Just for your Tandy Color Computer 1, 2 and 3

November 1989

Canada $4.95 U.S. $3.95

The RAINBOW

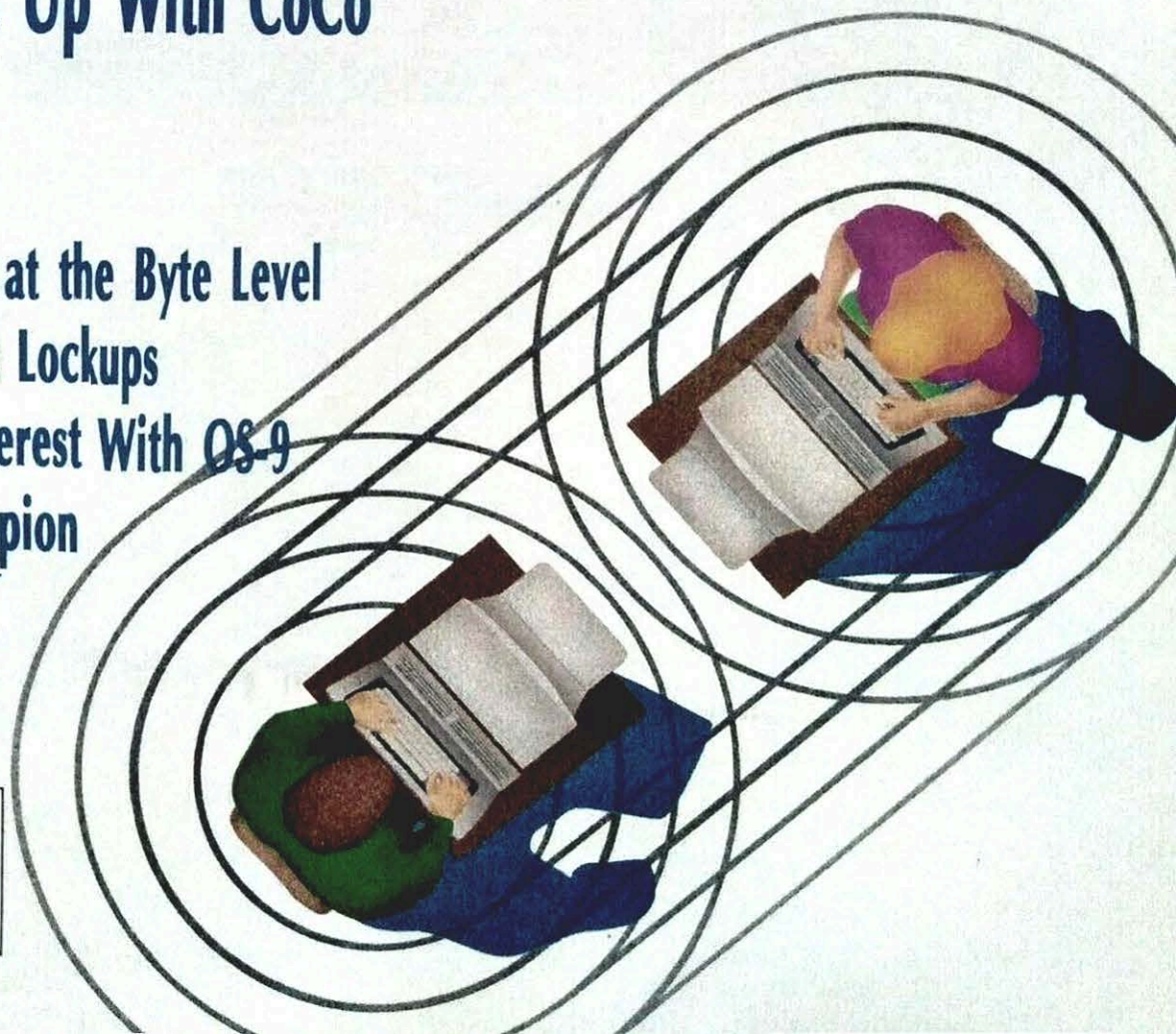
THE COLOR COMPUTER MONTHLY MAGAZINE

Person-to-Person

Protocol: the Key to Good Downloads

CoCo Teaches Morse Code

Hamming It Up With CoCo



Plus:

Patching Disks at the Byte Level

Prevent RS-232 Lockups

Principal & Interest With OS-9

Checkers Champion

0 44254 00001 11

SUNDOG SYSTEMS

Sinistaar

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.

$34.95

Kyum-Gai to be Ninja

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

$29.95

SoundTrax

SoundTrax is an unprecedented sound sequencing system for the CoCo III. It requires *no* extra hardware (i.e. midi keyboards, cables, etc.). All of it is contained in your CoCo. This amazing program will read in a digitized sound and play back all of the notes in the octave in which it was recorded. And it's POLYPHONIC! You can sequence up to four voices at one time, and not only the same sound! With as many voices as can be held in your memory, depending on the song, you can create a score of up to THREE DAYS in length using drums, horns, strings, even your own voice! And you can play them all together! Using the built-in windowing point-and-click editor, you can cut, paste, even synchronize the score to just the way you like it. Use the pre-sampled sounds from the disk included, or make your own by importing them from some of the more popular digitizers available. Also, CALL for the availability of extra sound sample disks! Get it today; you won't believe your ears! Req. 128K CoCo III, mouse/joystick, and disk drive.

$34.95

Paladin's Legacy

Years after the mysterious hero called the Paladin disappeared, loathsome creatures, spawned from the bowels of the planet, have overrun the land of Tarinth and captured the king. The situation is grave, for without the king's influence, the three nations will not unite against the growing evil. Only one pure of heart can master the five magics and thereby fulfill the Paladin's legacy and save the realm. Adventure into this vast land of fantasy, interract with its inhabitants, explore the ruinous mines, and do battle with supernatural forces. Experience the magic of the quest in this fast-paced role-playing adventure, all in the familiar quick scrolling, bird's eye play format. You will love the feeling of playing an action game with great graphics, animation, and sound effects, but all the while solving one of the most involved adventures yet. Tarinth awaits its savior! Available for all CoCo models! Req. 64K CoCo and disk drive.

$24.95

ALSO AVAILABLE:

In Quest of the Star Lord
128K CoCo III. $34.95
Hint Sheet: $3.95

Warrior King
128K CoCo III. $29.95

Kung-Fu Dude
64K CoCo. $24.95

- **Hall of the King I, II or III** $29.95 each
- **Hall of the King Trilogy** $74.95
- **Champion** $19.95
- **Dragon Blade** $19.95
- **White Fire of Eternity** $19.95.

*All require 64K CoCo.

Visa, Mastercard, Check, Money Order, and COD (USA only, please) accepted. All foreign orders must be sent in US currency Money Orders. Include $2.50 for shipping in USA and Canada. $5.00 Foreign. $3.00 extra for COD orders. PA residents add 6% sales tax. Dealer inquiries welcome. Authors: we're looking for new software!

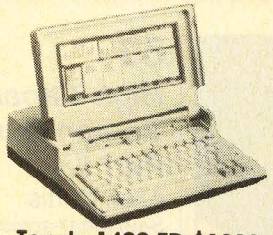
Sundog systems

VISA MasterCard

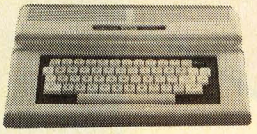
21 Edinburg Drive • Pittsburgh, PA 15235 • 412/372-5674

From Computer Plus to YOU . . .

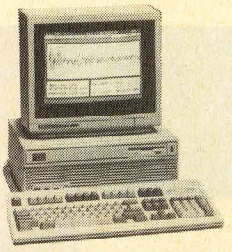
PLUS after PLUS after PLUS



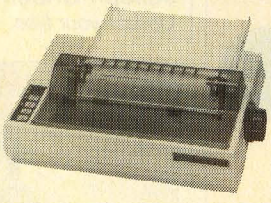
Tandy 1400 FD $1219
Tandy 102 32K $439
Tandy WP-2 $279



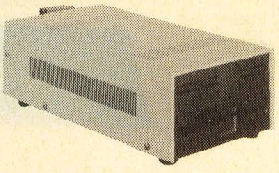
Color Computer 3
w/128K Ext. Basic $159



Tandy 1000 SL $689
Tandy 1000 TL/2 $959



DMP-132 $199*



Color Computer Disk Drive
Drive 0 $239 Drive 1 $149

TandyFax $929

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS	
Tandy 1000 HX 1 Drive 256K	349.00*
Tandy 1000 TX 1 Drive 640K	719.00*
Tandy 3000 NL 1 Drive 512K	1279.00
Tandy 4000 1 Drive 1 Meg.Ram	1959.00
Tandy 5000 MC 2 Meg. Ram	3799.00
PRINTERS	
Radio Shack DMP-107 120 CPS	219.00
Radio Shack DMP-132 120 CPS	199.00*
Radio Shack DMP-440 300 CPS	449.00*
Radio Shack DWP-230 Daisy Wheel	269.00*
Tandy LP-1000 Laser Printer	1899.00
Star Micronics NX-1000 144 CPS	199.00
Star Micronics NX-1000 Rainbow	269.00
Panasonic KXP 1180 192 CPS	219.00*
Panasonic KXP 1191 240 CPS	259.00*
Panasonic KXP 1124 192 CPS	369.00*
Okidata 320 300 CPS	369.00
Okidata 390 270 CPS 24 Wire Hd	515.00
NEC Pinwriter P-2200 170 CPS	399.00
MODEMS	
Radio Shack DCM-6	52.00
Radio Shack DCM-7	85.00
Practical Peripheral 2400 Baud	229.00
Practical Peripheral 1200 Baud	149.00

COLOR COMPUTER MISC.	
Radio Shack Drive Controller	99.00
Extended Basic Rom Kit (28 pin)	14.95
64K Ram Upgrade Kit (2 or 8 chip)	39.00
Radio Shack Deluxe Keyboard Kit	24.95
HI-RES Joystick Interface	8.95
Color Computer Deluxe Mouse	44.00
Multi Pak Pal Chip for COCO 3	14.95
Multi-Pak Interface	89.95
Serial to Parallel Converter	59.95
Radio Shack Deluxe Joystick	26.95
Magnavox 8515 RGB Monitor	299.00
Magnavox Green or Amber Monitor	99.00
Radio Shack CM-8 RGB Monitor	249.00
Radio Shack VM-4 Green Monitor	99.00
PBJ OK COCO 3 Upgrade Board	CALL
PBJ 512K COCO 3 Upgrade	CALL
Tandy OK COCO 3 Upgrade Board	24.95
Tandy 512K COCO 3 Upgrade	149.00

COLOR COMPUTER SOFTWARE	TAPE	DISK
The Wild West (CoCo3)		25.95
Worlds Of Flight	34.95	34.95
Mustang P-51 Flight Simul.	34.95	34.95
Flight 16 Flight Simul.	34.95	34.95

COCO Util II by Mark Data		39.95
COCO Max III by Colorware		79.95
Max 10 by Colorware		79.95
AutoTerm by PXE Computing	29.95	39.95
TW-80 by Spectrum (CoCo3)		39.95
TeleWriter 64	49.95	59.95
TeleWriter 128		79.95
Elite Word 80		79.95
Elite Calc 3.0		69.95
CoCo 3 512K Super Ram Disk		19.95
Home Publisher by Tandy (CoCo3)		35.95
Sub Battle Sim. by Epyx (CoCo3)		26.95
Thexder by Sierra (CoCo3)		22.45
Kings Quest III by Sierra (CoCo3)		31.45
Flight Sim.II by SubLogic (CoCo3)		31.45
OS-9 Level II by Tandy		71.95
OS-9 Development System		89.95
Multi-View by Tandy		44.95
VIP Writer (disk only)		69.95
VIP Integrated Library (disk)		149.95

Prices are subject to change without notice. Please call for shipping charges. Prices in our retail store may be higher. Send for complete catalog

*Sale prices through 9/30/89

CALL TOLL FREE
1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

computer plus

P.O. Box 1094
480 King Street
Littleton, MA 01460

SINCE 1973

IN MASSACHUSETTS CALL (508) 486-3193

TRS-80 is a registered trademark of Tandy Corp.

RAINBOW

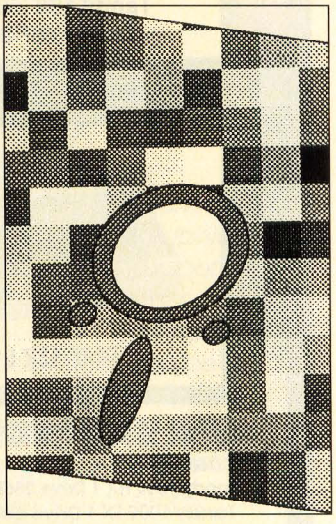
Table of Contents

November 1989
Vol. IX No. 4

72

50
The OS-9 *CART Interrupt Fix
Marty Goodman
Terminating terminal problems

26



Features

12
An Old Code in a New Mode
Ray Onley
Mastering Morse communication

20
Mapping Your Finances
David Macias
A matter of principle

26
Patchwork on the CoCo 3
Kirk Goodell
Exploring without adventure games

58
Captivating Captions
Kevin Reichert
Stylish photo labeling

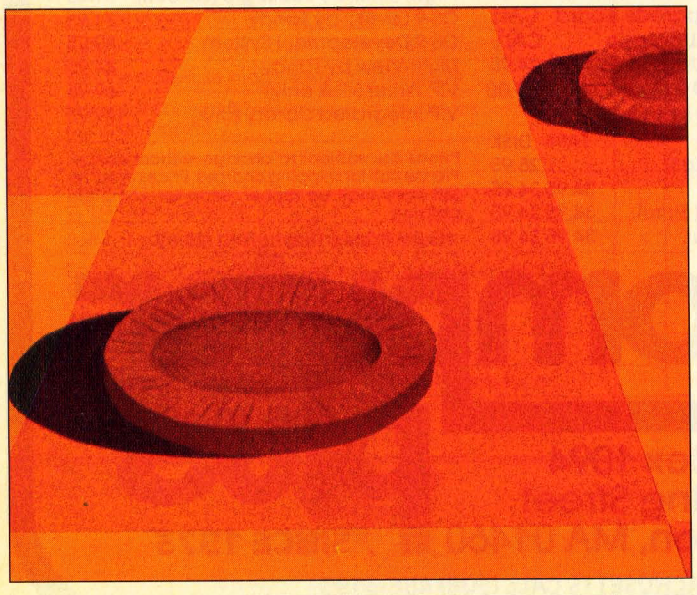
72
Observing the Social Graces
Tim Koonce
More than just "shaking hands"

82
The Checkers Champ
Marc Campbell
King me!

44
CoCo and Amateur Radio: A Natural Combination
Steven R. Ford
Dedicated to exploration and experimentation

124
Reader Survey

82



Novices Niche

39
Draw Figures Using Asterisks
Tio Babich

40
No Smoking!
Alejandro Lopez Rodriguez

40
Automile
Dan Weaver

41
Hi-Res Graphics Utility
Ric Pucella

42
Car Bingo Game
Warren Cheves

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on the inside front cover.

Columns

64
Barden's Buffer
William Barden, Jr.
Delving into digitizing

30
CoCo Consultations
Marty Goodman
Just what the doctor ordered

36
Delphi Bureau
Don Hutchison
and Greg Law's database report

34
Doctor ASCII
Richard Esposito
The question fixer

24
Education Notes
Steve Blynn
How can you possibly lose?

112
KISSable OS-9
Dale Puckett
Part III in the Maxlc *series*

10
Print-#2
Lawrence C. Falk
Editor's notes

54
Wishing Well
Fred Scerbo
Ten hits and you're dead

123
Wrapping THE RAINBOW
Cray Augsburg

"Turn of the Screw" and "BASICally Speaking" will return next month.

Product Reviews

Art-Deli II/*Specialty Projects* ____ **98**
BASIC Windows/*KB Enterprises* ____ **99**
CEBBS/*KB Enterprises* ____ **94**
Danosoft's Disk Utilities/*Danosoft* ____ **100**
Disk Handyman/*Micro Data Systems* ____ **104**
Donut Dilemma/*Game Point Software* ____ **102**
Lyra 2.62/*Rulaford Research* ____ **105**
The Lyra Companion/*Rulaford Research* ____ **107**
Milestones/*JR & JR Softstuff* ____ **104**
The O.S.I.T.E. File/*Tothian Software* ____ **102**
Telepak II/*Orion Technologies* ____ **109**
World at War/*GSW Software* ____ **110**

Departments

Advertisers Index ____ **128**
Letters to Rainbow ____ **6**
Racksellers ____ **126**
Rainbow Info ____ **90**
Received & Certified ____ **111**
Scoreboard ____ **48**
Scoreboard Pointers ____ **47**
Subscription Info ____ **121**

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. **THE RAINBOW**, **RAINBOWfest** and **THE RAINBOW** and **RAINBOWfest** logotypes are registered trademarks of FALSOFT, Inc. ● Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to **THE RAINBOW**, P.O. Box 385, Prospect, KY 40059. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. ● Entire contents copyright © by FALSOFT, Inc., 1989. **THE RAINBOW** is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. ● Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ®trademarks of the Tandy Corp. ● Subscriptions to **THE RAINBOW** are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. ● Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

The Rainbow

Editor and Publisher
Lawrence C. Falk

Managing Editor Cray Augsburg
Associate Editor Sue Fomby
Copy Editor Kelly Goff
Copy Assistant Theresa Johnson
Reviews Editor Lauren Willoughby
Submissions Editor Tony Olive
Technical Editor Greg Law
Technical Assistants Ed Ellers, Gregory Shultz
Editorial Assistant Julie Hutchinson
Contributing Editors
William Barden, Jr.
Steve Blyn, Tony DiStefano
Richard Esposito
Martin Goodman, M.D.
Joseph Kolar, Dale Puckett
Fred Scerbo, Richard White
Art Director Heidi Nelson
Designers Sharon Adams, Teri Kays, O'Neil Arnold
Consulting Editors David Horrar, Judi Hutchinson
Typesetter Renee Hutchins

Falsoft, Inc.

President Lawrence C. Falk
General Manager Bonnie Frowenfield
Asst. General Mgr. for Finance Donna Shuck
Admin. Asst. to the Publisher Kim Thompson
Editorial Director John Crawley
Senior Editor Jutta Kapfhammer
Director of Production Jim Cleveland
Chief Bookkeeper Diane Moore
Dealer Accounts Judy Quashnock
Asst. Gen. Manager For Administration Sandy Apple
Word Processor Manager Patricia Eaton
Customer Service Manager Beverly Bearden
Customer Service Representative Carolyn Fenwick
Chief of Printing Services Melba Smith
Dispatch Thomas Kendall
Business Assistant Laurie Falk
Chief of Building Security and Maintenance Lawrence Johnson
Advertising and Development Coordinator Ira Barsky
Advertising Representatives
Belinda Kirby, Kim Vincent
Advertising Assistant Debbie Baxter
(502)228-4492

For RAINBOW Advertising and Marketing Office Information, see Page 128

Cover illustration by Heidi Nelson

Letters to the RAINBOW

Not Just for Programmers

Editor:

The "Doctor ASCII" section (Page 58) of the September, 1989 issue of RAINBOW contains a letter from Jack Williamson of Bellevue, Ohio. The letter refers to creating AIFs under *Multi-Vue*.

While we have no problem with making this information available to our customers and your readers, we feel some clarification is in order.

The second paragraph states: "The people at Tandy said that *Multi-Vue* was originally intended for program developers . . ." This is incorrect.

Enclosed is a copy of "Multi-Vue and Pre-Existing Applications," the documentation we provided to Mr. Williamson. As you can see in the initial paragraph, the reference to programmers simply pertained to the *style* in which the *Multi-Vue* documentation was written, not the expertise of the user.

The document is provided as a convenience to your readers. Feel free to use it in publication as you see fit.

Thomas J. Halliday
Radio Shack
Computer Customer Relations

Thank you for offering us "Multi-Vue and Pre-Existing Applications." We will be publishing it in the very near future.

Microware's Secret

Editor:

Lately I have been using my CoCo 3 and OS-9 to write programs in FORTRAN-77. Wait! Did I say FORTRAN? I sure did! What about the August issue when William Barden wrote in his article "Computer Knowledge in Any Language" (Page 120) that "Languages such as COBOL, FORTRAN, PL/1, APL, Modula-2 and Smalltalk, although they are very popular in other segments of the computer world, are simply not available for the CoCo, . . . don't expect to see COBOL, FORTRAN or Ada on the CoCo."

The truth is FORTRAN-77 has been available for the CoCo 3 from Microware for some time now. I purchased the compiler in November of '88 at a price of $250. Though this is quite higher than any of the other languages for the CoCo, I had a specific use for it. It is an almost complete implementation of the language and uses the full subset of the ANSI standard.

Telephones at THE RAINBOW should be ringing off their hooks with calls from Microware protesting the unfair treatment its product has received from your magazine, though I doubt that is the case. Even Microware's brochures imply that FORTRAN-77 for the 6809 is currently not available as it is still under development. How can hardware/software developers expect their products to succeed if they will not make a commitment to market and support them? It is no wonder the CoCo is still underground, so to speak, when leading proponents such as Tandy and Microware take these positions.

Perhaps you can find room to publish an article about this language, giving it the equal recognition it deserves and making the CoCo community aware of another programming option. If it were not for THE RAINBOW, the CoCo possibly could have died a long time ago. So keep up the excellent job. I, for one, greatly appreciate the fine job all of you are doing in your offices at THE RAINBOW.

Herschel B. Eliker
Houston

Your Garden-Variety Users

Editor:

In the August '89 issue of THE RAINBOW (Page 80), Jeffrey S. Parker, in his tirade for OS-9, referred to a great many content Disk BASIC users as "*RS-DOS* potatoes." I, and I'm sure many others, greatly resent having been identified with this lowly vegetable. I would be pleased to no end if, in the future, Mr. Parker might at least limit his references to vegetables of a higher order. I would not be at all offended if, for instance, I were to be identified with an asparagus or cauliflower. Thank you very much.

John R. Hogerhuis
Fullerton, California

Touche! And 50 lashes with a wet broccoli stalk for us.

HINTS AND TIPS

Editor:

For a long time I couldn't get ON BRK GOTO and ON ERR GOTO working properly on my CoCo 3. I tried the commands in various locations in the program, but to no avail. Then I made the right guess.

PCLEAR and CLEAR statements appearing after ON BRK GOTO and ON ERR GOTO prevent them from working properly. Therefore, these statements have to appear after any CLEAR and PCLEAR statements. CLEAR and PCLEAR cause modifications to memory and the locations referred to by ON BRK GOTO and ON ERR GOTO are not adjusted properly.

I strongly suggest using ON BRK GOTO in your programs to GOTO a line containing a slow-speed poke if you are using the high-speed pokes. This way you won't damage your disks by saving the program while in the high-speed made as I have done. Having BREAK immediately issue the slow-down poke can save a lot of important data.

David B. Smith
Grand Portage, Minnesota

Remedy for Numerous Disk Swaps

Editor:

I enjoyed your excellent review of *King's Quest III*. I think the people at Sierra should be congratulated for their work in computer graphics and hope to see more of their games released for the CoCo.

Although I agree that the numerous disk swaps necessary to play this game in its original format can be tiresome, I disagree with your opinion that the only remedy for this is a hard drive.

By following the instructions included with the game I was able to transfer the entire game onto three 40-track double-sided disks without much problem. In its original 35-track single-sided format there is a lot of repetition of files as many large files are needed on several disks. By reducing the number of disks the total amount of data is reduced considerably.

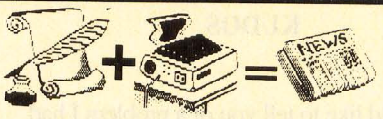
In the 40-track double-sided format the disk swaps become relatively infrequent and often provide a welcome break in the game.

I did encounter one problem, however.

FALL BLOWOUT

512K Upgrade: Only $109. See Page 17 **Drive 0 : Only $199.** See Page 15.
Magnavox RGB Monitor: Only $259. 40 Meg Hard Drive System: Only $569. See Page 15
(For Other Blowout Sale Prices, see pages 7 - 17)

CIII Pages



by Walter Bayer
The *ultimate* **desktop publishing** program for the CoCo 3. Allows COMPLETE CONTROL of all the elements in the page! Features pull-down menus, icons & dialog boxes, drawing tools (create boxes, polygons, rays, circles, elipses, brush shapes), cut, copy, stamp, paste, zoom, flip horizontal/vertical, enlarge/reduce, rotate at 45 & 90 degrees, stretch, undo, import any ASCII text (even CoCo Max 1/2 Creations & Fonts!), create 2/3 columns, change fonts/invert text & page preview. Includes 14 fonts & 60 pieces of clip art. **No other desktop program comes even close.** Req. CoCo 3, RGB/ Monochrome Monitor, Min 1 drive, Tandy Hi-Res Interface, Joystick/mouse & DMP 105/106 or Epson/Gemini & Compatible Printer. Only **$49.95**. w / Hires Inteface Only **$59.95.** w/ Hires Interface & Mouse: **$79.95**

Color Schematic Designer Ver 2.0

The **best Circuit Designer** for the CoCo 3. Pull Down Menus, hi-resolution symbol sets, Keyboard / Mouse / Joystick (with proportional cursor speed system), lightning fast multiple UNDOs, Symbol Add / Modify / Rotate/Line/Box Draw, Hi-res Fonts, workspace of 640 x 1000 pixels, 3 layers, font styles (fancy, italic, block, computer, etc). Supports DMP/ EPSON / GEMINI & compatible printers. Supports **near laser quality printouts** on almost all EPSON Compatibles! Only **$39.95**. CSD 1.1 / 1.2 owners can upgrade to version 2.0 by sending $10 with proof of purchase. *(See Review in September 1989 Rainbow)*

MUSIC

Musica II: Best Music Composition program for the CoCo 1,2 & 3. Disk Only **$29.95**
Lyra: MIDI Based Music Composition program for the CoCo 1,2 & 3. Disk Only **$49.95**
The Lyra Companion (Book): $9.95
CoCo Midi 3 Hardware: Sophisticated MIDI sequencer / recorder. Only **$99.95**
CoCo Midi 3 Software: $59.95

Max 10: **$39.95**
Spelling Checker for Max 10:**$29.95**
Max 10 Fonts (36 fonts): **$29.95**
CoCo Max III: **$49.95**
CoCo Max III Fonts (95 fonts): **$49.95**
Max Edit (Font Editor): **$19.95**
NX1000 Rainbow Driver: **$19.95**
CGP 220 Driver: **$19.95**
CoCo Max II: **$69.95**
CoCo Max I (Tape): **$59.95**
MAXPATCH:Run CoCo Max 2 on CoCo 3 **$19.95**

VIP CALC III

Best Spreadsheet for CoCo 3. Only **$69.95**

VIP DATABASE III

The Best Database for the CoCo 3. Only **$69.95**

File System Repack

A must utility for every OS9 owner. Unfragments your hard/floppy disk to speed up disk operation & reduce wear on drive heads. Only **$29.95**

CEBBS

By Kevin Berner
Best BBS for CoCo 3. Features Xmodem Up/Downloading, unlimited menus, login, message base, built-in clock/calendar, execution of external programs. Sysop has full control of user's access to menus, time on system & remote system access. Full Error Trapping. Even HYPERIO Compatible. Req. **$59.95**. Intro. Special. Only **$49.95**. Min Req. CoCo 3, 1 Drive, & RS232 Pack.

DOS

ADOS 3: Advanced Operating System for the CoCo 3. Epromable. Only **$34.95 ADOS** (CoCo 1,2): **$27.95**(Extended ADOS Might Be Avail by the time you read this!)

RGB DOS: Supports double sided drives, up to 2 hard drives & more. Epromable. Only **$29.95**

CoCo Util II

Transfer Programs between CoCo & IBM. Will Transfer Basic Programs & ASCII Files. Req DOS 3.2 or lower. Req. IBM Compatible with 2 drives. Only **$39.95**

Xenocopy

An amazingly versatile program that allows you to format/ duplicate / read/write disks between 300 different computers. For ex. you could transfer files between CoCo, IBM, NEC, Model 3, etc. Requires an IBM Compatible with 2 drives. Only **$79.95**

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618.
To Order: Refer to Page 17 of our 6-page ad series (Pgs 7-17)
Credit Card Toll Free Orderline 1-800-654-5244 (9AM - 8PM 7 DAYS/WEEK)
Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. **Fax:** 716-383-0026.

VISA MasterCard AMERICAN EXPRESS DISCOVER
UPS 2ND DAY AIR

The instructions for updating the TOC file seemed a bit confusing. When I ran the game with a completely rewritten file the system locked up at the first disk swap. The solution was to edit the original file, changing only the disk and side numbers (change all side numbers to S1.) The game now works perfectly.

Changing the step rate to 6 milliseconds also provides a big improvement.

Robert Zaker
Loxahatchee, Florida

INFORMATION PLEASE

Editor:

I live in Williams, California, which is 60 miles north of Sacramento and 100 miles south of Redding on the map.

I am having trouble finding anyone in this area who sells OS-9-based shareware for the Color Computer 3. I was hoping someone in the CoCo world could help me.

The software I write is mainly mathematic in nature. I have a fluid engineering program, as well as a series on silicon chip design — many more are forthcoming. I would appreciate your assistance in finding a place to share my wares.

John M. Sagers
Williams, California

Contact the OS-9 Users Group at:

OS-9 Users Group
1715 E. Fowler Ave.
Suite R-237
Tampa, FL 33612

The Best Of Both in One

Editor:

I am looking for a program that has the best things from both *ADOS-3* and *Basic Freedom*. For instance, it needs the ability to be customized like *ADOS-3*, including the possibility of setting up for 40- or 80-tracks, different drive speeds, etc. It needs to have the full-screen editing abilities of *Basic Freedom*, as well as automatic key-repeat. I need automatic line numbering (as per *ADOS*), and also to be able to enter programs and commands in lowercase (and true lowercase in the 32-column). It should also have all of the color commands from the 40-column screens available in the 32-column screen (ATTR, for instance).

Does anybody know of a program for the CoCo 3, be it public domain, shareware, or commercial? If you have something like this, please write me and I'll send you a disk and return postage. If you know of a commercial program that does all (or most of) this, please let me know what it is called, what it costs, and the name and address of the company.

Jeff Byers
124 Elizabeth St.
East Peoria, Il 61611

See the review of Extended ADOS-3 *in this (October) issue.*

Making Life Easier

Editor:

The *Up-Down* LIST Utility program by Grahame Pollack in the July RAINBOW looks like just the thing to make my life a lot easier.

Does anybody have a patch or a modification so I can run it on my CoCo 3?

Syd Tash
1925 Tricentenaire, Apt. 204
Montreal, QC Canada
H1B 5S5

REQUEST HOTLINE

Editor:

I have acquired several duplicate issues of THE RAINBOW that I would like to swap for issues I am still missing. If any readers have January, February and March of '83 and December of '85, I would like to hear from them and possibly swap issues they are missing for these.

Donald J. Briggs
229 Holland St.
Syracuse, NY 13204

KUDOS

Editor:

First of all, thanks for your fine publication. I would be lost without my RAINBOW. However, it is hard to find people locally who share my interest in the CoCo. I'm not a programmer or hacker, but consider myself a serious user, especially for my business. If anyone in the Greensboro, High Point or Burlington, North Carolina area knows of a group locally or would just like to correspond please let me know. I have 512K, OS-9, two drives, a printer, etc.

Secondly, I want to commend the manager of a local Radio Shack store in the Friendly Shopping Center, namely Ray Wachter, for his help and support.

Finally, I would like to see more articles for the novice in THE RAINBOW. Most writers assume readers know more than they really do — at least I've felt that way at times. At any rate keep up the good work.

Ron Russo
1848 Pembroke Rd.
Greensboro, NC 27408

A Bright Future Indeed

Editor:

I have to comment on the fine treatment from the people at Microcom Software. I recently bought two 30-Meg hard drives from them and encountered some difficulty in installing them in my system. Thanks to Chris Santwani who went over and beyond the call of duty, I now have two very good hard drives up and running on my system. As long as we have third-party vendors like Microcom Software, there is nothing but a bright future for the CoCo.

George Barber
Summit City, California

Another OS-9 Recruit

Editor:

I would like to tell you how much I enjoy THE RAINBOW. You have an excellent magazine. I have purchased many products advertised in the pages of RAINBOW and from reading "KISSable OS-9," I decided to purchase OS-9.

I also want to thank you for the series of articles you had on assembly language by William P. Nee. I like BASIC and other languages, but I really go for assembler. When I feel competent enough to do a small programming project, I would like to send it to THE RAINBOW to share with the CoCo community.

John Collyer
Medina, Ohio

We welcome your submission.

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

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

"... Just think of any word processing feature---chances are 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.

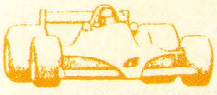
Word Power 3.2

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

"*... 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**

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

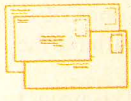
Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap.** All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

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.

DOCUMENTATION

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

MICROCOM SOFTWARE, 2900 Monroe Ave, Rochester,NY 14618

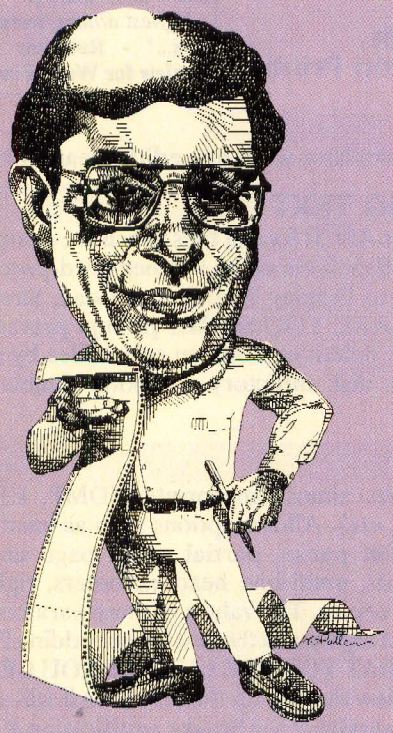
All Word Power 3.2 orders shipped by UPS 2nd Day Air at No Extra Charge in Continental US.

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

UPS 2ND DAY AIR



Spread the Word!

Time to start telling your non-computer friends about the Color Computer again! CoCo 3s are selling now at a price of $199 (expect a holiday-season special), but the really big news is a number of new items to choose from when you look at software — or firmware, anyway — from Tandy. I am talking about Nintendo software, which has certainly been a hot item for the last year or so.

There is some excellent software available for the CoCo — there has been for years. But now we are starting to see software available for other systems in formats that will run on our CoCos.

The question remains: Why would someone buy a pure game machine, a Nintendo for instance, if that software can also be found for a real computer? This is a question hundreds of thousands of Color Computer owners have asked for years. The answer is simple — the computer is the way to go!

All this is little-reported, but I think this is an important step for Tandy. Rather than porting games from other systems to the CoCo in a disk format, Tandy is buying the game software on ROMs and handling the import through the cartridge. It is simple, effective and costs less for development.

The advantages of the CoCo have always been low cost, easy expansion and power. This move by Tandy increases the advantage of the Color Computer we use today — it is a major plus.

So, I think it *is* time to point this out to neighbors and friends who haven't yet joined the world of computer users. They'll get a computer that plays games as well — sort of like having your cake and eating it too! The benefit of owning a computer with the power and software base of the CoCo — especially at the price — is difficult to beat.

* * * * *

While Tandy was making some changes, so were we here at THE RAINBOW.

As I wrote last month, Cray Augsburg has replaced Jutta Kapfhammer as managing editor. And as I mentioned, Cray brings a wealth of technical expertise with him to the post, having been technical editor for THE RAINBOW before his promotion.

The change, however, left us with an opening that needed to be filled. I am pleased to announce that it has been filled most ably by Greg Law, a name I am sure many of you recognize for his OS-9 expertise, his contributions to this magazine and his work on Delphi.

One of the reasons for asking Greg to move from Warner Robbins, Georgia, to Prospect is that we want to incorporate a slightly higher-level technical ability into THE RAINBOW. As I said last month, we have no intention of abandoning the games, graphics, beginner's information and the like. Our surveys have shown these are the most popular features of THE RAINBOW.

But we also understand that many of you are more technically oriented. Some of you started that way, and some of you have acquired it over years of working with your CoCo. While we have always provided an abundance of technical information, we now have the ability to produce more.

I think all of you will be pleased with the changes we are making to THE RAINBOW. I have always seen this magazine as an evolving publication. And if it is to continue to serve you best, it must *constantly* evolve.

— 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.

300 POKES, PEEKS, 'N EXECS for COCO III

*40/80 column Screen Text Dump
*Save Text/Graphics Screen to Disk
*Command/Functions Disables
*Enhancements for CoCo3 BASIC
*128K/512K RAM Test Program
*HPRINT Character Modifier

Only $19.95

500 POKES PEEKS,'N EXECS

All 3 Books $29.95

*Autostart your BASIC programs
*Disable Color BASIC/ECB/Disk BASIC commands
*Disable Break Key/ Clear Key/ Reset Button
*Generate a Repeat-key
*Transfer ROMPAKs to tape
*Set 23 different GRAPHIC modes
*Merge two BASIC programs
*And much much more!!!

For CoCo 1,2 and 3. Only *$16.95*
ALL 3 BOOKS for: $29.95

SUPPLEMENT TO 500 POKES,PEEKS, 'N EXECS

200 additional Pokes,Peeks and Execs (500 Pokes Peeks 'N Execs is a prerequisite)
*ROMPAK transfer to disk
*PAINT with 65000 styles
*Use of 40 track single/double sided drives
*High-speed Cassette Operation
*Telewriter, CoCo Max enhancements
* Graphics Dump (for DMP printers) /Text Screen Dump

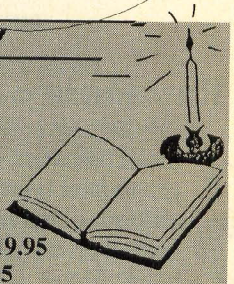
For CoCo 1,2 or 3. Only *$9.95*

UNRAVELLED SERIES

An invaluable aid for Basic and Machine Language programmers, these books provide a complete disassembly and annotated listing of the BASIC/ECB and Disk ROMs. These listings give complete, uninterupted memory maps of the four ROMs. Gain complete control over all versions of the color computer.

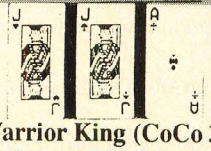
EXTENDED COLOR BASIC UNRAVELLED: COLOR BASIC and EXTENDED BASIC ROM Disassembly: **$39.95**
DISK BASIC UNRAVELLED: DISK BASIC ROM 1.1 and 1.0 Disassembly : **$19.95**
BOTH ECB AND DISK BASIC UNRAVELLED: $49.95
SUPER EXTENDED BASIC UNRAVELLED: SUPER EXTENDED BASIC ROM Disassembly for CoCo 3. **$24.95**
COMPLETE UNRAVELLED SERIES (all 3 books): $59.95

COCO LIBRARY



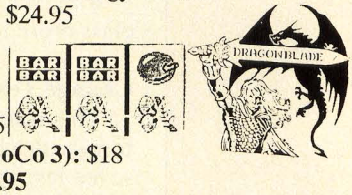
CoCo 3 Service Manual: **$39.95**
CoCo 2 Service Manual: **$29.95**
Start OS9 Book + Disk: **$32.99**
Inside OS9 Level II: **$19.95**
Rainbow Guide To OS9 Level II: **$19.95**
Rainbow Guide To OS9 Level II Disk: **$19.95**
Complete Rainbow Guide To OS9: **$19.95**
Complete Rainbow Guide to OS9 2 Disks: **$29.95**
Assembly Language Programming(tepco): **$18**
Addendum For CoCo3 (tepco): **$12**
Color Computer Disk Manual: **$29.95**
Basic Programming Tricks: **$5!**
CoCo 3 Secrets Revealed: **$9!**

Basic Prog. Tricks **$5**
CoCo 3 Secrets Revealed **$9**



GAMES (CoCo 1,2,3 unless otherwise specified; min 32K)

Warrior King (CoCo 3): $29.95
In Quest of the Star Lord(CoCo3): $34.95 **Hint Sheet:** $3.95
Hall of the King 1,2,3: $29.95 ea **Trilogy:** $74.95
Pyramix (Cubix for CoCo 3): $24.95
Kung Fu Dude: $24.95
Dragon Blade: $19.95
Champion: $19.95
White Fire of Eternity: $19.95
Quest for the Spirit Stone (CoCo 3): $18
Slots & Cards (CoCo 3): $39.95



TREASURY PACK #1: Lunar Rover Patrol, Cubix, Declathon, Qix, Keys of Wizard, Module Man, Pengon & Roller Controller. Only **$29.95**
TREASURY PACK #2: Lancer, Ms. Gobbler, Froggie, Madness & Minotaur, Ice Castles, Galagon, Devious. **Only $29.95**
SPACE PAC: Color Zap, Invaders, Planet Invasion, Space Race, Space War, Galax Attax, Anaroid Attack, Whirlybird, Space Sentry & Storm Arrows. **Only $29.95**

WIZARD's CASTLE: A hi-res graphics adventure game filled with tricks, traps and treasures. Req Min 64K. Only $19.95
Warp Fighter 3D (For CoCo 3): $24.95
Bash (For CoCo 3): $24.95
Mine Rescue (For CoCo 3): $24.95
Speed Racer: Buckle your seatbelt and get ready to race in this Pole Position® type game. Only $34.95
Pinball Factory: Design, Build, Edit and Play the classic game of Pinball. Min 64K. Only $34.95
Demon Seed: Battle the flying, diving & bloodthirsty bats. Only $19.95
Cashman: Explosive color, fast-moving animation and amazing sound-effects! Has over 40 levels! $29.95
Fury: An action packed airborne dogfight simulation. $29.95
Time Bandit: Fight the Evil Guardians, Killer Smurphs & more. Full animation & over 300 screens. $29.95
Rommel 3D: Exciting 3-D Tank Combat Game. CoCo 2.$34.95
Outhouse: One of the funniest, most original games. Excellent graphics, sound effects & playability. $19.95
Mudpies: Crazy circus fun! Only $29.95

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618.

VISA MasterCard AMERICAN EXPRESS DISCOVER

To Order: Refer to Page 17 of our 6-page ad series (Pgs 7-17)
Credit Card Toll Free Orderline 1-800-654-5244 (9AM - 8PM 7 DAYS/WEEK)
Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. **Fax:** 716-383-0026.

UPS 2ND DAY AIR

dit dit dit dah dah dah dit dit dit . . .

An Old Code in a New Mode

By Ray Onley

Since computers were invented, people have been coming up with all kinds of training programs to help others learn and use international Morse code. Many philosophies on learning code were adopted and have stood the test of time. *CodeMaster* is a new program that incorporates those philosophies along with new ideas.

Program Objectives

One of *CodeMaster*'s objectives is to offer a serious Morse code training program to CoCo users who have discovered that today's radio communications software is dominated by PC clones and older Commodore systems that had a head start in the amateur radio community. Another objective is to offer true choices among the various strategies for mastering modern Morse communication.

Ideas differ about the best way to learn the International Morse code, a skill required for amateur radio licenses as well as certain U.S. military and communications industry careers. A primary consideration in designing *CodeMaster* was to give you choices among most of the popular systems for learning to copy Morse code transmissions at various speeds.

Some radio professionals believe the best method is to be able to perfectly copy random groups of five letters, numerals or types of punctuation, which is the traditional format for code tests. Others think copying intelligible text is more helpful. A number prefer classroom-style practice sessions in contrast to those who encourage private practice or one-on-one tutoring sessions. Some believe any text material is fine for practice while others suggest a concentration on communications language and abbreviations. A recently developed technique starts the transmission at a very high speed to help get your brain in motion. Then it gradually slows to the desired speed.

International Morse Code

A	.-	N	-.
B	-...	O	---
C	-.-.	P	.--.
D	-..	Q	--.-
E	.	R	.-.
F	..-.	S	...
G	--.	T	-
H	....	U	..-
I	..	V	...-
J	.---	W	.--
K	-.-	X	-..-
L	.-..	Y	-.--
M	--	Z	--..
1	.----	period	.-.-.-
2	..---	comma	--..--
3	...--	?	..--..
4	....-	error	....
5	.....	dash	-....-
6	-....	wait	.-... (send AS)
7	--...	end msg	.-.-. (send AR)
8	---..	transmit	-.- (send K)
9	----.	sign off	...-.- (send SK)
0	-----		

Starting the Program

After you type RUN and the title screen appears, answer the "Keyboard or Joystick" question by pressing K for keyboard or J for joystick. If you press ENTER, the joystick input is selected as the default. Then the command menu appears. This is the main menu that controls all the routines and options offered by this program. The four different control routines are described below.

Take Test Routine

This is the main test-taking routine. It is to be selected after changing the speed, performing the test, and after setting whatever options you want. In most tests you are asked how long you want the test to be. This number represents the test length in words; if you entered 5 in the random call sign test, it would send five groups of letters. After the test is underway, you can pause by typing P or stop by pressing CLEAR.

Change Speed Menu

This routine allows you to change the speed at which you are tested. The different word-per-minute (WPMs) levels are explained below:

- 3 WPM — speed used by those just starting out.
- 5 WPM — minimum skill level for passing novice test.
- 7 WPM — suggested proficiency level before novice test.
- 10 WPM — typical ability of experienced novice.
- 13 WPM — minimum skill for passing general class test.
- 17 WPM — suggested proficiency level before general test.
- 21 WPM — a taste of amateur extra class proficiency.

Change Test Menu

This routine allows you to choose the form with which you want to be tested. The seven test options are explained below:

1) Random Characters

This is the classic hard-core test of code proficiency. Nothing you hear makes any sense. You hear a random mix of letters, numbers and some puncutation in groups of five, generated at any speed you choose. This means you need to be sharp with periods and commas but do not need to worry about brackets, parentheses and other characters that exist but are never used.

2) Random Call Signs

Recognizing worldwide station call signs is an operating skill fundamental to actual amateur radio communications. This op-

Ray Onley is a sophmore at Forest Park High School. He owns a CoCo 3 with 512K. Besides the computer his interests include biking, tennis, running and chess.

COCO UTILITIES GALORE

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

Super Tape/disk Transfer

Transfers Tape-To-Disk, Disk-to-Tape,Disk-to-Disk,Tape-To-Tape. Only $24.95 **$19.95**

Maillist Pro

Add, Edit, View, Print (Select/All), Sort Mailing Labels. Only ~~$19.95~~ **$14.95**

Computerized Checkbook

Add, View, Search & Print Checkbook Entries for savings/checking & other accounts. Only ~~$19.95~~ **$14.95**

CoCo 3 Screen Dump

32/40/80 column, PMODE 3/4 dump. Allows you to take snapshots of screens while program is running! For DMP & Epson/ Gemini/ Star & Compatibles. Only ~~$19.95~~ **$14.95** (CoCo 2 compatible)

RGB Patch

Displays most graphics in Color on RGB Monitors. For CoCo 3.Only ~~$24.95~~ **$19.95**

FKEYS III

Create up to 20 function Keys. EPROMable. For CoCo 3.Only **$19.95**

Sixdrive

Allows use of 3 double-sided drives from RSDOS or ADOS. Disk Only **$16.95**

Disk Label Maker

Design Professional labels. Allows expanded, normal, condensed text w/ Double-Strike & Borders. Supports DMP, Star, Gemini, Epson & Comp. Printers. Only ~~$19.95~~ **$14.95**

Disk Utility 2.1a

The best disk management program for the CoCo 2 & 3. Only ~~$19.95~~ **$9.95**

Bowling Score Keeper

For Team & Individuals. **$19.95**

Vcr Tape Orgranizer

Organize your videotapes.Only ~~$19.95~~ **$14.95**

Home Bill Manager

Organize your Bills.Only **$12.95**

Calendar Maker

Calendr & Appts. Only **$12.95**

From Cer-comp...

Window Master: Windowing Environment for CoCo 3. **$69.95** w/ HiRes: **$79.95**
Window Writer: **$59.95**
Window Basic Compiler: **$99**
Window ED/TASM: **$49.95**
Font/Icon Editors: **$19.95**
Advanced Prog. Guide: **$24.95**

CBASIC: Basic Compiler. Specify CoCo 1,2 or 3. Only **$149.95**

The Source: Best Disassembler. Specify CoCo 1,2 or 3. **$49.95**

EDT/ASM: Best Assembler. Specify CoCo 1,2,3. **$59.95**

Telewriter 64

Best Word Processor for CoCo 2. Disk: **$57.95** Cas: **$47.95**

Autoterm

Best Terminal Software. Disk: **$39.95** Cas: **$29.95**

From Dr. Preble®

Basic Freedom: **$24.95**
Vocal Freedom: **$34.95**
Mental Freedom: **$24.95**
Hacker's Pac: **$14.95**

Disk Utilities

Use all 360K from your double sided drive & more. **$17.95**

MEMORY MASTER

Run 2 programs at once, fix disks, scan, edit memory on CoCo 2. Only **$24.95**

Vterm

Terminal Software w/ VT Emulations and much more. CoCo 3 Only. Only **$39.95**

Maxsound

A High Quality Digital Audio Sampler & Sequence for CoCo 3. Only **$49.95**

OS9

RSB

The revolutionary program that allows you to use Basic under OS9 Level II to take advantage of features such as no-halt floppies, hard disks, 2 Mhz operation and more. Only **$39.95**

Start OS9

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

More Good Stuff...

OS9 Level II BBS V3.0: The absolute best BBS program for OS9. Even comes with its own terminal Program. Req. 512K & RS232 Pack. Only **$29.95**

Level II Tools: 25 utilities such as windowing, wildcards, tree and more. Only **$24.95**

Disk Manager Tree: Change, copy, view,create directories with ease. Req 512K. **$29.95**

Warp One: Complete Level II Windowing Terminal. Req 512K & RS232 Pack. Only **$34.95**

The Zapper: Patch Disk Errors. Disk Only **$19.95**

Multi-Menu: Create your own pop-down windows. Req 512K and Multi-Vue. Only **$19.95**

Presto Partner: Have a notepad, calculator, calendar, phone book,RT clock & more at your fingertips. 512K Req. **$29.95**

Transfer Utilities

GSC File Transfer: Transfer files from MSDOS / OS9/ RSDOS & Flex. Req OS9 (Level II for Multivue Ver.),2 drives, SDISK/SDISK3. Standard Version: **$44.95.** Multivue Version: **$54.95**

SDISK3: Standard drive replacement module allows use of 40/80 DS/DD drives. Req. OS9 Level II. **$29.95** SDISK: **$29.95**

PC-Xfer Utilities: Programs to format/transfer files to/from MSDOS disks to CoCo under Level 1/2. Req SDISK(3): **$44.95**

OS9 Level II Ramdisk

In-memory disk drive! Req 512K. Disk Only **$29.95**

Goldberg Utilities

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

From Burke & Burke®..

Wild & MV Version 2.1: Use "wildcards" with OS9 & re-arrange directory tree. **$19.95**

EZGen Version 1.04: Powerful OS9 bootfile editor. Changes names, add/delete modules, patch bytes, etc. **$19.95**

From Microtech®...

XWord: Best OS9 Word Processor with True character oriented & more. **$69.95**

XMerge: Mail Merge for XWord. Only **$24.95**

XSpell: 40000 word spelling checker. Only **$39.95**

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

XDIS: OS9 Disassembler. **$34.95**

XTerm: OS9 Communications Program. Only **$49.95**

XDir & XCal: Hierarchial directory, OS9 calculator. **$24.95**

From Frank Hogg®...

Dynastar: Most Popular OS9 Word Processor. Only **$99.95**

Dynaspell: Spelling Checker. Only **$74.95**

Both Dynastar & Spell: $124.95

Wiz: Communications Program. Req RS232 Pack. **$59.95**

Inside OS9 Level II:$19.95

From Sugar Software®

OS9 Calligrapher: Turn your printer into a calligrapher's quill & make beautiful flyers, invitations, etc. Includes 3 fonts. Only **$24.95**

Window Writer

Powerful OS9 word processor with multi-tasking, pull down menus & much more. Only **$59**

Multi-Edit

Create, Edit Application Information Files & Icons for Multi-Vue. Only **$24.95**

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618.

To Order: Refer to Page 17 of our 6-page ad series (Pgs 7-17)

Credit Card Toll Free Orderline 1-800-654-5244 (9AM - 8PM 7 DAYS/WEEK)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. **Fax:** 716-383-0026.

VISA MasterCard AMERICAN EXPRESS DISCOVER

UPS 2ND DAY AIR

tion generates whatever number of random call signs you select. You can expect to understand each call sign. Each consists of one or two letters (the prefix), a number, and one to three letters (the suffix). The prefix designates the country issuing the license, the number usually designates the geographical region within that country, and the suffix identifies the particular station — just like the last four digits of your telephone number. For a list of what the prefixes mean, check the ARRL operating manual, which is available at local amateur radio stores.

3) Translate Data File

This feature permits you to convert any CoCo ASCII text file into Morse code. This is the do-it-yourself option of this program. You can use any of your existing text files as practice material, or you can create your own test using almost any word processor.

