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October 1989

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RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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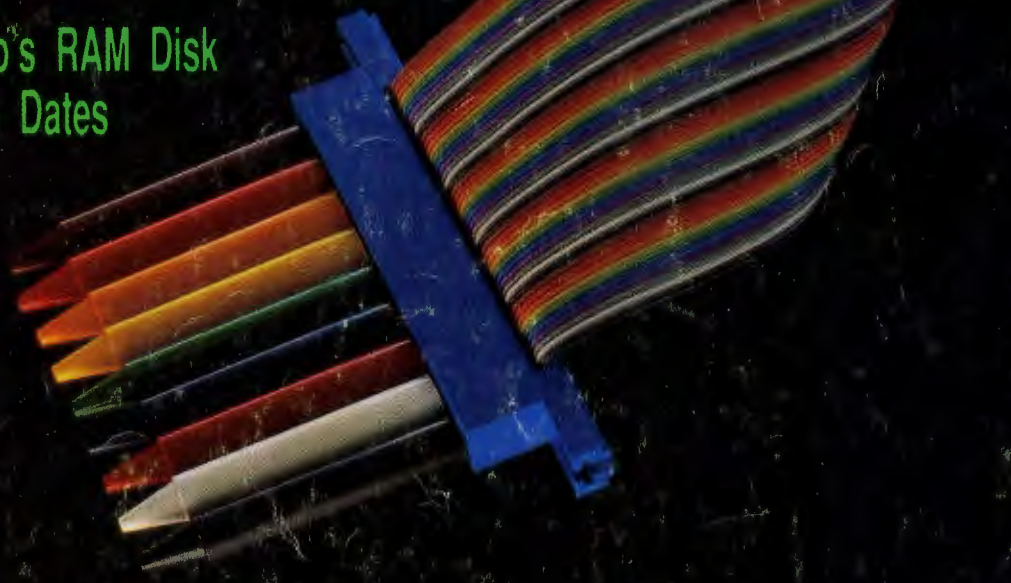

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SUNDOG SYSTEMS

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Sundog Systems proudly presents the first 512K arcade game available for your CoCo III! If you don't have 512K, you will want to get it just for this game! The evil Sinistaars have invaded the galaxy and it falls to you to destroy them. These fiends will attempt to hold you with a constant barrage of drone ships while they muster their strength, and eventually find and obliterate you. Your mission is to mine the myriad asteroids in search of the precious ore which can be refined into sinibombs, your only weapon against the Sinistaars. Many surprises await as you advance through the increasingly difficult stages. Experience the fast-paced action of 512K packed with spectacular graphics, sound effects, and voices! Dozens of stages will keep you coming back for more. Req. 512K CoCo III and disk drive.

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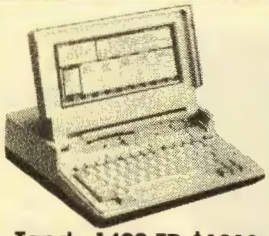

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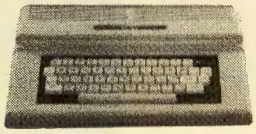

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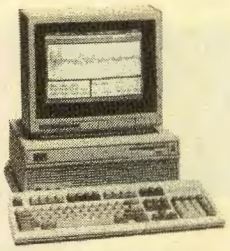

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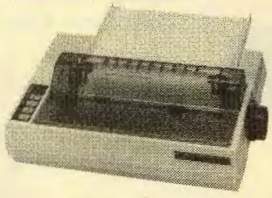

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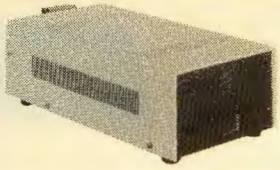

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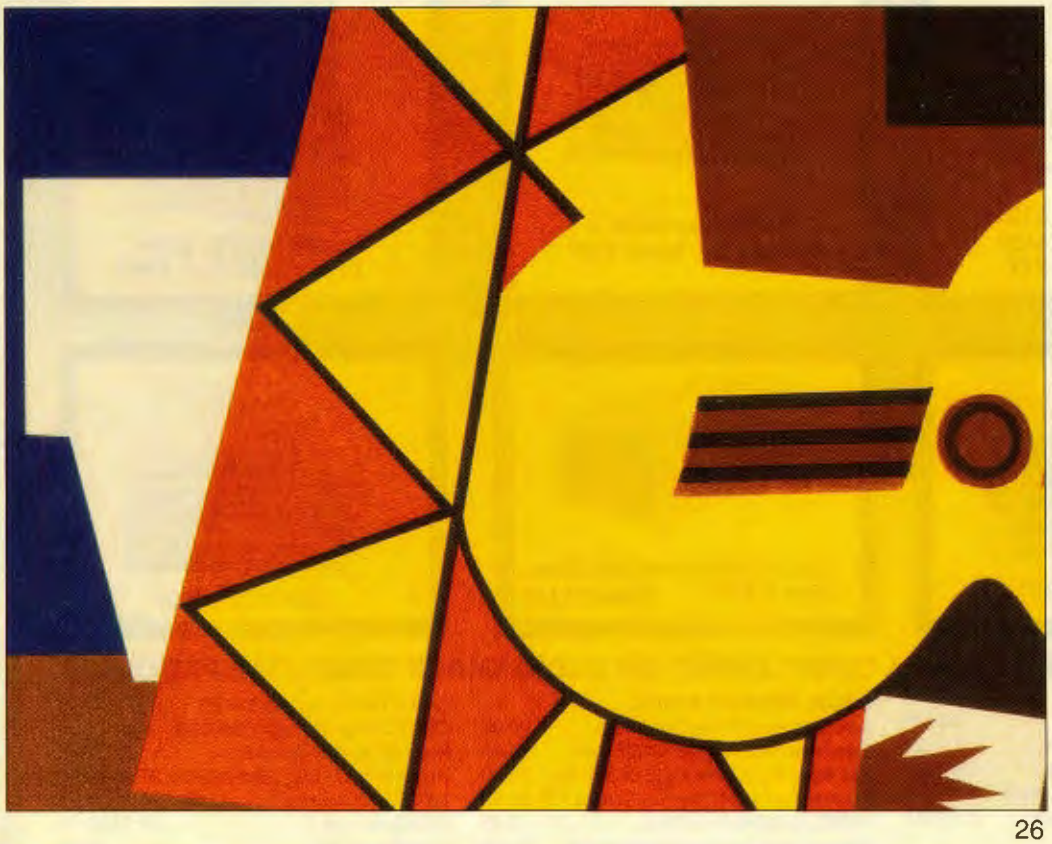

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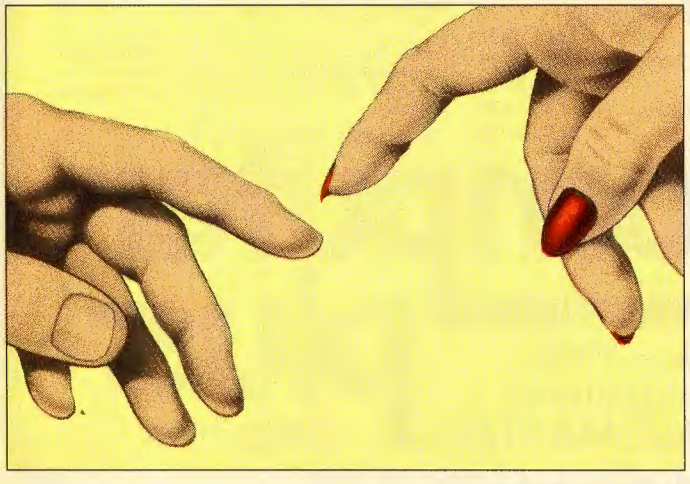

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Letters to the RAINBOW

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 Leithch 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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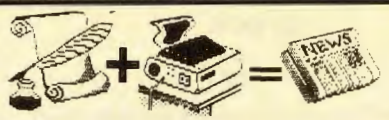

by Walter Bayer
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colors. Could you give me some tips and some possible sound effects for a good explosion?

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. Armburst
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 knowledge 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 gleaning 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 an 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.

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

MICROCOM SOFTWARE, 2900 Monroe Ave, Rochester,NY 14618

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 though 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

Programming Secrets Galore

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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COCO LIBRARY

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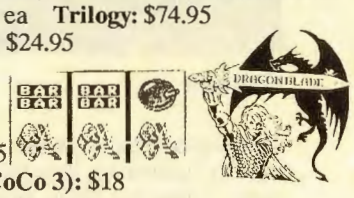

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UPS 2ND DAY AIR

CoCo Gallery

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.

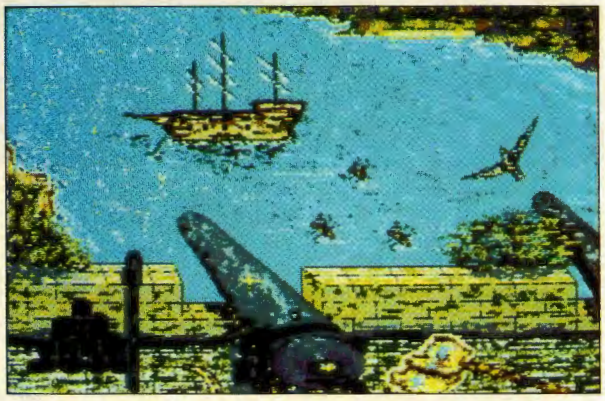
—Tony Olive, Curator

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.

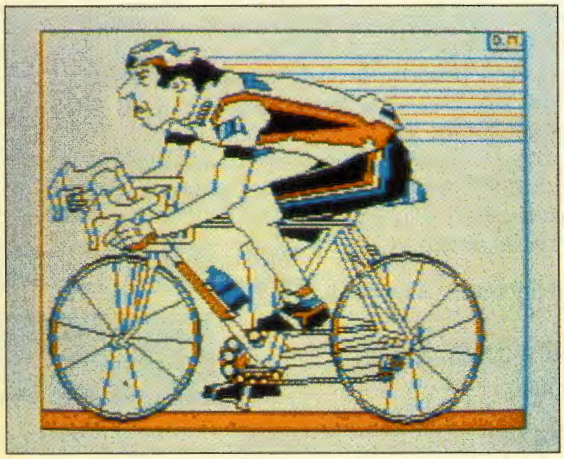
2nd Place



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.

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.

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

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Power-packed utilities with 15 useful commands such as sort, base conversion, lost file location, disk pack & much more. Only **$24.95**

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UPS 2ND DAY AIR

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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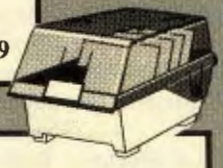

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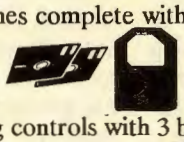

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UPS 2ND DAY AIR

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 idiosyncracy 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.

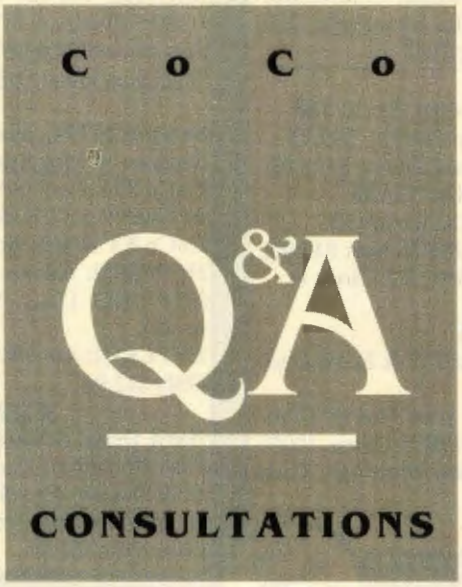
Texan Connection

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).

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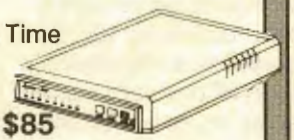

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UPS 2ND DAY AIR

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 recieve, 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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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

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

PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX 10,NX-1000 DMP100,105,106,110,120,130,200; OKI 62A,182,192; CGP 220(B&W)

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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, nonviolent 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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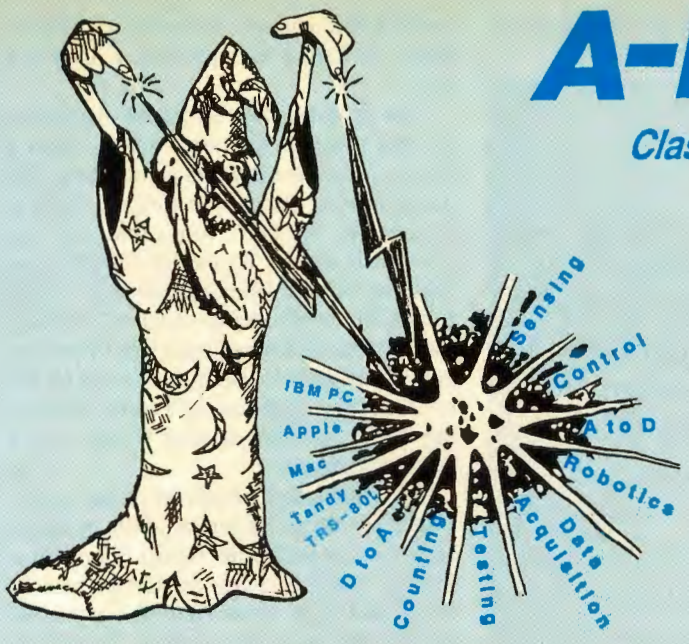

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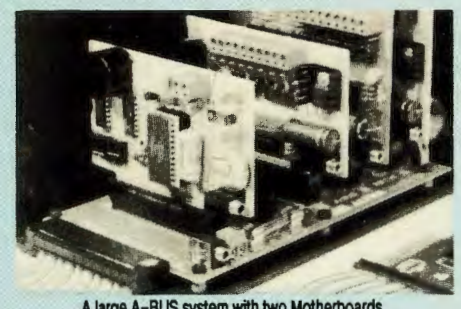

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TRS-80 Model 3,4,4D Y-Cable available if 50 pin bus is used. AR-132: $54
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the game screen with the letters at the top. Part 4 (lines 670 through 810) is the actual game routine. The fifth part (lines 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.

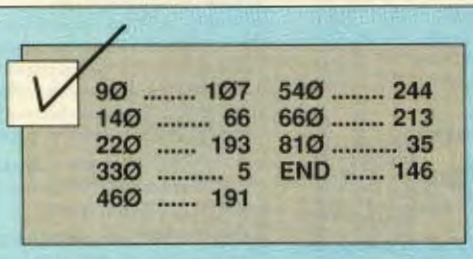
In order to use HGET, the HBUFF (Line 30) must appear at the start of the program. The first number following HBUFF identifies the buffer, and the second number identifies the amount of memory needed. I confess, the method given in the instruction manual for calculating the second number seemed awkward.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



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:PALETTEX,63:NEXT:C
LS:PALETTE13,0:PALETTE0,0:PALETT
E15,0
60 '*******CREATE TITLE*********
70 HSCREEN2:HCLS0:HCOLOR14:HPRIN
T(2,12),"Now presenting for your
 amusement..."
80 HDRAW "BM7,4;S4C15R3BLD4GLBR6
U3BU2UBR4BD2D4BU2E2RD4BU2E2RD4BR
6U5R2FGF2GL2BR7BU2R2U2L2D4R2BR4U
4D2E2RD4BR4U4BD2BUBDE2RD4BR4BU2R
2U2L2D4R2BR5U5BR5D5BL2BU3BL4BUBL
R9BD7BL62D5BR5U5BR5DF2D2L2U2E2UL
2BR13L2GD3FR2BR4R2U2L2D2BR6U3DER
BR4BUUD5BR5U3BU2UBR5
90 HDRAW "BD4R2U2L2D4R2BR4R2UH2U
R2BR7BD4U5ER3FD5BL2BU2BL3R4BR4BU
F3E3BR3BDBRR2U2L2D4R2BR4RBD3BL89
D6BU6R2FDGBLLBR5D3R2U4L3BR6D4R2U
4BR6L2D4R2U4D6L3BR6BU8D6BU3R3D3B
R3U6BD4E3G2F3BR3BU2R2U2L2D4R2BR4
BU2R2U2L2D4R2BR4BU4D7BU4R2U3L2BR
```

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M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

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```
9L3DF2DL3BR7BUU3
100 HDRAW "BU2UBRBF3BDR2U2L2D4R2
BR4RDGBR5BUBRBUU5RF5U5BR4F3G2E5B
D10BL89D5BR9L4E3U2L2GBR4BUBR5GD2
F2REU2L3BR8DF2RE2UH2LG2BR10BU2D5
110 HDRAW "BM254,4;S4C15RFRERFRE
RFRERFRERFRERFRERFRERFRERFRERFRE
RFRERFRERF2GDFDGDFDGDFDGDFDGDFDG
DFDGDFDGDFDGDFDGDFDGDFDG2LHLGLHL
GLHLGLHLGLHLGLHLGLHLGLHLGLHLGLHL
GLHLGLHLGH2UEUHUEUHUEUHUEUHUEUHU
EUHUEUHUEUHEUHUEUHUEUHEUBF5D33R3
9U34L39
120 HPAINT(260,10),15,15:HDRAW"C
0BF9D4L2GD4FR2
130 HDRAW "U4D6FDFRFDR3FR3ER2ERU
EU2EU5BD3REU3L2U2EU2H3LGLHUL4G2L
2GL2GBD3RE2R3E2F2RE2F5BD2BGBLBUB
LBHL3D4L2BU4BLL4BDBRRBR8RBDBG2BF
BR3G2LH2L5G2LH3BR7BD4BLRERF2BR5F
3R8BL20BH2BL2BGBLHGLDL6BLBR9RDF5
BR5RE6BUBL3BG4L5
140 FORDL=1TO600: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
E2BRBERERERERERERER2ER2ER2ER2ER3
ER6ER12FRFRF3D2FD2GDG2LGL3DL2DL3
GL14HL5HL5HL4HL2HL3HBHBL3BHL3HL2
HL2HLHLHLHL2HL2HL2HL2HLHLHLHLHLH
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;S4C6DGDGDGH
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;S4C11RFDFDF
3RFR2FR2ERERERE2UEG3L2GL2H3LHU2R
4ERERERUEUEU3H3L2GLGLGLG2DG4LG3BE
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
HL5U4BD4D5R8U2R2HNHBL4LBF3F5E5F2
E2H2GH2E3F6G3H2BH2GBF2G6L3D5BH10
BU3G8D2F4E2F2G2H2BE2H2E4D9BU7RER
EU3HLHL22D12FDF2RFR2FR5ER2E2
450 HDRAW "BM34,121;S4C8D8L8D5L2
U5RBDBRBD2R13U9D16R6U2LNL4U20
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
4HL5U4BD4D5R8U2R2HNHBL4LBF3F5E5F
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$="":PS=0
620 A$="ABCDEFGHIJKLMNOPQRSTUVWX
YZ"
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;O2;"+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
```

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 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-

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.

