32	END	.... 246
	1080	.....221		

Listing 1: GRAPHPRO

```

0 'COPYRIGHT 1989  FALSOFT, INC
1 ' Graphics Pro.
2 ' By Michael J. Vandall
3 ' 20985 Cindy Ct.
4 ' Poulsbo, WA 98370
5 ' December 1986
6 '
7 '
8 ' * Initialization *
9 '
10 GOSUB 2230:HSCREEN 2:HBUFF 1,
2416:HBUFF 2,799:HBUFF 3,44:HGET
(0,0)-(300,15),1:HSCREEN0:PALETT
E RGB:CLEAR 2000:ON BRK GOTO 440
20 LN=120:V=96:H=160:Z=1:DIMPL(1
5):WIDTH 40
30 INPUT"NEW DRAWING OR OLD (N/O
)";N$:INPUT"PROGRAM NAME ";NN$:I
F N$="O" AND NN$<>"?" THEN NN$=N
N$+".BAS":FG=1:GOTO 70:ELSE IF N
N$="?" THEN DIR:PRINT:GOTO 30
40 NN$=LEFT$(NN$,8)+".DAT":OPEN
"O",#1,NN$
50 GOSUB 1520
60 PRINT#1,"110HSCREEN2:HCLS0"
70 HSCREEN2:HCLS0:IF FG=1 THEN G
OSUB 1730:GOSUB 630:ELSE GOSUB 6
30
77 '
78 ' * Main Inkey$ *
79 '
80 HGET(0,V-2)-(319,V+2),2
90 HDRAW"BM"+STR$(INT(H))+", "+ST
R$(INT(V))+";C"+STR$(Z)+"ND2NU2N
L2NR2"
100 C$=INKEY$:HPUT(0,V-2)-(319,V
+2),2:VC=V:HC=H
110 IF PEEK(341)=247 THEN V=V-1

```

```

120 IF PEEK(339)=191 AND PEEK(34
1)=247 THEN V=V-4
130 IF PEEK(342)=247 THEN V=V+1
140 IF PEEK(339)=191 AND PEEK(34
2)=247 THEN V=V+4
150 IF PEEK(343)=247 THEN H=H-1
160 IF PEEK(339)=191 AND PEEK(34
3)=247 THEN H=H-4
170 IF PEEK(344)=247 THEN H=H+1
180 IF PEEK(339)=191 AND PEEK(34
4)=247 THEN H=H+4
190 GOSUB 1080
197 '
198 ' * Cursor Subroutines *
199 '
200 IF C$="" THEN 80 ELSE IF C$
="*" THEN END
210 IF C$="S" AND FLG=1 THEN FLG
=0:RETURN
220 IF C$="F" AND FLG=2 THEN FLG
=0:RETURN
230 IF C$="X" AND FLG=3 THEN FLG
=0:RETURN
240 IF C$="E" AND FLG=4 THEN FLG
=0:RETURN
250 IF C$="I" AND FLG=5 THEN FLG
=0:RETURN
260 IF C$="M" AND FLG=6 THEN FLG
=0:RETURN
270 IF C$="M" AND FLG=7 THEN FLG
=0:RETURN
280 IF ASC(C$)=4 THEN GOSUB 1640
:ELSE IF ASC(C$)=189 AND TG<>1 T
HEN TG=1:GOSUB 1080:ELSE IF ASC(
C$)=189 AND TG=1 THEN TG=0:GOSUB
1130
290 IF ASC(C$)=64 THEN RS=1:HPRI
NT(1,0),"REDRAW":PRINT #1,STR$(L
N)+"GOTO"+STR$(LN):CLOSE:GOSUB 1
370:RS=0:GOSUB 1130:GOSUB 1140
300 IF ASC(C$)=103 THEN HPRINT(1
,0),"ERASE LAST":GOSUB 1150:GOSU
B 1130
310 IF C$="L" THEN 400
320 IF C$="?" THEN GOSUB 1710
330 IF C$="C" THEN GOSUB 630
340 IF C$="E" THEN 450
350 IF C$="P" THEN 580
360 IF C$="D" THEN 700
370 IF C$="T" THEN 930
380 IF C$="Q" THEN HPRINT(1,0),"
REALLY WANT TO QUIT? (Y/N)":INPU
T Q$:IF Q$<>"Y" THEN GOSUB 1130:
GOTO 80 ELSE GOSUB 1130:HPRINT(1,
0),"QUIT":PRINT#1,STR$(LN)+"GOTO
"+STR$(LN):CLOSE #1:HSCREEN0:CLS
:PALETTE RGB:GOTO 1370
390 GOTO 80
397 '
398 ' * Line Command *
399 '
400 HPRINT(1,0),"LINE: Mark Star

```



```

t <S>":FLG=1:GOSUB 80:HSET(H,V,6)
)V1=V:H1=H:GOSUB 1130:HPRINT(1,
0),"LINE: Mark Finish <F>":FLG=2
:GOSUB 80:GOSUB 1130:HPRINT(1,0)
,"LINE: Box Option 1.None, 2.B,
3.BF"
410 H2=H:V2=V:A$=INKEY$:IF A$=""
THEN410ELSE IFINSTR("123",A$)=0
THEN 410:ELSE IF A$="1" THEN O$=
"PSET":HLINE(H1,V1)-(H2,V2),PSET
:ELSE IF A$="2" THEN O$="PSET,B"
:HLINE(H1,V1)-(H2,V2),PSET,B:ELS
E IF A$="3" THEN O$="PSET,BF":HLI
NE(H1,V1)-(H2,V2),PSET,B
420 E1=H1:E2=V1:E3=H2:E4=V2:IF A
$="1" THEN E$="L":ELSE IF A$="2"
THEN E$="LB":ELSE IF A$="3" THE
N E$="LF"
430 PRINT#1,STR$(LN)+"HLINE("+STR
R$(H1)+","+"STR$(V1)+")-("+STR$(H
2)+","+"STR$(V2)+")",""+O$:LN=LN+10
440 GOSUB 1130:FLG=0:GOTO 80
447 '
448 ' * Ellipse Command *
449 '
450 HPRINT(1,0),"ELLIPSE: Mark C
enter <X>":FLG=3:B=TG:TG=0:GOSUB
80:HSET(H,V,6):H1=H:V1=V:GOSUB
1130:HPRINT(1,0),"ELLIPSE: Mark

```

```

Radius <R>"
460 IF PEEK(343)=247 THEN H=H-1
ELSE IF PEEK(339)=191 AND PEEK(3
43)=247 THEN H=H-5
470 IF PEEK(344)=247 THEN H=H+1
ELSE IF PEEK(339)=191 AND PEEK(3
44)=247 THEN H=H+5
480 GOSUB 1080:HSET(H,V):FOR X=1
TO 5:NEXT:HRESET(H,V)
490 C$=INKEY$:IF C$<>"R" THEN HR
ESET(H1,V1):GOTO 460
500 IF H>H1 THEN R=H-H1 ELSE R=H
1-H:HSET(H,V,6)
510 GOSUB 1130:HPRINT(1,0),"ELLI
PSE: Color (1-15)":INPUT K$:HPRI
NT(23,0),K$:IF VAL(K$)<1 OR VAL(
K$)>15 THEN 510 ELSE K=VAL(K$)
520 GOSUB 1130:HPRINT(1,0),"ELLI
PSE: Height/Width Ratio (0-255)"
:INPUT H$:HPRINT(37,0),H$:IF VAL
(H$)>255 THEN 520 ELSE H=VAL(H$)
530 GOSUB 1130:HPRINT(1,0),"ELLI
PSE: Start (0-1)":INPUT S$:HPRI
NT(22,0),S$:IF VAL(S$)>1 THEN 530
ELSE S=VAL(S$)
540 GOSUB 1130:HPRINT(1,0),"ELLI
PSE: End (0-1)":INPUT E$:HPRINT(
20,0),E$:IF VAL(E$)>1 THEN 540 E
LSE E=VAL(E$)

```

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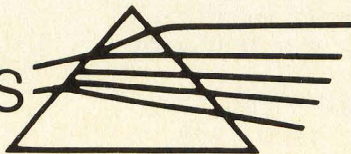
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```

550 HCIRCLE(H1,V1),R,K,H,S,E:E1=
H1:E2=V1:E3=R:E4=H:E5=S:E6=E:E$=
"E"
560 PRINT#1,STR$(LN)+"HCIRCLE("+
STR$(H1)+","+STR$(V1)+"),"R","K"
,"H","S","E
570 LN=LN+10:H=H1:V=V1:TG=B:GOSU
B 1130:GOTO 80
577 '
578 ' * Paint Command *
579 '
580 HPRINT(1,0),"PAINT: Mark Edg
e <E>":FLG=4:GOSUB 80:H1=H:V1=V:
E=HPOINT(H,V):GOSUB1130
590 HPRINT(1,0),"PAINT: Mark Int
erior <I>":FLG=5:GOSUB 80:H2=H:V
2=V:HSET(H1,V1,E):GOSUB 1130:E3=
HPOINT(H2,V2)
600 HPRINT(1,0),"PAINT: Paint Co
lor (1-15)":INPUT K$:HPRINT(27,0
),K$:IF VAL(K$)<1 OR VAL(K$)>15
THEN 600 ELSE K=VAL(K$)
610 HPAINT(H2,V2),K,E:E1=H2:E2=V
2:E4=E:E$="P"
620 PRINT#1,STR$(LN)+"HPAINT("H2
","V2"),"K","E:LN=LN+10:GOSUB 11
30:GOTO 80
627 '
628 ' * Color Command *
629 '
630 HPRINT(0,0),"COLOR: Select C
o. <C>"
640 FOR X=169 TO 309 STEP 10:HCO
LOR X/10-15.9:HLIN(X,0)-(X+10,1
0),PSET,BF:NEXT HC=174
650 HGET(0,3)-(319,7),2:HDRAW"BM
"+STR$(INT(HC))+",5C0ND2NU2NL2NR
2":C$=INKEY$:HPUT(0,3)-(319,7),2
660 IF PEEK(343)=247 AND HC>174
THEN HC=HC-10
670 IF PEEK(344)=247 AND HC<314
THEN HC=HC+10
680 IF C$<>"C" THEN 650 ELSE Z=(
HC/10-16.4):HCOLORZ:GOSUB 1140:I
F FLG=8 THEN FLG=0:RETURN
690 PRINT#1,STR$(LN)+"HCOLOR"+ST
R$(Z):LN=LN+10:GOSUB 1130:RETURN
697 '
698 ' * Draw Command *
699 '
700 HPRINT(1,0),"DRAW: Mark Star
t <M>":FLG=6:GOSUB 80:HSET(H,V,6
):H1=H:V1=V
710 T$=STR$(LN)+"HDRAW"+CHR$(34)
+"BM"+RIGHT$(STR$(H1),LEN(STR$(H
1))-1)+","+RIGHT$(STR$(V1),LEN(S
TR$(V1))-1)
720 GOSUB1130:HPRINT(1,0),"DRAW:
Press Dir. (U,D,L,R,E,F,G,H,M,C)
"
730 D$=INKEY$:IF D$="" THEN 730
ELSE IF ASC(D$)-103 THEN 1260 EL

```

```

SE IF D$="Q" THEN 920 ELSE IF IN
STR("UDLREFGHMC",D$)=0 THEN 720
740 IF ASC(D$)=103 THEN GOSUB 12
60
750 IF D$="M" OR D$="C" THEN 770
760 GOSUB 1130:HPRINT(1,0),"DRAW
: Number of Dots ":HPRINT(22,0),
D$:INPUT N$:HPRINT(24,0),N$:IF V
AL(N$)<1 THEN 760
770 ON INSTR("UDLREFGHMC",D$) GO
SUB 790,800,810,820,830,840,850,
860,870,900
780 GOTO 720
789 ' Draw Up
790 IF V1-VAL(N$)<0 THEN RETURN
ELSE HLINE(H1,V1)-(H1,V1-VAL(N$
)),PSET:T$=T$+"U"+N$:V1=V1-VAL(N$
):GOSUB 910:E$="U":RETURN
799 ' Draw Down
800 IF V1+VAL(N$)>191 THEN RETUR
N ELSE HLINE(H1,V1)-(H1,V1+VAL(N
$)),PSET:T$=T$+"D"+N$:V1=V1+VAL(
N$):GOSUB 910:E$="D":RETURN
809 ' Draw Left
810 IF H1-VAL(N$)<0 THEN RETURN
ELSE HLINE(H1,V1)-(H1-VAL(N$),V1
),PSET:T$=T$+"L"+N$:H1=H1-VAL(N$
):GOSUB 910:E$="L":RETURN
819 ' Draw Right
820 IF H1+VAL(N$)>319 THEN RETUR
N ELSE HLINE(H1,V1)-(H1+VAL(N$),
V1),PSET:T$=T$+"R"+N$:H1=H1+VAL(
N$):GOSUB 910:E$="R":RETURN
829 ' Draw 45 Degree
830 IF H1+VAL(N$)>319 OR V1-VAL(
N$)<0 THEN RETURN ELSE HLINE(H1,
V1)-(H1+VAL(N$),V1-VAL(N$)),PSET
:T$=T$+"E"+N$:H1=H1+VAL(N$):V1=V
1-VAL(N$):GOSUB 910:E$="E":RETUR
N
839 ' Draw 135 Degree
840 IF H1+VAL(N$)>319 OR V1+VAL(
N$)>191 THEN RETURN ELSE HLINE(H
1,V1)-(H1+VAL(N$),V1+VAL(N$)),PS
ET:T$=T$+"F"+N$:H1=H1+VAL(N$):V1
=V1+VAL(N$):GOSUB 910:E$="F":RET
URN
849 ' Draw 225 Degree
850 IF H1-VAL(N$)<0 OR V1+VAL(N$
)>191 THEN RETURN ELSE HLINE(H1,
V1)-(H1-VAL(N$),V1+VAL(N$)),PSET
:T$=T$+"G"+N$:H1=H1-VAL(N$):V1=V
1+VAL(N$):GOSUB 910:E$="G":RETUR
N
859 ' Draw 315 Degree
860 IF H1-VAL(N$)<0 OR V1-VAL(N$
)<0 THEN RETURN ELSE HLINE(H1,V1
)-(H1-VAL(N$),V1-VAL(N$)),PSET:T
$=T$+"H"+N$:H1=H1-VAL(N$):V1=V1-
VAL(N$):GOSUB 910:E$="H":RETURN
869 ' Draw Move
870 GOSUB 1130:HPRINT(1,0),"DRAW

```


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```

: Mark Point <M>":FLG=7:H=H1:V=V
1:GOSUB 80:H2=H:V2=V
880 H3=H1:V3=V1:E$="M"
890 HLINE(H1,V1)-(H2,V2),PSET:T$
=T$+"M"+RIGHT$(STR$(H2),LEN(STR$
(H2))-1)+", "+RIGHT$(STR$(V2),LEN
(STR$(V2))-1):H1=H2:V1=V2:GOSUB
910:RETURN
899 ' Draw Color
900 GOSUB 1130:FLG=8:GOSUB 630:T
$=T$+"C"+STR$(Z):GOSUB 910:RETUR
N
910 IF LEN(T$)>240 THEN PRINT#1,
T$+CHR$(34):LN=LN+10:GOSUB 1130:
GOTO 700 ELSE RETURN
920 PRINT#1,T$+CHR$(34):LN=LN+10
:GOSUB 1130:GOTO 80
927 '
928 ' * Text Command *
929 '
930 TS$="":HPRINT(1,0),"TEXT: Ma
rk Starting Point <P>":H1=0:V1=8
940 HGET(H1,V1)-(H1+8,V1+8),3:HL
INE(H1,V1)-(H1+8,V1+8),PSET,BF:C
$=INKEY$:HPUT(H1,V1)-(H1+8,V1+8)
,3
950 IF PEEK(341)=247 THEN V1=V1-
8 ELSE IF PEEK(342)=247 THEN V1=
V1+8
960 IF PEEK(343)=247 THEN H1=H1-
8 ELSE IF PEEK(344)=247 THEN H1=
H1+8
970 IF H1>311 THEN H1=0 ELSE IF
H1<0 THEN H1=311
980 IF V1>183 THEN V1=0 ELSE IF
V1<0 THEN V1=183
990 IF C$<>"P" THEN 940
1000 H2=INT(H1/8):V2=INT(V1/8):G
OSUB 1130:HPRINT(1,0),"Text ? ":
H1=64
1010 HGET(H1,0)-(H1+8,8),3:HLIN
E(H1,0)-(H1+8,8),PSET,BF:C$=INKEY
$:HPUT(H1,0)-(H1+8,8),3:IF C$=""
THEN 1010 ELSE C=ASC(C$)
1020 IF C>13 GOTO 1050
1030 IF LEN(TS$)>0 AND C=8 THEN
HCOLOR 0:HPRINT((H1+8)/8-2,0),RI
GHT$(TS$,1):H1=H1-8:HCOLOR Z:TS$
=LEFT$(TS$,LEN(TS$)-1):GOTO1010:
ELSE IF C=8 THEN 1010
1040 IF C=13 THEN 1060
1050 IF LEN(TS$)<=40 THEN TS$=TS
$+C$:HPRINT(H1/8,0),C$:H1=H1+8:G
OTO 1010:ELSE SOUND 250,3:GOTO 1
010
1060 HPRINT(H2,V2),TS$
1070 PRINT#1,STR$(LN)+"HPRINT("+
STR$(H2)+", "+STR$(V2)+")", "+CHR$(
34)+TS$+CHR$(34):LN=LN+10:GOSUB
1130:E1=H2:E2=V2:E$="T":GOTO 80
1077 '
1078 ' * Cursor Limiter *

```

```

1079 '
1080 IF H>317 THEN H=2:FG=3:ELSE
IF H<2 THEN H=317:FG=3
1090 IF V>189 THEN V=2:FG=3:ELSE
IF V<2 THEN V=189:FG=3
1100 IF TG=1 AND FG=3 THEN GOSUB
1130:FG=0:ELSE IF TG=1 AND HC=H
AND VC=V THEN RETURN
1110 IF TG=1 THEN HC$=STR$(HC):V
C$=STR$(VC):CO$=RIGHT$(HC$,LEN(H
C$)-1)+", "+RIGHT$(VC$,LEN(VC$)-1
):HCOLOR 0:HPRINT(30,0),CO$:HCOL
OR Z:H$=STR$(H):V$=STR$(V):CN$=R
IGHT$(H$,LEN(H$)-1)+", "+RIGHT$(V
$,LEN(V$)-1):HPRINT(30,0),CN$
1120 RETURN
1127 '
1128 ' * Status Clear & Co. Box
Update *
1129 '
1130 HPUT(0,0)-(300,15),1:RETURN
1140 HCOLOR Z:HLIN(300,0)-(319,
10),PSET,BF:RETURN
1146 '
1147 ' * Erase Last Function *
1148 '
1149 ' Erase Line
1150 IF E$="L" THEN HLINE(E1,E2)
-(E3,E4),PRESET:ELSE IF E$="LB"
THEN HLINE(E1,E2)-(E3,E4),PRESET
,B:ELSE IF E$="LF" THEN HLINE(E1
,E2)-(E3,E4),PRESET,BF
1159 ' Erase Ellipse
1160 IF E$="E" THEN K=HPOINT(E1,
E2):HCIRCLE(E1,E2),E3,K,E4,E5,E6
1169 ' Erase Paint
1170 IF E$="P" THEN HPAINT(E1,E2
),E3,E4
1179 ' Erase Text
1180 IF E$="T" THEN HCOLOR 0:HPR
INT(E1,E2),TS$:HCOLOR Z
1190 IF E$="" THEN GOSUB 1130:HP
RINT(0,0),"LAST ENTRY ALREADY ER
ASED":SOUND 50,5:FOR T=1 TO 500:
NEXT:GOSUB 1130,1140:RETURN
1199 ' Disk File Fix
1200 E$="":CLOSE:RENAME NN$ TO "
EL.DAT":OPEN "I",#2,"EL.DAT":OPE
N "O",#1,NN$
1210 LINE INPUT #2,K$
1220 IF EOF(2)=-1 THEN 1240
1230 PRINT#1,K$:GOTO 1210
1240 CLOSE#2:KILL"EL.DAT"
1250 LN=LN-10:RETURN
1259 ' Erase Draw
1260 IF E$="" THEN 720 ELSE IF E
$="M" THEN 1360
1270 T$=LEFT$(T$, (LEN(T$)-(LEN(N
$)+1)))
1279 ' Erase Up
1280 IF E$="U" THEN HLINE(H1,V1)
-(H1,V1+VAL(N$)),PRESET:V1=V1+VA

```



```

L(N$):E$="":GOTO 720
1289 ' Erase Down
1290 IF E$="D" THEN HLINE(H1,V1)
-(H1,V1-VAL(N$)),PRESET:V1=V1-VA
L(N$):E$="":GOTO 720
1299 ' Erase Left
1300 IF E$="L" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1),PRESET:H1=H1+VA
L(N$):E$="":GOTO 720
1309 ' Erase Right
1310 IF E$="R" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1),PRESET:H1=H1-VA
L(N$):E$="":GOTO 720
1319 ' Erase 45 Degree
1320 IF E$="E" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1+VAL(N$)),PRESET:
H1=H1-VAL(N$):V1=V1+VAL(N$):E$="
":GOTO 720
1329 ' Erase 135 Degree
1330 IF E$="F" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1-VAL(N$)),PRESET:
H1=H1-VAL(N$):V1=V1-VAL(N$):E$="
":GOTO 720
1339 ' Erase 225 Degree
1340 IF E$="G" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1-VAL(N$)),PRESET:
H1=H1+VAL(N$):V1=V1-VAL(N$):E$="
":GOTO 720
1349 ' Erase 315 Degree
1350 IF E$="H" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1+VAL(N$)),PRESET:
H1=H1+VAL(N$):V1=V1+VAL(N$):E$="
":GOTO 720
1359 ' Erase Move
1360 HLINE(H3,V3)-(H2,V2),PRESET
:H1=H3:V1=V3:W$=STR$(H2)+STR$(V2
):L=LEN(W$)+2:T$=LEFT$(T$,LEN(T$
)-L):E$="":GOTO 720
1367 '
1368 ' * Space Remover & Print S
ub. *
1369 '
1370 OPEN "I",#1,NN$:Q=LEN(NN$):
Q=Q-4:NN$=LEFT$(NN$,Q)+".BAS":OP
EN "O",#2,NN$
1380 IF RS=0 THEN PRINT"PROGRAM
LISTING OF ";NN$:PRINT
1390 LINE INPUT#1, L$:L1$=""
1400 P=INSTR(L$," "):L=LEN(L$)
1410 IF INSTR(L$,CHR$(34))>0 AND
P>INSTR(L$,CHR$(34)) THEN P=0
1420 IF P=0 THEN 1450
1430 L1$=L1$+LEFT$(L$,P-1):L$=RI
GHT$(L$,L-P)
1440 GOTO 1400
1450 L1$=L1$+L$:IF VAL(LEFT$(L1$
,4))<>VAL(LEFT$(L2$,4)) AND RS=0
THEN PRINTL2$
1460 L2$=L1$
1470 PRINT#2,L1$
1480 IF EOF(1)<>-1 THEN 1390
1490 IF RS=0 AND F<>0 THEN PRINT

```

```

L1$
1500 CLOSE#1:CLOSE#2:Q=LEN(NN$)-
4:NN$=LEFT$(NN$,Q)+".DAT":KILLNN
$
1510 IF RS=1 THEN NN$=LEFT$(NN$,
LEN(NN$)-4):NN$=NN$+".BAS":GOTO
1730:ELSE END
1517 '
1518 ' * Palette Setup Subroutin
e *
1519 '
1520 CLS:PRINT"PALETTE SETUP":PR
INT
1530 PRINT:INPUT "NEW PALETTE (Y
/N)";P$:IF P$<>"Y" AND P$<>"N" T
HEN 1530:ELSE IF P$="Y" THEN PRI
NT:GOTO 1550
1540 OPEN "I",#2,"PALETTE.DBL":F
OR X=1 TO 15:INPUT#2,PL(X):NEXT
X:CLOSE#2:FOR X=1 TO 15:PALETTE
X,PL(X):NEXT X:PALETTE 0,0:GOTO
1610
1550 FOR X=1 TO 15
1560 PRINT"COLOR";X;" Color Code
";:INPUT P:IF P>63 THEN 1560
1570 PL(X)=P:NEXT X
1580 FORX=1 TO 15:PALETTE X,PL(X
):NEXT X:PALETTE 0,0
1590 CLS:INPUT"SAVE NEW PALETTE?

```



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```

(Y/N)";P$:IF P$<>"Y" THEN 1610
1600 OPEN "O",#2,"PALETTE.DBL":F
OR X=1 TO 15:WRITE #2,PL(X):NEXT
X:CLOSE #2
1610 FOR X=1 TO 15:Q$=Q$+","+"STR
$(PL(X)):NEXT X
1620 Q$="100FORX=0TO15:READW:PAL
ETTE X,W:NEXT X:DATA 0"+Q$
1630 PRINT#1,Q$:RETURN
1637 '
1638 ' * Grid Function *
1639 '
1640 FOR X=0 TO 320 STEP 10
1650 FOR Y=0 TO 191 STEP 10
1660 IF G=0 THEN HSET(X,Y,Z)
1670 IF G=1 THEN HRESET(X,Y)
1680 NEXT Y,X
1690 IF G=0 THEN G=1 ELSE G=0
1700 RETURN
1707 '
1708 ' * Help Command *
1709 '
1710 FOR X=1 TO 12:READ H$:HPRIN
T(1,0),H$:FOR Y=1 TO 400:NEXT Y:
GOSUB 1130:NEXT X:RESTORE:RETURN
:DATA "COLOR: Press <C>","LINE:
Press <L>","ELLIPSE: Press <E>"
1720 DATA"DRAW: Press <D>","PAIN
T: Press <P>","TEXT: Press <T>","
"COORDINATES: On/Off Press <CTRL
>","GRID: On/Off Press <F2>","ER
ASE LAST: Press <F1>","REDRAW: P
ress <ALT>","HELP: Press <?>","Q
UIT: Press <Q>"
1727 '
1728 ' * Redraw Function & Old F
ile *
1729 '
1730 HCLS0:OPEN "I",#1,NN$
1740 LINE INPUT #1,I$
1750 IF INSTR(I$,"GOTO")<>0 THEN
2170
1760 IF VAL(LEFT$(I$,4))=100 THE
N A$=MID$(I$,42):FOR X=0 TO 14:A
=LEN(A$):P$=LEFT$(A$,INSTR(A$,"
")):P=VAL(P$):PL=LEN(P$):A$=RIGH
T$(A$,A-PL):PALETTE X,P:NEXT X:P
ALETTE 15,VAL(A$):GOTO2170
1770 IF VAL(LEFT$(I$,4))=110 THE
N 2170
1780 I=INSTR(I$,"H"):IF I>8 OR I
=0 THEN 2170
1789 ' Color
1790 IF MID$(I$,I,3)="HCO" THEN
HCOLOR VAL(MID$(I$,I+6,2)):GOTO
2170
1799 ' Ellipse
1800 IF MID$(I$,I,3)<>"HCI" THEN
1830 ELSE X=VAL(MID$(I$,I+8,INS
TR(I$,""))):I$=RIGHT$(I$,LEN(I$
)-INSTR(I$,"")):Y=VAL(LEFT$(I$,
INSTR(I$,""))):I$=RIGHT$(I$,LEN
(I$)-INSTR(I$,"")):R=VAL(LEFT$(

```

```

I$,INSTR(I$,""))))
1810 I$=RIGHT$(I$,LEN(I$)-INSTR(
I$,"")):C=VAL(LEFT$(I$,INSTR(I$
,""))):I$=RIGHT$(I$,LEN(I$)-INS
TR(I$,"")):HW=VAL(LEFT$(I$,INST
R(I$,""))):I$=RIGHT$(I$,LEN(I$)
-INSTR(I$,"")):S$=LEFT$(I$,INST
R(I$,"")-1):E$=RIGHT$(I$,LEN(I$
)-INSTR(I$,""))
1820 HCIRCLE(X,Y),R,C,HW,VAL(S$)
,VAL(E$):GOTO 2170
1829 ' Text
1830 IF MID$(I$,I,3)="HPR" THEN
X=VAL(MID$(I$,I+7,INSTR(I$,""))
):I$=RIGHT$(I$,LEN(I$)-INSTR(I$,
,"")):Y=VAL(LEFT$(I$,INSTR(I$,"
"))):I$=RIGHT$(I$,LEN(I$)-INSTR(
I$,"")):I$=LEFT$(I$,LEN(I$)-1):
I$=RIGHT$(I$,LEN(I$)-1):HPRINT(X
,Y),I$:GOTO 2170
1839 ' Draw
1840 IF MID$(I$,I,3)<>"HDR" THEN
2090 ELSE
1850 L=LEN(I$):I$=RIGHT$(I$,L-(I
NSTR(I$,"M"))):L=LEN(I$):H=VAL(L
EFT$(I$,INSTR(I$,""))):I$=RIGHT
$(I$,L-INSTR(I$,"")):L=LEN(I$)
1860 Q1$="":FOR Q=1 TO 3:Q$=MID$
(I$,Q,1):IF INSTR("UDLREFGHMC",Q
$)=0 THEN Q1$=Q1$+Q$:NEXT Q
1870 IF Q1$<>" THEN Q$=Q1$:V=VA
L(Q$)
1880 I$=RIGHT$(I$,L-LEN(Q$)):IF
LEN(I$)=1 THEN 2170
1890 L1=LEN(I$):FORX=1 TO L1:A$=
MID$(I$,X,1):IF INSTR("UDLREFGHM
C",A$)=0 THEN A1$=A1$+A$:GOTO 19
10
1900 W=INSTR("UDLREFGHMC",A$):IF
A1$="" THEN NEXT X
1910 IF INSTR("UDLREFGHMC",MID$
(I$,X+1,1))=0 THEN NEXT X
1920 IF LEN(I$)=0 THEN 2170
1930 L=LEN(I$):A=VAL(A1$):I$=RIG
HT$(I$,L-(LEN(A1$)+1)):A1$="":L=
LEN(I$)
1940 ON W GOSUB 2000,2010,2020,2
030,2040,2050,2060,2070,1960,208
0
1950 IF LEN(I$)<>1 THEN 1890 ELS
E2170
1959 ' Draw Move
1960 H1=A:I$=RIGHT$(I$,L-1):L=LE
N(I$):Z1$="":FOR Z=1 TO 3:Z$=MID
$(I$,Z,1):IF INSTR("UDLREFGHMC",
Z$)=0 THEN Z1$=Z1$+Z$:NEXT Z
1970 IF Z1$<>" THEN Z$=Z1$
1980 V1=VAL(Z$):I$=RIGHT$(I$,L-L
EN(Z$)):HLINE(H,V)-(H1,V1),PSET:
H=H1:V=V1:L=LEN(I$)
1990 RETURN
1999 ' Draw Up
2000 HLINE(H,V)-(H,V-A),PSET:V=V

```




<<< GIMMESOFT >>>



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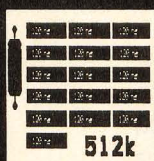
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```

-A:RETURN
2009 ' Draw Down
2010 HLINE(H,V)-(H,V+A),PSET:V=V
+A:RETURN
2019 ' Draw Left
2020 HLINE(H,V)-(H-A,V),PSET:H=H
-A:RETURN
2029 ' Draw Right
2030 HLINE(H,V)-(H+A,V),PSET:H=H
+A:RETURN
2039 ' Draw 45 Degree
2040 HLINE(H,V)-(H+A,V-A),PSET:H
=H+A:V=V-A:RETURN
2049 ' Draw 135 Degree
2050 HLINE(H,V)-(H+A,V+A),PSET:H
=H+A:V=V+A:RETURN
2059 ' Draw 225 Degree
2060 HLINE(H,V)-(H-A,V+A),PSET:H
=H-A:V=V+A:RETURN
2069 ' Draw 315 Degree
2070 HLINE(H,V)-(H-A,V-A),PSET:H
=H-A:V=V-A:RETURN
2079 ' Draw Color
2080 HCOLOR A:RETURN
2089 ' Paint
2090 IF MID$(I$,I,3)<>"HPA" THEN
2120 ELSE I$=RIGHT$(I$,LEN(I$)-
6-I):H$=LEFT$(I$,INSTR(I$,"")):
I$=RIGHT$(I$,LEN(I$)-LEN(H$)):H=
VAL(H$)
2100 V$=LEFT$(I$,INSTR(I$,"")):
I$=RIGHT$(I$,LEN(I$)-LEN(V$)):V=
VAL(V$)
2110 K$=LEFT$(I$,INSTR(I$,"")):
K=VAL(K$):I$=RIGHT$(I$,LEN(I$)-L
EN(K$)):E=VAL(I$):HPAINT(H,V),K,
E:GOTO2170
2119 ' Line
2120 IF MID$(I$,I,3)<>"HLI" THEN
2170 ELSE I$=RIGHT$(I$,LEN(I$)-
5-I):H1$=LEFT$(I$,INSTR(I$,""))
:I$=RIGHT$(I$,LEN(I$)-LEN(H1$)):
H1=VAL(H1$)
2130 V1$=LEFT$(I$,INSTR(I$,"-"))
:I$=RIGHT$(I$,LEN(I$)-LEN(V1$)):
V1=VAL(V1$):H$=LEFT$(I$,INSTR(I$
,"")):H$=RIGHT$(H$,LEN(H$)-1):I
$=RIGHT$(I$,LEN(I$)-LEN(H$)-1):V
$=(LEFT$(I$,LEN(I$)-6)):H=VAL(H$
):V=VAL(V$)
2140 IF INSTR(I$,"BF")<>0 THEN H
LINE(H1,V1)-(H,V),PSET,BF:GOTO 2
170
2150 IF INSTR(I$,"B")<>0 THEN HL
INE(H1,V1)-(H,V),PSET,B:GOTO 217
0
2160 HLINE(H1,V1)-(H,V),PSET:GOT
O 2170
2170 IF EOF(1)<>-1 THEN 1740
2179 ' Disk File Fix
2180 CLOSE #1:OPEN "I",#2,NN$:Q=
LEN(NN$)-4:NN$=LEFT$(NN$,Q)+".DA
T":OPEN "O",#1,NN$

```

```

2190 LINE INPUT#2,L$:PRINT#1,L$
2200 IF EOF(2)<>-1 THEN 2190
2210 LN=VAL(LEFT$(L$,4)):CLOSE #
2
2220 RETURN
2227 '
2228 ' * Title Page *
2229 '
2230 HSCREEN2:PALETTE 0,0:HCLS0:
HCOLOR 8
2240 HLINE(0,0)-(159,191),PSET:H
LINE-(319,0),PSET
2250 HCOLOR2:HLINE(319,85)-(159,
191),PSET:HLINE-(0,85),PSET
2260 HCOLOR3:HLINE(0,152)-(159,1
91),PSET:HLINE-(319,152),PSET
2270 HCOLOR3:HPRINT(10,5),"GRAPH
ICS PROGRAMMER"
2280 HCOLOR2:HPRINT(19,7),"by"
2290 HCOLOR8:HPRINT(11,9),"Micha
el J Vandall"
2300 FOR T=1 TO 10:FOR X=1 TO 75
:NEXT:PALETTE 2,9:PALETTE 3,36:P
ALETTE 8,18:FOR X=1 TO 75:NEXT:P
ALETTE 2,18:PALETTE 3,9:PALETTE
8,36:FOR X=1 TO 75:NEXT:PALETTE
2,36:PALETTE 3,18:PALETTE 8,9:NE
XT
2310 RETURN

```

Listing 2: DEMO

```

100 FORX=0TO15:READW:PALETTEX,W:
NEXTX:DATA0,54,9,36,63,27,45,38,
18,58,47,42,23,7,15,60
110 HSCREEN2:HCLS0
120 HCOLOR10
130 HCIRCLE(55,134),9,10,1.5,0,1
140 HCIRCLE(55,95),9,10,1.5,0,1
150 HCIRCLE(55,55),9,10,1.5,0,1
160 HDRAW"BM55,42R220D92L212"
170 HDRAW"BM63,55R167D13L175"
180 HDRAW"BM55,82R175D13L167"
190 HDRAW"BM55,108R175D13L175"
200 HLINE(55,147)-(255,147),PSET
210 HLINE(255,147)-(275,134),PSE
T
220 HLINE(230,108)-(210,121),PSE
T
230 HLINE(210,95)-(230,82),PSET
240 HLINE(230,55)-(210,68),PSET
250 HPAINT(214,94),11,10
260 HPAINT(214,120),11,10
270 HPAINT(214,66),11,10
280 HPAINT(56,66),11,10
290 HPAINT(56,84),11,10
300 HPAINT(56,125),11,10
310 HCOLOR2
320 HPRINT(8,3),"Graphics Progra
mmer Demo"
330 GOTO 330

```


Calligrapher Special

The Calligrapher (V2.0) for RS-DOS, OS9 and MS-DOS with all 5 Economy Font Packages and the Font Messenger is available at the special price of **\$99.95** (plus \$5 s&h). This is a savings of almost \$40! This special is valid through October 31st. See the descriptions below.

CALLIGRAPHER

CoCo Calligrapher - Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes three 1/2 inch high fonts. Works with many printers such as Epson, Gemini and Radio Shack. Over 135 additional fonts are available (see below). Tape/Disk (RS-DOS); **\$24.95**.

Calligrapher V2.0 - Prints all the same fonts as the CoCo Calligrapher. It reads a standard text file which contains text and formatting codes. You specify the fonts, centering, left, right or full justify, line fill, margin, line width, page size, page break, page numbers, indentation, multiple columns, macros, headers, footers and more. Includes the same 3 fonts with additional fonts available below. Disk only; Specify OS9 or MS-DOS; **\$24.95**.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk with 8 to 10 fonts; Specify RS-DOS, OS9 or MS-DOS format; **\$14.95** each:

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- Set #5 Stars, Hebrew and Victorian;
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- Set #7 Small: Roman, Italics, Cubes, etc;
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- Set #9 Gallant and Spartan;
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Courier
Italics
Screen

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Prestige
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checks
Modern
Tiny Roman
TekTron

Spartan
Gay20
Stars

The Font Messenger - This OS9/MS-DOS utility program allows you to do many things to Calligrapher font files. You may create new fonts, modify existing fonts, invert fonts, compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. (Note: OS9 and MS-DOS font files are identical and need no conversion. Simply copy or upload the files from one OS to the other.) Specify OS9 or MS-DOS; **\$19.95**.

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TIMS Combo Package - All three of the following programs: TIMS, TIMS Mail and TIMS Utility on one disk - **\$34.95**. Save about \$20.00!

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- Zap those Trigs

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SPECIAL INTEREST

Rental Property Income and Expense Management Package - Maintain rental property income and expense records and print reports. 28 expense categories. This program may be tax deductible. Disk only; **\$29.95**.

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All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add \$1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add \$5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

*TRS-80 is a trademark of Tandy Corp.



Use this program to create your own study guides

Super Quiz

By Douglas W. Giles

Super Quiz is a program designed to help both students studying at home and teachers involved with any subject requiring memorization. The program requires 32K and Disk Extended Color BASIC. The program is set up for a single-drive system; however, if you prefer to use a two-disk system, modify the program by deleting the REM statements in lines 216, 229, 301, 315 and 1008, and then inserting a REM statement in Line 1007. When you complete this alteration, the program will run from Drive 0, and your files or data will be stored in Drive 1. A summary of these REM statements can be found in the program following Line 2000.

I use two commands that some CoCo users may not be able to use. The first is POKE 65495,0 and its opposite, POKE 65494,0. These two pokes speed up

and slow down the CoCo 2 for various subroutines. (Use POKE 65497,0 and POKE 65496,0, respectively, if you are using a CoCo 3.) These commands may be found in lines 12, 13, 142, 502, 550, 625 and 636. The second unusual command, EXEC 44539, is found in lines 623 and 1034. This command performs the same function as: 10 A\$=INKEY\$: IF A\$ = "" THEN 10. It is a pause-and-wait-for-key-board input command. I prefer to use EXEC 44539 where possible, simply because it requires less space and looks neater.

When the program is run, a title graphics page is displayed, followed by the main menu. To create more space for the question-and-answer buffer, I have dumped the graphics capability (Line 14) of the program after the original graphics display. However, the computer is restored to its power-up default values when the program is exited through the appropriate prompt on the main menu.

The main menu gives you the following choices: Load Questions, Begin Questionnaire, Quit Program, Save Questions to Disk, Formulate Questions, Print View or Amend, and File Directory.

In the main menu, the computer will identify the file found in the buffer. If the buffer is empty or your questions have not been saved, the file is identified as No Name. If your buffer is empty, choose Load Questions from the main menu. Press the prompt for Save Questions to Disk if your questions are already loaded. Then choose an appropriate filename. In this way, you always know what file is in the buffer. There is also a fail-safe (GOSUB 150) that prevents you from accidentally dumping a newly created question/answer file. The only menu choice that will work at this time is option E, Formulate Questions.

Formulate Questions

The screen display now prompts you to enter Question 1. To exit this routine press @ to return to the main menu. At the prompt, enter Question 1, type in any question you choose (i.e., "How many suns are there in the sky?"). I use inverse video, SHIFT-0, so that during the questionnaire subroutine, questions and answers are easy to read, even with the screen prompts in place.

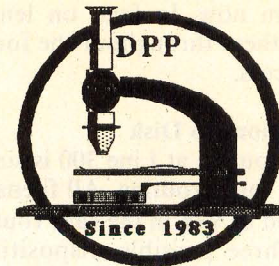
Now that your question is typed, press ENTER. You are now prompted to enter an answer. Once again, using SHIFT-0, enter your answer. Your question/answer is numbered and stored, and you are prompted to enter Question 2. The question/answer numbers are assigned permanently and will ascend to 99, at which time you will be prompted to save the contents and start a new questionnaire. You can use a maximum of 255 bytes for each question and answer (although if you did this for 99 questions and answers, you would run out of memory). For this trial run, enter five question/answer groups.

When you have finished entering five questions and answers, press @ and you will be returned to the main menu. I recommend that at this point, before proceeding to any other subroutine, you save your file. If you have spent a great

Doug Giles is a Lutheran Pastor in northern Canada. His hobbies include literature, language and theology. But when things really get hectic, he can be found working out programs on his Model 4/P or his Color Computer.

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Pyramix

This fascinating CoCo 3 game continues to be one of our best sellers. *Pyramix* is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordan Tsvetkoff and a product of ColorVenture.

The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. *Vocal Freedom* turns your computer into a digital voice recorder. The optional *Hacker's Pac* lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for *Vocal Freedom* is an **automatic message minder**. Record a message for your family into memory. Set *Vocal Freedom* on automatic. When *Vocal Freedom* "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.

Mental Freedom

Would your friends be impressed if your computer could **read their minds**? *Mental Freedom* uses the techniques of Biofeedback to control video game action on the screen. **Telekinesis**? Yes, you control the action with your thoughts and emotions. And, oh yes, **it talks** in a perfectly natural voice without using a

speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675.

BASIC Freedom

Do you ever type in BASIC programs, manually? If you do, you know it can be a real chore. *Basic Freedom* changes all that. It gives you a **full screen editor** just like a word processor, but for **BASIC programs**. Once loaded in, it is always on-line. It hides invisibly until you call it forth with a single keypress! This program is a must for programmers or anyone who types in programs. By Chris Babcock and a product of ColorVenture.

Lightning Series

These three utilities give real power to your CoCo 3.

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This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and **2 Ram drives on-line** and is fully compatible with our printer spooler below.

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High capacity **print spooler for CoCo 3**. Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard! Will operate with any printer you have already hooked to your CoCo.

Backup Lightning

This utility requires 512K. Reads your master disk once and then makes superfast multiple disk backups on all your drives! **No need to format blank disks first!** Supports 35, 40 or 80 track drives.

COCO Braille

Produce standard grade 2 Braille on a Brother daisy wheel printer. Easy to use for sighted or blind user. **No knowledge of Braille is necessary**. Call for free sample. The raised dots produced are easily touch readable by the blind. The print-to-braille algorithm is robust with

errors rarely being made--and, it has the ability to learn!