4) Character Help

Sometimes it can help to just listen to what you choose to transmit whether it's a single letter, radio abbreviation or other word. Press any key on your keyboard, and you can hear the Morse code version at the speed you have chosen.

5) Character Test

This tests character-by-character. When the test starts, you hear a code character and the computer asks which character you heard. If your answer is incorrect, you are shown the character sent and your incorrect answer. After this, press any key to hear the next letter. Your score is displayed after the test.

6) QSO Help

A QSO is a two-way communication between amateur radio stations. This option gives you practice in recognizing short words and abbreviations commonly used in actual communication. It is desirable to learn to hear these common expressions as a single unit rather than as a series of individual letters that you have to think about. For example, you can practice understanding QRL? as the message asking if a particular frequency is occupied, in contrast to writing down the characters Q,R,L and ? and then translating them. The data line for this program feature contains all the simple on-the-air communications expressions typically used.

7) Contest Simulation

This option simulates an amateur radio operating event in which random stations call CQ TEST (which means *calling any station interested in this contest*) and then they receive answers from other randomly-generated amateur station call signs. The answering stations are heard on a slightly different audio frequency, simulating typical listening conditions on a radio receiver.

When answering the test length question for this test, you give a number representing the amount of entire contacts. These contacts last about one minute at 13 WPM.

Sample Exchange:

Originating station (lower tone):
`CQ CQ TEST DE KA8RZP K`
[Meaning: Calling any station in this contest from `KA8RZP`.]

Answering station (higher tone):
`KA8RZP DE OA6OAF`
[Meaning: `KA8RZP`, this is `OA6OAF`.]

Originating station:
`OA6OAF DE KA8RZP R R NR 774 RST 559 BK`
[Meaning: Roger, Roger, your contest serial number is 774 and your signal report is 559. Break.]

Answering station:
`QSL NR 663 RST 579 BK`
[Meaning: I confirm your transmission. Your serial number is 663 and your signal report is 579. Break.]

Originating station:
`QSL 73 SK`
[Meaning: I confirm your transmission. Best regards. Break.]

Divider (program-generated) among complete exchanges (lowest tone):
`BT ( - ... - )`
[Meaning: a pause that occursduring a code conversation.]

After this pause a newly generated originating station calls CQ TEST and receives a reply from a new station. It should be noted that all the numbers and call signs given are samples and that they are different every time. The call sign prefix, however, means a specific country; for example, K means the United States.

Extensive practice with this option helps you become ready for contest-style radio communications at higher code speeds than you think you can handle. Then you find your next license code exam much less intimidating.

Option Menu

This menu allows you to control the features that affect the rest of the program. These are the five different options:

• Descending Speed — a newly created testing procedure in which the program starts out at a very fast speed and then evenly descends to a desired speed. The theory behind this is that the higher speed sets your brain in motion; when the speed slows down, you find you can handle code a bit faster than you thought you could.

To use this, select the descending speed option. You see an overlapping window pop in. I suggest you answer the "Start Speed" question by entering a speed two to three times what you can handle. Also answer the "End Speed" question by entering a speed slightly faster than what you think you can handle. This feature is effective in all seven tests.

• Ascending Speed — This option uses the converse of the theory above. I suggest you use a start speed of about what you can handle, maybe a little slower. And for the end speed, enter twice the speed you can handle. If those speeds don't work for you, play with them. Maybe you can find a set of numbers perfect for your needs.

• Dec./Acc Speed Off — Selecting this shuts off the descending and ascending speed options.

• Toggle Random Tones — This option changes the tone of the code sent every word. This helps simulate actual listing conditions heard on a receiver. With this feature get used to the different tones so you learn not to get thrown off when hearing a sudden tone change such as you would encounter on a receiver.

• Toggle Keyboard and Joystick — Selecting this changes the control input device from keyboard to joystick and vice versa.

• Display Line — This option shows what line is currently being sent and highlights the individual character being sent. This option does not work on the Character Help and Character Test testing routines.

• Command Menu — Selecting this brings you back to the command menu.

Formation of Morse Code Characters

The ratio of dots (dits), dashes (dahs), and spaces between each element (dit or dah), character or word, is controlled by variables in the program. I chose to make these spacings user friendly, not exactly following the classic mechanical proportions of length for spacing. This means the sending speed of each character is a little faster, with a bit more space between characters and words. This same practical adjustment is made in many, but not all, license exams administered by Volunteer Examiners (VEs).

DISTO PRODUCTS

All Disto Products now carry a 1-Year Warranty and are shipped **2nd Day Air** (at no extra charge!) within Continental US. All Disto Add-Ons (& Super Controller II) include OS9 Drivers, unless otherwise specified.

Disto Mini Controller (with RSDOS or CDOS) : **$74.95**
Disto Super Controller (with RSDOS or CDOS): **$99.95**
Disto Super Controller II (with RSDOS or CDOS): **$129.95**
- **Mini Eprom Programmer Add On: $54.95**
- **Hard Disk Adapter: $39.95** w/ RS232: **$69.95**
- **RT Clock & Printer Interface: $34.95 (OS9 Driver: $19.95)**
- **3-in-1 Multiboard Adapter**: Parallel Port, RT Clock & RS232 Port. **$74.95**
- **MEB Adapter: $34.95**
- **4-in-1 Board**: Parallel Port, RT Clock, RS232 & Hard Disk Interface: **$114.95**

RS232 Super Pack: True RS232 Port for your CoCo! Compatible with Tandy® RS232 Pack. Includes DB25 Cable. 100% Compatible with OS9 ACIA Software. Req. Multipak. Only **$54.95**

HARD DRIVES, Etc.

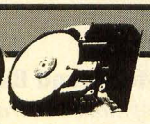
Systems w/ Seagate Hard Drive, Controller, Cables, CoCo XT Interface, Cables, Case (with fan & Power Supply), Software (OS9 Software & HYPERIO Software!) & Instruction Manuals. Assembled/Tested/Formatted. Just *Plug'N'Run*. Req. Multipak.
The Best Hard Drive Deal for the CoCo.

40 Meg System **$569**

Seagate 20 Meg System: $509
Seagate 30 Meg System: $539
CoCo XT: Use 2 5-120 Meg Drives with your CoCo. Only **$69.95** w/ Real Time Clock: **$99.95**
CoCo XT ROM: Boots OS9 from hard/floppy. Only **$19.95**
HYPERIO: Allows Hard Drive use with RSDOS. Only **$29.95.**
HYPERIO Disto Version (for Disto Hard Drive Interface users).
HYPERIII: Adds RAM Disk & Spooler to CoCo 3 HYPER I/O. Only **$12.95**

HYPERIO Utilities (by Kevin Berner)
Hard Drive Utilities: MSA Backup, Copy/Kill/Rename, Hard Disk Backup to Floppies (vica versa) & more. Only **$21.95**
Disk Doctor: Checks/locks out bad sectors. only **$17.95**
Hard Drive Zap: View tracks, sectors, modify data on your hard disk. Only **$21.95**

Drive 0 **$199**



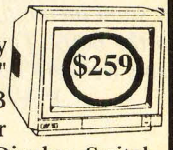
2 Drive System **$299**

DRIVES

There are a lot of dealers selling disk drives for the CoCo. Why buy from us? **First,** all our drives are BRAND NEW Fujitsu DOUBLE SIDED Drives. They are sleek, fast (6ms!), quict and havc a rcputation of superb performancè and reliability. **Second,** our Drive 0 & 2 Drive Systems come with the acclaimed DISTO Controller - with gold plated contacts & built-in ROM which allows you to access BOTH sides of our drives!. **Third,** our Drive 0 & 2 Drive Systems come with the **Official** 200 page Radio Shack Disk Manual. **Fourth,** you get $50 worth of our utility software (Disk Util 2.1A & Super Tape/Disk Transfer). Our drive systems are head & shoulders above the rest!

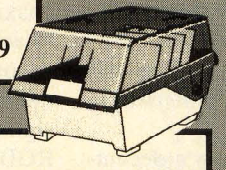
Drive 0 (with Disto Controller, Case, Power Supply, 1 Drive Cable, Manual, Software): **$199**
Drive 1 (with Case, Power Supply & Software): **$129** Bare 5 1/4" Drive: **$89**
2 Drive System (With Disto Controller, Case, Power Supply, 2 Drive Cable, Manual & Software): **$299**
1 Drive Cable: $16.95 **2 Drive Cable: $22.95** **4 Drive Cable: $34.95**
FD501 Upgrade Kit: Bare Drive, 2 Drive Cable & Instructions: **$109**
FD502 Upgrade Kit: Bare Drive, 2 Drive Cable, Power Cable & Instructions: **$119**

MAGNAVOX 8CM515 RGB Monitor



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

Magnavox RGB Cable for CoCo 3 and Composite Video / Audio Cable Set with Purchase of Monitor: **$19.95**



More Good Stuff...

DS69B Digitizer: Use your CoCo to display pictures from your VCR. Comes complete with CSEE Software. Only **$149.95. CoCo 2 Version: $99.95**

Questron Joystick (for CoCo): Atari type joystick w/ Rapid Fire. Only **$29.95**
Advanced Gravis Joystick: Features tension, rotary-centering, free floating controls with 3 buttons. Only **$59.95**
RS Speech & Sound Cartridge: $39.95 (limit[illegible]tities)
MPI Locking Plate (Specify 26-3024/3124): **$8**
5 1/4" DS/DD Disks: $.40 each
5 1/4" Colored DS/DD Disks: $.89 each
3 1/2" DS/DD Disks: $1.49 each
5 1/4" Disk Case (for 70 disks): **$9.95**
3 1/2" Disk Case (for 40 disks): **$7.50**

NX1000 Color Ribbon:$12.95
NX1000 Black Ribbon: $8.50
Seikosha, EPSON, DMP,Panasonic, Okidata
Gemini Ribbons: Only $8.50 each

Rascan Video Digitizer

State-of-the art video digitizer for the CoCo 3. 640x200 & 320x200 work area in color! Includes pop-up menu system, driver software & print driver disk.

Only $159

Hardware Hackers: We are interested in your projects. Excellent royalties. Call 716-383-0026.

VISA MasterCard AMERICAN EXPRESS DISCOVER

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618.
To Order:Refer to Page 17 of our 6-page ad series (Pgs 7-17)
Credit Card Toll Free Orderline 1-800-654-5244 (9AM - 8PM 7 DAYS/WEEK)
Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. **Fax:** 716-383-0026.

UPS 2ND DAY AIR

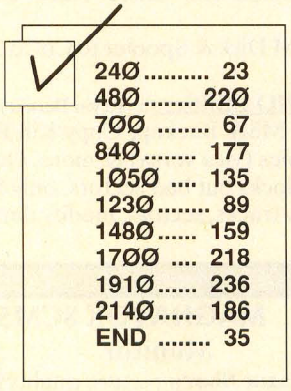
Line 120 of the program controls some of these values, and you may wish to try your hand at lightly adjusting them:

Dits — T1
Dahs — T2
Spacing between dits and dahs — P1
Spacing between characters — P2
Spacing between words — P3

The above adjustments control their respective lengths proportionally. This means that changing any of these numbers alters the lengths on all speeds. To change the lengths for each individual speed, the numbers in Line 800 must be changed. Line 800 is set up in groups of three numbers. The first of these numbers is the actual word-per-minute speed. The second number is the base timing unit for the elements. Changing this number proportionally changes the lengths of both the dits and the dahs. The smaller this number is, the longer the dit or the dah. The third number in the group is the base unit for the spacing. Altering this number changes the lengths of all the spaces. Be very careful in adjusting these numbers because any radical change might throw the timing off, making the indicated speed inaccurate.

I tried to design this program so it is practical, easy to use and fun. There are many options and features in the program that I encourage you to try. Try to push yourself into higher code speeds so you can upgrade your license and explore more in the world of amateur radio.

(Questions or comments concerning this article may be addressed to the author at 810 Cascade Road, Cincinnati, OH 45240. Please enclose an SASE when requesting a reply.) ❑



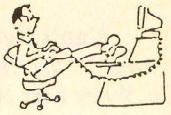
The listing: CODEMSTR

```
0 ' COPYRIGHT 1989 FALSOFT,INC
10 CLS:HL=32:VL=8:FOR TM=0 TO 66
 STEP 33:GOSUB 920:HL=HL-2:VL=VL
-1:NEXT
20 PRINT@105,"CODEMASTER I";:X=1
123:X1=25:GOSUB 900
30 PRINT@135,"BY RAY ONLEY 8/88"
;:X=1155:GOSUB 900
40 TM=297:HL=14:VL=3:GOSUB 920:P
RINT@330,"LOADING DATA";
50 CLEAR5000:DIM W$(200),L$(48),
W1$(37),C$(15),C1$(60)
60 FOR X=1 TO 47:READ L$(X):NEXT
70 FOR X=1 TO 36:READ W1$(X):NEX
T
80 FOR X=1 TO15:READ C$(X):NEXT
90 FOR X=1 TO 7:READ W(1,X),W(2,
X),W(3,X):NEXT
100 FORX=1TO 58:READ C1$(X):NEXT
110 FOR X=1 TO 7:READ T$(X):NEXT
120 T1=1:T2=3:P1=4:P2=28:P3=75:P
LAY"03":B$=CHR$(128):N=1:WPM=13:
U=16:U2=2:T$="A"
130 PRINT@416,;:INPUT"KEYBOARD O
R JOYSTICK (K OR J)";K$
140 IF K$="K" THEN KJ=1
150 'MAIN MENU
160 CLS:PRINTB$B$"command"B$"men
u"B$B$
170 PRINT STRING$(16,239)
180 PRINT"  TAKE   TEST":PRINT"
 CHANGE SPEED
190 PRINT"  CHANGE TEST":PRINT"
 OPTIONS
200 TM=17:HL=15:VL=6:GOSUB 920
210 PRINT@51,"SPEED -"WPM;
220 PRINT@83," TEST MODE:";:PRIN
T@115,LEFT$(T$(N),11);
230 PRINT@147,"CONTROL:";:IF KJ=
1 THEN PRINT"KEY"; ELSE PRINT"JO
Y";
240 J1=14:J3=1088:X1=15:GOSUB 16
70
250 ON L+1 GOTO 970,1500,1750,19
30
260 'GENERATE RND CHARACTORS
270 FOR Y=1 TO K:W$(Y)="      ":F
OR X=1 TO 5
280 R=RND(90):IF R<44 THEN 280
290 IF R>57 AND R<65 THEN 280
300 MID$(W$(Y),X,1)=CHR$(R):NEXT
 X,Y
310 'TEXT-TO-CODE ROUTINE
320 TM=352:HL=32:VL=3:GOSUB 920:
PRINT@385,"PRESS ANY KEY TO STAR
T TEST...";:EXEC 44539:GOSUB960
330 GOSUB 960:TM=228:HL=12:VL=3:
GOSUB 920:PRINT@261,"TESTING..."
;
340 IF RT=0 THEN T$="A"
350 SF=(SS-ES)/K
360 OM=((SS+ES)/2)*.06
370 IF DL=1 THEN TM=352:HL=32:VL
=3:GOSUB 920
380 IF F=3 THEN 1230
390 IF F=2 THEN U=SS*OM:U2=INT(5
0/U)
400 FOR V=1 TO K:IF DS=1 OR IS=1
 THEN U=U-SF:U2=INT(50/U)
410 IF F=2 THEN PRINT@58,INT(U/O
M);
420 IF RT=1 THEN T$=CHR$(64+RND(
7))
430 PRINT@385,STRING$(29,32);
440 IF DL=1 THEN PRINT@385,LEFT$
(W$(V),29);:IF LEN(W$(V))>29 THE
NF=7
450 FOR Y=1 TO LEN(W$(V))
460 IF Y>29 THEN O=Y-29 ELSEO=Y
470 IF DL=1 AND PEEK(O+1408)<64
THEN AN=64 ELSE AN=-64
480 IF SL=1 OR Y=1 THEN SL=0:GOT
O 500
490 IF DL=1 THEN POKE O+1407,Q
500 IF DL=1 THEN Q=PEEK(O+1408):
POKE O+1408,Q+AN
510 IF DL=1 AND Y=29 THEN PRINT@
385,STRING$(29,32);:PRINT@385,MI
D$(W$(V),30,29);:SL=1
520 A$=INKEY$:IF A$=CHR$(12) THE
N 160
530 IF A$="P" THEN EXEC 44539
540 N$=MID$(W$(V),Y,1)
550 IF N$="" THEN 650
560 A=ASC(N$)
570 IF A>97 AND A<123 THEN A=A-3
2
580 IF A<45 OR A>90 THEN 650
590 N1$=L$(A-43)
600 FOR X=1 TO LEN(N1$)
610 N2$=MID$(N1$,X,1)
620 IF N2$="Z" THEN PLAY"L"+STR$
(INT(U*T1))+T$:GOTO640
630 PLAY"L"+STR$(INT(U*T2))+T$
640 FORT=1TOP1*U2:NEXT T,X
650 IF F=1 THEN RETURN
660 FOR T=1 TO P2*U2:NEXT T,Y
670 IF F=3 THEN FOR T=1 TO 450:N
EXT:RETURN
680 FOR T=1 TO P3*U2:NEXT T,V
690 IF F=2 THEN WPM=ES
700 PRINT@352,STRING$(100,32)
710 TM=353:HL=30:VL=3:GOSUB 920:
PRINT@386,"PRESS ANY KEY FOR ANS
WERS...";:EXEC 44539
720 IF N=3 OR N=7 THEN 1550
730 FOR LY=1 TO INT(K/15)-1
740 CLS:FOR X=1 TO 30:Z1=(LY-1)*
30+X:PRINT STR$(Z1);") "W$(Z1),:
NEXT:EXEC 44539:NEXT:GOTO 160
750 GOTO 50
760 'DATA
770 DATA ZZXXZZ,,XZXZXZ,ZXXZX,ZZ
ZZZ,XZZZZ,XXZZZ,XXXZZ,XXXXZ,XXXX
X,ZXXXX,ZZXXX,ZZZXX,ZZZZX,ZZZXXX
,ZXZXZX,ZXZZX,ZXXXZ,ZXZZXZ,XXZZX
X,,XZ,ZXXX,ZXZX,ZXX,X,XXZX,ZZX,X
XXX,XX,XZZZ,ZXZ,XZXX,ZZ,ZX,ZZZ,X
ZZX,ZZXZ,XZX,XXX,Z,XXZ,XXXZ,XZZ,
ZXXZ,ZXZZ,ZZXX
780 DATA CQCQ,CQDX,CQTEST,CQCHES
S,QST,QRZ?,QRT,QRX,PSEQSY,PSEQSL
,QRL?,RST479,NAME,OP,HR,QTH,RIG,
RIG1TTW,ANT,WX,QSL,73,88,CUL,CUA
GN,SK,HW?,BK,KN,CL,FB,PSEQRS,QRN
,QRM,QSB,RST5NN
790 DATA AKRON OH,MONTGOMERY AL,
ALBANY GA,NEW HAVEN CN,COLUMBIA
SC,SPRINGFIELD MS,GRAND RAPIDS M
I,FLAGSTAFF AZ,MESA AZ,OWENSBORO
 KY,CINCINNATI OH,NASHVILLE TN,D
AYTONA BEACH FL,MIAMI FL,INDIANA
POLIS IN
800 DATA 3,2,8,5,4,5,7,7,4,10,14
,4,13,16,2,17,20,1,21,26,1
810 DATA K,A,N,W,KB,KA,WA,AA,AB,
AC,KC,WB,CE,CO,CP,CT,DL,DK,EA,EI
,F,G,GN,GW,GI,HA,HB,HC,HK,I,IK,J
A,LA,LU,LZ,OA,OE,OH,OK,ON,OZ,PA,
PP,PY,SM,SP,SV,TF,UA,UB,VE,VK,VP
,XE,YN,YU,YV,YO
820 DATA RANDOM CHARACTORS,RANDO
M CALLSIGNS,TRANSLATE DATA,CHARA
CTOR HELP,CHARACTOR TEST,QSO HEL
P,CONTEST SIMULATION
830 'KEYBOARD ROUTINE
840 F=1:Z=1:Y=1
850 TM=321:HL=30:VL=4:GOSUB920:P
RINT@354,"PRESS KEY TO HEAR CHAR
ACTOR";:PRINT@389,"PRESS CLEAR T
O EXIT";
```

BIG BASIC

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

KEYBOARDS, ETC...



Keyboard Extension Cable allows you to move your keyboard away from the computer & type with ease. Use your existing keyboard or leave your present keyboard intact and use a second keyboard. Only **$39.95**
CoCo 3 Keyboard: $39.95 w/ Extension Cable: **$69.95**
CoCo 2 Keyboard: $19.95 w/ Extension Cable: **$49.95**
(CoCo 3 Keyboard includes free Function Keys Software)

512K Upgrades

Fully assembled, tested and ready to be shipped NOW! Our design allows mounting chips on top to prevent any heating problems. No soldering; Easy instructions for 2 minute installation! Comes with following software (value $100):

- 512K Ramtest
- 512K Backup Lightning
- 512K Print Spooler
- 512K Ramdisk
- OS9 Level II Ramdisk

Only **$109**

The absolute best 512K Upgrade Package Available!
90 day warranty! **New Low Price $109**
0K Upgrade Board (with 512K Ramtest/Ramdisk/Spooler): **$39.95**

Upgrades for CoCo 2

64K Upgrade (8 chip) for CoCo I, CoCo II's with Cat # 26-3026/3027/3134/3136: **$29.95**
64K Upgrade (2 chip) for 26-3134 A/B CoCo II: **$39.95**
(Free 64K Software included with 64K Upgrades)

EPROM ...

INTRONICS EPROM PROGRAMMER: Programs 2516 to 27010 & more! Includes software & complete documentation. Latest version. Lowest Price Anywhere. CoCo 1,2,3. Only **$137.95**
DATARASE Eprom Eraser: For 24/28 pin Eproms. Erases up to 4 EPROMs at a time. Only **$49.95**
Both Eprom Programmer & Eraser: $179.95 Datarase II
2764 Eprom: $8 **27128 Eprom: $9**
ROMPAK (w/ Blank PC Board, 27xx Series): $12.95
BLANK CARTRIDGE (Disk Controller Size): $10.95

CABLES, Etc.

Magnavox 8505/8515/8CM643 Analog RGB Cable: $24.95
Serial-to-Parallel Interface: Use your parallel printer at high speed (300-9600 baud) with the CoCo. Comes with all cables. No software compatibility problems. Only **$44.95**
15" Shielded Multipak Extension Cable: $36.95
Y Cable: Use your disk system with Speech/RS232 Pack, DS69 Digitizer, etc. Only **$27.95**
RGB Analog Extender Cable: $19.95
SONY Monitor Cable: $29.95
MODEM Cable: 4 pin to DB25. Only **$19.95**
2 Position Switcher: Hook 2 devices to serial port. **$29.95**
HI-RES Joystick Interface: $11.99

COMMUNICATIONS EXTRAVAGANZA

(1) **Avatex 1200e Modem:** Fully Hayes Compatible 300/1200 w speaker, Auto Dial/Answer/Redial.
(2) **MODEM CABLE** (4pin to DB25; Reg $19.95)
(3) **Autoterm** Software (Reg $39.95)
(4) Free Compuserve Offer & Access Time
(5) **UPS 2nd Day Air Shipping**
Only **$129.95**

Avatex 1200e Modem Only : $85
Zoom 2400 Modem Only: $149
Communications Extravaganza 2400: Includes Zoom 2400 baud modem, cable, software & 2nd Day Air Shipping. Only **$189.95**
All our modems carry a 2 Year Warranty!

CHIPS, Etc.

Genuine RS Disk Rom 1.1 (Needed for CoCo 3): **$29.95**
ECB Rom 1.1: $29.95
68B09E Chip: $14.95 **68B21 Chip: $5.95**
GIME Chip for CoCo 3:**$39.95**
Genuine RS Multipak PAL Chip (Specify 26-3024 / 26-3124)**: $19.95**
PAL Switcher: Allows you to switch between CoCo 2 & 3 modes when using the Multipak. You need the OLDER & NEW PAL Chip for the 26-3024 Multipak. Only **$39.95.** With NEW PAL Chip Only **$49.95**

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester, NY 14618.

VISA MasterCard AMERICAN EXPRESS DISCOVER

To Order: All Orders $75 & above (except Printers, Monitors, Drives, Computers) shipped by **UPS 2nd Day Air** at no extra charge in Continental US. We accept Visa, MC, Amex, Discover, Check, MO & School PO's. Please add $3.00 S&H ($10 for Drives) in Continental US; all others add 10% S&H (Min $5). NYS Residents please add sales tax. Our Australian Agent: Australian Peripheral Development. Ph: 07-341-9061
Credit Card Toll Free Orderline 1-800-654-5244 (9AM - 8PM 7 DAYS/WEEK)
Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. **Fax:** 716-383-0026.

UPS 2ND DAY AIR

```
860 W$=INKEY$:IF W$="" THEN 860
870 IF W$=CHR$(12) THEN F=0:GOTO
160
880 N$=W$:GOSUB 560
890 GOTO 860
900 POKE X,128:FOR Z=X+1 TO X+X1
:POKE Z,PEEK(Z)-64:NEXT:RETURN
910 'WINDOWING ROUTINE
920 CN=RND(8)*16-16:VL=VL-1
930 PRINT@TM,CHR$(142+CN);:PRINT
STRING$(HL-2,140+CN);:PRINTCHR$(
141+CN);
940 FOR X=1 TO VL:Z=TM+X*32:PRIN
T@Z,CHR$(138+CN);:PRINT@Z+HL-1,C
HR$(133+CN);:NEXT
950 PRINT@TM+32*VL,CHR$(139+CN);
STRING$(HL-2,131+CN);:PRINTCHR$(
135+CN);:RETURN
960 FOR X=0 TO VL:PRINT@TM+32*X,
STRING$(HL,32);:NEXT:RETURN
970 FOR ZZ=1 TO K:W$(ZZ)="":NEXT
980 IF N=4 THEN 840 ELSE IF N=3
THEN 1030 ELSE TM=358:HL=18:VL=3
:GOSUB 920
990 PRINT@391,"TEST LENGTH: ";:L
INEINPUT K$:IF K$="" THEN 160 EL
SE K=VAL(K$)
1000 IF N=5 THEN 1030
1010 TM=358:HL=20:VL=3:GOSUB920:
PRINT@391,"GENERATING TEST...";
1020 IF F=2 THEN PRINT@58,SS;
1030 ON N GOTO 260,1050,1120,840
,2180,1200,1210
1040 'CALLSIGN ROUTINE
1050 FOR Y=1 TO K
1060 Z$=C1$(RND(59))
1070 Z1$=MID$(STR$(RND(10)-1),2,
1)
1080 FOR X=1 TO RND(3):Z2$(X)=CH
R$(64+RND(26)):NEXT
1090 W$(Y)=Z$+Z1$+Z2$(1)+Z2$(2)+
Z2$(3)
1100 NEXT:IF F=3 THEN 1250ELSE32
0
1110 'LOAD ASCII FILE
1120 TM=356:HL=24:VL=3:GOSUB 920
:PRINT@389,;:LINEINPUT"FILE NAME
:";F$
1130 IF F$="" THEN 160
1140 IF LEN(F$)>8 AND INSTR(F$,"
.")<1 THEN 1120
1150 TM=353:HL=30:VL=3:GOSUB 920
:PRINT@386,;:LINEINPUT"CASSETTE
OR DISK (C OR D)?";CD$
1160 IF CD$="C"THEN CD=-1 ELSE C
D=1
1170 OPEN "I",CD,F$:K=0
1180 K=K+1:IF EOF(CD)=-1 THEN CL
OSE:GOTO 320
1190 INPUT#CD,W$(K):GOTO 1180
1200 FOR X=1 TO K:W$(X)=W1$(RND(
36)):NEXT:GOTO 320
1210 F=3:GOTO320
1220 ' CONTEST SIMULATION
1230 FOR ZZ=0 TO K-1
1240 K=2:GOTO 1050
1250 C1$=W$(1):C2$=W$(2)
1260 M=8*ZZ
1270 W$(1)="CQ TEST DE "+C1$+" K
":V=1:T$="A":GOSUB 430
1280 FMM$=W$(1)
1290 W$(2+M)=W$(1)
1300 W$(1)=C1$+" DE "+C2$:T$="B"
:GOSUB 430
1310 W$(3+M)=W$(1)
1320 W$(1)=C2$+" R R NR"+STR$(RN
D(9))+STR$(RND(9))+STR$(RND(9)):
T$="A":GOSUB 430
1330 W$(4+M)=W$(1)
1340 IF RND(10)<7 THEN R1=5 ELSE
 R1=RND(5):IF R1<2 THEN 1340
1350 R2=RND(9):IF R2<5 AND R1>3
THEN 1350
1360 W$(1)="RST"+STR$(R1)+STR$(R
2)+"9 BK":GOSUB 430
1370 W$(5+M)=W$(1)
1380 W$(1)="QSL NR"+STR$(RND(9))
+STR$(RND(9))+STR$(RND(9)):T$="B
":GOSUB 430
1390 W$(6+M)=W$(1)
1400 IF RND(10)<7 THEN R1=5 ELSE
 R1=RND(5):IF R1<2 THEN 1400
1410 R2=RND(9):IF R2<5 AND R1>3
THEN 1410
1420 W$(1)="RST"+STR$(R1)+STR$(R
2)+"9 BK":GOSUB 430
1430 W$(7+M)=W$(1)
1440 W$(1)="QSL 73 SK":T$="A":GO
SUB 430
1450 W$(8+M)=W$(1)
1460 W$(1)="=":T$="C":GOSUB 430
1470 NEXT:W$(1)="":W$(2)=FMM$
1480 F=0:K=ZZ*8:GOTO 1560
1490 'CHANGE SPEED
1500 FOR X=0 TO 6:PRINT@274+(X*3
2),W(1,X+1);:NEXT
1510 TM=240:HL=6:VL=9:GOSUB 920
1520 J1=25:J3=1297:X1=3:GOSUB 16
70
1530 L=L+1:WPM=W(1,L):U=W(2,L):U
2=W(3,L)
1540 GOTO 160
1550 'LIST ANSWERS
1560 CLS:PRINT@7,"CODE TEST ANSW
ERS":PRINTSTRING$(32,175);:C=0
1570 FOR X=1 TO K
1580 C1=INT(LEN(W$(X))/32)+1:C=C
+C1:IF C>13 THEN C=0:GOTO 1610
1590 IF LEN(W$(X))>C1*32 THEN C=
C+1
1600 PRINT W$(X):GOTO 1640
1610 A$=INKEY$:IF A$=""THEN1610
1620 IF A$=CHR$(12) THEN 160
1630 FOR S=2 TO 14:PRINT@32*S,ST
RING$(32,32);:NEXT:PRINT@64,;
1640 NEXT X
1650 EXEC 44539:GOTO 160
1660 'JOYSTICK INPUT
1670 IF KJ=1 THEN KI=0:GOTO 1810
1680 J2=INT(64/(J1/4))
1690 H=JOYSTK(0):V=JOYSTK(1)
1700 X=J3+INT(V/J2)*32:POKE X,12
7+(16*RND(8)):FOR T=1 TO 50:NEXT
:POKE X,143
1710 IF INKEY$=CHR$(12) THEN160
1720 P=PEEK(65280):IF P=254 OR P
=126 GOSUB 900:L=INT(V/J2):RETUR
N
1730 GOTO 1670
1740 'CHANGE TEST
1750 TM=228:HL=23:VL=9:GOSUB920
1760   ZZ=263:FOR   X=0   TO
6:Z1=ZZ+(X*32)
1770 PRINT@Z1,T$(X+1);:NEXT
1780 J3=1285:J1=25:X1=20:GOSUB 1
670
1790 N=L+1:GOTO 160
1800 'KEYBOARD INPUT
1810 X=J3+KI:POKE X,127+(16*RND(
8)):FOR T=1 TO 50:NEXT
1820 A$=INKEY$:IF A$=""THEN1810
1830 POKE X,143
1840 IFA$=CHR$(94)THEN KI=KI-32
1850 IFA$=CHR$(10)THEN KI=KI+32
1860 IF A$=CHR$(13) THEN GOSUB 9
00:L=KI/32:RETURN
1870 IF KI<0 THEN KI=0
1880 IF KI>J1/4*32 THEN KI=KI-32
1890 GOTO 1810
1900 'TOGGLE KEY. & JOY.
1910 IF KJ=1 THEN KJ=0 ELSE KJ=1
1920 GOTO 1940
1930 'OPTIONS
1940 TM=224:HL=24:VL=8:GOSUB930
1950 FOR X=0 TO 6:PRINT@257+(X*3
2),STRING$(22,32);:NEXT
1960 PRINT@259,"DESCENDING SPEED
";:IF DS=1 THEN POKE 1302,191
1970 PRINT@291,"ACCENDING SPEED"
;:IF IS=1 THEN POKE 1334,191
1980 PRINT@323,"DEC/ACC SPEED OF
F";
1990 PRINT@355,"TOG. RANDOM TONE
S";:IF RT=1 THEN POKE 1398,191
2000 PRINT@387,"TOGGLE KEY. & JO
Y.";
2010 PRINT@419,"DISPLAY LINE";:I
F DL=1 THEN POKE 1462,191
2020 PRINT@451,"COMMAND MENU";
2030 J1=25:J3=1281:X1=20:GOSUB 1
670
2040 ON L+1 GOTO 2050,2050,2150,
2130,1910,2160,160
2050 TM=397:HL=18:VL=3:GOSUB930
2060 PRINT@462,STRING$(16,32);
2070 PRINT@430,;:BV=PEEK(1470):I
NPUT"START SPEED";SS:POKE 1470,B
V
2080 PRINT@462,;:INPUT"END SPEED
";ES:POKE 1502,BV
2090 IF L=0 THEN DS=1:IS=0 ELSE
DS=0:IS=1
2100 FOR XX=0 TO 3:PRINT@398+(32
*XX),STRING$(17,32);:NEXT
2110 F=2
2120 GOTO 1940
2130 IF RT=1 THEN RT=0ELSE RT=1
2140 GOTO 1940
2150 DS=0:IS=0:F=0:GOTO 1940
2160 IF DL=1 THEN DL=0 ELSE DL=1
2170 GOTO 1940
2180 PRINT@355," "
2190 PRINT@422,"WHAT DO YOU HEAR
"
2200 TM=389:HL=23:VL=3:GOSUB920
2210 CP=PEEK(1467)
2220 F=1:FOR P=1 TO K
2230 R=RND(43):IF R>9 AND R<16 T
HEN 2230
2240 N$=CHR$(R+48):GOSUB 560
2250 PRINT@439,;:INPUT I$
2260 IF N$<>I$ THEN 2310
2270 TM=243:HL=10:VL=3:GOSUB920
2280 PRINT@276,"CORRECT!";
2290 NR=NR+1
2300 GOTO 2350
2310 TM=240:HL=16:VL=5:GOSUB920
2320 PRINT@277,"SORRY";
2330 PRINT@305,"CHAR. SENT - "N$
;
2340 PRINT@337,"CHAR. RECD.- "I$
;
2350 EXEC 44539
2360 FOR X=0 TO 4:PRINT@218+(X*3
2),STRING$(15,32):POKE 1467,CP:N
EXT X,P
2370 TM=240:HL=14:VL=3:GOSUB920
2380 PRINT@273,"SCORE:"INT(100/K
*NR)"%";:EXEC 44539
2390 F=0:NR=0:GOTO 160
```

Have a Super CoCo Christmas !

With these great bargains:

Max-10™
The Dazzling Word Processor
$79.95 now $39.95

CoCo Max III
The Famous Graphics Creator
$79.95 now $49.95

Save $70
BOTH
CoCo Max III and Max-10 for
$149.90 now $79.95

Max-10: the Rolls-Royce of word processors. The only one with true graphic capability and dozens of type styles. Using your dot matrix printer you get from tiny footnotes (6 point) to big titles (24 point).

The *Rainbow* review (1/89) said: **"An incredible job of providing power, flexibility and speed in a program that is as easy to use as it is to pronounce! ... Max-10 takes a back seat to none, and is beyond comparison with most."** Max-10, the only word processor with **"What You See Is What You Get"**. A word processor you will love at first sight.

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

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

Desktop Publishing: together, **CoCo Max III** and **Max-10** form an unbeatable system for reports, flyers, invitations, greeting cards, signs, newsletters, etc. It's far beyond anything you've ever seen on a CoCo.

Here is one of the hundreds of unsolicited letters we got: **"Max-10 and CoCo Max III are wonderful. They are the first Color Computer products I have purchased that were even better than I hoped for."**

At **Colorware**, we all work hard to make you feel that way and we thrive on your appreciation.

FREE CHRISTMAS BONUS

Get any one of the "Add-Ons" below free with CoCo Max III or Max 10.

Select one of these: Max Fonts, Max Edit, the Color Drivers, the Spellchecker, the Max-10 Fonts, or the Hi-Res Pack. If you get both Max-10 and CoCo Max III, select any **two** free add-ons!

About Max-10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.
Max-10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).
We swear that Max-10 will add excitement to your word processing, and that's no small task!
PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,110,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max-10 Add-ons

- **Max-10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C-23 ..... **$29.95**
NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
- **Spell Checker** 50000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24..... **$29.95**

System Requirements

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

About CoCo Max III

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise.
Its major features include: Huge picture area (2 full 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 82A,182,192; CGP-220(B&W)
Color Drivers available. See next column.

CoCo Max III Add-ons

- **Max Fonts** disks. 95 fonts on 4 disks. Order #C-73..... **$49.95**
- **Max Edit** Create new fonts or edit existing ones. Order #C-16 ..... **$19.95**
- **Color Printer** drivers NX-1000 Rainbow, CGP-220 and Okimate 20. #C-2 ..... **$19.95**

CoCo Max I and II

- **CoCo Max I on tape**. See previous ads or write for info. For CoCo 1 or 2. Order #C-7..... **$59.95**
- **CoCo Max II**. For all disk CoCos. Multipak or Y-Cable required. #C-85..... **$69.95**

Digitizers

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max III and Max-10.
DS-69. Requires Multipak. 2 pictures per second. Order #C-18..... **$99.95**
DS-69B Faster: 8 pix/sec. #C-92... **$149.95**

Call or Write Now

VISA (203) 348-9436 MasterCard
Weekdays 9-5 EST

Ordering Information: We accept Visa, Mastercard, Checks and M.O. C.O.D. is $4 extra Purchase orders are subject to credit approval. Connecticut residents add 8% sales tax. Shipping: $4 per order (usually UPS ground). UPS 2nd Day Air: $4 extra. Next Day service available. Canada: $6 per order (Airmail). Outside U.S. & Canada: Add 10% of order total.

COLORWARE

Colorware
242-W West Ave.
Darien, CT 06820

Keeping an eye on principal payments down the road

Mapping Your Finances

By David Macias

Whether you're trekking through the Himalayas or figuring your finances, it's important to know where you are and where you're going. Because figuring your finances is the less exciting of the two, you'll welcome knowing the CoCo can help with a program called *Amortize*.

The BASIC program, originally written by Ralph D. Miller, first appeared in the March '87 issue of THE RAINBOW (Page 82). The program calculates annual interest rates in percentage form, the number of interest periods annually (if your interest is compounded daily, this is 365; for interest compounded monthly, it is 12, etc.), number of payments per year, the amount of the loan in dollars, and the term of the loan in years. You enter digits only — no percent symbols or dollar signs are needed. The program checks your printer and notifies you if it is not online. If the printer is online, *Amortize* prints a header describing the loan and the computed installment amount. Then each payment is detailed by the amount of the payment applied to interest, the amount applied to principal, and the amount of debt outstanding. The tables are handy when you prepay principal payments in order to save interest. After printing the last payment, *Amortize* goes to the data input prompts to run another table.

David is attending Cerritos College where he studies business computer systems. He works as a Computer operator in the data processing department and is a tutor for the music department in the MIDI lab. He is an advocate of the OS-9 operating system.

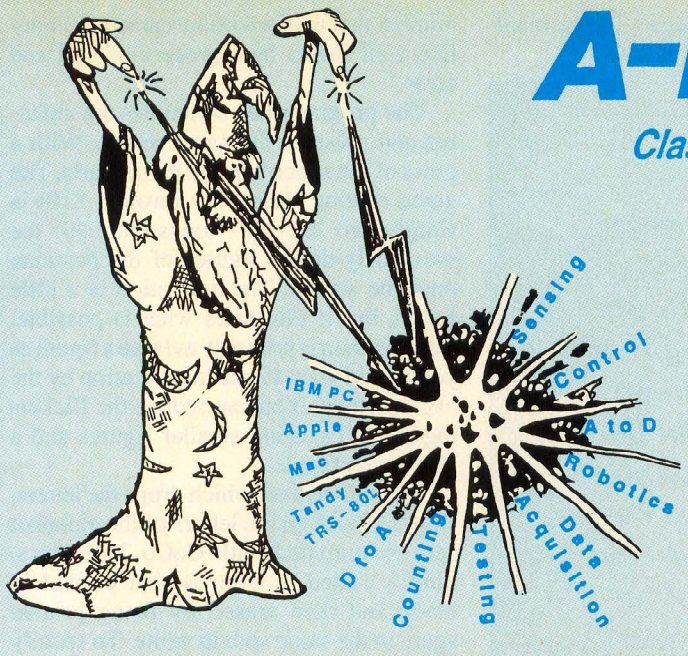
The version included here has been rewritten to run in OS-9. A utility program by Burke & Burke makes the conversion, but I wanted additional modifications to make use of windows and the added speed of a packed BASIC09 program.

The listing: amortize

```
PROCEDURE Amortize
 0000       (* ***************** AMORTIZE ***************************
 0039       (* by Ralph D. Miller - ********************************
 0071       (* ********************** - written in Basic09 **********
 00AA       (* ************************** by David Macias **********
 00E3       (* ************************************************************
 011C       (*
 011F       (* ...........Variables
 0136       (*
 0139       (* ....JU = Interest
 014D       (* .....Q = Number of interest periods per year
 017C       (* .....S = Number of payments per year
 01A3       (* .....A = Loan amount
 01BA       (* .....B = Period of loan in years
 01DD       (* .....D = Monthly interest
 01F9       (* .....F = Single payment amount
 021A       (* ....IT = Total interest
 0234       (*
 0237       (* .......String Variables
 0251       (*
 0254       (* ....F$ = Single payment
 026E       (* ...HM$ = Interest on debt
 028A       (* ...RT$ = Payment on principle
 02AA       (* ...LF$ = Outstanding debt
 02C6       (*
 02C9       DIM Q,S,B,NP,PF,Y,WY:INTEGER
 02E8       DIM CHAR:STRING[1]
 02F4       DIM C1$,HM$,RT$,LF$,JF$,IG$,SP$:STRING[12]
 0318       DIM A$,F$:STRING[12]
 0328       DIM path,HC:BYTE
 0333       path=1
 033A       HC=0
 0341       CHAR=""
 0348 10    REM **********
 0358       REM Input data
 0365       REM **********
 0372       SHELL "display 0c"
 0380       PRINT
 0382       PRINT TAB(10); "Enter the annual interest rate in percent";
 03B4       INPUT JU
 03B9       IF JU=0 THEN 1000
 03C9       M=JU/100
 03D5       PRINT
 03D7       PRINT TAB(10); "Enter the number of interest periods per year"
             ;
 040D       INPUT Q
 0412       PRINT
 0414       PRINT TAB(10); "Enter the number of payments per year";
 0442       INPUT S
 0447       PRINT
 0449       PRINT TAB(10); "Enter the loan amount in dollars";
 0472       INPUT A
 0477       PRINT
 0479       PRINT TAB(10); "Enter the period of the loan in years";
```

A-BUS™ MAGIC

Classroom to advanced industrial applications.



Be a Wizard in your Lab, Factory, College, Home...

It used to be difficult and costly to do process control, robotics, data acquisition, monitoring and sensing with your computer. Now the low-cost A-BUS system makes it easy to do almost any project you can imagine.

Versatility. A-BUS cards handle most interfacing, from on/off switching, to reading temperatures, to moving robot arms, to counting events, to sensing switches...

Adaptability. The A-BUS is modular, allowing expansion well beyond your needs. It works with almost any computer, or even as a remote data station with the **new** serial adapters.

Simplicity. You can start using the A-BUS in minutes. It's easy to connect, and software is a breeze to write in any language.

Reliability. Careful design and rugged construction make the A-BUS the first choice in specialized I/O.

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

NEW: REMOTE A-BUS! Use the new Serial (RS-232) Adapter or Processor to control any A-BUS system. Cards can be up to 500 ft away using phone type cable, or off premises using a modem. Call or send for the new A-BUS Catalog which covers all the products.

Important

All A-BUS Systems: ♦ Come assembled and tested ♦ Include detailed manuals with schematics and programming examples ♦ Can be used with almost any language (BASIC, Pascal, C, assembler, etc.) using simple "IN" and "OUT" commands (PEEK and POKE on some computers) ♦ Can grow to 25 cards (in any combination) per adapter ♦ Provide jumper selectable addressing on each card ♦ Require a single low cost unregulated 12V power supply ♦ Are usually shipped from stock. (Overnight service is available.)

About Alpha Products

Founded in 1976 for the purpose of developing low cost I/O devices for personal computers. Alpha has grown to serve over 70000 customers in over 60 countries. A-BUS users include many of the Fortune 500 (IBM, Hewlett-Packard, Tandy, Bell Labs, GM...) as well as most major universities. A-BUS products are U.S. designed, U.S. built, and serviced worldwide.
Overseas distributors: England: Caldy Science Assoc. Ltd., Merseyside, 051 342 7033.
Australia: Brumby Technologies Pty. Ltd., NSW, 759 1638. **France:** Coserm, Rungis, 46 86 64 75

Inputs, Outputs, etc.

Analog Input: 8 analog inputs. 0-5.1V in 20mV steps (8 bits). 0-100V range possible. 7500 conversions/second. **AD-142: $142**

12 Bit A to D: Analog to digital converter. Input range -4V to +4V, expandable to 100V. On-board amplifier. Resolution 1mV. Conversion time 130ms. 1 channel. (Expand to 8 channels with the RE-156 card.) **AN-146: $153**

Relay Card: 8 individually controlled industrial relays each with status LED's (3A at 120VAC contacts, SPST). **RE-140: $142**

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

D/A converter: 4 Channel 8 Bit D/A converter with output amplifiers and separate adjustable references. **DA-147: $149**

24 line TTL I/O: Connect 24 input or output signals (TTL 0/5V levels or switches). Variety of modes. (Uses 8255A) **DG-148: $72**

Digital Input: 8 optically isolated inputs. Input can be 5 to 100V voltage levels or switch closures. **IN-141: $65**

Digital Output Driver: 8 outputs: 250mA at 12V. Drive relays, solenoids, stepper motors, lamps, etc. **ST-143: $78**

Clock with Alarm: Powerful clock/calendar. Battery backup. Timing to 1/100 sec. Alarm relay, LED and buzzer. **CL-144: $98**

Touch Tone Decoder: Each tone is converted into a number which is stored on the board. **PH-145: $87**

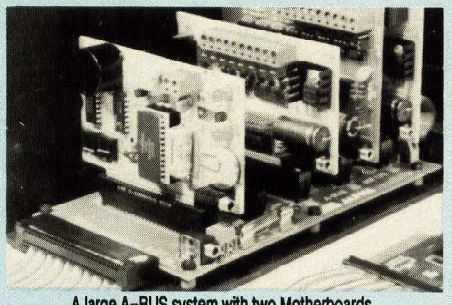
A-BUS Prototyping card: 4x4.5" card. Will accept up to 10 I.C.s. With power & ground bus. **PR-152: $16**

Counter Timer: Three 16 bit counters/timers. Use seperately or cascade for long (48 bit) counts. **CT-150: $132**

Call our application engineers to discuss your project.

Motion Control

Smart Quad Stepper Controller: The world's finest. On board microprocessor controls four motors simultaneously. Uses simple English commands like "MOVE ARM 10.2 (INCHES) LEFT". For each axis, you control coordinates (absolute or relative), ramping, speed, units, scale factors, etc. Many inputs for limit switches, etc. On the fly reporting of speed, position... Built in drivers for small motors (such as MO-103 or 105). **SC-149: $299**
Options: ► 5 amp/phase power booster for 1 motor: **PD-123: $49**
► Remote "teach" keypad for direct motor control: **RC-121: $54**



A large A-BUS system with two Motherboards
Adapter in the foreground plugs into PC,XT,AT type slot.

Stepper Driver Kit: For experimenting with stepper motors. Includes 2 MO-103 motors and a ST-143 dual driver **PA-181: $99**

Stepper Motors: (4 phase, unipolar)
MO-103: 2¼" dia, ¼" shaft, 7.5°/step, 12V, 5 oz-in torque. **$15**
MO-104: 2" dia, ¼" shaft, 1.8°/step, 5V, 60 oz-in torque. **$45**
MO-105: 1.7" square. .2" shaft, 3.75°/step, 12V. 6 oz-in. **$15**

A-BUS Adapters

► Can address 64 ports and control up to 25 A-BUS cards.
► Require one cable. Motherboard required for more than 2 cards.

A-BUS Parallel Adapters for:

IBM PC/XT/AT & compatibles. Uses one short or long slot. **AR-133: $69**
Apple II,II+,IIe Plugs into any slot inside. **AR-134: $52**
Commodore 64,128 Plugs into Expansion Port on back. **AR-139: $48**
TRS-80 Model 102,200 Uses 40 pin "System bus". **AR-136: $76**
Model 100 (Tandy portable) Plugs into socket on bottom. **AR-135: $75**
TRS-80 Model 3,4,4D Y-Cable available if 50 pin bus is used. **AR-132: $54**
TRS-80 Model I Plugs into 40 pin expansion bus. **AR-131: $39**
Tandy Color Computers Fits ROM slot, Multipak or Y-Cable **AR-138: $49**

A-BUS Cable: Necessary to connect any parallel adapter to one A-BUS card or to first motherboard. 50 pin, 3 ft. **CA-163: $24**
Special Cable for two A-BUS cards **CA-162: $34**

Serial Adapter: Connect A-BUS systems to any RS-232 port. Allows up to 500 ft from computer to A-BUS. **SA-129: $149**

Serial Node: To connect additional SA-129/A-BUS systems to a single RS232 serial port (max 16 nodes). **SN-128: $49**

Serial Processor: same as above plus built in BASIC for off-line monitoring, logging, decision making, etc. **SP-127: $189**
Use SA-129 or SP-127 with modems for remote data acquisition.

Motherboard: Holds up to 5 A-BUS cards in sturdy aluminum frame with card guides. A sixth connector allows (using cables CA-161: $12) additional Motherboards to be added. **MB-120: $108**

Power Supply: Power pack for up to 4 cards. **PS-126: $12**

Complete Catalog Available
For Orders and Info call (203) 656-1806
Weekdays from 9 to 5 EST or **FAX** 203 656-0756

Ordering Information: We accept Visa, Mastercard. Checks, and M.O. C.O.D. is $4 extra. Purchase orders are subject to credit approval. CT residents add 7.5% sales tax.
Shipping: $4 per order (usually UPS ground). UPS 2nd Day Air: $4 extra. Next Day service available. *Canada:* $6 per order (Airmail). *Outside US and Canada:* Add 10% of order total.

ALPHA Products
a Sigma Industries Company
242-W West Avenue, Darien, CT 06820

This new version of *Amortize* includes an overlay window that prompts you to decide if you want a hard copy of the amortization table. You must have the `/p` driver in your boot, and the `inkey` and `runb` modules must be in your `CMDS` directory in order for the program to work. If your table is a long one, use `tmode -pause` so the table does not scroll by you. In the print mode the program advances the paper every 40 lines.