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*

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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Rupert Rythym

by Nickolas Marentes

Help Rupert infiltrate "Music Box Records" and collect all of his stolen notes which are scattered throughout the complex. Ride the crazy elevators and beware of the security robots on patrol.

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bash

NEW For CoCo 1, 2, 3

by Steve Bjork

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

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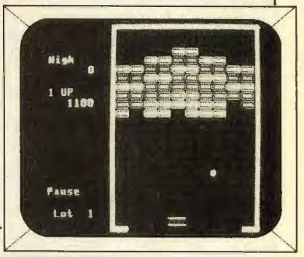

SPACE INTRUDERS

by Nickolas Marentes

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

MINE RESCUE

by Steve Bjork

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by Steve Bjork

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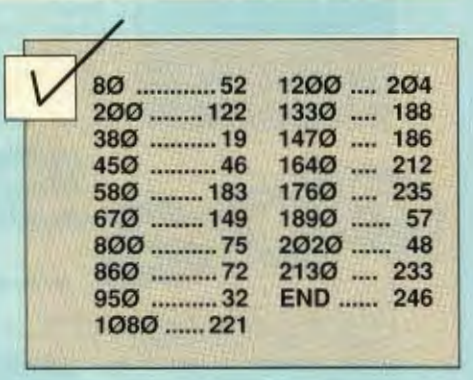
Editors Note: RAINBOW ON TAPE/DISK users will need to save both listings together on a separate disk before using Graphics Programmer. *Keep in mind, while DEMO is saved on this month's tape and disk in binary format, it will need to be saved in ASCII format before using.*



8Ø	52	12ØØ	2Ø4
2ØØ	122	133Ø	188
38Ø	19	147Ø	186
45Ø	46	164Ø	212
58Ø	183	176Ø	235
67Ø	149	189Ø	57
8ØØ	75	2Ø2Ø	48
86Ø	72	213Ø	233
95Ø	32	END	246
1Ø8Ø	221		

Listing 1: GRAPHPRO

```
Ø 'COPYRIGHT 1989  FALSOFT,INC
1 ' Graphics Pro.
2 ' By Michael J. Vandall
3 ' 2Ø985 Cindy Ct.
4 ' Poulsbo, WA 9837Ø
5 ' December 1986
6 '
7 '
8 ' * Initialization *
9 '
1Ø GOSUB 223Ø:HSCREEN 2:HBUFF 1,
2416:HBUFF 2,799:HBUFF 3,44:HGET
(Ø,Ø)-(3ØØ,15),1:HSCREENØ:PALETT
E RGB:CLEAR 2ØØØ:ON BRK GOTO 44Ø
2Ø LN=12Ø:V=96:H=16Ø:Z=1:DIMPL(1
5):WIDTH 4Ø
3Ø 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 7Ø:ELSE IF N
N$="?" THEN DIR:PRINT:GOTO 3Ø
4Ø NN$=LEFT$(NN$,8)+".DAT":OPEN
"O",#1,NN$
5Ø GOSUB 152Ø
6Ø PRINT#1,"11ØHSCREEN2:HCLSØ"
7Ø HSCREEN2:HCLSØ:IF FG=1 THEN G
OSUB 173Ø:GOSUB 63Ø:ELSE GOSUB 6
3Ø
77 '
78 ' * Main Inkey$ *
79 '
8Ø HGET(Ø,V-2)-(319,V+2),2
9Ø HDRAW"BM"+STR$(INT(H))+","+ST
R$(INT(V))+";C"+STR$(Z)+"ND2NU2N
L2NR2"
1ØØ C$=INKEY$:HPUT(Ø,V-2)-(319,V
+2),2:VC=V:HC=H
11Ø IF PEEK(341)=247 THEN V=V-1
12Ø IF PEEK(339)=191 AND PEEK(34
1)=247 THEN V=V-4
13Ø IF PEEK(342)=247 THEN V=V+1
14Ø IF PEEK(339)=191 AND PEEK(34
2)=247 THEN V=V+4
15Ø IF PEEK(343)=247 THEN H=H-1
16Ø IF PEEK(339)=191 AND PEEK(34
3)=247 THEN H=H-4
17Ø IF PEEK(344)=247 THEN H=H+1
18Ø IF PEEK(339)=191 AND PEEK(34
4)=247 THEN H=H+4
19Ø GOSUB 1Ø8Ø
197 '
198 ' * Cursor Subroutines *
199 '
2ØØ IF C$="" THEN 8Ø ELSE IF  C$
="*" THEN END
21Ø IF C$="S" AND FLG=1 THEN FLG
=Ø:RETURN
22Ø IF C$="F" AND FLG=2 THEN FLG
=Ø:RETURN
23Ø IF C$="X" AND FLG=3 THEN FLG
=Ø:RETURN
24Ø IF C$="E" AND FLG=4 THEN FLG
=Ø:RETURN
25Ø IF C$="I" AND FLG=5 THEN FLG
=Ø:RETURN
26Ø IF C$="M" AND FLG=6 THEN FLG
=Ø:RETURN
27Ø IF C$="M" AND FLG=7 THEN FLG
=Ø:RETURN
28Ø IF ASC(C$)=4 THEN GOSUB 164Ø
:ELSE IF ASC(C$)=189 AND TG<>1 T
HEN TG=1:GOSUB 1Ø8Ø:ELSE IF ASC(
C$)=189 AND TG=1 THEN TG=Ø:GOSUB
 113Ø
29Ø IF ASC(C$)=64 THEN RS=1:HPRI
NT(1,Ø),"REDRAW":PRINT #1,STR$(L
N)+"GOTO"+STR$(LN):CLOSE:GOSUB 1
37Ø:RS=Ø:GOSUB 113Ø:GOSUB 114Ø
3ØØ IF ASC(C$)=1Ø3 THEN HPRINT(1
,Ø),"ERASE LAST":GOSUB 115Ø:GOSU
B 113Ø
31Ø IF C$="L" THEN 4ØØ
32Ø IF C$="?" THEN GOSUB 171Ø
33Ø IF C$="C" THEN GOSUB 63Ø
34Ø IF C$="E" THEN 45Ø
35Ø IF C$="P" THEN 58Ø
36Ø IF C$="D" THEN 7ØØ
37Ø IF C$="T" THEN 93Ø
38Ø IF C$="Q" THEN HPRINT(1,Ø),"
REALLY WANT TO QUIT? (Y/N)":INPU
T Q$:IF Q$<>"Y" THEN GOSUB 113Ø:
GOTO 8Ø ELSE GOSUB1130:HPRINT(1,
Ø),"QUIT":PRINT#1,STR$(LN)+"GOTO
"+STR$(LN):CLOSE #1:HSCREENØ:CLS
:PALETTE RGB:GOTO 137Ø
39Ø GOTO 8Ø
397 '
398 ' * Line Command *
399 '
4ØØ HPRINT(1,Ø),"LINE: Mark Star
```

```
t <S>":FLG=1:GOSUB 8Ø:HSET(H,V,6
):V1=V:H1=H:GOSUB 113Ø:HPRINT(1,
Ø),"LINE: Mark Finish <F>":FLG=2
:GOSUB 8Ø:GOSUB 113Ø:HPRINT(1,Ø)
,"LINE: Box Option 1.None, 2.B,
3.BF"
41Ø H2=H:V2=V:A$=INKEY$:IF A$=""
THEN41ØELSE IFINSTR("123",A$)=Ø
THEN 41Ø: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":HL
INE(H1,V1)-(H2,V2),PSET,B
42Ø 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"
43Ø PRINT#1,STR$(LN)+"HLINE("+ST
R$(H1)+","+STR$(V1)+")-("+STR$(H
2)+","+STR$(V2)+"),"+O$:LN=LN+1Ø
44Ø GOSUB 113Ø:FLG=Ø:GOTO 8Ø
447 '
448 ' * Ellipse Command *
449 '
45Ø HPRINT(1,Ø),"ELLIPSE: Mark C
enter <X>":FLG=3:B=TG:TG=Ø:GOSUB
 8Ø:HSET(H,V,6):H1=H:V1=V:GOSUB
113Ø:HPRINT(1,Ø),"ELLIPSE: Mark
Radius <R>"
46Ø IF PEEK(343)=247 THEN H=H-1
ELSE IF PEEK(339)=191 AND PEEK(3
43)=247 THEN H=H-5
47Ø IF PEEK(344)=247 THEN H=H+1
ELSE IF PEEK(339)=191 AND PEEK(3
44)=247 THEN H=H+5
48Ø GOSUB 1Ø8Ø:HSET(H,V):FOR X=1
 TO 5:NEXT:HRESET(H,V)
49Ø C$=INKEY$:IF C$<>"R" THEN HR
ESET(H1,V1):GOTO 46Ø
5ØØ IF H>H1 THEN R=H-H1 ELSE R=H
1-H:HSET(H,V,6)
51Ø GOSUB 113Ø:HPRINT(1,Ø),"ELLI
PSE: Color (1-15)":INPUT K$:HPRI
NT(23,Ø),K$:IF VAL(K$)<1 OR VAL(
K$)>15 THEN 51Ø ELSE K=VAL(K$)
52Ø GOSUB 113Ø:HPRINT(1,Ø),"ELLI
PSE: Height/Width Ratio (Ø-255)"
:INPUT H$:HPRINT(37,Ø),H$:IF VAL
(H$)>255 THEN 52Ø ELSE H=VAL(H$)
53Ø GOSUB 113Ø:HPRINT(1,Ø),"ELLI
PSE: Start (Ø-1)":INPUT S$:HPRIN
T(22,Ø),S$:IF VAL(S$)>1 THEN 53Ø
 ELSE S=VAL(S$)
54Ø GOSUB 113Ø:HPRINT(1,Ø),"ELLI
PSE: End (Ø-1)":INPUT E$:HPRINT(
2Ø,Ø),E$:IF VAL(E$)>1 THEN 54Ø E
LSE E=VAL(E$)
```

```
55Ø HCIRCLE(H1,V1),R,K,H,S,E:E1=
H1:E2=V1:E3=R:E4=H:E5=S:E6=E:E$=
"E"
56Ø PRINT#1,STR$(LN)+"HCIRCLE("+
STR$(H1)+","+STR$(V1)+"),"R","K"
,"H","S","E
57Ø LN=LN+1Ø:H=H1:V=V1:TG=B:GOSU
B 113Ø:GOTO 8Ø
577 '
578 ' * Paint Command *
579 '
58Ø HPRINT(1,Ø),"PAINT: Mark Edg
e <E>":FLG=4:GOSUB 8Ø:H1=H:V1=V:
E=HPOINT(H,V):GOSUB113Ø
59Ø HPRINT(1,Ø),"PAINT: Mark Int
erior <I>":FLG=5:GOSUB 8Ø:H2=H:V
2=V:HSET(H1,V1,E):GOSUB 113Ø:E3=
HPOINT(H2,V2)
6ØØ HPRINT(1,Ø),"PAINT: Paint Co
lor (1-15)":INPUT K$:HPRINT(27,Ø
),K$:IF VAL(K$)<1 OR VAL(K$)>15
THEN 6ØØ ELSE K=VAL(K$)
61Ø HPAINT(H2,V2),K,E:E1=H2:E2=V
2:E4=E:E$="P"
62Ø PRINT#1,STR$(LN)+"HPAINT("H2
","V2"),"K","E:LN=LN+1Ø:GOSUB 11
3Ø:GOTO 8Ø
627 '
628 ' * Color Command *
629 '
63Ø HPRINT(Ø,Ø),"COLOR: Select C
o. <C>"
64Ø FOR X=169 TO 3Ø9 STEP 1Ø:HCO
LOR X/1Ø-15.9:HLINE(X,Ø)-(X+1Ø,1
Ø),PSET,BF:NEXT:HC=174
65Ø HGET(Ø,3)-(319,7),2:HDRAW"BM
"+STR$(INT(HC))+",5CØND2NU2NL2NR
2":C$=INKEY$:HPUT(Ø,3)-(319,7),2
66Ø IF PEEK(343)=247 AND HC>174
THEN HC=HC-1Ø
67Ø IF PEEK(344)=247 AND HC<314
THEN HC=HC+1Ø
68Ø IF C$<>"C" THEN 65Ø ELSE Z=(
HC/1Ø-16.4):HCOLORZ:GOSUB 114Ø:I
F FLG=8 THEN FLG=Ø:RETURN
69Ø PRINT#1,STR$(LN)+"HCOLOR"+ST
R$(Z):LN=LN+1Ø:GOSUB 113Ø:RETURN
697 '
698 ' * Draw Command *
699 '
7ØØ HPRINT(1,Ø),"DRAW: Mark Star
t <M>":FLG=6:GOSUB 8Ø:HSET(H,V,6
):H1=H:V1=V
71Ø T$=STR$(LN)+"HDRAW"+CHR$(34)
+"BM"+RIGHT$(STR$(H1),LEN(STR$(H
1))-1)+","+RIGHT$(STR$(V1),LEN(S
TR$(V1))-1)
72Ø GOSUB113Ø:HPRINT(1,Ø),"DRAW:
 Press Dir.(U,D,L,R,E,F,G,H,M,C)
"
73Ø D$=INKEY$:IF D$="" THEN 73Ø
ELSE IF ASC(D$)=1Ø3 THEN 126Ø EL
SE IF D$="Q" THEN 92Ø ELSE IF IN
STR("UDLREFGHMC",D$)=Ø THEN 72Ø
74Ø IF ASC(D$)=1Ø3 THEN GOSUB 12
6Ø
75Ø IF D$="M" OR D$="C" THEN 77Ø
76Ø GOSUB 113Ø:HPRINT(1,Ø),"DRAW
: Number of Dots ":HPRINT(22,Ø),
D$:INPUT N$:HPRINT(24,Ø),N$:IF V
AL(N$)<1 THEN 76Ø
77Ø ON INSTR("UDLREFGHMC",D$) GO
SUB 79Ø,8ØØ,81Ø,82Ø,83Ø,84Ø,85Ø,
86Ø,87Ø,9ØØ
78Ø GOTO 72Ø
789 ' Draw Up
79Ø IF V1-VAL(N$)<Ø THEN RETURN
ELSE HLINE(H1,V1)-(H1,V1-VAL(N$)
),PSET:T$=T$+"U"+N$:V1=V1-VAL(N$
):GOSUB 91Ø:E$="U":RETURN
799 ' Draw Down
8ØØ IF V1+VAL(N$)>191 THEN RETUR
N ELSE HLINE(H1,V1)-(H1,V1+VAL(N
$)),PSET:T$=T$+"D"+N$:V1=V1+VAL(
N$):GOSUB 91Ø:E$="D":RETURN
8Ø9 ' Draw Left
81Ø IF H1-VAL(N$)<Ø THEN RETURN
ELSE HLINE(H1,V1)-(H1-VAL(N$),V1
),PSET:T$=T$+"L"+N$:H1=H1-VAL(N$
):GOSUB 91Ø:E$="L":RETURN
819 ' Draw Right
82Ø IF H1+VAL(N$)>319 THEN RETUR
N ELSE HLINE(H1,V1)-(H1+VAL(N$),
V1),PSET:T$=T$+"R"+N$:H1=H1+VAL(
N$):GOSUB 91Ø:E$="R":RETURN
829 ' Draw 45 Degree
83Ø IF H1+VAL(N$)>319 OR V1-VAL(
N$)<Ø 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$):GOSUB 91Ø:E$="E":RETUR
N
839 ' Draw 135 Degree
84Ø 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$):GOSUB 91Ø:E$="F":RET
URN
849 ' Draw 225 Degree
85Ø IF H1-VAL(N$)<Ø OR V1+VAL(N$
)>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$):GOSUB 91Ø:E$="G":RETUR
N
859 ' Draw 315 Degree
86Ø IF H1-VAL(N$)<Ø OR V1-VAL(N$
)<Ø 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$):GOSUB 91Ø:E$="H":RETURN
869 ' Draw Move
87Ø GOSUB 113Ø:HPRINT(1,Ø),"DRAW
```