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Printer Lightning Disk.....\$19.95
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CoCo 1,2, or 3

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deal of time formulating questions and answers, you don't want to accidentally dump them now. In fact, on lengthy files, save them throughout the formulation process.

Save Questions to Disk

The subroutine at Line 300 is simply a filename input routine. All filenames are assigned as YY\$ in the save routine. YY\$ has three possible dispositions. Line 310 verifies if the escape symbol @ (CHR\$(64)) has been depressed and then returns the program to the main menu without losing the current filename. Line 312 determines if YY\$ equals ENTER. If so, it assigns the current filename (ZZ\$) as the same filename to be saved. Finally, if a new filename has been assigned, the program jumps to the subroutine at Line 700 to save.

Thus when you press D, Save Questions to Disk, you will be prompted to enter a filename. You then have three options: escape to the main menu (press @); assign the current filename of questions in buffer to the file to be saved and press ENTER (useful when you have amended or updated an old file, since the old filename is automatically saved); or save an entirely new file. This is the option you should use now.

In this instance assign filename TEST1 and enter. The display changes to advise you that TEST1 is being saved and then returns to the main menu. The computer now identifies TEST1 as the file in the buffer. When saving files, do not assign either extensions or disk designations to your filenames. The extension is assigned by the program (Line 708) in order to facilitate use of the File Directory subroutine. Should you assign either an extension or a disk drive designation, an error will result. To re-enter the program without losing your questions and answers, type GOTO100 and try again.

Begin Questionnaire

The questionnaire subroutine is the heart of the program. It will take a given number of questions (L) and randomly select one ($I=RND(N)$) to ask the user. If the response is correct, the question is dumped from the current buffer ($NN=NN-1$). If the response is wrong, it goes back into the buffer and is asked until the response is correct. The computer has been sped up in this routine (EXEC 44539) to reduce time lapse between question selection. When all the questions have been answered correctly, you are returned to the main menu.

A number appears in the top right-hand corner of the questionnaire display. This indicates the number of questions left in the buffer (N) to answer. It will not change when given an incorrect response, but will decrease by one when given a correct response. If you formulated five questions, this number should now be five.

At this point you can either enter a response (which reinforces the learning process) or simply press ENTER after you have thought about the answer. When ENTER is pressed, the correct answer is displayed and you are prompted to indicate whether your answer is correct (Y), incorrect (N) or if you wish to exit the questionnaire. If you respond (Y), the question on the screen is dumped and a new question appears. You will note that the number in the top left-hand corner is now four, indicating the new total of questions left to answer.

The Y and N responses can be a little slow. Therefore, the program can respond to ENTER for a yes response or, for a no response, through a subroutine (lines 540 and 542). In this manner you can operate the program with one hand, which frees your eyes to concentrate on the screen. This addition does not appear on the screen prompt and must simply be remembered.

I have also designed an abbreviated version of the screen display. In the abbreviated version, you cannot type in your own response to questions, but all other control keys are the same. The abbreviated display is uncluttered and provides a fast review of your study material. To implement the abbreviated screen display, make the following line changes: Insert REM at the beginning of lines 515, 524 and 526. Delete REM in lines 520, 522 and 530. A summary of these REM statements is included in this program beginning at Line 2000.

Add Questions to Quiz

To add questions and answers to a previously formulated questionnaire, choose prompt E, Formulate Questions, at the main menu. We used this subroutine when we first ran the program but now, instead of loading questions, a new submenu appears. There are questions already in the buffer. This new display gives you three choices: Add Questions to Quiz, Start New Quiz and Return to Main Menu.

Let's look at the second two options. If you press B (Start New Quiz), the current file will be dumped and you will lose all your questions and answers. I have included a safeguard at this point;

you are warned that you are about to erase your file (GOSUB 150). If you type Y at the prompt, you are returned to the main menu. The buffer has been cleared and the computer now tells you there is no file in the buffer. You can begin your new quiz by pressing E. However, if at the warning you press N for no, you are returned to the main menu with your file intact.

If you press C (Return to Main Menu), you are returned to the main menu with your current file intact.

If you press A (Add Questions to Quiz), you are returned to the Formulate Questions subroutine (GOSUB 400). The number of the question you are asked to enter is the next ascending number in your file. (Once again you have the option of exiting to the main menu at any point in the process by pressing @.) You can now enter up to 99 questions. When you complete this process, return to the main menu and save your expanded file (Option D). You can retain the same filename by pressing ENTER. There is no need to retype your current filename.

Quit Program

The third option on the main menu is Quit Program. Exit the program through this subroutine rather than using the BREAK key or the reset button. I have dumped all the graphics to make more room for questions and answers, and have sped up the CoCo for faster manipulation of questions. Option D (Quit Program) returns the CoCo to its power-up default values. The Quit routine also checks to see if you have questions in the buffer (which you probably will have if you've been using the program to study) and gives you the chance to save them (Line 140).

Load Questions

The Load Questions subroutine is straightforward. If the buffer is empty, you will simply be prompted to type in a filename. However, if you have a previously loaded or created file in the buffer, you will be warned that you are about to dump your questions and must respond either yes or no before continuing.

Should you enter a filename that does not exist, you will get an NE error in Line 806. Simply type GOTO100 to restore the main menu and try again. Check existing filenames by going to the file directory before loading.

Print, View or Amend

When you press F from the main

menu, you have the choice to print (to your DMP-100 printer), view (to screen) or amend the questions in the current file. Line 627, CHR\$(31), enables the large print mode for file identification at the top of your printout. Line 630, CHR\$(30), disables the large print mode. The only other printer control code used is CHR\$(10), which prints out the current line and inserts a linefeed. This subroutine is set to print out the questions and answers at the fastest speed the DMP-100 can handle (1200 Baud). I did not use a printer control code to do this. Rather, I used the speedup poke in Line 625. The hard copy printout of the questionnaire is useful for reviewing questions in those brief moments away from the CoCo.

The View and Amend subroutines are operated from the same display. When you enter the subroutine, the display gives the name of the file you see and will show you each question and answer, one at a time, in their original

order. Advance to the next question by pressing ENTER or escape the routine by pressing @.

If you wish to change, correct, or otherwise amend a question, press C. The screen will display the current question and ask you to enter the new or amended version. If there is no change, press ENTER and the old question will be retained. If you wish to amend the question, type in the new one and enter. Now the old answer will be displayed, and you can either change or leave it as it is. When you press ENTER at this point, you are returned to the question/answer view display with the question you just changed on the screen. When you get to the end of the questions, you are returned to the main menu.

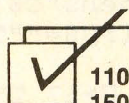
File Directory

The final selection on the main menu is File Directory. This subroutine will list all files on the disk with the exten-

sion .DAT. This extension is automatically assigned to your files in the Save routine (Line 708). The directory display lists 20 files on each display page. Advance through the pages by pressing any key, until all the filenames have been viewed. Once all of the files have been viewed, you are returned to the main menu. This routine reduces the occurrence of NE errors and the possibility of overwriting a file by assigning the same filename to a new file.

One final comment: A small Save routine is hidden in Line 9. I insert this or a similar line in all my BASIC programs. Once you have begun working on your program, you can save both what you've done and a backup to it by typing GOTO 9.

(Questions or comments regarding this program may be directed to the author at P.O. Box 8092, Bonnyville, AB, Canada T9N2J4. Please enclose an SASE when requesting a reply.) □



110 .....139	655 .....179
150 .....158	720 .....93
230 .....156	920 .....116
410 .....171	1000 .....229
515 .....34	2005 .....33
550 .....31	END .....120
630 .....215	

The listing: SUPRQUIZ

```

0 ' COPYRIGHT 1989  FALSOFT, INC
1 'SUPER QUIZ BY:
2 'DOUGLAS W. GILES
3 '530 COUNTRY KNOLL
4 '3093 PEMBINA HIGHWAY
5 'WINNIPEG, MANITOBA
6 'CANADA      R3T 4R6
7 GOTO 10
8 CLS0:VERIFON:PRINT@228,"savin
g"CHR$(128)" QUIZ/RDY:0";:SAVE"Q
UIZ/RDY:0":PRINT@292,"saving"CHR
$(128)" QUIZ/BKP:0";:SAVE"QUIZ/B
KP:0":CLS:PRINT@224," PROGRAM AN
D BACKUP ARE SAVED ":PRINT:PRINT
:PRINT:END
9 'DIMENSION ARRAYS & STARTUP
  GRAPHICS
10 POKE65495,0:GOTO900
11 POKE65494,0
12 SCREEN0,0:CLS3:PMODE0:PCLEAR1

```

```

:CLR18000
16 DIM W$(99),D$(99),R(99)
18 D$=CHR$(125):E$=CHR$(128):F$=
STRING$(10,128):G$=STRING$(5,128
):AA$=STRING$(32,45)
100 '**** startup menu ****
102 CLS(3):SOUND 175,1
106 PRINT@74,"select"E$"one";
108 PRINT@162,E$a"D$E$load"E$
questions"F$;
110 PRINT@194,E$b"D$E$begin"E$
"questionnaire"G$;
112 PRINT@226,E$c"D$E$quit"E$
programme"F$;
114 PRINT@258,E$d"D$E$save"E$
questions"E$to"E$disk"E$E$;
116 PRINT@290,E$e"D$E$formulat
e"E$questions"G$;
118 PRINT@322,E$f"D$E$print"E$
"view"E$or"E$amend"G$;
120 PRINT@354,E$g"D$E$file"E$
directory"F$;
122 IFZZ$=""THENZZ$="NO NAME"
124 IF ZZ$="NO NAME"ANDYY$<>"TH
ENZZ$=YY$
126 PRINT@454,"this"E$is"E$fil
e";E$E$ZZ$;
128 U$=INKEY$:IF U$=""THEN 128
130 U=ASC(U$)
132 IF U<65 OR U>71 THEN 128
134 SOUND 190,1:ON U-64 GOTO 200
,500,140,300,400,600,1000
140 IF N>0 THEN GOSUB 150 ELSE 1

```



```

42
142 CLEAR200:PCLEAR4:PMODE2,1:CL
S:POKE65494,0:CLOSE:END
150 '**BUFFER DUMP FAILSAFE**
152 IF N>0 THEN 154 ELSE RETURN
154 CLS:PRINT@197,"YOU ARE ABOUT
TO ERASE":PRINT@225,"QUESTIONS
CURRENTLY IN BUFFER":PRINT@258,"
DO YOU STILL WISH TO PROCEED":PR
INT@300,"YES/no"
156 SOUND 150,2
158 CLS:PRINT@197,"you"E$"are"E
$"about"E$"to"E$"erase";:PRINT@2
25,"questions"E$"currently"E$"in
"E$"buffer";:PRINT@258,"do"E$"yo
u"E$"still"E$"wish"E$"to"E$"proc
eed";:PRINT@300,"Yes"CHR$(124)"N
o";
160 SOUND 200,2
162 A$=INKEY$:IF A$="Y" THEN RET
URN
164 IF A$="N" THEN 100 ELSE 154
200 '**menu for load questions**
202 IF N>0 THEN GOSUB 150 ELSE 2
16
216 'DRIVE1
218 CLS:PRINT@225,"TO LOAD QUEST
IONS ENTER FILE#";
220 PRINT@294,"OR [0] FOR MAIN M
ENU"
222 FORX=1TO4:SOUND100,2:SOUND15
0,2:NEXT
224 PRINT@362,"=> ";:LINEINPUTZZ
$
225 IF ZZ$=""THEN216
226 IF ZZ$=CHR$(64)THENZZ$="":GO
TO229
228 GOSUB800
229 'DRIVE0
230 GOTO100
300 '**menu to save questions**
301 'DRIVE 1
302 CLS:PRINT@71,"TO SAVE QUESTI
ONS"
304 PRINT@136,"ENTER FILE NAME"
306 PRINT@198,"OR [0] FOR MAIN M
ENU"
307 FORX=1TO4:SOUND100,2:SOUND15
0,2:NEXT
308 PRINT@300,"";:LINEINPUTYY$
310 IF YY$=CHR$(64)THENYY$=ZZ$:G
OTO315
312 IFYY$=""THENYY$=ZZ$
314 GOSUB700
315 'DRIVE0
316 GOTO 100
400 '*** input quest/answers ***
402 IF N>0THEN450
404 CLS:PRINT@4,"PRESS [0] FOR M

```

```

AIN MENU"
406 N=N+1
408 PRINT"ENTER QUESTION"N":":LI
NEINPUTW$(N):SOUND225,1
410 IF W$(N)=CHR$(64)THEN N=N-1:
GOTO100
412 PRINT:PRINT"ENTER ANSWER":":L
INEINPUTD$(N):SOUND225,1
414 CLS
416 IF N<99 THEN 404
418 CLS:PRINT@225,"QUESTION/ANSW
ER BUFFER IS FULL"
420 PRINT@289,"SAVE THESE QUESTI
ONS AND BEGIN"
422 PRINT@364,"NEW QUIZ"
424 FOR QX=1TO150:NEXTQX:GOTO10
0
450 'add to existing quiz
452 CLS3
454 PRINT@74,"select"E$;"one";
456 PRINT@162,"a"D$E$"add"E$"que
stions"E$"to"E$"quiz"E$E$E$;
458 PRINT@194,"b"D$E$"start"E$"n
ew"E$"quiz"F$;
460 PRINT@226,"c"D$E$"return"E$"
to"E$"main"E$"menu"G$;
462 U$=INKEY$:IFU$=""THEN462
464 U=ASC(U$)
466 IF U<65 OR U>67 THEN 462
468 SOUND200,1:ON U-64 GOTO 414,
480,100
480 GOSUB150:GOTO14
500 ' ***** questionnaire *****
502 CLS:POKE65495,0
504 IFN=0THEN100
506 NN=N
508 FORL=1TON
510 I=RND(N)
512 IFR(I)=1 THEN 510
514 CLS
515 PRINT"QUESTION:"
516 PRINT@28,NN
518 PRINT@32,AA$;:PRINTW$(I):PRI
NTAA$;:IF W$(I)=" " THEN A$="Y":
GOTO540
520 REM A$=INKEY$:IF A$=""THEN 5
20
522 REM SOUND 200,1
524 PRINT:PRINT"YOUR RESPONSE:"
:LINEINPUTA$:SOUND 225,1
526 PRINT"THE CORRECT ANSWER IS:
"
528 PRINTD$(I)
530 REM PRINTAA$
532 PRINT@416,"IS YOUR ANSWER RI
GHT (YES OR no)";
534 PRINT@452,"ENTER [0] FOR MAI
N MENU"
536 A$=INKEY$:IFA$=""THEN536
538 IF A$=CHR$(64)THEN GOSUB 668

```


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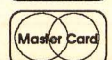
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```

:POKE65494,0:GOTO100
540 IF A$="Y" OR A$=CHR$(13) THE
N R(I)=1:SOUND225,1:NN=NN-1:GOTO
546
542 IF A$="N" OR A$=";" THEN L=L
-1:SOUND150,1:GOTO546
544 GOTO 536
546 NEXT L
548 GOSUB668
550 CLS:POKE65494,0:PRINT@228,"E
ND OF QUESTIONNAIRE"
552 PRINT@323,"MAKE ANOTHER SELE
CTION"
554 FORX=1TO1000:NEXTX:GOTO100
600 '*menu for view/print/amend*
601 IF N<1 THEN 716
603 CLS
604 PRINT@107,"select"E$"one";
605 PRINT@262,"Print"E$"view"E$
or"E$"Amend";
606 U$=INKEY$:IFU$=""THEN606
607 IF U$="V" OR U$="A"THEN640
608 IF U$="P"THEN620
609 GOTO 606
620 'print q/a to printer
621 CLS:SOUND150,2:PRINT@292,"p
ress"E$"any"E$"key"E$"to"E$"cont
inue";
622 PRINT@228,"set"E$"printer"E$
to"E$"baud"E$"1200";
623 EXEC 44539
624 CLS:PRINT@231,"printing"E$
hard"E$"copy";
625 POKE 65495,0
626 FORX=1TO5:PRINT#-2:NEXTX
627 PRINT#-2,CHR$(31)"QUESTIONS
AND ANSWERS FOR FILE "ZZ$
628 FORX=1TO5:PRINT#-2:NEXTX
629 FOR I=1TON
630 PRINT#-2,CHR$(30)TAB(35)"QUE
STION #"I":
631 PRINT#-2,CHR$(10)"Q: ";W$(I)
632 PRINT#-2,CHR$(10)CHR$(10)"A:
";D$(I)
633 PRINT#-2,CHR$(10)CHR$(10)
634 NEXTI
635 FORX=1TO5:PRINT#-2:NEXTX
636 POKE 65494,0:GOTO100
640 'view/amend file
641 FORI=1TON
642 IF W$(I)=W$(0)THEN100
643 CLS:PRINT@0,G$"this"E$"is"E$
"file"E$CHR$(123)ZZ$D$;STRING$(3
9,128);
644 PRINT@64,"QUESTION #"I":
645 PRINT:PRINT"Q: "W$(I)
646 PRINT:PRINT"A: "D$(I)
647.PRINTAA$;" TYPE <ENTER> FOR
NEXT QUESTION":PRINT" <C> TO CHA

```

```

NGE OR <@> TO ESCAPE"
648 SOUND 200,2
649 K$=INKEY$:IFK$=""THEN649
650 IF K$="@ "THEN100
651 IF K$="C" THEN GOSUB 660:GOT
O643
652 IF K$=CHR$(13) THEN 654
653 GOTO 649
654 CLS:NEXT
655 GOTO100
660 'amend file entry
661 CLS:SOUND200,2:SOUND150,2:PR
INT"OLD QUESTION:":PRINTW$(I)
662 PRINT:PRINT"TYPE NEW QUESTIO
N AND <ENTER> OR PRESS <ENTER>
IF NO CHANGE":PRINT:PRINT"=>";:
LINEINPUTNW$
663 CLS:PRINT"OLD ANSWER:":PRINT
D$(I)
664 SOUND200,2:SOUND150,2:PRINT:
PRINT" TYPE NEW ANSWER AND <ENTE
R> OR PRESS <ENTER> IF NO CHAN
GE":PRINT:PRINT"=>";:LINEINPUTND
$
665 IF NW$<>""THEN W$(I)=NW$:NW$
=""
666 IF ND$<>""THEN D$(I)=ND$:ND$
=""
667 RETURN
668 FORL=1TON:R(L)=0:NEXT:RETURN
700 '**** save quiz ****
702 CLS3:SOUND200,2:SOUND150,2
704 PRINT@228,"FILE <"YY$"> NOW
SAVING";
706 IF N<1THEN716
708 OPEN"O",#1,YY$+"/DAT"
710 WRITE #1,N
712 FORL=1TON:WRITE#1,W$(L),D$(L
):NEXT
714 IFN>0THEN724
716 CLS:PRINT@224,"THERE ARE NO
QUESTIONS IN BUFFER"
718 PRINT@293,"MAKE ANOTHER SELE
CTION"
719 YY$="NO NAME"
720 FORX=1TO15:SOUND150,2:SOUND2
00,2:NEXTX
722 CLOSE#1:GOTO100
724 CLOSE#1
726 CLS:RETURN
800 '**** load quiz ****
802 CLS3:SOUND200,2:SOUND150,2
804 PRINT@228,"FILE <"ZZ$"> NOW
LOADING";
806 OPEN"I",#1,ZZ$+"/DAT"
808 INPUT #1,N
810 FORL=1TON:INPUT#1,W$(L),D$(L
):NEXT
812 CLOSE#1

```



```

814 CLS:RETURN
900 '**graphics data & display**
902 CLEAR 200
904 SOUND 100,2
906 PCLEAR4:PMODE 4,1:PCLS:SCREE
N1,1
908 FOR I= 2 TO 110 STEP 2
910 CIRCLE(129,96),I
912 NEXT I
914 SOUND 100,2
916 FOR X=2 TO 120 STEP 1.1
918 CIRCLE(128,96),X,,.2
920 NEXT X
922 'GRAPHIC LETTERING
924 AA$="SUPER QUIZ"
926 DRAW"S8;C0;BM60,99"
932 FOR XX=1 TO LEN(AA$)
934 RESTORE:LL=0
936 READ LL$,CC$
938 IF LL$=MID$(AA$,XX,1)THEN DR
AW CC$:GOTO942
940 LL=LL+1:IF LL<48 THEN 936
942 SOUND 200,1:FORX=1TO10:NEXTX
:SOUND 200,1:NEXTXX
944 DATA " ", "BM+7, 0"
946 DATA"E", "NR4;U3;NR2;U3;R4;BM
+3,+6"
948 DATA"I", "BM+1,0;R1;NR1;U6;NL
1;R1;BM+4,+6"
950 DATA"P", "U6;R3;F1;D1;G1;L3;B
M+7,3"
952 DATA "Q", "BM+1,0;H1;U4;E1;R2
;F1;D3;G1;NH1;NF1;G1;L1;BM+6,0"
954 DATA"R", "U6;R3;F1;D1;G1;L2;N
L1;F3;BM+3,0"
956 DATA"S", "BM+0,-1;F1;R2;E1;U1
;H1;L2;H1;U1;E1;R2;F1;BM+3,+5"
958 DATA"U", "BM+0,-1;NU5;F1;R2;E
1;U5;BM+3,6"
960 DATA"Z", "NR4;U1;E4;U1;L4;BM+
7,6"
970 FORX=1TO2500:NEXT:GOTO13
1000 '**** file directory ****
1002 QQ=0:CLS0:PRINT09,"file"E$
directory";G$E$E$E$E$
1004 PRINT032,STRING$(32,128);
1006 FORGG=3TO11
1007 DSKI$ 0,17,GG,A$,B$
1008 'DSKI$ 1,17,GG,A$,B$
1010 C$=A$+LEFT$(B$,127)
1012 NAM$(0)=LEFT$(C$,8)
1014 EXT$(0)=MID$(C$,9,3)
1016 FOR HH=1TO7
1018 NAM$(HH)=MID$(C$,HH*32+1,8)
1020 EXT$(HH)=MID$(C$,9+HH*32,3)
1022 NEXT HH
1024 FOR HH=0TO7
1026 IF EXT$(HH)="DAT"AND LEFT$(
NAM$(HH),1)<>CHR$(0)THEN PRINTNA
M$(HH),,:QQ=QQ+1:IFQQ>19THENQQ=0
:GOSUB1032
1028 NEXT HH

```

```

1030 NEXT GG:GOSUB1032:GOTO100
1032 PRINT0451,"press"E$"any"E$
key"E$"to"E$"continue";
1034 EXEC 44539:CLS0:RETURN
2000 'SUMMARY OF REM STATEMENTS
2002 '*****
2004 '* BEGIN WITH REM YES/NO *
2005 '* FULL OR SHORT DISPLAY *
2006 '*-----*-----*-----*
2008 '* LINE# * FULL * SHORT *
2010 '*-----*-----*-----*
2012 '* 515 * NO * YES *
2014 '* 520 * YES * NO *
2016 '* 522 * YES * NO *
2018 '* 524 * NO * YES *
2020 '* 526 * NO * YES *
2022 '* 530 * YES * NO *
2023 '*****
2024 '* ONE OR TWO DISK DRIVES*
2025 '*-----*-----*-----*
2026 '* LINE# *1 DSK * 2 DSKS *
2028 '*-----*-----*-----*
2030 '* 216 * YES * NO *
2032 '* 229 * YES * NO *
2034 '* 301 * YES * NO *
2036 '* 315 * YES * NO *
2038 '* 1007 * NO * YES *
2040 '* 1008 * YES * NO *
2042 '*****

```

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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 most of the programs in the last few months have been educational programs, it's time to answer the requests of those who have been asking for games. (After all, isn't that really why we all bought computers?)

To achieve this end and to help me through a rather busy part of the year, I decided to go back and modernize one of my very first games, *Meteor Storm*. (Actually the task was bigger than I anticipated.)

Adios IMB?

Back in the early '80s when the Color Computer first came out, I started a small software writing venture called Illustrated Memory Banks, or IMB. The first game I wrote in BASIC was called *Meteor Storm*, and it was designed to be a variation on the asteroids-type game.

However, Version 1 of *Meteor Storm* was very slow, even with the high-speed poke. It had no onscreen scoring and had a lengthy listing. After selling a few copies, I revised the program. Version 2 was a little faster and added a long onscreen scoring routine. Still the program moved at a snail's pace. (Do you remember *Snail*?)

I had not touched *Meteor Storm* since late 1981 and the subroutines looked like a real jungle once I took out my old listing. (Now I remember why it is a good idea to keep a version with remarks.) As I suspected, the game was still painfully slow, but over the years I've learned a few tricks to speed things up.

First I cut the scoring subroutine down to less than 10 percent of what it was. This helps speed things up greatly. Then I switched from the original PMODE 4 down to PMODE 0. There is a loss of the artifact

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.

Something old and something new

Meteor Storm 3

By Fred B. Scerbo
Rainbow Contributing Editor

colors, but what is picked up in speed more than makes up for that. By going to PMODE 0, I could use the PCOPY command to get a flicker-free animation. I no longer needed to UNDRAW each meteor as it grew in size.

Add to that the removal of some needless subroutines by rewriting in straight code, and you end up with the version listed in this article — almost half the length of the original. It is now twice as fast and is relatively easy to type in. You can still add, somewhere in the listing, a high-speed POKE65495,0 (or POKE65497,0 if you have a CoCo 3). However, don't do this until after you have saved a copy.

I still believe the best way to understand Extended Color BASIC is by typing in someone else's program. The short listing included with this article fits the bill quite nicely.

This game is well-suited to the very young, yet older persons can still enjoy it by using a tougher difficulty level (there are three levels). Upon running the game, select Level 1, 2 or 3 by pressing the appropriate number. You then see a star field with approaching meteors. Use the right joystick and fire button (not the ATARI kind) to take a blast at the target. You'll burn away part of the surface but must hit the meteor at a certain pressure point to turn it into dust. If it gets too close, you take a hit. Five hits and you are dead.

The more advanced levels burn away a smaller part of the meteor. After a while you get the hang of just where to hit the moving targets. After taking five hits, press ENTER to restart the game. That's all there is to it.

Conclusion

After looking at the results, I concluded that *Meteor Storm*, even in its earliest form, is a nice little game. If some of you like these results, I may actually update a few more old classics since they are not available anywhere. Maybe we can even see some high scores listed on the scoreboard.

Let me know what you think. In the meantime I am working on completely new material for upcoming issues. □

✓ 50	221	260	68
90	105	310	101
150	117	END	167
195	197		

The listing: METEOR3

```

1 REM*****
2 REM*   METEOR STORM V.3   *
3 REM*   BY FRED B. SCERBO   *
4 REM*   60 HARDING AVENUE   *
5 REM*   NORTH ADAMS, MA 01247 *
6 REM*   COPYRIGHT (C) 1989   *
7 REM*****
10 PMODE4,1:PCLS0:CLAE500
15 CLS0:PRINTSTRING$(32,188)STRING$(32,204);
20 FORI=1TO 256:READ A:PRINTCHR$(A+128);:NEXT
25 PRINTSTRING$(32,195)STRING$(32,179);
30 PRINT@420,"      BY FRED B.SCER

```



```

BO      ";
35 PRINT@452,"      COPYRIGHT (C) 1
989     ";
40 PRINT@484,"      SELECT LEVEL (1
-3)     ";
45 DATA61,60,59,,,49,62,61,56,61,
60,60,61,53,60,60,62,60,61,52,62
,60,60,58,62,60,60,61,52,62,60,6
0,61
50 DATA53,,,52,59,62,,,53,,,53,51,5
0,,,,,58,,,59,51,,,58,,,53,48,5
9,51,51,55
55 DATA53,,,52,,,53,,,53,,,,,58
,,,58,48,,,58,,,53,48,58,53,51,
60 DATA55,50,,,,,55,50,55,51,51,
55,,,49,59,,,49,59,51,51,58,59,5
1,51,55,49,59,48,52,59
65 DATA67,67,67,67,67,65,67,67,6
7,67,67,65,67,67,67,66,67,67,67,
67,65,67,67,,,65,67,67,,,33,35,35,
35
70 DATA74,,,,,68,68,,,74,,,68,69,,
,,74,69,64,,,69,,,74,68,75,78,,,74,
,36,,,37
75 DATA76,76,76,76,77,,,,,74,,,69
,,,74,69,76,78,76,,,74,,,68,,,74,
,,,44,45
80 DATA75,67,67,67,71,64,,,65,75,
,,69,67,67,67,74,71,66,68,67,65,
75,,,65,75,,,37,35,35,39
85 DIMN$(9):FORI=0TO9:READN$(I):
NEXT
90 DATA BR2U5R3D5NL3,BR4NU5BR,BR
2U3R3U2NL3BD5NL3,BR2R3U3NL2U2NL3
BD5,BR2BU3NU2R3U2D5,BR2R3U3L3U2R
3BD5,BR2U5NR3D2R3D3NL3,BR2BU4UR3
D5,BR2U5R3D2NL3D3NL3,BR2BU3NR3U2
R3D5
95 XA$="NFUFDLNHGHUENFRD2ULND2GL
NENU3HNEUENF2R2NG2F":XB$="NU2NEN
HND2FNHRHGL3EREFDFGLGHUR2GLDFNE
RNU2NERE":XC$="NU2NL2NDNHNGNF2NE
R2NHUNENR2NFNGD2E2HLHLG2FRFR":G
OTO110
100 X=(JOYSTK(0)+6)*4:Y=(JOYSTK(
1)+14)*2:RETURN
105 S(1)=0:S(2)=0:S(3)=0
110 QB$="C0BRNU5RU5RD5RU5RD5RU5R
NL4D2NL4D3L6C1"
115 GS=0:PT=0
120 SL$=INKEY$:IF SL$="1"THEN125
ELSEIF SL$="2"THEN130ELSEIF SL$=
"3"THEN135ELSE120
125 UK=6:GOTO140
130 UK=4:GOTO140
135 UK=2:GOTO140
140 CLS0:PMODE0,3:PCLS0:SCREEN0,
1
145 O=RND(71)+55:J=90
150 W=RND(144)+56:V=30
155 M=RND(50)+150:K=100:F0RT=1TO
120:A=RND(256):B=RND(168):PSET(A

```

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```

RAWKSS$+"BM"+W$+"", "+V$+"C0"+XAS:D
RAWAZ$+"BM"+M$+"", "+K$+XB$:DRAWAO
$+"BM"+O$+"", "+J$+XC$:GOTO160
295 PMODE0,1:PCLS:SCREEN1,1
300 SOUND150,6:PMODE0,1:SOUND150
,6:SCREEN1,0:SOUND150,6:PMODE0,1
:PCLS:SCREEN1,1:GOTO145
305 PMODE0,1:SOUND176,10:SCREEN1
,0:SOUND147,10:SCREEN1,1:SOUND17
6,10:SCREEN1,0:SOUND147,10:SCREE
N1,1:SOUND176,10:SCREEN1,0:SOUND
147,10:PMODE0,1:PCLS:SCREEN1,1:G
OTO145
310 PMODE0,3:SCREEN1,1
315 SCREEN1,1
320 X$=INKEY$:IFX$<>CHR$(13) THEN
320ELSERUN
325 FORI=1TO2:PMODE0,1:SCREEN1,0
:PLAY"03L255BCBC01BCBC":PMODE0,1
:SCREEN1,1:NEXT:RETURN
330 PCOPY4TO3:MS$=STR$(M1):MK=LE
N(MS$)-1:MS$=RIGHT$(MS$,MK):FORI
D=1TO MK:A(ID)=VAL(MID$(MS$,ID,1
)):NEXTID
335 PMODE0,3:LINE(62,188)-(130,1
74),PRESET,BF:DRAW"S8BM64,187"+Q
$:FORSW=1TOID-1:DRAWN$(A(SW))+Q$
:NEXTSW:RETURN
340 PMODE0,3:SOUND150,1:DRAW"S8B
M162,186C5U5D2R3U2D5BR3NU5BR4U5L
2NDR4NDL2D5BR5NHREUHGHERF":DRAW
"S8BM210,187"+QB$+N$(PT):RETURN
345 IF S(1)>57THEN S(1)=56ELSEIF
S(2)>57THEN S(2)=56ELSEIF S(3)>
57THEN S(3)=56
350 RETURN

```



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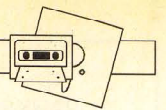
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Spelling is often a dry and boring subject for elementary school students. Many dread learning a new list each week, so teachers often try to present alternate ways of learning such as scrambles, crosswords and secret codes. The belief is that the greater the number of word activities the student is presented with, the more familiar the words become.

I have written a program that puts spelling words into a secret code. The student's task is to decipher words correctly in the shortest amount of time.

A list of spelling words is entered in the data lines. Start off the program by entering the words for numbers one through twenty. This list of numbers is just a sample to illustrate how the program operates. Substitute your own word list for ours when you key in the program. This gives the program meaning for your child or students. If no spelling list is available, a list of famous people or places, science words, math terms, computer terms or any other list of homogeneous words is suitable.

When entering your own data, be certain to place a comma between each entry except for the last one in each data statement.

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.

Suspenseful spelling lessons

Cracking Codes

By Steve Blyn
Rainbow Contributing Editor

Do not put a comma after DATA. Also, let the computer know the total number of items in the data statements. This is accomplished by altering the value of the variable N on Line 30.

The program contains a routine for a substitution of letters that represents a secret code. The code offsets each letter with the letter 13 values away from it. For example, the letter A becomes the letter N, and the letter N becomes the letter A. This proceeds throughout the alphabet and becomes the code.

This switching of letters by the computer is accomplished through the use of the ASCII values built into the computer. Each letter has a corresponding CHR\$() or ASCII number. To test this out, type PRINT

CHR\$(65) and press ENTER. The computer returns the letter A. Next try PRINT CHR\$(90). The letter Z is displayed when you press the ENTER key.

Our code is printed out on the left side of the screen. The code must be seen for the child to decipher the intended spelling word. It is printed by lines 100 and 110. CHR\$(L) represents each letter. The value of L begins at 65 to print out the letter A and is incremented by 1 as it proceeds throughout the alphabet.

Line 200 alters the letters of one of the spelling words to fit the code. If the real letter is between A and M, the computer prints out the letter 13 values *higher* in the alphabet. If the letter is between N and Z, then the letter 13 positions *lower* in the alphabet is displayed. The student is then asked to determine and type in the real spelling word.

A timer is included in the program to add an extra measure of interest. Each student should soon be able to figure out all of the spelling words. The extra challenge of speed should help to focus attention on the program for a longer period of time.

Save the program after you have used it for a list of words. When you have compiled a new list to enter, load the program and change the data lines and the value of N on Line 30. Then save your new list. An endless number of lists can be saved and used later for review purposes if needed.

The listing: CODEWORD

```
10 REM"SPELLING WORD CODE"
20 REM"STEVE BLYN, COMPUTER ISLAND,
  STATEN ISLAND, NY, 1989"
30 XY=RND(-TIMER):N=20:TIMER=0
40 DIM A$(N)
50 FOR T= 1 TO N:READ A$(T):NEXT
  T
60 CLS:PRINT@0,"code    code word
  spelling word";
70 R$=STRING$(32,175)
80 PRINT@32,R$;
90 L=65:R=64:S=66
100 FOR T=1 TO 13:PRINT@R,CHR$(L)
  );"-":R=R+32:L=L+1:NEXT T
110 FOR T=1 TO 13:PRINT@S,CHR$(L)
  ):S=S+32:L=L+1:NEXT T
120 FOR T=0 TO 12:POKE1091+(T*32)
  ),175:NEXT T
130 FOR T=1475 TO 1503:POKE T,17
  5:NEXT T
140 FOR TT=1 TO 5
150 PRINT@68+M,TT;
160 X=RND(N):Y=LEN(A$(X))
170 FOR T= 1 TO Y
180 B$=MID$(A$(X),T,1)
190 P=ASC(B$)
200 IF P>77 THEN P=P-13 ELSE P=P
```

```
+13:REM THIS IS WHERE THE SWITCH
  OCCURS
210 PLAY"L80BAG"
220 PRINT CHR$(P);
230 NEXT T
240 PRINT@81+M,"";:LINEINPUT G$
250 IF G$=A$(X) THEN PLAY"L8CDEF
  GGG":CR=CR+1
260 IF G$<>A$(X) THEN SOUND 10,3
  :PRINT@81+M,A$(X)
270 M=M+64
280 NEXT TT
290 FOR T=1 TO 5:PLAY"L20CEG":NE
  XT T:PRINT@392,"YOU DID";CR;"COR
  RECT";
300 TM=INT(TIMER/60):PRINT@426,"
  IN";TM;"SECONDS.";
310 PRINT@488,"PRESS 'e' OR 'c'"
  ;
320 EN$=INKEY$
330 IF EN$="E" THEN 340 ELSE IF
  EN$="C" THEN RUN ELSE 320
340 CLS:END
350 DATA ONE,TWO,THREE,FOUR,FIVE
  ,SIX,SEVEN,EIGHT,NINE,TEN
360 DATA ELEVEN,TWELVE,THIRTEEN,
  FOURTEEN,FIFTEEN,SIXTEEN,SEVENTE
  EN,EIGHTEEN,NINETEEN,TWENTY
```



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The database contains many different program types specific to the CoCo. For example, some programs downloaded are stored in tokenized BASIC format. When I say a program is tokenized or compressed BASIC, I mean it is in the same form that would appear if you typed in a BASIC program from the keyboard and then typed (C)SAVE "filename". BASIC replaces keywords such as PRINT or PAINT with a one-character token. Since several characters are replaced with a single one, resulting in a smaller file, the term *compressed BASIC* is used. However, the term *tokenized* is also often used.

BASIC tokenizes in order to save space and make program execution faster. Every time BASIC encounters a token, it executes code already existing in your computer. When you have a BASIC program in your computer, it exists in tokenized format.

The other common way to store a BASIC program is in ASCII format, which you can do by typing (C)SAVE "filename",A. The ,A at the end of that line tells your computer to save the program to tape or disk in ASCII (or text) format. By ASCII and/or text, I mean the type of characters (characters/letters that can be seen and recognized) you see on the screen when you tell BASIC to list a program.

You can experiment with a few of your programs by taking a BASIC program you've saved to tape/disk and loading it into the buffer of your terminal program. Now view the buffer — there are all sorts of colored blocks, weird symbols and characters. This *garbage* is the BASIC program in tokenized format.

Now load into the buffer a BASIC program that's been saved in ASCII format. When you view the buffer this time, you can read everything.

For many technical reasons Delphi stores RAINBOW ON TAPE/DISK files in tokenized format. Occasionally there is a tokenized BASIC program in the main database, but this is the exception to the rule and happens only when conditions dictate a tokenized format such as an end-packed code or long line lengths.

Don Hutchison is an electrical engineer and lives in Birmingham, Alabama. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

Why won't that downloaded program run?

Tokenized BASIC

By Don Hutchison
Rainbow Contributing Editor

Suppose you download a tokenized BASIC program and save it to disk as the wrong file type. You can correct the mistake by loading the program into the buffer of your terminal program (assuming you haven't altered it) and resaving it as a tokenized or compressed BASIC program.

All BASIC programs in the Rainbow topic area of the databases are stored in tokenized format, with the exception of BASFIX and TAPCNV. These two programs are utilities designed to help tape-users, so it doesn't do much good to upload them in disk-tokenized BASIC format. In other database areas the BASIC programs are ASCII unless the group description reads otherwise.

Conferences

Color Computer and OS-9 SIG Group Manager Jim Reed (JIMREED) says, "Even though informal get-togethers are a nightly occurrence in our conference area, we have decided to experiment with regularly scheduled formal conferences.

"We've seen that conferences announced in advance have had notable success in other SIGs, so we're asking some established experts and 'CoCo celebrities' to select some specific date and time slots," says Jim, "even though many of the potential hosts are on almost nightly as it is."

The conferences take place on the first Monday of every month at 10 p.m. EDT. Noted programmer Steve Bjork (6809ER) was the first guest in the series. Reed

Database Report

By Gregory A. Law
CoCo SIG Database Manager

In the General Information section **Brian Wright** (POLTERGEIST) contributed a series of messages written by Ron Dinse that describes several differences between the Intel and the Motorola microprocessors. **Mitch Thompson** (MADWAND) posted a picture file by Larry Olson describing how to put your CoCo inside an IBM PC/XT case, and Version 2.1 of *Sled*, a full-screen text editor. **Mike Sweet** (DODGECOLT) uploaded Version 1.2 of *Ed*, a simple full-screen text editor for OS-9 Level II. **John Sebella** (FORBIN1) gave us Version 2.03 of *Galactic Conflict*, *Journey II* that fixes a bug or two and adds some new features. **Raymond Mayeux** (RAYMAYEUX) posted a program to read monthly data files and give a report of events that happened on a given day, as well as a quote-of-the-day program giving a random quote from a user-defined file and a program that reads multiple-choice question-and-answer files you create.

In the Utilities section **Mitch Thompson** uploaded a program that converts codes imbedded in an ASCII file to OS-9 Level II graphics codes — great for creating colored text files — and chipped in the source code to the Zmodem file transfer engine ready to be added to your terminal program. **Roger Krupski** (HARDWAREHACK) gave us a warm-boot program that emulates pressing the Reset button and a cold-boot program that emulates turning the power off and on. **Zack Sessions** (ZACKSESSIONS) posted an update to *Super Directory* that fixes a problem with nonstandard window sizes and donated a command to append several files to a single file. **Tim Koonce** (TIMKOONCE) supplied an alias command that allows you to run complex command lines with a single word. **Steve Ottofy** (SHOTTOFY) contributed a disassembler that creates source code for either the ASM or RMA assembler. **Merle Kemmerly**

commented, "Steve is one of the top game programmers for the Tandy Color Computer, and we're pleased to have him as our first conference guest."

Bjork, who has a number of action games marketed by Tandy as well as his own software company, held his first conferences June 5, July 3 and August 7. They included a question-and-answer period, concentrating the discussion on various aspects of action game programming on the 6809. The CoCo SIG conferences last about an hour.

Another conference host whose time slot will soon be announced is Bill Vergona of Cer-Comp. Jim Reed says that even though staffers like Marty Goodman, Rick Adams, Tim Koonce, Eddie Kuns, Greg Law and Don Hutchison are online nightly, some of them may elect to host regularly scheduled conferences too. Watch THE RAINBOW for details as others hosts join us for regular conferences on the CoCo and OS-9 SIGs.

Classifieds

Another new feature in the CoCo SIG and OS-9 Online is the Classified Ads. While this facility has been available on Delphi for some time, it has just been added

in these two SIGs. Group Manager Jim Reed reports, "New ads are coming in every day. Until now we have encouraged people to list merchandise for sale right in Forum since we consider this information to be a service to our members. But having a separate section brings it all together."

The new CoCo and OS-9 Classifieds section is restricted to hardware only and to private individuals, not businesses. There is no charge for placing an ad, and you can also run an ad for items wanted. Jim says that the Items Wanted classification is just as popular as the For Sale section because certain discontinued items are sometimes difficult to locate.

Creating an ad is simple. "You just follow the prompts," says Reed, "and then the new ad is posted as soon as a staff member has a chance to review it. That's usually within a period of hours."

If you see an item of interest, you contact the advertiser by mail to settle on price or ask any questions. The ad is removed after the sale or after 90 days, whichever occurs first. "All of us have this or that lying around unused, but it is usually so much trouble to place an ad locally that we just let it gather dust," says Jim. "But since this is so easy to do, and the ad is targeted

to people who have a known interest in the Tandy Color Computer, not just the general public at large, we think the advertiser will be spared the types of off-the-wall telephone calls one can get when advertising in mass media." Besides, the price is certainly right.

Orchestra-90 and Disk

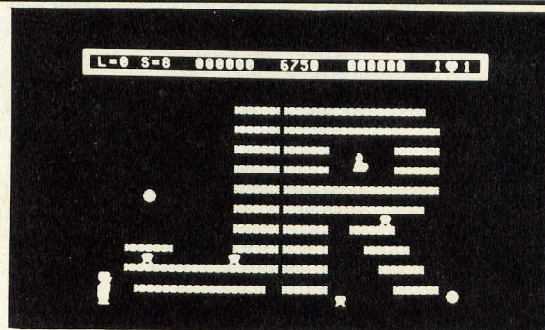
Several SIG users recently purchased the Orchestra-90 Pak at a greatly-reduced price, only to find they had difficulties using the Pak with a CoCo 3. Naturally they turned to the Forum section of the Rainbow SIGs for help.