(Questions or comments concerning this utility may be directed to the author at 11518 East Wimbley Court, Cevvitos, CA 90701. Please enclose an SASE when requesting a reply.) ❑

```
04A7        INPUT B
04AC        REM ******************************
04CE        REM Calculate monthly interest rate
04F0        REM ******************************
0512        D=(1+M/Q)^(Q/S)-1
0530        REM ************************
054C        REM Calculate single payments
0568        REM ************************
0584        F=(1-(1+D)^(-(S)*B))^-1*D*A
05AB        C1=F
05B3        GOSUB 600
05B7        F$=C1$
05BF        C1=A
05C7        GOSUB 600
05CB        A$=C1$
05D3        SHELL "display 0c"
05E1 20     REM
05E7        PF=1
05EE        GOSUB 710
05F2        DC=A
05FA        WY=0
0601        REM **********
060E        REM Start loop
061B        REM **********
0629 310    FOR Y=WY+1 TO WY+10
0644          HM=DC*D
0650          C1=HM
0658          GOSUB 600
065C          HM$=C1$
0664          RT=F-HM+.000325
0677          C1=RT
067F          GOSUB 600
0683          RT$=C1$
068B          LF=DC-RT
0697          C1=LF
069F          GOSUB 600
06A3          LF$=C1$
06AB          GOSUB 680
06AF          C1=Y
06B8          GOSUB 640
06BC          TI=INT(100*HM+.5)/100
06D4          IT=IT+TI
06E0          PRINT #path USING "S14>",C1$,F$,HM$,RT$,LF$
0701          PF=PF+1
070C          REM **********************
0724          REM Check for end of page
073C          REM **********************
0754          IF PF>33 AND HC=1 THEN
0767            GOSUB 720
076B          ENDIF
076D          REM ************************************
0796          REM Is balance smaller then single payment
07BF          REM ************************************
07E8          IF LF>=F THEN 530
07F8          REM **********************
0810          REM Check for end of page
0828          REM **********************
0840          IF PF>33 AND HC=1 THEN
0853            GOSUB 720
0857          ENDIF
0859          Y=Y+1
0864          REM ***************
0876          REM Print last line
0888          REM ***************
089A          HM=LF*D
08A6          RT=LF-HM
08B2          C1=Y
08BB          GOSUB 640
08BF          PRINT #path USING "S14>",C1$,
08D1          C1=HM+LF
08DD          GOSUB 600
08E1          GOSUB 700
08E5          PRINT #path USING "S14>",C1$,
08F7          IT=IT+INT(100*HM+.5)/100
0913          C1=HM
091B          GOSUB 600
091F          GOSUB 700
0923          PRINT #path USING "S14>",C1$,
0935          C1=LF
093D          GOSUB 600
0941          GOSUB 700
0945          PRINT #path USING "S14>",C1$,
0957          PRINT #path USING "S14>","0.00"
096B          C1=IT
0973          GOSUB 600
0977          GOSUB 700
097B          PRINT #path
0981          PRINT #path,"          Total Interest paid ="
                ; C1$
09BA          TI=0
09C2          IT=0
09CA          REM ************************
09E6          REM Wait until key is pressed
0A02          REM ************************
0A1E          WHILE CHAR="" DO
0A2A            RUN inkey(CHAR)
0A34          ENDWHILE
0A38          REM ******************************
0A57          REM Shift from printer to screen
0A76          REM ******************************
0A95          IF HC=1 THEN
0AA1            PRINT #path
0AA7          ENDIF
0AA9          IF HC=1 THEN
0AB5            CLOSE #path
0ABB          ENDIF
0ABD          IF HC=1 THEN
0AC9            path=1
0AD0          ENDIF
0AD2          IF HC=1 THEN
0ADE            HC=0
0AE5          ENDIF
0AE7          GOTO 750
0AEB 530      DC=LF
0AF6        NEXT Y
0B01        IF S*B>Y THEN 570
0B15        GOTO 310
0B19 570    WY=WY+10
0B27        GOTO 310
0B2B 600    REM ********************************
0B50        REM Round out to two decimal places
0B72        REM ********************************
0B94        C2=INT(100*C1+.5)/100
0BAC        C1$="$"+STR$(C2)
0BB9        IF C2=INT(C2) THEN
0BC7          C1$=C1$+"00"
0BD4        ENDIF
0BD6        RETURN
0BD8 640    C1$=STR$(C1)
0BE4        RETURN
0BE6        REM ********************
0BFD        REM Add zero if N*10^0=0
0C14        REM ********************
0C2B 660    JF$=RIGHT$(F$,3)
0C39        IG$=LEFT$(JF$,1)
0C44        IF IG$<>"." THEN
0C51          F$=F$+"0"
0C5D        ENDIF
0C5F        RETURN
0C61 680    REM
0C67        JF$=RIGHT$(HM$,3)
0C72        IG$=LEFT$(JF$,1)
0C7D        IF IG$<>"." THEN
0C8A          HM$=HM$+"0"
0C96        ENDIF
0C98        JF$=RIGHT$(RT$,3)
0CA3        IG$=LEFT$(JF$,1)
0CAE        IF IG$<>"." THEN
0CBB          RT$=RT$+"0"
0CC7        ENDIF
0CC9        JF$=RIGHT$(LF$,3)
0CD4        IG$=LEFT$(JF$,1)
0CDF        IF IG$<>"." THEN
0CEC          LF$=LF$+"0"
0CF8        ENDIF
0CFA        RETURN
0CFC 700    JF$=RIGHT$(C1$,3)
0D0A        IG$=LEFT$(JF$,1)
0D15        IF IG$<>"." THEN
0D22          C1$=C1$+"0"
0D2E        ENDIF
0D30        RETURN
0D32        REM *************
0D42        REM Print Heading
```

```
0D52       REM *************
0D62 710   PRINT #path,"The Amortization Table follows for a "; A$; " loan at "
             ; JU;
0DA8       PRINT #path," percent annually,  "
0DC5       PRINT #path,"for "; B; " years ("; S*B; " payments): "
0DF8       PRINT #path
0DFE       GOSUB 660
0E02       REM print #path," Installment amount:";f$
0E2A       PRINT #path
0E30       PRINT #path USING "S14>"," Payment","Single ","Interest","Payment  "
             ,"Outstanding"
0E77       PRINT #path USING "S14>"," Number ","Payment","On Debt ","On Princ "
             ,"Debt       "
0EBE       PRINT #path USING "S14>","--------","---------","---------"
             ,"---------","-----------"
0F08       RETURN
0F0A       REM ********************
0F21       REM Advance To Next Page
0F38       REM ********************
0F4F 720   FOR NP=0 TO 25
0F62         PRINT #path
0F68       NEXT NP
0F73       GOSUB 710
0F77       PF=1
0F7E       RETURN
0F80       REM ********************
0F96       REM Open overlay window
0FAC       REM ********************
0FC2 750   SHELL "display 1b 3d 01"
0FD9       SHELL "display 1b 22 01 C 8 30 B 02 00 00"
0FFF       REM ***************
1010       REM Choose options
1021       REM ***************
1032       PRINT
1034       PRINT "     Enter <1> for a hard copy"
1056       PRINT
1058       PRINT "     Enter <2> for another calculation"
1082       PRINT
1084       PRINT "     Enter <3> to quit"
109E       PRINT
10A0       PRINT "    ";
10A9       INPUT Z
10AE       REM ********************
10C5       REM Close overlay window
10DC       REM ********************
10F3       SHELL "display 1b 23"
1104       SHELL "display 1b 3d 00"
1118       ON Z GOTO 800,10,1000
112C       REM ********************
1143       REM Open path to printer
115A       REM ********************
1171 800   HC=1
117B       path=2
1182       OPEN #path,"/p":WRITE
118F       GOTO 20
1193       REM ************
11A1       REM End program
11AF       REM ************
11BD 1000  SHELL "display 0c"
11CE       END
```

Corrections

"Five-Column Directories"(March 1989, Page 80): To prevent errors when listing multiple directories change `THEN3ELSE` in Line 10 to `THENRUNELSE`.

"Key Ahead, Part II"(August 1989, Page 14): In the command sequence on Page 18, change `12200` in the fourth line to `12300`.

In Listing 2 on Page 20, change 179 in Line 260 to 79:

```
260 DATA 128,48,141,0,83,191,160
,218,191,247,129,191,165,105,134
,79,16,142
```

"The Black Box"(August 1989, Page 26): The listing on Page 28 in the second column has a smudge. Line 660 should read:

```
660 DRAW"BM80,184C2"+NUM$(MV)
```


TAZMAN

Peace has come to the galaxy at last, and with it an end to the Empire and its monopoly on trade. Now a new breed of free traders is emerging to serve the needs of countless worlds.

Soar through the universe with an old ship and a small cargo, searching for inhabited planets on which to market your goods. Shop for the latest and most efficient upgrades for your ship. Stay clear of space hazards and sidestep planetary storms as you seek your fortune among the stars!

128K CoCo3 One Disk Drive Joystick
Runs under OS-9/Level II $24.95

RAINBOW CERTIFICATION SEAL

Armchair Admiral

RAINBOW CERTIFICATION SEAL

The time-honored game of Battleship, enhanced by intelligent computer opponents, comes to your CoCo3 complete with sloops and galleons. Up to 8 players, any mix of human or computer.

128K CoCo3 Tape or Disk $14.95

Personal checks, money orders and C.O.D.
All orders add $2.00 shipping & handling.
C.O.D. please add an additional $2.00.
Washington addresses add 7.5% Sales Tax.

Eversoft Games Ltd
P.O. Box 3354
Arlington, Wa 98223

(206) 653-5263
10am to 6pm PST

MasterCard VISA

Taking your chances . . . .

Probability

By Steve Blyn
Rainbow Contributing Editor

Look, Dad! Look at what the postman just brought us — another two million dollars!

Well, Johnny, not really. We're actually just the recipients of a never-ending bombardment of sweepstakes junk mail. In fact, our chances of winning are improbable.

What does "improbable" mean?

It means "probably not."

Then we probably won't win the two million dollars?

Right.

Why?

How would you explain the idea of probability to an inquisitive youngster? You could flip a coin, observing how many heads or tails occur in a set number of trials. Or you could use the three-cups-and-a-ball trick.

Children learn about this concept in elementary school. As they get older, the concept of probability is broadened using verbal math problems. Many of us continue to study, if not defy, the idea of probabilities well into our adult lives by betting on lotteries, card playing, bingo and other forms of gambling.

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.

My program presents an exercise in becoming familiar with the laws of probability. It presents a wheel with 12 letters on it. The student is asked to determine the probability of a certain letter or combination of letters occurring on the next spin.

To add interest, some of the letters are red, some blue. This gives more flexibility to the questions. Sometimes the probability of one type of letter is asked for, and other times the probability of either of two types of letters is asked for.

Since there are 12 possible places for a spinner to land, each answer always begins in twelfths. The solution is reached by counting the correct occurrences and using that number as the numerator of a fraction with 12 as the denominator. As in other math problems, fractions should be reduced to lowest terms. For example, the probability that at any hour the little hand of a clock will be at 3 is 1/12. The probability that it will be at 3 or 4 is 2/12, which is 1/6 after reduction.

Although this program could easily have been written in low resolution, I felt that a Hi-Res program is more effective for a program that relates to fractions. You therefore need to create or use Hi-Res letters and numbers. Lines 50 through 290 contain the strings to draw the letters and numbers needed in this program. The script letters are compliments of Joseph Kolar. Lines 300 through 370 draw the wheel. Lines 500 through 610 draw the letters within the wheel.

Lines 640 through 710 randomly select the question and tell the computer the correct answer, which is represented by Z$. The student inputs his answer by pressing the letter preceding the correct answer on the screen. The program proceeds to the next question only after a correct response is given and is ended by pressing 9.

I have included a variety of sample questions; they are by no means the only possible questions that can be used for this particular letter wheel. You can study the program and modify it to ask other questions of your own design. If you are really adventurous, you can change the letters and questions to construct a follow-up program of your own. ❑

The listing: PROBABLE

```
10 REM"PROBABILITY"
20 REM "STEVE BLYN,COMPUTER ISLA
ND,STATEN ISLAND,NY,1989"
30 CLEAR1000:J=RND(-TIMER):PMODE
3,1:PCLS:SCREEN 1,1:COLOR 6
40 REM"STRINGS FOR LETTERS AND N
UMBERS BY J. KOLAR"
50 BB$="BRNR2HNGU3NHER2FGNL3FDGB
R2"
60 CC$="BU5F2M+3,-1HL2G2D2FR3NEB
R2"
70 DD$="BU4BRD4LURFR2EU3HL3GBD4B
R5"
80 FF$="BU2NF2NRBU2ER3NRGDNLNRD2
GBR3"
90 A$="RU2ERFDNFGLHBDBR4"
100 B$="RE2U3HGD4RFREUNLRBD2"
110 C$="RU2ERFBD2L2HBDBR3"
120 D$="RU2ERFDGLHBR3U4HGDFBDBFF
"
130 E$="RE2HGF2R"
140 F$="RE3UHGD6FEUHNLEBD"
150 H$="RE3UHGD3NDBEFDR"
160 L$="BRRE2U3HGD4FR"
170 N$="RENDUNUEFD2R"
180 O$="BEUERFDGLHBDBR4"
190 R$="REU2FRD2R"
200 S$="REU2F2GNHR2"
210 U$="RENU2FENU2F"
220 Q$="BU3BRUERFDGBDDBR2"'? MAR
K
230 X$="BR5"'SPACE
240 A1$="BU4BR2ED5BR2"
250 A2$="BU4ER2FDGL3D2R4BR2"
260 A3$="BU4ER2FGNL2FDGL2NHBR6"
270 A4$="BR3U5G3R4BD2BR3"
280 A5$="BU5NR4D2R3FDGNL3BR4"
290 A6$="BU5BRNR3GD3FR2EUHL2GBD2
BR7"
300 COLOR 8:CIRCLE(128,55),52:CO
LOR 6:CIRCLE(128,55),50
310 CIRCLE(128,55),6:PAINT(128,5
5),6,6
320 LINE(128,5)-(128,105),PSET
330 LINE(78,55)-(178,55),PSET
340 LINE(100,14)-(154,95),PSET
```

```
350 LINE(85,32)-(172,78),PSET
360 LINE(100,95)-(154,14),PSET
370 LINE(85,78)-(172,32),PSET
380 COLOR 7:LINE(0,133)-(255,135
),PSET,BF:COLOR 6
390 DRAW"S8BM30,155"+A1$+X$+X$+X
$+A1$+X$+X$+X$+A1$
400 DRAW+X$+X$+X$+A1$+X$+X$+X$+A
2$
410 DRAW"S8BM30,175"+A2$+X$+X$+X
$+A3$
420 DRAW"BM110,175"+A4$+X$+X$+X$
+A6$+X$+X$+A3$
430 DRAW"BM30,160;R8BR12R8BR12R8
BR12R8BR10R8"
440 DRAW"C7S4BM23,143"+A1$
450 DRAW"BM63,143"+A2$
460 DRAW"BM103,143"+A3$
470 DRAW"BM143,143"+A4$
480 DRAW"BM183,143"+A5$
490 REM"DRAW THE LETTERS"
500 DRAW"S8C6BM134,23"+BB$
510 DRAW"BM152,36"+FF$
520 DRAW"BM163,50"+DD$
530 DRAW"C8BM162,70"+BB$
540 DRAW"C6BM150,85"+BB$
550 DRAW"BM135,95"+BB$
560 DRAW"BM112,95"+CC$
570 DRAW"BM97,84"+BB$
580 DRAW"C8BM86,70"+FF$
590 DRAW"C6BM86,52"+DD$
600 DRAW"C8BM98,35"+BB$
610 DRAW"BM112,23"+DD$
620 COLOR 5:LINE(0,105)-(255,130
),PSET,BF:COLOR 6:X=RND(8)
630 DRAW"C6S8BM20,124"+CC$+H$+A$
+N$+C$+E$+S$+X$+O$+F$+X$+A$+X$
640 IF X=1 THEN Y$=BB$+X$+Q$:Z$=
"1"
650 IF X=2 THEN Y$=DD$+X$+Q$:Z$=
"3"
660 IF X=3 THEN Y$=FF$+X$+Q$::Z$
="4"
670 IF X=4 THEN Y$=BB$+X$+O$+R$+
X$+FF$+X$+Q$:Z$="5"
680 IF X=5 THEN Y$=CC$+X$+O$+R$+
X$+DD$+X$+Q$:Z$="2"
690 IF X=6 THEN Y$=R$+E$+D$+X$+Q
$:Z$="2"
700 IF X=7 THEN Y$=R$+E$+D$+X$+B
B$+X$+Q$:Z$="4"
710 IF X=8 THEN Y$=B$+L$+U$+E$+X
$+Q$:Z$="5"
720 DRAW + Y$
730 EN$=INKEY$
740 IF EN$=Z$ THEN PLAY"O3L32CDE
GFEDCEGFEDC":GOTO 620
750 IF EN$="" THEN 730
760 IF EN$="9" THEN 780
770 IF EN$<>Z$ THEN PLAY"O2L20F#
F#":GOTO 730
780 CLS:END
```


INTRODUCTORY OFFER !!

" PHONICS FUN "

A PRESCHOOL TO GRADE 1 EDUCATION PROGRAM THAT WILL PRESENT YOUR CHILD WITH HOURS OF LEARNING FUN.

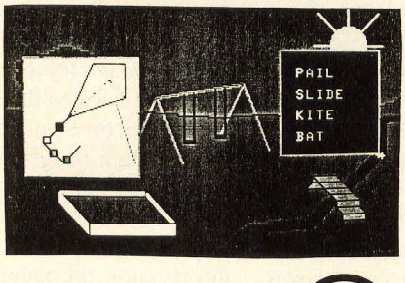
This program gives practice in associating the initial sounds of words with the letters that make those sounds. Each of the four categories presents ten pictures, each depicting a different word. There are over 40 high resolution 16 color pictures with 4 words to choose from for each picture. The first letter of each word is highlited and choices are made by typing letters in.

Works on COCO 3 only.

Disk only *

$15 US. / $18 CDN. plus $2.00 S/H

After NOV 30 $17 US. / $20 CDN. plus $2.00 S/H



Sorry no COD's
Send CHEQUE or MONEY ORDER to

W.B.D. SOFTWARE

P.O. BOX 1077
ESTERHAZY, SASK.
CANADA S0A 0X0

RAINBOW CERTIFICATION SEAL

SASK. RESIDENTS ADD 7% TAX

PH. (306) 745-6527

VIP Software for the CoCo 3

VIP Writer III includes VIP Speller.....$79.95
VIP Calc III.....$69.95
VIP Database III.....$69.95
VIP Library /WDCE.....$179.95
Upgrade Writer to Writer III.....$49.95
Upgrade Calc to Calc III.....$29.95
Upgrade Database to Database III....$39.95
Upgrade Library to Library /WDCE....$99.95

VIP Software for ALL CoCos

VIP Writer includes VIP Speller*.....$69.95
VIP Calc.....$59.95
VIP Database.....$49.95
VIP Speller.....$34.95
VIP Disk-Zap.....$29.95
VIP Integrated Library.....$149.95
Upgrade any VIP pgm to VIP Library $99.95

Upgrading? Send disk only + amount + $3 S/H
See our July ads for more information
VISA 1-800-322-9873 M/C
SD Enterprises info line (805) 566-1317
P. O. Box 621 Carpinteria Ca 93013

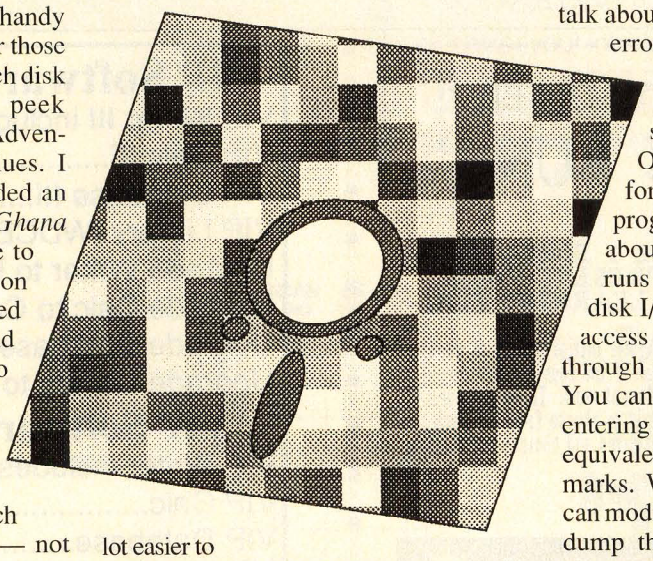
VIP Library orders add $4 S/H USA, $5 Canada & $10 Foreign
Other orders add $3 S/H in USA, $4 Canada, $6 Foreign. COD orders add an additional $2.75. Checks allow 3 weeks for delivery. Calif. res. add 6% tax.

For snooping around inside your programs

PATCHWORK on the CoCo 3

By Kirk Goodell

Disk Blaster is a handy little program for those who need to patch disk programs or peek around on an Adventures disk for commands and clues. I originally wrote it because I needed an easy way to patch *VIP Writer*, *Ghana Bwana*, *Trivia Fever* and the like to run on the CoCo 3. After hacking on my effort for a few days, I realized that with a little more work, I would have something good enough to share with fellow CoCoists.



During development I played with various screen formats but could not come up with one smaller than 80 columns upon which I could fit everything I wanted — not even the semi-supported 64-column screen. Those of you without decent monitors can modify the program to use a smaller, more readable screen and display a half-sector at a time.

The next thing I added in the development was the ability to search for a word in addition to just a byte, which made it a lot easier to upgrade disks to CoCo 3 compatibility. This usually involves changing $FF00 to $FE00. Next I realized I needed direct disk I/O to access more than 35 tracks and non-standard sectors.

My last design decision involved the Sector Print option. I decided not to make the baud rate a menu item since I was rapidly running out of menu space. You must set up the baud rate for yourself just once before you run the program for the first time. (The best idea is to put the baud rate poke in the first line of the program.)

Enough about development — let's talk about features. The program is fully error-trapped, including disk I/O. Error messages are written on the status line (Line 24) of the screen. You can also access any OS-9 disks. (Hint: Try looking for the directory on Track 0.) The program searches an entire disk in about three minutes (the program runs at double speed except during disk I/O and printer output). You can access Drive 0 through 3, Track 0 through 39, and Sector 1 through 255. You can search for a byte or a word by entering the Hex value or the character equivalent(s) preceded by quotation marks. While examining a sector, you can modify any bytes in the sector and/or dump the sector to your printer. The program warns you if you make a change to a sector and try to leave it without first writing it back to the disk.

The Sector Print option is very useful for tracing a program on the disk. First dump the FAT (File Allocation Table), Track 17, Sector 2. Then dump the directory, Track 17, Sector 3, 4, etc. With this information on paper and the technical information chapter in your Disk BASIC manual, following a program on the disk is fairly easy.

Unfortunately along with features come limitations. The screen update is slow due to graphics-generated text and

---

Kirk Goodell holds a bachelor's degree in computer science, and has been programming professionally for six years. He and his wife, Patty, and son, Justin, enjoy progamming on their Color Computers and on their PC/AT.

the construction of the Hex values and printable character strings. A decent monitor is also needed in order to read the 80-column screen. (A CM-8 is a little fuzzy; a Magnavox 8CM 515 or an NEC Multisync looks super.) The best results are probably achieved with a monochrome monitor. Finally, you cannot change track numbers, sector numbers, CRCs or any other control bytes. This requires track I/O as opposed to sector I/O, and I have not figured out how to do this yet!

Although the program is menu-driven and self-explanatory, a few notes are in order. You can enter any sector from 1 to 255 for the Read option. However, the Find option defaults to 1 to 18 for each track scanned. For the Change option the byte number to be changed must be entered in Hex, but don't precede the number with &H. To enter the new value, you may enter the Hex value or the character having that value, preceded by either a single or double quotation mark. (If you want to change a byte to 41 Hex, you can enter `41`, `'A` or `"A`.) For the Find option you can search for a byte or a word; the value can be Hex or character as in the Change option. (To search for IJ, enter `494A`, `'IJ` or `"IJ`.)

This program is not designed to allow you to crack or clone protected software, but it is one of my most useful utilities. At the very least, I have upgraded some stuff to work on the CoCo 3, and I have rediscovered my Adventures games!

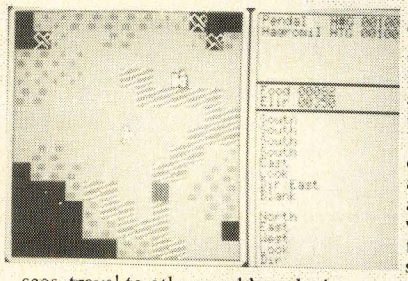
(Questions or comments concerning this utility may be directed to the author at 805 College Hill Road, Apt. 76, Oxford, MS 38655. Please enclose an SASE when requesting a reply.) ❑

```
15Ø .... 234
3ØØ .... 161
43Ø .. 1ØØ
69Ø ..... 44
88Ø .... 115
1Ø6Ø .. 188
128Ø .. 173
144Ø .... 55
END .... 159
```

The listing: BLASTER

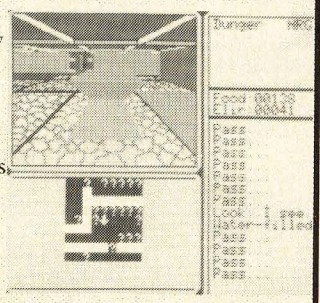
```
Ø ' COPYRIGHT 1989 FALSOFT,INC
1Ø ONERRGOTO1590:WIDTH80:CLS:CLE
AR1ØØØ:B$=STRING$(128," "):A$=ST
RING$(128," "):DIMPC$(2Ø):DR=Ø:T
R=Ø:SC=1:WG=Ø:OK=Ø:POKE&HFF9A,Ø
'BLACK BORDER
2Ø LOCATE21,1:PRINT"CAPTAIN KIR
K'S COCO3 DISK BLASTER":GOSUB
4Ø:GOTO5Ø
3Ø 'UPDATE DRIVE, TRACK, SECTOR
HEADING
4Ø LOCATE21,3:PRINT"DRIVE ";DR;"
    TRACK ";:PRINTUSING"##";TR;
:PRINT"      SECTOR ";:PRINTUSIN
G"##";SC:RETURN
5Ø LOCATEØ,22:PRINT" <D>RIVE <T
>RACK <S>ECTOR <R>EAD <W>RITE
  <P>RINT <C>HANGE <F>IND <Q>
UIT";
6Ø LOCATEØ,22
7Ø K$=INKEY$:IFK$="D"THENOP=1ELS
EIFK$="T"THENOP=2ELSEIFK$="S"THE
NOP=3ELSEIFK$="R"THENOP=4ELSEIFK
$="W"THENOP=5ELSEIFK$="P"THENOP=
6ELSEIFK$="C"THENOP=7ELSEIFK$="F
"THENOP=8ELSEIFK$="Q"THENOP=9ELS
E7Ø
8Ø 'OPTION: DRV,TRK,SEC,RED,WRT
,PRT,CHG,FND,QUIT
9Ø ONOP GOSUB12Ø,17Ø,22Ø,28Ø,41Ø
,55Ø,59Ø,77Ø,161Ø
1ØØ GOTO6Ø
11Ø 'CHANGE DRIVE
12Ø GOSUB1Ø1Ø:IFWG THEN15Ø
13Ø LOCATE28,3:K$=INKEY$:IFK$="Ø
"THEND=ØELSEIFK$="1"THEND=1ELSEI
FK$="2"THEND=2ELSEIFK$="3"THEND=
3ELSE13Ø
14Ø IFD<>DR THENOK=Ø:DR=D:GOSUB4
Ø
```


The Seventh Link



This program is quite simply the best role-playing adventure the CoCo has ever seen. You must build a character who will adventure as your alter-ego through wild lands, battle fierce monsters, sail treacherous seas, travel to other worlds and adventure through the dismal passages of Elira's many dungeons.

These dungeons are the visual highlight of the program. Presented in high speed 16-colour 3D, and full of monsters, ladders, pits and water, flooded rooms and doors, chests and healing fonts, they will keep you wandering and wondering for many fascinating hours.



Of course, you will need to arm and provision yourself first, and perhaps find friends to accompany you within the many castles you will find amongst the islands of Elira.

The package includes three discs, a 30-page manual, 4 maps, a quick reference card and a strip of simulated superconductor wire.

Price: $38 US/ $48 Cdn

Requires: 128k CoCo3, 1-40 track drive (Your RS drive is capable of 40 tracks if it's not an old grey one.)

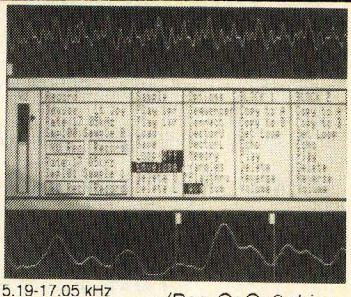
Version1.2 Features: Extra monster, faster boot-up, faster dungeon movement, and better outside graphics!

Hint Book (20 pgs. dngn/town maps, clues etc.):$5.50. Books for Caladuril1 or 2 (Specify): $3.50. Books, add $1 S/H each.

Studio Works

At last, here is the digital audio sampler that delivers what other systems promise. It features full point and click operation, on-screen graphical display and editing of TWO samples at once, using two available audio clipboards and a host of editing/ manipulation features.

An audio signal is digitzed through an adaptor cable (comes with package, or you may use the Maxsound cable), which plugs into your joystick port. Once the sound has been recorded into CoCo's memory, you can alter it and play it back, record it on disc and include it in your own BASIC or ML programs. Features include: reverse-, delete-, copy-, volume control-, play-block, sequencer, envelope draw, 56 samples in memory (512k only, 8 on 128k), play any from keyboard (great for adding special effects to home movies), playthrough, looping, file compression, 5.19-17.05 kHz record rate, (512k: 10-88 seconds, 128k:1.5-12 seconds), BASIC driver program, and more.



(Req:CoCo3,drive, mouse or joystick)

With cable: $54US/$64Cdn, without:$39US/$49Cdn.

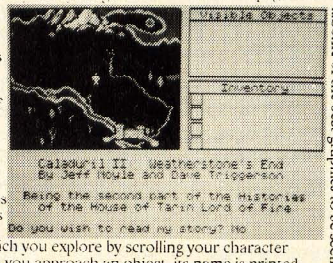
NEW!: Sound Effects Packs. Load a few samples into Studio Works, add them to movies or answering machine messages, or anything! $14 Each.

FX1: General (4 discs, 12 Samples) includes: Breaking glass, car starting, creaky door, applause, etc.
FX2: Animals (3 discs, 11 Samples). Dogs barking, monkeys, frogs, chickens, etc.

Caladuril 2: Weatherstone's End

See review, Rainbow June 89, page 126.

Monstrous storms threaten the Valley, and young Prince Olin is sent to secure help from the powers that remain on Lord's Isle. His ship is waylaid and he finds himself cast ashore on a land that is held in the grip of the enemy. Prompted by the success of the highly acclaimed Caladuril Flame of Light, this program was entirely re-written to take advantge of the CoCo 3's speed, graphics and memory to create one of the most impressive adventures to be found on the CoCo. Caladuril 2 recognizes over 70 verbs and contains in excess of 180 defined objects. The game is played in an unstructured world which you explore by scrolling your character around on a graphic window. When you approach an object, its name is printed on-screen, and you may manipulate it using multi-word English commands such as "GET THE KEY WITH THE LONG HOOK THEN UNLOCK THE DOOR". The package includes: a 20 page manual, 11X17" map, velvet pouch of Powerstones and 2 discs.



...Some of the best graphics to be seen on a CoCo 3..."

Price: $32 US/ $38 Cdn

Requires: 128K CoCo3, 1 drive

Also available: Caladuril, Flame of Light (64K CoCo 1/2/3, drive $18/$24), reviewed in The Rainbow, December 87

OBLIQUE TRIAD

32 Church St,
Georgetown
Ontario
Canada
L7G 2A7
416 877 8149

We Accept: MasterCard, Amex, personal cheques and money orders. COD in Canada only. Please add $2.50 shipping to all orders. Ontario residents please add 8% tax.

```
150 RETURN
160 'CHANGE TRACK
170 GOSUB1010:IFWG THEN200
180 LOCATE41,3:INPUTT:IF(T<0)OR(
T>39)THENLOCATE41,3:PRINT"   ";:
GOTO180
190 IFT<>TR THENOK=0:TR=T:GOSUB4
0
200 RETURN
210 'CHANGE SECTOR
220 GOSUB1010:IFWG THEN260
230 LOCATE56,3:INPUTS:IF(S<1)OR(
S>255)THENLOCATE56,3:PRINT"   ";
:GOTO230
240 IFS<>SC THENNOK=0:SC=S
250 GOSUB40
260 RETURN
270 'READ SECTOR
280 GOSUB1010:IFWG THEN320
290 LOCATE30,22:DP=256*PEEK(&HC0
06)+PEEK(&HC007):POKEDP,2:POKEDP
+1,DR:POKEDP+2,TR:POKEDP+3,SC:AA
=VARPTR(A$):POKEDP+4,PEEK(AA+2):
POKEDP+5,PEEK(AA+3):POKE65496,0:
EXEC256*PEEK(&HC004)+PEEK(&HC005
):POKE65497,0:ER=PEEK(DP+6):IFER
=0THEN310
300 LOCATE2,23:PRINT"*** DISK RE
AD ERROR -- ";:GOSUB450
310 IFOP=4THENGOSUB340
320 RETURN
330 'DISPLAY SECTOR CONTENTS
340 ROW=5:LOCATE0,5:OK=-1:FORSN=
1TO2:IFSN=1THENS$=A$ELSES$=B$
350 B=1:FORLP=1TO8:BS=(SN-1)*128
+B-1:PRINT"  ";:IFBS<16THENPRINT
"0";
360 PRINTHEX$(BS);:PRINT":  ";:F
ORBY=B TO15+B:PRINT" ";:BV=ASC(M
ID$(S$,BY,1)):IFBV<16THENPRINT"0
";
370 PRINTHEX$(BV);:IFINT(BY/4)*4
=BY THENPRINT" ";
380 IFINT(BY/8)*8=BY THENPRINT"
";
390 NEXT:PRINT" ";:PC$(ROW)="";F
ORBY=B TO15+B:CD=ASC(MID$(S$,BY,
1)):GOSUB710:PC$(ROW)=PC$(ROW)+C
HR$(CD):NEXT:PRINTPC$(ROW):ROW=R
OW+1:B=B+16:NEXTLP:NEXTSN:RETURN
400 'WRITE SECTOR
410 LOCATE38,22:DP=256*PEEK(&HC0
06)+PEEK(&HC007):POKEDP,3:POKEDP
+1,DR:POKEDP+2,TR:POKEDP+3,SC:AA
=VARPTR(A$):POKEDP+4,PEEK(AA+2):
POKEDP+5,PEEK(AA+3):POKE65496,0:
EXEC256*PEEK(&HC004)+PEEK(&HC005
):POKE65497,0:ER=PEEK(DP+6):IFER
=0THENWG=0:GOTO430
420 LOCATE2,23:PRINT"*** DISK WR
ITE ERROR -- ";:GOSUB450
430 RETURN
440 'DISPLAY DISK ERROR
450 IFER=4THENPRINT"LOST DATA";
460 IFER=8THENPRINT"CRC ERROR";
470 IFER=16THENPRINT"SEEK ERROR/
SECTOR NOT FOUND";
480 IFER=32THENPRINT"WRITE FAULT
";
490 IFER=64THENPRINT"WRITE PROTE
CT";
500 IFER=128THENPRINT"DRIVE NOT
READY";
510 IF(ER<>4)AND(ER<>8)AND(ER<>1
6)AND(ER<>32)AND(ER<>64)AND(ER<>
128)THENPRINT"MULTIPLE ERRORS!";
520 PRINT" -- PRESS <ENTER> ***"
;:SOUND150,5
530 IFINKEY$<>CHR$(13)THEN530ELS
ELOCATE2,23:PRINTSTRING$(77," ")
;:RETURN
540 'PRINT SECTOR
550 LOCATE30,23:ATTR0,0,B:PRINT"
*** PRINTING ***";:ATTR0,0:POKE6
5496,0:R=0:FORI=442848TO445728ST
EP2:A=LPEEK(I):R=R+1:A=A AND127:
IFA>95THENA=A-64
560 PRINT#-2,CHR$(A);:IFR>79THEN
PRINT#-2:R=0
570 NEXT:PRINT#-2:POKE65497,0:LO
CATE30,23:PRINT"
  ";:RETURN
580 'CHANGE BYTE
590 IFNOTOK THEN700ELSELOCATE64,
22:PRINT"BYTE # ";:PRINTCHR$(8);
:GOSUB1120 'GO ACCEPT A HEX VALU
E
600 IF(DV<0)OR(DV>255)THEN690
610 NB=DV:IFNB<128THENVA=ASC(MID
$(A$,NB+1,1))ELSEVA=ASC(MID$(B$,
NB-127,1)) 'SAVE ORIG VALUE IN C
ASE OF CHANGE-ABORT
620 ATTR0,0,B:GOSUB1050
630 LOCATE64,22:PRINT"TO      ";
:LOCATE67,22:GOSUB1120 'GO ACCEP
T A HEX VALUE
640 IF(DV<0)OR(DV>255)THEN680ELS
EVA=DV:WG=-1
650 IFNB>127THEN670
660 MID$(A$,NB+1,1)=CHR$(VA):GOT
O680
670 MID$(B$,NB-127,1)=CHR$(VA)
680 GOSUB1050
690 LOCATE64,22:PRINT" <F>IND";
700 RETURN
710 'IF CD IS NOT A PRINTABLE CH
ARACTER, REPLACE IT WITH A PERIO
D
720 IFCD<32THENCD=46
730 IF(CD>90)AND(CD<96)THENCD=46
740 IFCD>127THENCD=46
750 RETURN
760 'FIND A BYTE OR WORD
770 GOSUB1010:IFWG THEN990
780 LOCATE55,22:PRINT"FIND VALUE
 ":LOCATE66,22:GOSUB1300
790 IFWD$=""THEN980
800 GT=TR:GS=SC
810 LOCATE55,22:PRINT"START TRAC
K":LOCATE67,22:INPUTST:IF(ST<0)O
R(ST>34)THEN810
820 LOCATE55,22:PRINT"START SECT
OR":LOCATE67,22:INPUTSS:IF(SS<1)
OR(SS>18)THEN820
830 LOCATE55,22:PRINT"END  TRACK
":LOCATE67,22:INPUTET:IF(ET<0)OR
(ET>34)OR(ET<ST)THEN830
840 LOCATE55,22:PRINT"END  SECTO
R":LOCATE67,22:INPUTES:IF(ES<1)O
R(ES>18)OR((ST=ET)AND(ES<SS))THE
N840
850 LOCATE55,22:PRINT"S E A R C
H I N G";:FORTR=ST TOET:FORSC=SS
 TOES:GOSUB40:GOSUB280:PA=INSTR(
1,A$,WD$):PB=INSTR(1,B$,WD$):PC=
0:IF(LEN(WD$)=2)AND(RIGHT$(A$,1)
=LEFT$(WD$,1))AND(LEFT$(B$,1)=RI
GHT$(WD$,1))THENPC=1
860 IF(PA=0)AND(PB=0)AND(PC=0)TH
EN960ELSEGT=TR:GS=SC:GOSUB340
870 IFPA=0THEN900ELSEIX=0
880 NB=PA-1:VA=ASC(LEFT$(WD$,1))
:ATTR0,0,B:GOSUB1050:IFLEN(WD$)=
2THENNB=NB+1:VA=ASC(RIGHT$(WD$,1
)):ATTR0,0,B:GOSUB1050
890 IX=PA+LEN(WD$):PA=INSTR(IX,A
$,WD$):IFPA>0THEN880
900 QC=0:IFPC=0THEN910ELSEQC=1:N
B=127:VA=ASC(LEFT$(WD$,1)):ATTR0
,0,B:GOSUB1050:IFLEN(WD$)=2THENN
B=NB+1:VA=ASC(RIGHT$(WD$,1)):ATT
R0,0,B:GOSUB1050
910 IFPB=0THEN940ELSEIX=0
920 NB=127+PB:VA=ASC(LEFT$(WD$,1
)):ATTR0,0,B:GOSUB1050:IFLEN(WD$
)=2THENNB=NB+1:VA=ASC(RIGHT$(WD$
,1)):ATTR0,0,B:GOSUB1050
930 IX=PB+LEN(WD$):PB=INSTR(IX,B
$,WD$):IFPB>0THEN920
940 LOCATE55,22:PRINT"CONTINUE S
EARCH ?";
950 K$=INKEY$:IFK$=""THEN950ELSE
IFK$="N"THEN970ELSELOCATE55,22:P
RINT"S E A R C H I N G";
960 NEXTSC,TR
970 TR=GT:SC=GS:GOSUB30
980 LOCATE55,22:PRINT"<C>HANGE
<F>IND  <Q>UIT"
990 RETURN
1000 'WARN USER IF SECTOR CHANGE
 MADE BUT NOT WRITTEN
1010 IFWG THENLOCATE8,23:PRINT"*
** WARNING -- SECTOR CHANGE BUFF
ER NOT WRITTEN -- OKAY ? ";:SOUN
D150,5ELSE1030
1020 K$=INKEY$:IFK$=""THEN1020EL
SELOCATE8,23:PRINTSTRING$(70," "
);:IFK$="Y"THENWG=0
1030 RETURN
1040 'LOCATE THE VALUE AND PRINT
-CHARACTER OF A BYTE AND REFRESH
 THEM
1050 ROW=5:TB=NB
1060 IFTB>15THENTB=TB-16:ROW=ROW
+1:GOTO1060
1070 COL=TB*3+8:IFTB>3THENCOL=CO
L+1:IFTB>7THENCOL=COL+2:IFTB>11T
HENCOL=COL+1
1080 LOCATECOL,ROW:IFVA<16THENPR
INT"0";
1090 PRINTHEX$(VA);:CD=VA:GOSUB7
10:LOCATE62+TB,ROW:PRINTCHR$(CD)
;:ATTR0,0:LOCATE63+TB,ROW:PRINTR
IGHT$(PC$(ROW),15-TB)
1100 RETURN
1110 'HEX NUMBER ENTRY FROM 00 T
O FF.  ERROR TRAP AND RETURN DEC
IMAL VALUE IN DV.     USES XX, H
N$, AND LN$ LOCALLY AS SCRATCH V
ARIABLES.
1120 K$=INKEY$:IFK$=""THEN1120
1130 IFK$=CHR$(13)THENDV=999:GOT
O1280 'SIGNAL CALLING CODE TO AB
ORT
1140 PRINTK$;:HN$=K$
1150 K$=INKEY$:IFK$=""THEN1150
1160 IFK$=CHR$(13)THENLN$=HN$:HN
$="0":PRINT" ";:GOTO1220
1170 PRINTK$;:IFK$=CHR$(8)THEN11
20
1180 LN$=K$
1190 K$=INKEY$:IFK$=""THEN1190
```

```
1200 IFK$=CHR$(8)THENPRINTK$;:GO
TO1150
1210 IFK$<>CHR$(13)THEN1190
1220 IF(HN$="'")OR(HN$=CHR$(34))
THENDV=ASC(LN$):GOTO1280
1230 DV=ASC(HN$)-48:IFDV>9THENDV
=DV-7
1240 IF(DV<0)OR(DV>15)THENPRINTC
HR$(8);CHR$(8);:GOTO1120
1250 DV=DV*16:XX=ASC(LN$)-48:IFX
X>9THENXX=XX-7
1260 IF(XX<0)OR(XX>15)THENPRINTC
HR$(8);CHR$(8);:GOTO1120
1270 DV=DV+XX
1280 RETURN
1290 'HEX STRING ENTRY FROM 0 TO
 FFFF
1300 WD$(1)="":WD$(2)="":WD$(3)=
"":WD$(4)="":I=0
1310 I=I+1
1320 K$=INKEY$:IFK$=""THEN1320EL
SEIFK$=CHR$(13)THENNC=I-1:GOTO13
30ELSEPRINTK$;:IFK$=CHR$(8)THENI
=I-1:GOTO1320ELSEWD$(I)=K$:IFI<4
THEN1310ELSENC=4
1330 IF(WD$(1)<>"'")AND(WD$(1)<>
CHR$(34))THEN1370
1340 IFNC=3THENWD$=WD$(2)+WD$(3)
:GOTO1570
1350 IFNC=2THENWD$=WD$(2):GOTO015
70
1360 VD=0:GOTO1380
1370 VD=-1:FORI=1TONC:IFINSTR(1,
"0123456789ABCDEF",WD$(I))=0THEN
VD=0:NEXTELSENEXT
1380 IFNOTVD THENFORI=1TONC:PRIN
TCHR$(8);:NEXT:GOTO1300
1390 IFNC=0THENWD$="":GOTO1570
1400 ONNC GOTO1410,1430,1460,150
0
1410 HB$="":XX=ASC(WD$(1))-48:IF
XX>9THENXX=XX-7:GOTO1420
1420 LB$=CHR$(XX):GOTO1560
1430 HB$="":XX=ASC(WD$(1))-48:IF
XX>9THENXX=XX-7
1440 XY=ASC(WD$(2))-48:IFXY>9THE
NXY=XY-7
1450 LB$=CHR$(XX*16+XY):GOTO1560
1460 XX=ASC(WD$(1))-48:IFXX>9THE
NHB$=CHR$(XX-7)ELSEHB$=CHR$(XX)
1470 XX=ASC(WD$(2))-48:IFXX>9THE
NXX=XX-7
1480 XY=ASC(WD$(3))-48:IFXY>9THE
NXY=XY-7
1490 LB$=CHR$(XX*16+XY):GOTO1560
1500 XX=ASC(WD$(1))-48:IFXX>9THE
NXX=XX-7
1510 XY=ASC(WD$(2))-48:IFXY>9THE
NXY=XY-7
1520 HB$=CHR$(XX*16+XY)
1530 XX=ASC(WD$(3))-48:IFXX>9THE
NXX=XX-7
1540 XY=ASC(WD$(4))-48:IFXY>9THE
NXY=XY-7
1550 LB$=CHR$(XX*16+XY)
1560 WD$=HB$+LB$
1570 RETURN
1580 'ERROR
1590 LOCATE0,10:PRINT:PRINT"
                P R O G R A M
E R R O R":PRINT:END
1600 'QUIT
1610 GOSUB1010:IFWG THENRETURNEL
SEPOKE65496,0:END
```

THE RGB HARD DISK

A warranty can replace your Hard Disk **Drive,** but not the **valuable data it contains!** Think about this **BEFORE** you buy a used or rebuilt hard drive.

RGB Computer Systems uses only **BRAND NEW** Hard Disk Drives, Controllers and Components, all with the **Full Manufacturers Warranty.**

Due to the unique design of our components and software, RGB also has the **fastest** and **most reliable** data transfer in the industry!

The RGB Hard Disk System fully supports both BASIC and OS-9, and provides the ability to boot up OS-9 completely from the Hard Disk without the need for special EPROMS or the loss of Disk Basic.

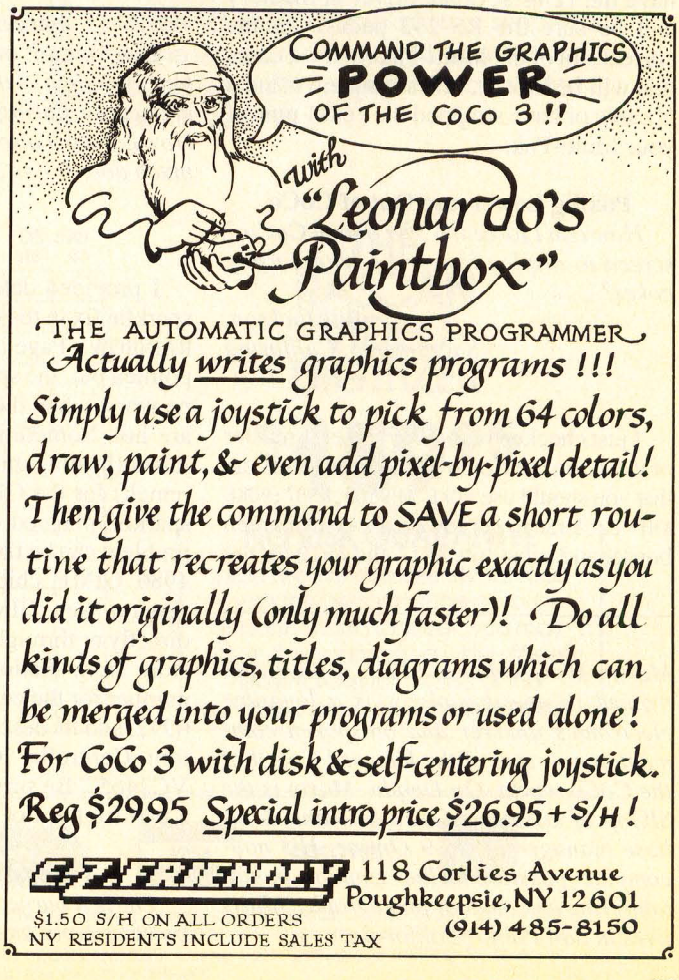
If you need a Fast, **Reliable** Hard Disk System and don't mind spending a few dollars more for **Quality,** please give us a call today!

RGB COMPUTER SYSTEMS

RAINBOW CERTIFICATION SEAL

294 STILLWELL AVE
KENMORE, NY 14217

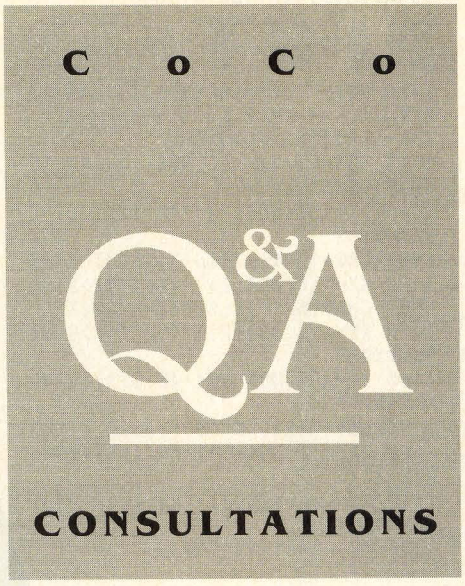
(716) 876-7538



THE AUTOMATIC GRAPHICS PROGRAMMER
Actually writes graphics programs !!!
Simply use a joystick to pick from 64 colors, draw, paint, & even add pixel-by-pixel detail! Then give the command to SAVE a short routine that recreates your graphic exactly as you did it originally (only much faster)! Do all kinds of graphics, titles, diagrams which can be merged into your programs or used alone! For CoCo 3 with disk & self-centering joystick.
Reg $29.95 Special intro price $26.95 + S/H !

E-Z FRIENDLY
118 Corlies Avenue
Poughkeepsie, NY 12601
(914) 485-8150

$1.50 S/H ON ALL ORDERS
NY RESIDENTS INCLUDE SALES TAX



By Marty Goodman
Rainbow Contributing Editor

Simple Upgrade?

Can I upgrade a 300-baud modem to 1200 baud by some simple means, such as installing a different crystal? Can you recommend any shareware OS-9 terminal programs?

Kerry Whittemore
Medicine Hat, Alberta

There is no way to upgrade a 300-baud modem because the circuitry for all aspects of a 1200-baud modem is completely different from that of a 300-baud modem. The only upgrade is to throw out the 300-baud modem and buy a 1200-baud one.

In Delphi's OS-9 SIG Telcom section are a number of newer programs that have the look and feel of *Procomm*, the most popular IBM shareware terminal program. These include *Telstar* and *Jterm*.

XCom9 (be sure to get the version for the CoCo 3), also available on Delphi, is an older OS-9 terminal program that is tried and true. With some of these programs you must be careful that all of the terminal program is on disk in your `CMDS` directory in order for the program to work. You must have the `t2` or `aciapak` driver in memory and be sure the RS-232 pack is in the correct slot of the Multi-Pak (in most cases this will be Slot 1), unless you are using a Y cable or have strapped the `*CART` pins of your Multi-Pak.

Poking Lowercase Out of CoCo

How can I force the 32-column CoCo 3 screen to display lowercase letters using pokes?

Bill Jackson,
Sacramento, California

I just checked with Art Flexser, a master of BASIC on the CoCo 3, and he informs me that you should use `POKE &H95C9,&H57:POKE &HFF22,&H50` to get lowercase with a green border and substitute `&H17` and `&H10` for the `&H7` and `&H50`, respectively, if you want a black border.

Screen Sparklies

Can you tell me how to fix the "sparklie" problem—those bits of snow I get on my screen during disk I/O under OS-9? How can I get a spare GIME chip and how much does it cost?

Jeff Beer
Canto, Massachusetts

I provided details of Roger Krupski's sparklie fix in the October '88 issue of THE RAINBOW, Page 58. As Kevin Darling pointed out, the sparklie problem seems to be worst when the computer and its chips are hot. Sometimes reflowing the solder joints (heating and allowing the solder to remelt) for the GIME chip socket helps a sparklie-plagued CoCo 3. Sometimes the problem can be fixed by replacing an older 1986 GIME chip with the newer 1987 version. New GIME chips can be ordered directly or through your local Radio Shack store from National Parts. The RS part number for the current GIME chip is MX-0992, and its description is "VC2838 Custom Controller Chip, Replacement for VC2465." Be sure to also specify that it is a part for the CoCo 3 (Cat. No. 26-3334).

Floppy Drive Burnout

I have a burned-out FD-500 floppy drive power supply and have been told that the supply has intrinsic problems. Can you recommend an alternative power supply?

George Quellhorst
Plainesville, Ohio

Jameco (call 415-592-8097), of Belmont, California, sells some excellent power supplies for that purpose. In particular, its PS72C, priced at $24.95, is a rugged bench linear power supply delivering regulated 12V at 6 amps and 5 volts at 2 amps. This should be enough for two floppy or hard drives. Alternatively if you are a determined do-it-yourselfer, look in Delphi's CoCo SIG Hardware Hacking section. There you'll find a schematic diagram for an excellent 12- and 5-volt power supply that Don Hutchison and I devised. With commercial surplus supplies available in the $20 to $40 price range, it seems silly to bother making one unless you have a well-stocked parts bin and lots of time on your hands.

Overheated in Dallas

I have a CoCo 2 whose power supply seems to be overheating. What can I do about it?