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```
: Mark Point <M>":FLG=7:H=H1:V=V
1:GOSUB 8Ø:H2=H:V2=V
88Ø H3=H1:V3=V1:E$="M"
89Ø HLINE(H1,V1)-(H2,V2),PSET:T$
=T$+"M"+RIGHT$(STR$(H2),LEN(STR$
(H2))-1)+","+RIGHT$(STR$(V2),LEN
(STR$(V2))-1):H1=H2:V1=V2:GOSUB
91Ø:RETURN
899 ' Draw Color
9ØØ GOSUB 113Ø:FLG=8:GOSUB 63Ø:T
$=T$+"C"+STR$(Z):GOSUB 91Ø:RETUR
N
91Ø IF LEN(T$)>24Ø THEN PRINT#1,
T$+CHR$(34):LN=LN+1Ø:GOSUB 113Ø:
GOTO 7ØØ ELSE RETURN
92Ø PRINT#1,T$+CHR$(34):LN=LN+1Ø
:GOSUB 113Ø:GOTO 8Ø
927 '
928 ' * Text Command *
929 '
93Ø TS$="":HPRINT(1,Ø),"TEXT: Ma
rk Starting Point <P>":H1=Ø:V1=8
94Ø 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
95Ø IF PEEK(341)=247 THEN V1=V1-
8 ELSE IF PEEK(342)=247 THEN V1=
V1+8
96Ø IF PEEK(343)=247 THEN H1=H1-
8 ELSE IF PEEK(344)=247 THEN H1=
H1+8
97Ø IF H1>311 THEN H1=Ø ELSE IF
H1<Ø THEN H1=311
98Ø IF V1>183 THEN V1=Ø ELSE IF
V1<Ø THEN V1=183
99Ø IF C$<>"P" THEN 94Ø
1ØØØ H2=INT(H1/8):V2=INT(V1/8):G
OSUB 113Ø:HPRINT(1,Ø),"Text ? ":
H1=64
1Ø1Ø HGET(H1,Ø)-(H1+8,8),3:HLINE
(H1,Ø)-(H1+8,8),PSET,BF:C$=INKEY
$:HPUT(H1,Ø)-(H1+8,8),3:IF C$=""
 THEN 1Ø1Ø ELSE C=ASC(C$)
1Ø2Ø IF C>13 GOTO 1Ø5Ø
1Ø3Ø IF LEN(TS$)>Ø AND C=8 THEN
HCOLOR Ø:HPRINT((H1+8)/8-2,Ø),RI
GHT$(TS$,1):H1=H1-8:HCOLOR Z:TS$
=LEFT$(TS$,LEN(TS$)-1):GOTO1Ø1Ø:
ELSE IF C=8 THEN 1Ø1Ø
1Ø4Ø IF C=13 THEN 1Ø6Ø
1Ø5Ø IF LEN(TS$)<=4Ø THEN TS$=TS
$+C$:HPRINT(H1/8,Ø),C$:H1=H1+8:G
OTO 1Ø1Ø:ELSE SOUND 25Ø,3:GOTO 1
Ø1Ø
1Ø6Ø HPRINT(H2,V2),TS$
1Ø7Ø PRINT#1,STR$(LN)+"HPRINT("+
STR$(H2)+","+STR$(V2)+"),"+CHR$(
34)+TS$+CHR$(34):LN=LN+1Ø:GOSUB
113Ø:E1=H2:E2=V2:E$="T":GOTO 8Ø
1Ø77 '
1Ø78 ' * Cursor Limiter *
1Ø79 '
1Ø8Ø IF H>317 THEN H=2:FG=3:ELSE
 IF H<2 THEN H=317:FG=3
1Ø9Ø IF V>189 THEN V=2:FG=3:ELSE
 IF V<2 THEN V=189:FG=3
11ØØ IF TG=1 AND FG=3 THEN GOSUB
 113Ø:FG=Ø:ELSE IF TG=1 AND HC=H
 AND VC=V THEN RETURN
111Ø IF TG=1 THEN HC$=STR$(HC):V
C$=STR$(VC):CO$=RIGHT$(HC$,LEN(H
C$)-1)+","+RIGHT$(VC$,LEN(VC$)-1
):HCOLOR Ø:HPRINT(3Ø,Ø),CO$:HCOL
OR Z:H$=STR$(H):V$=STR$(V):CN$=R
IGHT$(H$,LEN(H$)-1)+","+RIGHT$(V
$,LEN(V$)-1):HPRINT(3Ø,Ø),CN$
112Ø RETURN
1127 '
1128 ' * Status Clear & Co. Box
Update *
1129 '
113Ø HPUT(Ø,Ø)-(3ØØ,15),1:RETURN
114Ø HCOLOR Z:HLINE(3ØØ,Ø)-(319,
1Ø),PSET,BF:RETURN
1146 '
1147 ' * Erase Last Function *
1148 '
1149 ' Erase Line
115Ø 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$="LF" THEN HLINE(E1
,E2)-(E3,E4),PRESET,BF
1159 ' Erase Ellipse
116Ø IF E$="E" THEN K=HPOINT(E1,
E2):HCIRCLE(E1,E2),E3,K,E4,E5,E6
1169 ' Erase Paint
117Ø IF E$="P" THEN HPAINT(E1,E2
),E3,E4
1179 ' Erase Text
118Ø IF E$="T" THEN HCOLOR Ø:HPR
INT(E1,E2),TS$:HCOLOR Z
119Ø IF E$="" THEN GOSUB 113Ø:HP
RINT(Ø,Ø),"LAST ENTRY ALREADY ER
ASED":SOUND 5Ø,5:FOR T=1 TO 5ØØ:
NEXT:GOSUB 113Ø,114Ø:RETURN
1199 ' Disk File Fix
12ØØ E$="":CLOSE:RENAME NN$ TO "
EL.DAT":OPEN "I",#2,"EL.DAT":OPE
N "O",#1,NN$
121Ø LINE INPUT #2,K$
122Ø IF EOF(2)=-1 THEN 124Ø
123Ø PRINT#1,K$:GOTO 121Ø
124Ø CLOSE#2:KILL"EL.DAT"
125Ø LN=LN-1Ø:RETURN
1259 ' Erase Draw
126Ø IF E$="" THEN 72Ø ELSE IF E
$="M" THEN 136Ø
127Ø T$=LEFT$(T$,(LEN(T$)-(LEN(N
$)+1)))
1279 ' Erase Up
128Ø IF E$="U" THEN HLINE(H1,V1)
-(H1,V1+VAL(N$)),PRESET:V1=V1+VA
```

```
L(N$):E$="":GOTO 72Ø
1289 ' Erase Down
129Ø IF E$="D" THEN HLINE(H1,V1)
-(H1,V1-VAL(N$)),PRESET:V1=V1-VA
L(N$):E$="":GOTO 72Ø
1299 ' Erase Left
13ØØ IF E$="L" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1),PRESET:H1=H1+VA
L(N$):E$="":GOTO 72Ø
13Ø9 ' Erase Right
131Ø IF E$="R" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1),PRESET:H1=H1-VA
L(N$):E$="":GOTO 72Ø
1319 ' Erase 45 Degree
132Ø IF E$="E" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1+VAL(N$)),PRESET:
H1=H1-VAL(N$):V1=V1+VAL(N$):E$="
":GOTO 72Ø
1329 ' Erase 135 Degree
133Ø IF E$="F" THEN HLINE(H1,V1)
-(H1-VAL(N$),V1-VAL(N$)),PRESET:
H1=H1-VAL(N$):V1=V1-VAL(N$):E$="
":GOTO 72Ø
1339 ' Erase 225 Degree
134Ø IF E$="G" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1-VAL(N$)),PRESET:
H1=H1+VAL(N$):V1=V1-VAL(N$):E$="
":GOTO 72Ø
1349 ' Erase 315 Degree
135Ø IF E$="H" THEN HLINE(H1,V1)
-(H1+VAL(N$),V1+VAL(N$)),PRESET:
H1=H1+VAL(N$):V1=V1+VAL(N$):E$="
":GOTO 72Ø
1359 ' Erase Move
136Ø 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$="":GOTO 72Ø
1367 '
1368 ' * Space Remover & Print S
ub. *
1369 '
137Ø OPEN "I",#1,NN$:Q=LEN(NN$):
Q=Q-4:NN$=LEFT$(NN$,Q)+".BAS":OP
EN "O",#2,NN$
138Ø IF RS=Ø THEN PRINT"PROGRAM
LISTING OF ";NN$:PRINT
139Ø LINE INPUT#1, L$:L1$=""
14ØØ P=INSTR(L$," "):L=LEN(L$)
141Ø IF INSTR(L$,CHR$(34))>Ø AND
 P>INSTR(L$,CHR$(34)) THEN P=Ø
142Ø IF P=Ø THEN 145Ø
143Ø L1$=L1$+LEFT$(L$,P-1):L$=RI
GHT$(L$,L-P)
144Ø GOTO 14ØØ
145Ø L1$=L1$+L$:IF VAL(LEFT$(L1$
,4))<>VAL(LEFT$(L2$,4)) AND RS=Ø
 THEN PRINTL2$
146Ø L2$=L1$
147Ø PRINT#2,L1$
148Ø IF EOF(1)<>-1 THEN 139Ø
149Ø IF RS=Ø AND F<>Ø THEN PRINT
L1$
15ØØ CLOSE#1:CLOSE#2:Q=LEN(NN$)-
4:NN$=LEFT$(NN$,Q)+".DAT":KILLNN
$
151Ø IF RS=1 THEN NN$=LEFT$(NN$,
LEN(NN$)-4):NN$=NN$+".BAS":GOTO
173Ø:ELSE END
1517 '
1518 ' * Palette Setup Subroutin
e *
1519 '
152Ø CLS:PRINT"PALETTE SETUP":PR
INT
153Ø PRINT:INPUT "NEW PALETTE (Y
/N)";P$:IF P$<>"Y" AND P$<>"N" T
HEN 153Ø:ELSE IF P$="Y" THEN PRI
NT:GOTO 155Ø
154Ø 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 Ø,Ø:GOTO
161Ø
155Ø FOR X=1 TO 15
156Ø PRINT"COLOR";X;" Color Code
";:INPUT P:IF P>63 THEN 156Ø
157Ø PL(X)=P:NEXT X
158Ø FORX=1 TO 15:PALETTE X,PL(X
):NEXT X:PALETTE Ø,Ø
159Ø CLS:INPUT"SAVE NEW PALETTE?
```

```
 (Y/N)";P$:IF P$<>"Y" THEN 161Ø
16ØØ OPEN "O",#2,"PALETTE.DBL":F
OR X=1 TO 15:WRITE #2,PL(X):NEXT
 X:CLOSE #2
161Ø FOR X=1 TO 15:Q$=Q$+","+STR
$(PL(X)):NEXT X
162Ø Q$="1ØØFORX=ØTO15:READW:PAL
ETTE X,W:NEXT X:DATA Ø"+Q$
163Ø PRINT#1,Q$:RETURN
1637 '
1638 ' * Grid Function *
1639 '
164Ø FOR X=Ø TO 32Ø STEP 1Ø
165Ø FOR Y=Ø TO 191 STEP 1Ø
166Ø IF G=Ø THEN HSET(X,Y,Z)
167Ø IF G=1 THEN HRESET(X,Y)
168Ø NEXT Y,X
169Ø IF G=Ø THEN G=1 ELSE G=Ø
17ØØ RETURN
1707 '
1708 ' * Help Command *
1709 '
171Ø FOR X=1 TO 12:READ H$:HPRIN
T(1,Ø),H$:FOR Y=1 TO 4ØØ:NEXT Y:
GOSUB 113Ø:NEXT X:RESTORE:RETURN
:DATA "COLOR: Press <C>","LINE:
Press <L>","ELLIPSE: Press <E>"
172Ø DATA"DRAW: Press <D>","PAIN
T: Press <P>","TEXT: Press <T>",
"COORDINATES: On/Off Press <CTRL
>","GRID: On/Off Press <F2>","ER
ASE LAST: Press <F1>","REDRAW: P
ress <ALT>","HELP: Press <?>","Q
UIT: Press <Q>"
1727 '
1728 ' * Redraw Function & Old F
ile *
1729 '
173Ø HCLSØ:OPEN "I",#1,NN$
174Ø LINE INPUT #1,I$
175Ø IF INSTR(I$,"GOTO")<>Ø THEN
 217Ø
176Ø IF VAL(LEFT$(I$,4))=1ØØ THE
N A$=MID$(I$,42):FOR X=Ø 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$):GOTO217Ø
177Ø IF VAL(LEFT$(I$,4))=11Ø THE
N 217Ø
178Ø I=INSTR(I$,"H"):IF I>8 OR I
=Ø THEN 217Ø
1789 ' Color
179Ø IF MID$(I$,I,3)="HCO" THEN
HCOLOR VAL(MID$(I$,I+6,2)):GOTO
217Ø
1799 ' Ellipse
18ØØ IF MID$(I$,I,3)<>"HCI" THEN
 183Ø 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$,INSTR(I$,",")))
181Ø 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$,","))
182Ø HCIRCLE(X,Y),R,C,HW,VAL(S$)
,VAL(E$):GOTO 217Ø
1829 ' Text
183Ø IF MID$(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 217Ø
1839 ' Draw
184Ø IF MID$(I$,I,3)<>"HDR" THEN
 2Ø9Ø ELSE
185Ø 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$,",")):L=LEN(I$)
186Ø Q1$="":FOR Q=1 TO 3:Q$=MID$
(I$,Q,1):IF INSTR("UDLREFGHMC",Q
$)=Ø THEN Q1$=Q1$+Q$:NEXT Q
187Ø IF Q1$<>"" THEN Q$=Q1$:V=VA
L(Q$)
188Ø I$=RIGHT$(I$,L-LEN(Q$)):IF
LEN(I$)=1 THEN 217Ø
189Ø L1=LEN(I$):FORX=1 TO L1:A$=
MID$(I$,X,1):IF INSTR("UDLREFGHM
C",A$)=Ø THEN A1$=A1$+A$:GOTO 19
1Ø
19ØØ W=INSTR("UDLREFGHMC",A$):IF
 A1$="" THEN NEXT X
191Ø IF INSTR("UDLREFGHMC,",MID$
(I$,X+1,1))=Ø THEN NEXT X
192Ø IF LEN(I$)=Ø THEN 217Ø
193Ø L=LEN(I$):A=VAL(A1$):I$=RIG
HT$(I$,L-(LEN(A1$)+1)):A1$="":L=
LEN(I$)
194Ø ON W GOSUB 2ØØØ,2Ø1Ø,2Ø2Ø,2
Ø3Ø,2Ø4Ø,2Ø5Ø,2Ø6Ø,2Ø7Ø,196Ø,2Ø8
Ø
195Ø IF LEN(I$)<>1 THEN 189Ø ELS
E217Ø
1959 ' Draw Move
196Ø H1=A:I$=RIGHT$(I$,L-1):L=LE
N(I$):Z1$="":FOR Z=1 TO 3:Z$=MID
$(I$,Z,1):IF INSTR("UDLREFGHMC",
Z$)=Ø THEN Z1$=Z1$+Z$:NEXT Z
197Ø IF Z1$<>"" THEN Z$=Z1$
198Ø V1=VAL(Z$):I$=RIGHT$(I$,L-L
EN(Z$)):HLINE(H,V)-(H1,V1),PSET:
H=H1:V=V1:L=LEN(I$)
199Ø RETURN
1999 ' Draw Up
2ØØØ HLINE(H,V)-(H,V-A),PSET:V=V
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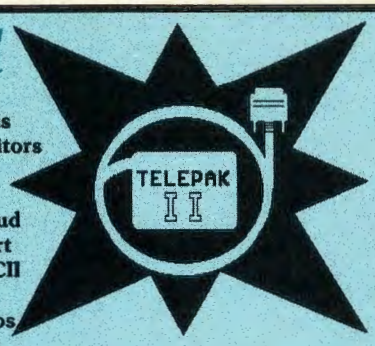

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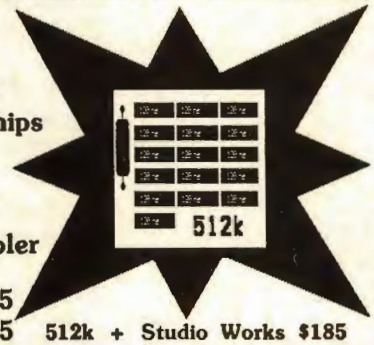

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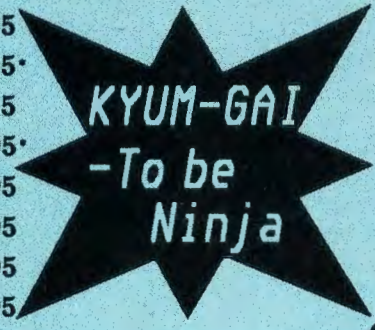
* CoCo 3 only



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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
```

Sugar Software

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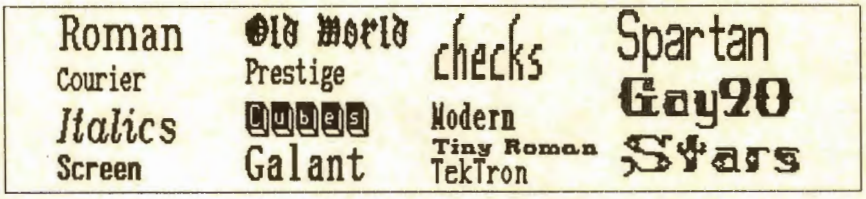

The Font Massager - This OS9/MS-DOS utility program allows you to do many things to Calligrapher font files. You may create new fonts, modify existing fonts, invert fonts, compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. (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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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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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.

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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 programers or anyone who types in programs. By Chris Babcock and a product of ColorVenture.

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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 @.

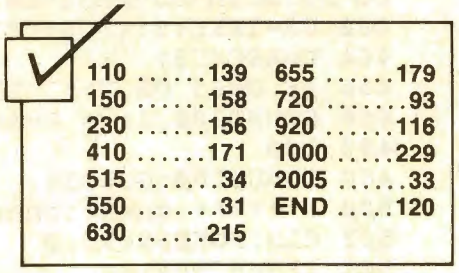
If you wish to change, correct, or otherwise amend a question, press C. The screen will display the current question and ask you to enter the new or amended version. If there is no change, press ENTER and the old question will be retained. If you wish to amend the question, type in the new one and enter. 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 extension .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

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1 'SUPER QUIZ BY:
2 'DOUGLAS W. GILES
3 '53Ø COUNTRY KNOLL
4 '3Ø93 PEMBINA HIGHWAY
5 'WINNIPEG, MANITOBA
6 'CANADA    R3T 4R6
8 GOTO 1Ø
9 CLSØ:VERIFYON:PRINT@228,"savin
g"CHR$(128)" QUIZ/RDY:Ø";:SAVE"Q
UIZ/RDY:Ø":PRINT@292,"saving"CHR
$(128)" QUIZ/BKP:Ø";:SAVE"QUIZ/B
KP:Ø":CLS:PRINT@224," PROGRAM AN
D BACKUP ARE SAVED ":PRINT:PRINT
:PRINT:END
1Ø 'DIMENSION ARRAYS & STARTUP
    GRAPHICS
12 POKE65495,Ø:GOTO9ØØ
13 POKE65494,Ø
14 SCREENØ,Ø:CLS3:PMODEØ:PCLEAR1
:CLEAR18ØØØ
16 DIM W$(99),D$(99),R(99)
18 D$=CHR$(125):E$=CHR$(128):F$=
STRING$(1Ø,128):G$=STRING$(5,128
):AA$=STRING$(32,45)
1ØØ '**** startup menu ****
1Ø2 CLS(3):SOUND 175,1
1Ø6 PRINT@74,"select"E$"one";
1Ø8 PRINT@162,E$"a"D$E$"load"E$"
questions"F$;
11Ø PRINT@194,E$"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@29Ø,E$"e"D$E$"formulat
e"E$"questions"G$;
118 PRINT@322,E$"f"D$E$"print"E$
"view"E$"or"E$"amend"G$;
12Ø PRINT@354,E$"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
13Ø U=ASC(U$)
132 IF U<65 OR U>71 THEN 128
134 SOUND 19Ø,1:ON U-64 GOTO 2ØØ
,5ØØ,14Ø,3ØØ,4ØØ,6ØØ,1ØØØ
14Ø IF N>Ø THEN GOSUB 15Ø ELSE 1
```

```
 42
 142 CLEAR2ØØ:PCLEAR4:PMODE2,1:CL
 S:POKE65494,Ø:CLOSE:END
 15Ø '**BUFFER DUMP FAILSAFE**
 152 IF N>Ø 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@3ØØ,"yES/nO"
156 SOUND 15Ø,2
158 CLSØ: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$"proc
eed";:PRINT@3ØØ,"Yes"CHR$(124)"N
o";
16Ø SOUND 2ØØ,2
162 A$=INKEY$:IF A$="Y" THEN RET
URN
164 IF A$="N" THEN 1ØØ ELSE 154
2ØØ '**menu for load questions**
2Ø2 IF N>Ø THEN GOSUB 15Ø ELSE 2
16
216 'DRIVE1
218 CLS:PRINT@225,"TO LOAD QUEST
IONS ENTER FILE#";
22Ø PRINT@294,"OR [@] FOR MAIN M
ENU"
222 FORX=1TO4:SOUND1ØØ,2:SOUND15
Ø,2:NEXT
224 PRINT@362,"=> ";:LINEINPUTZZ
$
225 IF ZZ$=""THEN216
226 IF ZZ$=CHR$(64)THENZZ$="":GO
TO229
228 GOSUB8ØØ
229 'DRIVEØ
23Ø GOTO1ØØ
3ØØ '**menu to save questions**
3Ø1 'DRIVE 1
3Ø2 CLS:PRINT@71,"TO SAVE QUESTI
ONS"
3Ø4 PRINT@136,"ENTER FILE NAME"
3Ø6 PRINT@198,"OR [@] FOR MAIN M
ENU"
3Ø7 FORX=1TO4:SOUND1ØØ,2:SOUND15
Ø,2:NEXT
3Ø8 PRINT@3ØØ,"";:LINEINPUTYY$
31Ø IF YY$=CHR$(64)THENYY$=ZZ$:G
OTO315
312 IFYY$=""THENYY$=ZZ$
314 GOSUB7ØØ
315 'DRIVEØ
316 GOTO 1ØØ
4ØØ '*** input quest/answers ***
4Ø2 IF N>ØTHEN45Ø
4Ø4 CLS:PRINT@4,"PRESS [@] FOR M
AIN MENU"
4Ø6 N=N+1
4Ø8 PRINT"ENTER QUESTION"N":":LI
NEINPUTW$(N):SOUND225,1
41Ø IF W$(N)=CHR$(64)THEN N=N-1:
GOTO1ØØ
412 PRINT:PRINT"ENTER ANSWER:":L
INEINPUTD$(N):SOUND225,1
414 CLS
416 IF N<99 THEN 4Ø4
418 CLS:PRINT@225,"QUESTION/ANSW
ER BUFFER IS FULL"
42Ø PRINT@289,"SAVE THESE QUESTI
ONS AND BEGIN"
422 PRINT@364,"NEW QUIZ"
424 FOR QX=1TO15ØØ:NEXTQX:GOTO1Ø
Ø
45Ø '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$"quiz"F$;
46Ø 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 SOUND2ØØ,1:ON U-64 GOTO 414,
48Ø,1ØØ
48Ø GOSUB15Ø:GOTO14
5ØØ ' ***** questionnaire *****
5Ø2 CLS:POKE65495,Ø
5Ø4 IFN=ØTHEN1ØØ
5Ø6 NN=N
5Ø8 FORL=1TON
51Ø I=RND(N)
512 IFR(I)=1 THEN 51Ø
514 CLS
515 PRINT"QUESTION:"
516 PRINT@28,NN
518 PRINT@32,AA$;:PRINTW$(I):PRI
NTAA$;:IF W$(I)=" " THEN A$="Y":
GOTO54Ø
52Ø REM A$=INKEY$:IF A$=""THEN 5
2Ø
522 REM SOUND 2ØØ,1
524 PRINT:PRINT"YOUR RESPONSE:":
LINEINPUTA$:SOUND 225,1
526 PRINT"THE CORRECT ANSWER IS:
"
528 PRINTD$(I)
53Ø REM PRINTAA$
532 PRINT@416,"IS YOUR ANSWER RI
GHT (yES OR nO)";
534 PRINT@452,"ENTER [@] FOR MAI
N MENU"
536 A$=INKEY$:IFA$=""THEN536
538 IF A$=CHR$(64)THEN GOSUB 668
```