Mike Ward (MIKEWARD), a musician himself, quickly replied, "My Orchestra-90 Pak has worked with my CoCo 3 and disk drive since I got it. If you look at the docs, you see that you have to enter a D at the opening screen to engage the disk mode. There is also a high-speed mode that can be switched in by pressing SHIFT-ENTER at the very first screen."

The CoCo SIG's database contains many Orchestra-90 music files you can download. The procedure is a little tricky, but it is easy to follow once you're used to it. The problem occurs because Orchestra-90 files are stored in your computer (and on disk or

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tape) in a special binary format, even though they are actually ASCII files.

The usual procedure is to process your Orchestra-90 file through an Orchestra-90-to-ASCII converter program before you upload it. This also means you need to use the reverse procedure after downloading an Orchestra-90 file from the SIG's database. You need a conversion utility called `OCNVRT` to convert the ASCII file back to Orchestra-90's internal format.

Mike Ward has graciously posted his `OCNVRT` utility for just these purposes. `OCNVRT` is available in the Utilities, Music and Rainbow topics of the database.

Getting a DATE

Want to know about a really neat new command on Delphi? It's the `/DATE` slash command. The `/DATE` function has always been available, yet it's been enhanced just recently to show the users some additional information, mostly concerning holidays.

For example, if you want to know how a day is billed on your account, just use the `/DATE` command:

`/DATE Dec 25`

Delphi responds, "Monday December 25, 1989, is billed like a Sunday because it's Christmas Day." So if you need to know on what day of the week a date falls, you can also determine that information from the `/DATE` command.

However, keep in mind that `/DATE` may generate confusing answers. For example: `/DATE JUL 3` causes Delphi to respond, "Monday, July 3, 1989, is billed like a Friday because the next day is Independence Day."

Now if anyone understands how being "billed like a Friday" differs from being "billed like a Monday," he or she is invited to conduct the conference on "Advanced Use of `/DATE`" to be held on the next Delphi holiday that is "billed like a Thursday."

Chatting With Other Computers

It's not hard for you to chat over the phone lines with your apple-headed friend. You don't really need to use a BBS program unless you want to.

Just use your normal terminal program, but set it up for half-duplex and insert line-feeds. If you're using *Mikeyterm*, you can do this easily from the Parameters menu.

The only other requirement is that one of you must set your modem to *auto answer*. For Hayes-compatible modems, use the `AT S0` command (for example, `AT S0=1`). You should see the AA LED illuminated on your modem.

If both of you use terminal programs that support Xmodem, file transfer is also possible. Naturally one computer's programs won't work on the other computer, but you can transfer ASCII files between the two machines. Expect to see some weird things from an Apple, however. As I remember, Apple pads the last Xmodem block with a strange fill character. The fill character represents the number of significant data bytes in the last block or something similar.

Remember that 24-hour help is always available online. No matter how small or insignificant your problem may seem, there is probably someone available to help you. After all, remember that the Rainbow SIGs boast a membership in excess of 7000 members nationwide!

— Don Hutchison

(TOOK3) has furnished *TelStar* Version 3.2.4, which features hot keys, macros, virtual buffers and numerous other capabilities. **Brad Neuberger** (FIDGET) donated the source code to the Fido BBS for those of you interested in converting it from MS-DOS to OS-9.

In the Graphics and Music section, **Jason Ruddock** (JAYR) posted the Beatles' "Hey Jude" in *UltiMuse* format. Tim Koonce submitted a graphics demo that creates string art with a lot of different options to create strange effects and a graphics display utility that displays VEF, MDE, CM3 and a common variant of MGE called "640 Format."

Brian Wright chipped in several sound files for the *Play* utility, including Disruptor Blasts, a General Quarters alarm and a sample from the movie *The Terminator*. Zack Sessions posted *Mixup*, a variant to the Concentration game written by Doug Langcamp and several VEF format pictures, originally `PMODE 4` monochrome images, colorized with *Max9*. **Jim Buck** (COCOROGUE) contributed "Snowbird," "California Girls" and several other *UltiMuse III* songs set up for a Yamaha PSS-480 synthesizer.

CoCo SIG

In the General Information section **Don Hutchison** (DONHUTCHISON) donated a complete up-to-date listing of all the local access numbers for Telenet. **Gay Crawford**

(GAYCRAWFORD) contributed a list of 40 lawn-care pesticides and their known health hazards. Also included is a list of publications and organizations offering advice on chemical-free lawn care. **Frances Calcraft** (FRACALCRAFT) chipped in an article about fixing bugs in auto-starting programs.

In the CoCo 3 Graphics section **Eric Stringer** (NES) chipped in the new *Batman* logo written in BASIC. **Bob Wharton** (BOBWHARTON) furnished the movie logos for *Ghostbusters II* and *Batman* done with *Color Max Deluxe*. **Erik Swenson** (ERIKS) submitted five graphics shorties, each creating interesting designs. **Dan Shargel** (TRIUMPH) posted a *Color Max 3* double-page file of his letter read on *Late Night With David Letterman*. **Travis King** (KING1) uploaded several *MacPaint* pictures including Vanna White, Brooke Shields, the Texas Diller armadillo, the orbiting Space Shuttle, and Scrooge McDuck in his money bin. **Mike Martin** (MPMARTIN) supplied four visages, two faces and two skulls in `PIX` format and some Atari ST graphics images of such favorites as Ronald Reagan and Madonna. **Pete Ellison** (PETEELLISON) contributed a GIF image of *Space Ace* taken by Brian Rhoden with the Rascan video digitizer and a digitized picture of Madonna (also taken with the Rascan video digitizer), saved in MGE format. **Robert Loudon** (KURSE) gave us a

program to be used on a 512K CoCo in conjunction with the GIF viewer to effectively increase the vertical resolution.

In the Utilities and Applications section **Brian Barnes** (ROBOFIGHTER) contributed a program for searching and replacing strings in ASCII BASIC files. **Robert Pierce** (RPIERCE) chipped in with a disk directory utility for the CoCo 3 with an RGB monitor. **Hadley Hazen** (HAZE) gave us a utility that prints directories on a DMP-130 printer. **John Beveridge** (JOHNTORONTO) donated an archive tool that extracts files from several MS-DOS and most CoCo archive formats.

In the Games section **Kelly Thompson** (KMTHOMPSON) submitted a slight revision of the popular *Vulcan* game by FIRE-FLY to include enhanced color and the "no-win scenario." **Marty Goodman** (MARTYGOODMAN) supplied a complete description of the process for transferring the game *Malcolm Mortar* to disk.

In the Music and Sound section **Matt Martin** (JOECOOL) uploaded a *Bells and Whistles* version of Johan Pachelbel's *Canon in D*.

In the Telecommunications section Matt Martin contributed a modified parameter loader written by Bell Haesslein for *GETerm* Version 2.5.



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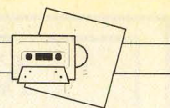


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Novices Niche



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

Music

Marynote by Jon Hobson

16K
ECB

Marynote plays "Mary Had a Little Lamb" and displays one note at a time on the PMODE 4 graphics screen while playing that note. It uses the treble clef scale. Now you can enjoy this song, while learning what notes it actually plays. Remember, from the bottom line to the top space the notes are as follows: E F G A B C D E F G.

The Listing: MARYNOTE

```
0 ' COPYRIGHT 1989  FALSOFT, INC
10 CLS
20 GOSUB250
30 PMODE 4,1:SCREEN1,1:PCLS
40 FORT=10TO50STEP10:LINE(10,T)-(
  (245,T),PSET:NEXTT
50 LINE(10,10)-(10,50),PSET:LINE
  (245,10)-(245,50),PSET:LINE(10,7
  0)-(10,110),PSET:LINE(245,70)-(2
  45,110),PSET
60 FORT=70TO110STEP10:LINE(10,T)
  -(245,T),PSET:NEXTT:FORT=130TO17
  0STEP10:LINE(10,T)-(185,T),PSET:
  NEXTT
70 LINE(110,10)-(110,50),PSET:LI
  NE(180,10)-(180,50),PSET:LINE(11
  0,70)-(110,110),PSET:LINE(180,70
  )-(180,110),PSET:LINE(10,130)-(1
  0,170),PSET
80 LINE(180,130)-(180,170),PSET:
  LINE(185,130)-(185,170),PSET:LIN
  E(110,130)-(110,170),PSET
90 LINE(10,10)-(10,50),PSET:LINE
  (245,10)-(245,50),PSET
100 DRAW"BM25,105;XA$;"
110 DRAW"BM25,45;XA$;"
120 DRAW"BM25,165;XA$;"
130 DRAW"BM50,15;XHD$;"
```

```
140 PLAY"E"
150 DRAW"BM65,20;XHD$;":PLAY"D":
  DRAW"BM80,25;XHU$;":PLAY"C":DRAW
  "BM95,20;XHD$;":PLAY"D"
160 DRAW"BM120,15;XHD$;":PLAY"E"
  :DRAW"BM135,15;XHD$;":PLAY"E":DR
  AW"BM150,15;XHD$;":PLAY"E"
170 DRAW"BM165,17;XHR$;":PLAY"P5
  "
180 DRAW"BM190,20;XHD$;":PLAY"D"
  :DRAW"BM205,20;XHD$;":PLAY"D":DR
  AW"BM220,20;XHD$;":PLAY"D":DRAW"
  BM235,22;XHR$;":PLAY"P5"
190 DRAW"BM50,75;XHD$;":PLAY"E":
  DRAW"BM65,65;XHD$;":PLAY"G":DRAW
  "BM80,65;XHD$;":PLAY"G":DRAW"BM9
  5,67;XHR$;":PLAY"P5"
200 DRAW"BM120,75;XHD$;":PLAY"E"
  :DRAW"BM135,80;XHD$;":PLAY"D":DR
  AW"BM150,85;XHU$;":PLAY"C":DRAW"
  BM165,80;XHD$;":PLAY"D"
210 DRAW"BM190,75;XHD$;":PLAY"E"
  :DRAW"BM205,75;XHD$;":PLAY"E":DR
  AW"BM220,75;XHD$;":PLAY"E":DRAW"
  BM235,75;XHD$;":PLAY"E"
220 DRAW"BM45,140;XHD$;":PLAY"D"
  :DRAW"BM60,140;XHD$;":PLAY"D":DR
  AW"BM75,135;XHD$;":PLAY"E":DRAW"
  BM90,140;XHD$;":PLAY"D"
230 DRAW"BM120,145;XHU$;":PLAY"C"
  :DRAW"BM135,143;XDW$;":PLAY"P15
  "
240 GOTO240
250 A$="U30R3F2D3G4L2G6D8F3R8E3U
  5H4L3G4D3F3R2E2U2"
260 HD$="U1D2F1R3E1U2H1L3G1D10"
270 HU$="U1D2F1R3E1U2H1L3G1U7"
280 HR$="L3R7L2U3L3D3"
290 DW$="L3R7L2D3L3U3D3R3U3R2BR3
  BD2R1"
300 RETURN
```


Computer Aided Design by Evan Haveman

CoCo 3

This program demonstrates CAD (Computer Aided Design) at a minimal level. The instructions are simple. When you first run the program, a question mark appears. Just type in a draw string and that becomes your symbol number 0; then 1; then 2, etc. If you don't want any special symbols, just press ENTER. The following is a description of all the keys used in the program:

T=move diagonally up and to the left
Y=move up
U=move diagonally up and to the right
G=move left
H=move right
V=move diagonally down and to the left
B=move down
N=move diagonally down and to the right
C=change color
Q=clear screen
0-9=draw previously made symbol

I have set the drawing cursor to move ten steps in the required

direction, but you can change the number of steps by changing the 10 in lines 50 through 120 to the number of steps you prefer.

The Listing: MINICAD

```

Ø ' COPYRIGHT 1989  FALSOFT, INC
    ***M I N I  C A D***
      BY EVAN HAVEMAN

1 C=Ø
2 NU$="123456789Ø"
1Ø ON BRK GOTO 17Ø
2Ø POKE65497,Ø
21 WIDTH 4Ø
22 INPUT D1$:INPUT D2$:INPUT D3$
:INPUT D4$:INPUT D5$:INPUT D6$:I
NPUT D7$:INPUT D8$:INPUT D9$:INP
UT DØ$
3Ø RGB:HSCREEN2:PALETTEØ,Ø
4Ø I$=INKEY$:IF I$="" THEN 4Ø
5Ø IF I$="T" THEN M$="-1Ø,-1Ø":G
OTO 15Ø
6Ø IF I$="Y" THEN M$="+Ø,-1Ø":GO
TO 15Ø
7Ø IF I$="U" THEN M$="+1Ø,-1Ø":G

```

ALPHA SOFTWARE TECHNOLOGIES

COMM - 4

ATTENTION!!! Alpha software technologies has teamed up with COCO Devices to bring you the incredible COMM-4 port! 4 ports in one slot! That's right 4 users at one time! Special pulsed IRQ line helps to prevent lockups! External IRQ line allows you to run multiple paks for a total of 8 ports available! Totally compatible 6551 technology, no special drivers needed! A must have for ANY BBS user! You'll be the talk of the town with a 4 node BBS system! A perfect match for OS9 Level II BBS!\$124.95

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Send check or money order to: Alpha Software Technologies, P.O. Box 16522, Hattiesburg MS. 39402 (504)649-5176

Please add \$3.00 Shipping and handling, all orders shipped same day via first class mail. Most orders arrive in 2 to 3 days. COD orders add \$2.50 extra.


```

OTO 150
80 IF I$="G" THEN M$="-10,+0":GO
TO 150
90 IF I$="H" THEN M$="+10,+0":GO
TO 150
100 IF I$="V" THEN M$="-10,+10":
GOTO 150
110 IF I$="B" THEN M$="+0,+10":G
OTO 150
120 IF I$="N" THEN M$="+10,+10":
GOTO 150
130 IF I$="C" THEN C=C+1:IF C>15
THEN C=0:HDRAW "C"+STR$(C) ELSE
HDRAW "C"+STR$(C):GOTO 40
140 IF I$="Q" THEN HCLS0:GOTO 40
141 ON INSTR(NU$,I$) GOSUB 2001,

```

```

2002,2003,2004,2005,2006,2007,20
08,2009,2000
142 GOTO 40
150 HDRAW "M"+M$+"C"+STR$(C)
160 GOTO 40
170 RGB:WIDTH 80:POKE65496,0:END
2000 HDRAW D0$:RETURN
2001 HDRAW D1$:RETURN
2002 HDRAW D2$:RETURN
2003 HDRAW D3$:RETURN
2004 HDRAW D4$:RETURN
2005 HDRAW D5$:RETURN
2006 HDRAW D6$:RETURN
2007 HDRAW D7$:RETURN
2008 HDRAW D8$:RETURN
2009 HDRAW D9$:RETURN

```

SprayCan by Joseph Pendell

16K
ECB

Spraycan is a graphics program that draws a special pattern positioned by the right joystick each time the fire button is pressed. The best effect is when using a composite monitor or TV, so the artifact colors show up. Also, the speed-up poke causes better joystick response. If your computer cannot take the speed-up poke, delete Line 30. A tip for using the program is to hold down the joystick button while moving the joystick in a small circle, causing a cluster to be drawn. Two changes are required to use the program on a CoCo 3. First, change Line 30 to POKE 65497,0. Second, change Line 180 to IF BUTTON(0)=1 THEN GET(X,Y)-(X+9,Y+9),B.

The Listing: SPRAYCAN

```

0 ' COPYRIGHT 1989  FALSOFT, INC
10 REM SPRAYCAN
20 REM BY JOSEPH PENDELL
30 POKE 65495,0
40 DIM A(10),B(10)

```

```

50 PMODE4,1:PCLS
60 FORI=1 TO 20:READ X,Y:PSET(X,
Y):NEXT I
70 DATA 2,0,4,0,6,0,8,1,1,2,3,2,
6,2,9,3
80 DATA 0,4,2,4,7,4,4,5,9,5,0,6,
6,6
90 DATA 3,7,8,7,1,8,6,8,4,9
100 GET(0,0)-(9,9),A,G
110 PCLS
120 GET(0,0)-(9,9),B
130 SCREEN 1,1
140 X0=0:Y0=0
150 X=JOYSTK(0)/63*245:Y=JOYSTK(
1)/63*181
160 IF X<>X0 OR Y<>Y0 THEN PUT(X
0,Y0)-(X0+9,Y0+9),B:X0=X:Y0=Y:GE
T(X,Y)-(X+9,Y+9),B
170 PUT(X,Y)-(X+9,Y+9),A,OR
180 IF (PEEK(65280)=126 OR PEEK(
65280)=254) THEN GET(X,Y)-(X+9,Y
+9),B
190 GOTO 150

```

Fun With Fractals by Andre Needham

CoCo 3

I know, a lot of you are saying, "what are fractals, and why are they fun?" Well, I'll tell you. Fractals are images generated using the methods of fractal geometry, using iterative (repetitive) functions. Sounds too technical? Don't worry, the two programs below can be typed in and run with little or no mathematical knowledge of the underlying concepts.

Fractals are fun because they are an easy way to draw natural looking objects, such as trees, clouds or, in the case of my first program, mountains. They can also be used to produce unnatural objects such as the Mandelbrot or Julia sets, as my second program demonstrates.

The first program, *Fractmtn*, produces a mountain with a snowy peak and patches of snow farther from the peak. Just type the listing in and run it. You are asked to enter your monitor type (C for Composite, R for RGB), and in less than a minute the program begins drawing small triangles calculated from one large one. It does this by splitting it up and moving the endpoints of the pieces around randomly. Sometimes a triangle is too small and the program misses when it attempts to paint the triangle. This results in what looks like a disaster; as the program continues, however, the rest of the mountain is drawn correctly.

When the mountain is finished, the program begins calculating a new mountain. To stop this cycle, press BREAK or just let it run and watch more mountains grow.

The second program, *Juliaset*, produces strange-colored patterns of an apparently random type. However, they are not actually

random, but generated from an imaginary (in the mathematical sense only; it does exist) iterative function.

To get going, just type the program in and run it. The computer asks you to press 1 for low iterations, or 2 for high iterations. Basically, Option 1 draws faster (about four hours on the average), but with less detail. Option 2 takes about eight hours (You might want to run it overnight with your disk drive and monitor turned off.) and offers more fine detail.

Next you must input the x and y coordinates that the set will be drawn from. These should both be between -1.5 and 1.5. Three sets that produce more unusual patterns are .320, -.0430; -.74543, .11301; and -1.350, 0. If you want to see a Julia set without waiting eight hours, there is one pictured in the *National Geographic* (June '89, Page 750). This is a more detailed mirror image of the first set of coordinates listed above. Above it on the same page is the Mandelbrot set, and on the next page are some very detailed fractal mountains.

Once the program finishes drawing the picture, it stays in an infinite loop until you press BREAK. If you want to save the resulting picture from either program, you might try the listing in Bill Bernico's "Basically Speaking" column (January '89 issue, Page 84).

Listing 1: FRACTMTN

```

Ø ' COPYRIGHT 1989  FALSOFT, INC
5 ' FRACTAL MOUNTAIN PROGRAM
6 ' BY ANDRE NEEDHAM
7 ' P.O. BOX 2516
8 ' RENTON, WA 98056
1Ø DIMX(32,32),Y(32,32):ON BRK G
OTO 34Ø
2Ø INPUT"(C)OMPOSITE OR (R)GB";Q
$:PRINT"JUST A MINUTE..."
3Ø POKE65497,Ø:I=5:II=32:R=.4
4Ø X(Ø,Ø)=16Ø:Y(Ø,Ø)=2Ø:X(II,Ø)=
31Ø:Y(II,Ø)=14Ø:X(Ø,II)=1Ø:Y(Ø,I
I)=14Ø
5Ø FORT=I TO1 STEP-1:Q=2^T
6Ø A=Ø:B=Ø
7Ø AA=A+Q:A2=A+Q/2:X(A2,B)=(X(A,
B)+X(AA,B))/2+RND(2*Q+1)-Q-1:Y(A
2,B)=(Y(A,B)+Y(AA,B))/2+(RND(2*Q
+1)-Q-1)*R 'ACROSS
8Ø A=A+Q:IF INT(A+B+.Ø1)=II THE
N A=Ø:B=B+Q:IFB>II THEN 1ØØ
9Ø GOTO7Ø
1ØØ A=Ø:B=Ø
11Ø BB=B+Q:B2=B+Q/2:X(A,B2)=(X(A
,B)+X(A,BB))/2+RND(2*Q+1)-Q-1:Y(
A,B2)=(Y(A,B)+Y(A,BB))/2+(RND(2*
Q+1)-Q-1)*R 'DOWN
12Ø B=B+Q:IF INT(A+B+.Ø1)=II THE
NB=Ø:A=A+Q:IFA>II THEN 14Ø
13Ø GOTO11Ø
14Ø A=Ø:B=Ø
15Ø AA=A+Q:BB=B+Q:A2=A+Q/2:B2=B+
Q/2
16Ø X(A2,B2)=(X(AA,B)+X(A,BB))/2
+RND(2*Q+1)-Q-1:Y(A2,B2)=(Y(AA,B
)+Y(A,BB))/2+(RND(2*Q+1)-Q-1)*R
'DIAGONAL
17Ø A=A+Q:IF INT(A+B+.Ø1)=II THE
N A=Ø:B=B+Q:IFB>II THEN 19Ø
18Ø GOTO15Ø

```

```

19Ø NEXT
2ØØ HSCREEN2:PALETTEØ,Ø:PALETTE3
,63:HCOLOR4,Ø:IFQ$="R" THENPALET
TE2,56 ELSE PALETTE2,32
21Ø HCLS2
22Ø FORA=ØTO II-1:FORB=ØTO II-1:
R=X(A,B):S=Y(A,B):HDRAW"BM=R; ,=S
; ":HLINE-(X(A,B+1),Y(A,B+1)),PSE
T:HLINE-(X(A+1,B),Y(A+1,B)),PSET
:HLINE-(X(A,B),Y(A,B)),PSET 'D
RAW TRIANGLES
23Ø IFA+B+1<II THEN R=X(A,B+1):S
=Y(A,B+1):HDRAW"BM=R; ,=S; ":HLINE
-(X(A+1,B+1),Y(A+1,B+1)),PSET:HL
INE-(X(A+1,B),Y(A+1,B)),PSET
24Ø XX=(X(A,B+1)+X(A+1,B+1)+X(A+
1,B))/3:YY=(Y(A,B+1)+Y(A+1,B+1)+
Y(A+1,B))/3 'FIND TRIANGLE MIDPO
INT FOR PAINT
25Ø IF Y(A,B)-RND(55)-55<Ø THEN
CX=3 ELSE CX=2 'MAKE TOP OF MO
UNTAIN MORE "SNOWY"
26Ø IF A+B+1<II THEN HPAINT(XX,Y
Y),CX,4
27Ø IF Y(A,B)-RND(55)-55<Ø THEN
CC=3 ELSE CC=2
28Ø XX=(X(A,B)+X(A,B+1)+X(A+1,B)
)/3:YY=(Y(A,B)+Y(A,B+1)+Y(A+1,B)
)/3:HPAINT(XX,YY),CC,4 'FIND O
THER TRIANGLE'S MIDPOINT
29Ø IFA+B+1=II THEN 31Ø
3ØØ NEXTB
31Ø NEXTA
32Ø HLINE(Ø,14Ø)-(1Ø,14Ø),PSET:H
LINE(31Ø,14Ø)-(319,14Ø),PSET:HPA
INT(Ø,139),5,4
33Ø GOTO3Ø
34Ø HSCREENØ:POKE65496,Ø

```

Listing 2: JULIASET

```

Ø ' COPYRIGHT 1989  FALSOFT, INC
1 POKE65497,Ø
2 INPUT"ITERATIONS: 1=LOW, 2=HIG
H";Z:IFZ<1 OR Z>2 THEN 2
3 INPUT"COORDINATES";CC,CI
1Ø HSCREEN2:FORT=ØTO11:READX:PAL
ETTET,X:NEXT:DATAØ,15,24,26,22,5
Ø,51,52,36,47,6Ø,63
3Ø XL=-1.5:YL=-1.5:XH=1.5:YH=1.5
:DX=(XH-XL)/2ØØ:DY=(YH-YL)/2ØØ
4Ø FORNX=1ØØ TO 1 STEP-1:FORYN=5
TO195
5Ø X=XL+NX*DX:Y=YL+NY*DY:K=Ø:A=X
*X:B=Y*Y
6Ø FORK=1TO88*Z:D=A-B+CC:Y=X*2*Y
+CI:X=D:A=X*X:B=Y*Y:IFA+B>32 THE
N7Ø ELSENEXT
7Ø C=INT(K/(8*Z)):IFC=Ø THEN 11Ø
1ØØ HSET(NX+6Ø,NY-5,C):HSET(26Ø-
NX,195-NY,C)
11Ø NEXTNY,NX
12Ø GOTO12Ø

```


The Time Sheet by Kyle Ketchel

16K
ECB

This program was written for those who own their own business and employ others. It's nice and short so you don't have to spend long hours typing it in. Once you've keyed it in, save the program to tape or disk, whichever you prefer. Then run it. The first prompt tells you what the program is and what it does if you continue. Then it asks you to enter your company's name, address and telephone number. Finally it asks how many copies of that address you want printed.

Timesht is set up on an Olivetti PR2300 ink-jet printer. I know there aren't very many around, so you will have to replace some of the lines with your own printer requirements. (See Table 1.)

The listing: TIMESHT

```
0 ' COPYRIGHT 1989  FALSEFT, INC
10 '**WEEKLY TIME SHEET**
20 '*MAIN SCREEN*
30 CLEAR1000
40 CLS:PRINT@39,"WEEKLY TIME SHE
ET"
50 PRINT@96,"THIS PROGRAM WILL P
RINT A WEEKLY TIME SHEET FOR YOU
R EMPLOYEES."
51 LINE INPUT "YOUR COMPANY NAME
:";Q$
52 LINE INPUT "COMPANY ADDRESS
:";R$
53 LINE INPUT "CITY, STATE, ZIP
:";S$
54 LINE INPUT "TELEPHONE #.
:";U$
60 PRINT:INPUT "HOW MANY COPIES "
;X
70 PRINT:PRINT "HOLD ON, I'M PRI
NTING.....":FORI=1TOX
80 '**PRINTING INFO**
90 PRINT#-2,CHR$(27);"3";CHR$(27
);"1";CHR$(27);"*1";Q$
100 PRINT#-2,CHR$(27);"4";CHR$(2
7);"%" ;CHR$(27);"+"
110 PRINT#-2,TAB(41);R$
120 PRINT#-2,TAB(41);S$
130 PRINT#-2,TAB(41);U$
150 PRINT#-2,CHR$(27);"&3":PRINT
#-2,TAB(30);"WEEKLY TIME SHEET"
160 PRINT#-2,CHR$(27);"*0"
170 A$=STRING$(35," ") :B$=STRING
$(15," ") :C$=STRING$(6," ") :D$=S
TRING$(28," ") :F$=STRING$(75," ")
):G$=STRING$(75," ") :H$=STRING$(
75," ") :J$=STRING$(10," ")
180 PRINT#-2,"YOUR NAME:";A$;"WE
EK DATE:";B$
190 PRINT#-2,"DAY";C$;"TIME IN";
```

Line

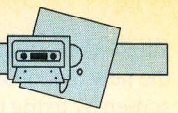
- 90 - This line sets up the printer for double width and double height characters.
- 100 - Turns off double width and double height characters.
- 150 - Sets up vertical spacing to three spaces.
- 160 - Turns on the underlining.
- 200 - Switches from 10 cpi to 12 cpi.
- 260 - General reset of all printer functions.

Table 1: Printer Set-Up Lines

```
C$;"LUNCH OUT";C$;"LUNCH IN";C$;
"TIME OUT";C$
200 PRINT#-2,CHR$(27)"=";"SUN :
";F$
210 PRINT#-2,"MON :";F$
220 PRINT#-2,"TUES :";G$
230 PRINT#-2,"WED :";F$;PRINT#-
2,"THURS:";H$
240 PRINT#-2,"FRI :";F$
245 PRINT#-2,"SAT :";F$
250 PRINT#-2,"TOTAL HOURS:";J$;"
AMOUNT PAID:";J$
260 PRINT#-2,CHR$(27);"0"
270 NEXTI
280 CLS:PRINT@256,"WOULD YOU LIK
E TO RETURN TO THE MAIN SCREEN":
INPUT M$
290 IF M$="Y" THEN 20
300 IF M$="N" THEN 310
310 '**ENDING SCREEN**
320 CLS:PRINT@196,"THANK YOU FOR
USING ONE OF THE FINE PR
ODUCTS FROM-":FORX=1TO1500
330 NEXTX
340 CLS(0):PRINT@229,"* KETCH EN
TERPRISES *"
350 FORT=1TO2000:NEXTT:POKE113,3
:EXEC40999
```

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

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



*Eliminate the tedious chore of swapping disks
while saving half-screens*

High-Capacity Screen Dumps for the Shoestring Desktop Publisher, Part 3

By H. Allen Curtis

In this article I include what I did not have space for in Part 2: information on how to give DESKTOPH the ability to save and load a half-screen — specifically the left half. I also want the driver programs, DRIVERHT and DRIVERHE, to load and process such half-screens. These capabilities allow DESKTOPH to save on one side of a single disk all 12 half-screens required for a three-column printout produced in the 800- or 960-dots-per-line graphics mode. The capabilities more importantly eliminate the burdensome, tedious and sometimes nerve-racking necessity of swapping disks five times during the process of generating and saving 12 half-screens. Furthermore, no swaps are needed while the printout is produced.

I am also taking the opportunity here to point out a bug in the CoCo 3 ROM, which caused some difficulties in the programming of DRIVERHT and DRIVERHE. I have

included a correction for those two programs to overcome a remaining problem brought about by this bug.

The following, seemingly innocent, two-line program causes a CoCo 3 hang-up that is unbreakable by means of the BREAK key or the Reset button:

```
10 CLEAR200,&H3FFF
20 WIDTH40
```

Replacing WIDTH40 with WIDTH80 leads to a similar unwanted result.

In DRIVERHT and DRIVERHE screens must be loaded and protected in the 16K bytes of RAM from hexadecimal addresses \$4000 through \$7FFF. Because of the ROM routine bug, neither the 40- nor 80-character-per-line text screen of the CoCo 3 can be employed while 16K bytes of RAM are being protected. Thus all prompts during the printout process of the driver programs have to be made on the 32-character-per-line text screen.

Part 2 of this series does not provide for the following possibility: Suppose you enter an incorrect filename intended for the processing of a three-column printout. The driver is stopped and an error message is printed

on the screen. In such a case, you likely want to rerun the driver program and type in a correct filename. Unfortunately a restart introduces a WIDTH40 statement while the 16K bytes of memory are still being protected via an earlier executed CLEAR200,&H3FFF, and hence the dreaded hangup ensues.

Listings 1, 2 and 3 are patch programs — DHPATCH, HTPATCH and HEPATCH — to be merged with DH, DRIVERHT and DRIVERHE, respectively, to add the aforementioned capabilities to the latter programs. After typing each patch program, save it in ASCII format, using the .A option of the SAVE command.

To obtain the new DH, for instance, do the following: With the DH disk in your disk drive, type LOAD"DH" and press ENTER. Insert the patch program disk in your disk drive, type MERGE"DHPATCH" and press ENTER. Finally, insert the DH disk in your drive and type SAVE"DH" and press ENTER. Employ a similar procedure to obtain new DRIVERHT and DRIVERHE programs.

If you have already saved, on two disks, 12 half-screens for a three-column printout, you might like to convert the 12 full-screen files to 12 half-screen files on a

H. Allen Curtis is interested in 17th and 18th century history and enjoys biking through the colonial capital of Williamsburg, Virginia, where he lives. He balances past and present with his computer work.

single disk. This can be done by running the new `DH`, obtaining the higher-resolution screen by using the `R` command, and selecting the `I` command. When asked whether or not you want a half-screen, press `N` for No. Then type the filename of one of the 12 full-screen files. After the command has been executed, insert a blank formatted disk in your drive and choose the `O` command. This time press `Y` for Yes when you are asked about the half-screen. Then type the filename of the screen file just loaded. When the half-screen is saved and you have returned to the graphics screen, you see that the screen is changed. It previously had characters printed only on the left half. Now three-quarters of the screen is full. The lower-left quadrant is copied onto the upper-right quadrant of the screen. The

upper half of the screen is saved. When the half-screen file is eventually loaded during the printout process of either driver program, it is rearranged to the left half of the screen once again.

To save 12 half-screens on a disk from scratch, use the screen generating and saving process described in Part 2 of this article but without swapping disks. Also, always save each file in half-screen form.

When you employ the `I` command of `DH` to load a half-screen file, the file is loaded into the upper half of the screen. The upper-right quadrant is copied onto the lower-left quadrant. Therefore three-quarters of the screen is occupied. This presents no problem because the right half of the screen is effectively ignored during the eventual three-column printout process.

The new `DRIVERHT` and `DRIVERHE` programs, similar to their forebears, lead you through the printout process by means of prompts. For the three-column printout produced in the 800- or 960-dots-per-line graphics mode, however, you must have 12 half-screen files available on a single disk. The three-column printout for the 1920 dots-per-line graphics mode cannot be changed and still requires the use of two disks containing six full-screen files each.

(Questions or comments concerning this article may be addressed to the author at 172 Dennis Drive, Williamsburg, VA 23185. Please enclose an SASE when requesting a reply.) □

Editors Note: The following files are saved on this month's RAINBOW ON TAPE/DISK in tokenized format. In order to merge them properly, you need to save them on a fresh disk in ASCII format using the `A` option of the `SAVE` command.

Listing 1: DHPATCH

```
6 A=A+30:A$="108E15F01E428D1CC62
8A6C0A7805A26F930882833C8280A502
6ED8E7A7B":GOSUB600:A=A+30:A$="B
FFFA21E42398E7071BFFFA2CE5E008E4
028C660D75039108E15F01E428D":GOS
UB600
7 A=A+30:A$="E7C628A680A7C05A26F
930882833C8280A5026ED20C94120435
552544953":GOSUB600
25 GOSUB825:IFK$="Y" OR K$="y"TH
EN26ELSEGOSUB820:POKE&HFFA2,&H70
:SAVEM"OUT1",&H4000,&H5FFF,&HAC7
3:POKE&HFFA2,&H71:SAVEM"OUT2",&H
```

```
4000,&H5BFF,&HAC73:POKE&HFFA2,&H
7A:RENAME"OUT1/BIN"TOF$+"/HR1":R
ENAME"OUT2/BIN"TOF$+"/HR2":DRIVE
0:RETURN
26 EXEC&H163C:GOSUB820:POKE&HFFA
2,&H70:SAVEM"OUT",&H4000,&H5DFF,
&HAC73:POKE&HFFA2,&H7A:RENAME"OU
T/BIN"TOF$+"/HR":DRIVE0:RETURN
30 GOSUB825:IFK$="Y" OR K$="y"TH
EN36ELSEGOSUB820:RENAMEF$+"/HR1"
TO"IN1/BIN":RENAMEF$+"/HR2"TO"IN
2/BIN":POKE&HFFA2,&H70:LOADM"IN1
":POKE&HFFA2,&H71:LOADM"IN2":POK
E&HFFA2,&H7A
36 GOSUB820:RENAMEF$+"/HR"TO"IN/
BIN":POKE&HFFA2,&H70:LOADM"IN":P
OKE&HFFA2,&H7A:RENAME"IN/BIN"TOF
$+"/HR":DRIVE0:EXEC&H1671:RETURN
825 GOSUB485:CLS:LOCATE8,8:PRINT
"HALF SCREEN? (Y/N) ";
826 K$=INKEY$:IFK$=""THEN826ELSE
IFK$="Y" OR K$="y" OR K$="N" OR
K$="n"THENRETURNELSESOUND60,9:GO
TO826
```

Listing 2: HTPATCH

```
155 S$(11)="CE5E008E4028C660D750
C628A680A7C05A26F930882833C8280A
5026ED8E7A7BFFFA239CE5EF08E4118
20DACE5FE08E420820D2CE5EA08E40C8
20CA":C(11)=7439
185 C=0:Y=&H1300:FORJ=1TO60:A$=M
ID$(S$(11),2*J-1,2):A=VAL("&H"+A
$):C=C+A:POKEY,A:Y=Y+1:NEXT:IFC<
.C(11)THENCLS3:LOCATE8,12:PRINT"
TYPING ERROR IN LINE 155.":END
```

```
540 IFK=1THENCLEAR200,&H3FFF:K=1
:X(1)=&H109A:X(2)=&H10D4:X(3)=&H
10ED:X(4)=&H1108:Y(1)=&H1300:Y(2
)=&H1324:Y(3)=&H132C:Y(4)=&H1334
ELSECLEAR200,&H3FFF:K=2:X(1)=&H
1085:X(2)=&H10BC:X(3)=&H10CC:X(4
)=&H10DF
545 ON ERR GOTO800
590 FORI=1TO4:POKEH,&H70:LOADM F
$+L$(I)+"/HR"+D$.O(I):POKEH+1,&H
71:EXECY(I):POKEH,&H72:POKEH+1,&H
73:LOADM F$+M$(I)+"/HR"+D$.O(I)
:EXECY(I)
```



```

600 LOADM F$+R$(I)+"/HR"+D$.0(I)
:EXECY(I):EXECX(I):NEXT
610 '
620 '
630 '
640 '
650 PRINT#-2:IFK=1THENCLEAR200,&

```

```

H7FFF:K=1ELSECLEAR200,&H7FFF:K=2
660 GOT0500
800 POKE&HFFA2,&H7A:POKE&HFFA3,&
H7B:CLEAR200,&H7FFF:CLS:FORI=1TO
2:PRINT@196,"CHECK FILENAME AND
DRIVE":NEXT:PRINT"      NUMBER (IF
USED).":PRINT"      THEN RERUN."