Norman Grubb
Dallas

Fixing an overheating CoCo power supply takes experience with electronics and some common sense. One thing that some have done with success is to replace the regulating NPN power transistor with a 2N3022 generic power transistor. Mount it on a fat, finned heat sink (instead of the wimpy heat sink provided by Tandy). Alternatively you can provide your own source of regulated +5 volts (capable of delivering 1.5 amps) and unregulated +10 and -10 volts (at 100 mA or so). To disconnect the existing power supply and hook up an external one, a schematic diagram for the exact model of CoCo you have is a must. Get the service manual for that CoCo catalog number from National Parts. Be sure when feeding in power from an external supply to remove the big filter capacitor in the Coco itself and replace it with a small (50 µF) one, or you risk ground loop current problems.

Strange Connector

What is involved in using one of those Tandy 1000EX external add-on drives with a Color Computer? It uses a funny 30-pin connector on its cable.

Dick Reitz
New Jersey

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.

OUR LATEST 30 ISSUES

ISSUE #57, MAR. 1987
THE BAKERY
ENCHANTED VALLEY
SAFE KEEPER
WAR 1
BOMB
PIANO PLAYER
SPREAD SHEET
SLOT MANEUVER
LIVING MAZE
GEM SEARCH

ISSUE #58, APR. 1987
ACCOUNTS PAYABLE
PRINTER GRAPHICS
SIMON
PANELING HELPER
MULTICAKES
CAR RACE
ELECTRONICS 1
BATTLE TANK
DISKETTE VERIFY
WEIRDO

ISSUE #59, MAY 1987
GENEOLOGY
HOME PLANT SELECT
CHECK WRITER
HELIRESCUE
KABOOM
NEWPONG
CROQUET
FUNCTION KEYS
ZOOM
ELECTRONICS 2

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

** TOM MIX PROGRAMS*

EACH ISSUE CONTAINS 10 PROGRAMS
READY TO LOAD. AVAILABLE ON TAPE OR DISK.
SEE JULY '89 RAINBOW FOR EARLIER ISSUES.

VISA

MasterCard

RAINBOW
CERTIFICATION
SEAL

SUPER SAVINGS

SINGLE ISSUE	$	8.00
2-5 ISSUES	$	6.00 EA
6-10 ISSUES	$	5.00 EA
11 OR MORE ISSUES	$	4.50 EA
ALL 86 ISSUES	$	235.00

PURCHASE 20 OR MORE ISSUES
AND RECEIVE A FREE
6 MONTH SUBSCRIPTION

ONE YEAR SUBSCRIPTION ONLY $ 70.00 !

COCO I, II, AND III

- All Programs Include Documentation.
- We Send 1st Class - No Charge!
- For Information on Subscription Prices, Turn to Pages 55 & 107

MAIL TO:

T&D SUBSCRIPTION SOFTWARE
2490 MILES STANDISH DR.
HOLLAND, MI. 49424
(616) 399-9648

PLEASE CIRCLE
TAPE OR DISK

1	9	17	25	33	41	49	57	65	73	81
2	10	18	26	34	42	50	58	66	74	82
3	11	19	27	35	43	51	59	67	75	83
4	12	20	28	36	44	52	60	68	76	84
5	13	21	29	37	45	53	61	69	77	85
6	14	22	30	38	46	54	62	70	78	86
7	15	23	31	39	47	55	63	71	79	
8	16	24	32	40	48	56	64	72	80	

Name _____

Address _____

City _____ State ____ Zip _____

Card # _____ Total $ _____

The drives and cases with those Tandy external drive systems are excellent generic items that can be used with the CoCo and other computers. However, the 30-wire cable that comes out of them is ultra-weird and very specific to the Tandy 1000 computer system. The cases have no power supply in them, and power is supplied to the drive via some of the lines on that 30-wire cable. The data and ground lines for the drive are in totally different places on the cable than they are in normal 34-wire drive cables. My recommendation, if you have such a drive and want to use it with the CoCo, is to open up the case and remove the Tandy special cable, then use your own normal 34-wire cable and add a power supply of your choosing to the system. Paul Tesch (PAUL TESCH) told me he checked the 30-wire cable using an ohmeter, and got the results shown in Table 1.

Table 1:

Tandy 30-wire cable	normal 34-pin cable or power	Tandy 30-wire cable	normal 34-pin cable or power
1	+12V	2	+5V
3	+12V	4	+5V
5	GND	6	+5V
7	GND	8	+5V
9	GND	10	Pin 8
11	GND	12	Pin 26
13	GND	14	Pin 20
15	Pin 32	16	Pin 16
17	Pin 18	18	GND
19	Pin 28	20	GND
21	Pin 30	22	GND
23	Pin 22	24	GND
25	Pin 24	26	GND
27	Pin 10	28	+12V
29	12	30	+12V

Intermingling Printer

How do I hook up to the CoCo a printer designed to be hooked to a Commodore 64's serial port?

Will Brunner
Brooksville, Florida

Unless you are familiar with some of the fundamentals of eletronic tinkering, it is probably not worth your effort to try, given how inexpensive printers are these days. The Commodore 64's serial port puts out serial data in a manner similar to that of "normal" RS-232 ports *but* not at the same voltage levels. Where normal RS-232 ports send data at levels of +5 to +12 volts for high and -5 to -12 volts for low, the Commodore 64 sends the data out at TTL levels: +5 volts for high, 0 volts for low. Given a schematic or technical specs for the printer in question, you should be able to add level converter chips (either the 1488 and 1489 pair sold by Tandy if you can add + and - 12 volt power supplies for them, or a MAX232 chip that runs directly off a single +5 volt supply and generates internally its own voltages for level conversion) and convert the printer for use with a normal RS-232 port. But as I mentioned, this requires some experience.

Intermingling Drives

How can I use the FD-502 or other double-sided disk drive as a double-sided drive under Radio Shack's Disk Extended BASIC?

Chris Tracy
Mt. Pulaski, Illinois

Your best bet by far is to purchase *ADOS-3* or a similar alternate DOS from any of a number of Color Computer vendors (such as Microcom). *ADOS-3*, produced by Art Flexser of SpectroSystems in Miami, Florida, allows using both sides of double-sided drives and adds many other fixes and features to Disk BASIC while retaining a high level of compatibility with Disk BASIC-based software. You can also get help and advice about this product directly from Art himself via Delphi's Color Computer Special Interest Group, where Art appears almost daily.

Echoing Printer

Is there a command under RS BASIC for the CoCo 3 that is equivalent to the DUAL command on a Model 3, which causes the printer to echo what is printed to the screen?

Chuck Carpinello
Rensselaer, New York

No, there is no such command within RS BASIC. But it is fairly simple to write a two- or three-line program that, under BASIC, dumps the contents of the text screen to the printer. Naturally you need to set your CoCo and printer's baud rates to be the same. You need a printer that has a serial input or one to which a serial-to-parallel converter has been added. The Model 3 talks to printers with parallel inputs, whereas the CoCo sends data to the printer over an RS-232 serial line.

Need Help in Independence

Can you help me use Color Scripsit *on my CoCo 1 to select different fonts on my DMP-106 printer?*

Paul Kemp
Independence, Missouri

It is not worth trying to do anything with *Color Scripsit*, in my opinion, when there are so many other far better, more flexible word processors available for the CoCo (all models) for relatively modest prices. For the CoCo 1 I recommend *TeleWriter 64* or *VIP Writer* (I find the former easier to learn, though many of my friends swear by the latter). Both these programs offer the ability to change printer fonts and support underline, boldface and most other features that any given printer offers.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

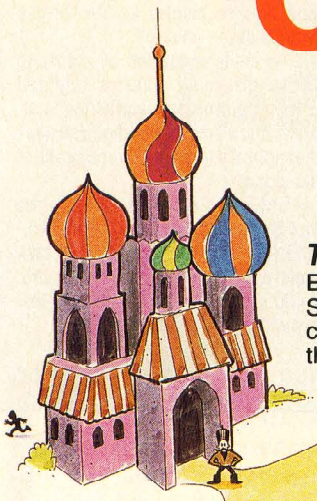
We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we recieve, we are unable to answer letters individually.

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.

Radio Shack Welcomes You to

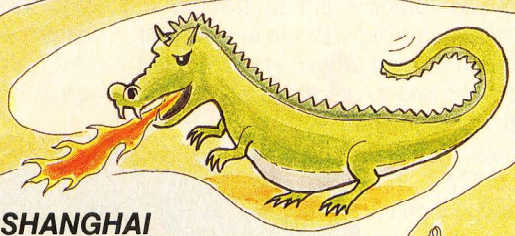
COCO LAND

Here's your ticket to a fun, fabulous world of adventure, thrills and intrigue! Come to Radio Shack for the best in games for your Color Computer. It's as much fun as an amusement park—and no waiting in lines!

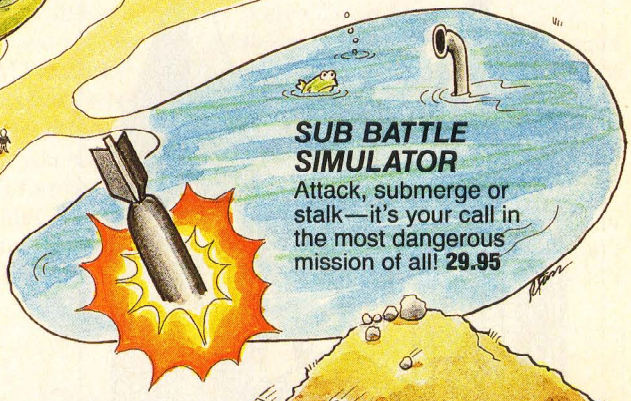


TETRIS
Experience the ultimate Soviet challenge by discovering the mystery of the four squares! **29.95**

RAMPAGE
Become a monster—smash your way through the city! **34.95**



SHANGHAI
Enter the captivating, 3000-year-old world of Oriental strategy! **24.95**

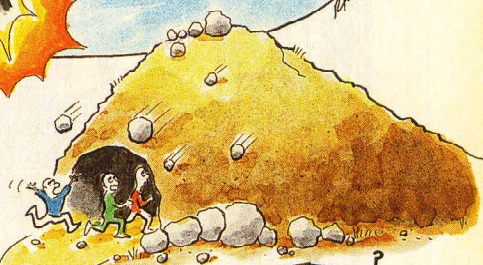


SUB BATTLE SIMULATOR
Attack, submerge or stalk—it's your call in the most dangerous mission of all! **29.95**

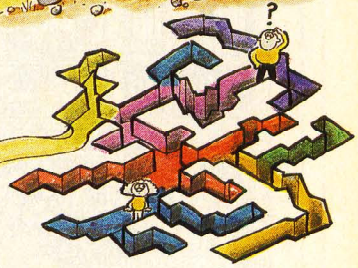
KING'S QUEST III
Use magic—and your wits—to battle the evil wizard, Manannan of Llewdor! **34.95**

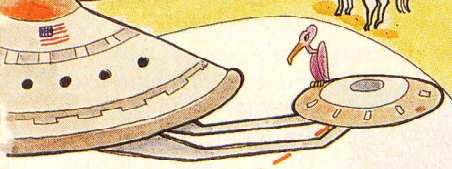
CASTLE OF THAROGGAD
Enter the treacherous fortress and rescue the Good Wizard from his evil brother! **29.95**

DUNGEONS OF DAGGORATH
You're pitted against awesome beasts! **29.95**



DOWNLAND
Make your way through a winding maze of caverns, collecting treasures! **19.95**





SOKO-BAN
Fifty levels of challenging puzzlers! **29.95**

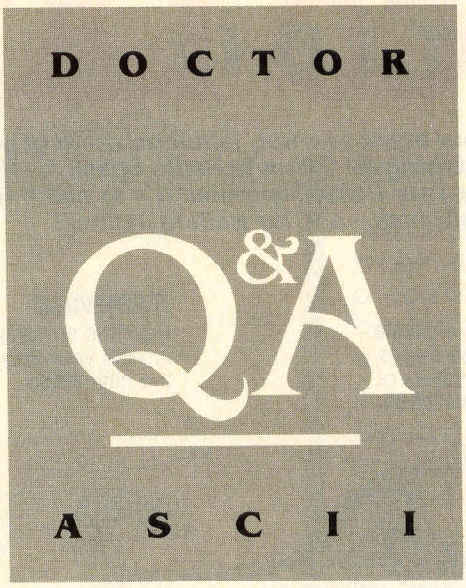
SILPHEED
Take control of a Super Dogfighter to keep the galaxy free! **29.95**

PREDATOR
It's a life-or-death struggle with an alien that shows no mercy! **34.95**

THEXDER
Command a Robot-Jet Assault Vehicle and destroy enemy creatures! **24.95**

BUY NOW FOR CHRISTMAS!

Radio Shack®
The Technology Store℠
A DIVISION OF TANDY CORPORATION



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

My Squinting Sister

Currently I own two word processors, Telewriter-64 *and* T/S Edit. *While I have no trouble using* Telewriter-64, *my sister, who frequently has the need to use a word processor, has trouble seeing the words and letters on* TW-64.

T/S Edit *provides a solution to her problem — even though the Disk* BASIC *version does not allow text formatting in any way. So to format the text, we use* TW-64, *which — when used to read files created by* T/S Edit *— presents some trouble. Even though* TW-64 *can read ASCII files, it frequently leaves out a big chunk of text when reading ASCII files created by* T/S Edit. *This situation causes both of us lots of aggravation.*

I am aware there's a text formatter for T/S Edit *called* T/S Word. *This program requires OS-9 to run, the very idea of which is outrageous to my sister. She dislikes its complexity and avoids it at all costs. What's more, the cursor in* T/S Edit's *OS-9 version for some unknown reason does not blink, making it hard to use and follow on the screen. Can you offer some assistance?*

Hinh Phansavath
Buena Park, California

With a CoCo3 you can upgrade from *Telewriter-64* to *Telewriter-128*, which satisfies both formatting requirements and provides readable text using the CoCo 3's native 80-by-24 display. If cost is a constraint, a relatively inexpensive composite video monochrome monitor works fine for word processing.

CoCo Possessed

Two weeks ago I received my Color Computer 3. My current system also includes dual disk drives with a Disto Super Controller, a 13-inch color TV and an NX-1000 Rainbow printer with a Blue Streak interface.

My problem started a couple of days ago when I met with two other Color Computer nuts over here in Germany. One of them has a CoCo 2 with ADOS and the other a CoCo 3 with ADOS 3. I have RS-DOS 1.1 installed in my controller and can run almost all of my programs just fine. But when I try to run their programs, the frustration begins.

I can only run about 10 percent of their programs. When I try to run the other 90 percent, the program freezes just after the beginning — or I receive OM, DS, OS, AO, or FC errors, just to name a few. I also get spiking lines that run horizontally across the screen while the picture is frozen. Sometimes the screen comes up with what I call "looking at the inside of a bee hive." It's the kind of screen you get when you try to run a CoCo 3 program on a CoCo 2. If this is not enough, sometimes the disk drive keeps running and running, at times without the little red light on. Or Drive 1 starts running when only Drive 0 contains a disk.

I also can see the picture of the Three Magi in the background of some of my programs. Is this because RS-DOS does not like ADOS-saved programs, or do I need to upgrade my current RS-DOS 1.1 ROM chip in my controller? If I have to upgrade to a different DOS, which one do I go to: ADOS, CDOS or MJK DOS? My Disto Super Controller has three more 28-pin sockets in which I can put a total of four DOS EPROM chips. From an economic standpoint, I think I should look at the most compatible DOS — or is there another problem that prohibits me from running these ADOS-saved programs?

Two more quick questions: What is the F2 key for? And which is most advisable: saving programs on drives 0, 1, 2 and 3 without flipping the disks, or saving programs on drives 0 and 1, which means flipping the disks, notching and punching out the other side of the disks?

William Gosz
APO New York

Start isolating your problem by trying your computer with your friend's controller. If the problems disappear, your controller is the problem. Otherwise return the new CoCo 3 computer to Tandy for replacement. If it is the controller, try swapping disk controller ROMs. It is possible that your friend's ADOS is set up to use 40 tracks, etc. If after the ROM swap you still cannot read his disks, I suspect your controller is at fault.

The F1 and F2 function keys are available to Disk BASIC programmers by polling the keyboard rollover table. They can be more directly sensed via their ASCII codes in OS-9. I have not had any problems with flipped-notched disks on single-sided drives. With double-sided drives and in Disk BASIC, I find accessing the back side of the drive via a different drive number more convenient.

Need More Memory

I would like more information about the MMU (Memory Management Unit) task segments and how to switch banks of RAM. I have the CoCo 3 upgraded to 512K and don't know how to access the memory. I know that the computer banks its memory into 64 blocks of 8K bytes. For example, suppose I want to write $40 in all of the memory (512K) and reset it back afterwards. What is the listing in machine language? I ask this because I have built an expansion relay with LEDs, and I need lots of memory to store data. I gained some of the information I have from THE RAINBOW *(March '89, Page 18, Table 1).*

Jean Gravelle
Gatineau, Quebec

A detailed explanation, along with example code that loads and saves Hi-Res screens, can be found in the January '87 issue of THE RAINBOW, Page 167.

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

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

Looking for Mighty Modem

I have been looking for a 9600-baud modem. I know they are made, but I can't find one.

Geoff Hall
Casselberry, Florida

Look for ads in *Byte Magazine* and *The Computer Shopper*. Be prepared, though — they are expensive!

Pocket These Patches

I just read your article in the July '89 issue of THE RAINBOW *and saw a reference to the OS-9 Pascal patch with an inquiry for patches for the other Pascal programs. I discovered the following patches on a local BBS:*

```
1 Pascal
c 697 21 25
c 1692 21 25
v

1 pascals
c a5d 21 25
c a82 21 25
v

1 pascale
c 23E 21 25
v

1 pascaln
c 99F 21 25
c 9C4 21 25
```

I contacted Mr. Scranton, the author, and obtained his permission to send these to you. Mr. Scranton lives in Columbus, Ohio.

Robert E. DeBolt
Pickerington, Ohio

Thanks for the Pascal info.

If You Want My Advice. . .

I want to comment on some of your answers in June's RAINBOW. *I realize that a question-and-answer column can't be perfect, but one user who had a 35-track problem with OS-9 could have followed quite a few other methods to fix his problem. First of all, his system should have given him a Read Error, not when running 40 tracks, but when he used his 35-track system master in the drive. I run with 40-track double-sided systems 100 percent of the time, but I regularly read and copy standard Radio Shack single-sided 35-track disks when I buy software there. Secondly, you should have mentioned that the* `format` *command has options for both the number of sides and the number of tracks. When running in 40-track mode, the user can easily format any number of 35-track disks for backup of other 35-track disks.*

Mark S. Ritchie
Garland, Texas

Granted, a 40-track drive set up as such can read 35-track disks. The point I was making is that the converse is not true. You will have problems reading a 40-track disk if your OS-9 device descriptor is set up for 35 tracks.

Let's Get Something Straight

In reference to your answer (July '89) to Phillip Brown, OS-9 makes use of hardware names to tell the system what a given device looks like. It passes this info to a driver. The driver is the actual software connection to a given piece of hardware. The following data was gleaned from the addendum manual of OS-9 Level 1 Revision 2.00.00:

Driver	*Descriptor*
`printer`	`/P`
	`/T1`
`aciapak`	`/T2`
	`/T3`
`modpak`	`/M1`
	`/M2`

The following notes should be used for the above: `/m1` *and* `/m2` *are always the Modem Pak;* `/t2` *and* `/t3` *are always the serial pak or equivalent;* `aciapak` *is the driver used when the MPI mapped hardware does the interrupt processing; and* `modpak` *is a specialized driver that makes use of something called a "virtual software interrupt." The overhead from its use is such that normally it works well only at 300 baud (although I've gotten feedback that it will work faster given certain caveats). This driver works with any ACIA port hardware but gives one the freedom to place the port in any slot. The* `modpak` *driver requires some patching as there is a known bug in its* `F$Exit` *call. (It seems like it should work but often glitches up a program exit.)*

At any rate this info should make the details clear. Please readdress your answer to Phillip Brown because your first answer is misleading and wrong.

Paul B. Pollock
Sepulveda, California

My answer, I admit, might be construed as an oversimplification. However, it is not wrong. I might add that if you inspect the binary `t1.dd`, you will discover that it uses the `sio` device driver, not `printer`. My answer is consistent with the Tandy-supplied OS-9 Level II documentation (Pages 1 through 3). It identifies `/m1` and `/m2` as being device descriptors for the optional 300-baud Modem Pak, and it describes `/t2` and `/t3` as being for the optional RS-232 Pak.

A Bland Screen

I recently purchased a 128K CoCo 3 and a CM-8 RGB monitor to replace my CoCo 1 and TV. I also have an FD-500 drive and CCR-81. My problem is that some programs in color on my CoCo 1 only show up in black and white on my CoCo 3 (e.g., Rescue *by Stephen C. Mitchell, December '84,* THE RAINBOW *and* Pitstop II *from Radio Shack). Is there something wrong with my CoCo 3 or monitor?*
Brad Kolman
Madison, Wisconsin

The games referred to use artifacted colors. These colors, which can be produced on a television set or monitor with composite video inputs, were not in the design specification for the original Motorola 6883 Video Display Generator used with CoCos prior to the CoCo 3. The Tandy CM-8 monitor is RGB-only. Other monitors such as the Magnavox Professional 8515 have inputs for both composite video and RGB and can produce artifacted colors in the composite video mode.

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

Then there's terminal emulation

KEYSUB and *WEFAX* and Guide — Oh, My!

By Don Hutchison
Rainbow Contributing Editor

This month I'll start with a personal item about a couple of our SIG members — the sort of thing you might not be able to find out elsewhere.

Sharon Blower (SEBJMB) managed to break 2000 in the CoCo SIG's *Scramble*. Her score of 2004 is most certainly a high for the CoCo SIG and a high score for anywhere on the system. Her hottest competition is **Art Flexser** (ARTFLEXSER) although several other SIG members are in active pursuit.

Sharon computes from a 512K CoCo 3. She is an emergency planning specialist for an electrical utility at a nuclear power generating plant. She and her husband Jeff live in New Cumberland, West Virginia. Feel free to join Sharon and Art online almost any night for a rousing game of *Scramble*.

KEYSUB Helper

Have you tried the /KEYSUB command in Conference? It's a great way to speed up your conferences as well as save some wear and tear on your fingers.

/KEYSUB has just been enhanced to provide macro parameter substitution, and to save or load keyboard substitutions from files in your Workspace. Type /KEYSUB ? for help, /KEYSUB *param* or /KEYSUB *file* for additional information online. Here are the valid keyboard substitution commands:

- To list the definitions: /KEYSUB
- To add or change a definition: /KEYSUB $*trigger*$*result*$ (any punctuation character can be used instead of $ as long as the same character is used in all three positions)
- To delete a definition: /NOKEYSUB $*trigger*$
- To delete all definitions: /NOKEYSUB
- For help: /KEYSUB ?

Up to 20 keyboard substitutions can be active at a time. For example, entering /KEYSUB $.$/SEND JQP1 $ causes a line reading .hi john to be interpreted as if you had typed /SEND JQP1 hi john.

In this example the period (.) is called the *trigger string* because the substitution is triggered by finding a period at the start of a line. /SEND JQP1 is the *result string* because the substitution results in replacing the trigger string with the result string. The space between JQP1 and $ is important; without it the command is translated as /SEND JQP1hi john. To cancel this substitution, type /NOKEYSUB $.$.

Note that /KEYSUB $$/SEND JQP1 $ causes everything you type to be interpreted as /SEND JQP1 unless some other substitution is active at the same time. If you make one of these catchall substitutions, you can type /NOKEYSUB to undo it; /EXIT and /BYE are recognized in any case.

WEFAX

Considerable interest has been focused lately on weather maps. Several SIG members are interested in obtaining, viewing and using these freely available sources of information. *WEFAX*, a long-time favorite program of CoCo owners, has been the subject of a lot of attention in the CoCo SIG's Forum recently. **Marty Goodman** (MARTYGOODMAN), the distributor of the programs, explains the programs and their uses:

"*WEFAX* is the format used to transmit weather maps and satellite images of Earth over shortwave radio. The protocol was formed in the '30s and '40s — long before digital computers. At that time tube-based analog equipment and mechanical analog devices were used to send and receive the pictures, which were mainly hand-drawn

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

OS-9 SIG

Applications: **Mike Sweet** (DODGECOLT) contributed *ED* Version 1.4, which supports lines longer than 80 characters, adds highlighting for block commands, and adjusts to the size of the window. **Mike Brant** (MBRANT) provided a quiz program that uses a text file for the questions and answers. It also prints to the printer or a disk file the questions and answers you missed. Mike also provided a BASIC09 program that measures ambient chaos. **Raymond Mayeux** (RAYMAYEUX) uploaded an update to the *TODAY* program that adds the ability to display the Julian date and the number of days left in the year.

Utilities: **Mike Woolley** (WOOLLEY) uploaded a program that prints either the decimal and hexadecimal values of a given character or the entire ASCII chart.

Patches: **Larry Oheron** (LOHERON) posted a patch to the Pascal compiler so it prints error message descriptions with error numbers.

Telcom: **Dennis Hoin** (HACKER1) contributed *Memory Master*, a game designed for use with BBS systems that tracks the top ten scores. **Ryszard Sliwinski** (RYSIEK) submitted a patch for the fileout procedure in *RiBBS* Version 2.0 to provide support for Kermit and a modified version of Kermit so the server functions properly. **Bill Brady** (OS9UGED) posted an update to *WizPro* that fixes a few minor bugs after running *XProg*.

Graphics and Music: **Mike Knudsen** (RAGTIMER) contributed a jukebox player for all levels of *UltiMusE* files, allowing you to play your musical compositions in any order and "Now is the Month of Maying" for *UltiMusE*. **Jim Buck** (COCOROGUE) submitted "Stairway to

weather maps. The protocol (a slow but very rugged one) survives to this day and is used by dozens of shortwave stations (most of them operated by various governments) to provide weather information to ships at sea and to others who want it.

"Using the *WEFAX* program and any shortwave receiver that supports BFO or SSB, you can receive *WEFAX* transmissions from all over and view them on your screen or printer. The *WEFAX* software does almost all of what you need. The *WEFAX* hardware interface needed is trivial: just a few plugs, a resistor and a couple of LEDs.

"*WEFAX* is in the public domain, too. The CoCo *WEFAX* program has been used by hurricane watch organizations in Florida. I've gotten several letters from owners of ships at sea thanking me for the excellent guidance they got from land-based friends who were using the *WEFAX* program to capture weather maps."

Contact Marty through Delphi Mail or the CoCo SIG for more information.

Guide to Delphi

Delphi: The Official Guide, by **Michael A. Banks** (KZIN) is a hardbound 500-page book designed to get you "up and running" on Delphi and serves as a continuing reference. In its pages you'll find everything you need to know to get the most from your time on Delphi. It is a Brady Book published by Prentice Hall Press.

Delphi: The Official Guide is a complete resource to Delphi services. The manual includes descriptions of menus, timesaving tips for the advanced user, an index of Delphi services, a Dial-Up Guide, a technical reference section, a troubleshooting guide, a glossary of terms and a Command Reference Card.

You can order the *Delphi: The Official Guide* for $19.95 plus $3 for shipping and handling at the main menu. Just enter `USING MANUALS` at the `MAIN>` prompt. You may also purchase the guide at many fine bookstores, including B. Dalton, Coles and Waldenbooks.

A terminal is a device that can consist of just a keyboard and some electronic circuitry. When you choose a terminal emulation, you are really defining how the Color Computer (acting as a terminal) responds to different criteria.

Terminal Emulations

Several questions have arisen lately from some of our users concerning which of the available terminal emulations is best suited for use with Delphi. That's a difficult question to answer. It's almost like asking, "Which ice cream do you prefer: vanilla, chocolate or strawberry?" My choice depends on my mood at the time.

Anyway, let's take a look at this thing called *terminal emulation*. That's really just a technical way of saying something imitates a certain type of terminal. In other words you are going to make your Color Computer act like a specific terminal. A terminal is a device that can consist of just a keyboard and some electronic circuitry (not much more hardware than a typewriter in some cases).

When you choose a terminal emulation, you are really defining how the Color Computer (acting as a terminal) responds to different criteria. In effect you are choosing a standard method of displaying graphics, setting screen attributes, etc. That way all terminals of one type look and act the same. You can conceivably connect the CoCo to a mainframe directly, as long as you are emulating the terminal type the mainframe computer expects.

Without going too deeply into the pros and cons of the different emulation modes, let's look at what's available:

- CRT — Very basic. Doesn't do very much. Good for most BBSs since they don't expect much out of your terminal. This terminal sends the characters typed from your keyboard to the remote computer, displays on your screen the characters sent by the remote computer to you, and does very little else. (If in doubt about which terminal emulation to use with a BBS, CRT is usually the preferred choice.)
- *VIDTEX* — Generally useful only on CompuServe although some BBSs support *VIDTEX* codes. *VIDTEX* is really a complex set of codes that allows the cursor to be positioned at will on your screen. This feature can be used to create some interesting text graphics (like a valentine heart) without the need to draw the graphics line-by-line. *VIDTEX* terminal programs usually support the display of high-resolution (`PMODE 4`) graphics sent to it in a special format that it can identify.
- VT-52 — This is an old standard. It includes a few cursor positioning commands, gives you several extra keys, allows a character graphics mode and not too much more.
- VT-100 — Probably the most power-

Live rock 'n roll -- a cool jazz band -- a baroque trio
Do it all yourself with the help of your CoCo!

If you've never heard what a CoCo and a MIDI synthesizer can do together, you're in for a real treat! Your CoCo can act as a sophisticated music controller. Use it to compose music on a graphics screen that looks just like printed music, and then play it on your synthesizer for incredible 8-part music. Or use it as a ten track tape recorder; advanced programming then lets you edit, modify, and perfect your performance as much as you wish.

- Lyra Library (an 18 disk collection of music transcriptions for Lyra--there's something for everyone here!) $14.95 each disk
- Lyra (an 8 part MIDI music composition program for amateurs and pros) $59.95
- The Lyra Companion (a 100 page book packed with tips on using Lyra) $9.95
- CoCo MIDI 3 (a complete professional quality MIDI sequencer) $150.00
- FBEDIT (Edit and create new voices for the FB-01) $29.95
- Synth Librarians (available for CZ, DX, K1 synthesizers) $29.95

Rulaford Research
P.O. Box 143
Imperial Beach, CA 92032
(619) 690-3648 (evenings 6-10 PT)

ful terminal emulation with the possible exception of *VIDTEX*. VT-100 supports a large number of escape sequences that tell the terminal to do such things as position the cursor, turn on/off bold, blinking, inverse video, change character sets, use double-height/width characters, and turn on/off many features such as wrap-around at Column 80. It also supports scrolling regions — you can tell the VT-100 that only a certain part of the screen is to scroll and that the rest stays put. This is used a lot in editors because it allows full-screen editing from your terminal. You can set tab locations as well. VT-100 is a very powerful terminal emulation and quite difficult to emulate accurately.

There are any number of other terminals floating out there that are commonly emulated. One example is a Tektronics terminal that does graphics. Most of these are not widely supported in terminal programs, however.

There are also later, larger versions of the VT-100, such as the VT-102 and the VT-220.

Many SIG users prefer *V-Term*, marketed by Gimmesoft. They usually leave *V-Term* in the VT-100 emulation mode. If they happen to be online with a system that doesn't take advantage of its VT-100 support, nothing is lost. Online Delphi supports a few of the VT-100 commands to clear the screen and home the cursor.

Editing Messages in the Forum

In Forum when you use ADD or REPLY to create a message, you start out in a "mini-editor." Many folks don't realize this. To see for yourself, type /HELP at the beginning of a message line and you'll see the following help screen displayed on your computer:

```
/LIST - lists all lines typed
/DELETE - erases the last line
/EDIT - invokes your editor
/EXIT - same as CTRL-Z
/QUIT - same as CTRL-C
```

For more sophisticated editing use /ED (at the beginning of a line) to call up either the EDT or OLDIE editors, whichever you have selected as your default editor.

You can also begin your message in the Edit mode in Forum with ADD /EDIT and REPLY /EDIT.

Designing with OS-9

A SIG member provided me with an interesting news item: "In a recent issue of a technical publication, I was surprised to find a short article, 'Real Time Audio/Video Environment,' which lets engineers construct custom instrument panels by combining images of dials, meters and switches on a computer screen. The *RAVE* software runs under the OS-9 operating system and is sold by Microware Systems Corporation of Des Moines, Iowa. I for one was very surprised to see the name, which shows up on so many CoCo screens!"

Kevin Darling (OS9UGPRES) quickly replied: "The last MOTD (the OS-9 User's Group newsletter) also had full coverage of *RAVE*. Microware is fairly well known in the controller world. GM is even thinking about moving over to it for its car computers. NASA has been the biggest OS-9 user for quite some time. Guess what it uses to handle launch communications and shuttle fueling and telemetry? Right!"

See how many interesting information tidbits can be picked up in the Forum sections of our SIGs? Join us online to learn more.

❑

Heaven" by Led Zeppelin for *UltiMusE*. **Bert Schneider** (OS9BERT) posted a series of files that allow you to run *UltiMusE III* under *Multi-Vue*. **Mike Schneider** (MSCHNEIDER) submitted Mac sound files of Mighty Mouse singing "Here I Come to Save the Day," the Blues Brothers' song from the movie of the same name, the Church Lady saying "Well, isn't that extra special," and a song from the movie *Batman*. **Zack Sessions** (ZACKSESSIONS) contributed a series of programs used to make several variations of a graphics demonstration system.

John Kou (BAMBOO) posted several songs from the books "Sacred Songs for your Wedding," arranged by Paul Mickelson, "Well-Tempered Praise II" and "Piano Arrangement of Celebration, Worship, and Praise" by Mark Hayes for *UltiMusE*. **Warren Moore** (WJMOORE) submitted *Nuts*, a BASIC09 game/puzzle for the CoCo 3. **Dave Philipsen** (DPHILIPSEN) contributed a revised version of *Play* that supports imbedded sound file codes and command line parameters and works with *Multi-Vue*.

Programmers Den: Mike Sweet posted a random number generator for C and BASIC09 with a cycle length in the trillions. **Mark Farrell** (XLIONX) uploaded *CC2&*, a concurrent C executive with help.

CoCo SIG

General Information: **Don Hutchison** (DONHUTCHISON) posted a document describing the standards for uploading material to the CoCo SIG databases and a complete, up-to-date listing of all the local access numbers for Telenet. **Steve Bjork** (6809ER) contributed the transcript from the Game Conference held on July 3rd. **Gay Crawford** (GAYCRAWFORD) submitted a list of 40 lawn care pesticides and their known health hazards and included a list of publications and organizations offering advice on chemical-free lawn care.

CoCo 3 Graphics: **Pete Ellison** (PETEELLISON) contributed a 4096-color image of an actual structure fire that was taken by a Rascan digitizer and images from *The Terminator*, *The Stranger*, *Mickey Mouse* and a Rascan slide show program. **Richard Trasborg** (TRAS) posted some pics of his favorite lady taken with the DS69-B digitizer. Mark Farrell submitted some GIF images of Samantha Fox. **Tommie Taylor** (TOMMIETAYLOR) posted several GIF images including *Star Wars* and a cherry coke.

Utilities and Applications: **Bryan Stephens** (BRSTEPHENS) contributed a short, simple disk editor useful for preparing binary files to be burned into an EPROM, and a position independent machine language monitor for the CoCo 3. **Fred McDonald** (FREDMCD) submitted a utility that can copy, kill, list, search and back up files from one drive to another for the Hyper I/O Hard Drive package. **Donald Jereczek** (DONJERE) posted Version 2.8 of *The Financial Calculator*, providing formats for input loans, loans paid and search routines to find the loans in the file. **Marty Goodman** (MARTYGOODMAN) contributed a brief article describing how you can piggy-back four 4164 memory chips on an 18-pin header to make it behave like one 4464 memory chip in a CoCo 3.

Games: **Jeff Voegeli** (TEK) posted a program to help keep track of dart scores for one to four players.

Music and Sound: **Bill Jackson** (BILLJACKSON) submitted a bare-bones voice editor for the TX81Z four operator Yamaha tone module. John Kou posted a collection of Christian music for *Lyra*.

Telecommunications: **Rick Adams** (RICKADAMS) contributed Version 1.1 of *GameTerm* that provides a graphic interface for use with games on Delphi including a unique real-time conferencing "doodle" mode.

Novices Niche

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

Graphics

Draw Figures Using Asterisks

By Tio Babich

16K ECB

If you find it hard to create figures or symbols for games and other programs, run this program to learn a neat trick. *Figure Draw* is a small but interesting program/subroutine written for the Color Computer. This routine allows the user to draw a picture within the data lines using asterisks (list the program for a better understanding). This is useful for drawing small, otherwise hard-to-plot figures or symbols. Try changing data in lines 10 through 23 to produce more interesting designs.

The Listing: FIGDRW

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 DATA"          *****          "
11 DATA"          * * *          "
12 DATA"          *****          "
13 DATA"     ***************     "
14 DATA"   ***  *******  ***   "
15 DATA"  ***     *****     *** "
16 DATA"   ***     ***     ***   "
17 DATA"  ****    *****    **** "
18 DATA"   **    *** ***    **   "
19 DATA"         ***   ***       "
20 DATA"         ***   ***       "
21 DATA"         ***   ***       "
22 DATA"         **     **        "
23 DATA"      ****     ****      "
100 REM**DRAW ON GRAPHICS SCRN**
102 IF S=0 THEN S=1'S=VARIABLE
 DECIDING HOW FAR FROM SIDES,
 FIGURE IS TO BE DRAWN, GOOD FOR
 LATER "GET"-ING OF THE FIGURE.
103 PM=4'SET PMODE VALUE,BEST
RESULTS OBTAINED WITH 4 OR 2.
104 PMODE PM:PCLS
105 CLS
110 FOR F=1 TO14
130 READ A$:FORG=1 TO LEN(A$)
140 G$=MID$(A$,G,1)
150 PRINTG$;
151 IF G$="*" THEN COLOR 1 ELSE
COLOR 0
152 PSET(G+S,F+S)
160 NEXT G
170 PRINT
180 NEXT F
190 PRINT"HIT ANY KEY TO SEE THE
 FIGURE ONTHE GRAPHICS SCREEN.";
192 EXEC44539
193 SCREEN1,1
194 G=G+1:F=F+1
198 DIM E(S+G,S+F):GET(100,100)-
(100+G,100+F),E
199 DIM V(S+G,S+F)
200 GET(S,S)-(G+S,F+S),V
210 FOR X=100TO 190
215 PUT (X,X)-(G+X,F+X),V
216 EXEC43345:POKE140,X+G
220 PUT (X,X)-(G+X,F+X),E
222 NEXT:FORT=1TO3::PLAY"L22;V31
;A;V21;A;V10;A":NEXTT
223 CLS:PRINT"PLEASE FEEL FREE T
O ADD THIS    SUBROUTINE TO YOUR
 OWN PROGRAMS."
1000 REM***BY TIO BABICH****
```

Pardon Me, I Didn't See the Sign

CoCo 3

By Alejandro Lopez Rodriguez

Here is a graphics-animation program that uses HSCREEN 4 (640-by-192 screen). For that reason only CoCo 3 owners can run it. Just type the program, save it on tape or disk, and type RUN. A similar program published in Novices Niche, May '88, does not require a CoCo 3.

The Listing: NOSMOKE

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 '*************************'
20 '      N O   S M O K E     '
30 '            BY:           '
40 ' ALEJANDRO LOPEZ RODRIGUEZ '
50 '       JULY, 25 1989      '
60 ' GUADALAJARA, JAL, MEXICO. '
70 '*************************'
80 POKE65497,0:ONBRKGOTO220:HBUF
F1,1900:HBUFF2,2000:HBUFF3,1500:
HBUFF4,300:HBUFF5,200:HBUFF6,200
0:FORA=0TO3:PALETTEA,63:NEXTA:HS
CREEN4:HCOLOR2:X=320:Y=105:Z=90
90 HDRAW"BM320,100R200BD10L200BU
10":HCIRCLE(X,Y),5,2,2:HCIRCLE(5
20,Y),5,2,2,.75,.25:HCIRCLE(380,
Y),5,2,2,.75,.25:HPAINT(325,101)
,1,2:HGET(300,Z)-(540,120),1
100 HCLS0:HDRAW"BM320,100D70R70U
70L70;U10R1U2R2U2R2U1R30D10R35D5
;U10R10U3L32":HCIRCLE(355,88),13
,2,1,.6,.25:HCIRCLE(340,92),3
110 HCIRCLE(340,92),3:HPAINT(330
,101):HPAINT(380,Z),3,2:HPAINT(3
57,Z),1,2:HGET(370,80)-(402,Z),5
:HGET(310,81)-(410,101),2:HGET(3
15,170)-(400,172),6:HCLS0
120 HDRAW"C1BM320,100;U5L1U3L1U2
L2U2L2U2L2U2L2U3L1U5L1U5R1U5R1U3
R1U3R2U2R2U2R2U3R2U5R1U5;D5R1D5R
2D3R2D2R2D2R2D3R1D3R1D5R1D5L1D5L
1D3L2D2L2D2L2D2L2D2L1D3L1D5BM315
,50L30BD10R20":HPAINT(X,Z),1,1
130 HCIRCLE(X,75),6,3,3:HPAINT(X
,75),3,3:HCIRCLE(X,75),2,2,2
140 HGET(300,95)-(335,40),3:HCLS
0:FORA=X TO340STEP3:HCOLOR2:HLIN
E(A,100)-(A,110),PSET:NEXTA:HGET
(X,100)-(340,110),4:HCLS0:PALETT
E1,52:PALETTE2,11:PALETTE3,32
150 FORA=191TO40STEP-1:HPUT(220,
A)-(460,A+30),1:NEXT A:GOSUB210:
FORA=191TO92STEP-1:HPUT(420,A)-(
520,A+20),2:IFA<100THENHPUT(425,
A+Z)-(510,A+92),6
160 NEXTA:GOSUB210:HPUT(480,97)-
(512,107),5:HPUT(420,95)-(455,40
),3:GOSUB210:HPUT(420,92)-(520,1
12),2:HPUT(425,182)-(510,184),6
170 HPUT(220,40)-(460,70),1:HPUT
(425,50)-(445,60),4:HPUT(425,50)
-(445,60),4:HLINE(420,95)-(455,7
0),PRESET,BF:HGET(220,40)-(460,7
0),1:GOSUB 210:FORA=92TO191:HPUT
(420,A)-(520,A+20),2:IFA<Y THENH
PUT(425,A+Z)-(510,A+92),6
180 NEXTA:HGET(0,0)-(100,55),2:H
PUT(420,136)-(520,156),2:GOSUB21
0:FORA=40TO85:HPUT(220,A)-(460,A
+30),1:NEXTA:GOSUB210:HCOLOR3
190 HCIRCLE(350,96),180:HCIRCLE(
350,96),140:HCIRCLE(350,96),140,
0,1,.35,.39:HCIRCLE(350,96),140,
0,1,.84,.89:HDRAW"BM245,145M+172
,-110BM+32,+12M-176,+109"
200 HPAINT(350,10):GOTO 200
210 FOR A=1TO2000:NEXTA:RETURN
220 CLS:RGB:POKE 65496,0:END
```

Utilities

Automile

16K ECB

By Dan Weaver

Do you ever get confused when you try to figure out how many miles per gallon your car gets? I'm sure some of you don't because you have computers in your cars that do this for you. Some of you, however, are driving cars that are older than the personal computer. If you own a car that's dated PC (pre-computer), *Automile* can do the job for you.

Of course you still have to jot down some figures on your trip. First you must have a full tank of gas when you begin your trip. You must also record the odometer reading at the beginning and end of the trip and the number of gallons it took to fill the tank at the end of the trip. The computer then figures out your miles per gallon. If you enter the amount of time the trip took, this program calculates your average miles per hour; if you enter the price per gallon of gasoline, it figures out your cost per mile for gasoline. Now if I can just figure a way to run my CoCo off my never-used cigarette lighter!

The Listing: AUTOMILE

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 CLS
20 PRINT@198,"////AUTO MILEAGE\\
\\"
30 PRINT@271,"BY"
40 PRINT@331,"DAN WEAVER"
50 PRINT@32,STRING$(32,239)
60 PRINT@448,STRING$(32,239);
70 FOR X=1 TO 2000:NEXTX
```

```
80 PU$="###.##"
90 CLS
100 INPUT"MILEAGE ON ODOMETER AT
 BEGINNINGOF TRIP";BM
110 INPUT"MILEAGE ON ODOMETER AT
 THE END  OF TRIP";EM
120 INPUT"HOW MANY HOURS DID THE
 TRIP TAKE(CHANGE MINUTES TO DEC
IMAL.     EXAMPLE:45 MIN.=.75)";
TT
130 INPUT"NUMBER OF GALLONS PUT
IN TANK ATEND OF TRIP";GG
140 INPUT"PRICE PER GALLON";PG
150 TM=EM-BM
160 MPG=TM/GG
170 CLS
180 PRINT"trip summary"
185 PRINT"TOTAL MILES TRAVELLED
";TM
190 PRINT"MILES PER GALLON
";:PRINTUSING PU$;MPG
200 PRINT"AVERAGE MILES PER HOUR
";:PRINTUSING PU$;TM/TT
210 PRINT"CENTS PER MILE FOR GAS
";:PRINTUSING PU$;PG/MPG*100
220 PRINT
230 PRINT"based on following inf
ormation"
240 PRINT"1ST ODOMETER READING "
BM
250 PRINT"2ND ODOMETER READING "
EM
260 PRINT"NUMBER OF HOURS      "
TT
270 PRINT"NUMBER OF GALLONS    "
GG
280 PRINT"PRICE PER GALLON     "
PG
```

Hi-Res Graphics Utility

By Ric Pucella

CoCo 3 Disk

I think the CoCo 3 is perfect. I especially like the high-resolution graphics capabilities. The only thing missing is a good, clean way to save the HSCREENs.

That's why I developed the *HRG* utility. It is a set of ML routines accessible via USR9 to allow the saving and loading of high-resolution screens. It also includes the option of displaying the screen (like HSCREEN) but without clearing it.

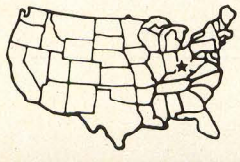
To use the program just type it in and run it. After a while it saves the binary file to disk and executes it. If you are using a tape recorder, simply change the SAVEM in Line 130 to CSAVEM. Don't forget to press the Play and Record buttons prior to running the program.

Afterward when you want to use the *HRG* utility, simply load the file saved by the program. You can execute *HRGCOM* from a

CINSOFT
PROGRAMS • PERIPHERALS • SUPPLIES • SERVICE

Fast Delivery...
Friendly Service

Now in our 7th year!

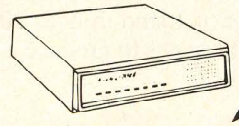


Avatex Modems

AVATEX 2400e just $125!

Avatex 1200e $79
with Coco Cable 89

Avatex 2400e $125
with Coco Cable 135
(Coco 3 only)
with RS-232 Cable* 140



RAINBOW CERTIFICATION SEAL

New

Avatex 1200e, Cable
AUTOTERM ... $119

Avatex 2400e, Cable
AUTOTERM ... $165

*Coco 1,2 requires Deluxe RS-232 Pak

• Call • 513-396-SOFT
• Shop by Modem • 513-396-SHOP

VISA MasterCard AMERICAN EXPRESS

2235 Losantiville, Cincinnati, OH 45237
SHIPPING will be charged at our ACTUAL COST
Ohio residents add 5.5% Sales Tax COD add 2.50

ARIZONA SMALL COMPUTER PERIPHERALS

HARD DRIVES 5 to 40 MEG — SYSTEMS KITS — $225 to 525 / $160 to $450

Systems and kits include a Disto interface, WD-1002-SHD controller, and choice of Hard Drive, cabled and burned in with pre-loaded Public Domain Utilities. Burke and Burke interface and controller or SCSI controller are optional. You or we install the HD interface in a Super Controller or in an adapter for the Multipack. You plug in the power cord and boot OS-9 with drivers, which we install on a copy of your boot disk.

Systems include a case with switch and cooling fan. Choose either a compact ½ height case or an XT/AT case large enough for your entire system. We will install your floppy and motherboard at no charge.

Use your new IBM style case as a monitor stand and relax in an easy chair with our external keyboard.

EXTERNAL KEYBOARD (w/adapter) $125

Gain freedom from your computer/MPI with a full width 105 key, sculptured keyboard. 6' cord, Auto Menu-Default Boot OS-9, reset keys, programmable keys, numeric keypad, 2 stroke commands — Basic and OS-9, no software required.

FLOPPY DRIVES	DS 40T/80T	$75/$85
MODEMS	1200 Bd. Auto Ans.	$50
	2400 Bd. Hayes Comp.	$125
512K MEM UPGRADES	Disto Board installed Fast Cool w/Software	$110.00
COMPUTER REPAIR	Complete repair facilities on-site.	CALL

ADD $5-$8 S&H
(602) 829-8028

930 W. 23rd St., Suite 26
Tempe, AZ 85282

program or from direct mode. In the latter case it prints a short summary of the possible commands. Let me explain them:

To save the high-resolution screen, use:

```
A$=USR9(0),"filename"
```

The variable in front of the expression (in my example, A$) is a dummy variable. To load a screen back, use:

```
A$=USR9(1),"filename"
```

To display the high-resolution screen without clearing it, use:

```
A=USR9(2),mode:EXEC44539
```

Replace the word mode with the number of the HSCREEN you want (from 0 to 4). For example:

```
A=USR9(2),2:EXEC44539.
```

The *HRG* utility is simple to use and incredibly useful.

The Listing: HRGCOM

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 '   HRG UTILITY
20 '
30 ' BY RIC PUCELLA
40 ' (C) 1989 DEBBIE SOFTWARE
50 '
60 ' AN UTILITY TO ADD NEW
70 ' COMMANDS TO HANDLE THE
80 ' HIGH RESOLUTION SCREEN.
90 '
100 CLS
110 L=&HD900
120 PRINT:PRINT"LOADING DATA..."
:GOSUB160
130 PRINT:PRINT"SAVING MACHINE F
ILE...":SAVEM"HRGCOM",&HD900,&HD
A8F,&HD900
140 PRINT:PRINT:PRINT"EXECUTING
'HRGCOM'.":EXEC&HD900
150 END
160 READA$:FORI=1TOLEN(A$)STEP2:
B$=MID$(A$,I,2):IFB$="**" THEN R
ETURN ELSE POKEL,VAL("&H"+B$):L=
L+1:NEXT:GOTO160 'ML LOADER
170 DATACCD9A8FD09719E6830012606
8ED912BDB99C390D48494748 2D524553
4F4C5554494F4E2047524150484943 20
4E45570D434F4D4D414E445320494E53
54414C4C45442E2E2E0D0D2041243D55
535239283092C46494C454E414D4520
202020544F20534156450D2041243D55
535239283192C46494C454E4
180 DATA4520202020544F204C4F4144
0D20413D5553523928322 92C48534352
45454E202020544F20444953504C4159
0D00BDB3ED4F5D102700815A27225A27
037EB44A9DA5BDB26DBDB70BC1041022
DA828621B7E6C6BDE69C868DB7E6C639
9DA5BDB26D8EDA8CBDC938BDCA07FC09
57830400 1026CC288670B7FFA
190 DATADA8BBDCDBC3402BDD0131F02
BDD0131F01A6E01026CA22BDC5C4D670
27037EC334A784A18027037ED616313F
26E9B6DA8B4C817425C68679B7FFA17E
A42D9DA5BDB26D8EDA8CBDC938CC0400
FD0957BDCA048670B7FFA1B7DA8B4FBD
CFB5CC20001F02BDCFB3CC20001F01BD
CFB3A680BDCC24313F26F7B6D
200 DATA4C817425D58679B7FFA186FF
BDCFB54F5FBDCFB3CC0000BDCFB37EA4
2D81485247D6**
```

Game

Car Bingo Game

By Warren Cheves

16K ECB

Parents, before venturing out on long road trips remember that children usually want games to play while traveling. *Bingo* is a game made specifically for those occasions. It prints 4-by-4 or 5-by-5 bingo card consisting of two-character state abbreviations. As the child or parent sees a car license plate that matches one of the entries on the bingo card, he/she circles it. The first player to circle four or five entries in a row vertically, horizontally or diagonally is the winner.

After loading the program, type RUN and press ENTER. You are asked to enter the number of states. Enter 16 if a 4-by-4 card is desired or 25 for a 5-by-5 card. The CoCo then prompts you to enter the two-letter abbreviations for each of the 16 or 25 states desired. (Hint: Choose states for which you expect to see license plates. For example, if I travel from Tennessee to Mississippi, I won't list Oregon. You can also use FR — free space as an entry.)

After you enter all 16 or 25 states, the CoCo prints the bingo card on your printer. The program then asks if another bingo card is to be printed. You may want to print several so each member in the car can play more than one game. The CoCo then prints another card with a different arrangement of the same 16 or 25 states. The main routine in this program is found in lines 200 through 260. These lines randomly sort the states to produce a different bingo card for each person.

Happy motoring!