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```
:POKE65494,Ø:GOTO1ØØ
54Ø 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$=";" THEN L=L
-1:SOUND15Ø,1:GOTO546
544 GOTO 536
546 NEXT L
548 GOSUB668
55Ø CLS:POKE65494,Ø:PRINT@228,"E
ND OF QUESTIONNAIRE"
552 PRINT@323,"MAKE ANOTHER SELE
CTION"
554 FORX=1TO1ØØØ:NEXTX:GOTO1ØØ
6ØØ '*menu for view/print/amend*
6Ø1 IF N<1 THEN 716
6Ø3 CLSØ
6Ø4 PRINT@1Ø7,"select"E$"one";
6Ø5 PRINT@262,"Print"E$"View"E$"
or"E$"Amend";
6Ø6 U$=INKEY$:IFU$=""THEN6Ø6
6Ø7 IF U$="V" OR U$="A"THEN64Ø
6Ø8 IF U$="P"THEN62Ø
6Ø9 GOTO 6Ø6
62Ø 'print q/a to printer
621 CLSØ:SOUND15Ø,2:PRINT@292,"p
ress"E$"any"E$"key"E$"to"E$"cont
inue";
622 PRINT@228,"set"E$"printer"E$
"to"E$"baud"E$"12ØØ";
623 EXEC 44539
624 CLSØ:PRINT@231,"printing"E$"
hard"E$"copy";
625 POKE 65495,Ø
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
63Ø PRINT#-2,CHR$(3Ø)TAB(35)"QUE
STION #"I":"
631 PRINT#-2,CHR$(1Ø)"Q: ";W$(I)
632 PRINT#-2,CHR$(1Ø)CHR$(1Ø)"A:
 ";D$(I)
633 PRINT#-2,CHR$(1Ø)CHR$(1Ø)
634 NEXTI
635 FORX=1TO5:PRINT#-2:NEXTX
636 POKE 65494,Ø:GOTO1ØØ
64Ø 'view/amend file
641 FORI=1TON
642 IF W$(I)=W$(Ø)THEN1ØØ
643 CLS:PRINT@Ø,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 2ØØ,2
649 K$=INKEY$:IFK$=""THEN649
65Ø IF K$="@"THEN1ØØ
651 IF K$="C" THEN GOSUB 66Ø:GOT
O643
652 IF K$=CHR$(13) THEN 654
653 GOTO 649
654 CLS:NEXT
655 GOTO1ØØ
66Ø 'amend file entry
661 CLS:SOUND2ØØ,2:SOUND15Ø,2:PR
INT"OLD QUESTION:":PRINTW$(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 SOUND2ØØ,2:SOUND15Ø,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)=Ø:NEXT:RETURN
7ØØ '**** save quiz ****
7Ø2 CLS3:SOUND2ØØ,2:SOUND15Ø,2
7Ø4 PRINT@228,"FILE <"YY$"> NOW
SAVING";
7Ø6 IF N<1THEN716
7Ø8 OPEN"O",#1,YY$+"/DAT"
71Ø WRITE #1,N
712 FORL=1TON:WRITE#1,W$(L),D$(L
):NEXT
714 IFN>ØTHEN724
716 CLS:PRINT@224,"THERE ARE NO
QUESTIONS IN BUFFER"
718 PRINT@293,"MAKE ANOTHER SELE
CTION"
719 YY$="NO NAME"
72Ø FORX=1TO15:SOUND15Ø,2:SOUND2
ØØ,2:NEXTX
722 CLOSE#1:GOTO1ØØ
724 CLOSE#1
726 CLS:RETURN
8ØØ '**** load quiz ****
8Ø2 CLS3:SOUND2ØØ,2:SOUND15Ø,2
8Ø4 PRINT@228,"FILE <"ZZ$"> NOW
LOADING";
8Ø6 OPEN"I",#1,ZZ$+"/DAT"
8Ø8 INPUT #1,N
81Ø FORL=1TON:INPUT#1,W$(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:PRINT@9,"file"E$"
directory";G$E$E$E$E$
1004 PRINT@32,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$(HH),;:QQ=QQ+1:IFQQ>19THENQQ=0
:GOSUB1032
1028 NEXT HH
1030 NEXT GG:GOSUB1032:GOTO100
1032 PRINT@451,"press"E$"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 '************************
```

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.*

Something old and something new

Meteor Storm 3

By Fred B. Scerbo
Rainbow Contributing Editor

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 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.

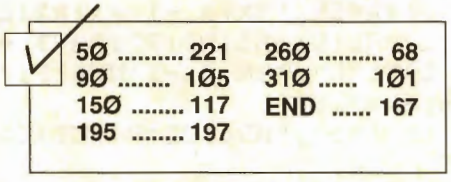
The more advanced levels burn away a smaller part of the meteor. After a while you get the hang of just where to hit the moving targets. After taking five hits, press ENTER to restart the game. That's all there is to it.

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. ❑

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.



The listing: METEOR3

```
1 REM**************************
2 REM*   METEOR STORM  V.3     *
3 REM*   BY FRED B. SCERBO     *
4 REM*   6Ø HARDING AVENUE     *
5 REM* NORTH ADAMS, MA Ø1247   *
6 REM*   COPYRIGHT (C) 1989    *
7 REM**************************
1Ø PMODE4,1:PCLSØ:CLEAR5ØØ
15 CLSØ:PRINTSTRING$(32,188)STRI
NG$(32,2Ø4);
2Ø FORI=1TO 256 :READ A:PRINTCHR
$(A+128);:NEXT
25 PRINTSTRING$(32,195)STRING$(3
2,179);
3Ø PRINT@42Ø,"    BY FRED B.SCER
```

```
BO    ";
35 PRINT@452,"   COPYRIGHT (C) 1
989   ";
4Ø PRINT@484,"   SELECT LEVEL (1
-3)   ";
45 DATA61,6Ø,59,,49,62,61,56,61,
6Ø,6Ø,61,53,6Ø,6Ø,62,6Ø,61,52,62
,6Ø,6Ø,58,62,6Ø,6Ø,61,52,62,6Ø,6
Ø,61
5Ø DATA53,,52,59,62,,53,,53,51,5
Ø,,,,,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,
6Ø DATA55,5Ø,,,,,55,5Ø,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
7Ø 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
8Ø 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$(9):FORI=ØTO9:READN$(I):
NEXT
9Ø DATA BR2U5R3D5NL3,BR4NU5BR,BR
2U3R3U2NL3BD5NL3,BR2R3U3NL2U2NL3
BD5,BR2BU3NU2R3U2D5,BR2R3U3L3U2R
3BD5,BR2U5NR3D2R3D3NL3,BR2BU4UR3
D5,BR2U5R3D2NL3D3NL3,BR2BU3NR3U2
R3D5
95 XA$="NFUFDLNHGHUENFRD2ULND2GL
NENU3HNEUENF2R2NG2F":XB$="NU2NEN
HND2FNRHNGL3EREFDFGLHGHUR2GLDFNE
RNU2NERE":XC$="NU2NL2NDNHNGNF2NE
R2NHNUNENR2NFNGD2E2HLHLG2FRFR":G
OTO11Ø
1ØØ X=(JOYSTK(Ø)+6)*4:Y=(JOYSTK(
1)+14)*2:RETURN
1Ø5 S(1)=Ø:S(2)=Ø:S(3)=Ø
11Ø QB$="CØBRNU5RU5RD5RU5RD5RU5R
NL4D2NL4D3L6C1"
115 GS=Ø:PT=Ø
12Ø SL$=INKEY$:IF SL$="1"THEN125
ELSEIF SL$="2"THEN13ØELSEIF SL$=
"3"THEN135ELSE12Ø
125 UK=6:GOTO14Ø
13Ø UK=4:GOTO14Ø
135 UK=2:GOTO14Ø
14Ø CLSØ:PMODEØ,3:PCLSØ:SCREENØ,
1
145 O=RND(71)+55:J=9Ø
15Ø W=RND(144)+56:V=3Ø
155 M=RND(5Ø)+15Ø:K=1ØØ:FORT=1TO
12Ø:A=RND(256):B=RND(168):PSET(A
```

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```
,B,5):NEXTT:PCOPY3TO1:PMODEØ,1:S
CREEN1,1
16Ø PMODEØ,3:DRAW"S8BM6Ø,186C5L3
U5NR3D2NR2D3BL2UHEUHL2D3NR2D2BL3
EU3HLGD3FRBL5NELHU3ERNFLGD3FBL5N
HREUHGHUERF":PCOPY3TO4:GOSUB33Ø
165 W$=STR$(W):V$=STR$(V):M$=STR
$(M):K$=STR$(K):O$=STR$(O):J$=ST
R$(J)
17Ø S(1)=S(1)+4:S(2)=S(2)+4:S(3)
=S(3)+4:PCOPY3TO2:PMODEØ,2
175 GOSUB345:SS$="S"+STR$(S(1)):
SZ$="S"+STR$(S(2)):SO$="S"+STR$(
S(3))
18Ø DRAW SS$+"BM"+W$+","+V$+"C5"
+XA$:KS$=SS$
185 DRAW SZ$+"BM"+M$+","+K$+"C5"
+XB$:AZ$=SZ$
19Ø DRAW SO$+"BM"+O$+","+J$+"C5"
+XC$:AO$=SO$:PCOPY2TO1:PMODEØ,1:
SCREEN1,1
195 IFS(1)=>56THEN28ØELSEIFS(2)=
>56THEN28ØELSEIFS(3)=>56THEN28Ø
2ØØ GOSUB1ØØ:IFPEEK(339)=254THEN
225
2Ø5 IF PPOINT(W,V)=ØTHEN235
21Ø IF PPOINT(M,K)=ØTHEN25Ø
215 IF PPOINT(O,J)=ØTHEN265
22Ø GOTO165
225 LINE(Ø,169)-(X,Y),PSET:LINE-
(Ø,169),PRESET:LINE(252,169)-(X,
Y),PSET:LINE-(252,169),PRESET:PL
AY"O5T255CG":FORI=2TO UK STEP2:C
IRCLE(X,Y),I,Ø:NEXT:GOTO2Ø5
23Ø LINE(188,192)-(X+2,Y),PRESET
:LINE(252,192)-(X+2,Y),PRESET:CI
RCLE(X-2,Y),2,Ø:CIRCLE(X+2,Y),2,
Ø:CIRCLE(X,Y),2,Ø:RETURN
235 DRAWSS$:DRAW"BM"+W$+","+V$:D
RAW"CØ"+XA$:GOSUB325
24Ø M1=M1+25:S(1)=Ø:GS=GS+25:GOS
UB33Ø
245 W=RND(144)+56:V=3Ø:GOTO165
25Ø DRAWSZ$:DRAW"BM"+M$+","+K$:D
RAW"CØ"+XB$:GOSUB325
255 M1=M1+25:S(2)=Ø:GS=GS+25:GOS
UB33Ø
26Ø M=RND(5Ø)+15Ø:K=1ØØ:GOTO165
265 DRAWSO$:DRAW"BM"+O$+","+J$:D
RAW"CØ"+XC$:GOSUB325
27Ø M1=M1+25:S(3)=Ø:GS=GS+25:GOS
UB33Ø
275 O=RND(71)+55:J=9Ø:GOTO165
28Ø FORI=1TO2:PMODEØ,1:SCREEN1,Ø
:PLAY"O3T255FCO1DC":PMODEØ,1:SCR
EEN1,1:NEXT:IFS(1)=>56THEN S(1)=
ØELSEIF S(2)=>56THEN S(2)=ØELSEI
F S(3)=>56THEN S(3)=Ø
285 PT=PT+1:GOSUB34Ø:IFPT=5THEN3
1Ø
29Ø PMODEØ,1:SCREENØ,1:GOTO16Ø:D
```

```
RAWKS$+"BM"+W$+","+V$+"CØ"+XA$:D
RAWAZ$+"BM"+M$+","+K$+XB$:DRAWAO
$+"BM"+O$+","+J$+XC$:GOTO16Ø
295 PMODEØ,1:PCLS:SCREEN1,1
3ØØ SOUND15Ø,6:PMODEØ,1:SOUND15Ø
,6:SCREEN1,Ø:SOUND15Ø,6:PMODEØ,1
:PCLS:SCREEN1,1:GOTO145
3Ø5 PMODEØ,1:SOUND176,1Ø:SCREEN1
,Ø:SOUND147,1Ø:SCREEN1,1:SOUND17
6,1Ø:SCREEN1,Ø:SOUND147,1Ø:SCREE
N1,1:SOUND176,1Ø:SCREEN1,Ø:SOUND
147,1Ø:PMODEØ,1:PCLS:SCREEN1,1:G
OTO145
31Ø PMODEØ,3:SCREEN1,1
315 SCREEN1,1
32Ø X$=INKEY$:IFX$<>CHR$(13)THEN
32ØELSERUN
325 FORI=1TO2:PMODEØ,1:SCREEN1,Ø
:PLAY"O3L255BCBCO1BCBC":PMODEØ,1
:SCREEN1,1:NEXT:RETURN
33Ø 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 PMODEØ,3:LINE(62,188)-(13Ø,1
74),PRESET,BF:DRAW"S8BM64,187"+Q
$:FORSW=1TOID-1:DRAWN$(A(SW))+Q$
:NEXTSW:RETURN
34Ø PMODEØ,3:SOUND15Ø,1:DRAW"S8B
M162,186C5U5D2R3U2D5BR3NU5BR4U5L
2NDR4NDL2D5BR5NHREUHGHUERF":DRAW
"S8BM21Ø,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
35Ø RETURN
```


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Suspenseful spelling lessons

Cracking Codes

By Steve Blyn
Rainbow Contributing Editor

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. 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. ❑