```

Listing 3: HEPATCH

```

125 S$(8)="CE5E008E4028C660D750C
628A680A7C05A26F930882833C8280A5
026ED8E7A7BBFFFA239":C(8)=4335
165 C=0:Y=&H1300:FORJ=1TO36:A$=M
ID$(S$(8),2*J-1,2):A=VAL("&H"+A$
):C=C+A:POKEY,A:Y=Y+1:NEXT:IFC<>
C(8)THENCLS3:LOCATE8,12:PRINT"TY
PING ERROR IN LINE 125.":END
510 IFK=1THENCLEAR200,&H3FFF:K=1
ELSEIFK=2THENCLEAR200,&H3FFF:K=2
ELSECLEAR200,&H3FFF:K=3
515 H=&HFFA2:Y=&H1300:ON ERR GOT
0800

```

```

545 IFK=3THENFORI=1TO4:POKEH,&H7
0:LOADM F$+L$(I)+"/HR"+D$:POKEH+
1,&H71:EXECY:POKEH,&H72:LOADM F$
+M$(I)+"/HR"+D$:POKEH+1,&H73:EXE
CY:LOADM F$+R$(I)+"/HR"+D$:EXECY
:EXEC&H1298:NEXT:GOT0630
630 IFK=1THENCLEAR200,&H7FFF:K=1
ELSEIFK=2THENCLEAR200,&H7FFF:K=2
ELSECLEAR200,&H7FFF:K=3
635 GOT0470
775 K=3
800 POKE&HFFA2,&H7A:POKE&HFFA3,&
H7B:CLEAR200,&H7FFF:CLS:FORI=1TO
2:PRINT@196,"CHECK FILENAME AND
DRIVE":NEXT:PRINT"      NUMBER (IF
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```

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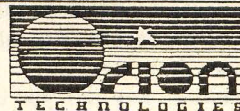
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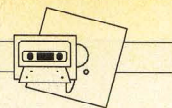
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We are at the mid-point in our graphics series. There is so much uncovered and deemphasized material to discuss in BASIC, this may be a good time to step back, take a pause and review some items the newcomer to BASIC programming may find interesting and useful.

In the good old days of the 4K and 16K CoCo, memory was always at a premium and hoarded by the programmer. Tight memory created disciplined programs. Every trick in the book was hungrily gobbled up to make a tight, shipshape program listing without loose and redundant program lines and routines.

With oodles of memory, who cares about keeping a weather-eye on remaining memory? To instill memory discipline, add some innocuous memory-wasting device, such as Line 1 of the listing, to reduce available memory. It is fun to make nonsense, memory-efficient program listings.

Although disk is great, a cassette recorder is still a valuable adjunct to your setup. Personally, I find it especially useful to record sheet music I have copied in home-made four-voice harmony, thanks to Matthew Thompson's *Music Synthesizer* program, (June 1987, Page 58).

As a newcomer, one of your main preoccupations is copying listings offered in THE RAINBOW. The listings are usually error-free as presented in the magazine. When you copy the listings, assume the bugs you encounter are not inherent but due to your own carelessness. Your worst enemy is the stingy program that saves memory relentlessly by using compound program lines and unnecessary punctuation marks. (Refer to the listings.)

In Line 10 unmask and make operative the GOTO statement. Enter EDIT10, then press the space bar four times to get under the REM marker. Press D and ENTER, then run the program. A few simple designs are displayed. The first one has a superimposed box element and does not show. Notice some of the design elements are \$6, a rarely-chosen draw size.

Press the BREAK key and type LIST240. Copying boring lines with repetitious, look-alike units drives me up the wall because there are no blank spaces to break up the long chain of characters. There is an excellent chance I will create a bug copying this

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

BASIC programming review

More Graphics

By Joseph Kolar
Rainbow Contributing Editor

line, either due to adding, omitting or erroneously copying the characters. Copying a line such as this is certain to require the TLC of a debugging session.

The first rule is to copy exactly as printed. Do not insert spaces or change anything. Now copy the first line. Stop at the end of the row of characters and scan your work to make sure the U4 butts up against the margin — exactly as in the original. Copy the second line. Stop and check to see if the 4 is under the 4 above. Also, check if a 4 is under the comma.

After you copy the third line, check to see if the G is under the 4 at the right-hand border. Suppose the G was under the R? If the L in the third line is in its proper slot, you omitted the character.

You may as well get in the Edit mode; enter EDIT 240, type 60 and press the space bar. Then pick up the L and walk through the third line. Read each character aloud as you pass by it (by pressing the spacebar). When your cursor is over the location for the missing character, press I (for Insert), type the missing character, and press ENTER to resave the line in memory.

Let's say you finish the fourth row, and R6 of the fifth row lines up at the right margin. It is a sure indicator that you skipped a pair of characters — usually two succeeding ones. Finish up and check the final quote mark to make sure it lines up under D.

After copying a few such program lines, run the program and see if any FC, SN or TM error messages pop up. This is a fine time to debug run-of-the-mill errors, especially if you are faced with zillions of bunched-up BASIC or hexadecimal program characters.

Put in some errors by typing EDIT240 and pressing the space bar two times, then typing C 0 and pressing the space bar three times. Now type C S and press the space bar eight times. Finally, type C T and press ENTER, then run the program.

- SN Error — correct the 0 in DRAW and run the program.
- FC Error — correct the S in BM and run the program.
- FC Error — change the T to R and run the program.
- If you omitted the starting quotation marks, a TM Error is displayed.

There are some errors not readily apparent. If you changed the first R4 to H4, and ran it, you would be alerted to a possible character substitution error. These kinds of errors are tricky because you may not realize what the author intended. If it doesn't look right, be suspicious.

The third rule is: When you complete a program line, no matter what length, check to see if it aligns below the correct character. If you notice an added or removed harmless blank space, stop and make the adjustment. It is much easier to compare printed listing lines with the window display if they are identical. Mistakes have a tendency to be highlighted. Some common copying errors are: pressing an S for \$, a period for a comma, a minus for an equal sign, and a left parenthesis for a right one.

When creating a BASIC program, it is important to avoid variables I and O. Try to use the same string variable for a commonly used function such as A\$=INKEY\$ or the variable Z in FOR Z=1 TO 2000. At one time computer hackers were hung up on the FOR I=etc. bit. In a lot of texts I is still a preferred variable. The same goes for 0 and O\$. I is easily confused with 1 and O with 0. Avoid variables such as X1 or Y1; use XX or YY, which stand out plainly.

Number your program lines in increments of 10, beginning with 10. Use a 0 line for the title. This increment allows plenty of room to add future unanticipated lines or routines without being forced to renumber the program lines — mentally throwing yourself for a loop while attempting to search out an area of the program suddenly located elsewhere.

You can readily follow my last-minute additions and alterations in the listing: Lines 25 and 211 are obvious examples. The most important reminder is to make frequent copies of work in progress, being sure to number the copies in succession.



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Creativity implies beginning one task and then, in a flurry of inspirational activity, veering off onto a tangent to develop a newer, more enticing or intriguing idea. Thus it happened I wanted to work out a system of adding two hexadecimal values, using paper and pencil, without converting the values to binary and getting googly-eyed from the ubiquitous ones and zeroes.

I figured out a system to add \$08 to \$0F:

$$\$08 + \$0F = \$17$$

$$\$F=15, 08 + 15 = 23$$

(in decimal addition of hexadecimal values.)

$$23-16=7$$

The 7 is the unit value and 16 is a carry of one to the next column, thus 17\$ is the answer. Clear as mud?

Verify this by using your CoCo in the immediate mode, without program line numbers. \$17 is equal to Decimal 23. Type PRINT &H17 and press ENTER.

Try another:

$$33A + B0A = ?$$

$$\$A=10, \$A+\$A=20 \text{ decimal,}$$

$$20-16=4, \text{ the right digit value.}$$

The 16 is a carry 1 to the middle column. The middle digit value is 1+3+0=4. The highest column value is B=11+3=14, 14=\$E. \$E44, CoCo tells us, is 3652 decimal. But does \$E44=3652? Out came the pencil and paper. Working overtime, I calculated the unit column digit added to the next column, 4*16=64, added to the last column, \$E=14 or 14*256=3584.

Adding the three sums up:

3584+64+4=3652 decimal. CoCo sure saves us a lot of work with PRINT &HE44, ENTER.

My next challenge was to make a parallel BASIC program to convert Hexadecimal Base 16 to Decimal Base 10.

Type EDIT10 to restore the REM, and we get my useless hexadecimal conversion program, which I planned to make valid for all values from \$0000 to \$FFFF.

I am certain there are numerous alternate programs to do the same job in BASIC. This is just my program. Variable W\$ was the string Variable I chose. This was due to the variable being both numerals from 0 to 9, and letters from A=10, B=11, C=12, D=13, E=14 and F=15, the Base=16. The four values are, from left to right, J\$,K\$,L\$ and M\$.

Line 60 plucked out the highest value using LEFT\$. The lowest right value was isolated using RIGHT\$. The middle values were K\$ and L\$ and determined via MID\$.

The J\$ highest figure was based on a constant multiplier of 4096. K\$, the next highest, used 256. L\$, the third figure, used 16, and M\$ used 1. This was an expanded version of the pencil-and-paper system I used above.

Line 60 directs us to a GOSUB at Line 100 to convert all the letter and number values, from 0 through F, into a compatible format.

Line 100 converts J\$="A" to J=4096*A. Rather than using J=4096*10, I saved CoCo the bother and calculated all the J\$ values from A to F. If J\$="F", the solution would be J=4096*15 or 61440. That left the J\$ values of 1 to 9*4096, which converted to J=VAL(J\$)*4096. A return from the routine ran us over to the second highest value, K\$. It was identically treated as lines 60 and

100, and in lines 70 and 110 (except for the 256 multiplier). The last two figures were similarly worked up with a multiplication factor of 16 and 1, respectively.

Line 200 added up the sum of the four figures to give the grand total decimal value, which was duly printed at Location Y, adjacent to the INPUT string value at Location X. Line 254 gave the starting location of the first row of conversions.

The plan was to allow for about 10 different values for handy comparisons. Line 25 also sets the counter, G to 0. Line 211 incremented the relocation of each new row, then sent CoCo back to Line 30 for more hexadecimal figures.

At this point I ran into a creepy-crawly bug. If you want to reproduce the bug, temporarily delete M\$="0": from Line 211. The bug wasn't hard to isolate since the trouble was confined to the lowest value, M\$. For instance: 00FF gave 255; 00FE gave 255; and 00FD gave 255, all the way down to 00F0. When I tried 00EF, I got 239 and promptly reinvented the mistake as I worked down to 00E0. Since M\$ was set at 15 in 00FF, the last digit kept showing F, so all the values were 255. M\$ wasn't reset to 0, so all the decimal conversions were incorrect as I worked down to 00F0. Finally, 00EF gave the right answer and then reverted to a bunch of errors. Now you know why I was forced to reset M\$ each time a decimal value was displayed.

Your challenge is to expand this program to cover six figures, 000000 to FFFFFF. If this listing is useless, you will only be making a more powerful useless program. You never know when some bit of knowledge or practice may stand you in good stead; and if you are aiming at mastering assembly language, it surely won't hurt. □

The listing: NEWCOMER

```
0 ' <LISTING1>
1 DIMA(350),B(350),C(350)
10 CLS:GOTO230
20 PRINT@2,"ENTER FOUR DIGITS. F
ILL IN          UNUSED SPACES WITH
ZEROS.          00F0 FOR F0; 01E3 F
OR 1E3.
25 X=129:Y=146:G=0
30 PRINT@X,"HEX. CODE:";
40 LINEINPUTW$
60 J$=LEFT$(W$,1):GOSUB100
70 K$=MID$(W$,2,1):GOSUB110
80 L$=MID$(W$,3,1):GOSUB120
90 M$=RIGHT$(W$,1):GOSUB130:GOTO
200
100 IF J$="A" THEN J=40960 ELSE
IF J$="B" THEN J=45056 ELSE IF J
$="C" THEN J=49152 ELSE IF J$="D
" THEN J=53284 ELSE IF J$="E" TH
EN J=57344 ELSE IF J$="F" THEN J
=61440 ELSE J=VAL(J$)*4096:RETUR
N
110 IF K$="A" THEN K=2560 ELSE I
F K$="B" THEN K=2816 ELSE IF K$=
"C" THEN K=3072 ELSE IF K$="D" T
```

```
HEN K=3328 ELSE IF K$="E" THEN K
=3584 ELSE IF K$="F" THEN K=3840
ELSE K=VAL(K$)*256:RETURN
120 IF L$="A" THEN L=160 ELSE IF
L$="B" THEN L=176 ELSE IF L$="C
" THEN L=192 ELSE IF L$="D" THEN
L=208 ELSE IF L$="E" THEN L=224
ELSE IF L$="F" THEN L=240 ELSE
L=VAL(L$)*16:RETURN
130 IF M$="A" THEN M=10 ELSE IF
M$="B" THEN M=11 ELSE IF M$="C"
THEN M=12 ELSE IF M$="D" THEN M=
13 ELSE IF M$="E" THEN M=14 ELSE
IF M$="F" THEN M=15 ELSE M=VAL(
M$):RETURN
200 N=J+K+L+M
210 PRINT@Y,"DECIMAL":N
211 M$="0":G=G+1:IF G=10 THEN FO
R H=1 TO 4000:NEXT:GOTO10
220 X=X+32:Y=Y+32:GOTO30
230 PMODE4,1:PCLS:SCREEN1,0
240 DRAW"BM128,96S6R4D4L4U4BR4U4
R4D4I4BR4U4L4D4R4BR4D4L4U4R4U4R4
L4D4BR4U4L4D4R4BR4E6F6G6H6BR6F6G
6H6E6S8BR6U6E6R6F6D6G6L6H6S4BE7B
R6E4R4F4D4G4L4H4U4"
300 GOTO 300
```


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Hi-Res Display

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

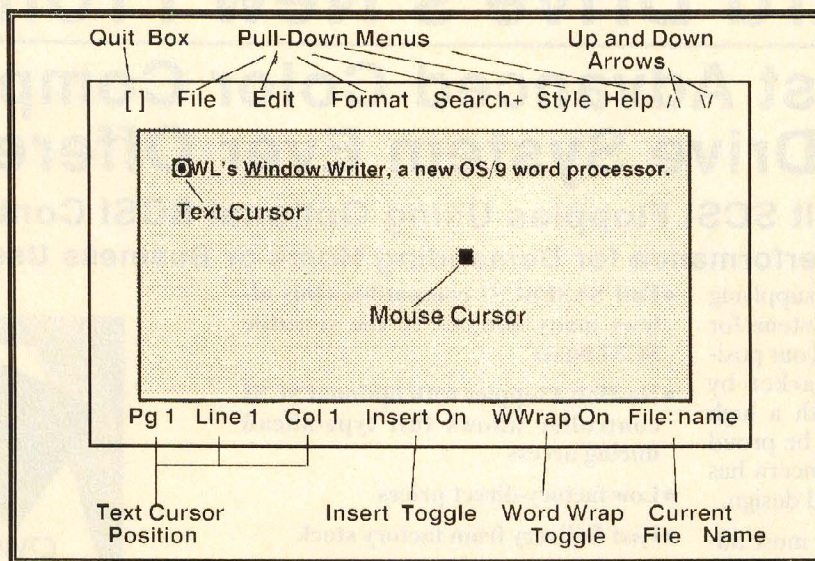
Ram Disk

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

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With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.

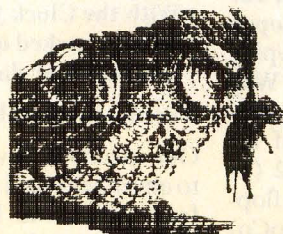


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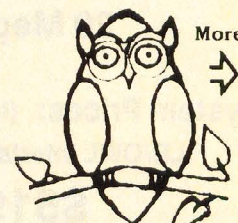
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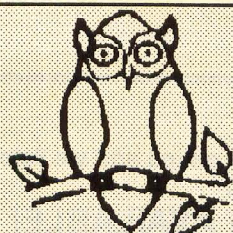
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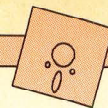
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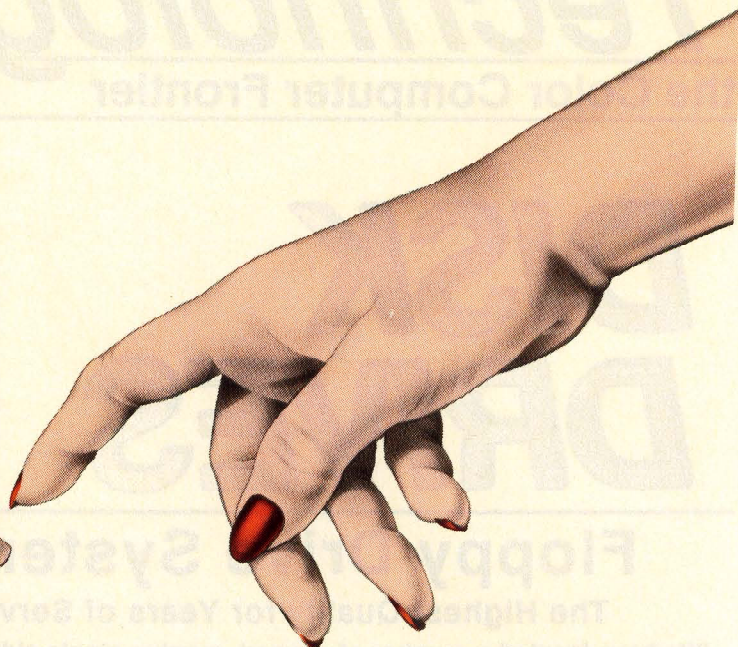
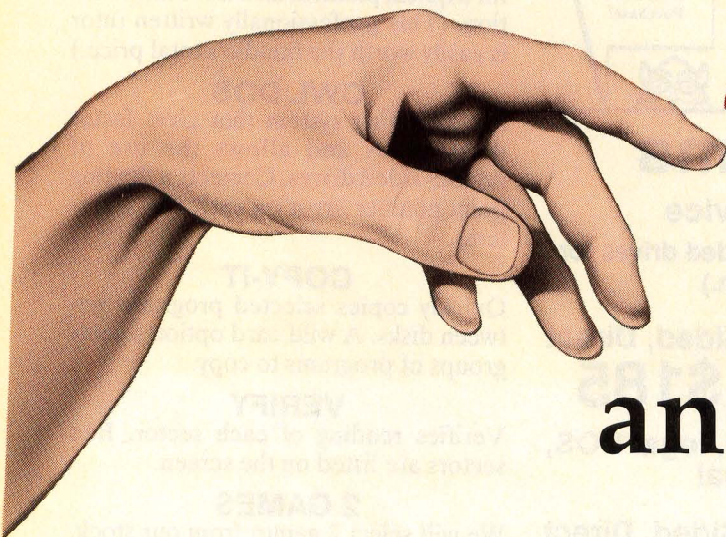
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A utility for updating your files

Reach Out



and Touch OS-9

By Joseph Cheek

OS-9 stores a wealth of information on each file — attributes, owner, last-modified date, file size, etc., not to mention things *Dir e* doesn't tell us about, such as date created, link count and segment lists. Most of these bits of information cannot be changed, so what good are they? Don't they just clutter up the listing? What if they're wrong? Can we change them? Not with the standard OS-9 programs included in the base package. I

Joseph Cheek, a high school junior who began using a CoCo 1 seven years ago, has been programming ever since, especially in BASIC09 and OS-9.

Listing 1: Touch

```
PROCEDURE touch
0000    TYPE regs=cc,a,b,dp:BYTE; x,y,u:INTEGER
0025    DIM r:regs
002E    TYPE date=year.month.day.hour,min:BYTE
0049    DIM d:date
0052    TYPE format=name:STRING[29]; sect(3):BYTE
006D    DIM f:format
0076    DIM filename:STRING[99]
0082    DIM tail:STRING[29]
008E    DIM dt:STRING[14]
009A    DIM msd:STRING[4]
00A6    DIM key:STRING[1]
00B2    DIM posi:REAL
00B9    DIM id:INTEGER
00C0    DIM disk,ccode,dev(32):BYTE
00D4    DIM touch,param1,param2:BOOLEAN
00E3    PARAM nam:STRING[99]; dat:STRING[14]
00FA    tail=""
0101    touch=TRUE
0107    param1=FALSE
010D    param2=FALSE
0113    ccode=12
011A    RUN syscall(ccode,r)
```


realized how nice it would be to use some of this information to my advantage.

I received OS-9 as a birthday present almost a year ago and I immediately enjoyed it. It was powerful, elegant, fast — just what a programmer needs. I wanted to learn more about this operating system, but I could not find many books on the subject. So I read about UNIX instead. While the two operating systems are not exactly the same, they are close enough that understanding one helps me understand the other.

I learned there are a lot more utilities on a UNIX system than on my OS-9 system. I had the operating system, but I just didn't have the utilities. Having a limited budget, I decided to write my own utilities with this wonderful language that comes with OS-9 — BASIC09.

Touch lets you update your files' last-modified date. You give it the filename, and it updates the file header automatically. The utility can be used in one of three ways: with no parameters, with only a filename, or with a filename and a date. It prompts you for what you don't give it on the command line.

If you give it no parameters, typing *touch* (or *runb touch* or *basic09 touch*) and pressing ENTER, it goes into a fully interactive mode and acts like an applica-

```

0129      ON ERROR GOTO 50
012F      filename=nam
0137      param1=TRUE
013D      ON ERROR GOTO 101
0143      dt=dat
014B      IF dt="" THEN
0157          dt=DATE$
015D      ENDIF
015F      ON ERROR
0162      param2=TRUE
0168      GOTO 101
016C 50    PRINT CHR$(12);
0175      PRINT "TOUCH OS9 filename creation date editor"
01A0      PRINT "Written by Joseph Cheek for CSS"
01C3      PRINT
01C5      PRINT "Your UID is "; r.y;
01DD      IF r.y=0 THEN PRINT " "; CHR$(31); " (Superuser)"; CHR$(31)
          ; "!"; CHR$(7);
0210      ENDIF
0212      PRINT "."
0217      REPEAT
0219          PRINT
021B 100    INPUT "Enter filename for date change? ".filename
0246 101    RUN ltou2(filename)
0253      IF LEFT$(filename,4)~"CHD " THEN
0266          CHD RIGHT$(filename,LEN(filename)-4)
0273          GOTO 100
0277      ENDIF
0279      IF LEFT$(filename,3)="DIR" THEN
028B          SHELL filename
0290          GOTO 100
0294      ENDIF
0296      IF ASC(filename)<>47 THEN
02A3          OPEN #disk,filename:READ
02AF          ccode=$8D
02B7          r.b=14

```

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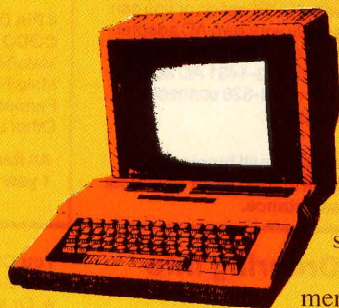
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Dale Puckett - RAINBOW Contributing Editor

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP.

Mr. Puckett will talk about the people involved in the ongoing development of OS-9 and milestones in OS-9: Crazy things which happened in its development, mistakes, highlights and its future.

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tion program. It displays a little header and then prints your user ID number, beeping if you are the superuser (UID 0). This goes along with my belief that there are not enough superuser privileges with OS-9. With *Touch* you can update any files if you are the superuser, but only your own if you are not.

It then asks you for the filename of the date you want to change. You can also enter *chd* or *dir* commands from this prompt (*chd* affects *Touch* only, not the underlying shell). If you did not type in a complete pathlist, *Touch* uses a system call to find the name of the device descriptor. This is because of the algorithm the program uses. It treats the entire disk as one file and it needs to know the device name.

If you do not own the file, it tells you so. If you are the superuser, it asks you if you want to "touch" it anyway. Press Y or N. If you press Y, you are presented with the date it was last modified and prompted for the new date. Enter the date in proper OS-9 yy/mm/dd hh:mm form. (It doesn't care about seconds — so don't add them.) It proceeds to change the date and asks if you want to touch any more files. If you press anything but Y, it ends and you are returned to the calling program.

Secondly, if you give it one parameter, the filename, *Touch* prompts for minimal information and displays a little information. If it is not your file and you are not allowed to change it, you are told and the program ends. You are asked for the new date, only not as verbosely as when the program receives no parameters. You are then given the new date.

Lastly, if you give *Touch* both parameters, filename and date, it is changed without any comment from *Touch*, except when it is not your file. *Touch* either terminates itself or asks for verification if you are the superuser.

Note: When asked for the date, you can just press ENTER and the file is stamped with the current date and time. If you have only 128K, you cannot use the *dir* command from the filename prompt. You should be able to with 512K.

To use this program from the command line, you must type in Listing 1 and save the four programs in a file for later use by entering *save* touch*. Then run the program from BASIC09 and debug it, if necessary. Pack the programs in a directory that contains the file *SysCall* by entering *pack* /dd/cmds/touch*. If you have the *SysCall* file in BASIC09's workspace memory, delete it first by typing *kill syscall* and then pressing ENTER. Make sure this is not the same directory you saved *Touch* in.

Now exit BASIC09 by pressing CTRL-BREAK or by typing *bye*. Change your cur-

```

02C2      r.a=disk
02CE      r.x=ADDR(dev)
02DC      RUN syscall(ccode,r)
02EB      CLOSE #disk
02F1      msd="/" +CHR$(dev(1))+CHR$(LAND(dev(2),127))
030A      ELSE
030E      msd=LEFT$(filename,3)
0319      ENDIF
031B      msd=msd+"@"
0327      IF ASC(filename)=47 OR ASC(filename)=46 THEN
033C      WHILE RIGHT$(filename,1)<>"/" DO
034C      tail=RIGHT$(filename,1)+tail
035B      filename=LEFT$(filename,LEN(filename)-1)
036B      ENDWHILE
036F      filename=LEFT$(filename,LEN(filename)-1)
037F      ELSE
0383      tail=filename
038B      filename="."
0393      ENDIF
0395      tail=LEFT$(tail,LEN(tail)-1)+CHR$(ASC(RIGHT$(tail,1))+128)
03B1      OPEN #disk,filename:READ+DIR
03BD      LOOP
03BF      EXITIF FOF(#disk) THEN
03C9      CLOSE #disk
03CF      ERROR 216
03D3      ENDEXIT
03D7      GET #disk,f
03E1      RUN !tou2(f.name)
03EE      EXITIF SUBSTR(tail,f.name)=1 THEN
0401      ENDEXIT
0405      ENDLLOOP
0409      posi=f.sect(1)*16777216.+f.sect(2)*65536.+f.sect(3)*256.+1
0444      CLOSE #disk
044A      OPEN #disk,msd:READ
0456      SEEK #disk,posi
0460      GET #disk,id
046A      GET #disk,d
0474      CLOSE #disk
047A      IF param1=FALSE THEN
0485      PRINT
0487      ENDIF
0489      IF r.y<>id THEN
0499      IF param1 AND r.y<>0 THEN
04AC      PRINT "Touch: not your file"
04C4      END
04C6      ENDIF
04C8      PRINT "Not your file."
04DA      touch=FALSE
04E0      IF r.y=0 THEN
04EF      PRINT "Touch anyway (Y/N)? ";
0508      GET #0,key
0511      PRINT
0513      RUN !tou2(key)
051D      IF key="Y" THEN touch=TRUE
052F      ENDIF
0531      ENDIF
0533      ENDIF
0535      IF touch THEN
053E      IF param2=FALSE THEN
0549      IF param1=FALSE THEN
0554      PRINT "File was last modified on ";
0573      RUN printdate(d.year,d.month,d.day,d.hour,d.min)
05A0      PRINT "Enter time to change it to (yy/mm/dd hh:mm)"
05CF      PRINT "(Hit [ENTER] for ": LEFT$(DATE$,14); ")";
05EE      ELSE
05F2      PRINT "Enter time to change to";
060E      ENDIF
0610      INPUT dt
0615      IF dt="" THEN dt=DATE$
0626      ENDIF
0628      ENDIF
062A      RUN getdate(dt,d.year)
063C      RUN getdate(dt,d.month)
064E      RUN getdate(dt,d.day)
0660      RUN getdate(dt,d.hour)
0672      RUN getdate(dt,d.min)
0684      OPEN #disk,msd:WRITE

```



```

00600      SEEK #disk,posi+2.
006A1      PUT #disk,d
006AB      CLOSE #disk
006B1      IF param1 THEN
006BA          IF param2=FALSE THEN
006C5              PRINT "Changed to ";
006D5              RUN printdate(d.year,d.month,d.day,d.hour,d.min)
00702      ENDIF
00704      END
00706      ENDIF
00708      PRINT "Done...another (Y/N)? ";
00723      ELSE
00727          PRINT "Another (Y/N)? ";
0073B      ENDIF
0073D      GET #0,key
00746      PRINT
00748      RUN ltou2(key)
00752      tail=""
00759      touch=TRUE
0075F      UNTIL key<>"Y"
0076B      END "Done Touching."
PROCEDURE printdate
0000      PARAM year,month,day,hour,min:BYTE
00017      PRINT year: "/";
00021      IF month<10 THEN PRINT "0";
00032      ENDIF
00034      PRINT month: "/";
0003E      IF day<10 THEN PRINT "0";
0004F      ENDIF
00051      PRINT day: " at ";
0005E      IF hour<10 THEN PRINT "0";
0006F      ENDIF
00071      PRINT hour: ":";
0007B      IF min<10 THEN PRINT "0";
0008C      ENDIF
0008E      PRINT min: "."
00097      END
PROCEDURE ltou2
0000      DIM workstring:STRING[40]
0000C      DIM count:INTEGER
00013      DIM char:BYTE
0001A      PARAM answer:STRING[40]
00026      workstring=""
0002D      FOR count=1 TO LEN(answer)
0003F          char=ASC(MID$(answer,count,1))
0004E          IF char>96 AND char<123 OR char>224 AND char<251 THEN
0006F              char=char-32
0007A          ENDIF
0007C          workstring=workstring+CHR$(char)
00089      NEXT count
00094      answer=workstring
0009C      END
PROCEDURE getdate
0000      DIM num:STRING[2]
0000C      DIM char:BYTE
00013      PARAM date:STRING[14]; time:BYTE
00025      num=""
0002C      REPEAT
0002E          num=num+LEFT$(date,1)
0003D          date=RIGHT$(date,LEN(date)-1)
0004D          char=ASC(date)
00056      UNTIL char=32 OR char=47 OR char=58 OR date=""
00076      date=RIGHT$(date,LEN(date)-1)
00086      time=VAL(num)
00090      END

```

Listing 2: Touch.hlp

@TOUCH

Syntax: Touch [{"<filename>"[, "<date>"]}]

Usage : Updates a file's last modified date. Only the owner can modify the date. The Superuser (UID 0) can modify any file. Prompts for all information not specified as parameters. Will stamp file with current date if other date not specified. Written in Basic09, uses RunB run-time package.

rent data directory to the directory you packed Touch into. Merge Touch and SysCall into one file called T by entering merge touch syscall >t. Then delete the original packed Touch file and rename the new file by typing rename t touch. Copy it to your normal system execution directory, normally the /d0/CMD5 directory of your boot disk, if needed.

Use Attr to reset Touch's permissions by typing attr /d0/cmds/touch e pe. Add Listing 2, Touch's help file, to the Helpmsg file in your Sys directory by using Edit or any word processor. Save the modified Helpmsg file before you quit. Make sure RunB is in your execution directory along with Touch and that it is executable, or else you cannot run it. Use Dir x e or Attr to determine RunB's permissions.

You should now be able to run Touch from the OS9 prompt. You should also be able to get assistance with the Help command.

You can delete everything from OR to <251 in the ltou2 program, rename it to isupper, and have a just-as-functional isupper program of about half the size.

You cannot load Touch into memory and use it without having OS-9 load it from memory each time. You must load RunB (or BASIC09) into memory also. However, you can just type touch and press ENTER, and it will go into Interactive mode where you can switch disks, etc. That's what the built-in Chd and Dir commands are for.

You can run BASIC09-packed procedures from shell scripts (procedure files) without having it end with an error if you replace filename params with runb filename params.

Following are some examples of how to use the program:

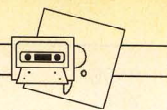
Type os9:touch, then press ENTER (used interactively).

Type os9:touch "filename" (changes filename's last modified date; you are prompted for the date).

Type os9:touch ("filename", "yy/mm/dd hh:mm") (changes filename's last modified date to the date you specified).

Type os9:touch ("filename", "") (changes filename's date to current date and time).

(Questions or comments concerning this article may be addressed to the author at 2855 W. 7380 S, West Jordan, UT 84084. Please enclose an SASE when requesting a reply.)



A "neighborly" two-dimensional array
to help you generate new values

The Graphics Corner

Part III: Good Neighbors

By William P. Nee

Welcome again to "The Graphics Corner." We'll discuss a third way of creating computer graphics. In the first article we used mathematical equations to color points; in the second we used a one-dimensional array along with a color code to generate new array values and color them. This time we'll use a two-dimensional array with the concept of *neighbors* to generate new values and color them.

Imagine you are in the center cell of a grid. Your neighbors (depending on what type of computer program you're using) are either all of eight cells around you or four cells that touch sides with you (above, left, right and below). In this article the neighborhood consists of the four cells that touch sides with the center cell.

As with the previous article, you also need some type of code or rules to determine how new values are generated. Initially any cell can have a value between 0 and 1. Its next value is the total value of its four neighbors AND the number of colors you are using (including zero). Since we're running this program in PMODE 4, we have two colors (0 and 1) to use so the new value is the neighbor's sum AND 1. The new value for each cell is stored in a temporary two-dimensional array. When all the new values are computed, they are transferred back to the original array and colored either as 0

or 1. In PMODE 4 just those with a value of 1 get PSET.

Listing 1 is an example of how this works in a 10-by-10 array with just the center cell having a value of 1. After you've run Listing 1 for a while, try increasing the array size to 20-by-20 (change the L in Line 10 to 20). You've actually made the array four times larger, and it takes four times longer to compute. Imagine how long a 100-by-100 array takes!

There is one way we can make this BASIC program quicker. Instead of checking the neighborhood of every point in the array, do it backwards. If a neighbor has no value, it doesn't affect the center cells; so we search just for those cells with a value of 1. As soon as we find one, we increase the value of the four center cells around it. When finished, we AND all the cell values with 1 and do the same thing as if we've checked the neighbors of every cell. Since there is usually some zero-value cells, this method is quicker. Try Listing 2 and see the difference.

As you can guess, this is still not fast enough. We need to design a machine language program along the lines of Listing 2 that computes, stores and PSETS new values. But how much memory does this take? The ML program doesn't use too much memory, but the arrays do. Each array takes L times L bits, and there must be two of them. By the time we PCLEAR eight graphics pages, there isn't enough memory left for a decent-sized array.

However, in a 64K Color Computer there is another 32K just waiting for data storage, and we can access it from a ma-

chine language program. We'll store the temporary values of a 169-by-169 array in high memory and let the screen itself store/display the actual array values.

Generally the program starts in PMODE 4,1, stores a value of 1 in any cells you choose, and displays them. Then the machine language program takes over, switches to PMODE 4,5, checks for every cell with a 1 value and increases that cell's four center cell values by 1 in the temporary array in high RAM. When the screen is completely checked, the process reverses and the program goes back through the temporary array in high RAM. There it looks for any cell with a value other than zero, ANDs it with 1, and (if the value is still 1) PSETS the corresponding point on the screen. Then the program switches back to PMODE 4,1 and repeats the entire process. Pressing any key and holding it down returns the ML program to BASIC.

Let's go through Listing 3 one subroutine at a time. CLEAR (lines 140 through 200) simply sets all of the temporary arrays (\$8000 through \$F800) to zero. Next is PPOINT (Lines 420 through 720), where we find which points on the screen are set. Even though the temporary array starts at \$8000, we begin saving data at \$8100 — I'll explain the reason why later.

Now let's look at the locations of our screen coverage and the temporary array. The area we're using on the screen is from 43,11 (x,y location) to 213,181. Since graphics start at the location in \$BA/BB, the byte containing 43,11 is graphics start plus 357. But the array is one space all the way around inside that rectangle, or 44,12 to

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

212,180. We need to do this so any neighbor checked is still within the graphics block. To make it easier to initially check each point within the graphics block, the PPOINT routine does it by bytes. At this point our data array is actually storing all the information about a graphics display 22 bytes wide and 171 bits long (and that is 30,096 bits of information).

Let's follow the PPOINT routine. Register U contains the start of the actual data array and Register X the start of graphics; adding 357 to Register X gives it the address of the starting byte of our graphics array. Since all the symbols and operands in this subroutine are at Location \$7000 plus a value, I set the DP Register to \$70; now the computer uses \$7000 as the address and we only have to give the one-byte offset from that point, saving both time and memory.

Activating \$FFDF puts us in high RAM — any location above \$7FFF is in high memory. The vertical counter is loaded with 171 and the horizontal counter with 22 — the number of bytes across. Register A is loaded with the first byte to be checked and Register B with 8 — the number of bits to be checked in each byte. As Register A is shifted one space to the left, the "lost" bit

goes to the CC Register. If that bit is a zero, the CC Register is clear and the program goes to CPPT. If it is a 1, the program increases the value of the four neighbors in the temporary array. Since there are 176 bits across in the temporary array, a cell's top neighbor is 176 spaces back in the array — that's why we left a lot of space between the array we initially cleared (\$8000) and the temporary array start (\$8100); the bottom neighbor is 176 spaces forward in the array; the other two neighbors are -1 and +1 array space.

Increase the array counter by one, decrease the bit counter by one, and shift Register A to the left again. Continue until all eight bits are checked. Then repeat the process until all 22 bytes are checked. Since there are 32 bytes per line and we're only using 22, we have to increase the graphics byte location in Register X now by 10. Repeat the entire process 170 times more and we're finished. Activating \$FFDE puts us back into low RAM and finally we'll set the DP Register back to 0.

The other major subroutine is PSET (lines 730 through 1140). This time we load Register X with \$81B4 — that's \$8100 plus 176 bits plus the next four bits in the next byte (X location of 44). High RAM is

activated and again the DP Register is set to \$70. Our starting coordinates are 44,12, so the vertical and horizontal counters are set accordingly. Register A is loaded with the first bit of data and the array counter is increased by one. If Register A is 0, the routine goes to CPSET. If it isn't, first clear the array bit to 0, then shift Register A to the left (this is the same as ANDA #1). If the result is 0, the routine goes to CPSET, or else it PSETs the coordinates in the horizontal and vertical counters. When the horizontal counter reaches 212, the first row is PSET. This time the array counter must be increased by seven (We've only gone across 168 bits plus one array counter increase. There are 176 bits between any two points on two rows, so we're seven bits short of dropping down one row). We keep repeating the process until we're down to 180 and all the screen is PSET. Finally, activate low RAM and set the DP Register back to 0.

All this keeps alternating between PMODE 4,1 and PMODE 4,5 unless you press any key to return to BASIC. If you do press a key, hold it down since the program only checks for this every other time. When you've typed in the program, check for any errors with A/NO/NS/WE; when it's error-free, save it with A NEIGHBOR/BIN. If you want a



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program that includes all eight neighbors, change the NEIGH subroutine (lines 570 through 605) to:

```
570 INC -177,U
575 INC -176,U
580 INC -175,U
585 INC -1,U
590 INC +1,U
595 INC +175,U
600 INC +176,U
605 INC +177,U
```

Assemble and save this version with A NEIGHALL.BIN.

Finally we need a BASIC program (Listing 4) to put the desired pattern on the screen and execute the ML program. The first two lines load either ML program if necessary (be sure to include REM Line 6 — it is used later), and the next two lines clear enough space for variables and graphics. Lines 40 through 49 draw the pattern (set the screen array), and Line 50 executes the ML program until you stop it. The last line ensures that we're back in low RAM. If you want to use the high-speed poke (POKE 65495,0), put it at the start of Line 50. Then put the slowdown poke (POKE 65494,0) at the start of Line 55. When you've typed the BASIC program, save it as NEIGHBAS.

Table 1 includes other variations that may be substituted for Lines 40 through 49 and the ML program to use with them. The possible designs are endless; some begin to repeat after a while, and some even vanish. You can include an addition to the ML program to have it check to see if a specific key has been pressed; if so, it can go to a screen dump routine you've added, print out the display, and then continue with the program.

That's all for "The Graphics Corner." We've covered three methods of creating computer graphics and suggested ways to modify all the programs. Let your imagination run wild and push these programs to their limits.

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216C, Mason, WI 54856-930. Please enclose an SASE when requesting a reply.) □

```
40 FOR X=0 TO 85 STEP 5
41 LINE(CX-X,CY-X)-(CX+X,CY+X).P
SET,B:NEXT
42 LINE(43,11)-(213,181),PRESET
43 LINE(128,11)-(128,181),PRESET
44 LINE(213,11)-(43,181),PRESET
45 LINE(43,96)-(213,96),PRESET
use NEIGHBOR.BIN
```

```
40 LINE(43,96)-(213,96),PSET
41 FOR X=43 TO 213 STEP 10
42 LINE(X,91)-(X,110),PSET:NEXT
43 LINE(128,11)-(128,181),PSET
44 FOR Y=11 TO 181 STEP 10
45 LINE(123,Y)-(133,Y),PSET:NEXT
use NEIGHBOR.BIN
```

```
40 CIRCLE(CX-15,CY),15,1,.75,.25
41 CIRCLE(CX,CY-15),15,1,0,.5
42 CIRCLE(CX+15,CY),15,1,.25,.75
43 CIRCLE(CX,CY+15),15,1,.5,0
44 PSET(CX,CY-3):PSET(CX,CY+3):P
SET(CX,CY-2)
45 PSET(CX,CY+2):PSET(CX-1,CY-1)
:PSET(CX+1,CY-1)
46 PSET(CX-1,CY+1):PSET(CX+1,CY+
1)
```

```
47 PRESET(CX,CY-1):PRESET(CX-1,C
Y):PRESET(CX,CY)
48 PRESET(CX+1,CY):PRESET(CX,CY+
1):PSET(CX-3,CY)
49 PSET(CX-2,CY):PSET(CX+2,CY):P
SET(CX+3,CY)
use NEIGHBOR.BIN
```

```
40 N=43
41 LINE(CX-N,CY-N)-(CX+N,CY+N),P
SET,BF
use NEIGHBOR.BIN
```

```
40 FOR X=5 TO 85 STEP 5
41 LINE(128,96-X)-(128+X,96),PSE
T
42 LINE-(128,96+X),PSET
43 LINE-(128-X,96),PSET
44 LINE-(128,96-X),PSET:NEXT
use NEIGHALL.BIN
```

```
40 LINE(CX,CY-2)-(CX+2,CY),PSET
41 LINE-(CX,CY+2),PSET
42 LINE-(CX-2,CY),PSET
43 LINE-(CX,CY-2),PSET
use NEIGHBOR.BIN or NEIGHALL.BIN
```

Table 1: Alternate Lines for Design Variations

Listing 1: NEIGHBR1

```
Ø 'COPYRIGHT 1989 FALSOFT, INC
1Ø PCLEAR8
2Ø L=1Ø
3Ø DIM A1(L,L),A2(L,L)
4Ø PMODE 4,1:PCLS:SCREEN 1,1
5Ø A1(L/2,L/2)=1:PSET(L/2,L/2)
6Ø PMODE 4,5:PCLS:GOSUB 8Ø:SCREE
N 1,1
7Ø PMODE 4,1:PCLS:GOSUB 8Ø:SCREE
N 1,1:GOTO6Ø
8Ø FOR Y=1 TO L-1
9Ø FOR X=1 TO L-1
1ØØ V=A1(X,Y-1)+A1(X-1,Y)+A1(X+1
,Y)+A1(X,Y+1)
11Ø A2(X,Y)=V AND 1
12Ø NEXT X,Y
13Ø FOR Y=1 TO L-1
14Ø FOR X=1 TO L-1
15Ø V=A2(X,Y):A2(X,Y)=Ø:A1(X,Y)=
V
16Ø IF V=1 THEN PSET(X,Y)
17Ø NEXT X,Y:RETURN
```

Listing 2: NEIGHBR2

```
Ø 'COPYRIGHT 1989 FALSOFT, INC
1Ø PCLEAR8
2Ø L=2Ø
3Ø DIM A1(L,L),A2(L,L)
4Ø PMODE 4,1:PCLS:SCREEN 1,1
5Ø A1(L/2,L/2)=1:PSET(L/2,L/2)
6Ø PMODE 4,5:PCLS:GOSUB 8Ø:SCREE
N 1,1
7Ø PMODE 4,1:PCLS:GOSUB 8Ø:SCREE
N 1,1:GOTO6Ø
8Ø FOR Y=1 TO L-1
9Ø FOR X=1 TO L-1
1ØØ V=A1(X,Y):IF V=Ø THEN 12Ø
11Ø A2(X,Y-1)=A2(X,Y-1)+1
111 A2(X-1,Y)=A2(X-1,Y)+1
112 A2(X+1,Y)=A2(X+1,Y)+1
113 A2(X,Y+1)=A2(X,Y+1)+1
12Ø NEXT X,Y
13Ø FOR Y=1 TO L-1
14Ø FOR X=1 TO L-1
15Ø V=A2(X,Y):AND 1:A2(X,Y)=Ø:A1
(X,Y)=V
16Ø IF V=1 THEN PSET(X,Y)
17Ø NEXT X,Y:RETURN
```

Listing 3: NEIGHBOR

```
ØØ1ØØ      ORG      $7ØØØ
ØØ11Ø VERT   RMB     1
ØØ12Ø HORZ   RMB     1
ØØ13Ø START  ORCC    #$5Ø    CLEAR THE INTERRUPTS
ØØ14Ø CLEAR  CLRA
ØØ15Ø      CLRB
```

```
ØØ16Ø      LDX      #$8ØØØ  BEGINNING OF TEMPORARY ARRAY
ØØ17Ø      CLR      $FFDF    HIGH RAM
ØØ18Ø LCLEAR STD      ,X++
ØØ19Ø      CMPX    #$F8ØØ  END OF TEMPORARY ARRAY
ØØ20Ø      BLS     LCLEAR
ØØ21Ø      BSR     PPOINT
```



```

00220 PAGE5 LDR #5
00230 JSR $9653
00240 JSR $9542
00250 BSR PSET
00260 LDB #1
00270 JSR $95AA
00280 BSR PPOINT
00290 PAGE1 LDB #1
00300 JSR $9653
00310 JSR $9542
00320 BSR PSET
00330 LDB #1
00340 JSR $95AA
00350 BSR PPOINT
00360 DONE JSR [$A000] ANY KEY PRESSED?
00370 BEQ PAGE5 IF NOT BACK TO PAGE5
00380 CLRB
00390 JSR $95AA
00400 ANDCC #5AF RESET THE INTERRUPTS
00410 RTS BACK TO BASIC
00420 PPOINT LDU #8100 BEGINNING OF DATA
00430 LDX SBA START OF GRAPHICS
00440 LEAX 357,X FIRST GRAPHICS BYTE USED
00450 SETDP $70
00460 LDA #570
00470 TFR A,DP
00480 CLR $FFDF HIGH RAM
00490 LDA #171 BITS DOWN
00500 STA VERT
00510 L3 LDB #22 BYTES ACROSS
00520 STB HORZ
00530 L2 LDA ,X+
00540 LDB #8 BITS/BYTE
00550 L1 LSLA CHECK FIRST BIT
00560 BCC CPPT
00570 NEIGH INC -176,U TOP NEIGHBOR
00580 INC -1,U LEFT NEIGHBOR
00590 INC +1,U RIGHT NEIGHBOR
00600 INC +176,U BOTTOM NEIGHBOR
00610 CPPT LEAU 1,U NEXT ARRAY LOCATION
00620 DECB BYTE CHECKED YET?
00630 BNE L1
00640 DEC HORZ HORIZONTAL DONE YET?
00650 BNE L2
00660 LEAX 10,X ADJUST GRAPHICS BYTE
00670 DEC VERT VERTICAL DONE YET?
00680 BNE L3
00690 CLR $FFDE LOW RAM
00700 CLRA
00710 TFR A,DP
00720 RTS
00730 PSET LDX #81B4 ACTUAL START OF DATA USED
00740 LDU #TABLE MUST USE OUR OWN OR TABLE
00750 SETDP $70
00760 LDA #570
00770 TFR A,DP
00780 CLR $FFDF HIGH RAM
00790 LDB #12 STARTING POINT DOWN
00800 STB VERT
00810 LOOP4 LDA #44 STARTING POINT ACROSS
00820 STA HORZ
00830 LOOP3 LDA ,X+
00840 BEQ CPSET BRANCH IF ZERO
00850 CLR -1,X CLEAR THE BIT
00860 LSRA ANDA #1
00870 BCC CPSET BRANCH IF ZERO
00880 LDD VERT REG A=VERT:REG B=HORIZ
00890 LSRA
00900 RORB
00910 LSRA
00920 RORB
00930 LSRA
00940 RORB
00950 ADDA >SBA
00960 TFR D,Y
00970 LDA HORZ
00980 ANDA #7
00990 LDA A,U
01000 ORA ,Y
01010 STA ,Y
01020 CPSET INC HORZ
01030 LDA HORZ
01040 CMPA #212 MAXIMUM ACROSS
01050 BLS LOOP3
01060 LEAX 7,X ADJUST BIT DATA POINTER
01070 INC VERT
01080 LDB VERT
01090 CMPB #180 MAXIMUM DOWN
01100 BLS LOOP4
01110 CLR $FFDE LOW RAM

```

```

01120 CLRA
01130 TFR A,DP
01140 RTS
01150 TABLE FDB $8040
01160 FDB $2010
01170 FDB $0804
01180 FDB $0201
01190 END START

```

Listing 4: NEIGHBAS

```

0 'COPYRIGHT 1989 FALSOFT, INC
5 IF PEEK(&H7066) <> &H50 THEN LOA
DM"NEIGHBOR.BIN"
6 'IF PEEK(&H7066) <> &H4F THEN LO
ADM"NEIGHALL.BIN"
10 CLEAR200,&H7000-1
20 PCLEAR8: CX=128: CY=96
30 PMODE4,1: PCLS: SCREEN1,1
40 FOR X=1 TO 25 STEP 2: LINE (CX-
X,96-X) - (CX+X,CY+X), PSET, B: NEXT
42 LINE (103,71) - (153,121), PSET
43 LINE (153,71) - (103,121), PSET
44 FOR X=104 TO 152 STEP 4
45 FOR Y=72 TO 120 STEP 4
46 PSET(X,Y): NEXT Y,X
47 FOR X=106 TO 150 STEP 4
48 FOR Y=74 TO 118 STEP 4
49 PSET(X,Y): NEXT Y,X
50 EXEC&H7002
55 POKE&HFFDE,0

```



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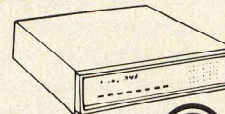
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*Getting started with cgfx functions and improving your system
with a fast compiler utility*

What You Should Know About Your C Compiler

By Numa David

The C compiler release predates the Color Computer 3, hard disk drives for the CoCo, OS-9 Level II, and the Level II *Development System* with its vdd (RAM disk). Neither the compiler nor the manual has been updated to achieve the high performance and compiling speed possible with the new hardware or software.

While the C compiler was being written, the CoCo did not have sufficient disk space to keep all the necessary files on one disk drive. The compiler was coded to look for files in the DEFS and LIB directories on Drive /d1, and the manual stated that the DEFS and LIB directories were on that drive. Disk space limitation no longer exists due to the recent improvements in hardware and software.

If your system has a 40- or 80-track, double-sided floppy drive as /d0, your disk has space for more files. The compiler can be patched to look for its DEFS and LIB directories there instead of on /d1, letting you keep all your system, commands and compiler files on one disk. If your system has a hard disk drive, you may not only

keep all your files there but all file access including the compiler files.

Better yet, if your system includes the Level II *Development System* with the vdd device driver (RAM disk), there are patches and procedures that give you the high performance and speed of RAM-based compiling instead of disk-based compiling.

The instructions that cause the compiler to look on Drive /d1 for the DEFS and LIB directories are coded in the compiler files ccl and c.prep. These files can be patched to cause the compiler to look for the DEFS and LIB directories on any drive you choose, including /r0 (vdd RAM disk) available with the Level II *Development System*.

The remainder of this article guides you through steps necessary to optimize the compiler to your system. Some initial notes to remember are:

- Perform the following on backup copies of your system and compiler disks. The system and compiler disks are modified, and it is possible for patch utilities to destroy important data on your disks.

- Drive /h0 is used in some of the following examples. Substitute /d0 if your system does not include a hard disk drive.

- The EZGen utility used is available from Burke & Burke, as advertised in THE RAINBOW. It is possible to use OS-9 commands (modpatch with os9gen or cobbler) if you prefer; but, after considering the low price, the readers this will interest, and the inevitable complications that will be avoided, I concluded that EZGen is the practical choice for these examples. The

Numa David, an architect and planning consultant, uses a CoCo 3 to process demographic and other data into graphic output for feasibility studies for contemplated real-estate development projects. He is currently writing a full-featured CAD (Computer-Aided Design) application in the C language for the CoCo 3.

objective here is to show you the simplest approach to a practical problem.

Compiler Patches

If you have a hard disk drive you can patch a custom version of your compiler that searches Drive /h0 for the DEFS and LIB directories as follows:

```
OS9: chd /h0/cmds
OS9: ezgen c.prep
l c.prep
c 135c 68
c 135d 30
v
q
OS9: ezgen ccl
l ccl
c 0EE5 68
c 0EE6 30
v
q
```

If you have a 40- or 80-track, double-sided disk drive as /d0, you can patch a custom version of your compiler that searches Drive /d0 for the DEFS and LIB directories as follows:

```
OS9: ezgen c.prep
l c.prep
```

```
c 135d 30
v
q
OS9: ezgen ccl
l ccl
c 0EE6 30
v
q
```

If you have the OS-9 Level II *Development System*, your compiler can be optimized to run at maximum speed using the vdd (RAM disk) as follows:

Boot patches:

To add the r0_192k.dd device descriptor to your boot file:

```
OS9: ezgen os9boot
b
i /d1/modules/r0_192k.dd
q
```

To set Default Drive /dd to /h0 (omit this if you don't have a hard disk drive):

```
OS9: ezgen os9boot
l dd
u /d1/modules/h0
q
```

You'll want to use the cgfx functions from your Level II *Development System*. They are C graphics functions similar to the gfx and gfx2 functions in BASIC09. The manuals furnished by Tandy fail to give the necessary instructions required to compile programs with cgfx functions.

To compile cgfx functions rlink must be renamed c.link, and rma must be renamed c.asm as follows:

```
OS9: chd cmds
OS9: del c.asm
OS9: del c.link
```

Now let's rename the headers for the MODULES directory.