The Listing: BINGO

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 REM "BINGO"
20 CLS
30 PRINT "ENTER NUMBER"
40 PRINT "OF STATES (16 OR 25)"
50 INPUT N
60 IF N=16 THEN GOTO 90
```

```
70 IF N=25 THEN GOTO 90
80 GOTO 20
90 DIM X$(N)
100 DIM S$(N)
110 FOR I=1 TO N
120 CLS
130 PRINT "ENTER STATE"
140 PRINT "NUMBER ";I
150 PRINT "(USE TWO LETTER"
160 PRINT "ABBREVIATION)"
170 INPUT X$(I)
180 NEXT I
190 REM *ROUTINE TO RANDOMLY
        SORT STATES*
200 FOR B=1 TO N
210 A=N+1-B
220 X=RND(A)
230 S$(B)=X$(X)
240 X$(X)=X$(A)
250 X$(A)=S$(B)
260 NEXT B
270 REM *END OF RANDOM SORT
        ROUTINE*
280 IF N=16 THEN GOSUB 400
290 IF N=25 THEN GOSUB 600
300 CLS
310 PRINT "DO YOU WANT TO PRINT"
320 PRINT "ANOTHER GAME (Y/N)"
330 INPUT C$
340 IF C$="Y" THEN GOTO 190
350 IF C$<>"Y" THEN END
400 A$="  "
410 FOR I=4 TO 16 STEP 4
420 PRINT #-2,S$(I-3);A$;S$(I-2)
;A$;S$(I-1);A$;S$(I)
430 PRINT #-2
435 NEXT I
440 FOR J=1 TO 5
450 PRINT #-2
460 NEXT J
470 RETURN
600 A$="  "
610 FOR I=5 TO 25 STEP 5
620 PRINT #-2,S$(I-4);A$;S$(I-3)
;A$;S$(I-2);A$;S$(I-1);A$;S$(I)
630 PRINT #-2
635 NEXT I
640 FOR J=1 TO 5
650 PRINT #-2
660 NEXT J
670 RETURN
```

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.

HOLIDAY SPECIALS from SPORTSware

We appreciate your patronage over the past years and want to thank you by putting ALL of our software on sale NOW! We've got some BRAND NEW games for you at incredible LOW prices. Have a great holiday season!

THE SUPER DISK
This disk contains a wealth of utilities for disk based COCO 3s. The 30 plus pages manual contains never before published information on copy protection, instructions for use of all 14 modules on the disk and source code listings of some of the modules used for copy protection. See October's RAINBOW ad for a more detailed description. this is a must have package for authors, fiddlers and novices alike. B.G. of the Marshall Islands says "Excellent copy protection techniques...a great educational tool for the novice.."
HOLIDAY SPECIAL JUST $39

NEW! AIRWAR PLUS
Remember the "good old days" of PONG, DOG FIGHT and SPACEWAR? Now, you can enjoy the thrills of two player ARCADE action aerial combat with AIRWAR PLUS. Includes AIRWAR, AIRWAR 2 and SPACEWAR. Many play options to choose from insures endless Hires arcade fun on your COCO3 disk system!
INCREDIBLY LOW PRICE AT ONLY $15

NEW! ELDUS
Like graphical adventure games? Try ELDUS! 101 graphic screens, no typing, joystick controlled! Explore the multileveled world of ELDUS via your COCO 3 disk system.
INTRODUCTORY PRICE a MERE $16

NEW! VOCAB
If you like SCRABBLE, you'll love VOCAB, a great new word game by the author of CC3 FLAGS, Rick Cooper. COCO3 Disk for 2 to 6 players or one player can challenge the computer! **GREAT FUN for JUST $16**

NEW! RORKES DRIFT
This FAST ACTION ML simulation pits you against the Zulu hordes in a recreation of one of Britain most famous battles. Can you and your men hold the fort until the relief column arrives? **INTRODUCTORY PRICE $15**

WARGAME DESIGNER II
If you haven't experienced the thrill of creating your own graphical combat simulation yet, NOW is the time! WGDII, four disk sides of fun is HOLIDAY PRICED AT ONLY $21. Upgrade from the original WGD for just $8

WARGAME DESIGNER ICON DISK #1
Want to add over 500 graphic icons to your WGD or WGDII game system? Do it now with the WGD ICON DISK for JUST $12. Two disk sides of icons, 8 sets!

GRIDIRON STRATEGY
Challenge a friend or the computer to the BEST football strategy game in town for the COCO3 disk. You get the game disk, manual, 2 Offense/Defense Cards and 2 Defense Wheels. Head to head strategy football. **JUST $18**

WEEKLY WINNER 2.0
Lottos are changing form state to state and so is WW2.0. We've revised it to accommodate changes in several states recently. Stop playing and start WINNING! ON SALE AGAIN for ONLY $15 Registered owners can upgrade for just $9. Return your original disk with payment. COCO3 disk systems.

CC3 FLAGS
Simply states, it's the BEST RISK play alike available for the COCO3 disk system! Conquer the world, joystick or keyboard play for 1 to 6 players!
ON SALE NOW FOR A MERE $19

COCO3 WHEEL
More fun for you and your friends! Can you win a FORTUNE in this recently revised COCO3 version of America's favorite TV game show? **ON SALE 19**

CATALOG ON DISK
Hate to buy sight unseen? Send just $3.00 for our CATALOG ON DISK and SEE before you BUY. If you order after receiving the catalog, you may deduct the $3.00 you paid for the catalog.

NEW CATALOG
We have many more fine entertainment, utility and productivity software products for the COCO3. Send $1.00 for our NEW fully illustrated catalog (included with the CATALOG on DISK). If you decide to purchase from the catalog, deduct the $1.00 from your order.

SOFTWARE AUTHORS; SEND US YOUR BEST!
We pay the highest royalties and all submissions are held in strictest confidence. Turn your talent into profits! Nondisclosure agreement available on request.

ORDER BY PHONE OR MAIL. We accept VISA, MASTERCARD, Money Orders and Checks. All orders are shipped within 24 hours of receipt by First Class Mail FREE anywhere on this planet! ORDER NOW, Enjoy for the holidays!

SPORTSware
1251 South Reynolds Road, Suite 414, Toledo, Ohio 43615
(419) 389-1515
All SPORTSware products are available ONLY from SPORTSware

You've always been a ham at heart

CoCo and Amateur Radio: A Natural Combination!

By Steven R. Ford

Think you've exhausted the list of unique things to do with your Color Computer? Then you have probably never heard of amateur radio — a fascinating hobby that counts many computer users among its ranks. Even so, surprisingly few people know of its potential.

What Is Amateur Radio?

Amateur radio is usually better known by its nickname, *ham radio*. It has been in existence since the very first days of radio. Many people have a tendency to confuse amateur radio with citizens band (CB), though there are few similarities.

Compared to amateur radio, CB is a fairly limited hobby. It restricts the user to voice communication on a narrow band of frequencies (channels). You may recall that CB enjoyed a burst of popularity in the mid '70s when it became fashionable to have a CB transceiver in every automobile. However, the sudden crush of the competing signals caused enormous interference problems. As a result the fad began to lose steam and finally faded away altogether.

Of course CB itself survived the fad and is still very much alive today. CB'ers have always provided an invaluable service during emergencies and continue to do so. Still, the serious limitations of CB restrict its usefulness as a hobby — especially for computer users.

Amateur radio, on the other hand, is rich and varied with a broad range of activities available for the licensee. Hams have a large number of frequencies at their disposal, beginning just above the AM broad-

Steve Ford is an amateur radio operator and has his advanced-class license. He holds a bachelor's degree in English and also an associates degree in electronic engineering.

A Once-in-a-Lifetime Opportunity

By the time you read this, the FCC may be considering (for the first time in history) an amateur radio license that doesn't require learning Morse code.

Why should this interest you? Because the hottest, fastest growing modes in amateur radio are digital modes — communicating by computer. Ham operators are sending data, programs and messages around the world (for free) every day via "packet radio." In recent weeks, for example, I exchanged a dozen messages with a vacationing ham operator touring Alaska with his portable radio. Messages from a campground in Whitehorse (in Yukon territory) were in my hands within 24 hours — all relayed automatically by the nationwide packet system. If you want to get in on this exciting action right now or in the future, then write to the FCC and make your feelings known.

The time for comments will be around the end of this year. Between now and then I encourage you to learn more about this exciting digital-communications mode. Visit a local "ham club" (your local Radio Shack store may be able to furnish a contact name), and ask if someone there can give you a demo. (Hams love to show off their stations.)

The American Radio Relay League filed a petition with the Federal Communications Commission asking that a new communicator class of amateur radio license be created. The FCC should issue a Notice of Proposed Rulemaking (NPRM) that will go up for public comment around the end of this year.

The ARRL board of directors chose to modify the recommendations of its own committee. The board will request operating privileges limited to the 220-MHz amateur band and above, with a power limitation of 250 watts. The majority of local FM activity and digital packet radio occurs on the 144-MHz amateur band, which is not included in the proposal as it will be written. Of course the FCC is not obligated to stick with its recommendation, especially if public opinion seems to suggest something different. However, this proposed license is not a free ride. There will still be a significant written examination, as there's always been. Anyone can study and pass it, but it requires commitment. The major difference is you will no longer be required to learn Morse code, which many would-be ham operators view as outmoded and irrelevant.

If you believe the proposal should go through as stated, then say so. If you believe it's a bad idea and should be killed — state that too. If you believe it should be modified to include *all* current amateur privileges above 50 MHz, then go on record with that opinion. Such a change would include the 6-meter band that has occasional, spectacular openings to other parts of the world and the most popular 2-meter VHF band.

The message from me to you is twofold: If you care, comment — your message will count. In my opinion the FCC needs to hear not just from current amateurs but from potential users as well. You may not get another chance to voice your opinion — so do it now.

— Ed Juge
Director of Market Planning,
Tandy Corporation

cast band and extending all the way to microwaves. Moreover, amateur radio is dedicated to exploration and experimentation. Its ongoing goal is to find new ways to advance the state of electronic communication while at the same time offering assistance to the public in time of need.

There is something in amateur radio for just about everyone. If you like to communicate with people in distant states or countries, amateur radio is the perfect choice. A modest investment in equipment allows you to chat with other hams hundreds or thousands of miles away — without incurring hefty long-distance phone charges. And you aren't limited to just speaking. Hams can use other communication modes such as Morse code (known as CW or *Continuous Wave*), radio teletype (RTTY), television (SSTV or ATV), and even facsimile (fax), to name a few.

Most hams find a niche within the hobby. Some communicate across town while others bounce signals off the surface of the moon. Some hams exchange television images from a half a world away while others provide badly needed local communications in the midst of a crisis. There are even amateur radio satellites in orbit with sophisticated computer networks on the ground.

The question is: Where does the CoCo fit into all of this? The answer — everywhere!

Color Computers and Amateur Radio

According to some recent surveys, up to 80 percent of the amateur radio operators in the United States own personal computers. While IBM, Commodore and Apple computers are the most popular, there are a number of hams who use Color Computers as well. These CoCos are usually involved directly in the communication activity itself, or they serve a peripheral role as data managers.

For example, CoCos have replaced the traditional telegraph key in some ham stations, making the task of sending and receiving Morse code much easier for the operator. Instead of tapping out the dots and dashes on a hand key, hams simply type the words from their keyboards and the CoCo operates the transmitter to send perfect code. In most cases this is accomplished through an interfacing device (sometimes called a *controller*) somewhat similar in function to a modem. In addition to sending code, the controllers can also receive code, translating the audio tones from the receiver into characters you can see on the CoCo's screen. All that is needed for the CoCo is terminal software, the same software you would use to connect to Compuserve, Delphi or your local BBS.

Most of the interface devices on the market are multifunctional in nature. That is, they allow your CoCo to control several communications modes, not just CW. Many include RTTY, AMTOR (a form of error-free radio teletype), WEFAX (reception of weather map facsimile transmissions) and packet, which I'll discuss in a moment.

In some cases it is also possible to connect the CoCo directly to the station equipment without using an interface. In fact software is available that allows the CoCo to send and receive some modes by using the cassette port. However, this approach is not commonly used because of operating and performance limitations.

As data managers CoCos help hams keep detailed logs of stations they have contacted. They are particularly helpful during on-the-air contests where the goal is to communicate with as many different stations as possible. Specially written software keeps track of contest scores and weeds out duplicate loggings where a station has been contacted more than once. Some hams also use their CoCos to design and print QSL (contact verification) cards and compile mailing lists. Among the hams who use the amateur radio satellites, CoCos track orbital information to predict when a satellite is in the best position for contact.

With most of the amateur radio software written for the Commodore and IBM computers, ham radio software for the CoCo may be a bit difficult to locate. However, it is out there. There are several sources for Color Computer ham software, both public domain and commercial. But if you're only interested in using the CoCo with interfacing devices, no special software is needed beyond a standard CoCo terminal program.

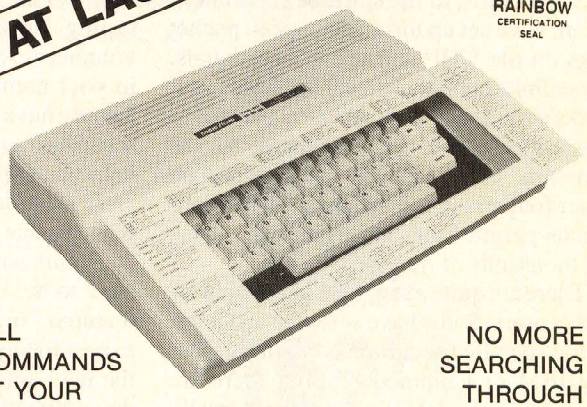
The Special World Of Packet

A new and growing form of amateur radio communication has appeared on the scene in just the last several years. It is the closest thing yet to a perfect blending of the amateur radio and computing hobbies. This unique and fascinating mode is known as *packet*.

Packet is a form of linking between two computers that uses an amateur radio version of the well-known X.25 networking protocol. As the name implies, packet transmissions involve short bursts (packets) of data sent from one ham station to another. Some stations link directly; but in instances where this is not possible, packets are passed automatically between relaying stations until they reach their destinations. Once again interfacing devices (often referred to as terminal node controllers or TNCs) form the bridge between the computer and the

AT LAST!!!

RAINBOW CERTIFICATION SEAL



ALL COMMANDS AT YOUR FINGERTIPS

NO MORE SEARCHING THROUGH MANUALS

KEYBOARD TEMPLATES FOR YOUR COCO

Available Now for TW 128 and TW 64

$4.95 plus $2.00 Shipping & Handling
(NC Residents Add 5% Sales Tax)

SPECIFY TW 128 OR TW 64

P&M PRODUCTS
1003 SHALIMAR DRIVE
HIGH POINT, NC 27260

other amateur station equipment.

Like the interfaces mentioned above, TNCs usually connect to the CoCo via the serial I/O port. Standard terminal software is all that is needed to communicate between the two. By communicating with the TNC, the CoCo user sets and adjusts certain operating parameters such as baud rate, date and time stamping, message logging, etc. In turn the TNC receives the incoming packets and displays them on the screen. The TNC also performs all the functions necessary to transmit and/or relay outgoing packets.

Packet enthusiasts exchange everything from simple messages to entire programs. There are even packet bulletin board systems (PBBS) that operate in much the same manner as telephone bulletin boards. The main difference is the lack of telephone lines since all communication is performed by radio.

Local area packet networks are appearing all across the country. Most of these operate on VHF frequencies where antennas are small and equipment is relatively cheap. If you have a programmable VHF police scanner, try setting it to 145.01 MHz. If you listen long enough, you may hear the brief, high-pitched buzzing sounds that are the trademarks of packet transmissions. If you have a TNC connected between your CoCo and the scanner's auxiliary speaker jack, you actually see packet messages scrolling across the screen.

Some hams, in the spirit of experimentation, have set up ultra-high-speed packet links on the UHF and microwave bands. These links connect several local area networks simultaneously, allowing packets to flow more easily between them. At the same time packet activity is also found on lower frequencies where atmospheric conditions permit long-range link-ups covering thousands of miles.

There are quite a few TNCs available for packet users. Some have software and interfacing specific for certain computers (usually IBM or Commodore), but there are also many models that are universally compatible. Some of the communication interfaces mentioned earlier include packet TNC functions as part of their design. Costs range from about $140 for a basic TNC to almost $400 for a deluxe all-mode TNC interface.

Questions and Answers

By now you may be interested in exploring amateur radio, but perhaps you still have some lingering questions. Let's try to address some of the common ones here.

Do you need a license to become an amateur radio operator? Yes, you do. There are five license grades: novice, technician, general, advanced and extra. As you progress from novice to extra, the tests become more difficult, but the privileges expand (more frequencies, more modes to use). This is not to say that you have to start at the novice level and work your way up over a period of months or years. If you can pass the test elements for the lower grades, you can get a license at any level right away.

Are the license exams difficult? The answer depends on the grade in question and your willingness to learn. All amateur radio license examinations require you to send and receive Morse code as well as pass a written test. At the novice level the tests are fairly easy. The code rate is a slow five words per minute. The written test covers basic electricity and the Federal Communications Commission law. The code speed gets higher and the written tests become tougher as you move up the ranks. For example, the technician, general and advanced licenses require that you send and receive code at 13 words per minute. Extra class requires code proficiency at 20 words per minute. While these code speeds are not overly difficult, they do present a challenge to some. The written tests also require a more in-depth knowledge of electronics, especially at the advanced and extra levels. Despite this I have seen people with little or no electronics education who have studied and passed the higher-level license tests. Dedication is the key.

Who gives the tests? The FCC recently changed the law affecting amateur license testing. Now qualified amateurs known as volunteer examiners can give the tests right in your home town. Your local ham club usually has a volunteer examiner among its members and may even offer classes to help you pass the tests.

Is there a minimum age requirement? No. Anyone can become a ham.

Is ham equipment expensive? It doesn't have to be. If you require the latest in full featured, high-tech equipment, you can expect to pay a fair amount for it. Much of the new amateur equipment available today is manufactured in Japan, and with the yen/dollar imbalance costs can be high. For example, a new transceiver for the shortwave frequencies can cost $1000 or more. VHF equipment costs range from the low to high hundreds, depending on the item desired. However, it is important to point out that there is a great deal of used equipment very reasonably priced. With a little shopping in the classifieds and at ham radio flea markets, it is possible to find excellent equipment bargains for $200 or less — sometimes much less. You can also build your own equipment, an activity that is truly in keeping with the spirit of the hobby. Depending on what you build and where you find your parts, this can be a very cost effective and rewarding approach.

Won't I need to put up huge antennas? Not at all. Once again it all depends on your ambitions. As a general rule the higher the antenna the better the performance. That's why you see those large antennas mounted on high towers. But you don't need a big, high antenna to communicate. Some hams talk around the world using a single wire strung between two trees. I once had a fascinating conversation with a ham in Alaska using a crude wire antenna that dangled out of my second-story-apartment window. As mentioned previously, VHF packet doesn't require large antennas at all. I'm a very active "packeteer" in my area, and yet I only have a small antenna (basically a six-foot-long aluminum tube) strapped to a fence post in the back yard.

How can I get more information? That's the easiest question of all! There are at least three good sources:

- The American Radio Relay League, 225 Main Street, Newington, CT 06111, is an excellent starting point. This organization represents amateur radio interests in the United States and is very active in promoting the hobby. It has a large assortment of helpful materials to get you on your way. The phone number is (203) 666-1541.
- Your local amateur radio club. Amateur radio is so widespread that there are ham clubs in many locations. The American Radio Relay League can provide you with a list of clubs in your area. Check your newspapers as well. Some clubs publish their meeting times and they always welcome strangers. If you have a programmable police scanner, set it to scan the frequencies between 146 and 148 MHz. You may hear local club members talking to each other about upcoming meetings and events.
- If you have a modem, check the BBSs for Special Interest Groups (SIGs) that are dedicated to amateur radio. CompuServe, for example, has an active SIG known as *hamnet*. You'll find helpful hams in the SIGs and often a wealth of public-domain amateur radio software too.

It is also worth mentioning that Radio Shack sells a pre-packaged novice license training course (Cat. No. 62-2402) for about $20. The package includes a study guide and cassette tapes to help you learn Morse code. If you can't attend a class in your area, this is a good alternative.

Amateur radio has a lot to offer the computer hobbyist. Beware, though — once it gets into your blood, it's a hard habit to shake. Most hams who join early stay hams for the rest of their lives. Once you take a good look at the hobby, you can see why.

★★★★★★★ SCOREBOARD POINTERS ★★★★★★★

In conjuction with THE RAINBOW's Scoreboard, we offer this bi-monthly column of pointers for game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• Clinton Morell: In *The Interbank Incident* give the medicine to the guy standing behind the desk at the hotel in Munich. If he has anything to tell you, he'll talk after taking a pill. As to what to do with the IBC shirt and the dice, you've got me. The computer is rather complicated. First you have to have the disk, the portable computer and the computer cartridge. Give the cartridge to the computer console in the museum. Next insert the disk into the portable computer, then give the portable computer to the console. The data should begin transferring to the computer and is stored on the disk.

What do you do with the ring?

• Jason Hanna: In *Dungeons of Daggorath*, keep either the fire ring or the ice ring without using it until you reach the wizard's image. Be sure your heartbeat has slowed down. You also need a Hale flask. Let the image come to you, then hit him once with the ring, run a few rooms away, use the Hale flask and wait for him to come at you again. Hit him once more with the ring and he should die. Then you are transported to Level 4.

• Brad Renfro: In *Dungeons of Daggorath*, to kill the bat you must have a ring. It can be just a gold ring. Hit him about 20 times repeatedly, run a few rooms away, then turn around and wait for him and attack again. It takes time but you'll get him.

Kill the wizard with an iron sword and bronze shield? You've got to be kidding — you need the elvish sword and the mithril shield. Wait for him to come to you, hit him once and run about 10 or 12 rooms away and turn around. This gives your heartbeat time to slow down. Then wait for him again. Repeat the above steps. Done correctly, you kill him but it takes time.

Jason Jones
Greenville, South Carolina

• David McCoy: In *Shenanigans* to convince the computer to open the trap door, type OPEN DOOR. Then you see the old cabin.

In *Vortex Factor*, how do you light up the caverns in the Cairo Moon? How do you open the safe in the first room?

Helder Santos
Montreal, Quebec

• Steven Lipsraw: You can get out of Level 5 in *Thexder* by getting to the place where there is just one creature (called a *balder*) in a dead end and blasting the ceiling away until you get out to the passage above.

James Wilcox
Epping, New Hampshire

Scoreboard:

I need help on *Martian Crypt*. How do I cross the open pit or the floor with cracks in the cave after I give the diamond to the Martian?

Eurik Perez
New York

Scoreboard:

In *Interbank Incident* I know if you have two keys at the start in Seattle, you can go to the apartment building and use both keys to open the door. Does anyone know what the slot on the boat is for?

Robert Freeze
Toledo, Ohio

Scoreboard:

In *Interbank Incident* I have the wallet but when I give it to anyone, the game stops. Why? I can't find the codebook or the thieves' hideout. Any other help would be great, too. I also need help in the force field room in the master control center in *Robot Odyssey*.

Andy Schmidt
Florence, Kentucky

Scoreboard:

I need help with *White Fire of Eternity*. I'm in a shrine honoring the dwarf miners. I see a statue, box, light, stone and pick. I tried to get the pick, but it's stuck in the statue's hands. Without a good grip I'm not able to pull it out. If you have any information regarding this, please write.

Harrison Feltner
Happy, Kentucky

Scoreboard:

Has anyone played the game *Night of the Living Dead* by Savage Software? We have gone into the church and examined it carefully (we think) and then gone into the churchyard. There we always get killed by the zombie. We are beginning adventure game players, but it seems we should get farther than that. Can anyone help?

Thelma J. Saffold
Austell, Georgia

To respond to others readers' inquiries and requests for assistance, reply to "Scoreboard Pointers" c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue. For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL, section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to:EDITORS. Be sure to include your complete name and address.

★★★★★★★★ RAINBOW ★★★★★★★★
★★★★ SCOREBOARD ★★★★

ADVANCED STAR*TRENCH (THE RAINBOW, 7/86)
4,750 Stephanie Martel, Laval, Quebec
4,500 Frankie DiGiovanni, Olney, MD
4,475 David Schaller, Clarkston, WA

ANDRONE *(Radio Shack)*
28,635 Wayne Roberts, Stillwater, OK
20,820 Gary Budzak, Westerville, OH

ASTRO BLAST *(Mark Data)*
49,356 Brian S. Brame, Lakeside, CA
48,825 Tony Bacon, Mt. Vernon, IN
24,980 Matthew Smith, Courtenay, British Columbia

ATOM *(Radio Shack)*
Round 2 Cobalt (#24) James Donegan, Saurgerties, NY

BASH *(SRB Software)*
1,342,800 David Ring, Lyman, NE
744,900 Andy Carter, North Charleston, SC

BEAM RIDER *(D & D Software)*
1,413,510 James Snyder, Cincinnati,OH
1,388,540 Rose Snyder, Cincinnati, OH
1,232,430 Beverly Rihm, Appleton, WI

BEE ZAPPER (THE RAINBOW, 9/87)
28,275 William Currie, Bryans Road, MD
15,785 David Hartmann, Osoyoos, British Columbia
12,825 Frederick Lajoie, Middleton, Nova Scotia

BIOSPHERE *(Radio Shack)*
64,000 Ty Stocksdale, Racine, WI

BLITZ (THE RAINBOW, 6/88)
126,400 Jerry Anderson, Jacksonville, FL
69,150 Ryun Schlecht, Gackle, ND
66,975 Joel Klein, Indianapolis, IN
63,150 Kreig Bryson, Woodstock, GA

BOUNCING BOULDERS *(Diecom Products)*
24,186 Dennis Zobel, Centereach, NY
16,874 Michael Zobel, Centereach, NY
10,930 Patrick Garneau, Ste-Croix, Quebec

BREWMASTER *(NOVASOFT)*
133,025 Andy DeGroat, Saginaw, MI
52,500 Chris Deierlein, Peekskill, NY
52,175 Helder Santos, Montreal, Quebec
51,925 Wendy Staub, Moundsville, WV

CASHMAN *(MichTron)*
11,910 Helder Santos, Montreal, Quebec
9,870 Martin Parada, Arcadia, CA

CAVEWALKER *(Radio Shack)*
209,870 Todd Von Natta, Isle of Palms, SC
183,290 Robert Young, Mildway, Ontario
41,060 Russell Warren Bevers, Tucson, AZ
34,720 Chris Kremo, Bethel, CT
30,309 Cathy England Kimble, Glendale, AZ

CLOWNS & BALLOONS *(Radio Shack)*
688,960 Faye Keefer, Augusta, GA
217,500 Frankie DiGiovanni, Olney, MD
70,180 Charles Andrews, Delta Jct, AK

COLOR BASEBALL *(Radio Shack)*
596-0 Franck C. D'Amato, Brooklyn, NY
595-0 Tom Cherubino, Brooklyn, NY
412-0 Brian S. Brame, Lakeside, CA
389-0 Wes Latimer, Grangeville, ID
387-0 Joel Stocksdale, Racine, WI
276-0 Kevin Wannemacher, Payne, OH
238-0 John Valentine, Malborough, CT
172-0 Ryan Murray, Herrin, IL
149-0 John Breckel, Wilmington, OH
147-2 John Weaver, Amsterdam, NY
137-0 Scott Galvao, Tiverton, RI
137-0 Jennifer Johnson, Meriden, CT
132-0 Karen Rimiller, Adams, NY
130-0 Matthew Snider, Pinehurst, TX
130-2 Greg Allen, Atwater, CA
126-0 Jason Trammel, Murphysboro, IL
113-0 Chris Donato, Euclid, OH

COLOR CAR *(NOVASOFT)*
343,075 Duncan Cameron, Chippewa Falls, WI
316,550 Alan Martin, Cornwall, Ontario

COLOR POKER (THE RAINBOW, 4/83)
110,149,600 Earl Foster, Lynchburg, VA

THE CONTROLLERS (THE RAINBOW, 2/88)
365 Roger Rance, Charleston, SC
308 Erin Carlton, Charleston, SC

CRYSTAL CASTLES *(Thunder Vision)*
516,220 Jason Trammel, Murphysboro, IL

DALLAS QUEST *(Radio Shack)*
81 Brad Wilson, Lithia Springs, GA
85 Paul Summers, Orange Park, FL
85 David and Shirley Johnson, Leicester, NC
86 Roy Grant, Toledo, OH
86 Melanie Moor, Florence, AL
86 Curtis Trammel, Murphysboro, IL

DEF MOV (THE RAINBOW, 1/87)
50,566 Frankie DiGiovanni, Olney, MD
43,806 Domingo Martinez, Miami, FL
39,320 Matthew Smith, Courtenay, British Columbia

DEMOLITION DERBY *(Radio Shack)*
113,200 Gary Budzak, Westerville, OH
110,500 Jason Downs, Albany, OR
100,500 Richard Winkelbauer, Bronx, NY

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

DESERT PATROL *(Arcade Animation)*
1,099,899 Chris Lucero, Denver CO
505,250 Ricky Turkett, Marlow, OK
234,300 Steven Turcotte, Matane, Quebec

DESERT RIDER *(Radio Shack)*
80,703 Thomas Payton, Anderson, SC
68,353 Mike Alt, San Juan Capistrano, CA
65,351 Jason Hackley, Clinton, CT

DEVIL ASSAULT *(Tom Mix)*
1,866,100 Stephane Martel, Laval, Quebec
623,550 Dale Krueger, Maple Ridge, British Columbia

DOWNHILL (THE RAINBOW, 1/89)
10 James Donegan, Saugerties, NY
10 Amy Schiller, Denmark, WI
10 Ryun Schlecht, Gackle, ND
10 Russell Warren Bevers, Tucson, AZ

DOWNLAND *(Radio Shack)*
125,450 Pat Norris, O'Fallon, MO
99,982 Eric Mellon, Newark, DE
99,980 Danny Wimett, Rome, NY

DRACONIAN *(Tom Mix)*
137,810 Chris Lucero, Denver, CO
127,870 Michael Mullen, Buffalo, NY

DRAGON FIRE *(Radio Shack)*
160,835 Eric Olson, Wheaton, IL
146,325 Stephane Martel, Laval, Quebec

ENCHANTER *(Infocom)*
400/361 David P. McCoy, Franklin, NC

FIRESTORM (THE RAINBOW, 1/86)
22,505 Chad Presley, Luseland, Saskatchewan
11,250 Stephane Martel, Laval, Quebec
5,680 Kathy Rumpel, Arcadia, WI
5,180 Mark Brissie, Nashville, TN

GALACTIC ATTACK *(Radio Shack)*
31,100 Upton Thomas, Arnold, MD
29,030 David Czarnecki, Northampton, MA
26,370 Jeff Remick, Warren, WI

GALAGON *(Spectral Associates)*
751,020 Sofia Giorgi, Brasilia, Brazil
357,890 Jason Clough, Houston, TX
328,820 Bernard Burke, Lee's Summit, MO

GANTELET *(Diecom Products)*
65,398,298 Phil Wooding, Renovo, PA
45,235,820 Ken Hubbard, Madison, WI
23,643,720 Geran Stalker, Rivordalo, GA

GANTELET II *(Diecom Products)*
65,399,289 Corey Kepler, Renovo, PA
17,701,060 Bryan Bell, Manassas, VA
441,490 Asher Martin, Woodridge, IL
55,015 Andy Freeman, Turtle Lake, WI

GFL CHAMPIONSHIP FOOTBALL II *(Tandy)*
1,046-0 Mark E. Wentroble, Tyler, TX
825-0 Ryan Grady, Newbury Park, GA
522-14 Josh Encarnation, Omaha, NE
83-3 Charles Reve de Cotret, Laurent, Quebec

GHANA BWANA *(Radio Shack)*
2,350,750 Michael Heitz, Chicago, IL
702,520 Joseph Delaney, Augusta, GA
400,000 Tom Jones, Milan, IL
282,070 Kelly Jones, West Salem, OH
174,410 Caraann Jentzsch, Dufur, OR

GIN CHAMPION *(Radio Shack)*
2,224-0 Lee Deuell, Shell Rock, IA
1,602-0 Jimmy Garner, Ft. Worth, TX
1,120-0 Kim Johns, Port Cog., British Columbia

GRANDPRIX CHALLENGE *(Diecom Products)*
67,710 H. Dingwell, Litchfield, CT

GROBOT *(Children's Computer Workshop)*
9,665 Wendy Staub, Moundsville, WV
8,090 Curt Lebel, Louisville, KY

HELICOPTER HERO (THE RAINBOW, 3/88)
4,608 Jerry Anderson, Jacksonville, FL
103 Phil Holsten, Moraga, CA
76 Chris Nuwer, Lockport, NY

HITCHHIKER'S GUIDE TO THE GALAXY *(Infocom)*
400/359 Roy Grant, Toledo, OH
400/422 Jeff Holtham, Waterloo, Ontario
400/510 Brad Wilson, Lithia Springs, GA

IRON FOREST *(Diecom Products)*
5,671,500 Douglas Paulson, Richfield, ID
4,088,000 Gabriel Riley, Richfield, ID
3,173,200 Charles Boyd, Amarillo, TX
2,676,300 Janet Boyd, Amarillo, TX
1,376,850 Ricky Turkett, Marlow, OK

JOKER POKER (THE RAINBOW, 3/87)
62,067,906 Carole Rueckert, Mansfield, OH
47,505,822 Blain Jamieson, Kingston, Ontario
21,733,284 Jon Fogarty, Yale, MI

JUNIOR'S REVENGE *(Computerware)*
2,503,000 Stephane Martel, Laval, Quebec
257,600 Keith Cohen, Rocky Mount, NC

JUNKFOOD (THE RAINBOW, 11/84)
535,760 Charlie Ginn, Augusta, GA
356,850 Jon Hobson, Plainfield, WI
18,990 Joel Klein, Indianapolis, IN

KING PEDE *(T & D Software)*
145,035 Trisha Eckhoff, North Platte, NE
83,855 Mike Snyder, Allen, OK

KING'S QUEST III *(Sierra On-Line)*
210/210 David Ring, Lyman, NE

KNOCK OUT *(Diecom Products)*
472,995 Frank D'Amato, Brooklyn, NY
183,675 Rush Caley, Port Orchard, WA
105,585 Bob Brinsfield, Jr., Norwood, PA

KORONIS RIFT *(Epyx)*
188,250 Mario Zuvieta, McAllen, TX
186,710 Tony Harbin, Cullman, AL

KUNG-FU DUDE *(Sundog Systems)*
32,000 Tony Geitgey, University Park, PA
16,130 Rod Miller, Sarasota, FL
14,305 David Schulze, San Antonio, TX
12,150 Cody Deegan, Fallon, NV
10,145 Randy Miller, Sarasota, FL

THE LAIR *(Freebooter Software)*
112,940 James Walton, Pittsburg, PA

LANDER *(T & D Software)*
780 Ari Erkin, Neapen, Ontario

LASER SURGEON: THE MICROSCOPIC MISSION *(Activision)*
42,767 Joe Stanley, Harrisburg, IL

LUNAR-ROVER PATROL *(Spectral Associates)*
73,500 Aron Wuelfing, Gladwin, MI
66,200 Chuck Lehotsky, N. Jackson, OH
45,700 Kameron Pence, Little Rock, AR

MARBLE MAZE *(Diecom Products)*
353,220 David Boland, Dubuque, IA
30,650 Amber Reynolds, White City, Saskatchewan

A MAZING WORLD OF MALCOLM MORTAR *(Radio Shack)*
7,830 Robert Mefferd, Rockford, OH
7,545 Joshua Wanagel, Freeville, NY
7,155 Kreig Bryson, Woodstock, GA
7,035 Thomas S. Corbitt III, Yaupon Beach, NC
6,530 Robert Young, Mildmay, Ontario

MEGA-BUG *(Radio Shack)*
12,000 Matthew Smith, Courtenay, British Columbia
10,044 Douglas Bacon, Middletown, CT
9,309 Alan Kramer, Cooksville, MD
3,263 Amy Schiller, Denmark, WI
2,292 David Weaver, Amsterdam, NY

MEMOCARDS (THE RAINBOW, 8/87)
3,120 Lise Gagne, St-David, Quebec
1,964 Scott Walotkiewicz, Tworivers, WI
1,640 Sara Mittelstaedt, Kiel, WI

MINE RESCUE (SRB Software)
670,200 Chuck Lehotsky, N. Jackson, OH

MISSION: F-16 ASSUALT *(Diecom Products)*
565,395 Tony Bacon, Mt. Vernon, IN
468,750 Karen Jessen, Cleveland, OH
355,570 Stirling Dell, Dundalk, Ontario

MISSION: RUSH'N ASSUALT *(Diecom Products)*
1,210,550 Robert Mefferd, Rockford, OH
787,300 Tony Bacon, Mt. Vernon, IN
361,750 Clay Jones, Wooster, OH
212,500 Kelly Jones, West Salem, OH
195,250 Kelly Jones, West Salem, OH

MONSTER MAZE *(Radio Shack)*
52,510 Chris Kremo, Bethel, CT
12,950 Paul DeVita, Vallejo, CA

ONE-ON-ONE *(Radio Shack)*
1,310-0 Jon Breckel, Wilmington, OH
1,302-0 Thomas Payton, Anderson, SC
1,280-0 Randy Sunderland, Page, WV
1,276-0 Jonathan Dorris, Indianapolis, IN
1,260-0 Brandon Reece, Chickamauga, GA

OPERATION FREEDOM (THE RAINBOW, 8/85)
49,690 Craig Schneider, North Platte, NB

OUTHOUSE *(MichTron)*
534,060 Kay Foxe, Kansas City, MO
59,641 Sam Zehel, Coal Center, PA
38,640 Dave Staub, Moundsville, WV

PAPER ROUTE *(Diecom Products)*
248,400 Cathy E. Kimble, Glendale, AZ
150,560 Heather Hamblen, Bar Harbor, ME

PITFALL II *(Activision)*
1,568,500 Sandy Baker, Martin City, Montana
1,519,500 Jim Hammons, Martin City, Montana
1,085,500 Tracey Lee Slack, Atwood, Ontario
871,500 Aaron Florence, English, IN
586,500 Jonathan Toloski, Torrington, CT

POOYAN *(Datasoft)*
1,453,950 Lois Crowson, East Alton, IL
1,286,050 Craig Schneider, North Platte, NB
626,700 Charles Rene de Cotret, Saint-Laurent, Quebec

POPCORN *(Radio Shack)*
150,560 Tom Cherubino, Brooklyn, NY
105,560 Heather Condit, Grafton, ND
26,889 Claude Jalbert, Matane, Quebec
25,450 Dianne Mozzetti, Pittsburgh, PA

PROSPECTOR (THE RAINBOW, 12/88)
56,150 Sara Mittelstaedt, Kiel, WI
51,850 Joel Klein, Indianapolis, IN
27,650 Ryun Schlecht, Gackle, ND
15,150 Cray Augsburg
5,000 Chris Nuwer, Lockport, NY
4,100 Angie Mittelstaedt, Kiel, WI
4,050 Jutta Kapfhammer

PYRAMID 2000 *(Radio Shack)*
220 Matt Chlapowski, Webster, MA
220 Darren King, Yorkton, Saskatchewan
220 Mike Snyder, Allen, OK

PYRAMIX *(Color Venture)*
72,060 Teresa Grant, Groton, CT
68,550 Andy Freeman, Turtle Lake, WI
67,850 Richard Winkelbauer, Bronx, NY
37,950 Blain Jamieson, Kingston, Ontario

QUIX *(Tom Mix)*
8,407,772 John Haldane, Tempe, AZ

RAD WARRIOR *(Epyx)*
21,424 Robert Mefferd, Rockford, OH
10,064 Kreig Daniel Bryson, Woodstock, GA
8,736 Jonathan Fullerton, Gardiner, ME
6,016 Diedrick Brown, Pine Mountain, GA
4,368 Sean Russell, Saint John, New Brunswick
4,224 Josh Encarnation, Omaha, NE
4,112 Randy Stocksdale, Racine, WI
3,936 Matthew Smith, Courtenay, British Columbia

RADIO BALL *(Radio Shack)*
1,780,870 Jocelyn Gagne, St-David, Quebec
1,761,030 Eric Mellon, Newark, DE
1,666,670 Lise Gagne, St-David, Quebec
1,557,100 David Reash, Hadley, PA

REACTOID *(Radio Shack)*
8,055 Gary Budzak, Westerville, OH

RED WARRIOR *(Radio Shack)*
5,488 Scott Godfrey, Nashua, NH
4,164 Roger Rance, Charleston, SC
4,011 Erin Carlton, Charleston, SC

RESCUE ON FRACTALUS *(Epyx)*
1,000,948 Steven Ujvary, Calgary, Alberta
323,167 Kenneth Hill, Severna Park, MD

RETURN OF JUNIOR'S REVENGE *(Colorware)*
2,053,100 Teresa Grant, Groton, CT
1,792,800 Chad Presley, Luseland, Saskatchewan

ROGUE *(Epyx)*
1,000,143 David Ring, Lyman, NE
71,833 Jon Fogarty, Yale, MI
65,529 Joseph H. Campbell, Norfolk, VA
15,400 Denny Turner, Virginia Beach, VA

SAILOR MAN *(Tom Mix)*
427,700 Marnie Schalm, Edson, Alberta
332,200 Jason Downs, Albany, OR
247,900 Jason Bauer, Menominee, MI
231,900 Jessica Wilkins, Seymour, TN

SANDS OF EGYPT *(Radio Shack)*
67 Tristan Terkuc, Richmond, Ontario
82 Edward Rocha, Cobleskill, NY

SAUCER DEFENSE (THE RAINBOW, 4/87)
95,000 Kevin Hilton, Conway, AZ
40,000 David Hartmann, Osoyoos, British Columbia

SCRATCH GOLFER (THE RAINBOW, 3/89)
63 Leif Smedberg, Churubusco, IN
62 Frank Sedlarcik, Carmel, NY
61 Jay Wood, Alexandria, MN

SHAMUS *(Radio Shack)*
61,745 Scott Galvao, Tiverton, RI
50,840 Chris Kremo, Bethel, CT
20,870 Larry Fuhrmann, Jr., Lynnwood, WA

SHOOTING GALLERY *(Radio Shack)*
36,830 Patricia Strakey, Littleton, CO
27,270 Jocelyn Hellyer, Montgomery, IL
25,870 Helder Santos, Montreal, Quebec
25,510 Donald Knudson, Minot, ND

SHOOT'N RANGE (THE RAINBOW, 8/87)
55,623 Paul Robbins, Picayune, MS
14,702 Richard Winkelbauer, Bronx, NY
13,794 Phillip Holsten, Modesto, CA

SILPHEED *(Game Arts)*
107,577 Josh Encarnation, Omaha, NE
93,351 Shan McKinney, Horton, AL
80,603 Frankie DiGiovanni, Olney, MD

SLAY THE NERIUS *(Radio Shack)*
73,091 Jeff Remick, Warren, MI
65,921 Chris Lucero, Denver, CO
63,476 Chris Kremo, Bethel, CT
21,410 Scott Severtson, Jamestown, NY

SNEAKY SNAKE (THE RAINBOW, 8/87)
137 Guy Greene, Bradenton, FL
102 Mike Alt, San Juan Capistrano, CA
91 Chris Nuwer, Lockport, NY

SPACE ASSAULT *(Radio Shack)*
49,070 John Stokes, Osoyoos, British Columbia
13,110 Jeff Remick, Warren, MI
7,280 Jason Kopp, Downs, IL
6,750 John Weaver, Amsterdam, NY
6,120 David Weaver, Amsterdam, NY

SPACE INVADERS *(Spectral Associates)*
3,920 Ari Enkin, Neapen, Ontario

SPEED RACER *(MichTron)*
103,120 Ricky Turkett, Marlow, OK
97,400 Jeff Morrison, Marlow, OK
96,420 Karen Rimiller, Adams, NY
96,000 Amber Reymonds, White City, Saskatchewan

SPEEDSTER (THE RAINBOW, 8/87)
250,500 Kevin Hilton, Conway, AZ
211,300 Paul Robbins, Picayune, MS
117,080 Bill Millington, Meriden, CT

SPIDERCIDE *(Radio Shack)*
27,730 Mike LeBrun, Cornwall, Ontario

SPRINGSTER *(Radio Shack)*
379,210 Wayne Roberts, Stillwater, OK
303,520 Mavis Hartmann, Osoyoos, British Columbia
200,670 Denise Root, Thorndale, PA
41,230 Jason Trammel, Murphysboro, IL

STAR BLAZE *(Radio Shack)*
9,150 Amy Schiller, Denmark, WI
8,950 Richard Durksen, Grunthal, Manitoba
6,550 Flint Weller, Swarthmore, PA

STOCK 3 (THE RAINBOW, 11/88)
77,386,525 Guy Greene, Bradenton, FL

STRATA (THE RAINBOW, 5/88)
4,380 Blain Jamieson, Kingston, Ontario
4,040 Ryun Schlecht, Gackle, ND
3,110 Kathy Rumpel, Arcadia, WI
2,992 Alan Lindaberry, Thorndale, PA

SUPER PITFALL *(Radio Shack)*
2,024,500 Danny Lee Fye, Independence, MO
1,752,500 Bruce Hoffsommer, Ridley Park, PA
1,723,000 Robert Young, Mildmay, Ontari
1,708,000 John Lipstraw, Rising Star, TX
1,700,000 Tom Jones, Milan, IL

TEMPLE OF ROM *(Radio Shack)*
604,000 Troy Graham, Arnold, MD
507,700 Adam Broughton, Morris, PA
303,600 Tim Hennon, Highland, IN

TETRIS *(Radio Shack)*
9,110 John Freidrich, Natrona Heights, PA
7,402 Jason Downs, Albany, OR
7,092 Chris Kremo, Bethel, CT
6,224 Lori Harvey, La Porte City, IA
6,122 Maggie Hackbarth, Clayton, NY
5,955 John Kreiley, Rochester, NY
5,662 Jimmy Garner, Fort Worth, TX
4,258 Chuck Lehotsky, N. Jackson, OH

THEXDER *(Sierra On-Line)*
3,001,300 Joseph Cheek, West Jordan, UT
2,033,000 Frankie DiGiovanni, Olney, MD
2,011,200 Travis King, Montrose, WV
1,823,900 Tom Gauwitz, Roanoke, IL
1,411,700 Steve Hallin, Biloxi, MS

TIME BANDIT *(MichTron)*
76,030 Brent Morgan, Centerville, OH
59,020 Stephanie Morgan, Centerville, OH

TOADER (THE RAINBOW, 2/89)
7,047 Jessica Wilkins, Seymour, TN
5,117 Jon Hobson, Plainfield, WI

TREKBOER *(Mark Data)*
123 Roy Grant, Toledo, OH
132 Matthew Fumich, Munford, TN

TRIG ATTACK *(Sugar Software)*
196,000 Cassaundra Stewart, Sacramento, CA

TUT'S TOMB (THE RAINBOW, 7/88)
54,344 Brian Brame, Lakeside, CA
53,280 William Currie, Bryans Road, MD

VARLOC *(Radio Shack)*
2,502 Frank D'Amato, Brooklyn, NY
2,032 Tony Harbin, Cullman, AL
2,032 Edward Rocha, Cobleskill, NY

VICIOUS VIC (THE RAINBOW, 7/86)
18,813 Talib Khan, Bronx, NY
15,063 John Conley, Everett, WA

WARRIOR KING *(Sundog Systems)*
46,100 Asher Martin, Woodridge, IL
31,800 Jason Cotting, Jackson, MS
30,500 Mike Sobjak, Reading, PA
18,700 Jason Bauer, Menominee, MI

WILDWEST *(Tom Mix)*
52 Farrell Kenimer, Phoenix, AZ
35 Paul Summers, Orange Park, FL

WISHBRINGER *(Infocom)*
400/201 Brad Wilson, Lithia Springs, GA

WIZARD'S DEN *(Tom Mix)*
593,950 Richard Winkelbauer, Bronx, NY
467,000 David Reash, Hadley, PA
425,350 Leif Smedberg, Columbia City, IN
195,050 Mark Touchette, Preston, CT

WRESTLE MANIAC *(Diecom)*
956,971 Marc Reiter, Cincinnati, OH
546,315 Louis Bouchard, Gatineau, Quebec

XENION *(Diecom)*
429,530 Chris Deierlein, Peekskill, NY
159,190 Charles Rene de Catret, Saint-laurent, Quebec

ZAKSUND *(Elite Software)*
557,900 Tom Cherubino, Brooklyn, NY
357,550 Martin Parada, Arcadia, CA
268,350 Tony Bacon, Mt. Vernon, IN

ZAXXON *(Datasoft)*
2,061,000 Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA

ZONERUNNER *(Radio Shack)*
65,535 Scott Godfrey, Nashua, NH
65,535 Mike Woycheshen, Coquitlam, British Columbia

ZONX (THE RAINBOW, 8/85)
13,000 Joel Klein, Indianapolis,IN

ZORK *(Infocom)*
350/328 Konnie Grant, Toledo, OH
350/587 Matthew Yarrows, Easthampton, MA

ZORK II *(Infocom)*
400/503 David P. McCoy, Franklin, NC

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

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG>prompt, pick MAIL, then type SEND and address to: EDITORS.

THE OS-9 *CART INTERRUPT FIX

Solving the mysteries of OS-9 terminal problems

By Marty Goodman

CoCo 3 OS-9 users with Multi-Pak Interfaces and RS-232 Paks occasionally find mysterious problems with OS-9 terminal programs locking up and refusing to receive more data. Restarting the terminal program, sometimes including use of the hardware Reset button, is required to resume operation.

Some experts have examined these problems and found that the problem is in the design of the Multi-Pak and the CoCo 3's GIME chip. It turns out that most, if not all, interrupt-related problems are solved by simple hardware modifications to the Multi-Pak and the Color Computer 3.

This article describes the Multi-Pak and CoCo 3 fixes and gives a detailed technical explanation of what is being fixed and why. The description of the Multi-Pak fix is brief. Tony DiStefano described a variant of that fix in the September '88 issue of THE RAINBOW in his "Turn of the Screw" column. The fix for the CoCo 3 is presented in detail to allow a hardware tinkerer of modest ability to make the needed modifications.

It is important to understand that these fixes are primarily valuable for those using OS-9 and the RS-232 Pak. The fixes are probably not needed for other applications. Most Disk BASIC terminal programs do not use the interrupt on the RS-232 Pak. Thus these fixes are not valuable for them. *Ultimaterm* uses the interrupt and its users may find mysterious lockups are alleviated by making these fixes.

Martin H. Goodman, M. D., a physician trained in anethesiology, 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.

General Background

Operating systems and other software are informed of events such as the arrival of data in the serial port through an *interrupt*. An interrupt is an electrical signal that tells the central processor to put other activities on hold and attend to the arrival of new data.

Although the Color Computer 1 was designed a long time ago, the designers provided for interrupts to be passed from the system bus (cartridge slot) or Multi-Pak slots to the 6809. However, the handling of this interrupt signal is not very sophisticated. Little thought appears to have been given to problems that might have arisen if interrupts were generated by multiple sources.

Instead of sending the interrupt directly to the 6809 (which would have been simple and direct), or adding a special interrupt handler chip designed to properly handle multiple interrupts, they provided for incoming interrupts to be processed by a PIA chip before being passed to the 6809. This is the *CART interrupt, Pin 8 on the 40-pin CoCo system bus.

Technical Background

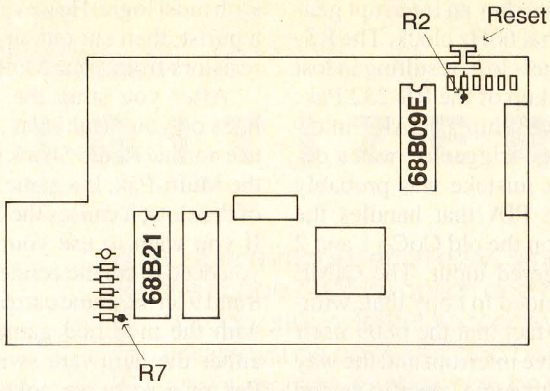
When the Multi-Pak was designed, more complexity was added to the processing of *CART interrupt signals. The Multi-Pak had provisions for switching through software which of the four slots were looked at by the computer for disk ROMs, I/O ports and *CART signals.

The low-order two bits (bits 0 and 1) of the byte written to $FF7F determines which of the four cartridge slots in the Multi-Pak is accepting signals from the *SCS line (Input/Output addresses in the range of $FF40 through $FF5F used by the disk controller). Bits 4 and 5 control which slot the computer looks at to find a disk ROM (*CTS line), and from which slot *CART interrupts are accepted.

When OS-9 is running, the ACIA device driver must switch the slot selector to see if there are any interrupts pending from any of the cartridge slots. That is, the device driver must switch the Multi-Pak slot se-

lector for the *CART line in order to detect the presence of an interrupt.

Sometimes an interrupt is generated and disappears before the Multi-Pak slot is selected to the device generating it, and it gets missed. Or two slots may be generating interrupts and, while processing one interrupt, the other pending interrupt fails to get serviced. If the interrupt that fails to get serviced is an RS-232 Pak interrupt, characters can be missed or — worse—the RS-232 Pak can lock up entirely. This problem is addressed by "strapping" the *CART interrupt.



● = the side of the resister to which the diode must be attached

Figure 1: CoCo 3 mother board showing where to find R2 and R7.

Technical Explanation

When the Color Computer 3 was designed, even more complexity was added to the handling of the *CART interrupt. In addition to the route from the cartridge slot to the CPU via the PIA chip, the GIME chip of the CoCo 3 was set up to receive the *CART interrupt also and pass it to the IRQ interrupt on the 6809.

The normal way interrupts work on the 6809 is that the interrupt line is normally in a logic high (+5) level, and when the interrupt is activated, it is pulled to logic low (ground) level. The 6809 responds to the level (high or low) of the interrupt and recognizes the IRQ interrupt whenever it sees its IRQ pin low. It keeps seeing the interrupt until the pin is high unless the interrupt is turned off by setting interrupt control flags inside the 6809 using the condition code register.

The designers of the GIME did not have the *CART signal detected by its level. The GIME chip's *CART interrupt input triggers on the transition from high to low of the interrupt line. What this means is that if one interrupt occurs very shortly after another, the GIME chip might never see the second interrupt because it is processing the first one. By the time it starts looking for the second one, all it sees is the persistence of a low level on its interrupt line. Since it needs to see an actual transition on that pin, it fails to see the second interrupt.

This situation can easily occur under OS-9 if you are using a terminal program. The 60Hz clock inside the GIME is constantly "ticking," generating 60 *CART interrupts per second. At the same time the RS-232 Pak is receiving characters and generating a *CART interrupt each time a character comes in. Sooner or later the

GIBRALTER SOFTWARE
UTILITIES/SUBROUTINES FOR BASIC

1) NOTEPAD: Type-ahead buffer, word wrap, backspace, keyrepeat and more. Use alone or as a BASIC subroutine. Includes a batch printing utility.

2) CALCULATOR: Algebraic notation, x^2 and SQR, integer derivatives for decimals (ex. PI=355/113), 4-Function memory. Use alone or as a BASIC subroutine.

3) SEARCH AND REPLACE: 36 user-defined templates search BASIC files. Replace strings with one or two keystrokes. Insert, delete & overwrite modes too! Modify templates "on the fly". File size limited only by disk capacity.

4) DISK MEMO: Append 48 character memos to disk filenames

5) HINPUT: Visible prompt and keyboard input for HSCREEN graphic modes.

6) HTIMER: Countdown to zero for HSCREEN graphic modes.

7) QUIKDRAW: PMODE4 Lines, circles, rays, get/put interactively.

PROGRAMS REQUIRE 128K COCO3, RSDOS.
SEND CHECK/M.O. FOR $14.95 + $2 S+H TO:
GIBRALTER SOFTWARE
65 BLUFF AVENUE
ROWAYTON, CT 06853

SUPERSOFT, INC
QUALITY COLOR COMPUTER SOFTWARE

SUPERSOUND The SOUND choice for the CoCo3. True SOUND with SOUND two track recording. None stop SOUND & ANIMATION together with CM3 ANIMATED graphics. The EASIEST and MOST powerfull digital sound available. Nothing to write down or forget. Unmatched for QUALITY & RELIABLILITY; Faster more accurate & more than double record/play time. Nothing extra to buy, beginer to hacker.

FEATURE	SUPERSOUND	MAX SOUND
CONTINUOUS SOUND WITH ANIMATION	YES	NO
NUMBER OF TRACKS	2	1
CUEING	YES	NO
ECHO DOUBLE/BACKWARDS	YES/YES	NO/NO
ALL VARIABLES SAVED IN DISK FILE	YES	NO!
SOUND with SOUND	YES	NO
FULL TIME SUPPORT OF COCO3 MODE	YES	NO
PROGRAMMABLE PLAYBACK VOLUME	YES	NO

by J.D.WALKER ONLY $39.95

SUPERSHOW The perfect mate for SUPERSOUND. A slide show format that supports MGE and CM3 graphics in any mix, with or without sound and/or animation. RS-DOS patches included for double sided disk operation. ONLY $12.95

WHEEL of FATE Wheel of fortune type game. Create your own puzzles or use the 2 puzzles included. by ROBERT GANTON ONLY $19.95

STAR*MAX2.0 The easy to use graphics printer utility for the STAR NX1000 Rainbow. B&W or FULL COLOR. Supports HSCREEN2,MGE and single or DOUBLE screen CM3. Full & quarter size prints,MIRROR(reversed/upsidedown). Print B&W or FULL COLOR LETTERHEADS,LOGOS and more! Now with NEW loader/editor. The easiest,best graphics prints. by J.D.WALKER ONLY $19.95

CGP*MAX2.0 COLOR ONLY VERSION FOR CGP-220 J.D.WALKER ONLY $14.95
*** ALL programs require 128k CoCo3,1 disk ***

SUPERSOFT,INC
363 OAKWOOD AVE.
JACKSON, MI 49203
(517) 787-3610

M/C & VISA accepted
please add $2.50 S/H
ATTENTION PROGRAMERS top royalties guaranteed for top quality programs.

interrupt generated by the RS-232 Pak occurs almost immediately after an interrupt generated by the internal 60Hz clock. The RS-232 Pak interrupt gets lost, resulting in lost characters or a lockup of the RS-232 Pak.

Making the GIME chip's *CART interrupt input pin "edge-triggered" was a design mistake. This mistake was probably made because the PIA that handles the *CART interrupt on the old CoCo 1 and 2 uses an edge-triggered input. The GIME chip designers decided to copy that, without thought to the fact that the 6809 itself uses a level-sensitive interrupt and the way OS-9 works. Due to some specific design decisions about the way OS-9's interrupt handling software was written, and the fact that OS-9 needs to use multiple sources for interrupts, a level-sensitive interrupt is more desirable. If the CoCo 3 had a special interrupt-handling chip to sort out multiple interrupts using dedicated hardware, there would not be a problem.

It is important to realize that various third-party manufacturers recommend this fix be used to cure a flaw in the basic design of the Color Computer 3's GIME chip.

Why would anyone want to use an edge-triggered input for an interrupt? The answer is that if you are only dealing with a single source of interrupts, edge-triggered interrupt inputs are best at detecting interrupts that occur for a very brief period of time. Level-sensitive interrupt handling is better for situations where more than one interrupt is used simultaneously and where the interrupt lines are left active (low) until they are serviced by the software.

The Multi-Pak *CART Hardware Fix

Before proceeding, it is important you keep in mind that opening your Multi-Pak or CoCo case voids any warranty currently in effect.

DiStefano recommends that OS-9 users "strap" the cartridge interrupt pins in their Multi-Paks. This involves opening the unit, removing the motherboard and turning it upside down. With the solder points for the four cartridge slots exposed, locate the spots where Pin 8 of each 40-pin female edge connector is soldered to the board. Run jumpers to each Pin 8, connecting all of them together. This fix may be done with either the old or new (Cat. No. 26-3024 or 26-3124, respectively) Multi-Pak Interfaces.

Some purists recommended cutting three of the four *CART pull-up resistors in the Multi-Pak in addition to strapping the *CART line. In the older Multi-Paks these are R11 through R14. In the newer, smaller Multi-Paks they are R3 through R6. If you do not cut three of the four pull-up resistors, there is a total resistance of over 1K, meaning less than 5 milliamps of current. It is unlikely that this will cause any problem with most logic. However, if you want to be a purist, then cut out any three of the four resistors from your Multi-Pak.

After you strap the *CART interrupt lines on your Multi-Pak, you are unable to use normal Radio Shack game cartridges in the Multi-Pak. If a game cartridge is in one of the slots, it causes the computer to crash. If you want to use your game cartridges, you need to cut the connection between Pin 8 and 9 on the game cartridge, select the slot with the modified game cartridge (using either the hardware switch on the Multi-Pak or a software poke), then type `EXEC &HE010`. The game then executes properly.

The CoCo 3 *CART Hardware Fix

Purchase a Schottky barrier diode from Radio Shack (Cat. No.276-1165). Note that virtually any physically small Schottky barrier diode will do. In a pinch you can use a germanium diode, such as a 1N34. The cathode is the lead nearest the band on the diode. The anode is the other lead.

Open the CoCo 3 and remove the case and keyboard. To remove the keyboard, grasp both sides of the plastic ribbon cable that attaches the keyboard to the keyboard ribbon cable socket and gently pull it out of the socket.

Now solder eight inches of insulated wire to each side of the Schottky diode. I recommend using 24- or 26-gauge stranded wire with black or green insulation soldered to the cathode of the diode (the side that has the stripe near it), and red or orange wire soldered to the anode of the diode. Insulate the diode using heat shrink tubing or electrical tape so none of the leads or solder joints between the diode and the wire are exposed. Be sure you know which wire leads to the anode and which leads to the cathode of the diode.

Locate R2 on your CoCo 3; this is a 4.7K ohm (yellow, violet and red) resistor in front of the Reset button of the computer. *R2* is silk-screened in white on the circuit board behind the resistor. Solder the wire from the anode of the diode to the side of R3 that is toward the front of the computer (the side away from the Reset button).

Locate R7; this is also a 4.7K ohm (yellow, violet and red) resistor found just to the left of the 68B21 PIA chip. *R7* is silk-screened in white just in front of this resistor. The 68B21 PIA chip is one of two 40-pin chips found to the left of the keyboard cable socket. Solder the wire from the cathode of the Schottky diode to the right side of R7 nearest the 68B21 chip.

The side of R7 that you soldered the cathode of the diode to is connected directly to Pin 8 of the 40-pin system bus socket. This is the incoming *CART signal. The side of R2 you hooked the anode of the diode to connects directly to Pin 3 of the 68B09E, which is the IRQ pin of the 6809.

You have bypassed the internal GIME chip circuitry by routing the incoming *CART line directly to the IRQ pin of the 68B09E. The diode is needed to make sure other interrupts (like the clock interrupt) are not fed backwards toward the *CART line. This would cause the computer to think it had an auto-start ROM pak plugged in, and cause it to crash. I suggest you use a Schottky diode because of the very low (0.2 volt) voltage drop across its junction. A germanium diode (which has a 0.3 volt drop across its junction) is less desirable but OK. Do not use a normal silicon diode because the 0.6 volt drop across its junction is high enough to potentially cause problems with the logic. This fix allows an auto start ROM pak to work properly if plugged directly into the CoCo 3's cartridge slot. Of course if the CoCo 3 is being used with a Multi-Pak modified as described above, normal auto-start ROM packs will not work properly.

Hacker's Historical Note

Old-time OS-9 hackers have used less elegant variants of this fix for several years. Typically they hard-wire the interrupt pin from the RS-232 Pak directly to the IRQ pin of the 6809. This modification requires an external wire running from the RS-232 Pak to the inside of the CoCo. Some sophisticated hackers eliminate the *CART line entirely and, having freed up Pin 8 of the CoCo's system bus, use that to pass the interrupt from the RS-232 Pak to the 6809's IRQ pin. These hacks work and nicely cure the GIME chip's interrupt-handling problem. But they are more difficult to use than the diode modification described above. The diode modification has been used quite extensively and works just as well as the more complicated internal CoCo 3 *CART modifications.

Acknowledgements

Special thanks are due Roger Krupski of RGB Systems (creator of the software for the RGB hard drive system) for his extensive help in explaining the diode modification to me. Roger is the originator of this elegant fix. Thanks, too, to Bruce Isted (designer of the Frank Hogg Labs deluxe hard drive system and the eliminator pack) for his comments on both Roger's fix and on some of the other *CART hacks. And thanks to Greg Law, SysOp on the Delphi OS-9 SIG, and Tim Koonce, author of *VTERM* and database manager on the Delphi CoCo SIG, who helped explain various technical subtleties.

Dr. Preble's Programs Since 1983

Pyramix

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

The Freedom Series

Vocal Freedom

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

Mental Freedom

Would your friends be impressed if your computer could **read their minds?** Mental Freedom uses the techniques of Biofeedback to control video game action on the screen.**Telekinesis?** Yes, you control the action with your thoughts and emotions. And, oh yes, **it talks** in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675.

BASIC Freedom

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

Lightning Series

These three utilities give real power to your CoCo 3.

Ramdisk Lightning

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

Printer Lightning

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

Backup Lightning

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

COCO Braille

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

Prices

CoCo 3 only

Ram Disk Lightning. Disk.....$19.95
Printer Lightning Disk.....$19.95
Backup Lightning. Disk.....$19.95
All three. Disk.....$49.95
Pyramix. Disk.....$24.95

CoCo 1,2, or 3

Vocal Freedom. Disk.....$34.95
Vocal Freedom Hackers Pac.....$14.95
COCO Braille.....$69.95

CoCo 2 or 3 only

Mental Freedom Disk.....$24.95
Basic Freedom. Disk.....$24.95

CoCo 1 or 2 only

VDOS. The Undisk. a menu operated ramdisk for the CoCo 1 or 2. LOAD, SAVE, KILL, DIRECTORY, are all supported. Tape.....$24.95
VDUMP. backup Undisk files to single tape file. Tape.....$14.95
VPRINT. Print Undisk directory, Tape.....$9.95

We Ship FAST!

Add $2.50 shipping/handling in USA or CANADA

Add $5.00 to ship to other countries

Dr. Preble's Programs
6540 Outer Loop
Louisville, KY 40228
24 Hour Order Line

Visa, MasterCard, COD, Check

(502) 969-1818

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.*

Innovative renovation

Machine Language Tricks from a BASIC Game: Star Siege II

By Fred B. Scerbo
Rainbow Contributing Editor

Last month I took a break from a long series of educational programs by revamping an old BASIC graphics game I wrote when the CoCo first came out: *Meteor Storm*. Those of you who have entered that listing or loaded it from your RAINBOW ON TAPE or DISK should have gotten a few hours of fun out of the new, improved version.

As a follow-up to that effort, I decided to take another stab at another old chestnut that has been out of circulation for many years, a program I wrote called *Star Siege*. Not to be outdone by its older brother *Meteor Storm*, *Star Siege 2* has taken on a whole new look and added an element which the original never had, and which no BASIC graphics CoCo game has ever attempted: a moving star field.

The Original Version

When I first wrote *Star Siege 1*, it was designed as a two-player game. Two differently shaped vehicles would race around the screen and fire laser bolts at each other. However, since the listing was very long, the program was very slow, even with the high-speed poke. Instead of being a real arcade-style game, it was more like a game of chess. You had to use a little strategy to move around the screen with your joystick. You also needed someone else to play the game with you.

New and Improved

I have learned quite a few shortcuts since the original version of this game came out. (Still, this is the first public listing of the game in a magazine. Unfortunately the original made a heavy tour on the piracy route.)

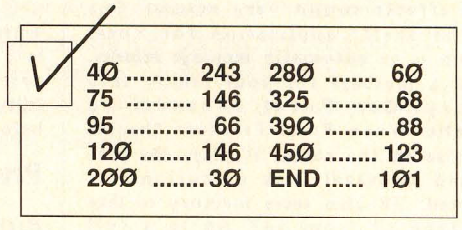
Since a different view of each ship is drawn depending on the direction in which your joystick is pointed, the original listing had a lengthy set of IF...THEN statements to determine which view of the ship was drawn.

The listing shown here uses a totally different approach to this problem. Using fewer IF...THEN statements, lines 110 to 150 do the job. This time I used a multi-dimensional array S$(3,3) to control the nine views of the ship(s). By reading the joystick values and setting them into three possible outcomes, I could much more rapidly select a direction and view for the ship.

For example, in our 3-by-3 array, S$(2,1) would show the ship pointing straight up. S$(2,3) would be directly down. Get the idea?

Another big change was switching from PMODE4 to PMODE0 and using the PCLEAR8 command. I have gone into great detail in previous articles about why I prefer using the lower-resolution graphic pages. In this case the increase in speed and number of graphic pages more than outweighs the loss of the artifact colors in the star field background.

Using PCOPY, we are also able to completely eliminate the flicker that the animation in the original *Star Siege* suffered from. We no longer need to undraw each



4Ø	243	28Ø	6Ø
75	146	325	68
95	66	39Ø	88
12Ø	146	45Ø	123
2ØØ	3Ø	END	1Ø1

The listing: SIEGE2