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

The listing: CODEWORD

```
10 REM"SPELLING WORD CODE"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,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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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.

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.

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

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.

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 colorized 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

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 to 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 linefeeds. 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 Neuberg** (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 Louden** (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 FIREFLY 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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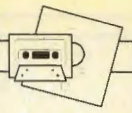

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC 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

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1Ø CLS
2Ø GOSUB25Ø
3Ø PMODE 4,1:SCREEN1,1:PCLS
4Ø FORT=1ØTO5ØSTEP1Ø:LINE(1Ø,T)-
(245,T),PSET:NEXTT
5Ø LINE(1Ø,1Ø)-(1Ø,5Ø),PSET:LINE
(245,1Ø)-(245,5Ø),PSET:LINE(1Ø,7
Ø)-(1Ø,11Ø),PSET:LINE(245,7Ø)-(2
45,11Ø),PSET
6Ø FORT=7ØTO11ØSTEP1Ø:LINE(1Ø,T)
-(245,T),PSET:NEXTT:FORT=13ØTO17
ØSTEP1Ø:LINE(1Ø,T)-(185,T),PSET:
NEXTT
7Ø LINE(11Ø,1Ø)-(11Ø,5Ø),PSET:LI
NE(18Ø,1Ø)-(18Ø,5Ø),PSET:LINE(11
Ø,7Ø)-(11Ø,11Ø),PSET:LINE(18Ø,7Ø
)-(18Ø,11Ø),PSET:LINE(1Ø,13Ø)-(1
Ø,17Ø),PSET
8Ø LINE(18Ø,13Ø)-(18Ø,17Ø),PSET:
LINE(185,13Ø)-(185,17Ø),PSET:LIN
E(11Ø,13Ø)-(11Ø,17Ø),PSET
9Ø LINE(1Ø,1Ø)-(1Ø,5Ø),PSET:LINE
(245,1Ø)-(245,5Ø),PSET
1ØØ DRAW"BM25,1Ø5;XA$;"
11Ø DRAW"BM25,45;XA$;"
12Ø DRAW"BM25,165;XA$;"
13Ø DRAW"BM5Ø,15;XHD$;"
14Ø PLAY"E"
15Ø DRAW"BM65,2Ø;XHD$;":PLAY"D":
DRAW"BM8Ø,25;XHU$;":PLAY"C":DRAW
"BM95,2Ø;XHD$;":PLAY"D"
16Ø DRAW"BM12Ø,15;XHD$;":PLAY"E"
:DRAW"BM135,15;XHD$;":PLAY"E":DR
AW"BM15Ø,15;XHD$;":PLAY"E"
17Ø DRAW"BM165,17;XHR$;":PLAY"P5
"
18Ø DRAW"BM19Ø,2Ø;XHD$;":PLAY"D"
:DRAW"BM2Ø5,2Ø;XHD$;":PLAY"D":DR
AW"BM22Ø,2Ø;XHD$;":PLAY"D":DRAW"
BM235,22;XHR$;":PLAY"P5"
19Ø DRAW"BM5Ø,75;XHD$;":PLAY"E":
DRAW"BM65,65;XHD$;":PLAY"G":DRAW
"BM8Ø,65;XHD$;":PLAY"G":DRAW"BM9
5,67;XHR$;":PLAY"P5"
2ØØ DRAW"BM12Ø,75;XHD$;":PLAY"E"
:DRAW"BM135,8Ø;XHD$;":PLAY"D":DR
AW"BM15Ø,85;XHU$;":PLAY"C":DRAW"
BM165,8Ø;XHD$;":PLAY"D"
21Ø DRAW"BM19Ø,75;XHD$;":PLAY"E"
:DRAW"BM2Ø5,75;XHD$;":PLAY"E":DR
AW"BM22Ø,75;XHD$;":PLAY"E":DRAW"
BM235,75;XHD$;":PLAY"E"
22Ø DRAW"BM45,14Ø;XHD$;":PLAY"D"
:DRAW"BM6Ø,14Ø;XHD$;":PLAY"D":DR
AW"BM75,135;XHD$;":PLAY"E":DRAW"
BM9Ø,14Ø;XHD$;":PLAY"D"
23Ø DRAW"BM12Ø,145;XHU$;":PLAY"C
":DRAW"BM135,143;XDW$;":PLAY"P15
"
24Ø GOTO24Ø
25Ø A$="U3ØR3F2D3G4L2G6D8F3R8E3U
5H4L3G4D3F3R2E2U2"
26Ø HD$="U1D2F1R3E1U2H1L3G1D1Ø"
27Ø HU$="U1D2F1R3E1U2H1L3G1U7"
28Ø HR$="L3R7L2U3L3D3"
29Ø DW$="L3R7L2D3L3U3D3R3U3R2BR3
BD2R1"
3ØØ 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
```

```
OTO 15Ø
8Ø IF I$="G" THEN M$="-1Ø,+Ø":GO
TO 15Ø
9Ø IF I$="H" THEN M$="+1Ø,+Ø":GO
TO 15Ø
1ØØ IF I$="V" THEN M$="-1Ø,+1Ø":
GOTO 15Ø
11Ø IF I$="B" THEN M$="+Ø,+1Ø":G
OTO 15Ø
12Ø IF I$="N" THEN M$="+1Ø,+1Ø":
GOTO 15Ø
13Ø IF I$="C" THEN C=C+1:IF C>15
 THEN C=Ø:HDRAW "C"+STR$(C) ELSE
 HDRAW "C"+STR$(C):GOTO 4Ø
14Ø IF I$="Q" THEN HCLSØ:GOTO 4Ø
141 ON INSTR(NU$,I$) GOSUB 2ØØ1,
2ØØ2,2ØØ3,2ØØ4,2ØØ5,2ØØ6,2ØØ7,2Ø
Ø8,2ØØ9,2ØØØ
142 GOTO 4Ø
15Ø HDRAW "M"+M$+"C"+STR$(C)
16Ø GOTO 4Ø
17Ø RGB:WIDTH 8Ø:POKE65496,Ø:END
2ØØØ HDRAW DØ$:RETURN
2ØØ1 HDRAW D1$:RETURN
2ØØ2 HDRAW D2$:RETURN
2ØØ3 HDRAW D3$:RETURN
2ØØ4 HDRAW D4$:RETURN
2ØØ5 HDRAW D5$:RETURN
2ØØ6 HDRAW D6$:RETURN
2ØØ7 HDRAW D7$:RETURN
2ØØ8 HDRAW D8$:RETURN
2ØØ9 HDRAW D9$: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

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1Ø REM SPRAYCAN
2Ø REM BY JOSEPH PENDELL
3Ø POKE 65495,Ø
4Ø DIM A(1Ø),B(1Ø)
5Ø PMODE4,1:PCLS
6Ø FORI=1 TO 2Ø:READ X,Y:PSET(X,
Y):NEXT I
7Ø DATA 2,Ø,4,Ø,6,Ø,8,1,1,2,3,2,
6,2,9,3
8Ø DATA Ø,4,2,4,7,4,4,5,9,5,Ø,6,
6,6
9Ø DATA 3,7,8,7,1,8,6,8,4,9
1ØØ GET(Ø,Ø)-(9,9),A,G
11Ø PCLS
12Ø GET(Ø,Ø)-(9,9),B
13Ø SCREEN 1,1
14Ø XØ=Ø:YØ=Ø
15Ø X=JOYSTK(Ø)/63*245:Y=JOYSTK(
1)/63*181
16Ø IF X<>XØ OR Y<>YØ THEN PUT(X
Ø,YØ)-(XØ+9,YØ+9),B:XØ=X:YØ=Y:GE
T(X,Y)-(X+9,Y+9),B
17Ø PUT(X,Y)-(X+9,Y+9),A,OR
18Ø IF (PEEK(6528Ø)=126 OR PEEK(
6528Ø)=254) THEN GET(X,Y)-(X+9,Y
+9),B
19Ø GOTO 15Ø
```

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  98Ø56
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:FORNY=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.)

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

The listing: TIMESHT

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1Ø '**WEEKLY TIME SHEET**
2Ø '*MAIN SCREEN*
3Ø CLEAR1ØØØ
4Ø CLS:PRINT@39,"WEEKLY TIME SHE
ET"
5Ø 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$
6Ø PRINT:INPUT "HOW MANY COPYS "
;X
7Ø PRINT:PRINT "HOLD ON, I'M PRI
NTING.....":FORI=1TOX
8Ø '**PRINTING INFO**
9Ø PRINT#-2,CHR$(27);"3";CHR$(27
);"'";CHR$(27);"*1";Q$
1ØØ PRINT#-2,CHR$(27);"4";CHR$(2
7);"%";CHR$(27);"+"
11Ø PRINT#-2,TAB(41);R$
12Ø PRINT#-2,TAB(41);S$
13Ø PRINT#-2,TAB(41);U$
15Ø PRINT#-2,CHR$(27);"&3":PRINT
#-2,TAB(3Ø);"WEEKLY TIME SHEET"
16Ø PRINT#-2,CHR$(27);"*Ø"
17Ø A$=STRING$(35," "):B$=STRING
$(15," "):C$=STRING$(6," "):D$=S
TRING$(28," "):F$=STRING$(75," "
):G$=STRING$(75," "):H$=STRING$(
75," "):J$=STRING$(1Ø," ")
18Ø PRINT#-2,"YOUR NAME:";A$;"WE
EK DATE:";B$
19Ø PRINT#-2,"DAY";C$;"TIME IN";
C$;"LUNCH OUT";C$;"LUNCH IN";C$;
"TIME OUT";C$
2ØØ PRINT#-2,CHR$(27)"=";"SUN  :
";F$
21Ø PRINT#-2,"MON  :";F$
22Ø PRINT#-2,"TUES :";G$
23Ø PRINT#-2,"WED  :";F$:PRINT#-
2,"THURS:";H$
24Ø PRINT#-2,"FRI  :";F$
245 PRINT#-2,"SAT  :";F$
25Ø PRINT#-2,"TOTAL HOURS:";J$;"
AMOUNT PAID:";J$
26Ø PRINT#-2,CHR$(27);"Ø"
27Ø NEXTI
28Ø CLS:PRINT@256,"WOULD YOU LIK
E TO RETURN TO THE MAIN SCREEN":
INPUT M$
29Ø IF M$="Y" THEN 2Ø
3ØØ IF M$="N" THEN 31Ø
31Ø '***ENDING SCREEN***
32Ø CLS:PRINT@196,"THANK YOU FOR
 USING ONE      OF THE  FINE PR
ODUCTS FROM-":FORX=1TO15ØØ
33Ø NEXTX
34Ø CLS(Ø):PRINT@229,"* KETCH EN
TERPRISES *"
35Ø FORT=1TO2ØØØ:NEXTT:POKE113,3
:EXEC4Ø999
```

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

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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$(11)="CE5E008E4028C660D750
C628A680A7C05A26F930882833C8280A
5026ED8E7A7BBFFFA239CE5EF08E4118
20DACE5FE08E42082OD2CE5EA08E40C8
20CA":C(11)=7439
185 C=0:Y=&H1300:FORJ=1TO60:A$=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$,O(I):POKEH+1,&H
71:EXECY(I):POKEH,&H72:POKEH+1,&
H73:LOADM F$+M$(I)+"/HR"+D$,O(I)
:EXECY(I)
```

```
600 LOADM F$+R$(I)+"/HR"+D$,O(I)
:EXECY(I):EXECX(I):NEXT
610 '
620 '
630 '
640 '
650 PRINT#-2:IFK=1THENCLEAR200,&
H7FFF:K=1ELSECLEAR200,&H7FFF:K=2
660 GOTO500
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:GOTO630
630 IFK=1THENCLEAR200,&H7FFF:K=1
ELSEIFK=2THENCLEAR200,&H7FFF:K=2
ELSECLEAR200,&H7FFF:K=3
635 GOTO470
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
 USED).":PRINT"    THEN RERUN."
```

BASIC programming review

More Graphics

By Joseph Kolar
Rainbow Contributing Editor

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 no-nonsense, memory-efficient program listings.

Although disk is great, a cassette recorder is still a valuable adjunct to your set-up. 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 `S6`, 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 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 `O` 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.

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

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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 decimal,

20-16=4, 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
R4D4L4BR4U4L4D4R4BR4D4L4U4R4U4R4
L4D4BR4U4L4D4R4BR6E6F6G6H6BR6F6G
6H6E6S8BR6U6E6R6F6D6G6L6H6S4BE7B
R6E4R4F4D4G4L4H4U4"
300 GOTO 300
```

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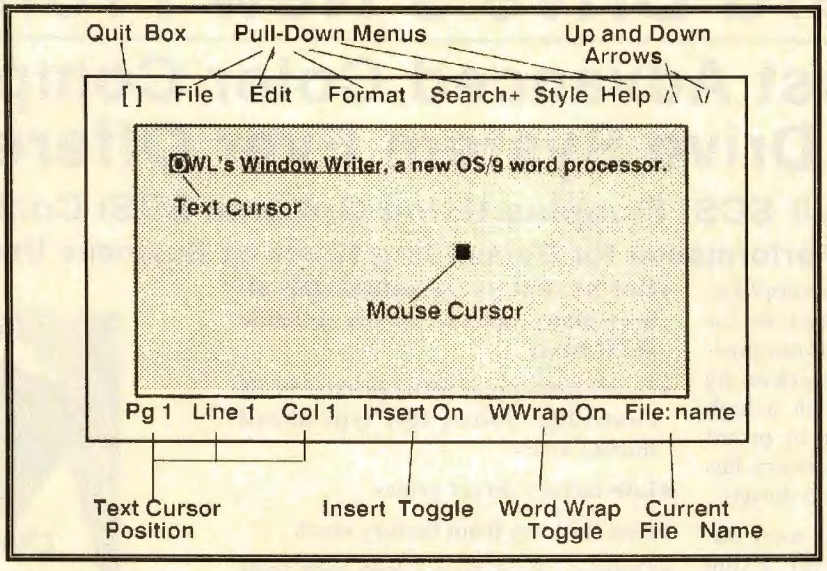

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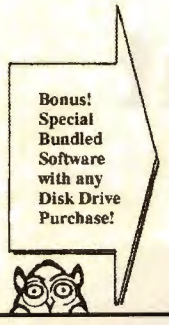

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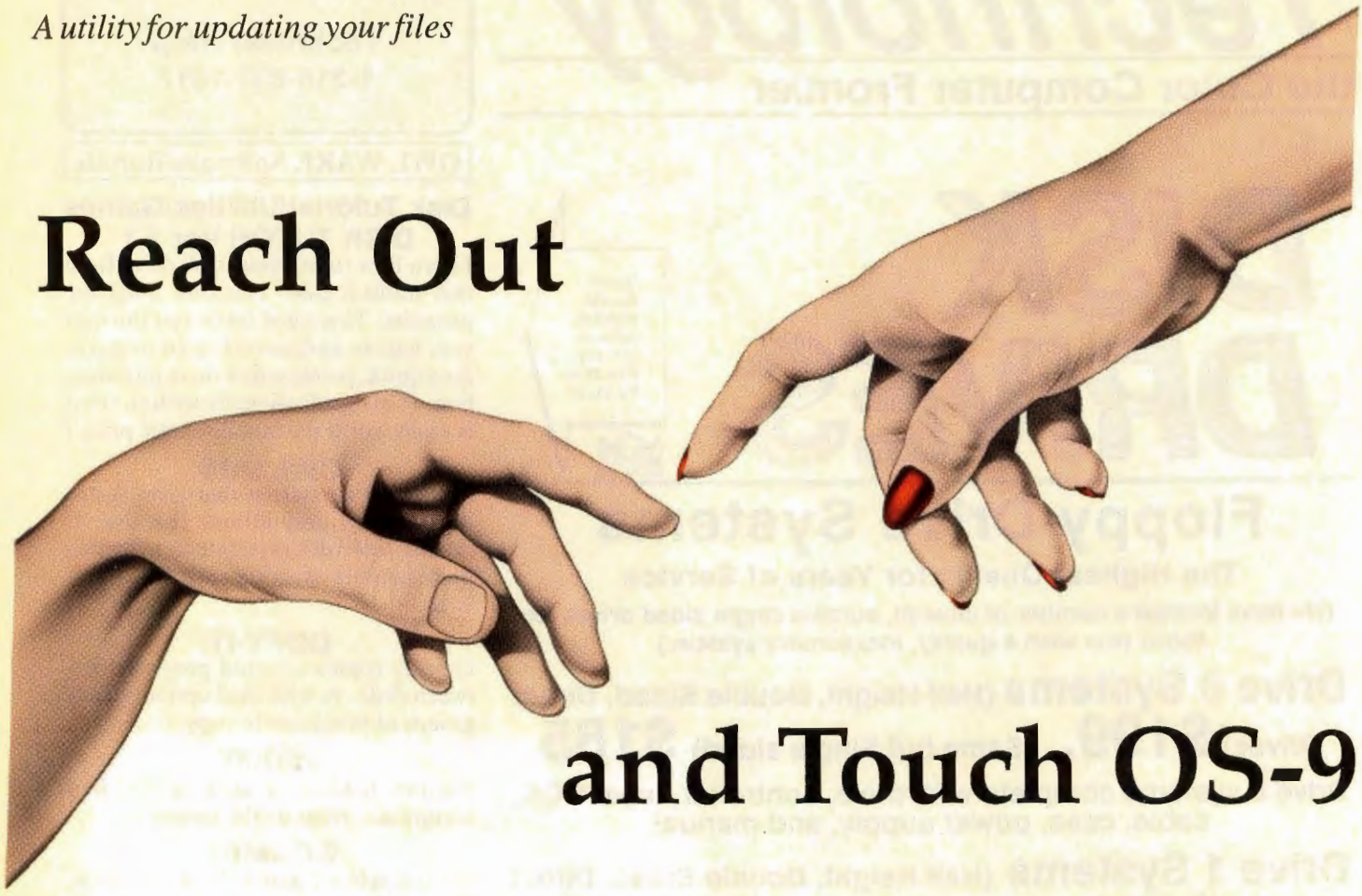
A utility for updating your files

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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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 direcfory 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 EOF(#disk) THEN
03C9          CLOSE #disk
03CF          ERROR 216
03D3        ENDEXIT
03D7          GET #disk,f
03E1          RUN ltou2(f.name)
03EE        EXITIF SUBSTR(tail,f.name)=1 THEN
0401        ENDEXIT
0405        ENDLOOP
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 ltou2(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
```

```
0690          SEEK #disk,posi+2.
06A1          PUT #disk,d
06AB          CLOSE #disk
06B1          IF param1 THEN
06BA            IF param2=FALSE THEN
06C5              PRINT "Changed to ";
06D5              RUN printdate(d.year,d.month,d.day,d.hour,d.min)
0702            ENDIF
0704            END
0706          ENDIF
0708          PRINT "Done...another (Y/N)? ";
0723        ELSE
0727          PRINT "Another (Y/N)? ";
073B        ENDIF
073D        GET #0,key
0746        PRINT
0748        RUN ltou2(key)
0752        tail=""
0759        touch=TRUE
075F      UNTIL key<>"Y"
076B      END "Done Touching."
PROCEDURE printdate
0000      PARAM year,month,day,hour,min:BYTE
0017      PRINT year; "/";
0021      IF month<10 THEN PRINT "0";
0032      ENDIF
0034      PRINT month; "/";
003E      IF day<10 THEN PRINT "0";
004F      ENDIF
0051      PRINT day; " at ";
005E      IF hour<10 THEN PRINT "0";
006F      ENDIF
0071      PRINT hour; ":";
007B      IF min<10 THEN PRINT "0";
008C      ENDIF
008E      PRINT min; "."
0097      END
PROCEDURE ltou2
0000      DIM workstring:STRING[40]
000C      DIM count:INTEGER
0013      DIM char:BYTE
001A      PARAM answer:STRING[40]
0026      workstring=""
002D      FOR count=1 TO LEN(answer)
003F        char=ASC(MID$(answer,count,1))
004E        IF char>96 AND char<123 OR char>224 AND char<251 THEN
006F          char=char-32
007A        ENDIF
007C        workstring=workstring+CHR$(char)
0089      NEXT count
0094      answer=workstring
009C      END
PROCEDURE getdate
0000      DIM num:STRING[2]
000C      DIM char:BYTE
0013      PARAM date:STRING[14]; time:BYTE
0025      num=""
002C      REPEAT
002E        num=num+LEFT$(date,1)
003D        date=RIGHT$(date,LEN(date)-1)
004D        char=ASC(date)
0056      UNTIL char=32 OR char=47 OR char=58 OR date=""
0076      date=RIGHT$(date,LEN(date)-1)
0086      time=VAL(num)
0090      END
```