```
OS9: ezgen rma
l rma
r c.asm
q
OS9: rename rma c.asm
OS9: ezgen rlink
l rlink
r c.link
q
OS9: rename rlink c.link
```

The above patches, using EZGen, act directly on the disk files; you do not use

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os9gen or cobbler. You simply reboot your system.

Note: Except for initial access to disk drives to move files to /r0 for compiling, the above compiles and links entirely in RAM — the disk drives do not run.

Merging the Library Files

The following merged cgfx library files are also merged with your programs when they are linked by the fast c.link procedure shown later.

```
OS9: merge cgfx.1 clib.1 sys.1
>merged.1
```

Include merged.1 in the LIB directory. To ensure compatibility, be sure to use only the new linker supplied with the *Development System*.

Preparing the Initializer

Use the editor to prepare ccl_init, a procedure file to initialize the fast compiler, as follows:

```
* ccl_init *
iniz r0
chd /r0
mkdir LIB
chd LIB
copy /h0/lib/merged.1 merged.1
chd /h0/defs
dsave /h0 /r0 ! shell
chx /h0/cmds
load ccl
load c.prep
load c.pass1
load c.pass2
load c.asm
load c.link
```

Setting Up the Fast Linker

Use the editor to prepare fast_link, a procedure file you can use to put specific programs in for linking. Using a procedure file avoids typing a long list of commands each time you recompile and relink your application.

The quantity of relocatable files merged below serves as only an example. The exact quantity depends upon the number of programs linked to form your application. Here is a typical procedure file:

```
* fast_link *
chd /h0/sources
merge prog1.r prog2.r prog3.r >temp1
merge prog4.r prog5.r prog6.r >temp2
merge prog7.r prog8.r prog9.r >temp3
merge temp1 temp2 temp3 >/r0/lib/
prog.1
* The following compiler line links
the *
* CGFX functions in merged.1 to
your program *
```

```
c.link cstart.r -l=prog.1 -
l=merged.1 -o=prog
```

This completes preparation of the system for fast compiling. Reset your computer and reboot.

To Use Your Fast Compiler:

Compile each of the source programs of your group of source programs to a relocatable object file as follows:

- Initialize the fast compiler by typing at the OS9 prompt:

```
OS9: ccl_init
```

- Copy the program to /r0:

```
OS9: chd /r0
```

```
OS9: copy /h0/sources/prog.c prog.c
```

- Compile the program.

```
OS9: ccl prog.c -ro
```

Note: Debug and recompile if errors occur during compiling.

- Copy the program back to /h0:

```
OS9: copy prog.r /h0/sources/prog.r
```

```
OS9: del prog.r
```

```
OS9: del prog.c
```

You now have a group of relocatable object files that must be linked to form an executable object file as follows:

To Use Your Fast Linker:

To link the group of relocatable files to an executable object file, simply type at the OS9 prompt:

```
OS9: fast_link
```

If fast_link produces errors, debug the offending source program, delete the offending relocatable file, and repeat the compiler steps above. The executable program is saved in the CMDS directory. To run the program type at the OS9 prompt:

```
OS9: prog
```

Summary

The keys to this fast compiler are the patches that cause the compiler to look for DEFS and LIB directories on /r0 instead of /d1 and keeping the compiler commands loaded in memory for immediate execution instead of loading from disk drives.

Beyond that, many approaches and variations are possible for setting up the system for fast compiling. Enhancements and improving convenience and utility will undoubtedly occur to you. You can develop a completely interactive, menu-driven, fast compiler utility.

C Graphics Library

Now for the C graphics library. Your C compiler has available a new graphics library that expands the original C library to a state-of-the-art graphics programming language. C language graphics library functions similar to the gfx2 functions in BASIC09 are provided on the OS-9 Level II *Development System* disk as cgfx functions for the C compiler. You will want to use your cgfx commands.

However, essential steps required before using cgfx with the compiler are not included in the manual — the kind of steps that probably never occur to even experienced programmers. The following gives you the information needed to get started with cgfx functions.

Use of cgfx functions requires a Color Computer 3 with the following software: OS-9 Level II Operating System, OS-9 Level II *Development System*, C compiler and C library, and *Multi-View*. (You can use cgfx functions without *Multi-View*, but your cgfx documentation is in the *Multi-View* manual.)

If you haven't compiled a program using cgfx functions yet, the following will spare you some time, frustration and confusion:

Pages 10-1 and 10-2 of the *Multi-View* manual advise you to link the cgfx library along with other libraries to your C program, and give instructions along with a command line example (that does not work yet) as follows:

```
OS9: ccl prog.c -r
```

```
OS9: c.link /d1/lib/cstart.r prog.r
-l=/d1/lib/cgfx.1 -l=/d1/lib/clib.1
-l=/d1/lib/sys.1 -o=prog
```

How frustrated a programmer can get if no one tells him that the ccl and c.link modules used above are not the ones that came with the compiler and do not work until they are changed. You can't be expected to know this because it's not in the manual. Tandy knows about this specific problem — and one of its capable technical representatives will explain it if you call Tandy's Fort Worth headquarters. But how long does a programmer troubleshoot a command line example before he resorts to that? (Have a heart, Tandy — we need addenda for this one.)

The manual fails to advise that the old c.link and c.asm must be deleted from the CMDS directory, and that r.link must be renamed c.link and rma must be renamed c.asm before using the compiler with the above command line as follows. (Warning: Perform the following on a backup disk. Important compiler modules will be changed.)

It is assumed the rma and r.link com-

mands from the *Development System* disk, as well as c.asm and c.link from the C compiler disk, are on the CMDS directory on Drive /d0.

```
OS9: chd /d0/cmds
OS9: del c.asm c.link
OS9: rename r.link c.link
OS9: rename rma c.asm
```

Now you are ready to proceed according to the instructions and examples on Page 10-2 of the *Multi-View* manual. However, I suggest first merging the library files as follows, assuming the library files from the *Development System* disk are in the LIB directory on /d1:

```
OS9: chd /d1/lib
OS9: merge cgfx.l clib.l sys.l
>merged.l
```

Keep merged.l in the LIB directory. The rather long linker line above can be shortened in all future calls as follows, provided your source code is on a directory named SOURCES on /d0 and the LIB and DEFS directories are on /d1:

```
OS9: chd /d0/sources
OS9: ccl prog.c -r
```

```
OS9: c.link /d1/lib/cstart.r prog.r
-l=/d1/lib/merged.l -o=prog
```

Debugging Your Manual

It may save you more time and confusion to know the manual contains errors in some cgfx command line examples. The following, from Page 10-21 of *Multi-View*, will help you debug your manual.

```
SetGo(path,grpnum,bufnum) Wrong
SetGC(path,grpnum,bufnum) Right
```

If you are uncertain about path simply use l to indicate standard output.

I don't know how many cgfx command line errors are in the manual, but when (not if) you run into other cases where everything seems OK but you get an Unresolved References Error, you can determine whether the command from the manual is correct by using rdump as follows:

To dump system command headers to your screen using rdump from the *Development System*:

```
OS9: chd /h0/lib
OS9: rdump cgfx.l -a
```

or

To produce a printout so you can compare all the cgfx commands on the system disk with all the cgfx commands in the manual:

```
OS9: rdump cgfx.l -a >/p
```

The information in the dump you are interested in has the exact spelling of the command in question, including uppercase, lowercase, underscores, etc., as listed under "global symbols defined." If the spelling from the dump differs from the manual, use the spelling from the dump and note the correct command in the manual. Otherwise you will find cgfx functions to be as simple, straightforward and useful as their BASIC09 counterparts.

These functions are fundamental to graphics programming in the C language. CoCo users are fortunate that Tandy chose an industry standard, state-of-the-art operating system, languages and powerful features such as cgfx for the Color Computer. You don't want to do without them.

(Questions or comments concerning this article may be addressed to the author at 5305 Grand Lake, Bellaire, TX 77401; (713) 664-9529. Please enclose an SASE when requesting a reply.)



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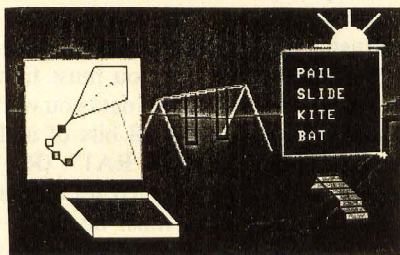
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It took a little longer than I thought, but here is Part 2. Before we get into it, be sure to review Part 1, which gives instructions for building a 256K RAM disk for the CoCo 1, 2 or 3.

You need a Multi-Pak Interface for this project. When you are finished building the RAM disk, I will supply you in Part 3 with a driver for Disk BASIC in the form of source code. I will also supply an OS-9 driver on Delphi and on RAINBOW ON DISK.

Look at Figure 1. It is the complete circuit for the RAM disk. (The parts list is described in detail in the previous article.) By now you should have completed Part 1 of this project. This means having all the sockets mounted on the proto-board and the sockets wired for +5-volts and ground. You should also have all of the .1µF capacitors in place and wired. Check over the wiring again. It is also wise to plug the empty card into the Multi-Pak and test the +5-volts and ground connections with a logic probe or meter. This way you know that all the chips will be powered properly.

Study Figure 1 carefully. None of the parts show +5-volts or ground, making the diagram easier to read. Notice there is only one RAM chip shown in the diagram, to save space. All of the RAM chips are connected in parallel (together).

For example, Pin 15 of the RAM chip comes from Pin 3 of U17A. Pin 3 of U17A also goes to Pin 15 of all other RAM chips as well. All pins to the RAM chips are connected together except for DI (Pin 2) and DO (Pin 14). Do you see the label D0 next to the RAM chip? It goes to any other wire with the same label. As an example, follow the heavy bus trace on the diagram. Not shown in the diagram are the other seven RAM chips with different labels. U1 has the label D0 on pins 2 and 14; U2 has the label D1 on these pins; U3 has D2, and so forth. There is one for each of the eight data lines.

Look again at the heavy traces. They are known as *bus* lines and are used when many lines go to the same area or chip. Usually address and data lines are wired using bus lines. Whenever you see a bus line, all wires entering and leaving the bus must be labeled. It is the label, not the bus, that determines where the wire goes. In fact the bus is just a visual guide to where the wires

Part 2 of a three-part series

Building a RAMDisk

By Tony DiStefano
Rainbow Contributing Editor

go. You can remove the bus lines and just follow the labels.

Now that you know how to properly interpret the diagram, let's start on how the circuit works. You should be familiar with U1 to U8. (See my previous article on RAM chips for a complete description on how they work.) The rest of the chips are standard TTL parts, and descriptions of each are found in the many TTL books on the market today. I suggest getting one in order to fully understand the following descriptions.

Look at U9, U10 and U14. These are latches that hold the 18 address locations needed to access 256K of RAM. Note that U14 is not a tri-state latch; so U15, a tri-state buffer, is needed. The input side of these latches comes from U13, which is being used as a memory decoder. It uses SCS signal from the CoCo, thereby mapping these bytes from \$FF40 to \$FF43 (A0, A1 and A2). Since we are not using A4, there is a mirror image of this area at \$FF48. U13 also uses the R/W line and the E clock to make sure that data is valid when writing to the latches. This leaves the decoder chip with four write-only output signals and four read-only signals. We need all four write-only outputs but only one read-only output.

A write to \$FF40 activates Y0 of U15. This latches the information on the data bus to U9. A write to \$FF41 activates Y1 of U15, and this latches data to U10. Again a write to \$FF42 activates Y2 of U15. This latches data into U14. Note that even though

six bits of data (D0 to D5) are written to U14, only the first two are used. The other four are not connected and may be used for further expansion. The outputs of U9, U10 and U14 are controlled by the RAS and CAS parts of the circuit.

U11 and U10 make up part of the refresh circuit. U11 is an eight-bit counter. If you remember the RAM info, only eight bits are required to completely refresh 256K of memory. The input of U11 comes from an AND gate, U16B. The main input to the AND gate is from the Q clock. Every Q clock cycle the CoCo puts out increments the counter. When the counter reaches \$FF, it resets to 0 and starts over again. Then other input to the AND gate comes from the SCS line of the CoCo. It is wired in such a way that the refresh counter is halted whenever an access to the area is done. This is to make sure that a count is not missed when the RAM is accessed. The output of the eight-bit counter is not tri-state — thus the need for U10. U10 is an eight-bit tri-state buffer. The outputs are almost always enabled via an inverter U18F. The input to U18F comes from U16A, which is only activated when you do a read or write to the RAM data at \$FF43. When a read or a write is done, the refresh cycle is stopped via U16A and U18F.

The string of inverts you see at the top of Figure 1 is a delay line. It delays the E clock in order to allow all other buffers to activate and deactivate in the proper sequence. Remember that in reading or writing a byte of data to a dynamic RAM such as this, there must be a proper sequence. (A complete sequence of events is discussed later.) But for this to happen, the refresh circuit must be removed from its counter address in time and be back on track for the next refresh count. This is one example of the timings to be reckoned with in designing a circuit.

Now let us look at a complete read cycle step-by-step. Before a read cycle can be done, you must first set up which 256K bytes of data you want to read. This is done using 18 bits of address. Let's call them RA0 to RA17. (RA stands for RAM address.) To set up the 18 RAM addresses, you must do three writes to the latches described above. RA0 to RA7 is mapped at \$FF40 using D0 to D7 respectively. The next group, RA8 to RA15, is addressed at \$FF41, again using D0 to D7 respectively. Finally the last two, RA16 and RA17, are addressed at \$FF42, using D0 and D1 respectively. After writing to these three address locations, the address of the byte

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

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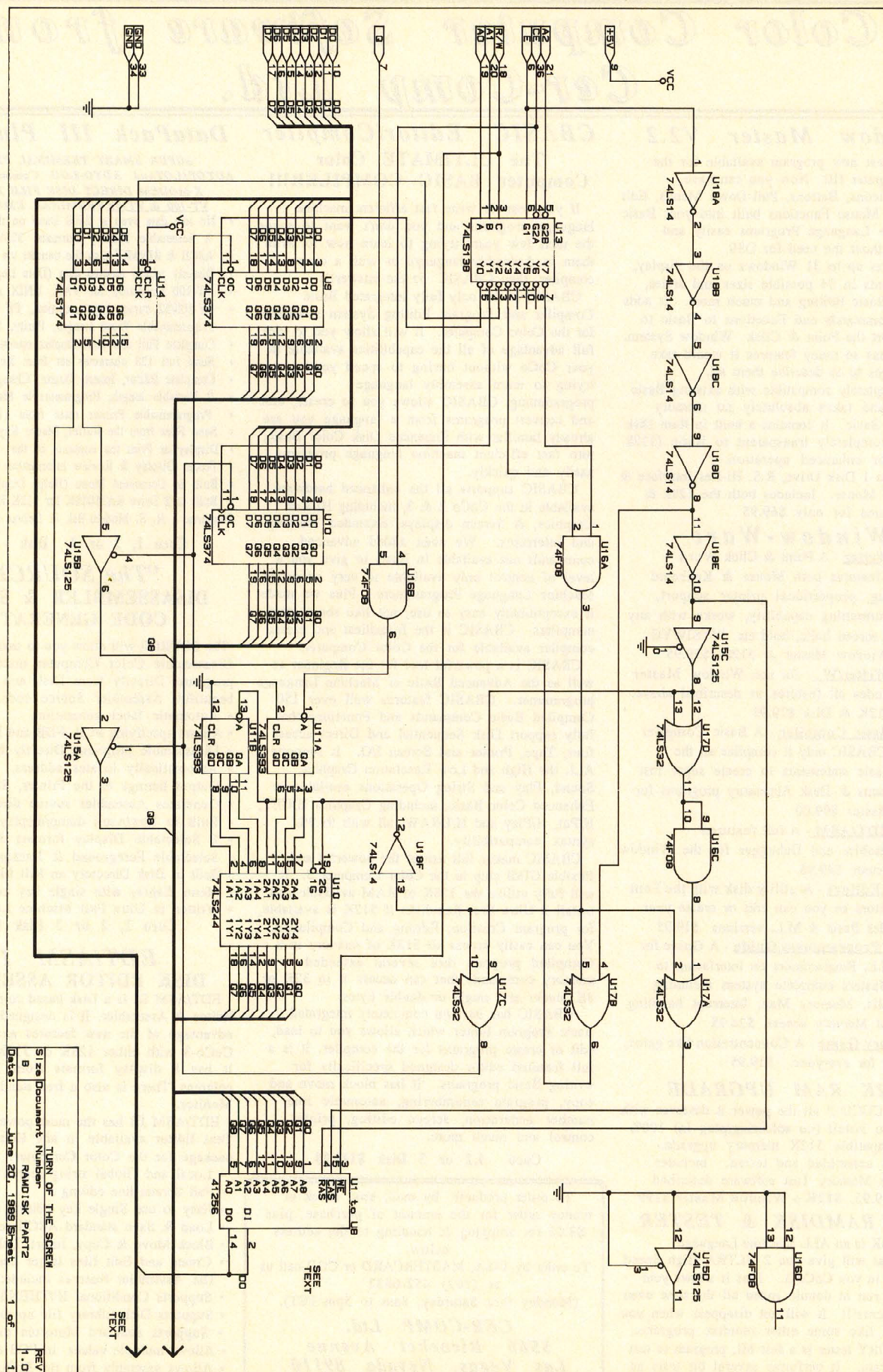


Figure 1

we want to read is set up.

To read the byte at the above address, read the address \$FF43. When we read \$FF43, we start the cycle by SCS going low. The memory-mapped byte is at \$FF43. The R/W line puts all the RAM chips in the Read mode. Then the SCS locks out the Q clock from counting the next refresh address to U11. U16A goes low and immediately locks out the refresh address via U18A and U10. That also puts the RAS address data on the Q bus line. Look at the delay line starting from U18A. The first encounter is the junction between U12D and U12E. This disengages the RAS address data from the Q bus. The next event (U18E and U15A) strobes the RAS address into the RAM chips. Note that the circuit appears to remove the address before the RAM chips get it. But because of the delays caused by U17B and the latches themselves, the RAS strobe happens before the RAS address disappears.

The next step (U15A and U17D) activates U17C and in turn activates U10 and U15A. This puts the CAS address on the Q bus. The following event at the end of the delay line is U16C. It activates U17A and strobes the CAS line of the RAM. At this point the RAM chips have all the data needed to produce the data. One hundred

and fifty nano-seconds later, the data appears on the data bus via Pin 14 on each RAM chip. Finally the CPU latches the data on the falling edge of the E clock. U13 deactivates due to the E clock and then everything else down the line deactivates. The next cycle starts all over again. If the CPU does not read or write to that memory location, a refresh cycle is made. This process is repeated continuously.

That's a lot of theory, but just remember: The above circuit took almost 100 hours of work to design. Now you're ready to begin wiring. The best way to do this is to follow a few guidelines. I start from U1 Pin 1 and make all the connections to it. Then I go to Pin 2 and do the same, then Pin 3, and so on until the end of the chip. Next I do U2 and U3 in the same manner, checking them several times.

Wire it up to the location designated by the circuit in Figure 1 and plug in the chips. Another tip is to label all the sockets with a felt pen on the bottom side of the proto-board. It's also good to circle Pin 1 of each socket — it gives you a point to start counting on. Try to keep all wires as short and the solder points as neat as possible. When you are finished with the connections, clean the bottom of the board with circuit-board flux cleaner.

Next time I'll have trouble-shooting and testing guides and some source code for the RAM disk.

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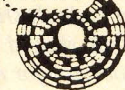
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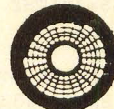
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October 1989

THE RAINBOW

89

Dear Larry:

I have written a word processing program for my CoCo and am wondering how to put a word-wrap feature into the program to prevent word division. I would like a line length to vary up to 250 characters. A listing of the program is enclosed with this letter.

Donald F. Graff
Springboro, Pennsylvania

Dear Donald:

Due to space limitations I cannot list the whole program in this article. But I can write a small routine that enables word wrap and show you the important elements to consider in designing one. The program is listed below. The variables are explained in the header of the routine.

Questions or improvements regarding this routine are welcome. Replies may take as much as two or three months, considering the complexity of the question.

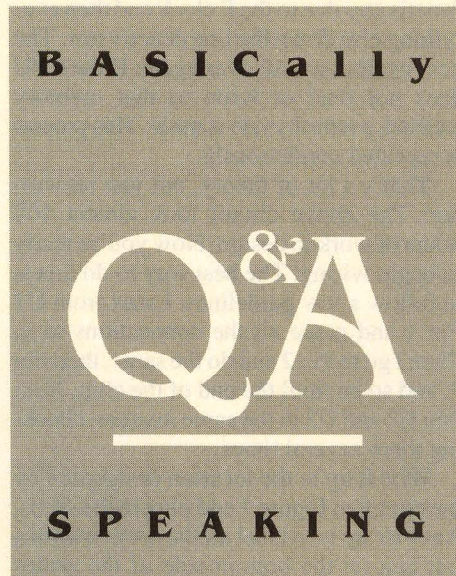
```
0 CLEAR 10000
1 DIM L$(100) ' THE NUMBER OF LINES ALLOWED TO BE TYPED (CAN BE INCREASED)
10 WO=0 'THE NUMBER OF LETTERS IN THE CURRENT WORD
11 LE=0 'THE LENGTH OF THE CURRENT LINE
12 LN=60 'THE MAXIMUM LENGTH OF A LINE
13 A$="" 'A CHARACTER FROM THE KEYBOARD
14 L$="" 'THE LINE CURRENTLY BEING TYPED
15 NU=1 'THE CURRENT LINE NUMBER
100 CLS:PRINT
110 EXEC 44537:A$=INKEY$
120 LE=LE+1:L$=L$+A$:PRINT A$;
130 IF A$=" " THEN WO=0 ELSE WO=WO+1
140 IF LE>LN THEN PRINT STRING$(WO,8):L$(NU)=LEFT$(L$,LEN(L$)-WO):L$=RIGHT$(L$,WO):LE=WO:WO=0:NU=NU+1:PRINT L$;
150 GOTO 110
```

Dear Larry:

I bought a used Radio Shack Color Computer 2 with a printer and double disk drive. There were no manuals with it. I was able to get some manuals for the printer and cassette player through Radio Shack.

My husband and I are trying to use it for a start-up computer business. I can't seem

Larry Boeldt has programmed on the Color Computer for five years. He has experience with BASIC, Pascal and FORTRAN IV. He runs a software customizing business for the CoCo market.



By Larry Boeldt

to find enough business software for this computer. I know it was originally made as a beginner's computer but am hoping I can find some business and educational software for it until I can buy a more business-oriented computer.

I am looking for an address label program so that I can alphabetically file names by city, state and zip code. It should allow for easy updating and should be able to work with a word processor for mail merge.

I hope you know of some company or individual that has this type of business software. I would also like to find a desktop publishing program for the Color Computer 2.

Kay Nelson
Jacksonville, Florida

Dear Kay:

Tothian Software, Inc., sells two programs called *Ultra-Merge* and *Ultra-Base*. Together they should take care of your mail merge and mailing list needs. For a CoCo 2 word processor many people use *Telewriter 64* from Cognitec. I used the CoCo 3 version of *Telewriter* to type this article. Both Cognitec and Tothian advertise in THE RAINBOW, so look for their ads.

If you plan to buy a PC-compatible computer in the future, I suggest a program sold by Radio Shack called *Q&A*. My personal suggestion is to upgrade to a CoCo 3. Your present drives are compatible and the

price is low. A CoCo 3 fills your small-business needs quite nicely.

These suggestions are based on my personal use, and the programs may not suit your needs. Many other RAINBOW advertisers sell similar products, and it would be a good idea to check the reviews in back issues. If these packages do not match your taste, you can have someone write custom software for you. It may cost more, but you will get exactly what you need.

Dear Larry:

I recently bought a Color Computer 3 and the OS-9 operating system. Before my purchase I owned a Color Computer 2 and used Disk BASIC. I would like to know if there is any way for OS-9 to read the directory of a Disk BASIC disk. I have TRSCopy, which I use to convert old text files, and would find it helpful be able to see which files I have on disk as I go along.

Jeff Hebert
Sheboygan, Wisconsin

Dear Jeff:

The listing `rsdir` should do exactly what you want it to. Simply type in the following lines to invoke it from OS-9's shell. Notice that it is written in BASIC09. Make sure you pack it, using the command `pack*`, so that it is stored in your execution directory. This causes BASIC09 to pack all procedures in memory and send them to the execution directory.

You must have `runb` in memory or in the execution directory. To get it to work, you must trick OS-9 into believing that an OS-9 format disk is in the disk drive.

First put any OS-9 disk in Drive /d1. Type `dir /d1`. Replace the OS-9 disk with your Disk BASIC disk and type `rsdir("/d1")`. The program asks if you want to make another directory listing. You may redirect the output to the printer with the line `rsdir("/d1") >>p`.

I purposely wrote the program to send its output to the standard error path.

```
PROCEDURE rsdir
0000 PARAM filename:STRING[5]
000C DIM done:BOOLEAN
0013 DIM s:STRING[1]
001F DIM fsector(256):BYTE
002B DIM i:INTEGER
0032 DIM path:BYTE
0039 DIM sector:INTEGER
0040 ON ERROR GOTO 300
0046 filename=filename
```



```

004E PRINT CHR$(12);
0054 OPEN #path,filename+"@
":READ
0064 REPEAT
0066 SEEK #path,78848.
0073 PRINT CHR$(12)
0078 PRINT "Put Color Bas
ic Disk into "; filename
009A PRINT "and press any
key to continue "
00BD GET #1,s
00C6 PRINT CHR$(12)
00CB done=FALSE
00D1 FOR sector=1 TO 18
00E1 GET #path,fsector
00EB RUN display(fsecto
r,done)
00FA IF done THEN 10
0106 NEXT sector
0111 10
115 PRINT
0117 PRINT "Another disk?
"
0129 GET #1,s
0132 UNTIL s="n" OR s="N"
0146 CLOSE #path
014C END
14E 300
0152 PRINT CHR$(7); CHR$(7)
015B i=ERR
0161 IF i=56 THEN

```

```

016D PRINT
016F PRINT "Usage: RSDIR(
"; CHR$(34); "/dl";CHR$(34); ") "
0192 ENDIF
0194 IF i=244 THEN
01A0 PRINT
01A2 PRINT "You must firs
t put an"
01BB PRINT "OS9 format di
sk in "
01D2 PRINT filename; " be
fore trying to use"
01EF PRINT "the Color BAS
IC disk"
0207 ENDIF

```

```

PROCEDURE display
0000 PARAM sector(256):BYTE
000C PARAM done:BOOLEAN
0013 DIM i,j:INTEGER
001E FOR j=1 TO 256 STEP 32
0034 FOR i=j TO j+10
0049 IF sector(i)=0 THE
N 20
005B IF sector(i)=255 T
HEN
006A done=TRUE
0070 GOTO 30
0074 ENDIF
0076 PRINT #3,CHR$(sect
or(i));

```

```

0084 IF i=j+7 THEN PRIN
T #3,"/";
009D ENDIF
009F NEXT i
00AA PRINT #3," ",
00B6 20
00BA NEXT j
00C5 30 END

```

Questions about specific BASIC programming problems can be addressed to **BASICally Speaking**, 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 Larry 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 "BASICally Speaking" online, which has complete instructions.

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Software

CoCo 3

Extended ADOS-3— An Elevated Environment

Tandy's introduction of the Color Computer 3 was a giant leap in the evolution of the CoCo. This powerful machine with advanced graphics and addressing capabilities is in my opinion the best computer available at anywhere near its price. And for some applications, it's the best computer, *period*. Many purchasers of the CoCo 3 were disappointed, however, to find that the CoCo 3's Disk BASIC is nearly identical to the dull DOS of the earlier CoCos. What the CoCo 3 needs is a new Disk BASIC that fully uses the abilities of this incredible machine and is of the CoCo 3's caliber. *Extended ADOS-3* is the answer to that need.

Extended ADOS-3, the latest product in the popular *ADOS* line, is an enhancement to standard *ADOS-3*. Remarkable new features are added, and a few standard commands are greatly improved — especially those dealing with the disk drive. Your

configurable cold start actions, and more — along with all the functions available in standard *ADOS-3*.

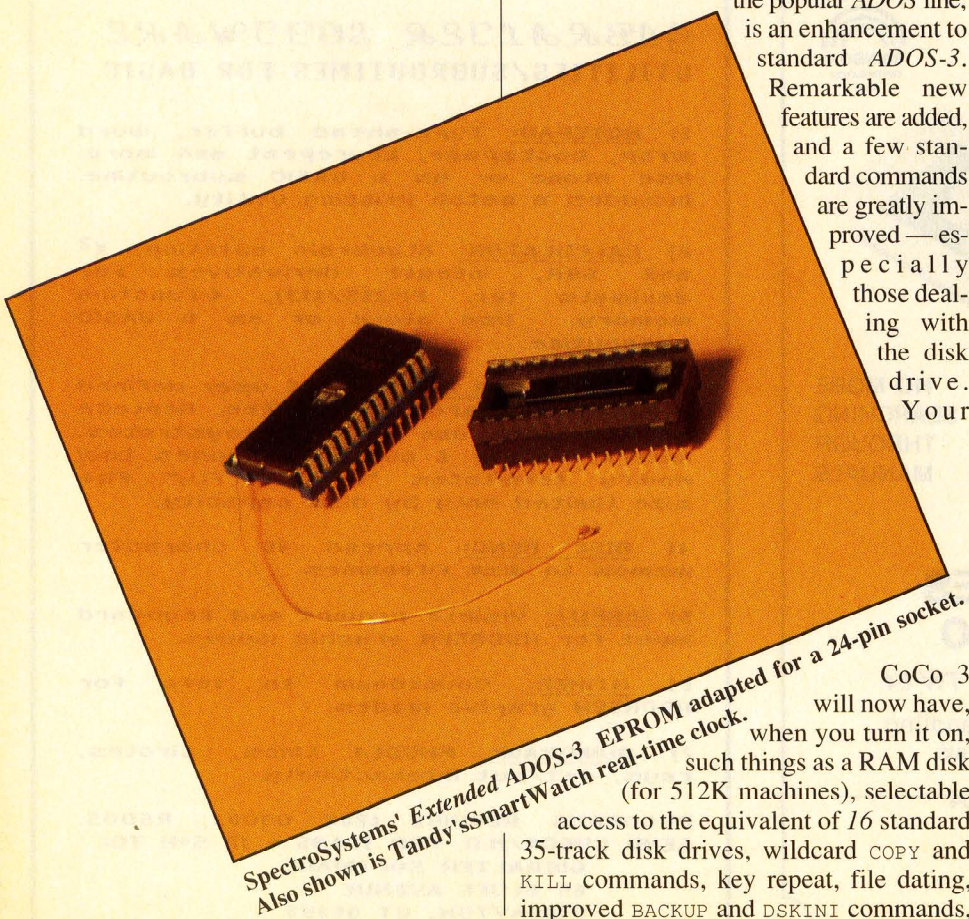
Extended ADOS-3 comes with one floppy disk and a 12-page 8½-by-11-inch manual. The documentation is well-written, straightforward and understandable upon first reading. The author is easy to get in touch with and answered all my questions in a helpful manner.

Extended ADOS-3 is designed to be “burned into” a 27128 EPROM (Erasable, Programmable Read-Only Memory), which replaces the ROM chip presently in your disk controller. This is an important difference from standard *ADOS-3*, which can be loaded into RAM from disk. *Extended ADOS-3*'s massive code won't fit into the same amount of memory that *ADOS-3* does. This problem is now solved by a novel approach.

Most of you are probably familiar with programs for the 64K CoCo 1 or 2 that put the computer into “RAM mode” and make use of the extra memory. Since the CoCo 3 already operates in RAM mode, *Extended ADOS-3* actually switches into ROM mode and accesses information stored on the EPROM in the disk controller. This is a definite switch from standard program operation, and it was a pleasant surprise to learn of this scheme.

However, power often comes at a price. I mentioned that the program must be burned into an EPROM; while EPROM programmers are not unknown to the CoCo community, I suspect most purchasers will need to have someone else burn the EPROM for them. Finding someone to do it isn't a problem (the manual contains the addresses of two such people), but it costs an additional \$15.

I should also mention that even though *Extended ADOS-3* is designed to be burned into an EPROM, it is possible to use a few of its functions without doing so. You will basically be running standard *ADOS-3*, but with the ability to use (one at a time) several stand-alone utilities that come on the disk.



SpectroSystems' *Extended ADOS-3* EPROM adapted for a 24-pin socket. Also shown is Tandy's SmartWatch real-time clock.

CoCo 3 will now have, when you turn it on, such things as a RAM disk (for 512K machines), selectable access to the equivalent of 16 standard 35-track disk drives, wildcard COPY and KILL commands, key repeat, file dating, improved BACKUP and DSKINI commands,

However, I *strongly* encourage anyone who wants to get their money's worth from *Extended ADOS-3* to have it burned into an EPROM and use the program to its full potential as intended.

An additional price for power is that the size of *Extended ADOS-3* demands that it be burned into a 28-pin 27128 EPROM, since no 24-pin EPROM has enough capacity to store it. The Tandy FD 502 disk controller has a 28-pin ROM socket, but earlier Tandy controllers have only 24 pins. Those with the smaller sockets need to purchase a \$10 adapter from SpectroSystems.

In either case, both types of controllers need some minor hardware modification in order to use a 28-pin EPROM. This involves opening the controller (which voids your warranty if still in effect) and doing a little soldering. So if the thought of a soldering iron in your hand makes you break out into a cold sweat, get a friend who knows how to solder to perform this for you. Also, owners of the FD 500 drive need to either run a wire into the CoCo's cartridge slot or add a new pin to the controller's card edge connector, because a pin necessary for the EPROM's operation is missing from these controllers. This particular modification may prove to be a little more difficult. Even with all these things considered, I had no problem installing the adapter in my 24-pin ROM, and I think this is a small price to pay for the kind of power you get.

Guaranteed to Fit

Extended ADOS-3 is intended to fit your computer setup and personal preferences like a glove — but some participation on

your part is required. Upon receiving your package, first do as the instructions ask and make a backup of the disk to use as a working copy. Keep the original disk write-protected and in a safe place. Then after reading the manual, modify the customizing program to reflect the way you want your new Disk BASIC to be configured.

The customizing program, which is in BASIC (as were the original *ADOS* and

ADOS-3 customization programs), is well commented as to what changes and configuration options are available. It is not menu-driven; users list and edit lines to effect the changes they want.

You need to place a copy of your configured *ADOS-3* onto the *Extended ADOS-3* disk. (If you are running *ADOS-3* from an EPROM, you can use the *SAVEROM.BAS* program to create a file using

The Man Behind ADOS

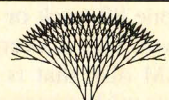
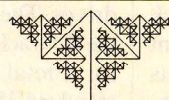
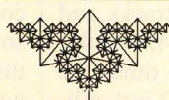
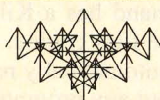
Arthur J. Flexser, owner and operator of SpectroSystems, is an associate professor of psychology at Florida International University in Miami. His first experience with computers was programming on mainframes. However, when he started using his first personal computer (one of the original gray-case CoCos), he found much more enjoyment working with it than with the larger machines, and was soon writing commercial-quality software for the CoCo.

SpectroSystems was founded as a means of making these programs available to the public. From the very beginning emphasis has been placed on program quality and extensive testing as opposed to quick product releases.

"I try to put out the very best product I can; I polish it a lot and am not in a big hurry to release it at the first possible minute," said Flexser. "I take my time when I'm developing. I check out every detail very thoroughly, and if there is some subtle funniness, I will spend hours

and hours . . . tracking it down." This attention to error-free program operation is found in all of SpectroSystems' products. The first release of a SpectroSystems' product is often equivalent in testing and debugging to some companies' third or fourth versions.

ADOS itself began when Flexser purchased a lowercase kit for his CoCo and wanted to make BASIC able to accept commands using lowercase. To this DOS modification he began to add many utilities, and the program soon grew into a product that other people began to express an interest in. Out of this eventually came the original *ADOS*. From that time on, the CoCo Community has been fortunate to have this source of excellent software continue to produce quality products. For those of you who were wondering, yes, *ADOS* does stand for "Art's DOS." I think he would be perfectly content, however, if it were *everyone's* DOS.



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your EPROM.) Then run the *Extended ADOS-3* customizer, which creates a binary file you send to an EPROM burner. When you receive the EPROM, place it into your disk controller, making the necessary hardware modifications. When you turn the CoCo 3 on, be prepared for a moving experience — *Extended ADOS-3* will blow your socks off.

Extended ADOS-3 is the culmination of all that has gone before in the development of *ADOS*. It combines all the old functions with powerful new ones, comprising an irresistible integrated package. The total effect is a DOS worthy of the CoCo 3.

One excellent example of *Extended ADOS-3*'s usefulness can be seen by looking at its editing features, such as a key-repeat function. If a key is held down for more than half a second, it begins to repeat. The delay before repeating begins and the speed of the repeat are both configurable. In the Edit mode you can step forward in the line by holding down the space bar and backward by holding down the backspace (left arrow) key. The key repeat combined with other excellent features gives you an incredible editing environment unparalleled by anything I've ever seen for the CoCo. The manual states that it combines the best features of a screen editor and a line editor, and I have to agree.

Two new commands are also added to BASIC. *LCOPY* and *LMOVE* allow you to copy or move a line or range of lines from one location to another within the BASIC program, with lines automatically being numbered to fit into their new locations. For example, *LMOVE 150-200 to 350* moves lines 150 to 200 to fit between Line 350 and the line immediately after it. These commands work very well and are a long-awaited addition to BASIC. (I can't count the times I've retyped an entire line just to move it to a new location.)

RAM Disk (When You Need Data Fast!)

For 512K machines, *Extended ADOS-3* includes a RAM disk that functions either as one 80-track or as two 35- or 40-track drives. This is a very fast, reliable, resident RAM disk that is as easy to use and as compatibly transparent as any I have seen. A full 40-track RAM drive to RAM drive backup takes only three seconds, and a RAM drive *DSKINI* just a fraction of a second. The contents of the RAM disk are preserved after a reset or even a cold start (*POKE113,0* followed by a reset).

Except for its lightning-fast speed, the RAM disk operates in all other aspects as a normal external disk drive, and all disk-related commands are compatible with it. Furthermore, to maintain data integrity, the RAM disk, unlike many others, stores a

checksum for each sector that gives an I/O Error if the data on the disk is found to be bad. (You can override this protection by using the *CSUM OFF* command, re-enabling it with *CSUM ON*.)

An Excellent CONFIG

In the quest for attaining the full potential of their disk drives, CoCo users have been limited severely by standard Disk BASIC. *Extended ADOS-3* allows you to make full use of your drives. It has support for double-sided drives, variable step rates (6 to 30ms), and 35-, 40- or 80-track drives. I am currently using a 30-ms, single-sided 40-track drive as Drive 0, a 6-ms double-sided 40-track drive as Drive 1, and a 30-ms single-sided 80-track drive as Drive 2.

The *CONFIG* command lets you assign various *physical* drives to the *logical* drive numbers 0 to 3. That is, you can assign a physical drive (external disk drive or internal RAM drive) to a particular logical drive number so that, for instance, when you type *DIR1* you get a directory of whatever physical drive you have assigned as logical Drive 1. *CONFIG* is used in this format:

```
CONFIG 0 B0 R0 R1
```

This means you have assigned physical Drive 0 as logical Drive 0, the back (second) side of physical Drive 0 as logical Drive 1, the first RAM drive as logical Drive 2, and the second RAM drive as logical Drive 3.

Hardware limitations of the CoCo set the maximum number of drives that can be connected at one time to four single-sided or three double-sided drives. This means that by using the *CONFIG* command you can have access to up to eight different disk drives (six sides from three double-sided disks and two from the RAM drives). You may be wondering how I am going to pull the "equivalent of 16 standard 35-track disk drives" claim out of the hat. Well, consider a system with two 40-track RAM drives and three double-sided 80-track drives. The RAM drives total 80 tracks, and the 80-track drives give $3 \times 80 \times 2 = 480$ tracks, for a total of 560 tracks — 16 times the standard 35 tracks. (See, I wasn't just pulling your leg.)

"I Said, I Want My Data Fast!"

Extended ADOS-3 improves the *BACKUP* and *DSKINI* commands to give speed addicts what they long for most. *BACKUP* is modified to work twice as fast as before for a full disk. In addition, a "GAT backup" feature is used, which means that only tracks with data on them are copied (based on the Granule Allocation Table), resulting in extremely quicker backups of disks that

are only partially full. You can override this feature if you want.

BACKUP is modified to allow formatting of the destination disk at the same time the *BACKUP* is done. You can also use a number-of-tracks specifier, such as *BACKUP 0 to 1,35*, causing only the first 35 tracks to be copied to the destination disk, even if the source disk has 40 or 80 tracks.

DSKINI is modified to work about 30 percent faster. However, the timing on this fast *DSKINI* is critical, and no speed increase is realized for drives whose motors are not operating at the correct speed.

Get Wild (Then COPY and KILL)

Many of us are aware that Big Blue's Unspeakable-DOS has the ability to perform wildcard operations, and we may have at one time or another wished the CoCo had the same ability. (Oh, sacrilege.) We can come out of the closet now, thanks to *Extended ADOS-3*'s wildcard *COPY* and *KILL* commands.

The asterisk (*) and question mark (?) characters in a filename or extension within a *COPY* or *KILL* command cause the operation to be performed on all files that match the description. For example, *COPY "*.BAS" TO 1* copies all files with an extension of .BAS from Drive 0 to Drive 1. *COPY "PR*.BIN:1" TO 2* copies all files with an extension of .BIN and starts with the letters PR. The question mark can be used to match any single character; thus *KILL "R?G.BAS:1"* kills all BASIC files that are three letters in length, start with R and end in G.

These commands can also be followed by one or more options to increase their power and flexibility. Both *COPY* and *KILL* can be followed by an O, which outputs to the screen each file copied or killed. Or they can be followed by an A, which asks if each file is to be affected by the operation. The commands *COPY "*. *" TO 1,A* and *KILL "*. *" ,A* are especially effective and useful commands, providing quick and easy disk transfer and purging. Also, the *COPY* command has a Kill option that kills all source files copied, and a Replace option that automatically replaces duplicate files without any prompting.

All these commands work like magic and perform flawlessly. So go ahead and get wild — you'll be glad you did.

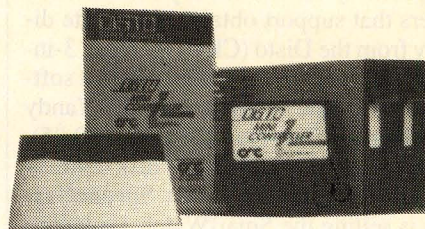
How About A DATE?

Extended ADOS-3 now automatically attaches the date to files when saved to disk; these dates are displayed when you do a *DIR* of the disk. The date is also used as a header when you *LLIST* a program and is returned as the value of the *DATES* function, as in *PRINT DATES*, or *AS=DATES*.

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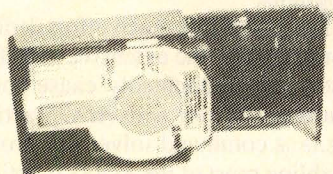
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The date is taken from a 16-character string you input either at power-up or at a later time using the `DATE` command, or it is taken from a real-time clock that is supported by the available software.

SpectroSystems currently has software drivers that support obtaining the date directly from the Disto (CRC) RTIME, 3-in-1 and 4-in-1 adapters. It also offers a software driver that is used with the Tandy SmartWatch (Cat. No. 25-1033, \$39.95), which plugs directly into any disk controller with a 28-pin ROM socket. SpectroSystems is selling the SmartWatch, including drivers for use with *Extended ADOS-3*, for \$35. Whether you have a real-time clock or input the date at power-up, the file-dating feature is a nice function.

May I Have A Menu, Please?

The `MENU` command is a more powerful version of the popular `BOOT` and `BOOT3` utilities found in previous *ADOS* products. It gives a directory of the files on the selected drive and allows the use of execution commands (`RUN` for BASIC programs, `RUNM` for ML programs), `SCAN`, `COPY`, `KILL` and `LOAD` by simply selecting the desired file using the arrow keys.

A word of warning: The menu command affects the memory where pages 1 and 2 of the low-resolution graphics are located. Use of `MENU` changes the graphics on those pages. Also, if you are using a `PCLEAR1` (or `PCLEAR0`), using `MENU` destroys any BASIC program already in memory. This normally isn't a problem since `MENU` is mainly used to load or execute other programs, but I thought I would mention it here because the manual doesn't include this warning.

A Special Euphoria

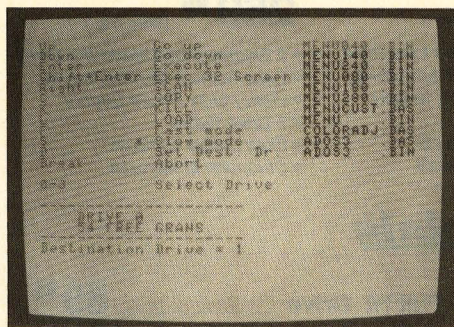
Here's a little feature I really like. Having used an 80-track drive for years, I've always been annoyed by its incompatibility with standard 35- and 40-track drives. The `SKIP ON` command allows the use of an 80-track drive with standard disks. I stuck a 40-track disk into my 80-track drive, issued a `SKIP ON` command, did a `DIR`, and *Bingo!* — scrolling beautifully on the screen were the disk's contents. I know this may sound strange, but I think there is a special euphoria reserved only for those seeing their 80-track drive, for the first time, read a 40-track disk. Not only that, but use of this command allows you to read, write and format standard disks on the 80-track drive.

More Commands

With the `POUT ON` command, *Extended ADOS-3* allows output to be sent to a parallel printer port instead of the serial port. `POUT OFF` directs output back through the

serial port. This feature supports the parallel ports in the Disto (CRC) and older J&M controllers.

The `COLS` command is used while in either the 40- or the 80-column screen. It prints a line on the screen that shows the column numbers in order to aid you in knowing what values to use for the `LOCATE` command.



The `PEEP` command is like a large-scale memory monitor that uses graphics displays to allow you to page through and view the contents of memory.

There is also a function that allows you to send a dump of the current text screen to the printer. You hold down the J, K and L keys simultaneously while in direct mode or at a BASIC `INPUT` or `LINEINPUT`. The `COLD` command causes a cold start.

A few changes have been made in *Extended ADOS-3*. The `SCAN` and `SCANP` commands, when stopped by the `BREAK` key, close the files they opened and shut off output to the printer. Also, the long-standing bug in standard Disk BASIC — and in *ADOS* and *ADOS-3* — that caused a crash if an I/O Error occurred during a `COPY` command is fixed.

Turnkey Potential

Another potentially useful feature is *Extended ADOS-3*'s configurability to perform one of two operations (or neither of them) on a cold start. You can have the `DOS` command executed or a BASIC program named `SYS.BAS` looked for on a specified drive and run if found. You can also configure the system to perform these functions depending on whether the space bar is or isn't being held down during the cold start. For example, you could have the system automatically do a `DOS` command if the space bar is being held down. This or the automatic running of `SYS.BAS` allows you to set up a "turn-key" system, with the necessary programs being loaded and run without the user needing to type anything at all.

The other alternative is an excellent choice for those who run a BBS. Having one of the two actions performed on a cold start when the space bar is not being held down allows a BBS to restart itself after a

power failure. This feature would already have come in handy the several times my board has gone down due to a temporary loss of power.

Utilitarianism

There are several stand-alone utilities provided on the *Extended ADOS-3* disk that can be used under ordinary *ADOS-3* — to tide you over until your EPROM arrives. They are neither as complete nor as error-free as their EPROM counterparts, and they can be used only one at a time (except for `MENU.BIN`). The utilities include `WCOPY.BIN` (wildcard `COPY` and `KILL`), `LCOPY.BIN` (`LCOPY` and `LMOVE`), `KEYRPT.BIN` (key repeat), `DATE.BIN` (file dating), `RAMDISK.BIN` and `MENU.BIN`.

But Are We Compatible?

Since the beginning of *ADOS*, compatibility has been a major concern of the author, Arthur Flexser. Every effort has been made to ensure that the presence of *ADOS* in your system won't cause problems with programs that work under normal Disk BASIC. The author actually works directly with programmers of commercial CoCo software to maintain this compatibility. Part of the popularity of *ADOS* is due to the compatibility record, and *ADOS* is probably the closest to being a "standard" alternate DOS that you are going to find. No other product contains this many features yet is so universally accepted by other programs.

Even with this much effort dedicated to compatibility, the extensive modifications made will undoubtedly cause some programs not to run with *ADOS* active. The `DISABLE` command solves this problem by disabling most of the *ADOS* functions, and a `DISABLE:DLOAD` command approximates standard Disk BASIC even closer. In addition, the documentation for *Extended ADOS-3* includes pokes to selectively disable and re-enable the key repeat and RAM disk functions. Most of the programs I tested on *Extended ADOS-3* worked without any problems, and there were none that wouldn't function after the `DISABLE:DLOAD` sequence. Because it resides in ROM "underneath" Super Extended BASIC, no program can have a conflicting use for that space.

This outstanding compatibility is another reason to make *Extended ADOS-3* your DOS of choice.

Wrap It Up, I'll Take It

Extended ADOS-3 is everything it promises. All the commands and functions perform exceptionally well and exactly as stated in the manual, with the exception of the `DSKINI` command, which doesn't seem to work any faster on my system (Mr.

Flexser said this is probably due to timing considerations with my drives).

As an enhancement to standard ADOS-3, this program provides a good number of useful utilities integrated and available instantly when you want them. There is no hassle of loading in program after program and worrying about compatibility. Additionally, several of the features can't be found elsewhere, and those that can outshine the competition.

Even with a very critical eye, I find very little wrong with this product. It does everything it claims, and with style. It seems as if there are fewer errors in *Extended ADOS-3* than in *Disk BASIC* — a testimony to the care Mr. Flexser takes in producing the highest quality product possible.

It is impossible for me to give *Extended ADOS-3* anything other than a rave review. The CoCo 3 without *Extended ADOS-3* is like a grounded plane — why not let your CoCo soar?

(SpectroSystems, 11111 N. Kendall Drive, Suite A108, Miami, FL 33176, 305-274-3899; \$39.95; \$64.95 for *Extended ADOS-3* and *ADOS-3*; \$5 for real-time clock drivers; add \$2 S/H)

—Michael G. Toepke

Hardware

MC-1— A Compact Floppy Controller From DISTO

The MC-1 (Mini Controller 1) is a floppy disk controller cartridge that works with or without a Multi-Pak. Tony DiStefano designed the MC-1, and CRC Computers manufactures and distributes it.

The MC-1 is approximately the same size as the Radio Shack FD-501 controller. The housing is white plastic, which doesn't match the CoCo, but it looks better than Radio Shack's black housing. There is one small toggle switch on the operator's side of the housing. Overall, the look is classy.

Tony has chosen the latest state-of-the-art Western Digital WD1773 controller chip as the heart of the system. He has provided two sockets, selectable by the external switch, memory-mapped for CoCo 1, 2 and 3 DOS operation. The first socket can accept a 24-pin ROM or a 28-pin

EPROM (2764 or 27128). Three jumpers configure the socket for either the 24- or 28-pin chip. The second socket supports only a 28-pin EPROM. The controller comes with Radio Shack Disk BASIC 1.1.

I was disappointed when I tried to plug my drive cable (standard Radio Shack issue) into the controller. The cable is keyed between pins 3 and 5, but the MC-1 is not. I had to remove the glued-in key from the cable connector. I thought the printed circuit board would be notched for a key since a keyed board works with an unkeyed cable, but a keyed cable does not work with an unkeyed board. The cartridge fit the computer without any problem. My CoCo 2 had no problem filling the low power requirements of the controller.

Documentation comes in the form of a three-page pamphlet. Information on the two DOS sockets is adequate but certainly not extensive. I assume the controller is capable of handling double-sided 5¼- and 3½-inch drives since the WD1773 chip has the power, but no mention of this is found in the documentation. I am running three single-sided, 5¼-inch drives and have not run into any problems with the controller. I have exercised it with numerous programs and disk utilities in both Disk BASIC and OS-9.

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An ad in the August 1989 issue of RAINBOW states that there are "No clumsy jumpers to move." I guess they are referring to jumpers for DOS selection because there are jumpers to configure the first DOS socket.

All in all, this is a nice package that functions well at a fair price. I recommend it to anyone needing a controller for single-sided drives.

(CRC Computers, 11 Boul. des Laurentides, Laval, PQ, Canada H7G 2S3, 514-967-0195; \$75 U.S., add \$4 S/H)

—William Baird

Software

CoCo 1, 2 & 3

Leisure Suit Larry— Larry Gets Laid Back

Poor Larry; here he is, 40 years old, the owner of 17 cardigan sweaters, six pairs of pleated slacks and a 20-year collection of elevator music. How could things get worse? Easy—he can decide to change his life and become a party animal. "No more Mr. Nice Guy," he shouts. "This pussycat has decided to howl!" Larry, however, doesn't have the foggiest idea of what howling is all about.

It's your mission, should you choose to accept it, to guide Larry through the pratfalls of modern life, to help him get laid back and supercool, to aid him in finding a bosom buddy. After all, aren't you so much more experienced than Larry, who is striking out into unexplored territory? Better watch who you admit that experience to, though.

First you have to practice "safe DOS" by backing up the two disks that come in the package. You need to fool around with OS-9 formatting to accomplish this, but the supplemental instructions are clear enough. There's also the everpresent boot program in the back, in case you need to free an older CoCo of its operating system inhibitions. Then you need to format a save disk; you'll see how much of a good idea that is later on, when the plot steams up. There are specific notes for swinging single disk drive users, in case you don't have multiple basic drives.

The supplemental booklet also contains instructions on how to poke all the game information into a hard disk or double-sided floppy disks.

Leisure Suit Larry in the Land of the Lounge Lizards (boy, there's a mouth-full) is an OS-9 based, 512K disk game for the

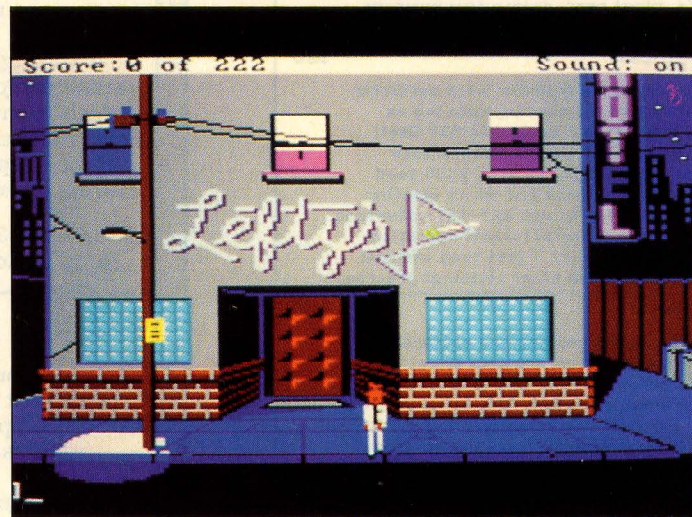
CoCo 3. Produced and directed by Sierra On-Line, it's one of their interactive fiction offerings. To the new guys on the block, "interactive fiction" means you take the role of the main character and guide him through a series of close encounters by use of a keyboard, joystick and typed instructions to the hero.

After booting the game, you'll see a warning that some portions of the plot may not be appropriate for some children. This is true; some portions may not be appropriate for certain adults. Just to make sure you are who you claim to be, the game runs you through a series of trivia questions. If you're too young, you can't answer them. It scared me to find out that every one of them (there are several versions of the entrance exam) is easy. Of course, now it takes me all night to answer them, whereas before I could answer trivia questions all night.

This is an adult game—a roll through the fast lane without having to worry about your spouse giving you a .38-caliber "inny" belly button.

Having gotten the preliminaries out of the way, you're ready to start scoring. There are 222 possible points. You have zero, nada, *absolut gar nichts*, zip points as you stand alone on the sidewalk outside Lefty's Bar. Well, do something! If you don't, a large, ugly dog is going to in just a minute or so.

As with all games of this sort, make sure to LOOK at everything. When you first view the regulars in Lefty's, you can see that this is a tough place. A guy just might get a bust



in the mouth. There's some dude talking to a dudette at the bar, ratcheting his jaw like the Devil can take tomorrow. "Blah... blah... blah... blah... blah!" followed by "And then the chief says, 'Death — by booga-loo!'" If you hang around this guy long enough, you'll hear a lot of punch lines. As a self-test, see how many you can tell the rest of the story to, and then compare your

total score with the depravity scale found on Page 69.

By the way, the instructions sort of make saving a game appear a rather fear-some experience. Let your old Uncle John advise you: Just go with the flow, Moe, and don't bother yourself none about that fancy booklearnin'. You'll figure out what you gotta do.

I didn't get very far the first time I tried it. Sort of like Larry, who is lacking grace and interpersonal skills. Face it, he's risen to his own level of social incompetence, living proof of the Peter Principle. However, to each man is given his time of glory, his day in the sun, that experience which climaxes his existence as he overcomes all obstacles and rises to the occasion, heroically. This may take longer for Larry, since a rocket scientist he's not. Actually, intellectually he's somewhere between the guy who just fell off the turnip truck at Ben's Gas 'n Go and the astrophysicist who formulated the Big Bang theory.

Eventually you may go all the way with this game. If, however, you continue to have hang-ups with it, Sierra has a telephone number you can call at abnormal hours to get hints by using a touch-tone telephone. This is a maximum neat idea, game fans.

On the other hand, in addition to the dangers confronting Larry (such as contracting Mal Peevis Pooey or getting thoroughly and thanklessly thumped by a thick-set thieving thug—in 3-D), if you do die, there is one other humiliation. You have to

watch Larry's body get recycled in Sierra's special plant: This final indignity is sort of a combination of *Soylent Green* and *I, Robot*. Those of us charged with making a penetrating analysis of software programs sometimes feel developers of cutesy things like that should be sent to a penal colony.

On the other hand, if you are an adult, enjoy reading "Dark and Stormy

Night" purple prose and laugh "Har, har!" at corny old saws, this game is definitely for you. You are already a sick puppy, so how much harm could it do you? Besides, the whole thing is about as much fun as a person can expect to have when alone. People used to get hanged for having this much fun.

Turn the lights down low, flip on the soft

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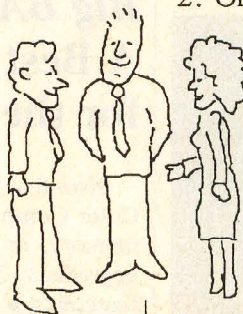
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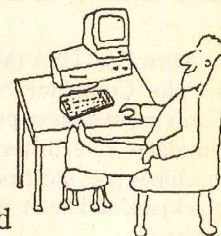
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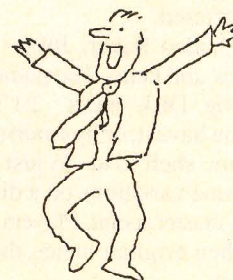
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(Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614, 209-683-4468; \$39.95)

—John Hebert

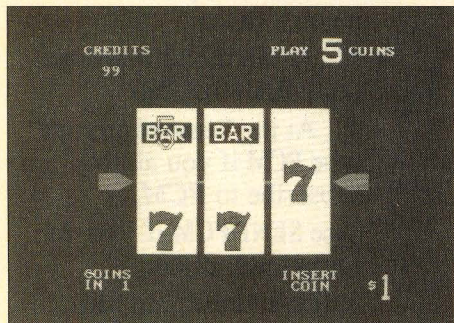
Software

CoCo 1, 2 & 3

Slots & Cards— CoCo's Casino

MicroDeal USA (MichTron) has released a Color Computer version of its *Slots & Cards* entertainment program. *Slots & Cards* simulates five different Vegas-style slot machines plus electronic versions of poker, blackjack and keno, all in one inexpensive package.

I have had the pleasure of using a Color Computer since the days of 4K and tape drives. From the beginning there have been computer versions of the slots. The quality of these products has varied dramatically. Now *Slots & Cards* sets a new standard for them all. Indeed this may be one of the finest CoCo game products ever!



The programs come on a set of three nonprotected disks, attractively packaged with a simple but complete instruction pamphlet. MicroDeal suggests you make backup copies of the original disks for your personal use. Disks 1 and 2 each contain five versions of the most common Vegas/Atlantic City slot machines. Single- or multiple-line play and multicoin are among the variations offered.

Disk 3 has Video Poker, Jokers Wild Poker, blackjack and keno. The games can be started using Disk BASIC 2.1's `DOS` command, if you have it, or by entering `RUN "DOS"`. The game shell loads in just a few seconds. All game variations on a disk are selected from a master menu. Players select the amount of their original stakes, then it's off to the casino.

The graphics are outstanding, among the very best. The slot machines have the

look and feel of the real thing. Rolling movement of the slot lines is extremely smooth and realistic. The amount of time the lines roll before stopping seems about right. In the video card games the dealing goes quickly. I found myself soon addicted. This review probably would have been finished a week earlier if I hadn't insisted on testing and retesting each of the games — just for accuracy, of course!

The odds of winning are accurately reflected in game play. This was soon demonstrated by my winning big a few times but sometimes losing everything but the proverbial shirt. Just the right mix of winning and losing makes the game even more fun to play.

Slots & Cards has to rank with the best game programs available for the CoCo. If you ever have had even the tiniest urge to try your luck at Vegas or Atlantic City, you'll love *Slots & Cards*.

(Microdeal, 576 S. Telegraph, Pontiac, MI 48053, 313-334-5700; \$39.95)

—Leonard Hyre

Software

CoCo 3

Big BASIC— A Best Buy for the CoCo 3

Now that you've gone out and bought a Color Computer 3 with 128 kilobytes of memory, or better yet, one that's been upgraded to 512K, what do you do with it? Executing a `PRINT MEM` tells you there is about 22,000 bytes available, the same as a CoCo 2. So where's the other hundred kilobytes or the other 490K? Well, if you ask Radio Shack, you'll be told OS-9 Level II is required to access it — for another \$80. Plus you'll have to learn a new operating system and a different BASIC. And you were getting so comfortable with the old one!

Enter Danosoft, of Mississauga, Ontario, with its *Big BASIC*. How do you feel about more than 90K of usable BASIC memory on a 128K CoCo 3, or more than 475K on a 512K machine? Now you can write programs up to 24K long, switch them into another part of memory, and either run other programs independently or switch variables and data from one program to another. With a little work you can even "disk chain" a program of more than 400K in length.

Big BASIC is different from RAM disk

programs. In a RAM disk programs are saved in the computer's extra memory as if it were a disk drive; but the programs have to be called one at a time, and old programs are erased when new ones are run. *Big BASIC* allows the programs to be run simultaneously or even called separately from a menu program. It's sort of like multitasking: You work from two full-page windows, and you can have as many as 58 programs on tap (nine in a 128K CoCo) at one time.

After loading *Big BASIC* with a `LOADM` command, you have a little more than 28K of user memory available — or about 6K more than usual. Since *Big BASIC* loads in over normal BASIC, it doesn't take up any extra room and in fact gives you a little more to work with. This is *Big BASIC*'s Window 1, its default or startup mode. The second window is created when you use the slightly modified `CLEAR` command to build an 8K, 16K or 24K working area in Window 2. Then the new `BLOCK` function takes over, and you can shift in blocks of memory of 8K to 24K in size, depending on how large you've made your Window 2.

Up to eleven 8K blocks, each containing a separate program, can be switched through in a 128K CoCo — and up to 58 in a 512K machine. Imagine running short demonstration programs for a science fair or a computer show, automatically running and switching at lightning speed without accessing the disk drive after startup. Or you could be writing a BASIC program in one block and have your calculator and notepad programs waiting in another block. The possibilities are endless.

There are few drawbacks to *Big BASIC*. One suggestion I would make to Danosoft is the inclusion of some sort of "hot key" command, such as `CTRL-1` to shift from a running program in Window 2 to access Window 1 again. It isn't always possible to key in the `WINDOW` command from a running program, and it could be particularly difficult from a machine language program executing in Window 2. Then too, it isn't a good idea to try to run more than one machine language program at once; many of them use absolute addressing, and important memory locations can be overwritten during switching. There is also a small problem concerning compatibility with operating systems such as *ADOS 3* and *MJK-DOS*.

My only other caveat is to strongly suggest using *Big BASIC* with 512K. This utility and the extra memory really complement each other. While I encountered no problems using it with 128K, you do have to be a bit more careful with graphics — some of the 128K blocks overwrite the Hi-Res graphics and text areas.

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Reviewed in April Rainbow

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The version of *Big BASIC* sent to me included both the original distribution version and the latest revision. Some minor changes in the later release include more demos, better compatibility with hard drive systems (although there is an incompatibility problem with Burke & Burke's *Hyper-I/O* system), and an improved `PCLEAR` command to clear up to 17 graphic pages, plenty for serious animation in medium resolution.

In general I find Danosoft's *Big BASIC* to be a useful, even valuable tool for serious programmers and other heavy users. The documentation is clear and complete, and the program is easy to use. The sample programs supplied are loaded with comments that help make adapting your favorite BASIC code a snap. At less than \$40, it is a bargain, particularly for CoCoists daunted by the \$80 price tag and 700 pages of documentation that come with OS-9 Level II. Danosoft has a winner in *Big BASIC*, and I recommend it to anyone wanting to get the most out of a Color Computer 3.

(Danosoft, Box 124, Station A, Mississauga, ON, Canada L5A 2Z7, 416-897-0121; \$39.95 U.S., \$46 CDN, add \$2.50 S/H)

—J. Frederick Toon

Software

CoCo 3

TextPro IV— The Old Way Still Works

I should mention at the start that I'm writing this review from a different point of view from what you usually find in THE RAINBOW and other magazines: I am not using this program for the first time with a mere week or so before I need to submit my review. I have owned *TextPro IV* for more than a year. Thus I am aware of the program's strengths and weaknesses.

I bought *TextPro IV* when I became fed up with the ultra-slow performance of my old CoCo 3 word processing software. So when it came time to find a better program, I didn't have any doubt that I could find a better performer. I looked at dozens of advertisements in THE RAINBOW. *TextPro IV* was billed as "the most powerful word processor for the CoCo3," and the price was the highest going. After reading the ads, comparing the listed features, and thinking very hard, I decided the extra power might be worth the extra money and ordered *TextPro IV*.

I quickly discovered that I had let myself in for more word processor than I had bargained for. When the ads say *TextPro IV* is the most powerful word processor on the market, they aren't kidding. This software has capabilities a serious business user wouldn't tap in the average year. I've been learning about *TextPro IV* for a year, and there is still more to learn.

The first thing I should tell you, though, is that if you use a word processor primarily to write letters, you should get something less expensive and less complex. That's because there is a price to all this power besides the highest dollar tag outside the OS-9 world. That price is complexity. The manual for *TextPro IV* is about 70 pages long, and you need to read practically the whole thing before typing one letter. The text-formatting commands almost make up a complete programming language, including input commands, disk access commands, screen formatting, printer control and decision makers. Learning *TextPro IV* is comparable to learning BASIC—and I'm still learning BASIC after almost three years of fairly intensive hacking.

One thing that jumps out immediately about *TextPro IV* is that it doesn't look like most other word processors. If you're expecting a window with a movable cursor, a status bar and a bunch of one-key commands or pop-up dialog boxes, you may be in for a bit of a shock. The text editor seems primitive in comparison to other programs. You can't steer the cursor to where you need a correction and type over your mistake because *TextPro IV* doesn't have a full-screen editor. Instead, you enter text in a line-number environment similar to BASIC; when you want to change text you edit it by line (although the editor is much easier to use than BASIC's `EDIT` command).

TextPro IV's operation is in the finest tradition of the older, mainframe-based word processors that were in use before microcomputers were even a lab curiosity. Those word processors—which saved their files to paper tape or punched cards—were divided into a text editor and text processor (or page formatter). The text editor was just for editing text and no more. Often the commands were sensitive to tiny errors, such as extra spaces inserted, and the language used was cryptic enough to make OS-9 or UNIX look like plain English.

Once you edited the text into the form you wanted, inserting commands for the page formatter into the body of the text, you then invoked the page formatter and hoped the thing would print in the fully formatted form. If that seems like a lot of trouble to go through to get a printed document, it was. But when you were working on your doctoral dissertation, it was a major improve-

ment over paying a typist to type and retype and retype.

TextPro IV is a major step up from that sort of program, but it keeps a lot of the flexibility (something often lacking in programs written with ease of use as the foremost requirement). You still have the line-by-line entry and editing, but those lines now auto-number; and you can move the cursor along the line—and even change lines in the Edit mode—by pushing arrow keys. To make a change, you simply type over it. For more extensive changes, there are prompt-line commands that move or copy text, delete it, find and replace occurrences of character strings, and even allow editing a document bigger than the 42K buffer.

To control the appearance of text when printed, commands are embedded into the body of the text just as with old-time mainframe programs. The difference here is that the embedded commands are reasonably easy to remember. Each command begins with a dot (`.`), followed by two or more characters that constitute the name or an abbreviation. These include things like `.ll` (to set the line length of the printed page), `.tm` (to set the top margin height), and `.bold` (to initiate or end bold-face print).

In *TextPro IV*, these functions are combined into one program that runs in only 128K, including using a graphics screen to display up to 212 characters per line. Since the 80-column display is reasonably readable on a composite monitor, I assume that even the higher-density screens are readable on an RGB monitor. It includes the option to kill the color burst and to use text screens of 32, 40, 64 or 80 columns by 16 (in 32- or 64-column width), 25 or 28 lines.

TextPro IV follows the rules and uses the BASIC ROM routines for its disk activity. Thus it tolerates somewhat modified versions of Disk BASIC. I normally start my CoCo 3 with a program that modifies Disk BASIC to allow access to 40 tracks, sets a faster stepping rate and makes use of a disk access patch to allow reliable reads and writes in high-speed mode. *TextPro IV* tolerates these modifications and more.

In addition to "following the rules," Cer-Comp's word processor is comparatively fast. One reason for that is that *TextPro IV* runs the CoCo 3 at double speed. Another reason is efficient handling of data. When the software needs only to take care of the current line and a normal screen scroll at the end of that line, things are a lot simpler and faster than when an entire screen needs updating. Still, very careful software design is evident since the program preserves the ROM routines (which normally run from RAM in the CoCo 3), inserts itself, uses a minimum of about 18K

for the screen in the graphics mode, senses RAM size and installs a RAM disk if it detects a 512K machine, and *still* has room for a 42K editing buffer.

There's also a lot of real power and flexibility built in here. If you have the budget for a hard disk and laser printer, *TextPro IV* works with them (assuming that the hard disk is accessible from BASIC).

You can send a boilerplate letter to everyone on your mailing list by typing the letter once and including text-processing commands that cause the page format section to repeat the text, inputting the individual data from a disk file, until the entire list has been processed — and you can go get a cup of coffee while it does it.

You can set up a file to prompt you for input during processing — for instance, to insert the current date — and then include the data entered in several locations in the document. You can process a document to disk instead of to the printer, and then transfer that file via modem so that the recipient needs only to dump the contents of the file to a printer to see the full, formatted output, with underlining, bold text, italics and so forth.

TextPro IV also handles proportional printing, something most word processors don't do, though it justifies only by insert-

ing the single-dot spaces between words, rather than evenly between letters.

TextPro IV won't give you any help in using it. There's a good manual that contains all you need to know, though understanding the manual is easier if you're at least a bit of a programmer. There's as much power here as is found in some BASIC interpreters, and you shouldn't expect to learn to use it all in a couple of hours.

Furthermore, *TextPro IV* won't tell you what to use it for. If you aren't sure you need all the power a word processor can pack, maybe you don't need this word processor and don't need to spend this much money. I've had this package for over a year and still wonder if I really need this much word processor. On the other hand, I know now that if I ever need anything special done, *TextPro IV* will do it. All I have to do is learn how to tell it what I want.

Knowing what I know now, would I buy *TextPro IV* again? Probably. *TextPro IV* gives me everything I need from a word processor. It's like four-wheel drive: It's better to have it and not need it than to need it and not have it. If you never word-process anything but letters, I've got a copy of an old, slow word processor I can sell you, and I guarantee you can learn it in an

hour. But if you expect to do the kind of word processing people usually associate with multikilobuck systems and huge amounts of memory, you just might need *TextPro IV*.

(Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, 702-452-0632; \$89.95 plus \$3 S/H)

— Don Qualls

Software

CoCo 1, 2 & 3

Ultra-Cat— Catalog Disks With Ease

If you own a disk drive, you know that it can be difficult to remember where all your programs are. I've lost a few programs from time to time, but that is all changed with *Ultra-Cat*.

Ultra-Cat is a BASIC program with machine language subroutines that helps you keep track of disk-based programs by creating a catalog file of standard (non-OS-9) disks. The program runs on any Color Computer with at least 64K of memory and one or two disk drives attached.

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A simple `RUN"ULTRACAT"` command is all that's needed to boot *Ultra-Cat*, which then proceeds to look for its ML subroutines in memory. If the program does not find them there, it loads them from the disk. The main menu then appears and presents you with a list of options allowing you to select the single- or dual-drive mode, look at the directory of a disk, create or merge catalog files, or exit the program. Creating a catalog file of your disk-resident programs is very easy because the program displays the appropriate prompts to guide you swiftly and effortlessly through the file-creating process.

Ultra-Cat reads all the directory entries and the granule allocation table from the disk and stores the information in a catalog containing seven categories, which include the following: filename, file extension (`BAS`, `BIN`, etc.), type of file (`BASIC`, `ML`, data or text), file format (`ASCII` or binary), file size in granules, the name of the disk (which you enter), and the number of free granules left on the disk. The program also creates a comment category in the file, which I'll explain later on. The program then prompts you for a filename. The file created is saved to the catalog disk, and *Ultra-Cat* returns you to the main menu.

When you have a number of files on the catalog disk, you can then use *Ultra-Cat* to do a global or partial merge of these files into one larger file. This feature proves very helpful because you can mix and match catalog files, and by merging several smaller files into one larger file you can save a considerable amount of space on your catalog disk. If you choose to do a partial merge of the files, *Ultra-Cat* displays all catalog files on the disk and then prompts you to select the ones you want to merge. Otherwise it merges all the catalog files it finds on the disk. Either way, *Ultra-Cat* displays the filename of the file currently being read into memory as well as a running count of the amount of free memory remaining in its workspace.

After merging the files in memory, *Ultra-Cat* prompts you again for a filename and saves the merged file to the disk you choose. You can decide whether you want to "kill" the original files merged together.

One thing the manual does not tell you is that the Kill option does not delete any catalog files created during the same session. You must press `BREAK` to exit the program, then run it again to merge and delete the catalog files *Ultra-Cat* saved to disk.

The manual is easy to understand and talks a little about error recovery. But the program is so well-written that you may never have to refer to it after the first time.

Now, a little bad news. As far as catalog-

ing your collection of disks, *Ultra-Cat* does a fine job. However, if you want to edit, sort, alphabetize, enter comments in the comment category, even print or look at the catalog files, this program will not do it.

Ultra-Cat is part of the *Ultra-Base* software family sold by Tothian Software; as such, the files created by *Ultra-Cat* are designed to be used by *Ultra-Base*.

I received *Ultra-Base* along with a copy of *Ultra-Cat*, so I will say a few words about it. *Ultra-Base* allows you to perform searches and number sorts on the catalog files. You can scan, alphabetize, append, edit or print these files. When using *Ultra-Base* on the catalog files, you can put your list of programs in practically any order you want because *Ultra-Base*'s alphabetizing function, as well as other functions, works on just about any category in the file (filename, extension, disk name, etc.).

Considering the price at which *Ultra-Cat* is marketed, the program needs a simple printer driver of its own so that its users can print catalog files without having to resort to another program. On the other hand, *Ultra-Base* is a fine database program and *Ultra-Cat* complements it nicely.

As an owner of over 800 disk-based programs, I appreciate the organization *Ultra-Cat* and *Ultra-Base* bring to my disk collection. For more information on *Ultra-Base*, see its review in the January 1989 issue of *THE RAINBOW*.

(Tothian Software, Inc., Box 663, Rimersburg, PA 16248; *Ultra-Cat* \$24.95, *Ultra-Cat* and *Ultra-Base* \$39.95; add \$2 S/H)

—Richard L. McNabb

Software

CoCo 1, 2 & 3

C.A.R.— Computerized Auto Records

Performing timely maintenance on your car is very important. It makes your vehicle longer-lived, more reliable, and more cost-efficient. Keeping records of such maintenance not only helps you determine when service is due but may help you get top dollar for the car if you sell it.

Maybe you agree that recordkeeping is a good idea, but you're not interested in using a complicated spreadsheet or database program to accomplish it. *C.A.R.*, a BASIC program from E.Z. Friendly Software, might be just what you've been looking for.

Reasonably priced, *C.A.R.* provides an

easy way to maintain a service record for your vehicle. The program does not just keep track of regular maintenance, either. It provides you with reminders of when service is due and computes gas mileage, cost per mile, and the total amount of money spent on the vehicle.

C.A.R. runs on any Color Computer 1, 2 or 3 with a disk drive attached. A printer is required only if you want hard copies of the vehicle records. Before using the program you should make a backup as a working disk, because *C.A.R.* repeatedly writes to the disk during execution.

Booting the program is easy: just insert the disk in your drive and type `RUN"CAR"`. After the title screen appears, you are prompted to insert a data disk, which can be the *C.A.R.* disk itself (better use that backup copy!) or a separate data disk. If *C.A.R.* cannot find its index file, you are asked to enter the information required to make one.

After this you are shown a schedule for five types of maintenance: oil change, oil filter replacement, chassis lubrication, engine tune-up and tire rotation. At this time you can change the miles/months frequency of any of these. When you have finished entering this data, you proceed either to the File menu or return to the main menu to set up a file for another vehicle.

In the File menu the first option allows you to add data to a file. The categories of service data to add to the file include fuel, oil changes, oil filter replacements, lube jobs, tire rotations, tune-ups and "other." The cost for each item is also entered at this time. The "other" category allows you to enter items up to 32 characters in length.

After each entry *C.A.R.* writes the item into the disk file. If you forget which items you entered, you can always use the View File option from the File menu. This program won't delete duplicate entries from the file. In fact you cannot delete any entries at all. Also from the File menu you can search the file for a particular word or number, check the maintenance reminders (and possibly make a printout), compute total cost (cost per mile and gas mileage), view the file onscreen, make a printout of the entire file, back up the file onto another disk (single- and double-drive systems are supported), return to the main menu, or quit the program. Indeed this is quite a lot of options for such a small program.

The manual that comes with *C.A.R.* is well-written and easy to understand. The program itself is so simple to operate that one might not have to refer to the manual at all, just boot and run it.

As you can see, *C.A.R.* is full of features, yet extremely easy to use. In consideration of its asking price (under \$10), I believe *C.A.R.* to be a very good bargain. If you

choose to take advantage of all the features C.A.R. has to offer, you should easily save the purchase price many times over in the form of reduced operating costs over the lifetime of your vehicle.

(E.Z. Friendly Software, 118 Corlies Avenue, Poughkeepsie, NY 12601, 914-485-8150; \$9.95)

—Richard L. McNabb

Software

CoCo 1, 2 & 3

CoCo MIDI 3— A Multi-Track MIDI Recording Studio

If you're a musician of the '80s, or aspiring to be one, chances are you have a keyboard music synthesizer. If your synthesizer uses MIDI (Musical Instrument Digital Interface) and you have a CoCo, all you need is *CoCo MIDI 3* to make your system sing!

Created by Lester Hands, the master programmer who introduced *Lyra* to CoCo users four years ago, *CoCo MIDI 3* is a

software/hardware package that allows for two-way communication between a CoCo and any MIDI-capable device. Not to be confused with a sound digitizer, *CoCo MIDI 3* turns your CoCo into a true 10-track MIDI sequencer/recorder that allows you to record, play, compose and edit MIDI data. System requirements are a CoCo with a minimum of 64K, a disk drive and a Multi-Pak Interface or Y-cable.

The *CoCo MIDI 3* package consists of one unprotected disk, a hardware MIDI interface pack and a pair of 6-foot MIDI cables. *CoCo MIDI 3* is compatible with the CoCo MIDI hardware pack (formerly by Speech Systems) and *Colorchestra*. If you already have the hardware from Speech Systems or *Colorchestra*, you need the *CoCo MIDI 3* hardware.

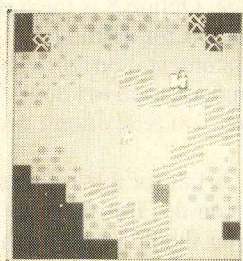
Setting up the system is easy. Make sure your CoCo is turned off, then plug the hardware MIDI interface into a Y-cable or slot of the Multi-Pak Interface. The MIDI cables are then plugged into the IN and OUT ports of the MIDI interface and your synthesizer. The two cables allow data to be sent back and forth between your CoCo and synthesizer. Since MIDI signals and MIDI hardware connectors are standard, there should be no incompatibility problem with your particular MIDI synthesizer.

The thoroughly indexed 40-page manual includes comprehensive definitions and a tutorial, and the disk has sample files to help you get started. You begin by entering LOADM "CM3", and *CoCo MIDI 3* quickly loads and auto-executes. One key press takes you to the main menu, displayed on the standard 32-column green screen. If you're using a CoCo 3, it automatically goes into double-speed mode.

CoCo MIDI 3 is like a 10-track studio tape recorder, allowing you to create and build a composition by recording each music track separately in real time. Depending on your synthesizer(s), you can have *CoCo MIDI 3* play one or more tracks while you record another. Tempo and other variables can be adjusted while editing tools let you review and modify compositions note by note or block by block.

From the main screen you see 10 status lines for each of the 10 available music tracks, and across the top is a menu bar for quick access to all of the program's features. Each of the 10-track status lines displays the total number of MIDI events currently in a track, whether or not a track has been set to be played or not. The main menu screen also displays how much total system memory is currently available and how much is used by the edit buffer.

The Seventh Link



Fontal HED 00100
Hagroms1 HTC 00100

This program is quite simply the best role-playing adventure the CoCo has ever seen. You must build a character who will adventure as your alter-ego through wild lands, battle fierce monsters, sail treacherous

seas, travel to other worlds and adventure through the dismal passages of Elira's many dungeons.

These dungeons are the visual highlight of the program. Presented in high speed 16-colour 3D, and full of monsters, ladders, pits and water, flooded rooms and doors, chests and healing fonts, they will keep you wandering and wondering for many fascinating hours.

Of course, you will need to arm and provision yourself first, and perhaps find friends, to accompany you within the many castles you will find amongst the islands of Elira.

The package includes three discs, a 30-page manual, 4 maps, a quick reference card and a strip of simulated superconductor wire.

Price: \$38 US/ \$48 Cdn

Requires: 128k CoCo3, 1-40 track drive (Your RS drive is capable of 40 tracks if it's not an old grey one.)

Version 1.2 Features: Extra monster, faster boot-up, faster dungeon movement, and better outside graphics!

Hint Book (20 pgs. dgnn/town maps, clues etc.):\$5.50. Books for Caladuril1 or 2 (Specify): \$3.50. Books, add \$1 S/H each.

Studio Works

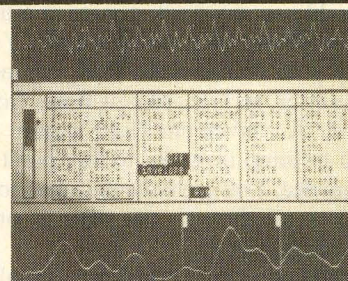
At last, here is the digital audio sampler that delivers what other systems promise. It features full point and click operation, on-screen graphical display and editing of TWO samples at once, using two available audio clipboards and a host of editing/ manipulation features.

An audio signal is digitized through an adaptor cable (comes with package, or you may use the Maxsound cable), which plugs into your joystick port. Once the sound has been recorded into CoCo's memory, you can alter it and play it back, record it on disc and include it in your own BASIC or ML programs. Features include: reverse, delete, copy, volume control, play-block, sequencer, envelope draw, 56 samples in memory (512k only, 8 on 128k), play any from keyboard (great for adding special effects to home movies), playthrough, looping, file compression, 5.19-17.05 kHz record rate, (512k: 10-88 seconds, 128k:1.5-12 seconds), BASIC driver program, and more.

With cable: \$54US/\$64Cdn, without:\$39US/\$49Cdn.

NEW!! Sound Effects Packs. Load a few samples into Studio Works, add them to movies or answering machine messages, or anything! \$14 Each.

FX1: General (4 discs, 12 Samples) includes: Breaking glass, car starting, creaky door, applause, etc.
FX2: Animals (3 discs, 11 Samples), Dogs barking, monkeys, frogs, chickens, etc.



(Req:CoCo3,drive, mouse or joystick)

Caladuril 2: Weatherstone's End

Monstrous storms threaten the Valley, and young Prince

Olin is sent to secure help from the powers that remain on Lord's Isle. His ship is waylaid and he finds himself cast ashore on a land that is held in the grip of the enemy.

Prompted by the success of the highly acclaimed Caladuril Flame of Light, this program was entirely re-written to take advantage of the CoCo 3's speed, graphics and memory to create one of the most impressive adventures to be found on the CoCo. Caladuril 2 recognizes over 70 verbs and contains in excess of 180 defined objects. The game is played in an unstructured world which you explore by scrolling your character around on a graphic window. When you approach an object, its name is printed on-screen, and you may manipulate it using multi-word English commands such as "GET THE KEY WITH THE LONG HOOK THEN UNLOCK THE DOOR". The package includes: a 20 page manual, 11X17" map, velvet pouch of Powerstones and 2 discs.

Price: \$32 US/ \$38 Cdn

Also available: Caladuril, Flame of Light (64K CoCo 1/2/3, drive \$18/\$24), reviewed in The Rainbow, December 87

See review, Rainbow June 89, page 126...



Caladuril II: Weatherstone's End
By Jeff Noble and Dave Triggerson
Being the second part of the histories of the House of Tavin Lord of Fire
Do you wish to read my story? No

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\$2.50 shipping to
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please add 8% tax.

Unlike *Lyra's* graphics-oriented, point-and-click environment, *CoCo MIDI 3* does not accept mouse or joystick input; access to all options is through the keyboard with single-key commands. I found this method easy to learn and intuitive to use.

To begin a MIDI recording session, for example, working from the main menu, you first use the arrow keys to scroll the cursor to the track you want to record. You then press P to access the Perform menu. An option box immediately opens; press R for Record and *CoCo MIDI 3* immediately begins recording.

Time is displayed by a digital clock indicating your position in the music sequence in measures and beats. As you play, each note is recorded to a resolution of 1/96th of a beat, and you are advised of the total number of notes played so far.

CoCo MIDI 3 records each note as a single data line, containing alphanumeric values for the note type (or MIDI event), its velocity (volume), how long it is sustained, its place in the sequence, and the channel it's being played in. While not presented as standard musical notation, the information is easy to understand. A middle C, for example, is displayed as C4. A C# one octave above middle C is displayed as C5#, and so on.

CoCo MIDI 3 offers some powerful editing tools. You can change any data variable on any track, a note at a time, or entire blocks of notes at a time. You can play your composition from any point in the editor, and record new notes from any point. A convenient Goto feature allows you to jump instantly to any point in the sequence. You can have the notes sound as you scroll through the data in order to locate miss-keys.

And speaking of mistakes, should your playing have roamed inadvertently ahead or behind the beat, there is a powerful Quantize feature that allows notes to be rounded off to one of 10 selectable fractions of a beat. A useful scale can be used to gradually change velocity data over time to create smooth crescendos and decrescendos. There is a powerful Filter command that allows you to review and edit only selected kinds of MIDI data. You can even view and edit all tracks simultaneously. Many more editing features — too numerous to mention here — are also available. Suffice it to say, plugging your keyboard into *CoCo MIDI 3* is only the beginning.

Aside from basic note data, *CoCo MIDI 3* also supports other MIDI events. Included are system event messages, instrument selection, key pressure, channel pressure and pitch wheel. For more advanced applications, *CoCo MIDI 3* can act as master or slave, and there is a song position pointer

for exact synchronization with studio tape recorders.

My only misgiving with *CoCo MIDI 3* is its limited memory capacity. Because each MIDI event is recorded as eight bytes of memory (as opposed to *Lyra's* two bytes per event), a single composition is limited to a total of about 5000 MIDI events, or 682 beats. While this is an impressive feat for the 64K CoCo, it did mean that my own four-minute, nine-voice composition consumed 94 percent of the memory and required 18 granules of disk space to save. Disk files can be linked to play in sequence; but in order to make use of additional internal memory, a disk controller ROM that allows access to RAM disks (such as *ADOS-3*) is required.

CoCo MIDI 3 is an intelligent, accommodating, easy-to-use MIDI sequencer/recorder. This program offers an efficient and powerful tool for today's musician.

(Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, 619-690-3648; \$150, \$59.95 for disk only)

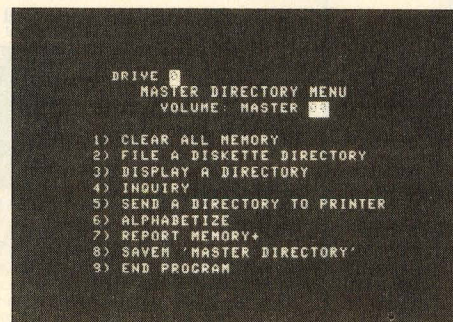
—Walter Myers

Software

CoCo 3

MasterDIR— Now Let Me See ... Which Disk?

I have been searching a long time for a disk directory file program to organize my disks. And let me tell you, I've tried many over the past few years. None I came across were satisfactory. Most were extremely slow. But now I've found a program that is close to what I've been looking for — at least it comes closer than any other I have seen. *MasterDIR* by Sportware is a very good disk cataloger for the CoCo 3 disk system.



If *MasterDIR* has one outstanding feature, it is speed that leaves other similar programs in the dust. *MasterDIR* is 100 percent machine language. The program

itself occupies the lower area of memory, and the data files are saved in the remainder. *MasterDIR* holds up to 2238 filenames from your disk directories. You can use files from up to 250 disks in one *MasterDIR* file. And the master disk comes to you on an unprotected disk.

Upon booting *MasterDIR* and pressing any key, you are greeted by a main menu with nine options. This menu is so easy to understand that you really have no need of documentation... my kind of program!

Option 1 allows you to clear all memory. When you boot *MasterDIR*, it automatically loads your data file; if you want to start a new file, it is necessary to clear memory with this option. Option 2 allows you to place a disk's directory in memory (you are asked for a two-digit disk name). Option 3 displays the directories in memory by disk name. Please note that it displays only one disk at a time and not the whole data file.

Option 4, which I find to be the most useful function, is the "Inquire" feature (I would call it a search feature, myself). After you type in the name of a specific program, or any part of it, it displays all files meeting that criteria. A truly useful feature. Option 5 prints the directory to your printer. As with Option 3, it prints only one disk directory, not all. Option 6 is the alphabetizing feature, which is as fast as the rest of the program.

Option 7 is a handy feature that shows your memory usage. Option 8 is the Save option, and Option 9 is for quitting.

MasterDIR's documentation is brief but contains everything you need to know. As I mentioned before, you really don't even need it.

The price, \$18, is fair for this software, considering all it can do. But there are a couple of things you should be aware that *MasterDIR* cannot do. First of all it won't display to the screen or print to your printer an entire collection of disks at one time, but rather just one disk at a time. I personally would prefer to be able to print a master directory of all of my disks to the printer. Secondly *MasterDIR* allows only a two-digit disk name to be entered. Since my disks already number in the hundreds, a three-digit name would be more helpful. And *MasterDIR* does not provide a way to delete a disk from the data file. About the only thing you can do in this case is read in a blank disk for that disk name.

With these things considered, on a scale of 1 to 10 I rate *MasterDIR* as an 8.

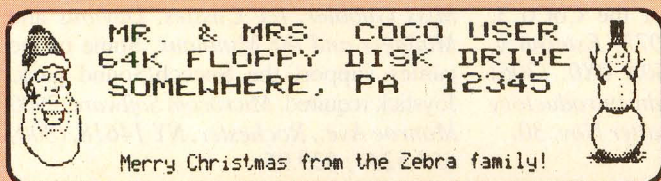
(Sportware, 1251 S. Reynolds Rd. Suite 414, Toledo, OH 43615, 419-389-1515; \$18)

—Robin Jackson

Label Designer

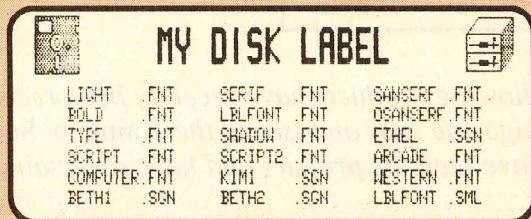
Everything you'd want a label program to do and more!
No other program lets you make great labels so easily.

- **Print Labels With Text And Graphics:** Use Label Designer's fonts and pictures or any of Zebra's optional Picture & Font Disks.
- **Zebra Systems' Graphics User Interface:** Pull down menus, scrolling-window file selectors, dialog boxes, radio Buttons, the works!
- **Standard Features:** Click and drag picture placement, up to 4 pictures per label, 3 different picture sizes, powerful text editing with variety of type fonts and sizes, prints 1-999 copies, templates for standard & large address, file folder, disk, and cassette label sizes.



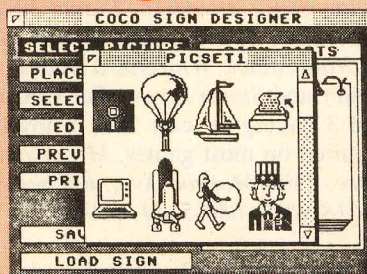
LABEL DESIGNER LABEL
PRINTED ON DMP105
80% OF ACTUAL SIZE

- **Mail Merge Option** merges name and address or other text file data for printout onto your custom label templates with graphics and other text. Great for club mailings, Christmas card lists, membership name tags, etc.



- **Disk Directory Option** pastes the names of your disk files onto the label text editor screen for inclusion on your labels.
- **Serial Numbering Option** for making sequentially numbered admission tickets, product numbering, inventory labels, etc.
- **Hardware Requirements:** CoCo II 64K, or CoCo 3, disk drive, mouse or joystick, compatible printer (compatible with same printers as CGDP).
- **Includes** disk, laser typeset user's manual and sample quantities of different size labels. Price: **\$34.95**
We stock white and colored labels in a variety of address, disk, and cassette sizes at competitive prices.

Banners, Signs & Greeting Cards



Picture Selection Screen

The CoCo Graphics Designer Plus, produces beautiful greeting cards, banners, and signs for holidays, birthdays and other occasions.

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

Read the review in May 89 Rainbow.
CGDP Disk & 64 page typeset manual.

\$29.95

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

Label Designer & CGDP

Optional Picture, Font, and Border disks.
\$14.95 each.

Picture Disk #2 4 sets of 30 pictures ea., Sports, America, Party, Office, Total 120 pictures.

Picture Disk #3 4 sets of 30 pictures ea. Animals, Nature, Religion, Travel, Total 120 pictures.

Picture Disk #4 120 Holiday Pictures: Christmas, Chanukah, Thanksgiving, New Year's, Easter, Halloween, etc.

Font Disk A 10 Fonts: Western, Stencil, Banner, Shadow, Variety, Type, Stripes, Digital, Bold3, Object
Font Disk B 10 Fonts: Arcade, Circle, Alien, Cube, Baroque, Deco, Block, Gray, Computer, Script

Border Disk #1 Contains 176 High resolution borders, great variety from simple to ornate. (The border disk is for use with the CGDP, but not with the Label Designer).

Color Paint

Color Paint is an easy to use drawing program for your CoCo 3. It uses the CoCo 3 High resolution 320x200 video mode that allows you to create highly detailed artwork.

All the standard features of classic paint programs: lines, rectangles, filled or round cornered rectangles, ovals, paint, spray-can, fill pattern that can be edited, etc. Comes with 11 Hi-res fonts that you can print in any combination of styles: Color, Shadow, Outline, Bold, and Italics!

The Deluxe version runs faster and uses the additional memory to implement really exciting features.

Color Paint requires a Tandy mouse



or joystick and an inexpensive \$9.95 Tandy Hi-re interface (Catalog #: 26-3028). Prints COLOR using Tandy CGP-220 and OKIMATE-20 printers or in black and white on Tandy DMP 105/ 120/ 130/ 200/ 400, EPSON MX/RX/FX/ printers & compatibles.

Color Paint (128K).....\$29.95

Color Paint (512K) ...\$29.95

HARDWARE

Color Computer Mouse (Quantities Limited)...19.95
Atari-To-CoCo Joystick Adaptor 12.95
WICO Trackball Controllers..... 29.95
HDS Floppy Disk Controllers with RS ROM.. 59.95
Disk Drive Case & Power Supply 35.00
Wildcard Cartridge Emulator 109.95

SOFTWARE

Car Sign Designer 14.95
Disk Utility 2.1a..... 14.95
Printer Font Generator 14.95
Multi-Pak Crack 14.95
Telepatch III 14.95
Tape/Disk Utility 14.95

Ordering Instructions: All orders add \$3.00 Shipping & Handling, UPS COD add \$3.00. VISA/MC Accepted. PA residents add sales tax. Hours 9-5 Monday to Friday. We offer comprehensive sales and customer support for Zebra Systems Products.

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The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

Big BASIC, an updated multitasking program for the CoCo 3, which lets users run BASIC programs in windows. Includes new demos. *Danosoft, P.O. Box 124, Station A, Mississauga, Ontario, Canada L5A 2Z7, (416) 897-0121; \$39.95 U.S. + \$2.50 S/H.*

◆ **DX-100L Diskette File**, a transparent-lidded, locking diskette case that can hold up to 120 5¼-inch floppies. Comes with dividers and colored labels. *CBUG, Inc., 4102 N. Odell, Norridge, IL 60634, (312) 456-8720; \$12 plus \$3 S/H.*

◆ **Floppy Wallets**, a disk storage and carrying case that holds 24 5¼-inch disks in its pockets. The wallet is constructed of anti-static nylon with velcro closures. It can "pyramid" itself to stand unsupported and also fold to fit into a purse or briefcase. Wallets are also available for 3½-inch floppies. *CBUG, Inc., 4102 N. Odell, Norridge, IL 60634, (312) 456-8720; \$12.50 plus \$3 S/H.*

◆ **Keyboard Templates: Telewriter 64 and Telewriter 128**, typeset and laminated cardboard templates for the *Telewriter-64* and *Telewriter-128* word processors. The templates, which are placed on the keyboard to fit around the keys, cover editor commands, disk commands, embedded format commands and more. Users can have an at-a-glance reference for all *Telewriter* functions, without having to resort to the documentation. *P&M Products, 1003 Shalimar Drive, High Point, NC 27260, (919) 279-3091; \$4.95 plus \$2 S/H each for Telewriter-64 and Telewriter-128 templates.*

KJV on Disk #1, Genesis 1 through 29 from the King James Version of the Bible on disk in ASCII files for the CoCo 1, 2 and 3. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; \$3.*

◆ **Phonics Fun**, an educational program that helps children associate the sounds of letters with words in which they occur. It shows pictures in four categories (farm,

circus, playground and magician) and asks children to press the first letter of the word the picture represents. For the CoCo 3. *W.B.D. Software, Box 1077, Esterhazy, Saskatchewan, Canada S0A 0X0, (306) 745-6527; \$15 U.S., \$18 Cdn. introductory offer; \$17 U.S., \$20 Cdn. after Nov. 30.*

Space Pac, a machine-language action game collection, many of which are based on popular arcade titles. Includes *Color Zap*, *Color Space Invaders*, *Planet Invasion*, *Spacewar*, *Space Race*, *Galax Attack*, *Android Attack*, *Whirlybird Attack*, *Space Sentry* and *Storm Arrow*. For CoCos 1, 2 and 3 having at least 16K; a joystick is required on most games. *Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; \$29.95.*

Treasury Pack #1, a machine-language collection of CoCo Adventure and arcade game classics, many of which are based on popular arcade titles. The set includes *Keys of the Wizard*, *Lunar Rover Patrol*, *Cubix*, *Module Man*, *Decathlon*, *Pengon* and more. Some games support the Speech/Sound pack. Requirements range from 32K to 64K. Comes on disk for the CoCo 1, 2 and 3; joystick required. *Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; \$29.95.*

Treasury Pack #2, a collection of machine-language arcade games for CoCo 1,

2 and 3 disk systems, requiring at least 32K. Includes *Galagon*, *Lancer*, *Froggie*, *Miss Gobbler*, *Ice Castles*, *Devious* and *Madness and the Minotaur*. Some of the games support the Speech/Sound pack. Joystick required. *Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; \$29.95.*

Wizard's Castle, a text and graphics Adventure game with randomized "tricks, treasures and creatures of all types." The Adventurer can amass an arsenal of four weapons (crossbow, club, sword and axe) with which to face creatures such as dragons, trolls and cyclops. Features a game save command and support for the Speech/Sound Cartridge. Requires 64K, Disk Extended BASIC and one disk drive. *Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; \$19.95.*

Z'89, an update of the *Zaxxon* arcade game, written in 100-percent machine language by Steve Bjork for the CoCo 3. Players pilot their crafts through a hostile space fortress, scaling walls, dodging force fields and dogfighting with defense ships in an attempt to vanquish the robot overlord. Features enhanced graphics and digitized sound. For one or two players, joystick required. *Game Point Software, P.O. Box 6907, Burbank, CA 91510, (818) 566-3571; \$29.95.*

◆ 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.

—Lauren Willoughby

RASCAN

VIDEO DIGITIZER

The Rascan Video Digitizer is a state-of-the-art image processing system designed to take advantage of your Color Computer 3's graphic capabilities.

The Rascan Video Digitizer connects easily to any color or black & white video camera, video recorder or video disc player and captures images with precision accuracy.

Why settle for a 256 x 256 image area when the Color Computer can display so much more? We asked that question ourselves. Our only answer was to provide an image area of 640 x 200 and 320 x 200! Say good-bye to those useless lo-resolution images created by other digitizers on the market.

Life is not simply black & white, that's why we added living color to our Digitizer. Now, through the use of advanced programming techniques, 512K Color Computer 3 owners can capture images from their video camera and display them in 4096 Super Hi-Resolution graphics!

Capture images effortlessly. Simply select the image capture option and turn your Rascan unit on. Within seconds your image will be captured and displayed on your screen. Images can be fine tuned by use of the contrast and brightness knobs found on the Rascan unit.

Rascan also features a professional pop-up menu system which will allow for easy palette manipulation and color painting of captured images.

The Rascan Video Digitizer comes complete with Rascan driver software, an easy to read manual, sample graphic images disk and print driver disk (supporting most printers). Although no further graphic editors are necessary to produce quality images, Rascan images can be easily loaded into ColorMax and CoCo Max graphic editors.

Whether your interests are in desk-top publishing, report generation or simply for fun, the Rascan Video Digitizer will provide you with images of near photographic quality!

FEATURES

	RASCAN		DS-69b	
	YES	NO	YES	NO
Support of 640 x 200 16 Level Grey Images	X			X
Support of 640 x 200 4 Level Grey Images	X			X
Support of 320 x 200 16 Color Images	X			X
Support of 4096 Hi-Res Color Graphics in 512K mode	X			X
Support of Multiple Image Buffers in 512K mode	X			X
Control of Contrast & Brightness via Control Knobs found on Digitizer	X			X
Professional, Easy to Use Pop-Up Menu System	X			X
Designed Exclusively to Take Advantage of the power of the Color Computer III	X			X
Built in Histogram Utility to Aid in Image Quality	X			X
Easy to use Paint and Palette editing, no need for additional Graphic editors	X			X
15 Day Full Money Back Guarantee	X			X
Interface through Joystick Ports	X			X
Requires additional cost of Y-Cable or Multi-Pak interface		X	X	

THE RASCAN VIDEO DIGITIZER

\$159⁹⁵

NO RISK GUARANTEE

If you are not completely satisfied with the performance of your Rascan Video Digitizer, you may return it, undamaged within fifteen days for the full refund of the purchase price plus shipping costs.



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Personal checks, money orders, and American C.O.D. orders accepted. Include \$3.00 for S/H. \$2.50 extra for C.O.D. orders. (Cal. res. add 6.5% tax.)
ATTENTION PROGRAMMERS: Game Point Software is looking for talented writers. Top royalties guaranteed.

More on *MaxIc* and OS-9 Hits the Mac

By Dale L. Puckett
Rainbow Contributing Editor

Last month I presented the first of a three-part tutorial series exploring Robert Moody's *MaxIc*. This line-by-line tour of *MaxIc* helps you to master a few of the techniques needed to write *Multi-View*-based application programs in BASIC09. To save typing and to provide you with a chance to run *MaxIc*, I published the complete program in the August edition of RAINBOW ON DISK. It is also available in the Rainbow Programs section of Delphi's OS-9 Online data library.

Eleven Parts in October

Modular programming techniques help break projects into small parts you can tackle one at a time. OS-9 in general, and BASIC09 in particular, are natural tools when modular programming is required. *MaxIc*, a *Multi-View*-based icon editor, demands a modular approach. It contains 27 modules. Last month there were seven source code listings for modules named *maxic*, *main*, *menu*, *setbuf*, *clearbuf*, *files* and *showdir*.

This month, I tackle 11: *tandy*, *dirfiles*, *getans*, *writefile*, *getname*, *getdir*, *winset*, *mouser*, *loadicon*, *getfile* and *getkey*. As I made the selection, I tried to

pick individual modules that run together. *dirfiles*, the program that drives one of *MaxIc*'s three menus, was the driving force behind my selection. This procedure runs *getans*, *writefile*, *getname*, *getdir* and *winset* directly. These modules in turn run the other modules, which are published this month. The modules *geticon*, *saveicon*, *readicon*, *showicon*, *writeicon*, *editor*, *updatbuf*, *errmsg* and *loadbar* must wait until November.

The Familiar Tandy Menu

MaxIc is structured much like *MVShell* and *DoMenu*. You can run any of the standard Tandy desk accessories from within *MaxIc* at any time. *MaxIc* also gives you access to a standard file menu similar to those used in most *Multi-View* applications. When application writers follow established standards like this, they make life easy for the person running their programs. If every programmer uses a similar menu to open, close, abandon, read or write files, the user only needs to learn these operations one time. Thus after you have learned to start one program, you've learned to start every program.

Tandy Desk Accessories Revisited

The first listing this month is a procedure named *tandy*. It exercises the menu that delivers the standard Tandy desk accessories to your Color Computer screen. As you review this procedure, notice that it is almost identical to the *tandy* menu used within *MVShell*, *DoMenu* and *Locate*. When I published *Locate* in July, I suggested

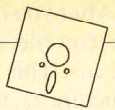
comparing its *tandy* menu routines to those in *DoMenu*. I also detailed those changes to help you learn how to add, remove or otherwise change the actions available under the menu. Feel free to review that article and customize Moody's *tandy* menu to meet your own needs.

Notice that Moody passes all information required by the procedure *tandy* in the three data structures defined last month when the procedure *main* was listed. To recap, the structure *MS* contains data of the type *MicSys*, which contains (in order), *DNAME*, a directory name stored in a 32-byte string; *TNAME*, an array of 48 icon names stored in 32-byte long strings; and *BYT*, a 144-byte array used to hold a single icon's bit map.

These larger fields are followed immediately by eight single-byte fields and two integer fields. The byte-wide fields hold several numbers: group, buffer, a counter-named number, menu-select, menu, error, color and a scroll count. The horizontal and vertical position of the Color Computer mouse are stored in the two integer fields. The structures *DR* and *IC*, both of type *MIC*, are not used in the procedure *tandy* even though they are passed when it runs.

Moody starts the procedure with code that reserves space in memory for the parameters above and the variables *TName* and *OK*. He then moves OS-9's cursor to the upper left corner of the window in Line \$008E. When this is done, he turns off the graphics cursor, turns off proportional spacing, and tells OS-9 to use the font found in Group 200, Buffer 2.

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The line at \$00DA decides what you want and branches to the proper line to run the desk accessory program you requested with the mouse pointer and button. If the menu number field `MS.MenNum`, of the parameter `MS`, is 2 after the mouse button is pushed, for example, the program knows you want to run the `tandy clock` program. This decision made, it branches directly to Line 2, Location \$014B, which actually runs an OS-9 program named `gclock`.

The first step in the routine begins at Line 2, opening an overlay window and saving the information on the window underneath it. The upper left corner of the overlay window is located one character space to the right of the left edge and two characters down from the top of the window. The overlay window is 20 characters wide and 15 rows deep. Its foreground is black (2), and its background is white (0).

After Moody creates the overlay window, he runs the procedure `winset` to tell OS-9 he would like a Type 5 window. This is a plain box window `wt.pbox` in the `os9defs` file and the standard graphics library used by the C compiler. After the window is drawn on the screen, Moody turns on OS-9's Echo function using `tmode` and then uses the BASIC09 command `shell` to run the `tandy` program `gclock`.

When you close `gclock` by clicking the mouse button with the pointer over the go-away box in the upper left corner of the window, the procedure `tandy` branches to Line 20, where Moody closes the overlay window he created earlier, turns off the Echo function, turns the proportional spacing back on, changes to the font stored in Group 200, Buffer 1, and turns the cursor off. The procedure `tandy` handles each of the other menu items in the same way. That's it for Listing 1.

The `dirfiles` Directory

Most of *Maxlc*'s work is initiated from the menu `dirfiles`. Notice that it starts out in a manner similar to the procedure `tandy`. It reserves space in memory for the parameters it will receive from the procedure `main`, reserves space in memory for its variables `TName` and `OK`, and then branches to a routine determined by the menu item number passed to it in the `MenNum` field of the data structure `MS` — `MS.MenNum`. Menu choices include Write, Rename, Delete, CHI, Load Dir, CHD, CHX and Print. Notice there are exactly eight choices on the menu and exactly eight possible branches in the `on ms.mennum goto` routine at \$008E. There

really is a method behind this madness.

If you push the mouse button while the pointer is over Write in the `dirfiles` menu, the control of the procedure is transferred to Line 1, which is the beginning of the code needed to write or save an icon file to disk. Here `dirfiles` looks for the name of the selected icon by checking the name field of the parameter `DR` — `DR.name`. If this field is empty, you have not selected an icon to save to a file. If it contains a name, `dirfiles` runs the procedure `getans` to give you a chance to change your mind.

Moody passes three parameters to `getans` — the entire data structure `MS`, a Boolean named `OK` and a string. The string is made up of the word `write` followed by the name of the icon you have selected. `getans` opens an overlay window and draws a dialog box in which you are asked if you are sure you want to write the icon file.

The procedure `getans` lets you click the mouse button over the word `Yes` printed on the screen or press the letter Y. If you click Yes or press Y, `getans` sets the value of the Boolean parameter `OK` to True and returns you to the `dirfiles`. If you press anything else or click the mouse button with the pointer located anywhere else in the dialog box, `OK` is false and the file is not written to disk.

After running `getans`, `dirfiles` runs the procedure `writefile`, which actually saves the icon to disk. Notice that before calling `writefile`, Moody sets the value of `TName` to "" — a null or empty string. The value of `TName` and the field `DR.name` determine where the image of the icon is sent. If `TName` is a null and `DR.name` exists, the icon is written to a disk file. Otherwise if `DR.name` is empty or a null string, `dirfiles` knows that you want to

print the icon, and the icon is written to the device `/p`.

When the routine that started at Line 1 ends, it transfers control to Line 20 where `dirfiles` clears the `IC.select` field, erases any data in the field `DR.name`, then refreshes the visual directory display by running the procedure `showdir`. The action code for each of the directory items exits in exactly the same manner.

In Line 2 `dirfiles` has determined that you want to rename an icon file. The first thing it must do is find out what you would like to name the icon file. There's no better way to find out something than by asking. And that's exactly what the call to the procedure `getname` does.

`getname` follows a sequence very similar to that followed by `getans`. It creates an overlay window, draws a dialog box, prompts you for the file name by printing "Filename" in that box, and waits for you to type in the name. When you do, it returns the name to `dirfiles` in the parameter `filename`. `dirfiles` reads this parameter into a string variable named `TName`.

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After you have supplied a new name for the icon file, `dirfiles` runs the procedure `getans`. This time it passes the entire data structure `MS`, the Boolean variable `OK`, and a rename string. Again you have a chance to say yes or no or click the appropriate answer with the mouse button.

Notice that `getans` does two different jobs by simply changing the parameters passed to it. This is a perfect example of the power and functionality you can achieve by passing parameters between OS-9 procedures.

Notice that `getans` has already been used to do two different jobs by simply changing the parameters passed to it. This is a perfect example of the power and functionality you can achieve by passing parameters between OS-9 procedures.

Assuming you said yes, `dirfiles` goes on to rename your icon file, using the BASIC09 `shell` command to run the OS-9 `rename` utility. After it has done this, it must run the procedure `showdir` again to update the visual directory display on `Maxlc`'s screen. When you follow the code that activates the other `dirfiles` menu item choices, you see that each routine is structured in an identical manner.

Every Mouse Should Have a RatPack

The dual functionality of the procedure `getans` is made possible by its call to the procedure `getkey`. In `getkey`, Moody queries both the mouse and the keyboard. He uses the `ISGetStt` call to determine the location of the mouse and the packed BASIC09 I-code module `inkey` to capture any key that happens to be pressed.

Moody defines his `ratpack` as an array of 32 bytes and remembers the numerical location of each piece of information stored in the array. I prefer to define a BASIC09 data type that tells me mnemonically where my data is located. For example, he must remember that the value of the mouse button — up or down — is stored in the ninth byte from the beginning of the array, and the

Listing 1: `tandy`