```
1 REM**************************
2 REM*     STAR SIEGE TWO      *
3 REM*   BY FRED B.SCERBO      *
4 REM*  COPYRIGHT (C) 1989     *
5 REM*     6Ø HARDING AVE      *
6 REM*  NORTH ADAMS,MA Ø1247   *
7 REM**************************
8 PCLEAR8
9 CLEAR1ØØØ:CLSØ
1Ø PRINTSTRING$(32,188);:FORI=1T
Ø288:READA:PRINTCHR$(A+128);:NEX
T
15 DATA11Ø,1Ø8,1Ø8,1Ø6,11Ø,1Ø9,1
Ø8,1Ø6,11Ø,1Ø8,1Ø9,,11Ø,1Ø8,1Ø9,
37,44,44,45,36,46,37,44,44,42,46
,44,45,37,44,44,45
2Ø DATA1Ø6,,,,1Ø4,1Ø1,,1Ø4,1Ø6,,
1Ø1,,1Ø6,,1Ø1,37,32,,,,42,37,,,,
42,,32,37,,,
25 DATA1Ø8,1Ø8,1Ø8,1Ø6,,1Ø1,,,11
Ø,1Ø8,1Ø9,,11Ø,1Ø9,1Ø8,36,44,44,
45,,42,37,44,4Ø,,42,32,45,37,44,
4Ø.
3Ø DATA,,,1Ø6,,1Ø1,,,1Ø6,,1Ø1,,1
Ø6,1Ø1,,,32,,37,,42,37,32,,,42,,
37,37,,,
35 DATA98,,,1Ø6,,1Ø1,,,1Ø6,,1Ø1,
,1Ø6,1Ø1,,33,,,37,,42,37,,,34,42
,,37,37,,32,33
4Ø DATA1Ø8,1Ø8,1Ø8,1Ø4,,1Ø8,1Ø4,
1ØØ,1Ø8,,1Ø8,1Ø4,1Ø4,1ØØ,1Ø8,36,
44,44,44,36,44,36,44,44,4Ø,44,44
,44,36,44,44,44
45 DATA124,124,124,124,124,124,1
24,124,96,78,76,77,76,76,74,74,6
4,66,64,74,78,76,76,74,116,124,1
24,124,124,124,124,124
5Ø DATA124,124,124,124,124,124,1
24,124,,,,69,64,,,74,,74,,74,74,
,,74,116,124,124,124,124,124,124
,124
55 DATA124,124,124,124,124,124,1
24,124,,,,76,72,,64,76,76,76,76,
72,76,76,76,72,116,124,124,124,1
24,124,124,124
6Ø PRINTSTRING$(32,188);
65 PRINT@389," GRAPHIC SPACE BAT
TLE ";:PRINT@421,"  BY FRED B. S
```

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.

ship. We simply use a clean graphic page and PCOPY it to the one we are looking at.

In our layout pages 3 through 8 have random star fields. We PCOPY one of these pages to Page 2, do our drawing, and then PCOPY Page 2 to Page 1 where we do all our watching.

By having six pages reserved for star fields, each one a random field, we get a moving starfield by selectively using a different page for each drawing. This can be found in lines 285 to 290.

Not bad for BASIC, eh?

Using the Game

If you really want to have fun with this game, add the high-speed poke to Line 8 so it reads:

```
8 PCLEAR8:POKE65495,0
```

for CoCo 1 or 2, or:

```
8 PCLEAR8:POKE65497,0
```

for a CoCo 3.

Be sure to save the program before you run it. With the CoCo 3 high speed poke the game really zips, but it might do weird

```
CERBO   ";:PRINT@453," COPYRIGHT
  (C)  1989 ";
70 PRINT@485,"  ENTER LEVEL  (1-
2)  ";
75 V$="D2RNURNU2BR2NU2BR2U2F2NU2
BR2U2F2U2BR2NR2DNRDR2BR2U2R2DLNF
R":D$="D2R2NUBR2NR2U2R2D2BR2R2UL
2UR2BR2NR2DNRDR2BR2U2R2DLNFL":NO
$="U2F2U2C0RC5R2D2L2U2"
80 CO$="R3NDL3D4R5U4R3D2L3RF2RU3
ERFDNL3D2R3EUL3UER3D4U2R3U2D4":H
O$="U5RD2R2U2RD5NLBRU5RD5NLBR3U4
L2UR5DL2D4LBL6U2L2D2L":PF$="NL3N
R3U2DLGFR2EHLGFEH":DIMA(21):FORI
=12TO240STEP12:A(I/12)=I:NEXT:DI
MB(14):FORI=12TO156STEP12:B(I/12
)=I:NEXT:B(13)=152
85 A(21)=A(20):B(14)=B(13):HR=12
4:CR=256:K=126:L=71:S$(2,1)="U4G
D3G2DRDR4URUH2U3HD6LNGR2F":S$(2,
3)="D4EU3E2ULUL4DLDF2D3FU6RNEL2H
":S$(3,2)="R4HL3H2LDLD4RDRE2R3EL
6UNHD2G":S$(1,2)="L4FR3F2RURU4LU
LG2L3GR6DNFU2E":S$(1,1)="F4ND2NR
2H4DF2D3FEREUEHL3H2L"
90 S$(3,1)="G4NL2ND2E4LG2L3GFDFR
FEU3E2U":S$(3,3)="H4NU2NL2F4UH2U
3HGLGDGFR3F2R":S$(1,3)="E4NR2NU2
G4RE2R3EHUHLHGD3G2D":A$(2,1) ="G
NU4ND2GNU2GDREFENU6FRUHNU2H2NENH
":A$(3,2)="HNR4NL2HNR2HLDFGFNR6G
DRENR2E2NFNE":A$(2,3)="END4NU2EN
D2EULGHGND6HLDFND2F2NGNF"
95 A$(1,2)="FNL4NR2FNL2FRUHEHNL6
EULGNL2G2NHNG":A$(3,1)="LNE2NG2L
2NELGFRDRDFEUNEU2NG2NE2UNRNU":A$
(3,3)="UNF2NH2U2NFUHGDLDLGFRNFR2
NH2NF2RNDNR":A$(1,3)="RNG2NE2R2N
GREHLULUHGDNGD2NE2NG2DNLND":A$(1
,1)="DNH2NF2D2NHDFEURUREHLNHL2NF
2NH2LNUNL"
100 EX$="NU2ND2NR2NL2NENFNGNH":T
C$="UR3UL3U3R15D3LDRDL2U2LU2R2DL
2D3LU4LD4LU2U2LDRDLD2LU4LD4LU4L4
DR3D3L4":TD$="UR3UL3U3R4DL3DR3D2
RU4RD4RU4R3DL2DRDLDR3U4R4DL3D3R2
ULUR2D2RU4R3DL2DRDLDR2DL19":SJ$=
SD$:AJ$=AD$:S$(2,2)=S$(1,2):A$(2
,2)=A$(1,2):GOTO180
105 PMODE0,1:SCREEN1,0:SOUNDRND(
210),1:SCREEN1,1:SOUNDRND(210),1
::PMODE0,1:SCREEN1,1:RETURN
110 A=1:KK$=K$:LL$=L$:SP$=SS$:X=
JOYSTK(0):Y=JOYSTK(1):P1=0:R1=0:
IFX<20THENP1=(-A)ELSEIFX>40THENP
1=(+A)
115 IFY<21THENR1=(-A)ELSEIFY>42T
HENR1=(+A)
120 K=K+P1:L=L+R1:GOSUB125:GOTO1
40
125 IFK<1THENK=20 ELSE IF K>20TH
ENK=1
130 IFL<1THENL=13ELSEIFL>13THENL
=1
135 RETURN
140 X=INT(X/21)+1:Y=INT(Y/21)+1:
IFX=4THENX=3
145 IFY=4THENY=3
150 GOSUB510:K$=STR$(A(K)):L$=ST
R$(B(L)):RETURN
```


TAKE CONTROL OF YOUR OS9 LvII COLOR COMPUTER

S - SCREEN CONTROL UTILITY - $19.95 + S&H
Complete control of your text screen in only 510 bytes. 34 built in mnemonic commands give simple command line control of your screen. S gives you control of screen size (80 or 40 column), foreground, background, and border color, montype, cursor position, blinking, reverse video, underline, proportional and bold printing. Ring the bell, clear portions of the screen and echo to the screen all from the same command line. Merge S into your shell and forget display codes forever.

M - MENUING UTILITY - $19.95 + S&H
Create complete menuing system for your OS9 LvII color computer. Small 100% M.L. program merges into your shell to give you a complete memory resident menuing system. M uses 1 simple to edit text file for each menu. Each menu may contain up to 12 items, each items command line can be up to 200 characters, and any valid command line can be processed. Each menu has independent user selected colors and selection characters. Full parameter passing to command line. MULTI-VUE not required.

Pt - POINT AND SHOOT FILE SELECTION - $19.95 + S&H
Add point and shoot file selection to any command line based program. Pt accepts a program name, displays current directory and allows you to use arrow keys to select file to process. Many built in utilities; del, copy, rename, list, dump, chd and chx from within PT. Call your favorite editor from within PT.

r3 Systems Consultants (602) 745-2327
4072 E 22nd Suite #178 Please add $3.00 for S&H
Tucson, Ariz 85711 AZ residents add 7% tax.

Checks, Money Orders, or COD orders accepted.

QUALITY PROGRAMS AS LOW AS 25¢ EACH!

T&D 860 PROGRAMS
(86 DISKS OR TAPES)
ONLY $235.00
SEE PAGE 31 FOR LISTING

T&D 630 PUBLIC DOMAIN PROGRAMS
(53 DISKS OR TAPES)
ONLY $145.00
SEE PAGE 97 FOR LISTING

BUY BOTH SETS FOR ONLY $325.00

VISA MasterCard

- COCO 1,2,OR 3
- WE PAY SHIPPING
- PLEASE SPECIFY TAPE OR DISK

THIS MONTH ONLY
BUY BOTH SETS AND RECEIVE A FREE 1 YEAR (120 PROGRAMS) SUBSCRIPTION - A $70.00 VALUE!

T&D SUBSCRIPTION SOFTWARE • 2490 Miles Standish, Holland, MI 49424 616-399-9648

things to your machine.

Running the program gives you a new title card. You have two difficulty levels, 1 and 2. One is a simple game; Level 2 includes a mystery ship that zaps both you and your opponent.

The Shuttle-like vehicle shown at the bottom left of the score screen is yours. The one on the right looking like an insect belongs to the computer. The game is now a one player game and you must use your right joystick. Simply fly around the screen and zap your opponent before he zaps you. You will quickly learn that flying directly above or below your opponent can be dangerous. Be careful not to crash into each other. You can have some close calls that look like collisions, but a direct hit will zap you both.

Each side can take ten hits. The first one

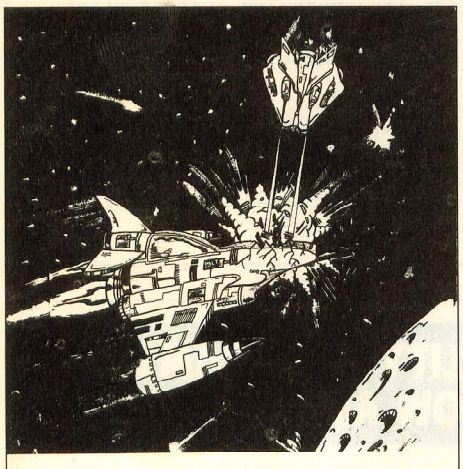


Figure 1

hit ten times is the loser. Believe me, it is not as simple as it sounds. Even without the high-speed poke, the game does move quite nicely, and I think you will like the moving star field.

Conclusion

Take a close look at the listing and you will see there are a lot of GOSUBs that I did not eliminate from the original. I did not want to make this job too big, and quite frankly I do not remember why I did some things certain ways. If you do check the lines I mentioned, you may get some programming ideas of your own. Give it a shot.

Next month we return to some more serious business. Until then, let me know how you like these two new versions of older games and whether or not you would like to see more of the same.

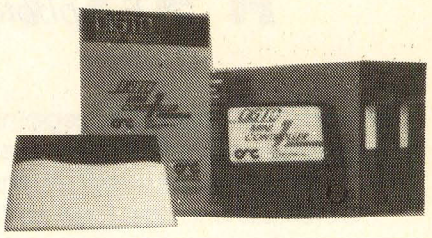
❑

```
155 TS=TS+1:IFTS>5THEN TS=0:A=1:
W=RND(3):Z=RND(3):P2=0:R2=0:IFW=
1THENP2=(-A)ELSEIFW=3THENP2=(+A)
160 IFZ=1THENR2=(-A)ELSEIFZ=3THE
NR2=(+A)
165 M=M+P2:N=N+R2:IFM<1THENM=20E
LSEIFM>20THENM=1
170 IF N<1THEN N=13ELSEIF N>13TH
EN N=1
175 GOSUB500:M$=STR$(A(M)):N$=ST
R$(B(N)):RETURN
180 IN$=INKEY$
185 IF IN$="1"THEN200
190 IF IN$="2"THEN205
195 GOTO180
200 R3=1:SD$=SJ$:AD$=AJ$:GOTO210
205 R3=12:SD$=SJ$:AD$=AJ$:GOTO21
0
210 CLS0:REM START GAME
215 SOUND220,3:SOUND110,3:SOUND1
,3:PMODE0,1:PCLS0:SCREEN0,1
220 LINE(0,168)-(256,192),PSET,B
F:LINE(24,188)-(124,174),PRESET,
BF:LINE(154,188)-(256,174),PRESE
T,BF:DRAW"S8BM12,180C0"+S$(1,2):
DRAW"S9BM138,180C0"+A$(1,2)
225 FORQ=29TO119STEP10
230 CIRCLE(Q,181),3,5,1.3
235 NEXTQ
240 FORQ=159TO249STEP10
245 CIRCLE(Q,181),3,5,1.3
250 NEXTQ
255 FOREP=2TO8:PCOPY1TO EP:NEXTE
P:FOREP=3TO8:PRINT@258," STAND B
Y FOR COUNTDOWN: ";10-EP;:PMODE0
,EP:FORQ=1TO110
260 PSET(RND(256),RND(148),5)
265 NEXTQ:SOUND1,1:NEXTEP
270 FP=2:K=3:L=9:M=17:N=4:PCOPY1
TO2:TS=5
275 GOSUB110:GOSUB155
280 PMODE0,1:SCREEN1,1:IFHR<=24A
NDCR<=156THEN490ELSEIFHR<=24THEN
470ELSEIFCR<=156THEN480
285 FP=FP+1:IF FP>8THEN FP=3
290 PCOPY FP TO2:PMODE0,2:GOSUB4
50:S1=0:S2=0:HT=0:CT=0:GOSUB110:
DRAW"S8BM"+K$+","+L$+"C5"+S$(X,Y
):IFK=M AND L=N THENGOSUB460
295 GOSUB155:DRAW"S9BM"+M$+","+N
$+"C5"+A$(W,Z):PCOPY2TO1:PMODE0,
1:IFK=M AND L=N THEN GOSUB460
300 PA=RND(R3):IFPA<10THEN325
305 PB=RND(6):PC=RND(230)+16:PD=
RND(136)+10:PC$=STR$(PC):PD$=STR
$(PD):DRAW"S12BM"+PC$+","+PD$+"C
5"+PF$:SOUND120,2:IFPB<5THEN310E
LSEIFPB=5THEN315ELSEIFPB=6THEN32
0
310 DRAW"S12BM"+PC$+","+PD$+"C0"
+PF$:DRAW"S1BM10,10C5U":GOTO325
315 LINE(PC,PD)-(A(M),B(N)),PSET
:SOUND120,1:LINE-(PC,PD),PRESET:
DRAW"S12BM"+PC$+","+PD$+"C0"+PF$
:DRAW"S1BM10,10C5U":GOSUB370:GOT
O280
320 LINE(PC,PD)-(A(K),B(L)),PSET
:SOUND120,1:LINE-(PC,PD),PRESET:
DRAW"S12BM"+PC$+","+PD$+"C0"+PF$
:GOSUB375:GOTO280
325 S1=PEEK(339)
330 IFX-2ANDY-2THEN335ELSEIFS1=2
54THEN385
335 IF M=K THEN420
340 IFHT-0ANDCT-0THEN280
345 IFHT=1THENGOSUB370
350 IFCT-1THENGOSUB375
355 GOTO280
360 GOSUB365:GOSUB440:GOSUB445:G
OTO280
365 DRAW"S40BM26,60C5"+CO$:DRAW"
S40BM"+K$+","+L$+"C5"+EX$:DRAW"S
40BM"+M$+","+N$+"C5"+EX$:PCOPY2T
O1:GOSUB105:N=4:K=3:L=9:M=17:RET
URN
370 DRAW"S48BM50,120C5"+HO$:DRAW
"S32BM"+M$+","+N$+"C5"+EX$:PCOPY
2TO1:GOSUB105:GOSUB105:M=17:N=4:
GOSUB445:HT=0:RETURN
375 DRAW"S48BM50,120C5"+HO$:DRAW
"S32BM"+K$+","+L$+"C5"+EX$:PCOPY
2TO1:GOSUB105:GOSUB105:K=3:L=9:G
OSUB440:CT=0:RETURN
380 GOTO290
385 HT=0:K1=K:L1=L
390 K1=K1+P1:L1=L1+R1:IFX=2ANDY=
2THEN405ELSEIFK1=M AND L1=N THEN
405:GOSUB510
395 IFK1<=1THEN405ELSEIFK1=>20TH
EN405ELSEIFL1<-1THEN405ELSEIFL1=
>13THEN405
400 GOTO390
405 GOSUB510:LINE(A(K),B(L))-(A(
K1),B(L1)),PSET:SOUND220,1:LINE-
(A(K),B(L)),PRESET:CIRCLE(A(K1),
B(L1)),2,5:CIRCLE(A(K1),B(L1)),2
,0:IFK1=M AND L1=N THEN415
410 GOTO335
415 SOUND10,2:HT=1:GOTO335
420 CT=0:M1=M:N1=N
425 REM YOU ARE HIT
430 GOSUB500:LINE(A(M),B(N))-(A(
K),B(L)),PSET:SOUND190,1:LINE-(A
(M),B(N)),PRESET:CIRCLE(A(M1),B(
N1)),2,5:CIRCLE(A(M1),B(N1)),2,0
435 SOUND50,2:CT=1:GOTO340
440 HR=HR-10:FOREP=3TO8:PMODE0,E
P:LINE(124,174)-(HR,188),PRESET,
BF:NEXTEP:SOUND175,1:RETURN
445 CR=CR-10:FOREP=3TO8:PMODE0,E
P:LINE(256,188)-(CR,174),PRESET,
BF:NEXTEP:SOUND175,1:RETURN
450 IFK=M AND L=N THENGOSUB460
455 RETURN
460 GOSUB365:GOSUB440:GOSUB445
465 RETURN
470 DRAW"S16BM26,156C5"+D$:DRAW"
BM156,156"+V$:GOSUB105:GOSUB105:
GOSUB105:RW=RW+1:FORI=1TO2500:NE
XT
475 GOTO495
480 DRAW"S16BM26,156C5"+V$:DRAW"
BM156,156"+D$:GOSUB105:GOSUB105:
GOSUB105:LW=LW+1:FORI=1TO2500:NE
XT
485 GOTO495
490 DRAW"S56BM86,72C5"+NO$:DRAW"
S48BM40,84C5"+V$:GOSUB105:GOSUB1
05:GOSUB105:FORI=1TO2500:NEXT
495 X$=INKEY$:IFX$<>CHR$(13)THEN
495ELSERUN
500 IFM1<=1THENM1=1ELSEIFM1=>20T
HENM1=20ELSEIF N1<=1THEN N1=1ELS
EIF N1=>13THENN1=13
505 RETURN
510 IFK1<=1THENK1=1ELSEIFK1=>20T
HENK1=20ELSEIF N1<=1THEN N1=1ELS
EIF N1=>13 THEN N1=13
515 RETURN
```

Color Computer I, II, III

Free Software for Drive 0 Systems

CoCo Checker...Test roms, rams, disk drives and & controller printer, keyboard cassette & more.
Tape/Disk Utility...Transfers disk to tape and tape to disk.



159.95 Drive 0
- Full Ht Drive
- Single Case
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & manuals

179.95 Drive 0
- Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

269.95 Drive 0 & 1
- 2 Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

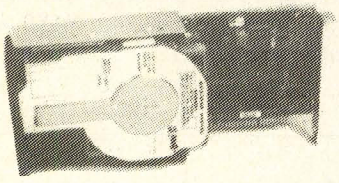
Other Drive Specials

119.95
2nd Drive
for new Radio Shack
includes:
- Slim Line DS/DD Drive
- Cabling & Instructions
- Mounting Hardware

Full Ht Drive	89.95
Full Ht Drive Ps/Case	129.95
Slim Line Drive	99.95
Slim Line Drive Ps/Case	139.95
2 Slim Drives Ps/Case	239.95
Disk Controller	59.95

Single Ps & Case	44.95
Dual ½ht Ps & Case	54.95
Dual Full Ht. Ps & Case	79.95
Disk Controller	59.95
10 Diskettes with free library case	9.95

Quality Add-On's for Tandy 1000, SX, TX, SL, TL, 3000, 4000



HARD CARDS

10 meg	259.95	40 meg	399.95
20 meg	299.95	49 meg	499.95
30 meg	349.95	64 meg	599.95

HARD DRIVE KITS

10 meg kit	249.95	40 meg kit	399.95
20 meg kit	299.95	60 meg kit	539.95
30 meg kit	339.95		

1000, 1000A,
Memory Cards
Zucker Memory
- DMA & 512K — CALL

Zucker Multifunction
- Serial
- Real Time Clock
- 512K DMA
- Software — CALL

TANDY 1000
1000, SX, TX, 3000, 4000
2nd Floppy

360K	TEAC	$119.95
720K	Mitsubishi	$99.95
3½"	Mitsubishi	$119.95

1000, 1000A, SX, TX, SL, TL
Hard Drive Controller
Will run 1 or 2
Hard Drives
Supports drives up to 120 megabytes
$99.95

QUALITY
CUSTOMER SERVICE
508-278-6555

TECHNICAL ASSISTANCE
508-278-6556

TOLL FREE ORDER LINE
1-800-635-0300

TRUE DATA PRODUCTS
115 MAIN ST., P.O. BOX 347
UXBRIDGE, MA 01569
508-278-6555
HOURS: MON-FRI. 9-6, SAT. 10-4 (EST)

CORPORATE P.O.'S WELCOMED

ALL PACKAGES SHIPPED UPS
EXCEPT CANADA AND A.P.O.'s
C.O.D.'S ADD $2.30
MASTER CHARGE/VISA ADD 3%
1 YEAR WARRANTY UNLESS
OTHERWISE NOTED
PRICES TERMS CONDITIONS
SUBJECT TO CHANGE WITHOUT
NOTICE

For photo albums that are pretty as a picture

Captivating Captions

by Kevin Reichert

While sorting through photos of my recent vacation and trying to find an organized way of placing them in an album, I got the idea for *Captivating Captions*. It is a program designed for the 128K CoCo 3 tape- or disk-based system and requires a printer.

If your system encounters problems when using the speed-up poke, you can change Line 2290 to `2290 RETURN`. This subroutine slows the computer down while printing and speeds it up when printing is finished.

The printer used in conjunction with this program is the Star NX-1000 Rainbow. But with minor adjustments you can modify the following lines for compatibility with your printer. The control codes in `K$(1)` and `K$(2)` in lines 2050 and 2060 respectively are the characters for the top and bottom borders of the caption's frame. In Line 600 `C$(1)` holds the left side of the frame, a line of text, and the right side of the frame. The `1` in Line 15's statement `POKE 150,1` tells the computer to print data at 9600 baud. You should consult your manual to find the value that coincides with your printer's baud rate.

Kevin Reichert has a degree in computer information processing from Southern Illinois University-Carbondale. He is knowledgeable in seven languages and worked with the NEC system and university students while in Japan. He enjoys playing the systhesizer and incorporating graphics into plain programs.

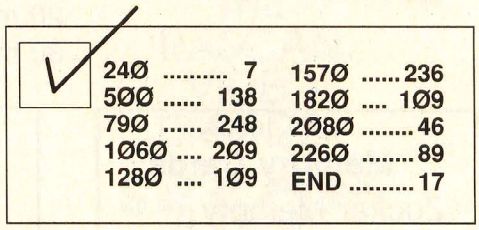
To use *Captivating Captions* simply type in the listing, save a copy on disk or tape, and run it. Following the title screen and the program outline, you are asked to either enter a caption or press ENTER to see a sample caption. Once you have done this, the caption is framed at the top of the screen while the menu is displayed at the bottom. Entering a number 1 through 36 causes the caption to be displayed containing the number of characters per line as you have selected. Entering a 1 instructs the computer to display the caption at its smallest possible width. To print your caption, press P. As a safety precaution you are asked once more to press either ENTER to print or M to return to the menu.

After you have printed your captions, you can cut them out and place them under, over or beside the photos in your album or even on the back of the photos themselves. Pressing T in the main menu allows you to enter and manipulate a new caption. When you are ready to quit, press the Q key.

Not only does this program provide a stylish way of labeling photos and other items, but it also provides some unique subroutines that can be modified to incorporate into your own programs. Please feel free to send me your modifications and enhancements.

(Questions or comments concerning this article may be addressed to the author at P.O. Box 103, Grand Chain, IL 62941-0103. Please enclose an SASE when requesting a reply.)

❑



The listing: `CAPTION`

```
0 ' COPYRIGHT 1989 FALSOFT,INC
10 '*************************
20 '** CAPTIVATING CAPTIONS **
30 '**  COPYRIGHT (C) 1989  **
40 '**  BY KEVIN REICHERT   **
50 '*************************
60 '
70 '*****************
80 '**   SET-UP    **
90 '*****************
100 ON BRK GOTO 110: GOTO 120
```

XTEAM & OS-9

XTERM

OS-9 Communications program

- Menu oriented
- Upload/download Ascii or XMODEM protocol
- Execute OS-9 commands from within XTERM
- Definable macro keys
- Works with standard serial port, RS232 Pak, or PBJ 2SP Pack, Includes all drivers
- Works with standard screen, Xscreen WORDPAK or DISTO 80 column board

$49.95 with source **$89.95**

ECONOMIST

Perform economic analysis to compare different cost and income alternatives! Compute present and future Life Cycle Worths for various combinations of single, series and gradient dollar amounts. Quickly edit and recompute for sensitivity analysis! Display line graphs. Printout data and results. Pull-down menus, windows and prompts. Requires os-9 level II and Basic09.

$39.95 WITH SOURCE **$79.95**

HARDWARE

512k memory upgrade $99.95

Ram Software

Ram Disk
Print Spooler
Quick Backup

All three for only $19.95

*Software by ColorVenture

XWORD

OS-9 word processing system

- Works with standard text screen, XSCREEN, WORDPAK, or DISTO
- True character oriented full screen editing
- Full block commands
- Find and Replace commands
- Proportional spacing supported
- Full printer control, character size, emphasized, italics, overstrike, underline, super/sub-scripts
- 10 header/footers
- Margins and headers can be set different for even and odd pages

$69.95 with source **$124.95**

XMERGE Mail merge capabilities for XWORD
$24.95 with source **$49.95**

XSPELL OS-9 spelling checker, with 40000 word dictionaries
$39.95

XTRIO XWORD/XMERGE/XSPELL
$114.95 with source **$199.95**

XED OS-9 full screen editor
$39.95 with source **$79.95**

XDIS OS-9 disassembler
$34.95 with source **$54.95**

XDIR & XCAL Hierarchial directory, OS-9 calculator
$24.95 with source **$49.95**

THE DIRECTOR

Produces hires picture sound and color animation shows. Completely menu driven with full editing. Great for presentations and vcr's. Requires COCO III only. **$39.95**

Call for package price

AND FOR RS DOS ...

SMALL BUSINESS ACCOUTING

This sales-based accounting package is designed for the non-accountant oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vender status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List.

$79.95

INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter/update salesman records, and update the SBAP inventory.

$59.95

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Aditional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware

$59.95

PERSONAL BOOKKEEPING 2000

Handles 45 accounts. Enters cash expenses as easily as checks. Handles 26 expense categoriesK. Menu driven and user friendly.

$39.95

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, perpares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accting package.

$59.95

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package.

$59.95

MICROTECH CONSULTANTS INC.
1906 Jerrold Avenue
St. Paul, MN 55112

Dealer Inquiries Invited
Author Submissions accepted
OS-9 is a Trademark of Microware

VISA MasterCard

Ordering Information
Add $3.00 shipping & handling, MN residents add 6% sales tax.
Visa, Mastercard, COD (add $3.50), personal checks.

(612) 633-6161

```
110 WIDTH 40:ATTR 2,1:POKE 65496
,0:PRINT"PROGRAM TERMINATED":END
120 GOSUB 2290 '-=<SPEED UP POKE
>=-'
130 GOSUB 1460 '-=<TITLE PAGE>=-
'
140 LOCATE 10,9:PRINT"ONE MOMENT
 PLEASE";:LOCATE 1,22
150 CLEAR 6000:DIM X$(6,37),X(6,
37),C$(30),K$(30),A(30),S$(30),O
C$(30)
155 POKE 150,1 '-=<9600 BAUD>=-'
160 KE$="This is an example of w
hat your caption might look like
. Alter the characters per line
by entering various values."
170 R=-1:KK=0:YY=5
180 X$=STRING$(16,32)+"CHOICES"+
STRING$(14,32):GOSUB 260
190 X$=STRING$(6,32)+"(1-36)=CHA
RACTERS PER LINE"+STRING$(5,32):
GOSUB 260
200 X$=STRING$(9,32)+"(1)=SMALLE
ST WIDTH"+STRING$(10,32):GOSUB 2
60
210 X$=STRING$(9,32)+"(P)=SEND T
O PRINTER"+STRING$(9,32):GOSUB 2
60
220 X$=STRING$(9,32)+"(T)=TYPE N
EW CAPTION"+STRING$(8,32):GOSUB
260
230 X$=STRING$(9,32)+"(Q)=QUIT P
ROGRAM"+STRING$(12,32):GOSUB 260
240 Y(1)=5
250 GOTO 360
260 R=R*-1:KK=KK+1:YY=YY+1
270 FOR T = 1 TO 37
280 IF R=1 THEN X(KK,T)=38-T:X$(
KK,T)=LEFT$(X$,T)
290 IF R=-1THEN X(KK,T)=1:X$(KK,
T)=RIGHT$(X$,T)
300 Y(KK)=YY
310 NEXT T
320 RETURN
330 '*****************
340 '** GET CAPTION **
350 '*****************
360 LOCATE 10,1:PRINT"INPUT ENTI
RE CAPTION"
370 LOCATE 39,1:ATTR5,5:PRINT ST
RING$(41," ");
380 LOCATE 0,3:ATTR 1,1:PRINT ST
RING$(239," ");:LOCATE 0,9:ATTR
5,5:PRINT STRING$(39," ");
390 LOCATE 6,14:ATTR 2,1:PRINT"P
RESS <ENTER> TO SEE SAMPLE";:LOC
ATE 19,16:PRINT"OR";:LOCATE 9,18
:PRINT"TYPE YOUR OWN CAPTION.";:
LOCATE 0,3
400 LINE INPUT C$
410 IF C$="" THEN C$=KE$
420 GOSUB 1300
430 IF LEN(C$)<35 THEN L=LEN(C$)
+2:GOSUB 1130 ELSE L=36: GOSUB 1
130
440 GOSUB 550
450 TB=19-INT(LEN(S$(1))/2)-1:L=
LEN(S$(1)):IF TB<0 THEN TB=0
460 FOR T = 0 TO F+2:LOCATE 0,T:
ATTR 0,0:PRINTSTRING$(39," ");:N
EXT T
470 FOR T = 0 TO F+1:LOCATE TB,T
:ATTR 6,6:PRINTSTRING$(L+2," ");
480 NEXT T
490 LOCATE TB+1,1:ATTR 2,1
500 IF F<5 THEN RN=1 ELSE RN=2
510 ON RN GOTO 680,770
520 '*****************
530 '** CENTER TEXT **
540 '*****************
550 KS=INT(L/2+.5)
560 FOR I=1 TO F
570 A(I)=KS-INT(LEN(C$(I))/2)
580 IF INT(LEN(C$(I))/2) <> LEN(
C$(I))/2 THEN C$(I)=C$(I)+" ":GO
TO 570
590 S$(I)=" "+STRING$(A(I)," ")+
C$(I)+STRING$(A(I)," ")
600 C$(I)=CHR$(179)+" "+STRING$(
A(I)," ")+C$(I)+STRING$(A(I)," "
)+" "+CHR$(179)
```


MLBASIC 2.0 - BASIC Compiler

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

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

- Low- and high-resolution graphics
- All types of I/O (disk, screen, printer, RS232)
- All available commands offered with BASIC
- Floating point functions and expressions
- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

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

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

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

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

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

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

<<<< ONLY $59.95 >>>>

COCO 3 WITH DISK REQUIRED -Add $4.00 Postage.
Check, Money Order or COD accepted
Foreign orders use U.S. MONEY ORDERS only.

WASATCHWARE
7350 Nutree Drive
Salt Lake City, Utah 84121
Phone (801) 943-1546

```
610 NEXT I
620 LOCATE 10,10:PRINT STRING$(2
4,32);:LOCATE 1,22
630 RETURN
640 '********************
650 '** PRINT SCREEN  **
660 '** LEFT TO RIGHT **
670 '********************
680 FOR S=1 TO LEN(S$(1))
690 FOR T=1 TO F
700 LOCATE TB+S,T
710 PRINT MID$(S$(T),S,1);
720 NEXT T,S:GOTO 870
730 '********************
740 '** PRINT SCREEN **
750 '** SIDE TO SIDE **
760 '********************
770 RR=1:J=LEN(S$(1))
780 FOR T=1 TO F: RR=RR*-1
790 IF RR=1 THEN FOR S=1 TO J
800 IF RR=-1 THEN FOR S=J TO 1 S
TEP -2
810 LOCATE TB+S,T
820 IF RR=1 THEN PRINT MID$(S$(T
),S,1); ELSE PRINT MID$(S$(T),S,
J-S+1);
830 NEXT S,T
840 '*****************
850 '**    MENU     **
860 '*****************
870 LOCATE 0,F+3
880 ATTR 5,5:PRINT STRING$(40,"
");:LOCATE 17,F+5:ATTR 2,1
890 FOR S=1 TO 6
900 FOR T=1 TO 37
910 LOCATE X(S,T),F+Y(S)
920 PRINT X$(S,T);
930 NEXT T,S
940 P=0:LOCATE 39,F+12:ATTR 5,5:
PRINT" ";
950 LOCATE 20,F+12:ATTR 2,1:PRIN
T"   ";
960 LOCATE 20,F+12:ATTR 2,1
970 LINE INPUT P$
980 IF P$="P" THEN 2040
990 IF P$="T" THEN GOSUB 1310:GO
TO 360
1000 IF P$="Q" THEN GOTO 110
1010 IF P$=""  THEN GOTO 940
1020 P=VAL(P$)
1030 IF P<1 OR P>36 THEN GOTO 94
0
1040 GOSUB 1300
1050 G=0:W=0:FOR Q=1 TO LEN(C$):
W=W+1:IFMID$(C$,Q,1)=" "THEN 106
0 ELSE NEXTQ:IFW>G THEN G=W:GOTO
 1070 ELSE GOTO 1070
1060 IF W>G THEN G=W:W=0:NEXT Q
ELSE W=0: NEXT Q
1070 IF P>G THEN 1080 ELSE P=G
1080 L=P:GOSUB 1300:GOSUB 1130:G
OTO 440
1090 GOSUB 1300:RETURN
1100 '*****************
1110 '**  SET WIDTH  **
1120 '*****************
1130 LOCATE 10,10: PRINT"ONE MOM
ENT PLEASE...";:LOCATE 1,22
1140 F=0:TP$=C$
1150 F=F+1:LC=LEN(C$)
1160 IF LEFT$(C$,1)=" " THEN C$=
RIGHT$(C$,LC-1):LC=LC-1:GOTO 116
0
1170 IF LEN(C$)<L THEN C$(F)=C$:
GOTO 1250
1180 FOR A=L TO 1 STEP -1
1190 IF MID$(C$,A,1)=" " THEN 12
20
1200 NEXT A:C$(F)=C$
1210 GOTO 1250
1220 C$(F)=LEFT$(C$,A-1)
1230 C$=RIGHT$(C$,LC-A)
1240 GOTO 1150
1250 C$=TP$
1260 IF F<=10 THEN RETURN
1270 L=L+1: GOTO 1130
1280 '*****************
1290 '**   BORDER   **
1300 '*****************
1310 CLS: ATTR 5,5
1320 PRINT STRING$(40," ");
```


LOTTERY

MADE EASY

Most people spend $5.00 to $25.00 dollars or more on their favorite lottery. Most of this money is spent on purchasing easy picks. The reason for this is that most people don't have the time or they have a hard time thinking up all the different combinations of numbers.

If you have a Color Computer 3, one Disk drive, and a CM8 or RGB monitor this program can help you. (Printer optional)

This program offers several ways to play the lottery. There is a Pick 7, Pick 7/6, Pick 8, Pick 12, and a Pick 20. The program is menu driven and has a Special feature that will identify winning numbers at a glance. Why not take the lottery challenge & play with your own numbers?

This program is made available by the RRA & CO. at the cost of $15.00, this includes postage & handling.

Send check or money order to. . RRA & CO.
P.O. Box 17087
Des Moines, Iowa
zip 50317

(money orders shipped same day)