Listing 2: Touch.hlp

```
@TOUCH
Syntax: Touch [("<filename>"[,"<date>"])]
Usage : Updates a file's last modified date.  Only the owner can modif
        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/CMDS 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 machine 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

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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

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 HOR2     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
ØØ2ØØ          BLS     LCLEAR
ØØ21Ø          BSR     PPOINT
```

```
00220 PAGE5   LDB    #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    $95AA
00400         ANDCC  #$AF    RESET THE INTERRUPTS
00410         RTS            BACK TO BASIC
00420 PPOINT  LDU    #$8100  BEGINNING OF DATA
00430         LDX    $BA     START OF GRAPHICS
00440         LEAX   357,X   FIRST GRAPHICS BYTE USED
00450         SETDP  $70
00460         LDA    #$70
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    #$70
00770         TFR    A,DP
00780         CLR    $FFDF   HIGH RAM
00790         LDB    #12     STARTING POINT DOWN
00800         STB    VERT
00810 LOOP4   LDA    #44     STARTING POINT ACROSS
00820         STA    HORZ
00830 LOOP3   LDA    ,X+
00840         BEQ    CPSET   BRANCH IF ZERO
00850         CLR    -1,X    CLEAR THE BIT
00860         LSRA           ANDA #1
00870         BCC    CPSET   BRANCH IF ZERO
00880         LDD    VERT    REG A=VERT:REG B=HORIZ
00890         LSRA
00900         RORB
00910         LSRA
00920         RORB
00930         LSRA
00940         RORB
00950         ADDA   >$BA
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
```

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 `cc1` 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

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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 cc1
l cc1
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 cc1
l cc1
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

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.l clib.l sys.l
>merged.l
```

Include merged.l 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
makdir LIB
chd LIB
copy /h0/lib/merged.l merged.l
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.l
* The following compiler line links
the *
* CGFX functions in merged.l to
your program *
c.link cstart.r -l=prog.l -
l=merged.l -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-Vue*. (You can use cgfx functions without *Multi-Vue*, but your cgfx documentation is in the *Multi-Vue* 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-Vue* 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.l -l=/d1/lib/clib.l
-l=/d1/lib/sys.l -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-Vue* 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-Vue*, will help you debug your manual.

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

If you are uncertain about path simply use 1 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.)

Part 2 of a three-part series

Building a RAMDisk

By Tony DiStefano
Rainbow Contributing Editor

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 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 username on Delphi is DISTO.

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EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns. There is also a free standing ML Debug Monitor.

EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

- Local and Global string search and/or replace.
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The Assembler features include:

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- Supports Disk Library file up to 9 levels deep.
- Supports standard Motorola directives.
- Allows multiple values in FCB & FDB directives
- Allows assembly from the Buffer, Disk or both.

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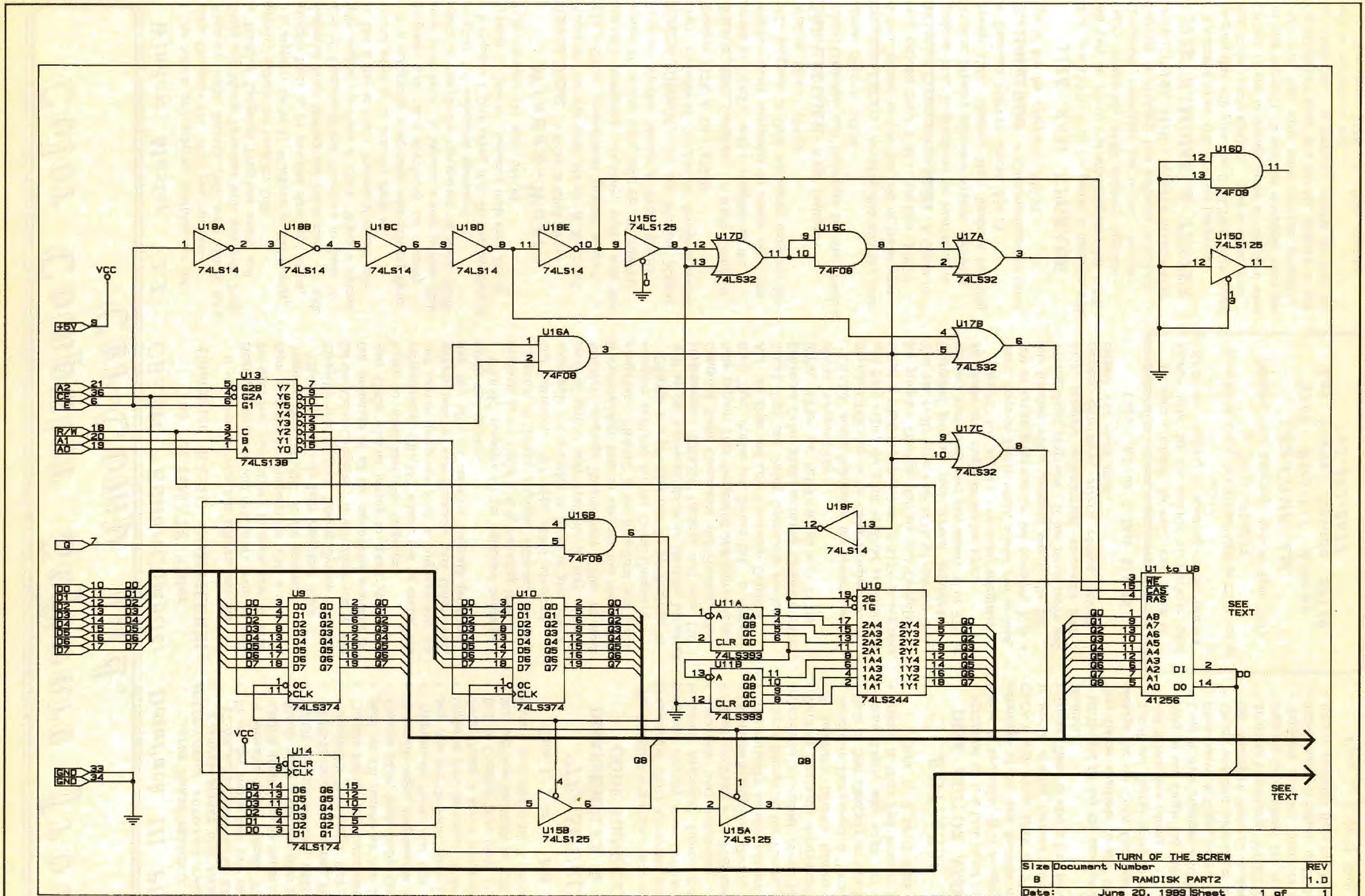

TURN OF THE SCREW
Size Document Number REV
B RAMDISK PART2 1.0
Date: June 20, 1989 Sheet 1 of 1
SEE TEXT
SEE TEXT
U1 to U8
41256
74LS14
74LS138
74LS374
74LS174
74LS125
74LS32
74F08
74LS393
74LS244

Figure 1

we want to read is set up.

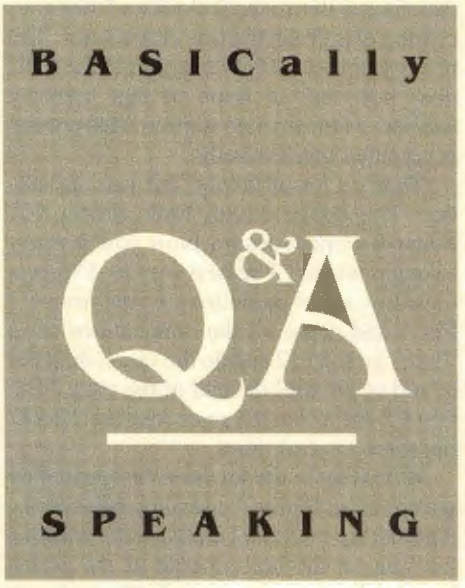
To read the byte at the above address, read the address $FF43. When we read $FF43, we start the cycle by SCS going low. The memory-mapped byte is at $FF43. The R/W line puts all the RAM chips in the Read mode. Then the SCS locks out the Q clock from counting the next refresh address to U11. U16A goes 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 protoboard. 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.



By Larry Boeldt

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$(100) ' THE NUMBER OF LI
NES ALLOWED TO BE TYPED (CAN BE
INCREASED)
10 WO=0 'THE NUMBER OF LETTERS I
N THE CURRENT WORD
11 LE=0 'THE LENGTH OF THE CURRE
NT LINE
12 LN=60'THE MAXIMUM LENGTH OF A
LINE
13 A$=" "'A CHARACTER FROM THE K
EYBOARD
14 L$=""'THE LINE CURRENTLY BEIN
G TYPED
15 NU=1 'THE CURRENT LINE NUMBER
100 CLS:PRINT
110 EXEC 44537:A$=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 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

ØØØØ PARAM filename:STRING[5]
ØØØC DIM done:BOOLEAN
ØØ13 DIM s:STRING[1]
ØØ1F DIM fsector(256):BYTE
ØØ2B DIM i:INTEGER
ØØ32 DIM path:BYTE
ØØ39 DIM sector:INTEGER
ØØ4Ø ON ERROR GOTO 3ØØ
ØØ46 filename=filename
```

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.

```
ØØ4E PRINT CHR$(12);
ØØ54 OPEN #path,filename+"@
":READ
ØØ64 REPEAT
ØØ66 SEEK #path,78848.
ØØ73 PRINT CHR$(12)
ØØ78 PRINT "Put Color Bas
ic Disk into "; filename
ØØ9A PRINT "and press any
key to continue "
ØØBD GET #1,s
ØØC6 PRINT CHR$(12)
ØØCB done=FALSE
ØØD1 FOR sector=1 TO 18
ØØE1 GET #path,fsector
ØØEB RUN display(fsecto
r,done)
ØØFA IF done THEN 1Ø
Ø1Ø6 NEXT sector
Ø111 1Ø
115 PRINT
Ø117 PRINT "Another disk?
"
Ø129 GET #1,s
Ø132 UNTIL s="n" OR s="N"
Ø146 CLOSE #path
Ø14C END
14E 3ØØ
Ø152 PRINT CHR$(7); CHR$(7)
Ø15B i=ERR
Ø161 IF i=56 THEN
```

```
Ø16D PRINT
Ø16F PRINT "Usage: RSDIR(
"; CHR$(34); "/d1";CHR$(34); ")"
Ø192 ENDIF
Ø194 IF i=244 THEN
Ø1AØ PRINT
Ø1A2 PRINT "You must firs
t put an"
Ø1BB PRINT "OS9 format di
sk in "
Ø1D2 PRINT filename; " be
fore trying to use"
Ø1EF PRINT "the Color BAS
IC disk"
Ø2Ø7 ENDIF

PROCEDURE display
ØØØØ PARAM sector(256):BYTE
ØØØC PARAM done:BOOLEAN
ØØ13 DIM i,j:INTEGER
ØØ1E FOR j=1 TO 256 STEP 32
ØØ34 FOR i=j TO j+1Ø
ØØ49 IF sector(i)=Ø THE
N 2Ø
ØØ5B IF sector(i)=255 T
HEN
ØØ6A done=TRUE
ØØ7Ø GOTO 3Ø
ØØ74 ENDIF
ØØ76 PRINT #3,CHR$(sect
or(i));
```

```
ØØ84 IF i=j+7 THEN PRIN
T #3,"/";
ØØ9D ENDIF
ØØ9F NEXT i
ØØAA PRINT #3," ",
ØØB6 2Ø
ØØBA NEXT j
ØØC5 3Ø 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.

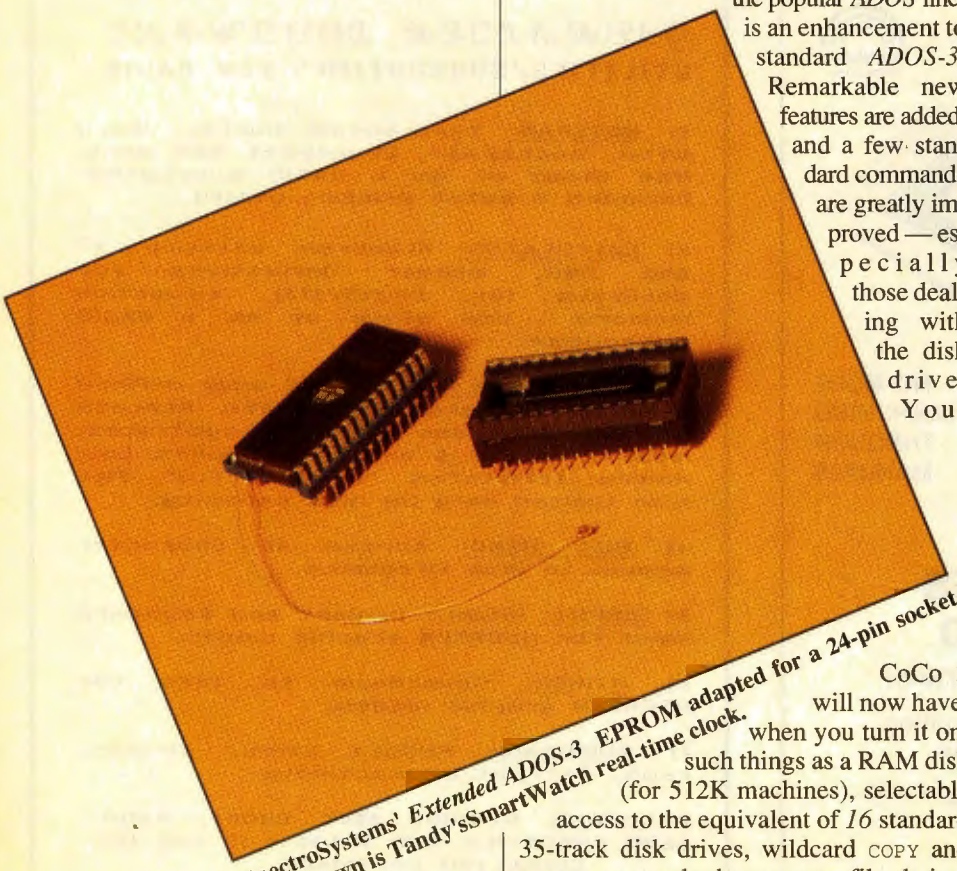
Software

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



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

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.

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.

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*80*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 DATE$ function, as in PRINT DATE$, or A$=DATE$.

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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.

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 boogaloo!'" 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 fearsome 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.

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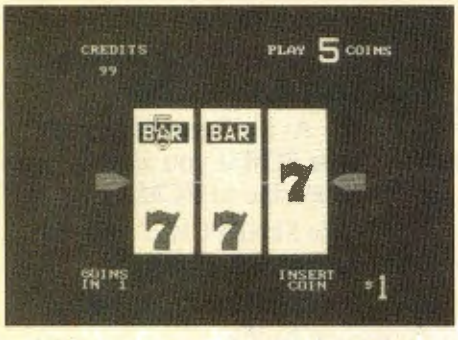
—John Hebert

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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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 improvement 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 inserting 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.

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 cataloging 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.

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 Sportsware 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.

(Sportsware, 1251 S. Reynolds Rd. Suite 414, Toledo, OH 43615, 419-389-1515; $18)

—Robin Jackson

Label Designer

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- **Print Labels With Text And Graphics:** Use Label Designer's fonts and pictures or any of Zebra's optional Picture & Font Disks.
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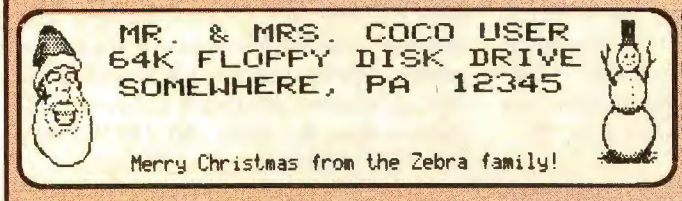
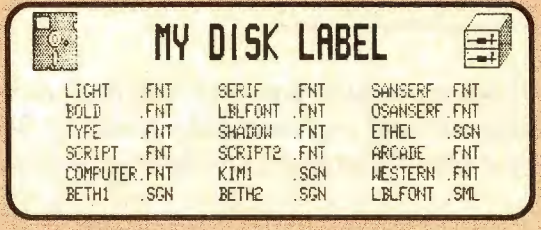


LABEL DESIGNER LABEL
PRINTED ON DMP105

- **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.



LABEL DESIGNER LABEL
PRINTED ON DMP105
80% OF ACTUAL SIZE

- **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**

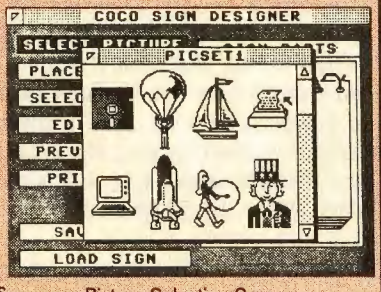
We stock white and colored labels in a variety of address, disk, and cassette sizes at competitive prices.

Banners, Signs & Greeting Cards

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 typset manual. **$29.95**



Picture Selection Screen

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, rectanges, 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

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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

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 antistatic 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

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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.

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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.

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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
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KISSable OS-9

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-Vue*-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-Vue*-based icon editor, demands a modular approach. It contains 27 modules. Last month there were seven source code listings for modules named `maxic`, `main`, `menup`, `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-Vue* 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; `INAME`, 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.

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: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

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 *MaxIc*'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.

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 *MaxIc*'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 `I$GetStt` 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
 ØØØØ      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 ØØ1B      TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpId,BufNo,number
            ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 Ø064      PARAM MS:MicSys
 Ø06D      PARAM DR,IC:Mic
 Ø07A      DIM TName:STRING
 Ø081      DIM OK:BOOLEAN
 Ø088      ON ERROR GOTO 3Ø
 Ø08E    (* set cursor at top to help keep window rollup when coming out of ow_window
 ØØDA      RUN gfx2("curxy",Ø,Ø)
 ØØED      (* get rid of the arrow
 Ø1Ø4      RUN gfx2("gcset",Ø,Ø)
 Ø117      RUN gfx2("propsw","off")
 Ø12B      (* use small 6x8 letters
 Ø143      RUN gfx2("font",2ØØ,2)
 Ø155      (* goto what we selected
 Ø16D      ON MS.MenNum GOTO 1,2,3,4,5,6,7,8,9
 Ø19B      END
 Ø19D 1    (* calc
 Ø1A7      RUN gfx2("owset",1,2,4,3Ø,17,2,Ø)
 Ø1C9      (* set window for plane box
 Ø1E4      RUN winset(5)
 Ø1EC      SHELL "gcalc"
 Ø1F5      GOTO 2Ø
 Ø1F9 2    (* clock
 Ø2Ø4      RUN gfx2("owset",1,2,5,2Ø,15,2,Ø)
 Ø226      RUN winset(5)
 Ø22E      SHELL "tmode echo"
 Ø23C      SHELL "gclock"
 Ø246      GOTO 2Ø
 Ø24A 3    (* calendar
 Ø258      RUN gfx2("owset",1,Ø,Ø,4Ø,24,1,Ø)
 Ø27A      RUN winset(5)
 Ø282      SHELL "tmode echo"
 Ø29Ø      SHELL "gcal"
 Ø298      GOTO 2Ø
 Ø29C 4    (* control
 Ø2A9      RUN gfx2("owset",1,1,1,2Ø,2Ø,2,Ø)
 Ø2CB      RUN winset(5)
 Ø2D3      SHELL "control"
 Ø2DE      GOTO 2Ø
 Ø2E2 5    (* printer
 Ø2EF      RUN gfx2("owset",1,1,1,2Ø,2Ø,2,Ø)
 Ø311      RUN winset(5)
 Ø319      SHELL "tmode echo"
 Ø327      SHELL "gprint"
 Ø331      GOTO 2Ø
 Ø335 6    (* port
 Ø33F      RUN gfx2("owset",1,1,1,2Ø,21,2,Ø)
 Ø361      RUN winset(5)
 Ø369      SHELL "tmode echo"
 Ø377      SHELL "gport"
 Ø38Ø      GOTO 2Ø
 Ø384 7    (* help
 Ø38E      RUN gfx2("owset",1,1,5,38,16,1,Ø)
 Ø3BØ      (* set window for double box
 Ø3CC      RUN winset(4)
 Ø3D4      SHELL "tmode echo"
 Ø3E2      RUN gfx2("curon")
 Ø3EF      LOOP
 Ø3F1        PRINT "Press [ENTER] to exit"
 Ø4ØA        INPUT "What OS-9 Subject(s)?  ",TName
 Ø429      EXITIF TName="" THEN
 Ø435      ENDEXIT
 Ø439        SHELL "help "+TName
 Ø446        PRINT
 Ø448      ENDLOOP
 Ø44C      GOTO 2Ø
 Ø45Ø 8    (* shell
 Ø45B      RUN gfx2("owset",1,1,5,38,16,1,Ø)
 Ø47D      RUN winset(4)
 Ø485      SHELL "tmode echo"
 Ø493      RUN gfx2("curon")
 Ø4AØ      RUN gfx2("curxy",Ø,Ø)
 Ø4B3      RUN gfx2("font",2ØØ,2)
 Ø4C5      PRINT "press [CTRL] and [ESC] to exit"
 Ø4E7      SHELL "shell"
 Ø4FØ 9    (* clipboard
 Ø4FF 2Ø   RUN gfx2("owend")
 Ø5ØF      GOTO 35
 Ø513 3Ø   MS.ErrNum:=ERR
 Ø52Ø      RUN gfx2("owend")
 Ø52D      RUN errmsg(MS.ErrNum)
 Ø53A 35   SHELL "tmode -echo"
 Ø54C      RUN gfx2("propsw","on")
 Ø55F      RUN gfx2("font",2ØØ,1)
 Ø571      RUN gfx2("curoff")
 Ø57F      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: INTEGER;  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
 ØØØØ      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 ØØ1B      TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpId,BufNo,number
            ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 ØØ64      PARAM MS:MicSys
 ØØ6D      PARAM DR,IC:Mic
 ØØ7A      DIM TName:STRING
 ØØ81      DIM OK:BOOLEAN
 ØØ88      ON ERROR GOTO 3Ø
 ØØ8E      (* goto selected number
 ØØA5      ON MS.MenNum GOTO 1,2,3,4,5,6,7,8
 ØØCF      END
 ØØD1 1    (* write dirfile
 ØØE4      (* end if nothing selected
 ØØFE      IF DR.name<>"" THEN
 Ø1ØD        (* else do we relly want to
 Ø128        RUN getans(MS,OK,"Write "+DR.name)
 Ø147        (* if we do let't do it
 Ø15E        IF OK THEN
 Ø167          (* set temp name to nothing
 Ø182          TName:=""
 Ø189          (* go make a file
 Ø19A          RUN writefile(MS.Dname,DR.name,TName)
 Ø1B4        ENDIF
 Ø1B6      ENDIF
 Ø1B8      GOTO 2Ø
 Ø1BC 2    (* rename dirfile
 Ø1DØ      IF DR.name<>"" THEN
 Ø1DF        (* get new name
 Ø1EE        RUN getname(TName)
 Ø1F8        (* is there a new name
 Ø2ØE        IF TName="" THEN
 Ø21A          (* no so forget about it
 Ø232          END
 Ø234        ELSE
 Ø238          (* yes so is it correct
 Ø24F          RUN getans(MS,OK,"ReName "+DR.name+" to "+TName)
 Ø27A          IF OK THEN
 Ø283            (* it is correct so let's give it a new name
 Ø2AF            SHELL "rename "+MS.Dname+"/"+DR.name+" "+TName
 Ø2D4            (* and change the name in the buffer number
 Ø2FF            MS.Iname(DR.select)=TName
 Ø311            DR.name:=TName
 Ø31D            (* we do the directory window
 Ø33A            GOSUB 4Ø
 Ø33E          ENDIF
 Ø34Ø        ENDIF
 Ø342      ENDIF
 Ø344      GOTO 2Ø
 Ø348 3    (* delete dirfile
 Ø35C      IF DR.name<>"" THEN
 Ø36B        RUN getans(MS,OK,"Delete "+DR.name)
 Ø38B        IF OK THEN
 Ø394          SHELL "del "+MS.Dname+"/"+DR.name
 Ø3AE          (* rename it to XXXX so we know it's not there
 Ø3DC          MS.Iname(DR.select):="icon.XXXX"
 Ø3F6          (* now show it on the screen
 Ø412          GOSUB 4Ø
 Ø416        ENDIF
 Ø418      ENDIF
 Ø41A      GOTO 2Ø
 Ø41E 4    (* chi
 Ø427*     RUN gfx2("owset",1,5,1Ø,3Ø,7,2,Ø)
 Ø449      RUN winset(4)
```