```
PROCEDURE TANDY
0000 TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
0001 TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpId,BufNo,number
    ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0064 PARAM MS:micSys
006D PARAM DR,IC:mic
007A DIM TName:STRING
0081 DIM OK:BOOLEAN
0088 ON ERROR GOTO 30
008E (* set cursor at top to help keep window rollup when coming out of ow_window
00DA RUN gfx2("curxy",0,0)
00ED (* get rid of the arrow
0104 RUN gfx2("gcset",0,0)
0117 RUN gfx2("propsw","off")
012B (* use small 6x8 letters
0143 RUN gfx2("font",200,2)
0155 (* goto what we selected
016D ON MS.MenNum GOTO 1,2,3,4,5,6,7,8,9
019B END
019D 1 (* calc
01A7 RUN gfx2("owset",1,2,4,30,17,2,0)
01C9 (* set window for plane box
01E4 RUN winset(5)
01EC SHELL "gcalc"
01F5 GOTO 20
01F9 2 (* clock
0204 RUN gfx2("owset",1,2,5,20,15,2,0)
0226 RUN winset(5)
022E SHELL "tmode echo"
023C SHELL "gclock"
0246 GOTO 20
024A 3 (* calendar
0258 RUN gfx2("owset",1,0,0,40,24,1,0)
027A RUN winset(5)
0282 SHELL "tmode echo"
0290 SHELL "qcal"
0298 GOTO 20
029C 4 (* control
02A9 RUN gfx2("owset",1,1,1,20,20,2,0)
02CB RUN winset(5)
02D3 SHELL "control"
02DE GOTO 20
02E2 5 (* printer
02EF RUN gfx2("owset",1,1,1,20,20,2,0)
0311 RUN winset(5)
0319 SHELL "tmode echo"
0327 SHELL "gprint"
0331 GOTO 20
0335 6 (* port
033F RUN gfx2("owset",1,1,1,20,21,2,0)
0361 RUN winset(5)
0369 SHELL "tmode echo"
0377 SHELL "sport"
0380 GOTO 20
0384 7 (* help
038E RUN gfx2("owset",1,1,5,38,16,1,0)
03B0 (* set window for double box
03CC RUN winset(4)
03D4 SHELL "tmode echo"
03E2 RUN gfx2("curon")
03EF LOOP
03F1 PRINT "Press [ENTER] to exit"
040A INPUT "What OS-9 Subject(s)? ",TName
0429 EXITIF TName="" THEN
0435 ENDEXIT
0439 SHELL "help "+TName
0446 PRINT
0448 ENDLOOP
044C GOTO 20
0450 8 (* shell
045B RUN gfx2("owset",1,1,5,38,16,1,0)
047D RUN winset(4)
0485 SHELL "tmode echo"
0493 RUN gfx2("curon")
04A0 RUN gfx2("curxy",0,0)
04B3 RUN gfx2("font",200,2)
04C5 PRINT "press [CTRL] and [ESC] to exit"
04E7 SHELL "shell"
04F0 9 (* clipboard
04FF 20 RUN gfx2("owend")
050F GOTO 35
0513 30 MS.ErrNum:=ERR
0520 RUN gfx2("owend")
052D RUN ertmsg(MS.ErrNum)
053A 35 SHELL "tmode -echo"
054C RUN gfx2("propsw","on")
055F RUN gfx2("font",200,1)
0571 RUN gfx2("curoff")
057F END
```


horizontal location is made up of both the 25th and 26th bytes in the array. I prefer the code:

```
Button:=msret.cbsa
horiz:=msret.acx
```

As a bonus here's a review of the BASIC09 data type that defines the packet of information returned from the mouse by I\$GetStt.

```
TYPE rodent=valid,actv,totm:BYTE;
rsrv0:INTEGER; ttto:BYTE; tsst: IN-
TEGER; cbsa,cbsb,ccta,cctb,ttsa,
ttsb,tlsa,tlsb:BYTE; rsrv1,bdx,bdy:
```

```
INTEGER; stat,res:BYTE; acx,acy,wrx,
wry:INTEGER
```

After you have defined the data type, you can then reserve memory for it by using the BASIC09 DIM statement:

```
DIM RatPack:rodent
```

If you click the mouse button while getkey is running, Moody computes the horizontal and vertical position of the mouse pointer and passes it back to the calling procedure in the parameters horiz and vert. He also sets the value of the one-byte string key to a space. This lets him escape from

Listing 2: dirfiles

```
PROCEDURE DIRFILES
0000 TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
001B TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpId,BufNo,number
,MenSel,MenNum,ErrNum,color,acount:BYTE; horiz,vert:INTEGER
0064 PARAM MS:MSys
006D PARAM DR,IC:MIC
007A DIM TName:STRING
0081 DIM OK:BOOLEAN
0088 ON ERROR GOTO 30
008E (* goto selected number
00A5 ON MS.MenNum GOTO 1,2,3,4,5,6,7,8
00CF END
00D1 1 (* write dirfile
00E4 (* end if nothing selected
00FE IF DR.name<>"" THEN
010D (* else do we really want to
0128 RUN getans(MS,OK,"Write "+DR.name)
0147 (* if we do let't do it
015E IF OK THEN
0167 (* set temp name to nothing
0182 TName:=""
0189 (* go make a file
019A RUN writefile(MS.Dname,DR.name,TName)
01B4 ENDIF
01B6 ENDIF
01B8 GOTO 20
01BC 2 (* rename dirfile
01D0 IF DR.name<>"" THEN
01DF (* get new name
01EE RUN getname(TName)
01F8 (* is there a new name
020E IF TName="" THEN
021A (* no so forget about it
0232 END
0234 ELSE
0238 (* yes so is it correct
024F RUN getans(MS,OK,"ReName "+DR.name+" to "+TName)
027A IF OK THEN
0283 (* it is correct so let's give it a new name
02AF SHELL "rename "+MS.Dname+"/"+DR.name+" "+TName
02D4 (* and change the name in the buffer number
02FF MS.Iname(DR.select)=TName
0311 DR.name:=TName
031D (* we do the directory window
033A GOSUB 40
033E ENDIF
0340 ENDIF
0342 ENDIF
0344 GOTO 20
0348 3 (* delete dirfile
035C IF DR.name<>"" THEN
036B RUN getans(MS,OK,"Delete "+DR.name)
038B IF OK THEN
0394 SHELL "del "+MS.Dname+"/"+DR.name
03AE (* rename it to XXXX so we know it's not there
03DC MS.Iname(DR.select):="icon.XXXX"
03F6 (* now show it on the screen
0412 GOSUB 40
0416 ENDIF
0418 ENDIF
041A GOTO 20
041E 4 (* chi
0427* RUN gfx2("owset",1,5,10,30,7,2,0)
0449 RUN winset(4)
```

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the repeat . . . until control structure that waits forever if you don't press a key.

The routine `mouser` is almost identical to the `getkey` routine except it does not look for a key press from the keyboard. It simply goes out, looks at the mouse, and returns the horizontal and vertical position of the mouse and the status of the button.

If you have typed the `gfx3` procedure from the August 1988 column or downloaded it from Delphi's OS-9 Online SIG, you will find it much easier to type:

```
run    gfx3(StdIn,"gs.mous",addr
(RatPack))
```

I have merged the `gfx3` I-code module in a file with the `gfx2` module. This means all `gfx3` functions are always available to my BASIC09 programs.

writefile Uses Parameters Too

I mentioned in the procedure `dirfiles` how the routines write a file to a disk or print a file. Both use the procedure `writefile`. This too is made possible by the parameter-passing capability of BASIC09.

When `writefile` is called, it puts up the hourglass cursor to tell you it is busy with the command "run `gfx2`('gcset',202,4)". Then it opens a path to the icon file you want to write and reads its data into the 144-byte array `byt`.

Next it checks to see if the filename you have requested is `"/p"`. If so, it opens a path to the printer and sends out the name of the icon. If not, it simply opens a path to a filename with the same name as the icon you want to write. It then prints that array, two bytes at a time in Hex format, to the path just opened. If a file for the icon does not already exist, `writefile` creates a file and writes the array to it.

Grand Opening

If you're looking for the magic that lets Moody read the names of the files in his

```
0451  RUN gfx2("curxy",0,0)
0464  (* the current icon director
0480  PRINT "current icon dir "; MS.Dname
049C  RUN gfx2("curxy",0,2)
04AF  (* turn off the propsw so we can backup with out overlap
04E7  RUN gfx2("propsw","off")
04EB  (* and turn on the echo so we can see it
0523  SHELL " tmode echo"
0532  (* now we can get the new path
0550  INPUT "change to > ",TName
0564  (* let's we set every thing
057F  SHELL "tmode -echo"
058E  RUN gfx2("propsw","on")
05A1  RUN gfx2("owend")
05AE  (* was there a new path
05C5  IF TName<>" THEN
05D1  (* yes so let's change it
05EA  MS.Dname=TName
05F6  (* do we want to laod it in
0611  RUN getans(MS,OK,"Laod "+MS.Dname)
062F  IF OK THEN
0638  (* yes so goto loadaddr
064E  GOTO 5
0652  ENDIF
0654  ENDIF
0656  GOTO 20
065A 5  (* load dir
0668  (* start at the first buffer
0684  MS.number:=0
068F  (* and the first page
06A4  MS.scount:=1
06AF  (* clear the screen first
06C8  GOSUB 40
06CC  RUN getdir(MS,DR)
06DB  GOTO 20
06DF 6  (* chd
06E8  RUN gfx2("gcset",0,0)
06FB  RUN gfx2("owset",1,5,10,30,7,2,0)
071D  RUN winset(4)
0725  RUN gfx2("curxy",0,0)
0738  PRINT "current wk.dir ";
074C  (* get the current path
0763  SHELL "pwd"
076A  RUN gfx2("curxy",0,2)
077D  RUN gfx2("propsw","off")
0791  SHELL "tmode echo"
079F  INPUT "change to > ",TName
07B2  SHELL "tmode -echo"
07C1  RUN gfx2("propsw","on")
07D4  RUN gfx2("owend")
07E1  IF TName<>" THEN
07ED  CHD TName
07F2  ENDIF
07F4  GOTO 20
07F8 7  (* chx
0801  RUN gfx2("gcset",0,0)
0814  RUN gfx2("owset",1,5,10,30,7,2,0)
0836  RUN winset(4)
083E  RUN gfx2("curxy",0,0)
0851  PRINT "current ex.dir ";
0865  (* get the current ex path
087F  SHELL "pxd"
0886  RUN gfx2("curxy",0,2)
0899  RUN gfx2("propsw","off")
08AD  SHELL "tmode echo"
```

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```

08BB INPUT "change to >",TName
08CE SHELL "tmode -echo"
08DD RUN gfx2("propsw","on")
08F0 RUN gfx2("owend")
08FD IF TName<>"" THEN
0909 CHX TName
090E ENDIF
0910 GOTO 20
0914 8 (* print
091F IF DR.name<>"" THEN
092E RUN getans(MS,OK,"Print "+DR.name)
094D IF OK THEN
0956 (* set the temp name to printer
0975 TName:="/p"
097E (* and send it to the writefile
099D RUN writefile(MS.Dname,DR.name,TName)
09B7 ENDIF
09B9 ENDIF
09BB 20 (* exit dirfiles
09CE IC.select:=0
09D9 DR.name:=""
09E4 RUN showdir(MS,DR)
09F3 END
09F5 30 MS.ErrNum:=ERR
0A02 (* report the error
0A15 RUN errmsg(MS.ErrNum)
0A22 IC.select:=0
0A2D DR.name:=""
0A38 END
0A3A (* clear the dir window
0A51 40 RUN gfx2("color",0)
0A64 RUN gfx2("bar",290,20,636,188)
0A7D (* and see it
0A8A RUN showdir(MS,DR)
0A99 RETURN

```

Listing 3: getans

```

PROCEDURE getans
0000 TYPE MicSys=Dname,Iname(48):STRING; Byt(144),CrpId,BufNo,number
, MenSel, MenNum, ErrNum, color, scount:BYTE; horiz,vert:INTEGER
0049 PARAM MS: MicSys
0052 PARAM OK: BOOLEAN
0059 PARAM MessAge: STRING
0060 DIM key: STRING[1]
006C ON ERROR GOTO 10
0072 (* use arrow pointer
0086 RUN gfx2("gcset",202,1)
0099 (* set OK to no
00A8 OK:=FALSE
00AE RUN gfx2("owset",1,5,10,32,8,1,3)
00D0 RUN winset(4)
00D8 (* try to relive some garbag if any
00FB PRINT \ PRINT
00FE RUN gfx2("curxy",1,0)
0112 PRINT MessAge
0117 (* turn off propsw to write yes and no
013D RUN gfx2("propsw","off")
0151 RUN gfx2("curxy",8,4)
0164 RUN gfx2("propsw","off")

```

icon directory and capture their bit map in a buffer that can be displayed in an OS-9 window, look no further than the listing of the procedure `getdir`.

Here Moody displays the hourglass cursor again to show you *Max/c* is busy before going to work. Then he opens up the icon directory you have selected. If you haven't selected one, he opens up the directory `CMD5/ICONS`. Notice that he uses the "READ+DIR" attribute in his open statement to tell BASIC09 he wants to open a directory for read.

After he has opened the directory for read, he reads in each filename one character at a time. After he has gathered a complete filename, Moody writes its name into an array in the data structure `MS` in the field named `MS.Iname(MS.Number)`.

After an end-of-file signal lets him know he has reached the end of the icon directory, Moody opens each icon file and reads it. He then writes the data into an OS-9 buffer using the "gpload" `gfx2` call. Each icon has its own buffer number. That number is equal to its file number, which is counted while Moody is reading the directory.

There are several other interesting tidbits within the 11 *Max/c* procedures listed this month. Learn and enjoy. I'll wrap up the series in November.

WizPro Revisited

OS-9 Users Group MOTD editor Bill Brady has upgraded his outstanding shareware communications program *WizPro* again. You'll find the new code in Delphi's OS-9 Online SIG and on CompuServe and GENie as well.