```
1330 FOR T = 1 TO 22
1340 LOCATE 39,T
1350 PRINT" ";
1360 NEXT T
1370 LOCATE 0,23: PRINT STRING$(
39," ");
1380 LOCATE 1,1
1390 ATTR 2,1
1400 PRINT" ";
1410 LOCATE 1,22
1420 RETURN
1430 '******************
1440 '** TITLE SCREEN **
1450 '******************
1460 WIDTH 80
1470 CMP:PALETTE 4,0:PALETTE 0,0
:PALETTE 5,0:PALETTE 1,50
1480 CLS 1:ATTR 2,1:CLS:LOCATE 1
,1:ATTR 0,0
1490 FORT=1 TO 22:LOCATE 1,T:PRI
NTSTRING$(77," ");:NEXT T
1500 LOCATE 32,8:ATTR 3,0:PRINT"
ONE MOMENT PLEASE";:ATTR 0,0
1510 T=1:P=7:L=2:K=4:J=4
1520 LOCATE P,L
1530 READ T
1540 IF T=99 THEN L=L+1:LOCATE P
,L:GOTO 1630
1550 IF T=88 THEN L=L+1:LOCATE P
,L:GOTO 1530
1560 IF T=100 THEN GOTO 1650
1570 IF T=77 THEN P=16:LOCATE P,
L:J=5:K=J:GOTO 1530
1580 IF T=0 THEN T=1
1590 FOR A= 1 TO T
1600 ATTR 0,K
1610 PRINT" ";
1620 NEXT A
1630 IF K=J THEN K=0 ELSE K=J
1640 GOTO 1530
1650 '
1660 LOCATE 32,8:ATTR 0,0:PRINT
STRING$(19," ");
1670 LOCATE 35,18:ATTR 3,0:PRINT
"WRITTEN BY";
1680 LOCATE 33,20:PRINT"KEVIN RE
ICHERT";
1690 LOCATE 1,22
1700 FOR T=1 TO 8
1710 IF INKEY$<>"" THEN 1740
1720 FOR R=19 TO 40:PALETTE 1,R:
PALETTE 4,R+2:PALETTE 5,R+4:NEXT
 R
1730 NEXT T
1740 FOR T = 1 TO 500 : NEXT T
1750 LOCATE 79,23
1760 FOR T=1 TO 24:PRINT:NEXT T
1770 PALETTE 1,50:ATTR 2,1
1780 FOR T=1 TO 24: PRINT STRING
$(79," ");: NEXT T
1790 WIDTH 40:PALETTE CMP:PALETT
E 0,0:PALETTE 1,50:PALETTE 6,23:
PALETTE 5,27:ATTR 2,1: CLS
1800 GOSUB 1300
1810 LOCATE 10,1
1820 PRINT"CAPTIVATING CAPTIONS"
;
1830 LOCATE 39,1:ATTR5,5
1840 PRINT STRING$(41," ");
1850 LOCATE 2,5:ATTR 2,1
1860 PRINT"This program is desig
ned to allow";
1870 LOCATE 2,6
1880 PRINT"you to:";
1890 LOCATE 2,8
1900 PRINT"* Alter the width of
any caption";
1910 LOCATE 2,10
1920 PRINT"* Center each line of
 text";
1930 LOCATE 2,12
1940 PRINT"* Print caption with
a border";
1950 LOCATE 2,16
1960 PRINT"PRESS <ENTER> TO CONT
INUE";
1970 LOCATE1,22
1980 I$=INKEY$:IFI$=""THEN 1980
1990 GOSUB 1300
2000 RETURN
2010 '******************
2020 '**  PRINT-OUT  **
```


StG Computers Inc.

NO HYPE!
JUST QUALITY
OS9 SOFTWARE AND HARDWARE

Level 2 Login/BBS Package $50
NOW SHIPPING - NEW VERSION 3.0
Setup a secure private system or take advantage of BBS features - Auto-baud Tsmon, foolproof Login Config'ble Menu w/Ansi&OS9 Graph Send Mail, News, Files thru Net! Multi-User chat, run eight lines Lv2,512k,RS232pak,Hard drv req'd Free updates and utils thru net. CDI Interface (one per line) $15

C Compiler Lib, Src, & Utils $50
Compile fast with CC exec-checks file dates, wildcards, auto link C Lib & src used to create login and example multiuser game incl.

2400 Baud Modem (1200-$100) $150
SuperComm 2.1 Terminal Prog $30
Star NX1000 Rainbow VEF Dump $20

Indiana residents add 5% sales tax. COD Add $3. No credit cards.
Shipping & handling included. Send check or money order to:
StG Computers, Inc. - P.O. Box 24285 - Speedway IN 46224
(317) 241-6401 (voice) - (317) 244-3159 (modem, 3/12/2400)