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

```
Ø451        RUN gfx2("curxy",Ø,Ø)
Ø464        (* the current icon director
Ø48Ø        PRINT "current icon dir "; MS.Dname
Ø49C        RUN gfx2("curxy",Ø,2)
Ø4AF        (* turn off the propsw so we can backup with out overlap
Ø4E7        RUN gfx2("propsw","off")
Ø4FB        (* and turn on the echo so we can see it
Ø523        SHELL " tmode echo"
Ø532        (* now we can get the new path
Ø55Ø        INPUT "change to > ",TName
Ø564        (* let's we set every thing
Ø57F        SHELL "tmode -echo"
Ø58E        RUN gfx2("propsw","on")
Ø5A1        RUN gfx2("owend")
Ø5AE        (* was there a new path
Ø5C5        IF TName<>"" THEN
Ø5D1          (* yes so let's change it
Ø5EA          MS.Dname=TName
Ø5F6          (* do we want to laod it in
Ø611          RUN getans(MS,OK,"Laod "+MS.Dname)
Ø62F          IF OK THEN
Ø638            (* yes so goto loaddir
Ø64E            GOTO 5
Ø652          ENDIF
Ø654        ENDIF
Ø656        GOTO 2Ø
Ø65A 5      (* load dir
Ø668        (* start at the first buffer
Ø684        MS.number:=Ø
Ø68F        (* and the first page
Ø6A4        MS.scount:=1
Ø6AF        (* clear the screen first
Ø6C8        GOSUB 4Ø
Ø6CC        RUN getdir(MS,DR)
Ø6DB        GOTO 2Ø
Ø6DF 6      (* chd
Ø6E8        RUN gfx2("gcset",Ø,Ø)
Ø6FB        RUN gfx2("owset",1,5,1Ø,3Ø,7,2,Ø)
Ø71D        RUN winset(4)
Ø725        RUN gfx2("curxy",Ø,Ø)
Ø738        PRINT "current wk.dir ";
Ø74C        (* get the current path
Ø763        SHELL "pwd"
Ø76A        RUN gfx2("curxy",Ø,2)
Ø77D        RUN gfx2("propsw","off")
Ø791        SHELL "tmode echo"
Ø79F        INPUT "change to >",TName
Ø7B2        SHELL "tmode -echo"
Ø7C1        RUN gfx2("propsw","on")
Ø7D4        RUN gfx2("owend")
Ø7E1        IF TName<>"" THEN
Ø7ED          CHD TName
Ø7F2        ENDIF
Ø7F4        GOTO 2Ø
Ø7F8 7      (* chx
Ø8Ø1        RUN gfx2("gcset",Ø,Ø)
Ø814        RUN gfx2("owset",1,5,1Ø,3Ø,7,2,Ø)
Ø836        RUN winset(4)
Ø83E        RUN gfx2("curxy",Ø,Ø)
Ø851        PRINT "current ex.dir ";
Ø865        (* get the current ex path
Ø87F        SHELL "pxd"
Ø886        RUN gfx2("curxy",Ø,2)
Ø899        RUN gfx2("propsw","off")
Ø8AD        SHELL "tmode echo"
```

```
Ø8BB        INPUT "change to >",TName
Ø8CE        SHELL "tmode -echo"
Ø8DD        RUN gfx2("propsw","on")
Ø8FØ        RUN gfx2("owend")
Ø8FD        IF TName<>"" THEN
Ø9Ø9          CHX TName
Ø9ØE        ENDIF
Ø91Ø        GOTO 2Ø
Ø914 8      (* print
Ø91F        IF DR.name<>"" THEN
Ø92E          RUN getans(MS,OK,"Print "+DR.name)
Ø94D          IF OK THEN
Ø956            (* set the temp name to printer
Ø975            TName:="/p"
Ø97E            (* and send it to the writefile
Ø99D            RUN writefile(MS.Dname,DR.name,TName)
Ø9B7          ENDIF
Ø9B9        ENDIF
Ø9BB 2Ø     (* exit dirfiles
Ø9CE        IC.select:=Ø
Ø9D9        DR.name:=""
Ø9E4        RUN showdir(MS,DR)
Ø9F3        END
Ø9F5 3Ø     MS.ErrNum:=ERR
ØAØ2        (* report the error
ØA15        RUN errmsg(MS.ErrNum)
ØA22        IC.select:=Ø
ØA2D        DR.name:=""
ØA38        END
ØA3A        (* clear the dir window
ØA51 4Ø     RUN gfx2("color",Ø)
ØA64        RUN gfx2("bar",29Ø,2Ø,636,188)
ØA7D        (* and see it
ØA8A        RUN showdir(MS,DR)
ØA99        RETURN
```

Listing 3: `getans`

```
PROCEDURE getans
 ØØØØ       TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpId,BufNo,number
             ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 Ø049       PARAM MS:MicSys
 Ø052       PARAM OK:BOOLEAN
 Ø059       PARAM MessAge:STRING
 Ø06Ø       DIM key:STRING[1]
 Ø06C       ON ERROR GOTO 1Ø
 Ø072       (* use arrow pointer
 Ø086       RUN gfx2("gcset",2Ø2,1)
 Ø099       (* set OK to no
 ØØA8       OK:=FALSE
 ØØAE       RUN gfx2("owset",1,5,1Ø,32,8,1,3)
 ØØDØ       RUN winset(4)
 ØØD8       (* try to relive some garbag if any
 ØØFB       PRINT  \ PRINT
 ØØFF       RUN gfx2("curxy",1,Ø)
 Ø112       PRINT MessAge
 Ø117       (* turn off propsw to write yes and no
 Ø13D       RUN gfx2("propsw","off")
 Ø151       RUN gfx2("curxy",8,4)
 Ø164       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 *MaxIc* 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 `CMDS/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 *MaxIc* 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

— 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-

```
Ø178        PRINT "[yes]  [no]"
Ø187        RUN gfx2("propsw","on")
Ø19A        (* go get the answer
Ø1AE        RUN getkey(key,MS.horiz,MS.vert)
Ø1C8        (* if key is yes make it yes
Ø1E4        IF key="y" OR key="Y" THEN
Ø1F9          MS.horiz:=25Ø \MS.vert:=38
Ø2ØF        ENDIF
Ø211        RUN gfx2("owend")
Ø21E        IF MS.horiz>243 AND MS.horiz<3Ø6 AND MS.vert>36 AND MS.vert
             <42 THEN
Ø24C          (* it's yes so ok is true
Ø265          OK=TRUE
Ø26B        ENDIF
Ø26D        END
Ø26F 1Ø     MS.ErrNum:=ERR
Ø27C        RUN errmsg(MS.ErrNum)
```

Listing 4: `writefile`

```
PROCEDURE writefile
ØØØØ        PARAM DirName,Name,Tname:STRING
ØØØF        DIM Byt(144),path,tpath,ErrNum:BYTE
Ø027        ON ERROR GOTO 1Ø
Ø02D        IF Name="" THEN
Ø039          (* we forgot to select so end
Ø056          END
Ø058        ENDIF
Ø05A        (* show hour glass
Ø06C        RUN gfx2("gcset",2Ø2,4)
Ø07F        (* try to open icon
Ø092        OPEN #path,DirName+"/"+Name:READ
ØØA6        (* get byte info
ØØB6        FOR x:=1 TO 144
ØØC8          GET #path,Byt(x)
ØØD7        NEXT x
ØØE2        CLOSE #path
ØØE8        (* do we want it sent to the printer
Ø1ØC        IF Tname="/p" THEN
Ø11A          (* yes so open it
Ø12B          OPEN #path,Tname:WRITE
Ø137          (* print out the name of the icon
Ø158          PRINT #path USING "s4Ø^",Name
Ø169        ELSE
Ø16D          (* no we what a file
Ø182          OPEN #path,Name:WRITE
Ø18E        ENDIF
Ø19Ø        (* start at Ø
Ø19D        xx:=Ø
Ø1A5        (* go in steps of two
Ø1BA        FOR x:=1 TO 144 STEP 2
Ø1D2          (* use hex numbers
Ø1E4          PRINT #path USING "h2",Byt(x);
Ø1F8          PRINT #path USING "h2",Byt(x+1);
Ø21Ø          (* and a blank space
Ø224          PRINT #path," ";
Ø22F          xx:=xx+1
Ø23B          IF xx=8 THEN
Ø248            (* at the end so send a CR
Ø262            PRINT #path
Ø268            (* and start over
Ø279            xx:=Ø
Ø281          ENDIF
Ø283        NEXT x
Ø28E        CLOSE #path
Ø294        END
Ø296 1Ø     ON ERROR GOTO 2Ø
Ø29F        (* we have to make one
Ø2B3        CREATE #path,Name:WRITE
Ø2C1        (* and do the same
Ø2D3        xx:=Ø
Ø2DB        FOR x:=1 TO 144 STEP 2
Ø2F3          PRINT #path USING "h2",Byt(x);
Ø3Ø7          PRINT #path USING "h2",Byt(x+1);
Ø31F          PRINT #path; " ";
Ø32A          xx:=xx+1
Ø336          IF xx=8 THEN
Ø343            PRINT #path
Ø349            xx:=Ø
Ø351          ENDIF
Ø353        NEXT x
Ø35E        CLOSE #path
Ø364        END
Ø366 2Ø     ErrNum:=ERR
Ø36F        (* report error
Ø37E        RUN errmsg(ErrNum)
```

Listing 5: getname

```
PROCEDURE getname
 ØØØØ       PARAM filename:STRING
 ØØØ7       DIM ErrNum:BYTE
 ØØØE       ON ERROR GOTO 1Ø
 ØØ14       (* turn off the pointer
 ØØ2B       RUN gfx2("gcset",Ø,Ø)
 ØØ3E       RUN gfx2("owset",1,1,5,14,6,1,3)
 ØØ6Ø       RUN winset(4)
 ØØ68       RUN gfx2("curxy",1,1)
 ØØ7B       (* what do we want
 ØØ8D       PRINT "Filename"
 ØØ99       RUN gfx2("curxy",1,2)
 ØØAC       RUN gfx2("propsw","off")
 ØØCØ       SHELL "tmode echo"
 ØØCE       (* a name
 ØØD8       INPUT ">",filename
 ØØE1       SHELL "tmode -echo"
 ØØFØ       RUN gfx2("owend")
 ØØFD       RUN gfx2("propsw","on")
 Ø11Ø       (* there's a name so do this
 Ø12C       IF filename<>"" THEN
 Ø138         (* do's it start with icon.
 Ø153         IF LEFT$(filename,5)<>"icon." THEN
 Ø167           (* no so add it on
 Ø179           filename:="icon."+filename
 Ø189         ENDIF
 Ø18B       ELSE
 Ø18F         filename:=""
 Ø196       ENDIF
 Ø198       END
 Ø19A 1Ø    ErrNum:=ERR
 Ø1A3       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.

Let's get this universal platform on the CoCo too. It's one more chance for the CoCo OS-9 user to make a mark. Good things are coming. Keep on hacking!