One of the interesting features of this version is the addition of a new utility program called `wizgen`. This program makes it much easier for you to create a new boot file. You can use it to modify the `os9boot` file on any bootable disk. It creates a new file called `wizproboot`, then links to it. There's only one caveat with this approach

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— you must ensure that you have plenty of free disk space on the disk because OS-9 must always have its bootfile stored in contiguous sectors. The exciting thing about wizgen is the fact that it can be easily modified and turned into a program similar to the popular *Font/Da* mover on Macintosh computers. Of course a program like this would compete with Config. Or would there be any competition?

Steve Goldberg's *Find* is Fast

While I was busy writing the BASIC09 program *Find*, Steve Goldberg was hacking away with assembly code. He sent me a copy of his programs *Find* and *Tree*. I've recommended that we publish the assembly version of *Find* in the front section of THE RAINBOW. In the meantime these programs are worth owning. Write Goldberg at 695 Plainview Road, Bethpage, NY 11714 and make an offer. Or contact Paul Ward, who sells many of the Goldberg utilities with his fine book, *Start OS-9*. These latest utilities are worth their weight in time...er, gold. Despite the fact that I mention them quite often in these pages, Steve's utilities still remain one of the best-kept OS-9 secrets. Vendors, are you reading?

Goldberg has also produced a package called *Professional Protector*. He wrote to ask if I thought there was a market for the package. I'll pass the question on. If you're looking for a security package that contains a set of utilities such as *chown* (change owner), *crypt*, *hide*, *unhide*, *view*, *dir*, *who* and *lock*, get in touch with Goldberg. He's put a lot of effort into this package. Let him know what you think.

Putting OS-9 on the Mac

Brady was also the first one to tip me off about an exciting new product in the OS-9 community. Very soon my favorite operating system will run on all Apple Macintosh computers. The port is being done by a group of programmers at UltraScience, a division of Gibbs Laboratories, Inc., 1824 Wilmette Ave., Wilmette, IL 60091; (312) 256-0080.

UltraScience is also responsible for the PC68K1 hardware/software implementation of OSK on IBM PC/XT/AT computers. Its goal: a powerful graphics platform based on CURSES, which looks the same to OS-9 users on a large number of commercially available computers. Dr. Eric Gibbs has invited the staff of THE RAINBOW to Chicago for a special unveiling sometime soon. I hope to be able to attend and report on it.

I've seen brief descriptions of UltraScience's *Facet* software series, and it's enough to make your mouth water. *Facet* contains TICTOC, a software inter-

```

0178      PRINT "[yes] [no]"
0187      RUN gfx2("prospw","on")
019A      (* go get the answer
01AE      RUN getkey(key,MS.horiz,MS.vert)
01C8      (* if key is yes make it yes
01E4      IF key="y" OR key="Y" THEN
01F9          MS.horiz:=250 \MS.vert:-38
020F      ENDIF
0211      RUN gfx2("owend")
021E      IF MS.horiz>243 AND MS.horiz<306 AND MS.vert>36 AND MS.vert
          <42 THEN
024C          (* it's yes so ok is true
0265          OK=TRUE
026B      ENDIF
026D      END
026F 10    MS.ErrNum:=ERR
027C      RUN errmsg(MS.ErrNum)

```

Listing 4: writefile

```

PROCEDURE writefile
0000      PARAM DirName,Name,Tname:STRING
000F      DIM Byt(144),path,tpath,ErrNum:BYTE
0027      ON ERROR GOTO 10
002D      IF Name="" THEN
0039          (* we forgot to select so end
0056          END
0058      ENDIF
005A      (* show hour glass
006C      RUN gfx2("qcset",202,4)
007F      (* try to open icon
0092      OPEN #path,DirName+"/"+Name:READ
00A6      (* get byte info
00B6      FOR x:=1 TO 144
00C8          GET #path,Byt(x)
00D7      NEXT x
00E2      CLOSE #path
00E8      (* do we want it sent to the printer
010C      IF Tname="/p" THEN
011A          (* yes so open it
012B          OPEN #path,Tname:WRITE
0137          (* print out the name of the icon
0158          PRINT #path USING "s40^",Name
0169      ELSE
016D          (* no we want a file
0182          OPEN #path,Name:WRITE
018E      ENDIF
0190      (* start at 0
019D      xx:=0
01A5      (* go in steps of two
01BA      FOR x:=1 TO 144 STEP 2
01D2          (* use hex numbers
01E4          PRINT #path USING "h2",Byt(x);
01F8          PRINT #path USING "h2",Byt(x+1);
0210          (* and a blank space
0224          PRINT #path," ";
022F          xx:=xx+1
023B          IF xx=8 THEN
0248              (* at the end so send a CR
0262              PRINT #path
0268              (* and start over
0279              xx:=0
0281          ENDIF
0283      NEXT x
028E      CLOSE #path
0294      END
0296 10    ON ERROR GOTO 20
029F      (* we have to make one
02B5      CREATE #path,Name:WRITE
02C1      (* and do the same
02D3      xx:=0
02DB      FOR x:=1 TO 144 STEP 2
02F3          PRINT #path USING "h2",Byt(x);
0307          PRINT #path USING "h2",Byt(x+1);
031F          PRINT #path," ";
032A          xx:=xx+1
0336          IF xx=8 THEN
0343              PRINT #path
0349              xx:=0
0351          ENDIF
0353      NEXT x
035E      CLOSE #path
0364      END
0366 20    ErrNum:=ERR
036F      (* report error
037E      RUN errmsg(ErrNum)

```


Listing 5: getname

```

PROCEDURE getname
0000  PARAM filename:STRING
0007  DIM ErrNum:BYTE
000E  ON ERROR GOTO 10
0014  (* turn off the pointer
002B  RUN gfx2("gcset",0,0)
003E  RUN gfx2("owset",1,1,5,14,6,1,3)
0060  RUN winset(4)
0068  RUN gfx2("curxy",1,1)
007B  (* what do we want
008D  PRINT "Filename"
0099  RUN gfx2("curxy",1,2)
00AC  RUN gfx2("propsw","off")
00C0  SHELL "tmode echo"
00CE  (* a name
00D8  INPUT ">",filename
00E1  SHELL "tmode -echo"
00F0  RUN gfx2("owend")
00FD  RUN gfx2("propsw","on")
0110  (* there's a name so do this
012C  IF filename<>" THEN
0138  (* do's it start with icon.
0153  IF LEFT$(filename,5)<>"icon." THEN
0167  (* no so add it on
0179  filename:="icon."+filename
0189  ENDIF
018B  ELSE
018F  filename:=""
0196  ENDIF
0198  END
019A 10 ErrNum:=ERR
01A3  RUN errmsg(ErrNum)

```

face that removes differences between computer terminals; the Bourne shell; and cron, a utility that lets you order your OS-9 system to perform any procedure automatically at any time. You can even tell the system to run a particular procedure file at the same time every day, week or month.

Facet also contains XDIR, which delivers a graphic display of file directories that can even be made to act like the UNIX find command, so filename matches can be used in a pipeline. And there's a menu to make OS-9 use much easier for the beginner.

If OS-9 takes hold on IBM and Apple computers, and the same visual platform runs on the Color Computer... hold on to your hat. I'm talking major excitement.

Finally software houses will find OS-9 is a viable market for application programs needed by the common man. It can do nothing but help CoCo OS-9 users — if we do our part. Talk to Kevin Darling, Bill Brady, Mark Griffith, Ron Lammardo, Kent Meyers and all the other CoCo OS-9 gurus you know now.

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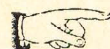
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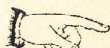
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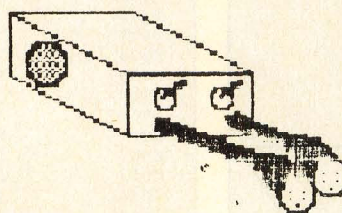
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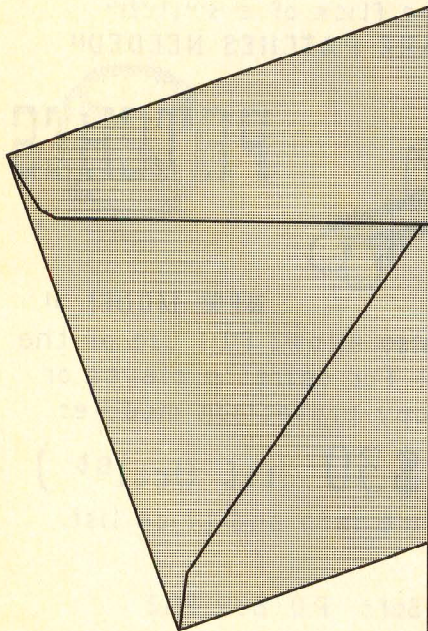
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Listing 6: getdir

```

PROCEDURE getdir
0000 TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
001B TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpID,BufNo,Number
      ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0064 PARAM MS:micSys
006D PARAM dr:mic
0076 DIM Tname,temp(60):STRING
0086 DIM Count:INTEGER
008D DIM path,BT:BYTE
0098 ON ERROR GOTO 10
009E (* show that we are busy
00B6 RUN gfx2("gcset",202,4)
00C9 (* let's start at the first buffer
00EB Count:=0
00F2 RUN gfx2("color",1)
0102 (* get the icon directory open
0120 OPEN #path,MS.Dname:READ+DIR
012F RUN gfx2("curxy",18,1)
0142 (* if it opened let's say what we are doing
016D PRINT USING "s30^","Loading "+MS.Dname
0188 RUN gfx2("propsw","off")
019C WHILE NOT (EOF(#path)) DO
01A7 (* move the count up one
01BF Count:=Count+1
01CA (* get name from directory
01E4 GET #path,temp(Count)
01F2 (* go get another one if not at end
0215 ENDWHILE
0219 CLOSE #path
021F (* skip the first 64 bytes
0239 FOR xx:=3 TO Count
024C (* is the first byte a char
0267 IF ASC(LEFT$(temp(xx),1))>31 THEN
027B (* yes so clear the temp name
0298 Tname:=""
029F (* now read the bytes
02B4 FOR x:=1 TO 32
02C6 (* one by one and short them out
02E6 BT:=ASC(MID$(temp(xx),x,1))
02FA (* is it a large letter
0311 IF BT>64 AND BT<96 THEN
0324 (* yes make it small
0338 BT:=BT+32
0343 ENDIF
0345 (* stop if not a valid char
0360 EXITIF BT>127 THEN
036C (* then LAND it
037B BT:=LAND(BT,127)
0386 (* add the char to the name
03A1 Tname:=Tname+CHR$(BT)
03AE (* move the buffer up one
03C7 MS.Number:=MS.Number+1
03D9 (* add the name to the list
03F4 MS.Iname(MS.Number):=Tname
0406 ENDEXIT
040A (* or exit if byte -0
041F EXITIF BT=0 THEN
042B (* and move the buffer up one
0448 MS.Number:=MS.Number+1
045A (* and add the name to the list
0479 MS.Iname(MS.Number):=Tname
048B ENDEXIT
048F (* where still going so add char to name and go get another char
04CF Tname:=Tname+CHR$(BT)
04DC NEXT x
04E7 (* we got a full name so let't get the icon
0512 OPEN #path,MS.Dname+"/"+MS.Iname(MS.Number)
0530 (* point to the buffer to put it in
0553 RUN gfx2("gpload",MS.GrpID,MS.Number,6,24,24,144)
057D (* now read the bytes to put in it
059F FOR x:=1 TO 144
05B1 GET #path,BT
05BB PUT #MS.GrpID,BT
05C8 NEXT x
05D3 CLOSE #path
05D9 ENDF
05DB (* well let's see if we can do that agin
0603 NEXT xx
060E (* all done
0619 (* so let's show the name of the directory
0643 RUN gfx2("propsw","on")
0656 RUN gfx2("color",1,0)
0669 RUN gfx2("curxy",18,1)
067C PRINT USING "s30^",MS.Dname
068C RUN showdir(dr,MS)
069B END
069D 10 MS.ErrNum:=ERR
06AA (* report any errors
06BE RUN errmsg(MS.ErrNum)

```


Listing 7: winset

```

PROCEDURE winset
0000  (* till windint the type of window we want
002B  TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
0050  DIM regs:registers
0059  DIM callcode,ErrNum:BYTE
0064  PARAM wtyp:INTEGER
006B  ON ERROR GOTO 10
0071  regs.a:=0
007C  regs.b:=$86
0088  regs.y:=wtyp
0094  callcode:=$8E
009C  RUN syscall(callcode,regs)
00AB  END
00AD 10 ErrNum:=ERR
00B6  RUN ermsg(ErrNum)
00C0  END

```

Listing 8: mouser

```

PROCEDURE mouser
0000  TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
0025  DIM regs:registers
002E  DIM path,callcode,ErrNum:BYTE
003D  DIM RatPack(32):BYTE
0049  PARAM horiz,vert:INTEGER
0054  PARAM button:BYTE
005B  ON ERROR GOTO 10
0061  (* get mouse info
0072  regs.a:=0
007D  regs.b:=$89
0089  regs.x:=ADDR(RatPack)
0097  regs.y:=0
00A2  callcode:=$8D
00AA  RUN syscall(callcode,regs)
00B9  (* set horiz for actual then adjust
00DC  horiz:=RatPack(25)*255+RatPack(26)+horiz/16
00F6  (* set vert for relative
010E  vert:=192*(RatPack(31)*255+RatPack(32))/172
0127  (* get button info
0139  button:=RatPack(9)
0143  END
0145 10 ErrNum:=ERR
014E  RUN ermsg(ErrNum)
0158  END

```

Listing 9: loadicon

```

PROCEDURE loadicon
0000  TYPE Mic=Name:STRING; select:BYTE; xpos,ypos:INTEGER
001B  TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpID,BufNo,number
,MenuSel,MenuNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0064  PARAM MS:MicSys
006D  PARAM Dr,Ic:Mic
007A  DIM x,count:INTEGER
0085  DIM path:BYTE
008C  (* is there a dir name selected
00AB  IF Dr.Name="" THEN
00BA  (* no so use editor name
00D2  Dr.Name:=Ic.Name
00E1  IF Ic.Name="" THEN
00F0  (* but no editor name ether so end
0112  END
0114  ENDIF
0116  ENDIF
0118  BASE 0
011A  (* show the disk is busy
0132  RUN gfx2("gcset",202,4)
0145  (* turn off logic
0156  RUN gfx2("logic","off")
0169  ON ERROR GOTO 10
016F  (* open the icon path
0184  OPEN #path,MS.Dname+"/"+Dr.Name
019C  (* found it so tranfer the name to the editor
01C9  Ic.Name:=Dr.Name
01D6  RUN gfx2("gupload",MS.GrpID,49,6,24,24,144)
01FD  FOR x:=0 TO 143
020D  GET #path,MS.by(x)
021E  PUT #MS.GrpID,MS.by(x)
0232  NEXT x
023D  CLOSE #path
0243  (* place it in the update window
0263  RUN gfx2("put",MS.GrpID,49,26,13)
027F  (* blank out the editor first

```



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Please do not submit material currently submitted to another publication.

```
029C    RUN loadbar(Ic.Name)
02A9    (* now fill it with the icon
02C5    RUN showicon(MS.byf)
02D2    END
02D4 10 MS.ErrNum:=ERR
02F1    (* report the error
02F4    RUN errmsg(MS.ErrNum)
0301    END
```

Listing 10: getfile

```
PROCEDURE getfile
0000    TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
001B    TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpId,BufNo,number
        ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0064    PARAM MS:MicSys
006D    PARAM Dr,Ic:Mic
007A    DIM button:BYTE
0081    ON ERROR GOTO 10
0087    (* clear the select pos
009E    RUN gfx2("put",MS.GrpId,50,Dr.xpos,Dr.ypos)
00C4    (* put it in update window
00DE    RUN gfx2("put",MS.GrpId,50,26,13)
00FA    REPEAT
00FC        IF MS.horiz>5 AND MS.horiz<255 AND MS.vert>40 AND MS.vert
            <185 THEN
0129            (* use open pointer
013C            RUN gfx2("gcset",MS.GrpId,52)
0154            (* put in update window
016B            RUN gfx2("put",MS.GrpId,Dr.select,26,13)
018C        ELSE
0190            IF MS.horiz>60 AND MS.horiz<130 AND MS.vert<30 THEN
01B3                (* use kill pointer
01C6                RUN gfx2("gcset",MS.GrpId,54)
01DE            ELSE
01E2                (* use selected as pointer
01FC                RUN gfx2("put",MS.GrpId,50,26,13)
0218                RUN gfx2("gcset",MS.GrpId,Dr.select)
0235            ENDIF
0237        ENDIF
0239        RUN mouset(MS.horiz,MS.vert,button)
0253    UNTIL button<>0
025E    RUN gfx2("put",MS.GrpId,Dr.select,Dr.xpos,Dr.ypos)
0289    RUN gfx2("put",MS.GrpId,49,26,13)
02A5    IF MS.horiz>5 AND MS.horiz<255 AND MS.vert>40 AND MS.vert<185
        THEN
02D2        (* we selected to open it
02EB        MS.BufNo:=Dr.select
02FA        RUN loadicon(MS,Dr,Ic)
030E    ENDIF
0310    IF MS.horiz>60 AND MS.horiz<130 AND MS.vert<30 THEN
0333        (* we selected to kill it
034C        SHELL "del "+MS.Dname+"/"+Dr.name
0366        MS.Iname(Dr.select):="icon.XXXX"
0380        (* now let's see what the dir looks like
03A8        RUN showdir(MS,Dr)
03B7    ENDIF
03B9    END
03BB 10 MS.ErrNum:=ERR
03C8    RUN errmsg(MS.ErrNum)
03D5    END
```

Listing 11: getkey

```
PROCEDURE getkey
0000    (* something like mouset but add the keyboard
002D    PARAM key:STRING[1]
0039    PARAM horiz,vert:INTEGER
0044    TYPE registers=dp,a,b,cc:BYTE; x,y,u:INTEGER
0069    DIM regs:registers
0072    DIM RatPack(32):BYTE
007E    (* set the key's to nothing
0099    key:=""
00A0    REPEAT
00A2        regs.a:=0
00AD        regs.b:=$89
00B9        regs.x:=ADDR(RatPack)
00C7        regs.y:=0
00D2    RUN syscall($8D,regs)
00E0    (* check the keyboard
00F5    RUN inkey(key)
00FF    horiz:=RatPack(25)*255+RatPack(26)+horiz/17
0119    vert:=192*(RatPack(31)*255+RatPack(32))/176
0132    IF RatPack(9)<>0 THEN
0140        (* button used so change the key to something
016D        key:=""
0175    ENDIF
0177    UNTIL key<>""
```


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Your First BASIC Program

By William Barden, Jr.
Rainbow Contributing Editor

Maybe you've muddled through some one-liners in the pages of THE RAINBOW, or even tied together a program of ten lines or so. Where do you go from here? How do you actually go about constructing a BASIC program of hundreds of lines? What's the structure of the program? How many subroutines should you use? What about line numbers? What variable names should be used? In this article I'll try to answer some of those questions.

I assume you're using DECB, Disk Extended Color BASIC. Many of the tips I mention here also apply to Extended Color BASIC on cassette systems as well. However, most won't apply to BASIC09, the BASIC used in OS-9. Although I use an example of a mailing list program, all of the steps apply equally well to other programs.

Step 1: The Zen of Programming

Before you even begin, prepare yourself mentally. It's tough initially, but the more you do it, the easier it becomes. If you think you're not cut out for programming because you're blundering through and redoing the program dozens of times, welcome to the club! What you see in the pages of RAINBOW is the final result of people who have blundered through a program dozens of times (and I certainly include myself in that category). Another truism: There are an infinite number of ways to write a program, not just one.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

Step 2: Know What You Want To Do

Really think through what you want to accomplish and how to go about it. Maybe the idea isn't even workable. If you have a thousand names in a mailing list and each name is 100 characters long, it's going to be very difficult to process 100,000 characters in 64K of memory. If you want to write a simulated car race game to compete with the ones at the arcades that show buildings, scenery and crashes (with instant replays), you're not going to be able to do it on the CoCo or any other popular system — they're simply too slow.

The catch here is that often you don't know what's possible until you have some experience in BASIC programming. With a few programs under your belt, it's much easier to get an idea of what's achievable and what isn't. However, spend a great deal of time thinking through your project.

For our example, assume you're writing a mailing list program that handles up to

250 members in a club. Each member is allowed a 64-character address. You are able to add, delete and modify names, display, and print the list. The list is in alphabetical order by last name. A typical entry is shown in Figure 1.

Step 3: Write Down the Screen Displays and Menus

Once you have a good idea of what you're going to do and what you want to accomplish, write down all the "goes-into" and "goes-outas." What data goes into the program? What data comes out of the program? What does the data look like — how many characters are allowed? What kind of characters? What is the format of screen displays? Where are they located on the screen? Will there be text and graphics or just text?

Believe it or not, drawing up every screen display and showing the format and screen position saves you a great deal of work in

Figure 1: Sample Entry for Mailing List Program

```
Barden, William      P.O. Box 3568      Mission Viejo, CA 92692
0123456789012345678901234567890123456789012345678901234
```

Figure 2: Typical Screen Display for Mailing List Program

```
*****Insert Name*****

Last name:
First name(s):
Street Address:
City:
State:
ZIP:

***You have exceeded 64 characters. Please reenter***
```


programming — more than enough to compensate for the time in planning.

A typical screen display for our mailing list program is shown in Figure 2.

Step 4: Throw Away the Flowcharts

In case you're not familiar with the term, *flowcharts* use symbols such as boxes, diamonds and circles to show the flow of a program. It's a planning step. In the old days, books stressed that a flowchart should always be used to plan a program. I've included that idea in some of my books. However, as a programmer I never flowcharted until after the program was written. And I wasn't alone. Flowcharts are too cumbersome to use and never anticipate the problems that arise in programs.

Instead of flowcharts, write an *algorithm*, a broad sequence of operations in plain English describing how a program flows. A more detailed version of this is known as "pseudo-code," but you don't actually have to use any BASIC commands in pseudo-code. An algorithm for the mailing list program is shown in Figure 3.

You can see that it is not too detailed but gives a good general idea of how the program works. Include any loops by drawing lines. This type of programming aid gives the overall program structure — you can see how things may break down into several functions: Main Menu, Initialize, Insert, Delete, Modify, Display, Print and End. Not shown are all the lower-level functions that answer questions such as: How do I insert in the list itself? What does the list look like? Is it an array of items? It looks as if I need to keep it sorted — what kind of sort routine should I use?

You can now answer most of these unresolved questions by giving some further thought to the lower-level functions and the structure of the actual mailing list. As an example, assume the mailing list is held in a string array kept in alphabetical order by last name. Insertions are handled by rewriting the array to a second array, inserting the new name at the proper point. Deletions are handled by clearing an array entry with a special string, such as "*****," until the next insert, at which time the entry is completely deleted. Modifying the list deletes the old entry and inserts the new entry by rewriting to the second array.

Step 5: Make a List of Subroutines

Once you have a rough idea of the program flow, you can scan it to see what kind of subroutines you need. You don't have to use subroutines — you can simply write the program as one huge mass straight through. A lot of code has been written this way. However, subroutines are easier to debug,

saving you a lot of time. Subroutines also add modularity to the program. You'll probably be able to reuse a subroutine for something else — for example, a subroutine to search a list can be used in many different programs.

Figure 3: Algorithm for Mailing List Program

```
Initialize everything
Title message — wait five seconds
Display main menu
Read in user choice, Initialize, Insert, Delete, Modify,
    Display, Print, or End — check if valid
Branch out to menu choice
Initialize:
    Clear array, reset pointers
    Read in user-specified file or start new file
    Return
Insert:
    Display insert menu
    Read in fields
    Check for < 64 characters, error message if not
    Add to list
    Return
Delete:
    Display delete menu
    Read in name for delete
    Search list for name, display if found, error if not
    Ask delete, Y/N
    Delete if Y, return to main menu if no
    Return
Modify:
    Display modify menu
    Read in last name for modify
    Search list for name, display if found, error if not
    Read in fields to modify
    Delete old entry from list, insert new entry
    Return
Display:
    End? If so return ←
    Display next group
    Ask for keypress
Print:
    End? If so return ←
    Display next group
    Ask for keypress
End:
    Write out file to disk
```

Each subroutine should perform a useful function. It can call other subroutines within it. You should list the variables being used to pass parameters to the subroutine and what parameters come out of the subroutine as well. Figure 4 shows a sample list for this example.

Step 6: Write the Subroutines or the Main Code?

Programmers are divided on which of these actions to take first. Once you've reached this point, you have a pretty good idea of the structure of the program, the number of main functions, the number of subroutines, and what they accomplish. You can now write the subroutines starting at the bottom, or you can write the main

code starting from the top — it's a matter of personal preference. I use a combination of the two since there are bound to be additional questions that come up to redefine things.

It's completely possible that questions come up which cause you to redesign portions of the program. For example, what if you had planned to sort a string array of 250 entries for the mailing list by moving strings within a single array. Every insert for a large list might mean seconds of waiting time.

If you're writing the main code, include all the parameters you're passing to the subroutine just as if it exists. Assign a line number for the subroutine that's easy to remember and jot it down. (Not having labels for subroutines in BASIC is something we must live with.) An example is:

```
1000 ' Search for name - error m
    essage if not found
1010 ZA$=RE$: GOSUB 10000
1020 IF ZE<>-1 THEN GOTO 1500
1030 ZA$="Name not found": GOSUB
    11000
```

Step 7: Desk Check

In the old days there was a great deal of "desk checking." Programmers pored over code, making certain all their zeroes were slashed and looking for logical errors in their programs. Of course they didn't have their own computers on which to debug — they had to wait in line for expensive hardware. These days it's not as important to desk check your code over and over again. When you have completed your coding, get a good listing and save the program on disk, together with a backup version (call it `PROGAM.BAK` or similar). Now go over the listing to answer these questions:

- Does the program generally follow the flow as written down previously?
- Are there any `GOSUBs` to lines that don't exist?
- Are all parameters set up before a `GOSUB`?
- Does every subroutine have a return?
- Are variables with the same name used in different places, causing them to be overwritten?
- Can you find any logical errors?

A rule of thumb: Desk check until you find the last error. Then desk check again, and if no more errors are found, the program is ready for debugging on the CoCo.

Step 8: Debug

Debugging is the hardest part of developing a program. For a larger program you discover situations you never thought of while designing it — situations that cause you to beat your head in despair. There's a

good chance you'll have to add or modify code during the first stages of debugging. If so, give the new code a cursory desk check from a fresh listing (and save the new program with a backup).

Remember that BASIC shines in debugging. Use the interactive ability of BASIC to put in STOP commands at different points in the program to examine the contents of variables, arrays and strings. You can also insert PRINT statements to print variables or other data as the program executes.

When the program appears to be working well, you're only at the half-way point in debugging. At this point generate some test data to complete the process. For our mailing list example, you actually want to generate a mailing list of several hundred names. It's a lot of work but if you don't do this, I almost guarantee you'll run into unanticipated problems later on — things like Out Of Memory errors, array subscripts too large, execution speed too slow and the like. You might want to consider writing a second program just to generate dummy data. In our mailing list example, a short program can easily produce a disk file with dummy names such as:

```
Barden, William P.O. Box 3568 Mission
Viejo, CA 92692
Bbrden, William P.O. Box 3568 Mission
Viejo, CA 92692
Bcrden, William P.O. Box 3568 Mission
Viejo, CA 92692
Bdrden, William P.O. Box 3568 Mission
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Berden, William P.O. Box 3568 Mission
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Viejo, CA 92692
Bhrden, William P.O. Box 3568 Mission
Viejo, CA 92692
Carden, William P.O. Box 3568 Mission
Viejo, CA 92692
Cbrden, William P.O. Box 3568 Mission
Viejo, CA 92692
```

Step 9: Wrap It Up

After wringing out the program as well as you can, save the final version on disk, both in a master file and a backup file. Delete any previous versions so you won't be confused and start using an older version that has not been fully debugged. Get a final listing and file one copy away as a master copy to match the file on disk.

Line Numbering

There are no hard and fast rules about line numbering. During debugging you are inserting and deleting many lines and using the RENUM command to get "gaps" so you can add new lines. Once the program is

debugged, consider renumbering from the front back, using increments of 10 and starting at 100. You can then renumber

Figure 4: Sample for Typical Subroutine

```
Display menu on screen subroutine
Read input line and count characters
Clear Error message on Screen
Display error message on screen and wait for keypress
Search array for name
Rewrite array for insert
Delete entry in array
Display list
Print list
Read from disk file
Write to disk file
```

A sample definition for a subroutine is:

```
Search Array for Name Subroutine
Inputs:  ZAS=name for search, e.g., "Barden, William"
Outputs: ZE=-1 if not found, otherwise # of entry, 1-250
        ZAS=unchanged
```

major subroutines or blocks in convenient line numbers by using the BASIC RENUM *new,old,increment* format. For example, the menu functions of Initialize, Insert, Delete, etc., in our mailing list example can be renumbered in blocks of 10000, 11000, 12000, etc., to correspond with the menu item number.

Comments

It's important to use comments profusely in a language such as BASIC, which doesn't have much structure. Use both beginning comment lines:

```
2000 ' Subroutine to make a string
    all uppercase
```

and comments at the end of lines:

```
7560 ZAS=RES: GOSUB 2000 ' write
    out the new list
```

When you have a final version of the program (if there is such a thing), delete all comment lines for compactness, providing there are no subroutine calls to comment lines (GOSUB 2000 for the above code causes an error if the lines are deleted). You can even save the comment lines to add back in the program by a MERGE, providing neither the saved program without comment lines nor the saved comment lines have been renumbered.

However, if too many comments are used, the program becomes cluttered and hard to read, not to mention using up a great deal of memory. There's a fine line here. I favor several comment lines at the beginning of each subroutine (showing what goes in and comes out) and a comment line

before major actions in the main program (perhaps a comment line every dozen BASIC lines or so).

Here's a program to strip comment lines from program files saved with the ,A (ASCII) option:

```
100 INPUT "BASIC PROGRAM FILE NAME:", SF$
110 INPUT "SHORT BASIC FILE NAME:", DF$
120 OPEN SF$ FOR INPUT AS #1
130 OPEN DF$ FOR OUTPUT AS #2
140 IF EOF( 1 ) THEN GOTO 190
150 LINE INPUT#1, A$
160 IF LEFT$( A$, 1 ) = "'" THEN
    GOTO 180
170 PRINT#2, A$
180 GOTO 140
190 CLOSE
```

Change Line 160 to:

```
160 IF LEFT$( A$, 1 ) <> "'" THEN
    GOTO 180
```

to create a file made up only of comment lines.

Subroutines vs. Main Line Code

The main portion of the program ideally is made up of many GOSUBS with not much code in between. This makes for a very structured, easy-to-read program. The program listing looks nicer if the main code is placed at the beginning. However, commonly called subroutines are found faster if they are put directly at the beginning of the program. You may want to do this if you're trying to crank out the absolute fastest speed from your program.

Here's a short example to illustrate what I mean — it doesn't do anything except loop 1000 times, calling a subroutine to set J=1.

```
100 J=1
110 RETURN
1000 FOR I=1 TO 1000
1010 GOSUB 100
1020 NEXT
```

If the subroutine is placed at the end of the program and there is intervening code:

```
1000 FOR I=1 TO 1000
1010 GOSUB 2000
1020 NEXT
1030 END
1040 '
1050 '
1060 '
1070 '
1080 '
1090 '
1100 '
2000 J=1
2010 RETURN
```


Execution takes 8.54 seconds, about seven percent longer. This effect is even more significant for long programs with subroutines towards the end. The reason for the increased execution time is that the BASIC interpreter must search through all the lines from the beginning of the program to find the subroutine.

There's really no limit to the number of subroutines that can be used, other than a practical memory limit. However, you probably don't want to use more than three or four levels of subroutines — using more makes the program hard to comprehend, and you run the risk of using the same variable names.

Multiple-Statement Lines

You can add as many statements as you can cram into a line. This is efficient in terms of speed and memory storage. However, you might want to break up the code into individual lines, using multiple statement lines only for subroutine calls or tight loops such as:

```
1000 FOR I=1 TO 100: A(I)=0: NEXT
1010 ZA$="*****": GOSUB 10000
```

Blanks Within Lines

If you have a CoCo 3, use the 80-column width mode for writing your code — the 32-column limitation is just at odds with anything readable. Adding blanks really helps in the readability of lines and is not that much less efficient in speed (adding maybe two percent or less). Which is more readable?

```
200 IFX=-1THENGOTO231ELSEPRINT@
Y*32+X,"O":A(Y*20+X)=I
```

or

```
200 IF X= -1 THEN GOTO 231 ELSE
PRINT@ Y*32+X, "O": A(Y*20+X)= I
```

Variable Names

Unfortunately CoCo BASIC does not allow the flexibility of more than two-character variable names. The following code prints 200 200:

```
100 ANSWER = 100
110 AN = 200
120 PRINT ANSWER, AN
```

You can use `ACCOUNTS` and `ACCTPAY`, but since they are treated as the same name (AC), you have a debugging problem on your hands. One convention I use is to name all variables used in subroutines with the prefix letter Z — `ZA`, `ZB`, `ZC$`, etc. However, it's easy to run out of variables this way.

To keep all variables straight, use what's called a *data dictionary*. This is a table at

the beginning of the program that lists every variable name with its function in alphabetized order:

```
101 ' DATA DICTIONARY
102 ' A$( ) = ARRAY OF 250 ELEMEN
TS HOLDING LIST NAMES
103 ' ACTIVE = CURRENTLY ACTIVE
LIST ENTRY
104 ' I, J, K = WORKING VARIABLE
S, USED MANY PLACES
.
.
121 ' ZA$ = INPUT TO DISPLAY MEN
U SUBROUTINE, HOLDS TITLE
122 ' ZB$ = INPUT TO DISPLAY MEN
U SUBROUTINE, HOLDS ITEM 1
123 ' ZC$ = INPUT TO DISPLAY MEN
U SUBROUTINE, HOLDS ITEM 2
.
.
```

This table is extremely helpful in coding the program and in debugging. It eliminates duplicate names used in different functions and for different purposes. Variables `I`, `J`, `K`, `L`, `M` and `N` are commonly used for "loop control variables" to keep track of a count through a loop.

Using NEXT

Use `NEXT` by itself rather than with a variable name. This program:

```
100 A=0: B=0: C=0: D=0: E=0: F=0
110 FOR I = 1 TO 1000
120 FOR J = 1 TO 10
130 NEXT J
140 NEXT I
```

executes in about 32 seconds as it stands, but in about 26 seconds (a 20-percent improvement) when lines 130 and 140 read:

```
130 NEXT
140 NEXT
```

BASIC does not have to search for the variables in the latter case. Of course the readability of the program is decreased.

Arithmetic Computation

This program:

```
100 FOR I=1 TO 500
110 J=I^2
120 NEXT I
```

computes the square of `I` for `I=1, 2, 3`, etc. In doing so it uses exponentiation, a time-consuming algorithm. The program takes 30.85 seconds. If a multiply is used in place of the exponentiation, the program takes 3.33 seconds:

```
100 FOR I=1 TO 500
110 J=I*I
120 NEXT I
```

Although the difference between multiplication and division is not as extreme, multiplication problems are generally faster than division problems by about 15 percent. In place of `A=B/5`, you might use `A=B*0.2`, for example.

Use Step-Wise Debugging

When debugging, make certain the lower-level portions of the program are working first. It's hard to debug mainline code that calls one subroutine which calls another subroutine when the bottom subroutine is bad. Use a combination of bottom-up and top-down debugging. Some programmers exhaustively check out the lower-level code first and work their way up. This is tedious but effective.

The same approach can be used in proceeding sequentially through a program. Stop at a certain point and use the `PRINT` statement to print out variables and arrays to make certain data is what it should be. Variable and array data is not reset until you edit the program in some way, so it's easy to stop and then perform a statement such as:

```
FOR I=1 TO 50: PRINT N(I),: NEXT
```

which immediately prints the contents of `Array N` on the screen so you can check it for accuracy.

`TRON` (TRace ON) is fine in theory, but who wants to wade through 32,000 iterations of a loop with line numbers filling up the screen? Use tracing sparingly; a few `STOPS` in the right places can probably find the problem faster than `TRON`.

Avoid Moving Large Data Blocks

Nothing slows down a program more than moving around hundreds of strings, so try to avoid such large data movements. Learn about such data structures as linked lists, which change only a pointer to the next element in the list to insert and delete items, and pointers, which point to an entry number in an array. For example, in the mailing list program, an alternative approach to alphabetizing data is to keep the entries in a string array with a list of pointers to the array — 2, 34, 205, 4, 6, etc. The pointers are then shuffled around to order the list. It's much more efficient to move integer data than to move large strings to reorder lists.

Remember, there's never a wrong way to write a program as long as it works for you and accomplishes your goals. Improve your techniques as you go along, but get in there and use the power of BASIC in the CoCo. There's an infinite number of applications just waiting to be run.

See you next month with more CoCo topics.

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

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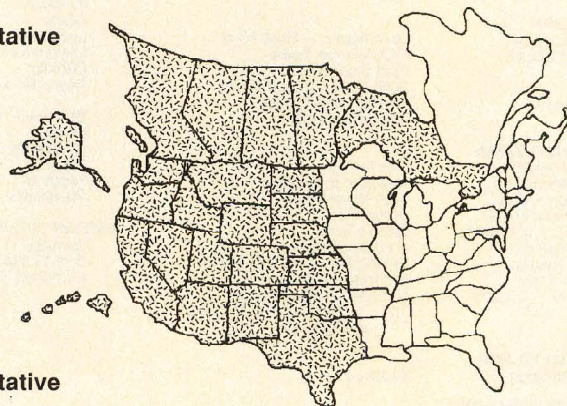
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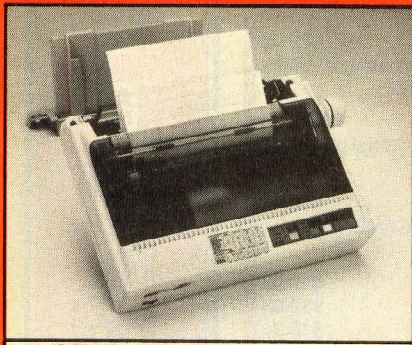
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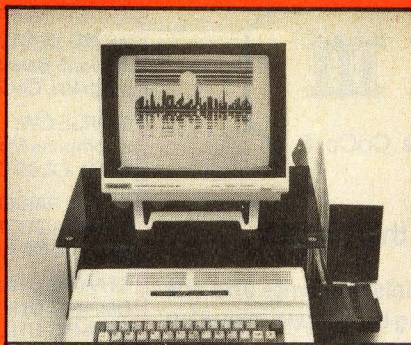
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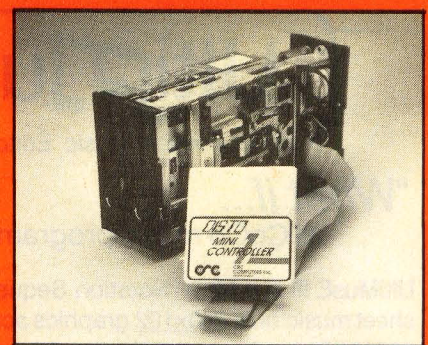
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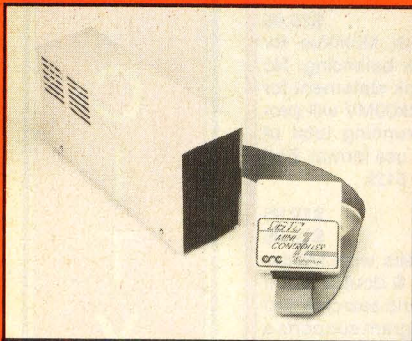
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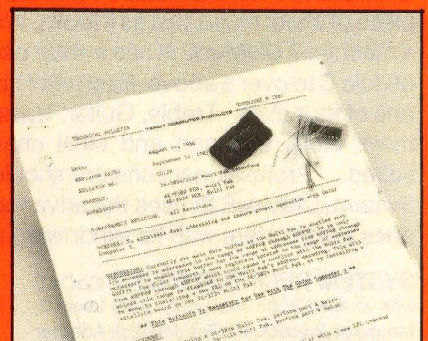
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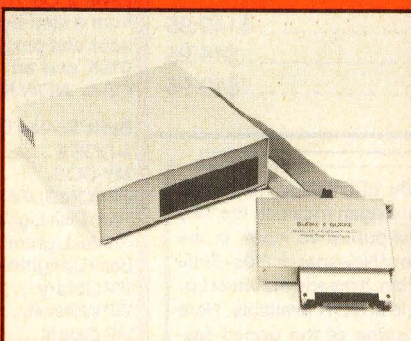
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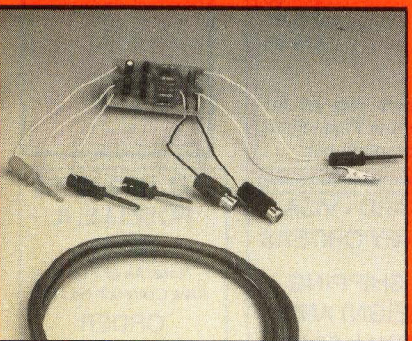
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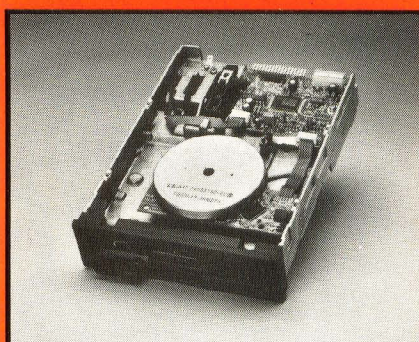
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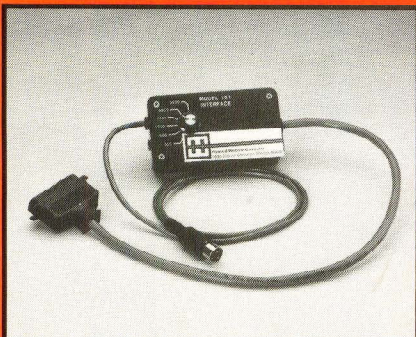
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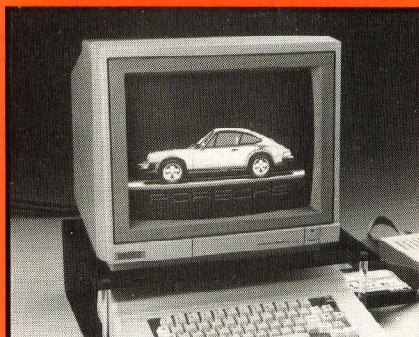


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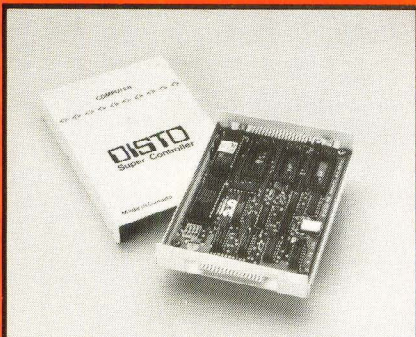
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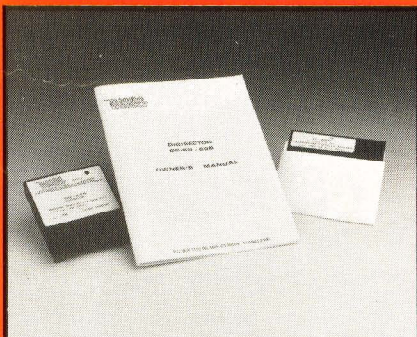
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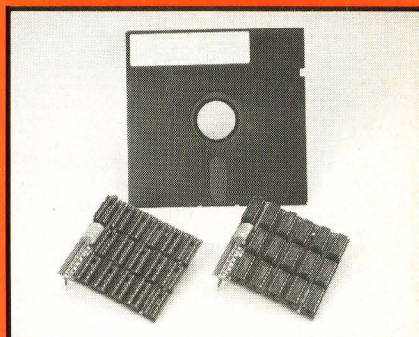
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