❑

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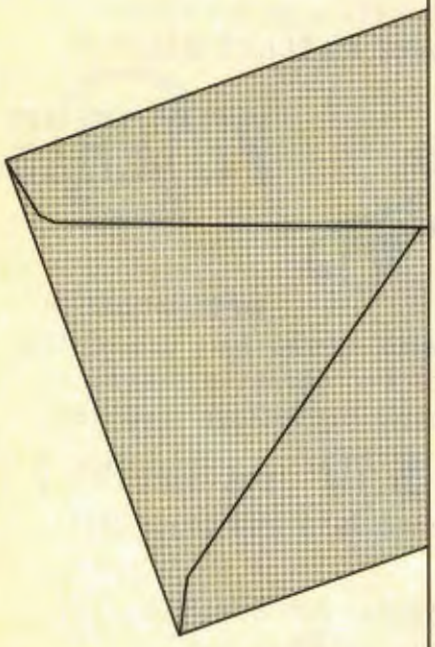

Listing 6: `getdir`

```
PROCEDURE getdir
 ØØØØ      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 ØØ1B      TYPE MicSys=Dname,Iname(48):STRING; Byt(144),GrpID,BufNo,Number
            ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 ØØ64      PARAM MS:MicSys
 ØØ6D      PARAM dr:Mic
 ØØ76      DIM Tname,temp(6Ø):STRING
 ØØ86      DIM Count:INTEGER
 ØØ8D      DIM path,BT:BYTE
 ØØ98      ON ERROR GOTO 1Ø
 ØØ9E      (* show that we are busy
 ØØB6      RUN gfx2("gcset",2Ø2,4)
 ØØC9      (* let's start at the first buffer
 ØØEB      Count:=Ø
 ØØF2      RUN gfx2("color",1)
 Ø1Ø2      (* get the icon directory open
 Ø12Ø      OPEN #path,MS.Dname:READ+DIR
 Ø12F      RUN gfx2("curxy",18,1)
 Ø142      (* if it opened let's say what we are doing
 Ø16D      PRINT USING "s3Ø^","Loading "+MS.Dname
 Ø188      RUN gfx2("propsw","off")
 Ø19C      WHILE NOT(EOF(#path)) DO
 Ø1A7        (* move the count up one
 Ø1BF        Count:=Count+1
 Ø1CA        (* get name from directory
 Ø1E4        GET #path,temp(Count)
 Ø1F2        (* go get another one if not at end
 Ø215      ENDWHILE
 Ø219      CLOSE #path
 Ø21F      (* skip the first 64 bytes
 Ø239      FOR xx:=3 TO Count
 Ø24C        (* is the first byte a char
 Ø267        IF ASC(LEFT$(temp(xx),1))>31 THEN
 Ø27B          (* yes so clear the temp name
 Ø298          Tname:=""
 Ø29F          (* now read the bytes
 Ø2B4          FOR x:=1 TO 32
 Ø2C6            (* one by one and short them out
 Ø2E6            BT:=ASC(MID$(temp(xx),x,1))
 Ø2FA            (* is it a large letter
 Ø311            IF BT>64 AND BT<96 THEN
 Ø324              (* yes make it small
 Ø338              BT:=BT+32
 Ø343            ENDIF
 Ø345            (* stop if not a valid char
 Ø36Ø          EXITIF BT>127 THEN
 Ø36C            (* then LAND it
 Ø37B            BT:=LAND(BT,127)
 Ø386            (* add the char to the name
 Ø3A1            Tname:=Tname+CHR$(BT)
 Ø3AE            (* move the buffer up one
 Ø3C7            MS.Number:=MS.Number+1
 Ø3D9            (* add the name to the list
 Ø3F4            MS.Iname(MS.Number):=Tname
 Ø4Ø6          ENDEXIT
 Ø4ØA            (* or exit if byte =Ø
 Ø41F          EXITIF BT=Ø THEN
 Ø42B            (* and move the buffer up one
 Ø448            MS.Number:=MS.Number+1
 Ø45A            (* and add the name to the list
 Ø479            MS.Iname(MS.Number):=Tname
 Ø48B          ENDEXIT
 Ø48F           (* where still going so add char to name and go get another char
 Ø4CF           Tname:=Tname+CHR$(BT)
 Ø4DC          NEXT x
 Ø4E7          (* we got a full name so let't get the icon
 Ø512          OPEN #path,MS.Dname+"/"+MS.Iname(MS.Number)
 Ø53Ø          (* point to the buffer to put it in
 Ø553          RUN gfx2("gpload",MS.GrpID,MS.Number,6,24,24,144)
 Ø57D          (* now read the bytes to put in it
 Ø59F          FOR x:=1 TO 144
 Ø5B1            GET #path,BT
 Ø5BB            PUT #MS.GrpID,BT
 Ø5C8          NEXT x
 Ø5D3          CLOSE #path
 Ø5D9        ENDIF
 Ø5DB        (* well let's see if we can do that agin
 Ø6Ø3      NEXT xx
 Ø6ØE      (* all done
 Ø619      (* so let's show the name of the directory
 Ø643      RUN gfx2("propsw","on")
 Ø656      RUN gfx2("color",1,Ø)
 Ø669      RUN gfx2("curxy",18,1)
 Ø67C      PRINT USING "s3Ø^",MS.Dname
 Ø68C      RUN showdir(dr,MS)
 Ø69B      END
 Ø69D 1Ø   MS.ErrNum:=ERR
 Ø6AA      (* report any errors
 Ø6BE      RUN errmsg(MS.ErrNum)
```

Listing 7: winset

```
PROCEDURE winset
 ØØØØ      (* till windint the type of window we whant
 ØØ2B      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 ØØ5Ø      DIM regs:registers
 Ø059      DIM callcode,ErrNum:BYTE
 Ø064      PARAM wtyp:INTEGER
 ØØ6B      ON ERROR GOTO 1Ø
 Ø071      regs.a:=Ø
 Ø07C      regs.b:=$86
 ØØ88      regs.y:=wtyp
 Ø094      callcode:=$8E
 ØØ9C      RUN syscall(callcode,regs)
 ØØAB      END
 ØØAD 1Ø   ErrNum:=ERR
 ØØB6      RUN errmsg(ErrNum)
 ØØCØ      END
```

Listing 8: mouser

```
PROCEDURE mouser
 ØØØØ      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 Ø025      DIM regs:registers
 ØØ2E      DIM path,callcode,ErrNum:BYTE
 Ø03D      DIM RatPack(32):BYTE
 Ø049      PARAM horiz,vert:INTEGER
 Ø054      PARAM button:BYTE
 Ø05B      ON ERROR GOTO 1Ø
 Ø061      (* get mouse info
 Ø072      regs.a:=Ø
 Ø07D      regs.b:=$89
 Ø089      regs.x:=ADDR(RatPack)
 Ø097      regs.y:=Ø
 ØØA2      callcode:=$8D
 ØØAA      RUN syscall(callcode,regs)
 ØØB9      (* set horiz for actual then adjust
 ØØDC      horiz:=RatPack(25)*255+RatPack(26)+horiz/16
 ØØF6      (* set vert for relative
 Ø1ØE      vert:=192*(RatPack(31)*255+RatPack(32))/172
 Ø127      (* get button info
 Ø139      button:=RatPack(9)
 Ø143      END
 Ø145 1Ø   ErrNum:=ERR
 Ø14E      RUN errmsg(ErrNum)
 Ø158      END
```

Listing 9: loadicon

```
PROCEDURE loadicon
 ØØØØ      TYPE Mic=Name:STRING; select:BYTE; xpos,ypos:INTEGER
 ØØ1B      TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpID,BufNo,number
            ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 Ø064      PARAM MS:MicSys
 Ø06D      PARAM Dr,Ic:Mic
 Ø07A      DIM x,count:INTEGER
 Ø085      DIM path:BYTE
 Ø08C      (* is there a dir name selected
 ØØAB      IF Dr.Name="" THEN
 ØØBA        (* no so use editor name
 ØØD2        Dr.Name:=Ic.Name
 ØØE1        IF Ic.Name="" THEN
 ØØFØ          (* but no editor name ether so end
 Ø112          END
 Ø114        ENDIF
 Ø116      ENDIF
 Ø118      BASE Ø
 Ø11A      (* show the disk is busy
 Ø132      RUN gfx2("gcset",2Ø2,4)
 Ø145      (* turn off logic
 Ø156      RUN gfx2("logic","off")
 Ø169      ON ERROR GOTO 1Ø
 Ø16F      (* open the icon path
 Ø184      OPEN #path,MS.Dname+"/"+Dr.Name
 Ø19C      (* found it so tranfer the name to the editor
 Ø1C9      Ic.Name:=Dr.Name
 Ø1D8      RUN gfx2("gpload",MS.GrpID,49,6,24,24,144)
 Ø1FD      FOR x:=Ø TO 143
 Ø2ØD        GET #path,MS.byt(x)
 Ø21E        PUT #MS.GrpID,MS.byt(x)
 Ø232      NEXT x
 Ø23D      CLOSE #path
 Ø243      (* place it in the update window
 Ø263      RUN gfx2("put",MS.GrpID,49,26,13)
 Ø27F      (* blank out the editor first
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful, helpful and fun for other CoCo owners.

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

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

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

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

Please do not submit material currently submitted to another publication.

```
Ø29C       RUN loadbar(Ic.Name)
Ø2A9       (* now fill it with the icon
Ø2C5       RUN showicon(MS.byt)
Ø2D2       END
Ø2D4 1Ø    MS.ErrNum:=ERR
Ø2E1       (* report the error
Ø2F4       RUN errmsg(MS.ErrNum)
Ø3Ø1       END
```

Listing 1Ø: `getfile`

```
PROCEDURE getfile
 ØØØØ      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 ØØ1B      TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpId,BufNo,number
            ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 ØØ64      PARAM MS:MicSys
 ØØ6D      PARAM Dr,Ic:Mic
 ØØ7A      DIM button:BYTE
 ØØ81      ON ERROR GOTO 1Ø
 ØØ87      (* clear the select pos
 ØØ9E      RUN gfx2("put",MS.GrpId,5Ø,Dr.xpos,Dr.ypos)
 ØØC4      (* put it in update window
 ØØDE      RUN gfx2("put",MS.GrpId,5Ø,26,13)
 ØØFA      REPEAT
 ØØFC        IF MS.horiz>5 AND MS.horiz<255 AND MS.vert>4Ø AND MS.vert
              <185 THEN
 Ø129           (* use open pointer
 Ø13C           RUN gfx2("gcset",MS.GrpId,52)
 Ø154           (* put in update window
 Ø16B           RUN gfx2("put",MS.GrpId,Dr.select,26,13)
 Ø18C         ELSE
 Ø19Ø           IF MS.horiz>6Ø AND MS.horiz<13Ø AND MS.vert<3Ø THEN
 Ø1B3             (* use kill pointer
 Ø1C6             RUN gfx2("gcset",MS.GrpId,54)
 Ø1DE           ELSE
 Ø1E2             (* use selected as pointer
 Ø1FC             RUN gfx2("put",MS.GrpId,5Ø,26,13)
 Ø218             RUN gfx2("gcset",MS.GrpId,Dr.select)
 Ø235           ENDIF
 Ø237         ENDIF
 Ø239         RUN mouser(MS.horiz,MS.vert,button)
 Ø253       UNTIL button<>Ø
 Ø25E       RUN gfx2("put",MS.GrpId,Dr.select,Dr.xpos,Dr.ypos)
 Ø289       RUN gfx2("put",MS.GrpId,49,26,13)
 Ø2A5       IF MS.horiz>5 AND MS.horiz<255 AND MS.vert>4Ø AND MS.vert<185
             THEN
 Ø2D2         (* we selected to open it
 Ø2EB         MS.BufNo:=Dr.select
 Ø2FA         RUN loadicon(MS,Dr,Ic)
 Ø3ØE       ENDIF
 Ø31Ø       IF MS.horiz>6Ø AND MS.horiz<13Ø AND MS.vert<3Ø THEN
 Ø333         (* we selected to kill it
 Ø34C         SHELL "del "+MS.Dname+"/"+Dr.name
 Ø366         MS.Iname(Dr.select):="icon.XXXX"
 Ø38Ø         (* now let's see what the dir looks like
 Ø3A8         RUN showdir(MS,Dr)
 Ø3B7       ENDIF
 Ø3B9       END
 Ø3BB 1Ø    MS.ErrNum:=ERR
 Ø3C8       RUN errmsg(MS.ErrNum)
 Ø3D5       END
```

Listing 11: `getkey`

```
PROCEDURE getkey
 ØØØØ      (* something like mouser but add the keyboard
 ØØ2D      PARAM key:STRING[1]
 ØØ39      PARAM horiz,vert:INTEGER
 ØØ44      TYPE registers=dp,a,b,cc:BYTE; x,y,u:INTEGER
 ØØ69      DIM regs:registers
 ØØ72      DIM RatPack(32):BYTE
 ØØ7E      (* set the key's to nothing
 ØØ99      key:=""
 ØØAØ      REPEAT
 ØØA2        regs.a:=Ø
 ØØAD        regs.b:=$89
 ØØB9        regs.x:=ADDR(RatPack)
 ØØC7        regs.y:=Ø
 ØØD2        RUN syscall($8D,regs)
 ØØEØ        (* check the keyboard
 ØØF5        RUN inkey(key)
 ØØFF        horiz:=RatPack(25)*255+RatPack(26)+horiz/17
 Ø119        vert:=192*(RatPack(31)*255+RatPack(32))/176
 Ø132        IF RatPack(9)<>Ø THEN
 Ø14Ø          (* button used so change the key to something
 Ø16D          key:=" "
 Ø175        ENDIF
 Ø177      UNTIL key<>""
```

It's Time for a Sale SALE!!

It's Fall, and what better time than this to have a sale? We're celebrating our upcoming 14th birthday! 14 years, in business!, WOW, that's longer than any other CoCo company! So lets have a sale to end all sales. In the July issue, The RAINBOW wrote some good things about our products. We decided to put them on sale. Call for unlisted sales and other new products.

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Barden's Buffer

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-intos" 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
012345678901234567890123456789012345678901234567890123456789012345678901234
```

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 halfway 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 Viejo, CA 92692
Berden, William P.O. Box 3568 Mission Viejo, CA 92692
Bfrden, William P.O. Box 3568 Mission Viejo, CA 92692
Bgrden, William P.O. Box 3568 Mission 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 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.

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:   ZA$=name for search, e.g., "Barden, William"
Outputs:  ZE=-1 if not found, otherwise # of entry, 1-250
          ZA$=unchanged
```

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 stri
ng all uppercase
```

and comments at the end of lines:

```
7560 ZA$=RE$: GOSUB 20000 ' writ
e 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 NA
ME:", 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 ) <> "'" THE
N 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: NEX
T
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.

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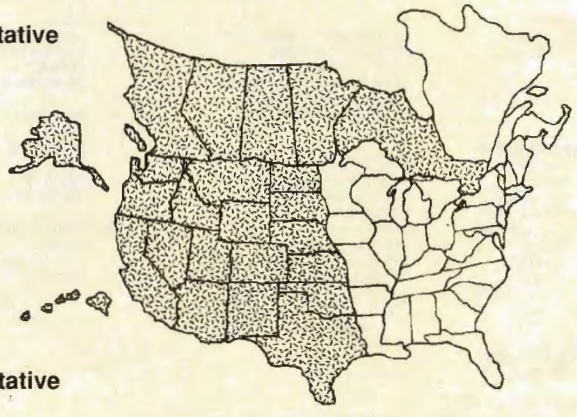

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UltiMusE III is a MIDI 'Notation Sequencer'. It lets you write and edit sheet music on a 640x192 graphics screen using the mouse, play it on ANY MIDI-equipped synthesizer(s), and print out the score... Written by an experienced computer professional who is also a serious amateur musician and composer. With **UltiMusE III**, there is no more 'faking' to play what you want to hear! Perfect for the trained musician, **UltiMusE III**'s natural notation also helps a beginner to copy a favorite piece of sheet music just as it looks. Why should your music sound like a machine? **UltiMusE III** has a wide pitch range, from 4 octaves below Middle C to over 3 above. Each staff has a 4-octave range centered on one of four clefs - Treble, Guitar, Bass, and Double Bass. Staff placement, clefs, and part and MIDI channel assignments can ALL be edited... Professional software should use a professional Operating System. **UltiMusE III** uses the advanced features of OS-9 Level II and does not interfere with its windowing and multi-tasking in any way.

SYSTEM REQUIREMENTS: CoCo 3 with at least 256K memory, OS-9 Level 2, Mouse or Joystick (Hi-Res Joystick Adapter recommended), Synthesizer(s) with MIDI-In jack, plus a Serial to MIDI cable. Tandy's DMP printer, a MIDI Interface Pak, and a Multi-Pak are optional equipment.

UltiMusE III
$54.95

CASIO MT-240 MIDI KEYBOARD $149.95
A/C POWER ADAPTER $14.95
SERIAL TO MIDI CABLE $19.95

Newspaper Plus

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DeskTop Publishing for the CoCo 3 just got better! With the **ALL NEW NEWSPAPER PLUS - FINAL EDITION**, you can create complete and sophisticated Banners, Headlines along with Text Columns and Graphics. Bring in different pictures, fonts, fill patterns, and text from disk and create a publication with that pro-look to it. Comes complete with 22 fonts, 50 NewsArt pictures and fill patterns. 128k or 512k Disk

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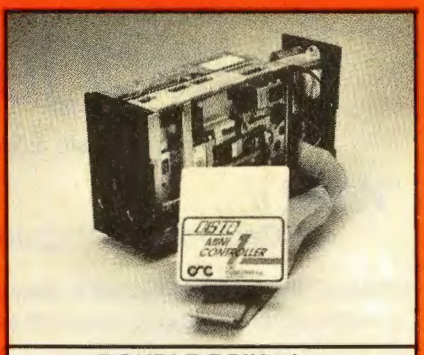

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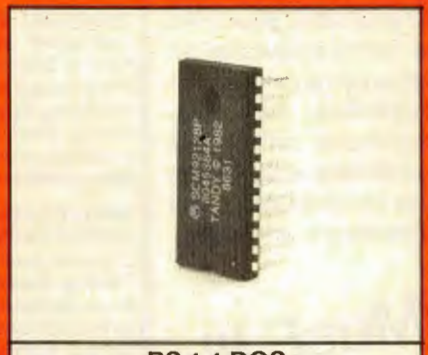

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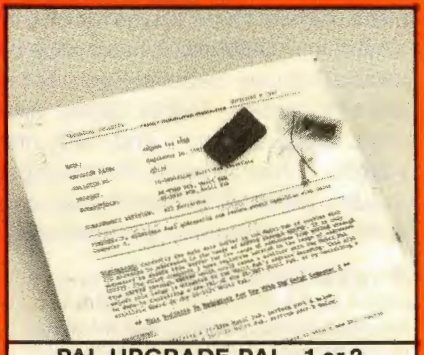

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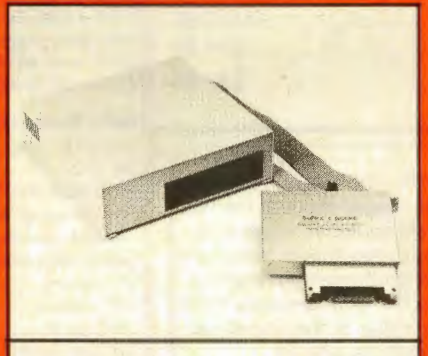

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See Rainbow Reviews 8/89

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*Burke & Burke **CDC drive

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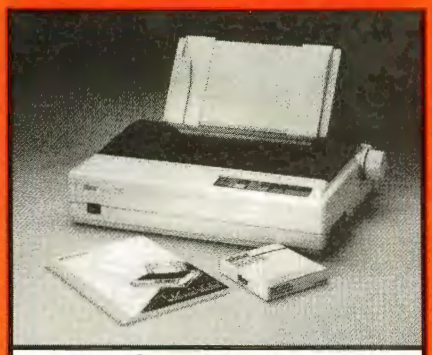

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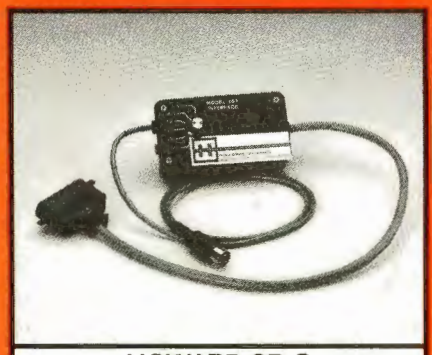

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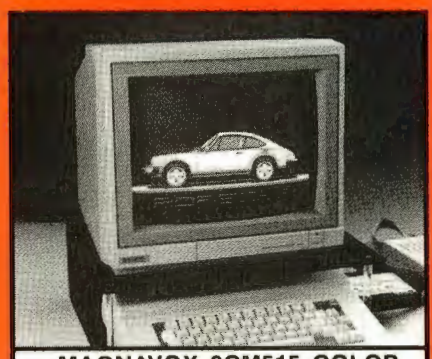

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