```
2030 '*****************
2040 C=KS*2
2050 K$(1)=CHR$(218)+STRING$(C+2
,196)+CHR$(191)
2060 K$(2)=CHR$(192)+STRING$(C+2
,196)+CHR$(217)
2070 FOR T=F+5 TO F+11: LOCATE 4
,T:PRINT STRING$(32," ");:NEXT T
2080 LOCATE 39,F+12:ATTR 5,5:PRI
NT"  ";:ATTR 2,1
2090 LOCATE 18,F+12:PRINT"  ";
2100 LOCATE 7,F+7
2110 PRINT"<ENTER>=PRINT   <M>=M
ENU";
2120 LOCATE 1,22:POKE 65496,0
2130 O$=INKEY$:IFO$=""THEN 2130
2140 IF O$="M" THEN GOSUB 2290:G
OTO 8702150 LOCATE 7,F+7
2160 PRINT STRING$(24,32);
2170 LOCATE 1,22
2180 PRINT#-2, K$(1)
2190 FOR T=1 TO F
2200 PRINT#-2, C$(T)
2210 NEXT T
2220 PRINT#-2, K$(2)
2230 PRINT#-2:PRINT#-2
2240 ATTR 2,1
2250 GOSUB 2290:GOSUB 870: GOTO
2040
2260 '*******************
2270 '** SPEED UP POKE **
2280 '*******************
2290 POKE 65497,0:RETURN
2300 '*********************
2310 '** DATA FOR TITLE **
2320 '*********************
2330 DATA 5,,5,,5,,5,,5,,,3,,,5,
,5,,5,,,3,,,5,99
2340 DATA ,5,,3,,,,3,,3,,5,,3,,3
,,,,3,,3,,5,,3,2,2,,,,4,88
2350 DATA ,5,5,,5,3,,5,,4,,,,2,5
,3,,5,,3,,,,,,,,2,2,99
2360 DATA ,5,,3,,,,7,,5,,4,,,,2,
,3,,3,,5,,3,,2,2,,,3,,99
2370 DATA 5,,,3,,,,7,,3,5,3,,3,,
3,,3,,3,5,,,3,,,5,88
2380 DATA ,99,,88,77
2390 DATA 5,,5,,5,,5,,5,,5,,,3,,
,5,99
2400 DATA ,5,,3,,,,3,,3,,5,,3,,3
,,,2,2,,,,4,88
2410 DATA ,5,5,,5,3,,5,,3,,3,,,,
,,,,,5,99
2420 DATA ,5,,3,,,,7,,5,,3,,3,,,
,2,2,5,,99
2430 DATA 5,,,3,,,,7,,3,5,,5,,,3
,,,5
2440 DATA 100
```


Burke & Burke
P.O. Box 58342
Renton, WA 98058

TOLL-FREE U.S. ORDER HOTLINE:
1-800-ADS-AHOY 1-800-237-2409
TECHNICAL SUPPORT & INTERNATIONAL ORDERS:
206-235-0917

WASHINGTON RESIDENTS PLEASE ADD 8.1% SALES TAX. Minimum U.S. shipping $3.00; $4.00 to Canada. $2.75 U.S. COD charge. Please allow 2 weeks for delivery. U.S. overnight or 2-day delivery available for in-stock items. Software upgrades $5.00 each (free with orders over $25).

QuarterMeg *256K memory upgrade for CoCo 3: $89.95!*

Price includes 4 memory chips at our current reference market price. Due to fluctuating market conditions, prices are subject to change without notice.

A New Breed of CoCo 3 Memory Expansion
Uses existing CoCo 3 64K x 4 memory chips!
Our revolutionary circuit combines four 64K x 4 memory chips on the QuarterMeg board with the four identical memory chips in the 128K CoCo 3 to double your OS9 and BASIC memory to 256K. Piggy-back upgrades to 512K!

Expandable to 512K!

Zero-K QuarterMeg (no chips) – $39.95
Also available: Standard QuarterMeg (4 chips), Full QuarterMeg (8 chips) & Fat QuarterMeg (512K – 16 chips)
>>> MARKET PRICE <<<

New!

File System Repack

Your OS9 disks are suffering from a bad case of fragmentation, and $29.95 we've got the cure.

Did you know that OS9 gets less efficient (and just a little slower) every time you use it? It's true! As you modify or create files, OS9 breaks them up into smaller and smaller pieces scattered randomly across your disks. Smaller pieces mean slower disk access.

Our new File System Repack program examines each file on your hard or floppy disk. It reverses the effects of fragmentation by gathering up and combining pieces of files. In addition to the immediate benefit of a faster system, our program also reduces disk head movement -- in the long term, decreasing wear on your system's mechanical parts.

Real BASIC for OS9! ***R.S.B. V1.3 $39.95***

Burke & Burke's R.S.B. software gives you a complete, OS9-compatible version of Disk Extended Color BASIC. We've added new software for OS9-style graphics, sound, printer, and disk I/O. The BASIC you know and love is now running under Level 2 OS9 windows!

R.S.B. loads and saves files using OS9's file format, so we've also included utilities to transfer BASIC programs and data files betwen OS9 and BASIC disks. Of course, you can't use R.S.B. to run machine language programs, and some BASIC commands work slightly differently under R.S.B.

Requires CoCo 3, 256K RAM, floppy controller with either Tandy Disk BASIC or DISTO CoCo 3 CDOS, and Level 2 OS9.

CoCo-XT Hard Disk Interfaces

NO HALT • 1 or 2 hard drives • 30% faster than SASI • Uses PC-type hard disk drives & controllers • 5 Meg to 120 Meg per drive • Does not use interrupts • Multi-PAK recommended • Includes EZGen boot file editor for easy installation • CoCo XT-RTC includes real-time clock

CoCo XT $69.95 *CoCo XT-RTC* $99.95

XT-ROM AUTO-BOOT ROM . . . Automatically boots OS9 from your Burke & Burke hard disk at power-up. Use XT-ROM as a convenience, or for fail-safe CoCo operation in unattended BBS, home security systems, etc.

XT-ROM $19.95

4' hard disk cable set $17.50

HYPER-I/O $29.95
Modifies Disk BASIC to use hard disks (CoCo XT, DISTO, LR), RAM disks, & any mix of 35-160 track floppy drives. Fully reset protected, 16K EPROM-able.

HYPER-III $12.95
RAM disk and printer spooler add-on for HYPER-I/O. Requires 512K CoCo 3 and HYPER-I/O.

HYPER-I/O Utilities $21.95
Kevin Berner's wildcard copy, delete, and file search utilities for HYPER-I/O

HYPER-I/O Disk Doctor $17.95
Kevin's second utility package. Find bad disk sectors, edit GAT/FAT, etc.

Both utility packages for $37.95

EZGen Version 1.06 $19.95
Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too.

PERTASCII $19.95
Level 2 OS9 scrambled-letter word game for 1-16 players. Play against the computer's 15,000 word dictionary or friends. 256K.

Full color and greater resolution for the CoCo 3

Put on Your 3-D Glasses

By William Barden, Jr.
Rainbow Contributing Editor

In the June '88 issue of THE RAINBOW I wrote a column titled "Digitizing the World Revisited," describing my experiences with the Micro Works DS-69 and DS-69B video digitizers. The DS-69 and DS-69B were the staple CoCo video digitizers for several years and are excellent products. However, the DS-69s are somewhat limited in that they digitize a video image to 256-by-256 pixels in 16 levels of gray. With the CoCo 3 you use 640-by-192 pixels, and it would be nice to have a unit that takes advantage of that resolution. The Game Point Rascan video digitizer provides this capability as well as full-color and 3-D graphics for the CoCo 3. Hard to believe? Read on. . .

What's a Video Digitizer, Anyway?

A video digitizer converts a standard-format television picture into digital data — the same standard format as used in a color camcorder, color video cassette recorder, television receiver with video output, and monochrome (black and white) surveillance camera. This signal is not the same as that from a television antenna, which is tens of thousands of times weaker and in a different format. (The video information is carried by a radio signal.)

A standard television signal has 525 scan lines per screen, as shown in Figure 1. Actually there are 60 *frames* of 262.5 lines each, with each frame making up one half of a 1/30th second picture. If you feed video from a camcorder, video cassette recorder or surveillance camera into a video digitizer, it digitizes a video picture scan line by scan line in about 10 seconds, converting the picture into digital pixels. In the case of the Rascan video digitizer, 640 pixels per scan line are produced for *every other* scan line. That is, there are a total of 384 scan lines, but every other line is skipped leaving 192 digitized scan lines. This 640-by-192 digitization fills the CoCo 3 high-resolution screen. Although some digitizers *freeze* a picture for one frame, the Rascan unit (and the DS-69) digitizes on-the-fly, so it's necessary to have a stationary image.

If the standard television signal is a color signal, the color information (contained in a phasing scheme) is thrown away by the Rascan. It is possible to decode this and send it to a display like the CoCo's, but it is more expensive. Also, the CoCo is not really capable of displaying full color in 640-by-192 mode but just four selected colors (16 colors in 320-by-192 mode), which does not reproduce the many hues and intensities of a typical color picture.

Shades of Gray

Without color a television signal still contains many graduations of intensity, ranging from black (0 intensity) to white (maximum intensity) and an infinite number of shades of gray in between. To digitize a picture it's necessary to encode the infinite number of levels of gray into a fixed number of different levels. The simplest case is 0 for black and 1 for white. However, even the swimsuit issue of THE RAINBOW would look uninspiring with only two shades. Four levels (00, 01, 10, and 11) is better, but 16 levels is even better yet (0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, and 1111).

How can you represent shades of gray on a CoCo screen? Rascan and DS-69 both use a *dithering* process similar to the halftone representation used in newspapers. In this process some resolution is given up to produce the 16 gray-scale levels.

Hooking the Beast Up

When I first saw the Rascan ads in THE RAINBOW, I immediately knew I had to try one. I'm a graphics freak and the idea of digitized 640-by-192 images is very appealing. One (four-level) gray day a box from Game Point appeared on my doorstep. The day brightened immediately as I eagerly ripped it open and uncovered a white box about the size of three CoCo ROM cartridges stacked on top of each other. (The unit is installed next to the CoCo on the left side and requires its own AC power.)

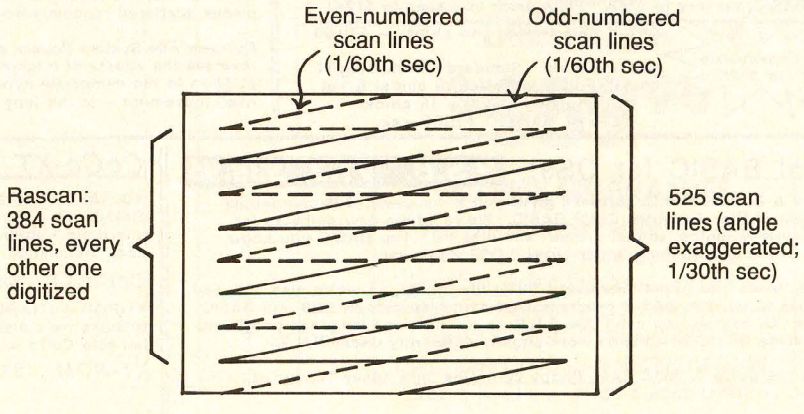


Figure 1: Television Signal Scan Lines

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.

Color Computer Software from Cer-Comp Ltd.

Window Master V2.2

The hottest new program available for the Color Computer III! Now you can have Windows, Icons, Buttons, Pull-Down Menus, Edit Fields and Mouse Functions built into your Basic or Machine Language Programs easily and quickly, without the need for OS9.

It supports up to 31 Windows on the display, multiple fonts in 54 possible sizes and styles, Enhanced Basic Editing and much more. It adds over 50 Commands and Functions to Basic to fully support the Point & Click Window System. In fact it has so many features it would take several pages to to describe them all.

It is completely compatible with existing Basic programs and takes absolutely no memory away from Basic. It contains a built in Ram Disk which is completely transparent to Basic (512k version) for enhanced operation.

It requires 1 Disk Drive, R.S. Hi-Res Interface & Joystick or Mouse. Includes both the 128k & 512k versions for only $69.95

Window-Ware

Window Writer - A Point & Click Word Processor, features both Mouse & Keyboard type editing, proportional printer support, powerful formatting capability, works with any printer. On screen Italic, bold etc. WYSIWYG Requires Window Master & 512k- $59.95

Window Writer/W - for non Window Master users includes all features as described above. Requires 512K & Disk $79.95

Window Basic Compiler - A Basic Compiler similar to CBASIC only it compiles all the Window Basic statements to create super fast M.L. programs & Desk Accessory programs for Window Master $99.00

Window EDT/ASM - A full featured Editor/Assembler and Debugger for the Window Master System $49.95

Font/Icon Editors - A utility disk with the Font & Icon Editors so you can edit or create your own, includes Basic & M.L. versions $19.95

Advanced Programmers Guide - A Guide for Basic & M.L. Programmers on interfacing to Window Masters complete system including System Calls, Memory Map, Interrupt handling & Extended Memory access. $24.95

The Memory Game - A Concentration like game, lots of fun for everyone. $19.95

512K RAM UPGRADE

Give your COCO 3 all the power it deserves with this easy to install (no soldering/plug in) 100% Tandy compatible 512K memory upgrade. Completely assembled and tested. Includes Ramdisk & Memory Test software described below. $159.95, **512K + Window Master $199**

512K RAMDISK & TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in you CoCo-3. Plus it allows your CoCo-3 to run at double speed all the time even for disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test.

Requires 512K & Disk $19.95

CBASIC Editor/Compiler

The ULTIMATE Color Computer BASIC COMPILER!!!

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

CBASIC is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your CoCo without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly.

CBASIC supports all the enhanced hardware available in the CoCo 2 & 3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts. We even added advanced commands not available in Basic to give you a level of control only available to very advanced Machine Language Programmers. Plus we made it exceptionally easy to use, not like some other compilers. CBASIC is the friendliest and easiest compiler available for the Color Computer.

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. CBASIC features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/Put, H/Play and H/DRAW, all with 99.9% syntax compatibility.

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

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

Coco 1,2 or 3 Disk $149.00

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

To order by VISA, MASTERCARD or COD call us at (702) 452-0632

(Monday thru Saturday, 8am to 5pm PST).

CER-COMP Ltd.
5566 Ricochet Avenue
Las Vegas, Nevada 89110
702-452-0632

DataPack III Plus V1.1

SUPER SMART TERMINAL PROGRAM
AUTOPILOTand AUTO-LOG Command Processors
X-MODEM DIRECT DISK FILE TRANSFER
VT-100 & VT-52 TERMINAL EMULATION

- No lost data even at 2400 Baud on the Serial port.
- 8 Selectable Display Formats, 32/40/64/80 columns
- ASCII & BINARY disk file transfer via XMODEM.
- Directly record receive data (Data Logging).
- VT-100 emulation for VAX, UNIX and other systems.
- VT-100/52 cursor keys ,position,, PF & Alt. Kbd. keys.
- Programmable Word Length, Parity, Stop Bits .
- Complete Full and Half Duplex operation,
- Send full 128 character set from Keyboard
- Complete Editor, Insert, Delete, Change or Add.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 Baud.
- Send Files from the Buffer, Macro Keys or Disk.
- Display or Print the contents of the 50k Buffer.
- Freeze Display & Review information On line.
- Built in Command Menu (Help) Display.
- Built in 2 Drive RAMDISK for 512K RAM.

Supports: R. S. Modem-Pak & Deluxe RS-232 Pak.

Coco 1, 2 or 3 Disk - $59.95

"The SOURCE"

DISASSEMBLER & SOURCE CODE GENERATOR

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

- Automatic label generation.
- Allows specifying FCB, FDB and FCC areas.
- Disassemble programs Directly from disk.
- Automatically locates address.
- Output listings to the Printer, Screen or both.
- Generates Assembler source directly to disk.
- Built in Hex/Ascii dump/display.
- 8 Selectable Display formats 32/40/64/80 .
- Selectable Foreground & Background colors.
- Built in Disk Directory an Kill file commands.
- Menu display with single key commands.
- Written in Ultra Fast Machine Language.

Coco 1, 2 or 3 Disk $49.95

EDT/ASM III

DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns. 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.
- Full Screen line editing .
- Easy to use Single key editing commands.
- Load & Save standard ASCII formatted files.
- Block Move & Copy, Insert, Delete, Overtype.
- Create and Edit files larger than memory.

The Assembler features include:

- Supports Conditional IF/THEN/ELSE assembly.
- 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.

Coco 1, 2 or 3 Disk $59.95

Photo 1

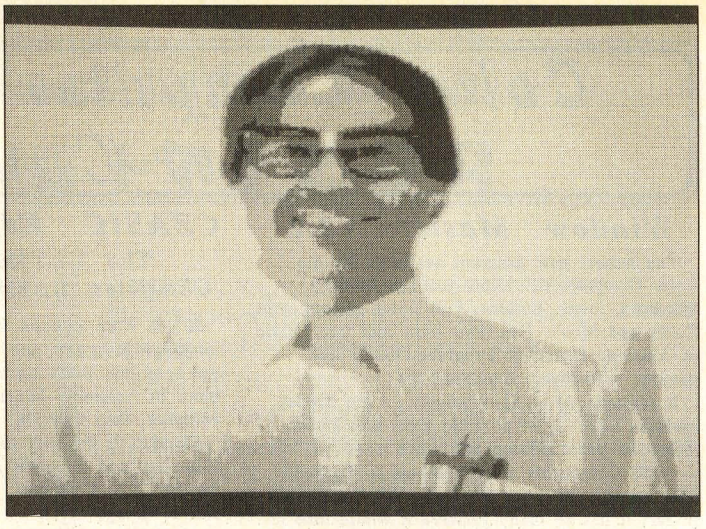


Photo 2

The Rascan unit *does not* plug into the Multi-Pak or ROM cartridge slot. It has two cables that plug into the left and right joystick ports. This is good and bad. It leaves a free Multi-Pak slot but means you have to unplug the joystick cables. On the other hand you don't need to buy a Multi-Pak to run Rascan.

I plugged my Sanyo VC1224 monochrome video camera into the RCA jack on the rear of the Rascan unit. (The Sanyo camera without lenses costs about $170.) By adding a C-mount adapter available at many camera stores, you can use 35mm SLR camera lenses (the adapter costs about $15). I have a 70mm-210mm Canon lens on the camera that I used for all the pictures in this article. The cable from the camera is an inexpensive video cable with RCA jacks on either end, which you can buy at your local Radio Shack.

I switched on the Rascan unit and ran BOOT from the Rascan disk. Uh, oh — trouble! When I attempted to enter commands, nothing happened — there was no text on the screen. I found when I turned the Rascan unit off, things operated normally. I opened the manual. Sure enough, the manual confirmed that the Rascan unit should be powered up directly before digitizing pictures and turned off after digitizing. I then took time to print up a three-foot banner that states "Always read the manual first" and pinned it up in my office.

In light of this operator error I thought I should try to display some sample files as a first step. I pressed ESC to bring up the main menu and then selected the proper menu item to load picture files from disk. The samples I saw were excellent.

I made a cursory scan of the manual and started digitizing data myself. When digitizing, you must have a small television or monitor so you can frame the picture and focus. I have a nine-inch monochrome TV fed by an RF modulator that converts the camera output to television Channel 3 or 4. I framed a shot of my Sheltie, JB, and adjusted the focus. I then switched on the digitizer box and after a moment saw the results on the CM-8 screen — instant Shetland sheepdog! At that moment my cousin Ferd walked in.

Ferd's Photos

Ferd Barden is a typical computer nerd, complete with taped eyeglasses and pocket protector.

"Hey, Ferd, how ya doin'?" I queried, thinking all the time that he might be a good subject to digitize.

"Well, pretty good," he mumbled, "if I can get this program working. It seems the program clobbers the stack after about 30,000 iterations."

"That's great, Ferd. Here, sit down and rest for a while." I steered him over to a chair facing the camera. "Tell me about your stack problem," I offered, swiveling the camera and focusing on his horn-rimmed glasses.

"Well, I get halfway through the program — I've almost computed the matrix — and then I . . . ."

"Sounds great — here, just keep focused on this magazine centerfold while I take some pictures," I suggested.

The first picture I took required some adjustment. There are two controls on the Rascan, one for contrast and one for brightness. Getting the proper picture qualities is largely a matter of trial and error — adjusting one control and then the other. How-

Nine-Times

The first magazine devoted exclusively to OS-9!

Every other month you will receive a disk *jam-packed* with programs and articles *all* for **OS-9**.

Each issue contains: 10 helpful and useful programs to help build your OS-9 library * Instructions, examples, and samples of Basic09 procedures and subroutines to help with your own programs and your understanding of Basic09 * C programs and programming examples * Program reviews, Hints, Help columns, and informative articles to advance your knowledge of OS-9 * Supplied totally of 5.25" disk * Bound manual sent to each new subscriber for help in getting *Nine-Times* up and running, as well as tips on using it with a ram disk or hard disk * All graphic/joystick interface for ease of use.

1-Year Subs, $34.95 Canadian postage, add $1.00
Foreign postage, add $7.00

Back Issues: Back issues are available for the May 1989 and July 1989 issues. Please write for information on Back Issue contents.

Back Issue, ea. $7.00 Foreign postage, add $1.50 ea.

Magazine Source: Due to many inquiries, the source code for the magazine graphic shell is being provided as an informational tool. Included is the actual Basic09 source code and compiled modules on disk, as well as documentation and a printed copy of the source code.

Source, $24.95 Foreign postage, add $1.50

To order, please send U.S. check or money order to:
JWT Enterprises
5755 Lockwood Blvd.
Youngstown, OH 44512

Technical Assistance: (216)-758-7694

Sorry, no C.O.D.'s; foreign orders, *please* use **U.S. money orders**.
Checks, allow 3 weeks for receipt of first issue/back issue.

Copyright (C) 1989 OS-9 is a trademark of Microware Systems Corp. and Motorola, Inc.

ever, it goes smoothly, especially if your subject is well-lighted.

The first picture I took of Ferd was the 16-level, 640-by-192 resolution shot shown in Photo 1. There is a white background in the shot that doesn't offer much contrast against Ferd's white shirt, but the mechanical pencils in his pocket protector show up quite nicely.

I then changed the mode to four-level, 640-by-192 resolution. In this mode there are only three levels other than white, and you get a type of contouring effect (see Photo 2).

There are 16 levels in a digitized picture. These levels can be assigned false colors by another mode in Rascan. The initial false colors assigned to Ferd's 16-level image are shown in Photo 3. A total of 64 different colors can be displayed in the CoCo 3's

Photo 3

320-by-192 high-resolution mode in a palette of 16. You can choose any of the 64 colors and assign them to any level via Rascan's Edit Color and Custom Paint modes. In this manner you can actually change the colors into something approaching real life, but I didn't have time to do this with Ferd's image. Besides, Ferd is scary enough in real life.

Digitizing Photos

Ferd left to go to a computer club meeting. (The club was having a stimulating lecture he couldn't miss — something about upgrading MC-10s to CoCo 3s.) I was left to my own devices and decided to try digitizing some newspaper photos. The first one I tried was a very poor resolution shot of a cougar shown in Photo 4. Considering the original, I think it turned out fairly well. Sixteen-level mode was used here.

The next digitization I attempted was a portion of the Rascan ad from the pages of THE RAINBOW. Using a close-up lens, I digitized a two-by-one-and-one-half inch area, adjusting the brightness and contrast to essentially get two colors, black and white. The results are shown in Photo 5.

Full Colors . . .

Having excellent luck with the basic

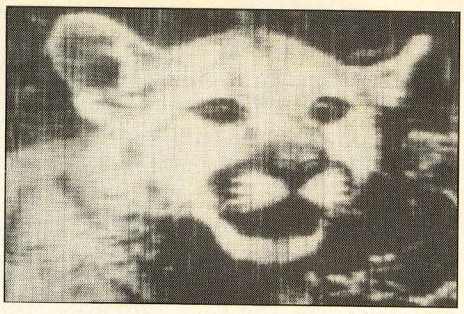


Photo 4

Photo 5

modes, I went on to full colors. Just how can you get a full range of colors out of four colors on a CoCo 3 Hi-Res screen? Rascan does it by taking three digitizations of the same subject: one with a red filter, one with a green filter, and one with a blue filter. If you remember grade school art classes, you know these are the primary colors. They are mixed to produce any hue of color. Rascan maintains four different buffer areas on a 512K byte CoCo 3. The first buffer is called the *main buffer* and stores a 16-level black and white image. There are three additional buffers called the red, green and blue buffers, each holding a filtered digitization of the same scene.

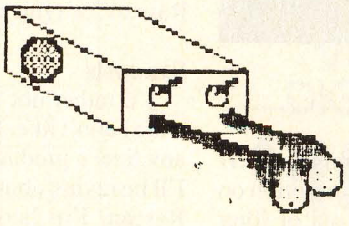
Once the scene has been digitized in red, green and blue, the image can be viewed in full color by selecting a 4096 mode. In this mode the three screens are displayed in rapid sequence. The eye integrates the three colors into the full range of colors present in the original shot.

I loaded a sample from the Rascan disk and was impressed with the coloration. The disadvantage of the display, though, was flicker. Although Game Point claims that flicker is less on a normal television, the flicker on a CM-8 is quite noticeable. It's about equivalent to the flicker you see on some renditions of silent movie footage. Still it *is* full color and the image compares very favorably to the EGA mode used in MS-DOS systems.

I had to try the technique myself. I needed the filters immediately. Looking in my Edmund Scientific catalog, I saw that two-by-two-inch red, green and blue filters sell for $3.95 — a bargain. However, even with airfare reductions, Barrington, New Jersey, was out of the question — and it was too late to order the filters from Game Point. I opted instead for trying to locate red, green and blue cellophane locally. I filtered through two malls and assorted drug and craft stores. After three hours I found what I'd been looking for — a roll each of red, green and blue cellophane.

I cut out a square of each color and set up a small scene on photographic background paper using Sesame Street characters. I added about 200 watts of lighting using photo reflectors. Once the scene is ready to

The ONLY joystick adapter you will ever need !
Replaces TANDY Hi-Res adapter!
Replaces COLORWARE Hi-Res adapter!
Acts as a LORES (no) adapter!
All at the flick of a switch!!
NO SOFTWARE PATCHES NEEDED!!



PATCHES

NEW MODEL !!
The adapter also allows full use of the cassette jack for cassette player or hardware copy-protection modules
$40 ($30 till Oct1st)
SASE for more info and price list.

HAWKSoft P.O. Box 7112
Elgin, IL. 60121-7112
(312)-742-3084 eves & ends
S/H (US & CAN) always included

be shot, it literally takes about a minute to shoot the three buffers. Just select the proper buffer from a menu, select the digitize function, flip a switch on the digitizer, and sit back and watch the digitization on the screen, which proceeds from right to left in a vertical column. The screen refreshes every 15 seconds or so while digitizing, and you get a warning beep at the end of each refresh. During this time you can press ESC to save the current digitization.

I captured the red, green and blue screens, saved them on disk and played back the shots in full-color mode. The results were fairly good but nothing near the quality of some of the samples included with Rascan. It's amazing how much additional optical information is added to a shot when color is used. The monochrome digitization tends to hide picture information; adding color greatly aids the brain in interpreting what is shown in a screen.

Although the shots I've taken in full color are not quite sharp enough for publication, Photo 6 shows a sample from the Rascan disk, which shows up quite well.

. . . And 3-D

Another feature found in Rascan is the capability to view three-dimensional images. The process is similar to viewing a full-color picture but requires red and blue or red and green three-dimensional glasses.

Photo 6

(Save your glasses after watching *Jaws III* or the most recent soft-drink promotion on television to make your own out of filter material, or buy them from Game Point). A red-filtered shot of a scene is taken and saved in the red buffer. The camera is shifted about four inches to the right or left, and a blue- or green-filtered shot is taken. A special view in 3-D mode alternately displays red and green or red and blue buffers.

There isn't a 3-D sample on the Rascan disk, so I decided to try my own. I took two shots of the Cookie Monster and Big Bird and played them back. The flicker wasn't as bad in 3-D mode and there actually is a 3-D effect. I suspect you can get good results after acquiring some expertise in this area.

Other Features of Rascan

In addition to the features described above, Rascan has other functions that allow you to edit and analyze the screen image, copy files and buffers, and convert to *CoCo Max 3* and *Color Max 3* formats:

- Screen Image Adjustment: Rascan allows you to center the scanned image by moving the image up or down when you press the ALT or CTRL keys. The aspect ratio of the image can be adjusted by pressing the lesser-than (<) and greater-than (>) keys. A *negative* image is displayed by using the negative image function, which inverts the image in a split second.
- Save and Restore Files: Rascan allows you to save and load any image onto disk. Rascan images have the file extension .IMG to denote a Rascan file.
- Histogram: The histogram function analyzes a digitized image, showing a bar graph representing the number of times each level is used. This can be an aid to getting a good balance in the case of a picture in which there should be an equal number of gray scales.
- Copying Buffers: The image in any buffer can be transferred to any other buffer by the Rascan Copy Buffer function.
- Conversion to *CoCo Max III* and *Color Max 3*: Two utility programs allow you to convert between Rascan format and *CoCo Max III* or *Color Max 3* format. Once in these programs, you can perform different editing functions on the digitized images, including cropping or addition of text.
- Slide Show: Another utility program allows you to prepare a slide show or sequence of images from disk.
- Printer Support: Although not present in this version, Game Point is upgrading Rascan for typical CoCo printers.

Synopsis

I'd rather not review software or hardware I don't like. You know in advance that any time a product appears in this column, I'll be raving about it. Such is the case with Rascan. I'm hooked on graphics — the higher resolution the better.

Rascan works perfectly for me, with only one glitch caused by an operator error (faulty keyboard scan when digitizing). I like the pop-up menus on the software and the sound feedback when functions are selected. In general Rascan is professional. About the only thing that could stand improvement is the manual — but it's no worse than most everyone else's CoCo documentation — a level below that which you get with MS-DOS systems.

The $159.95 price seems more than reasonable compared to MS-DOS equipment. If you have your own camera and spare monitor, there is little other expense. If you don't have a camera, consider getting a monochrome surveillance-type camera that can be purchased used for about $75 and new for $250 with a lens. If you don't have a monitor, buy a used or new black and white monitor for $50 to $100. Connecting cables costs another $12. The total bill is about as follows:

Rascan:	$160
Camera:	$75
Monitor:	$75
Cable:	$12
Total:	$322

This is a little hefty for many CoCo users, but you can get by without the camera and monitor if you want to digitize directly from VCR or freeze-frame television. CoCo 1 and 2 users must be content with monochrome DS-69 or DS-69B — still fine units, but with resolutions of 256-by-256 in 16 levels.

Still More on CoCo Outputs

A few months ago I wrote a column on CoCo outputs. Charles G. Weiser of Malibu, California, wrote a nice letter telling me I was wrong when I said there were only three programmable outputs on the CoCos. He uses the sound output of the CoCo to feed 567 tone decoders. Although he states that 255 tones can be decoded, he uses 15 tones with fifteen 567s.

Each 567-tone decoder is tuned to a particular tone. The output of the 567 then goes to opto-couplers to control relays or transistors. This is a darned good idea and might merit a separate article in the future, at which point I'll give Mr. Weiser credit again. Those of you who know what I'm talking about will catch the concept immediately. Other readers, check out the 567 tone decoder specs at your local well-equipped electronics store. I can't find the part in Radio Shack's 1990 catalog, although it's been carried in the past.

Dennis Buswell of Jefferson City, Montana, wrote to say that Heathkit made at one time — and may still have in stock — an RS-232-C to BSR X10 Interface (GD-1530). This might be an alternative to the Plug 'N Power controller for the CoCo if you can locate one.

David B. Smith of Grand Portage, Minnesota, sent a number of ideas for CoCo inputs. One I liked was using a potentiometer in a home-built foot pedal. Another was a steering wheel for driving simulation games. I'd like to see that implemented.

See you next month with more CoCo topics.

NEW! Window Writer 1.2

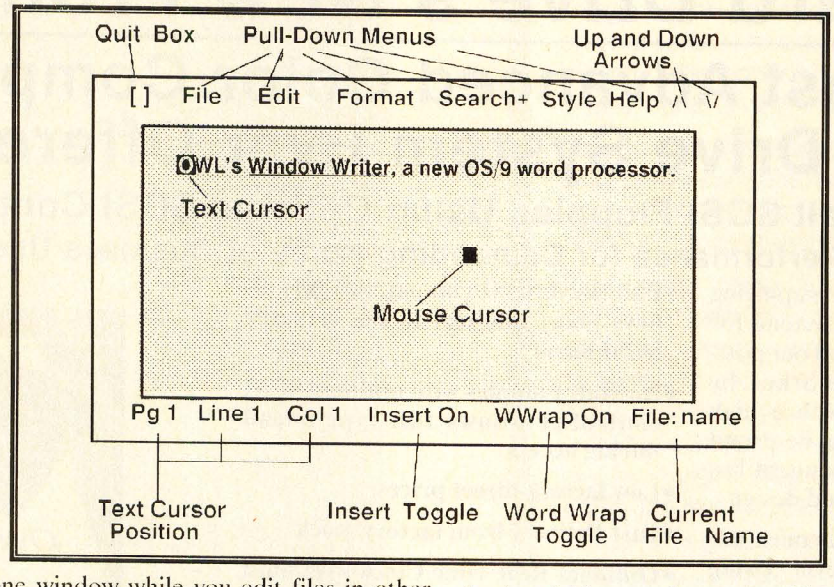
What we believe to be the best word processor available for OS/9 just got better! You asked and we listened. We have added new features which the public has requested!

DYNASPELL 102K WORD SPELLING CHECKER NOW AVAILABLE!

More Versatile and Powerful. OS/9 Allows you Freedom and Power. The mouse and pull-down menus give you speed and ease of use.

Multi-Tasks

Window Writer is the first Color Computer word processor which takes full advantage of OS/9. The result is a word processor which is fully as modern and professional in action as those previously available only for the IBM and Mac. The operating system allows true multi-tasking with other programs or itself. Not limited to just printing one file and editing another. You can print one file in one window while you edit files in other windows. At the same time you can be running a small program in another window. You can cut and paste between sections of files in different windows.



Pull Down Menus and Help Screens

A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one help item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse (or joystick) or can be accessed by control keys.

Hi-Res Display

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

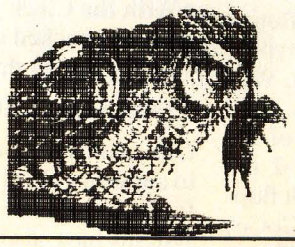
Ram Disk

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

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

Mail-Merge

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



Upgrade Policy:
A free replacement for earlier versions of *Window Writer* is available in the US until October 31, 1989. Call us at 215-837-1917 for instructions. PLEASE do not call the 800 number.

Editing is a snap with OWL's Efficient Mouse Usage!

Editing

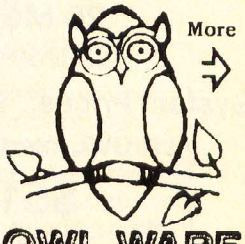
Like most modern word processors, with **Window Writer** there is always more than one way to access any editing feature. You can access editing by menus using mouse, "keyboard mouse", or through control keys. Full help screens are quickly available for all editing features. A help screen can be left visible while needed and then quickly removed to get back to full screen editing.

One nice feature is the price:

only $59.

For the DynaSpell Spelling Checker by Dale Puckett including the 102K Word Dictionary:

only $20. additional!



OWL-WARE

P.O. Box 116-A
Mertztown, PA 19539
— ORDER LINES (only) —
(800) 245-6228
(215) 682-6855 (PA)

Proven

On the Razor's Edge of

The Hard Drive's New Frontier:

The Most Advanced Color Computer Hard Drive System Ever Offered!

Fast No-Halt SCSI Floppies Using Optional SCSI Controller

Proven Performance for Demanding Home or Business Users

OWL-WARE has now been supplying Color Computer hard drive systems for over 4 years. We have reached our position in the hard drive market by providing our customers with a high quality product that they can be proud to own and use. Our first concern has always been quality and sound design.

We are now announcing our most advanced hard drive system ever. **Using the optional OMTI 5200 SCSI controller with our Hard Drive Interface, our new system will support no-halt floppy drives.** You need not wait while typing or worry about clock time losses. Why be limited to 3 floppy drives? A complete system could now consist of 1-3 standard CoCo floppy drives, 1-2 (or more) hard drives, and 1-2 no-halt floppies using standard (not just CoCo) OS/9 format. You can use single or double-sided 40 or 80 track drives with the SCSI no-halt controller.

There are several new features with this improved interface. These include:

- **Full SASI/SCSI compatible (this allows many add-ons to the versatile SCSI buss)**
- **No-Halt Floppies with optional SCSI controller allows full type-ahead during access**
- **Low factory-direct prices**
- **Fast Delivery from factory stock**
- **Optional Real Time Clock with built in battery (3-10 year lifetime)**
- **With the Clock you have 240 Bytes of battery backed up RAM for password protection or data storage!**
- **Same super stable LRTech quality**

Our quality is obvious when compared to any other Hard Drive system or interface. Even the box is special. Our systems have always had a fan. Has our competition just heard about them?

Interface Price only: $85.

Real Time Clock-RAM: $25.

20 Meg. 40 Meg. 80 Meg.
(2X40Meg.)

System Prices: (Includes Hard Drive, case, & fan, SASI Controller*, LR/OWL Interface, Software. Fully assembled and tested.)

$519. $629. $929.

Super System Prices: (LR/OWL System as above but OMTI 5200 SCSI Controller AND 3.5" 80 Track Floppy Drive in same case)

$649. $759. $1099.(2 cases)

*SASI controller is unused surplus. Add $75 for OMTI SCSI

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly, testing,** and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 4 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

OWL HD BASIC 3 is very fast due to our index method. Almost all BASIC commands including DSKINI, DSKI$, and DSKO$.

BASIC for Hard Drives Prices: With/Without Hard Drive

$35./$79.

Technology

the Color Computer Frontier

DISK DRIVES

Floppy Drive Systems

The Highest Quality for Years of Service

(We have located a number of unused, surplus single sided drives for those who wish a quality, inexpensive system.)

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$199.** (Same but Single sided) **$185**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$129.** (Same but Single sided) **$115.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$179.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) $295.

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model 500 $119. **Model 501 or 502 $129.**

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)
1-800-245-6228
1-215-682-6855

Technical Help
1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than $20 each.

If sold separately this is more than $125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE
P.O. BOX 116
Mertztown, PA 19539

An introduction to file-transfer protocols

Observing the Social Graces

By Tim Koonce

So you finally figured out how to use a modem and a terminal program to call up and leave messages on local BBSs, or maybe even how to set up an account on Delphi or CompuServe, but you're a little confused about how to download files to your CoCo. Or maybe you've been downloading for a long time but you're starting to hear more about Ymodem and aren't sure what's up. Are you baffled by a friend telling you about the wonders of Kermit? Is Zmodem really better than Ymodem? What is *batch*?

Even long-time modem users often get confused about the differences between the available protocols and why certain ones are preferred.

In the Beginning

In the mid '70s, when people were first trying to figure out how to connect modems to CP/M computers, it became clear that it should be easy to send files from one machine to the next. The idea was that I could call you up, and we would both turn on our modems, setting up a program on each end to copy the file across. Several groups of people set out to design such programs by writing down a *protocol*, a set of rules describing what the transfer program does.

ASCII Files Are Easy

Some files are simple to transfer. Straight ASCII text files are usually not impaired by a few spelling errors, so text files are easy to handle by just opening a *capture buffer*. In this setup one side lists the file and the other side captures it. One nice addition is the use of CTRL-R and CTRL-T to mark the beginning and end of the file. This way the receiving side knows exactly where the file starts and ends. Using these two control characters is sometimes referred to as *RT Buffer Capture* or *Automatic Buffer Control*. This simple method of transferring files is also the fastest, although it isn't sufficient for many purposes.

Christensen's Protocol

Binary files such as programs and compressed files (many graphics formats include compression) and even program

---

Tim Koonce, currently pursuing his doctorate in mathematics at the University of California at Berkeley, has worked with the Color Computer since 1982. He is the author of VTerm *and is the CoCo SIG Database Manager on Delphi.*

source code require more care for several reasons. First, errors are more important. If one letter is transferred wrong in a long text file it results in a misspelled word; if one byte of a program is wrong, it can be disastrous. Secondly, you must know exactly where a binary file starts and preferably where it ends. While it is possible to use one character to mark the start of a binary file, you can't use just one character to mark the end because that character may appear in the file being transferred.

People have spent a lot of time developing methods to transfer all file types reliably. Some attempts were sophisticated and offered a lot of features. But the one that became popular was Ward Christensen's simple Xmodem protocol.

In order to understand Xmodem you need to understand a little about CP/M files. Every CP/M file is an exact multiple of 128 bytes. That's the size of a CP/M sector. For text files, which may not fit in an exact number of sectors, CTRL-Z is used to mark the end of the text. Christensen's protocol was first implemented in his series of *MODEM* programs. *MODEM2* has a version of the protocol, and *MODEM7* includes a batch extension, which has faded from popular use. *XMODEM*, from which the current name comes, is intended for unattended remote operation so you can get a file from a friend's computer without having them there. The basic protocol consists of transferring each sector of the file and awaiting an acknowledgement.

To establish some terminology, a group of bytes sent together constitute a *packet.*

Most protocols distinguish between data packets, which have the data you're attempting to transfer, and control packets, which communicate other information. In Xmodem control packets are always single characters. The makeup of an Xmodem data packet is outlined in Figure 1.

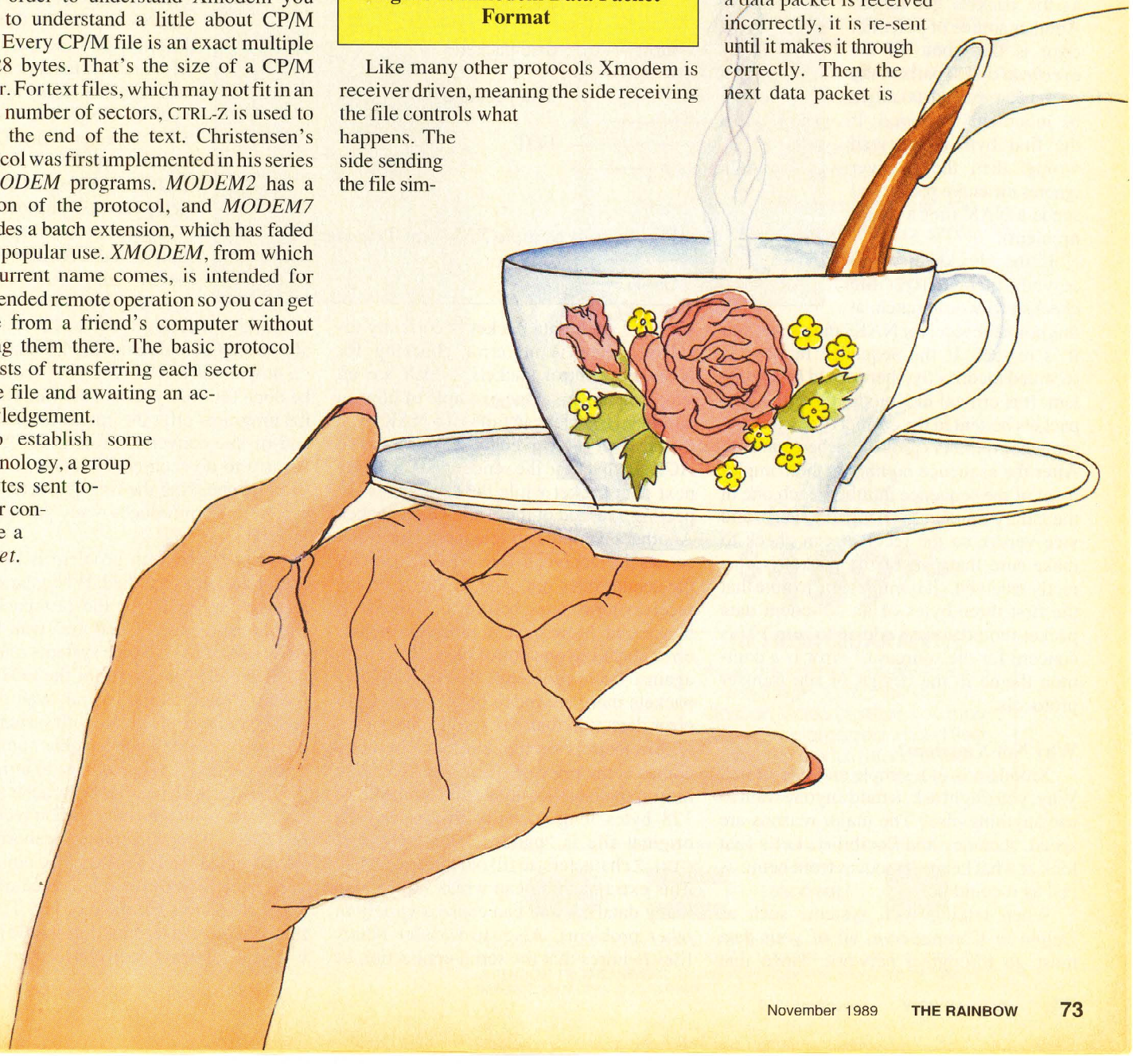
Bytes

1	- Character 1 (SOH character)
1	- sequence number (starts at 1, wraps from 255 to zero)
1	- complement of sequence number; for error checking
128	- data; one sector of file
1	- checksum; sum of the 128 data bytes

Figure 1: Xmodem Data Packet Format

Like many other protocols Xmodem is receiver driven, meaning the side receiving the file controls what happens. The side sending the file simply waits until the receiver tells it what it needs to do.

The receiver starts by sending a NAK (Negative AcKnowledge) packet. (In Xmodem, this is the single character NAK.) If this gets no response, it repeats every 10 seconds until the sender answers by sending the first data packet. When the receiver gets the first data packet, it adds up all the bytes in the packet and compares it against the checksum at the end. If they agree, there is no error and the receiver sends an ACK (ACKnowledge) packet. The sender interprets the ACK as "send the next data packet." If the checksums don't agree or there is some other problem, the receiver sends a NAK, which the sender interprets as "resend the same data packet." When a data packet is received incorrectly, it is re-sent until it makes it through correctly. Then the next data packet is



dealt with. When there are no more sectors in the file, the sender sends an EOT (End Of Text) packet, which the receiver acknowledges, and the transfer is complete. Figure 2 illustrates how a file 256 bytes long might be transferred with Xmodem. Notice that the Xmodem protocol allows for either side to start first. If the transmitter starts first, it simply waits until the receiver starts.

Xmodem has become popular because it is simple. Yet even this simple protocol has a number of important features. First a check value is included in every data packet to allow the receiver to check that the packet was correctly received. In Xmodem this check value is computed by adding up the values of each byte, which is called a *checksum*. Checksum error checking works well in protocols that have small packet sizes, such as Xmodem, but becomes progressively less reliable as the packets get larger. Another source of potential error is that some of the *overhead* bytes (parts of the packet that aren't data) might be incorrectly received. If the first byte is received wrong, then the receiver ignores the entire packet and sends a NAK (not a major problem).

If the checksum is received incorrectly, the checksums won't match; at this point the receiver NAKs the packet and it is re-sent. If the sequence number is received incorrectly, there could be a problem. It is critical in Xmodem that the data packets be sent in the correct order, and the sequence numbers provide a check on that. After the sequence number is the complement of the sequence number (each one in the binary number is changed to zero, and vice versa), so the receiver can check to make sure that part of the packet is correctly received. (It is interesting to note that the first three bytes of an Xmodem data packet should always add up to zero.) This concern for the sources of error is a common theme in the design of file transfer protocols.

Receiver sends **Transmitter sends**

NAK ——————> (transmitter hasn't started yet; after 10 seconds receiver tries again)
NAK ——————>
<—————— data packet 1
ACK ——————>
<—error—— data packet 2
NAK ——————>
<—————— data packet 2
ACK ——————>
<—————— EOT
ACK ——————>

Figure 2: A Sample XModem Transfer.

Why Not Xmodem?

Xmodem is old, simple and functional. Why, you might ask, would anyone want to use anything else? The major reasons are speed, accuracy and flexibility. Let's first look at what keeps Xmodem from being as fast as it could be.

When talking with systems such as Delphi or CompuServe, all of your data must go through a network. Since that network sometimes gets very busy, it can sometimes take several seconds for your data to get through the network. In Xmodem, after the sender finishes sending a packet, the receiver may not finish receiving it until several seconds later. The receiver then sends an ACK, which takes several more seconds to get back to the sender. At 1200 baud, half of the time can be spent waiting for this delay. At 2400 baud, nearly three quarters of the time in an Xmodem transfer can be spent waiting for network delays. Clearly, at higher baud rates, this additional time becomes the limiting factor to the total transfer speed.

Although Xmodem takes pains to ensure that each data packet is correctly received, there is no error checking for Xmodem control packets, which are all single characters. One example of how an Xmodem transfer can fail is if a NAK from the receiver is received by the sender as an ACK. In that case the sender goes on to the next data packet while the receiver is expecting a resend of the current data packet. Another example is if telephone line noise causes the receiver to see an EOT character the sender does not send. In this case the receiver terminates before the full file is transferred. More modern protocols include error checking on control packets to gaurd against such problems. Even with data packets there are much better methods of error detection than the simple checksum.

Xmodem is simple, but that simplicity comes at the price of flexibility. Xmodem only transfers files that are a multiple of 128 bytes long. Usually this means the original file is "padded," typically with CTRL-Z characters, to fill out the last packet. This extra padding can wreak havoc with many datafiles and can cause a variety of other problems. Also, to transfer binary files requires that the serial connection be able to transfer any eight-bit byte. There are some situations in which this is simply not possible. A typical example is when transferring files to/from mainframe computers. Another example is when many networks use certain characters for special purposes, and havoc ensues if those characters appear in the data being transferred across the network. Newer protocols use various methods to encode certain characters to avoid these problems.

Finally one convenience issue is that under Xmodem, there is no way to transfer a batch of files at one time without operator intervention, a capability that is a part of most newer protocols.

Common Shortcomings

A few issues concerning writing programs to handle Xmodem transfers are often overlooked. One has to do with the transfer of ASCII files. Under CP/M, ASCII files use a CR/LF (Carriage Return plus Line Feed) pair of characters to mark the end of a text line. Some systems such as UNIX use a single LF character. The CoCo, under both OS-9 and RS-DOS, uses a single CR character for this purpose. The Xmodem protocol specifies that all ASCII files should be sent with CR/LF characters between lines. For the CoCo, this means adding an LF character after each CR and removing LF characters on download. Such processing should not be done for binary files. Few CoCo terminal programs offer the option of doing this end-of-line conversion for ASCII files. A few try to do such conversions automatically by checking the first character of the file, but this introduces many problems of its own.

Another common problem is how the end of the file is handled. When the sender receives an ACK for the last packet, it should send an EOT and then wait for an ACK of that EOT. Some systems routinely NAK the EOT and wait for the EOT to be resent. Programs that do not wait for the ACK can cause problems with systems that do this. When an unacceptable number of errors occurs, it is customary to terminate the transfer with the CAN character (CTRL-X). Systems that terminate upon receiving one CAN character sometimes abort when a CAN character is generated by noise. It is preferable to wait for a sequence of three CAN characters before aborting. The side that requests the termination should probably send at least five consecutive CAN

characters in case noise causes one of them to be incorrectly received.

Receivers and transmitters using Xmodem allow each other a specific amount of time for a proper response. If one end takes too long and this *time-out delay* is not satisfied, a Time-Out Error is generated. This normally beneficial aspect of Xmodem has its drawbacks too. Since most terminal programs are tested over local telephone connections, it is not uncommon for the time-out delay to be too short for use over a network, causing a lot of unnecessary time-out errors. However, a very long time-out delay can slow error recovery when a character is lost due to noise. Some terminal programs go to the extreme of having two different versions of Xmodem, one with shorter time-out delays (less than 10 seconds) for quick error recovery over local telephone connections, and another with longer time-out delays (sometimes as long as 30 seconds) for use over slower networks such as those used to connect to CompuServe and Delphi. The best option is for the program to adjust the time-out delay based on the round-trip delay it sees, but this is difficult to do well.

One point of debate is the proper handling of a file partially received before the transfer is aborted because of errors. Some people claim the file should be deleted so the user does not mistakenly believe the file was received correctly. This reasoning has some merit for binary program files, where a partial program is not useful. However, for text files and other files where the problem may be something like the EOT incompatibility just mentioned, it seems preferable to keep the partial file, issue an appropriate error message, and let the user decide if the partial file is useful.

Improving a Standard: Xmodem-CRC

It wasn't long before people tried to improve Xmodem. In order to reduce the chances that an incorrect packet is accepted by the receiver, it is good to use a 16-bit Cyclic Redundancy Check (CRC) for error detection, rather than an eight-bit checksum. By taking advantage of the properties of irreducible polynomials, CRCs are much more sensitive to errors than checksums. This change alone provides a significant increase in the reliability of Xmodem-CRC transfers over standard Xmodem. In order to maintain compatibility, though, it is desirable that the sender be able to figure out which type of error checking it should use. Xmodem-CRC handles this problem by modifying the initial handshake. In a standard Xmodem transfer, the first thing the receiver sends to the transmitter is a NAK. In an Xmodem-CRC transfer, the receiver sends a capital C (Character 67), signifying that CRC error checking is to be used. The receiver sends this several times and if the transmitter doesn't respond, the receiver assumes the transmitter can only use standard Xmodem and switches to a NAK, signifying that checksum error detection should be used. The transmitter watches for the first character from the receiver. If it is a NAK, it assumes the receiver can only use checksum error detection. Otherwise the transmitter uses CRC error detection.

The biggest problem with Xmodem-CRC is that routines for calculating CRCs are difficult to understand. Cyclic Redundancy Checks rely on being able to do polynomial division modulo two. However, routines for calculating the most common CRCs (there are many different ones, and the 16-bit CRC-CCITT used by Xmodem-CRC is by far the most common) are not difficult to find. In fact most people simply use routines already written by someone else.

Next Online: Ymodem

In the late '70s, Chuck Forsberg started working on his series of YAM (Yet An-

DROWNING IN A SEA OF EXPENSIVE COMPUTER SOFTWARE? TURN TO PAGES 31, 55, OR 97 FOR SOME INEXPENSIVE QUALITY PROGRAMS FOR YOUR COLOR COMPUTER!

T & D SUBSCRIPTION SOFTWARE
2490 MILES STANDISH DR., HOLLAND MI 49424 (616) 399-9648

COLOR RIBBONS & PAPER

COLOR RIBBONS
RED, BLUE, GREEN, BROWN, PURPLE, YELLOW

Ribbons — Price Each	Black	Color	Heat Transfer
Radio Shack —			
— DMP 130	6.50	8.00	—
— DMP 110	4.50	5.25	5.75
— DMP 120	6.75	7.75	—
— DMP 130/132	5.25	6.50	7.95
— DMP 200	6.75	7.75	—
— DMP 230/520	4.00	5.25	—
— DMP 410/510	5.00	7.00	—
— DMP 430	12.00	—	—
Apple Image I/II	3.75	4.50	6.50
Citizen 120/180D	5.00	6.00	7.95
Epson MX80/LX800	3.75	4.25	6.75
Okidata 180/192	6.50	7.50	6.00
Panasonic K-XP 1080	6.75	7.75	—
Seikosha SP 800/1000	5.25	6.50	7.95
Star NX 10/NL 10	5.00	6.00	7.95
Star NX 1000	4.50	5.50	6.75
Star NX 1000 — 4-Color	—	8.75	—

COLOR PAPER
BRIGHT PACK —
200 Sheets/50 ea. color: Red, Blue, Green, Yellow. 9 1/2 x 11 — $11.90/pk.
PASTEL PACK —
200 Sheets/50 ea. color: Pink, Yellow, Blue, Ivory. 9 1/2 x 11 — $11.90/pk.

COLOR BANNER, PARTY BANNER, CHRISTMAS BANNER, HAPPY B-DAY BANNER, CONGRAT'S BANNER — 45'/Roll — $9.95/Ea. Roll

COLOR CERTIFICATE PAPER — 100 Shts./Pk. — $9.95/Pk.

GREETING CARDS — 50 Cards & 40 Env./Pk. — $11.95/Pk.

T-SHIRT RIBBONS (Heat Transfer) — Call For Price & Avail.
COLORS: Red, Blue, Green, Brown, Purple, Yellow, Black

COLOR DISKETTES
5 1/4" DS/DD Rainbow Pack. 10/pack — $12.50

For ribbons & paper not listed above, call for price. Price & spec. subject to change w/o notice. Min. order $25.00. S & H $3.50 minimum. Visa, M.C., C.O.D.

RAMCO COMPUTER SUPPLIES
P.O. Box 475, Manteno, IL 60950 U.S.A.
(U.S.A.) 800-522-6922 • (Canada) 800-621-5444
815-468-8081

The CoCo Picture Show

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

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

Yes! Send me Volume 1 of CoCo Gallery on Disk for

___ CoCo 1 or 2 ($7.95) ___ CoCo 3 ($7.95)

Name _____

Address _____

City _____ State __ ZIP _____

Kentucky residents add 5% sales tax.

My check in the amount of _____ is enclosed.

Bill to:

☐ VISA ☐ MasterCard ☐ American Express

Account Number _____

Expiration Date _____ Signature _____

Mail to: CoCo Gallery On Disk, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

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

All other inquiries call (502) 228-4492.

other Modem) terminal programs. While working on these, Chuck became an expert on weaknesses in the Xmodem protocol. Chuck compiled several ideas that other people had been suggesting (including the use of CRC error checking from Xmodem-CRC) and several ideas of his own and developed an extension of Xmodem known as Ymodem.

Ymodem's major improvements over Xmodem are in its longer packet size, which gives increased speed over networks, its use of CRC error detection, and its batch capabilities. Let's look at each of these separately, then get an overview.

Earlier you saw that one weakness of Xmodem is that for every data packet transferred you must wait for data to make it across the network both ways, resulting in a very long delay between packets. One simple way to reduce the effect of this delay is to make the packets bigger. This way a smaller percentage of the time is spent waiting for the round-trip delay. The trade-off is that if an error occurs, it takes longer to resend a longer packet than it does to resend a short packet. But over modern networks there are few enough errors that this is usually not a serious problem. As far as the protocol itself goes, you need to make one slight change to the form of a data packet, since you want to maintain as much compatibility with Xmodem as possible. In Ymodem there are actually two types of data packets, which can be distinguished by the first byte. Figure 3 outlines what a Ymodem data packet looks like.

1 byte	Start of data packet character. Character 1 means there are 128 data bytes; Character 2, 1024.
1 byte	Sequence number
1 byte	Complement of sequence number
n bytes	Data, either 128 or 1024 bytes, depending on first byte of packet.
1 or 2 bytes	Either 1-byte checksum or 2-byte CRC check value, depending on the initial handshake

Figure 3: Ymodem Data Packet

One of the nice parts of the Ymodem protocol is that it retains the ability to use 128-byte data packets. This is nice for several reasons: First, when transferring the last part of a file, there may not be enough data to fill a 1024-byte packet. It may be faster to send a few shorter packets, rather than one long packet. Second, it takes much longer to retransmit a longer data packet, so under noisy conditions it is desirable to use shorter packets. Finally, a properly written Ymodem receiver can receive files from an Xmodem sender with no problems at all. In fact a properly written Ymodem sender can send to an Xmodem receiver with no problems if it interprets the initial handshake properly.

Ymodem handles the initial handshake in the same way Xmodem-CRC does. The transmitter watches for the first character from the receiver. If it is a NAK, the receiver can use only standard Xmodem (128 byte packets and checksum error detection). If it is a C, the transmitter uses Ymodem (1024 byte packets and CRC error detection). The convention that a NAK handshake means to use 128-byte packets, as well as checksum error detection, gaurantees compatibility with programs using the Xmodem protocol.

The third major addition Ymodem makes to the Xmodem protocol is batch capabilities. Common usage is that Ymodem refers to just the 1024-byte data packets and CRC error detection. Ymodem-batch refers to

What your CoCo was really meant for.

Expanding Horizons

Take your CoCo beyond the limits of floppy diskettes — connect to DELPHI, your **complete online business and personal resource.** With your modem and a local phone call, select from tens of thousands of downloadable programs, meet friends from across the globe, or tap into the world's most comprehensive databases to expand the horizons of your CoCo.

Your Resource for Color Computers

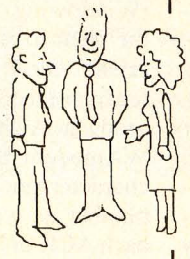
DELPHI's special group for owners of Tandy Color Computers is supported by the people who bring you *RAINBOW*. Access extensive databases where you can upload your favorite files and download programs written by other personal computer enthusiasts. Chat with other members and resident experts in Conference, use electronic mail, and post or respond to messages in Forum.

OS–9 Online

In OS–9 Online, DELPHI's interest group for fans of the OS–9 operating system, you'll meet other members, download files, and get tips to help you make the most of your CoCo.

RAINBOW Online

DELPHI is your online connection to *RAINBOW*. You can renew your subscription, meet other Color Computer owners, order software or hardware, or inquire about products. You can even download programs published in *RAINBOW*.



Wallet-Friendly

You can access DELPHI with a local phone call from almost anywhere in the United States. There is NO extra charge for using Tymnet or Telenet, NO monthly minimum, NO premium for 1200 or 2400 bps, and connect rates are a low $7.20/hour.

FREE Lifetime Membership

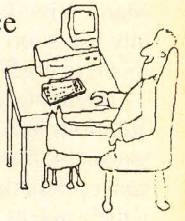
As a *RAINBOW* subscriber, you get a **FREE** lifetime DELPHI membership ($29.95 value) which includes a credit worth one evening hour of usage ($7.20).

If you don't already subscribe to *RAINBOW*, just request a subscription when you sign-up to DELPHI, and, for the $31 subscription fee, you'll get the same great deal!

Sign up now - Online!

With your CoCo and modem:

1. Dial 1-617-576-2981.*
2. Once connected, press RETURN once or twice.
3. At Username:, type **JOINDELPHI**
4. At Password:, type **RAINBOW**, if you already subscribe to *RAINBOW*.
   Type **SENDRAINBOW**, if you do not yet subscribe and wish to do so.
5. Have credit information ready.



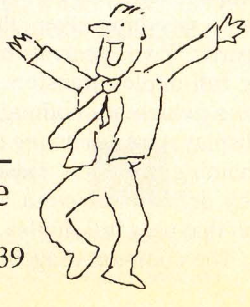
* Or call DELPHI Member Services by voice at **(800)544-4005** to obtain a local access phone number.

No Risk

With DELPHI there is no risk. You can cancel your membership within 30 days and pay only for your usage beyond the initial one-hour credit.

DELPHI

The World's Premier Online Information Service



General Videotex Corporation • Three Blackstone St • Cambridge MA 02139
800-544-4005 • 617-491-3393

the full Ymodem protocol with batch capabilities, although many purists only use the term Ymodem to refer to the full protocol, including batch capabilities. Chuck Forsberg added batch capabilities to Xmodem by noting that the packet sequence number starts at one. So he defined Packet 0 to be a special packet containing the file name, length and other information about the file being transferred. (Those interested in writing Ymodem programs should note that Packet 256 is not unusual.) In this way several files can be transferred consecutively without operator intervention. The file length is a particularly nice addition to the protocol since it allows the receiving end to remove extra padding that must be added to fill the last data packet. However, on some systems it is possible for files to grow before they are completely sent, particularly due to end-of-line conversions. Many Ymodem-batch senders intentionally use a too large file size, which makes this less useful.

In summary Ymodem makes three major additions to Xmodem: It uses a longer data packet for faster transfers over networks; it can optionally use CRC error detection, which makes it much more reliable; and when fully implemented, it supports a batch option that makes multiple file transfers much more convenient and can also remove problems with extra file padding. Ymodem does not address the reliability problems of having single-character control packets, nor does it address the need for all 256 data bytes to be transferrable through the connection. For most BBSs and information services these are not major problems, but there are situations in which they can make Ymodem unusable.

Half-Duplex Versus Full-Duplex

All the protocols discussed so far have been *half-duplex* protocols. Here the term half-duplex is being used in a technical sense, meaning that only one side sends at a time. This is handled by alternating which side sends. Half-duplex protocols have a significant advantage in that they are much simpler to write. However, in order to gain increased speed, especially over networks, it is desirable to use *full-duplex*, which means that either side is allowed to transmit at any time. This results in significantly more complex code, but can also result in significant speedups over the simpler counterparts. Two general methods of handling full-duplex transfers are to use *windowing* (which has nothing to do with screen displays), or *streaming* techniques. The remaining protocols either use full-duplex by default or have a variation or extension that uses full-duplex.

Note: The common usage of the terms half-duplex and full-duplex for terminals is quite different and should not be confused with this more technical meaning.

It Does Windows: WXmodem

Ymodem attempts to address the slow speed of Xmodem by using a longer packet size. This slows down error recovery, though, since it takes longer to retransmit a long packet. It would be nice to be able to get fast transfer rates while still using a small packet size. One way to do this is to use a technique known as *windowing*. The basic idea is that the reason networks slow down file transfers so much is because of the need to wait for the other end. WXmodem (Windowing Xmodem) simply removes the need to wait. It works by having the sender send packets continuously. The receiver receives and checks each one and sends an ACK or NAK as appropriate. In WXmodem the ACK is more than one character since it must identify the packet number as well. The sender matches up each ACK or NAK as it receives it, resending packets that were NAKed and pausing if it gets too far ahead of the receiver. The number of packets that can remain unaccounted for at the sender end before it stops to wait for the receiver is called the window size and explains the term Windowing Xmodem. WXmodem is much faster than Xmodem and can be marginally faster than Ymodem over networks, much faster when there is noise on the line since it is not necessary to resend a long 1024-byte packet.

WXmodem also does some "transparency masking," or encoding, to prevent certain characters from appearing in a packet. After WXmodem builds a data packet, it replaces those characters by two-character sequences starting with DLE (Data Link Escape, although the specific character is unimportant) so those characters can have their usual meanings. In particular, since the WXmodem sender is sending continuously, it may be necessary for the receiver to ask the sender to pause. This is accomplished by using the standard XOFF (to request the sender to pause) and XON (to request the sender to continue) characters. In order for those characters to be used in that capacity, it is necessary that they not have any meaning in the rest of the transfer. In fact, they are completely ignored by WXmodem except for flow control. This usage of DLE is called *quoting* and is a common technique for encoding characters that aren't allowed to appear in a data packet.

Chuck Forsberg Strikes Again: Zmodem

After Chuck's YAM program became fairly well-known, he was asked to develop a protocol especially for use over packet-switched networks. He apparently considered adding onto Ymodem but later decided to scrap that completely and start over from scratch. The result is the very impressive, if inappropriately named, Zmodem protocol. The full description of Zmodem is too long to cover here, but a few highlights will suffice.

Zmodem addresses the major shortcomings of Xmodem using a variety of techniques. Any character can be encoded (or *quoted*) in a manner similar to WXmodem to prevent its being used. Several specific characters (including XON and XOFF) are always encoded, and any other character with special meaning to the network can be encoded to prevent problems. It is even possible to use only seven bits by encoding every character over 127. Zmodem uses 16-bit or 32-bit CRCs for error detection, making it an extremely reliable protocol. Every command and control packet includes full error detection so incorrectly transferred control packets can be detected and resent. Zmodem has an impressive array of command packets that allows either side to request one or more file transfers, and can even implement some limited security measures.

Zmodem addresses Xmodem's concern about sequence numbers, file padding and speed by using a full-duplex method of file transfer referred to as *streaming*. The idea here is that the sender simply sends the entire file directly and periodically inserts special packets with cumulative error detection information and current file position. The receiver compares this information when it receives it. If the received information disagrees with what the receiver has calculated, it requests that the sender resend, beginning with a specific file position. By using file position rather than sequence number, Zmodem gains the additional ability to send only part of a file. Zmodem is a fast protocol that is only beginning to gain popularity.

Frogs and Piggies: the Kermit Story

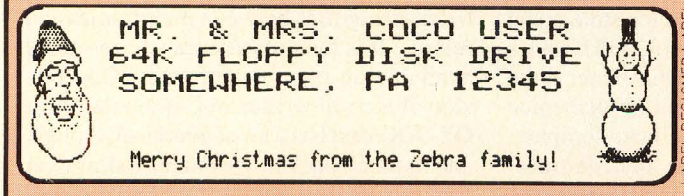
People who use mainframes often con-

Label Designer

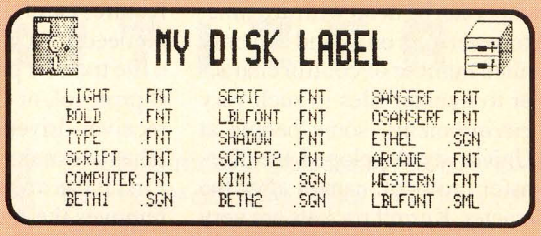
Everything you'd want a label program to do and more!

No other program lets you make great labels so easily.

- **Print Labels With Text And Graphics:** Use Label Designer's fonts and pictures or any of Zebra's optional Picture & Font Disks.
- **Zebra Systems' Graphics User Interface:** Pull down menus, scrolling-window file selectors, dialog boxes, radio Buttons, the works!
- **Standard Features:** Click and drag picture placement, up to 4 pictures per label, 3 different picture sizes, powerful text editing with variety of type fonts and sizes, prints 1-999 copies, templates for standard & large address, file folder, disk, and cassette label sizes.



- **Mail Merge Option** merges name and address or other text file data for printout onto your custom label templates with graphics and other text. Great for club mailings, Christmas card lists, membership name tags, etc.



- **Disk Directory Option** pastes the names of your disk files onto the label text editor screen for inclusion on your labels.
- **Serial Numbering Option** for making sequentially numbered admission tickets, product numbering, inventory labels, etc.
- **Hardware Requirements:**

CoCo II 64K, or CoCo 3, disk drive, mouse or joystick, compatible printer (compatible with same printers as CGDP).

- **Includes** disk, laser typeset user's manual and sample quantities of different size labels. Price: **$34.95**

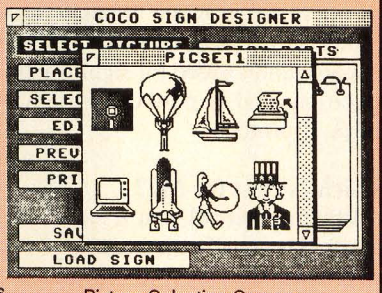
We stock white and colored labels in a variety of address, disk, and cassette sizes at competitive prices.

Banners, Signs & Greeting Cards

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).

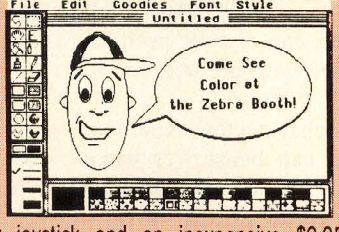
Color Paint

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

Ordering Instructions: All orders add $3.00 Shipping & Handling, UPS COD add $3.00. VISA/MC Accepted. PA residents add sales tax. Hours 9-5 Monday to Friday . **We offer comprehensive sales and customer support for Zebra Systems Products.**

Paul & Tony's Stereo• 121 S. Burrowes Street• State College, PA 16801• (814) 237-2652

nect to them through special terminal connections that have unusual limitations in the microcomputer world. In particular many terminal connections have limits on how many characters can be dealt with at a time, are limited to seven bits only, and can only handle a limited number of control characters. In order to transfer files in such very restrictive environments, some people at Columbia University developed the Kermit file transfer protocol, named after the Muppet character. Kermit packets are very short, to avoid line-length limitations on terminal connections. Kermit also supports encoding, which can encode every eight-bit character (*8th bit quoting*) and most control characters. It is even possible to run Kermit where only one control character can be communicated. It has become extremely popular at universities, where it is not uncommon for people to want to transfer files between mainframes and microcomputers. Kermit has an extended handshake when the two sides start up, which determines the way the two sides will communicate, what type of quoting and error checking will be used, and what extensions to the basic protocol each can use. This guarantees that Kermit programs can implement any combination of advanced capabilities and will still be able to communicate as long as they include some basic subset.

Kermit is interesting in that one end of the connection usually runs in the server mode. Once you get the two Kermit programs running, you give commands to the Kermit program at your end (the local Kermit), which passes some of them through to the server Kermit. For example, you can request a directory on the server machine or on your local machine; you can request that files be transferred either way; and you can reconfigure either Kermit program by giving commands to the local Kermit. If your purpose for calling the other machine is to transfer files, this is a very convenient environment.

Unfortunately the extensive encoding causes a lot of overhead, and the very short packet size makes Kermit very slow over networks. There have been many extensions to Kermit that help to address these problems by allowing for longer packet sizes (up to about 9000 bytes) and windowing operation, but these extensions have been slow to catch on.

Other Protocols: CIS B, B+

Since the advent of Xmodem nearly 15 years ago, many people have tried to design their own file transfer protocols, with varying degrees of success. Many are just variations of Xmodem, and most never caught on. But two deserve special mention.

CompuServe has done a lot of work to make its system as easy to use as possible. Much of its work has revolved around developing special terminal programs with features carefully matched to their particular needs. As part of this effort it designed a file transfer protocol called CompuServe B protocol, or CIS B. B protocol is a basic receiver-driven, non-windowing protocol. It has two major advantages over Xmodem. First it has a variable packet length, which removes the problems with padding since the last packet can simply be made shorter than the others. Having a variable packet size can also help adaptation to noise since the transfer can use short packets under noisy circumstances to reduce time spent resending (and long packets up to 512 bytes with CIS B for faster transfer under quiet conditions). Secondly when implemented in a particular fashion, the host computer (CompuServe) can initiate any file transfer. This makes it significantly easier to use the system since you simply tell CIS that you want to download a file, and then it tells your terminal program to begin the download. This protocol recently had windowing capabilities added for significantly faster operation, and is now called CIS B+, or Quick-B protocol.

Which Is Best for Me?

Which protocol you'll use in a given situation is usually dictated by your terminal program and thesystem you are calling. Very few CoCo terminal programs offer much more than Xmodem, and protocols more sophisticated than Ymodem are still not widely available. A few points to keep in mind when you do have a choice:

- Xmodem is popular but slow over networks. Almost every terminal program that can do file transfers can do Xmodem, and it is the specified fall-back protocol for Ymodem and Zmodem. The need for a full eight-bit connection can also be prohibitive, especially when working with mainframes.
- Ymodem is much faster than Xmodem over networks but can be slower when there are a lot of errors since it takes so much longer to resend a long packet. Ymodem can use 128-byte packets, but this capability is often not properly implemented. Ymodem does have a batch capability, which can make life much more convenient for people doing lots of file transfers. When the batch capability is fully implemented, it can also avoid problems with padding.
- Compuserve B protocol is better than Xmodem in that it has a variable packet size, which allows for larger packets (and hence greater speed) under non-noisy conditions. It also avoids the problems with Xmodem padding.
- WXmodem is faster than Xmodem. It's marginally more complicated but doesn't offer the batch capabilities of Ymodem. WXmodem is faster than Ymodem in cases where there is both a network delay and noisy conditions and comparable in speed when there is no noise. WXmodem also encodes certain flow-control characters so it can be used in some situations where Xmodem and Ymodem cannot.
- Compuserve B+ protocol is similar to B protocol but offers sliding windows for significantly improved speed.
- Kermit offers eight-bit quoting (a fancy way of saying it can work on seven-bit lines) and is the most popular protocol for transferring files between mainframes and micros. It is the only file transfer protocol available on many mainframes. One version of Kermit written in C is available for OS-9. Kermit has a lot of overhead, though, and its small packet size makes it slow over packet-switched networks unless the sliding window option is implemented, which is rarely done due to the complexity.
- Zmodem seems to be the best all-around, although its complexity means that it's availability to CoCo users will probably be delayed a long time. It is fast and flexible, and it supports batch capabilities.

For Further Information

These documents all provide careful descriptions of the corresponding protocol. The Ymodem and WXmodem descriptions include descriptions of standard Xmodem. Some of these are fairly easy to read, and others are slow going. Chuck Forsberg's article describing Ymodem is a particularly good starting point because it gives a good explanation of Xmodem and the sources of error in Xmodem.

Except for the book on Kermit, these articles should be available presently on the major information services (Delphi or CompuServe).

- Peter Boswell, "Xmodem, CRC Xmodem, WXmodem File Transfer Protocols," June 20, 1986.
- CompuServe Incorporated, "VIDTEX 4.0 Standards for Terminal Emulator Programs," April 1985.
- Frank da Cruz, *Kermit User's Guide*, Columbia University, 6th Edition.
- Frank da Cruz, *Kermit, A File Transfer Protocol*, Digital Press, 1987.
- Chuck Forsberg, editor, *Xmodem/Ymodem Protocol Reference: A Compendium of Documents Describing the Xmodem and Ymodem File Transfer Protocols*, Omen Technology, Inc., May 1985.
- Chuck Forsberg, *The Zmodem Inter-Application File Transfer Protocol*, Omen Technology, Inc., June 1988.

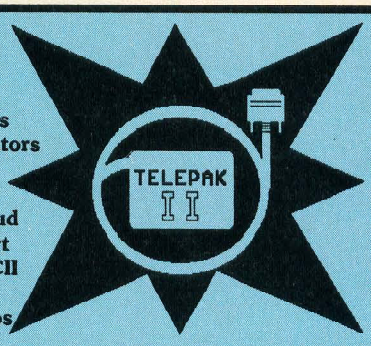
<<< GIMMESOFT >>>

A new generation of Color Computer products

V-Term Terminal

-Vax, Unix, Mainframe, and BBS systems
-Vt-100, Vt-52, Vidtex, and Ascii emulations
-Works with EMACS and VI full screen editors
-Full 28x80 screen, 128 ASCII characters
-High-Res graphics, Monochrome support
-Serial port to 2400, RS-232 to 19,200 baud
-DCModem Pak and Disto controller support
-XModem, XModem-CRC, YModem, & ASCII
-File transfers direct to disk or memory
-15 entry autodial, 10 programmable macros
-35/40/80 Tracks, Hyper I/O & RGBDOS

Disk (128k or 512k CoCo 3 only) $39.95



V-TERM + Telepak ..$79

Telepak II

A Truly Compatible RS-232 Interface! Telepak II answers the demand for an RS-232 interface. It comes with a 3 foot DB25 cable, gold edge contacts and is built with low power drain (5v) components. Works on all CoCo 1,2, or 3. MPI or Y-Cable required on disk systems.

Telepak & Manual $49.95

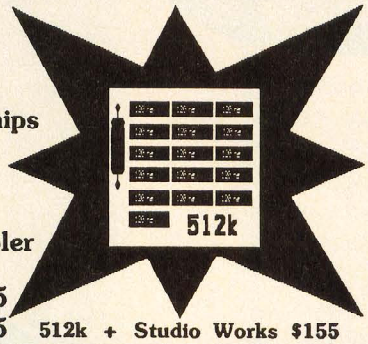
Y-Cables

Gold contact Y-Cables $27.95

Turbo 512k Ram

-Fully assembled and tested board
-Premium 120ns 256x1 memory chips
-Easy to follow instructions
-Fast and easy installation
-Complete with 512k software
-RamDisk, RamTest, & Print Spooler

512k board w/software ... $108.95
0k board w/software ... $34.95



512k + Studio Works $155

Studio Works

A digital audio sampler second to none! Full point & click. Includes reverse, delete, copy, volume control, play block, sequencer, envelope shape, key play, play thru, looping & file compression. Samples 17k/sec. Works with Maxsound cable!

W/O cable - $38.95 W/cable - $53.95

Games

Warrior King	$29.95*
Kung-Fu Dude	$24.95
In Quest of the Starlord	$34.95*
Hint sheet for Starlord	$3.95
Pyramix	$19.95*
Hall of the King 1 2 or 3	$29.95
Dragon Blade	$19.95
White Fire of Eternity .	$19.95
Paladin's Legacy	$24.95

* CoCo 3 only

Kyum-Gai: to be Ninja

As the Ninja Gai-Dan, you must find and destroy evil forces, use a multitude of martial arts moves to defeat your enemies, obtain treasures & weapons, and evade obstacles! Kyum-Gai: to be Ninja uses the most detailed 320x200, 16 color graphics, the highest quality digital sound effects and spectacular animation!

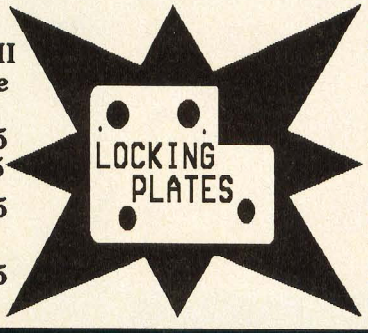
CoCo 3, disk, & joystick .. $29.95

Multi-Label III Version 2.00

This latest version of Multi-Label III now prints labels one, two or three across! Comes configured for most Tandy and Epson printers .. $16.95
Upgrades to Version 2.00 .. $6.95

Fkeys III (CoCo 1,2, 3) $19.95
Easy to use, DOS mods, 20 function keys

Sixdrive (CoCo 1,2, 3) $16.95
Use up to 3 d/s drives as 0,1 2,3 4,5.



MPI-CoCo Locking Plates

This money saving device is now available for the CoCo 2 and 3! It is important when ordering to specify CoCo 2 or 3 and MPI 26-3024 or 26-3124. Only $7.95

Suprfile III (CoCo 3 only) $29.95
Easy to use, multi-purpose database.

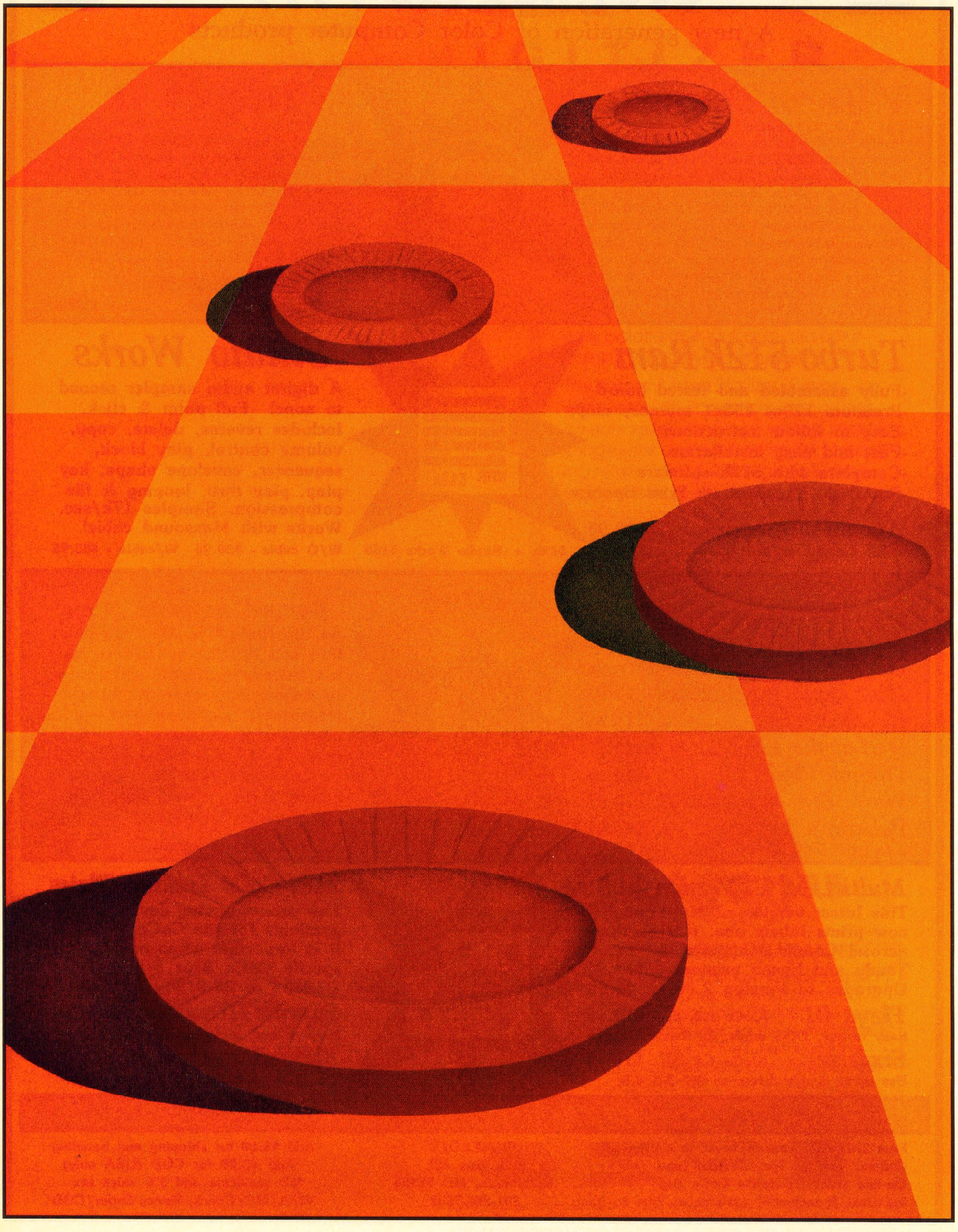
BidWriter (pc/xt/at only) $49.95
Create & print professional proposals.

Toll Free 1-800-441-GIME Order Line

Free 2ND AIR from Midwest to California
Orders: 9am to 9pm Eastern time
On-line orders: Delphi's CoCo Sig
Inquiries & technical assistance: 7pm to 9pm:

GIMMESOFT
P.O. Box 421
Perry Hall, MD 21128
301-256-7558

Add $3.00 for shipping and handling
Add $3.00 for COD (USA only)
MD residents add 5% sales tax
VISA/MC/Check/Money Order/COD



The CoCo who would be kinged

The Checkers Champ

by Marc Campbell

That people are fascinated by games is evident from the wide variety on the market today. There are sophisticated trivia games; complex battle simulation games with armchair generals in command of armies fighting historic battles; and role-playing games that use the imagination for playing pieces and game board. *The Checkers Champ* joins the ranks of these amusements and guarantees you a good time.

The Checkers Champ translates the classic board game to bits and bytes of BASIC code. Anyone with a 128K Color Computer 3 and at least one joystick can play. (Those who use Tandy's Deluxe Joystick should set both axis switches to the "free float" position for best results.) *The Checkers Champ* incorporates 320-by-192 resolution graphics and 16 palette colors that bring the familiar red and black checkerboard back with style. The program's point-and-click interface makes it incredibly easy to use, even for young children. Devoted checkers players with reservations about this adaptation are needlessly intimidated because computerization brings with it some distinct advantages: You'll never lose any pieces, your sore-loser opponent can't rearrange the board while you pause to answer the telephone, and you don't need a flesh-and-blood friend in order to play. With this program, the Color Computer knows the game like the back of its "hand," and it plays to win.

Marc Campbell, a self-taught programmer, is a student at Ephrata Senior High School. His computing has grown into more than a hobby, as he has seen several of his programs in print and is marketing others through his own software house.

Getting Started

Let's play some checkers CoCo style. Fire up the Color Computer 3, connect one or both joysticks, and type in and save the listing. After you've corrected any errors in your typing, you are ready to begin. Type RUN and away you go. You are greeted with a title screen and a short song. (To cut the musical interlude short, hold down any key until the tune stops.) At this point the options of the game are set. Read each of the onscreen prompts and respond accordingly. If you make a mistake or change your mind after pressing a key, press the CLEAR key to redo all the options. The title screen vanishes after you have set all the options, and the gameboard is drawn in its place.

Screen Schematics

Notice the playing screen is divided into five distinct areas. The dialog box, the blue strip located at the top of the screen, is the communications bridge between the computer and the players. Various messages are displayed in the dialog box during the course of the game. The gold box in the upper-left corner of the screen is the scoreboard. The number of games won by black and red players is neatly displayed here. The scoreboard is accurate up to 999 games; 1000 causes it to roll over and begin at 000 again. (While it isn't likely you'll play 1000 games at one sitting, *The Checkers*

XX	00	XX	01	XX	02	XX	03
04	XX	05	XX	06	XX	07	XX
XX	08	XX	09	XX	10	XX	11
12	XX	13	XX	14	XX	15	XX
XX	16	XX	17	XX	18	XX	19
20	XX	21	XX	22	XX	23	XX
XX	24	XX	25	XX	26	XX	27
28	XX	29	XX	30	XX	31	XX

Note: Blocks marked with XX should be colored red. Do not print the XX. Blocks marked with a number should be colored black. Numbering should be in white.

Figure 1: Numbering System Used to Designate Checkerboard Blocks

Champ's Score Save feature allows you to keep a running total of all the games you've played. You can have your own ongoing checkers tournament — play a few games, save the score, and play again later.) The pink box near the bottom of the screen is the menu, from which you can select and perform a variety of functions (like correcting a mistake or saving a game in progress). The white flag in the lower-right corner of the screen is used when a player wants to cut his losses and surrender. The checkerboard itself is the fifth and last area of the screen.

It's as Simple as Point-and-Click

What makes *The Checkers Champ* so easy to use is its point-and-click user interface, which means that you tell the computer what to do by positioning the blinking arrow with your joystick and pressing the red firebutton. It's all very obvious once you've given it a try, so do just that. Run the program, and select a one-player game at whatever level of difficulty you feel comfortable. Make sure Red goes first.

Take a look at the dialog box. You see the message SELECT YOUR PIECE in red print. The red print indicates that it is Red's turn; on Black's turn the print in the dialog box is black. There is only one exception to this red print/black print rule: Whenever you receive a SYSTEM MESSAGE (one that doesn't directly involve the game), the print shows up as dark blue.

Point the blinking arrow at the piece you want to move and hold down the red firebutton until you hear a high-pitched beep. The message in the dialog box should change to MAKE YOUR MOVE. If you click on the wrong piece or change your mind after selecting a piece, jump down to the Oops block on the menu and press the button. You may now select another piece. Once you have selected a piece and are ready to move, point the arrow to where you want the piece to move and click again. Keep in mind that Oops will not backtrack a bad move; once you've clicked with "Make your move" in the dialog box, the move is permanent. Habitual checkers cheaters won't have any luck pulling the wool over the Color Computer's eyes. If and when you click on an illegal block (i.e., one that is occupied, one that is non-adjacent, or one that is red in color), a buzzer sounds and you must reselect the piece you want to move. (Players with devious intent will be embarrassed whenever they sound the buzzer.)

After your move the dialog box displays the message THINKING... in black print, indicating that it is now Black's turn. The computer decides which piece to move by looking at all the different possibilities and selecting the best move. Naturally the level of difficulty you selected has a bearing on whether a move is deemed advantageous or disadvantageous. Generally speaking, the higher the level of difficulty, the longer you have to wait while the computer processes its move (about 30 seconds tops).

Jumping

Treat a jump just like any other move; click where you want your piece to go. Your opponent's checker vanishes as yours leaps to its new location.

After you jump one of your opponent's pieces, the computer checks to see if another jump can be made from the new position. The dialog box reads CONTINUE YOUR JUMP if this is possible. As usual, click in the block where you want the jump to continue. Do not reselect the piece that is jumping or you'll lose the extra move. The traditional rules of checkers say that you don't have to continue a jump. Therefore,

Programs for Home or Classroom

Educational Programs for Students Grade K-12 and Adult Self Studies

More than 500 programs on cassette for any Color Computer! At every level from kindergarten through adult. All have full-time narration!

Send for our FREE catalog of over 1,000 Dorsett educational programs for Atari, TRS 80, Apple, IBM PC Jr., Commodore, Tandy 1000, etc.

16 Programs in each of the following

Children's Tales — Reading — Arithmetic
Fractions — Algebra — Geometry
Accounting — Psychology — MUCH MORE!
New courses in Spanish and geography.

CASSETTES: $59.50 for an album containing a 16-program course (8 cassettes with 2 programs each); **$9.95** for a 2-program cassette.

DISKS: $14.95 for a one-program disk; **$28.95** for two disks; **$48.95** for four disks. All disks come in a vinyl album.

For more information, or to order call:
TOLL FREE 1-800-654-3871
IN OKLAHOMA CALL (405) 288-2301

MasterCard VISA

DORSETT
Educational Systems, Inc.
Box 1226, Norman, OK 73070

Dealer Inquiries Welcome

no matter what strategic trick you have up your sleeve, click on Oops or any illegal block to forfeit the additional jump.

King Me!

A normal piece becomes a king when it successfully moves all the way across the board without being removed by an opponent. As anyone who has ever lost to an uncontrolled king population knows, kings can move and jump in any direction. After a piece is kinged in *The Checkers Champ*, a short coronation ceremony interrupts the game temporarily. Kinged pieces are marked with a yellow crown.

As an option, you may choose to play an all-king version. This game variation is something of a house rule that found its genesis when I became bored with garden-variety checkers. The game begins with all pieces as kings. Be prepared for some wild multidirectional jumps once things get going.

Waving The White Flag

If your opponent traps you so masterfully that you cannot make a move, or if you move the arrow to the white flag in the bottom right corner of the screen, the arrow disappears as it exits the checkerboard, and the white flag begins to wave. A click while the flag is waving causes the dialog box to ask if you're sure you want to throw in the towel. Pressing any key other than Y sends you back to the game; simply move the arrow away from the white flag and back onto the checkerboard. Pressing the Y key automatically makes your opponent the winner.

Winning The Game

To win the game you must eliminate all your opponent's checkers, either by jumping them or cornering them so they can't move. Prompts ask you to select between playing another game or shutting down for the evening.

The Menu

To select an item from the menu, position the arrow anywhere in the block that contains the item and click. There are four items up for grabs on the menu:

Oops: Allows you to reselect the piece you wish to move. This item is explained in more detail above.

Stat: Returns the number of pieces each player has remaining. Click on Stat to see at a glance who's winning.

Save: Saves a game in progress to tape or disk. Prompts guide you every step of the way to ensure the game is saved properly.

Direction	Number	P AND 4	Formula
Top Right	0	0	P-3
Top Right	0	4	P-4
Top Left	1	0	P-4
Top Left	1	4	P-5
Bottom Right	2	0	P+5
Bottom Right	2	4	P+4
Bottom Left	3	0	P+4
Bottom Left	3	4	P+3

Figure 2: Determining Neighbors With Boolean Formulas

If you click on this item accidentally, press CLEAR when the dialog box reads `SAVE TO (1) DISK or (2) CASSETTE`. There is no turning back afterwards, so think a little before pressing a key. The only time you cannot save a game is when you are in the middle of a multiple jump. Finish the jump first, then save it. It may be advantageous to save an important game two or three times, either under different filenames or, better yet, on separate disks or tapes.

Quit: Ends the game if you press the Y key when asked if you are sure you want to call it quits. Any other key sends you back to the game in progress. You have the option of saving the score before the program stops.

Installing Scores

If needed you can load the score of a previous checkers tournament at the beginning of the playing session. If you do not have a separate score file saved, you can enter the filename of a saved game with the score you want installed. In this case, the computer looks only at the score and disregards the rest of the information.

Error Trapping: Disk

If, in the course of your game saving and loading enterprises, you happen to come upon this message: `ERROR PRESS ANY KEY TO CONTINUE`, the computer is telling you that something is wrong. Most likely a bad filename, a write-protection tab, or a full disk is at fault. Save the game to another disk, and don't press ENTER without specifying a filename when asked for one. Game Load errors are generally more fatal. The game file or, even worse, the disk directory

ULTRA-QUAD

FOUR PROGRAMS DESIGNED TO GIVE YOU A DATABASE AND TO GET THE MOST OUT OF THE DATABASE AND YOUR WORD PROCESSOR PROGRAM.
ALL FOUR PROGRAMS ONLY $59.95

ULTRA-BASE

THE ULTIMATE DATABASE FOR THE COCO 1, 2, OR 3 WITH AT LEAST 64K. See Rainbow Review - January 1989
Sold separately for $24.95

ULTRA-MERGE

WHY SETTLE FOR SIMPLE WORD PROCESSING WHEN YOU CAN PERSONALIZE LETTERS, FORMS, ETC. USING YOUR FAVORITE WORD PROCESSOR AND DATABASE FILES FROM ULTRABASE. See Rainbow Review - July 1989
Sold separately for $14.95

ULTRA-CAT

YOU KNOW YOU HAVE A PROGRAM ON DISK BUT CAN'T FIND IT. CONVERT DISK DIRECTORIES TO ULTRABASE FILES.
Sold separately for $14.95

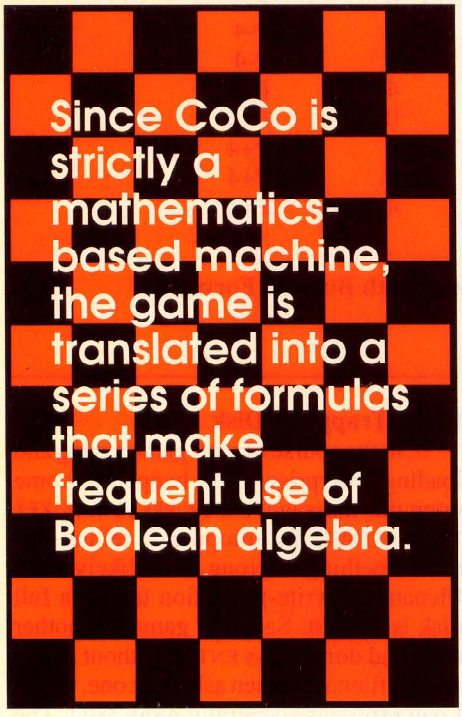
ULTRA-TEXT

READ YOUR DATABASE FILES INTO YOUR WORD PROCESSOR PROGRAM. CONVERTS ULTRABASE FILES INTO ASCII FILES.
Sold separately for $14.95

ADD $2.00 S/H
$4.00 FOR U.P.S.
$3.00 FOR C.O.D.
PA RESIDENTS ADD
6% SALES TAX

Tothian Software, Inc.
Box 663
Rimersburg, PA 16248

or entire disk may be garbled. Before jumping to any conclusions, check to make sure the filename is correct and the disk in Drive 0 contains the file.



Error Trapping: Cassette

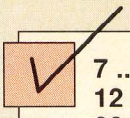
You should never receive an error message while saving a game. Errors received while loading are caused by bad data, but retry the load a few times at various recorder volume settings before giving up on the saved file.

Error Trapping: Otherwise

The Checkers Champ should report only errors caused by the Game, Save and Load procedures. If the error message pops up unexpectedly, the listing may have a typing error. Debuggers should eliminate the `ON ERR GOTO`, `POKE41598,32`, and `POKE 41599,32` portions of Line 1 to cripple the error-trapping and break-disabling routines. Once the program is debugged, you can add the deleted segments.

Technically Speaking . . .

Teaching a person to play checkers is one thing, but teaching a computer to do the same is a different story. Since CoCo is strictly a mathematics-based machine, the game is translated into a series of formulas that make frequent use of Boolean algebra (the logical operators `AND`, `NOT` and `OR`; see your Color Computer user's manual or a high school mathematics textbook for further information). Each of the 32 "legal" boxes on the gameboard is assigned a number, ranging from zero in the upper left corner to 31 in the lower right (see Figure 1). From any given block, there are as many



7 152	162 134
12 233	174 194
22 162	187 119
29 25	2Ø4 56
4Ø 228	213 87
47 221	226 .....24Ø
6Ø 176	END 146

The listing: CHECKERS

```
Ø 'THE CHECKERS CHAMP COPYRIGHT
    (C)  1988 BY MARC CAMPBELL
  ' COPYRIGHT 1989  FALSOFT,INC
1 WIDTH32:CLSØ:POKE41598,32:POKE
41599,32:X=RND(-TIMER):X=Ø:POKE1
4Ø,Ø:POKE&HFFD9,Ø:POKE&HFØ15,&H2
1:HBUFF1,14:HBUFF2,269:E$="O1L16
C":B$="O5L32C":DIMP(31,1):DIMA(1
1):DIMB(11):DIMC(11):DIMD(11):DI
MBL(31):ONERRGOTO227
2 RGB:PALETTEØ,Ø:PALETTE9,35:PAL
ETTE1Ø,53:PALETTE11,52:PALETTE12
,Ø:PALETTE13,39:PALETTE14,57:PAL
ETTE15,19
3 X=Ø:HCOLOR,8:HSCREEN2
4 DATAO3L12G,L6O4C,L12O3G,L6O4C,
L12O3G,L3.O4C,L12O3G,L12O4C,L16D
,L12E,L16D,C,L6E,L12C,L6D,L3CP6,
L6C,L8E,E,L4E,L6C,L8E,E,L4E,L6C,
L8E,E,L6E,L1ØD#,D,L3C#,O3G,O4L8E
,E,L6E,L12C,L6D,C,O3C,O2C
5 HCOLOR4:FORQ=ØTO3Ø4STEP2Ø:HLIN
E(Q,Ø)-(Q+2Ø,15),PSET,B:HLINE(Q,
1Ø5)-(Q+2Ø,12Ø),PSET,B:IFX=ØTHEN
HPAINT(Q+1,1),3,4:HPAINT(Q+1,1Ø6
),12,4:X=1ELSEHPAINT(Q+1,1Ø6),3,
4:HPAINT(Q+1,1),12,4:X=Ø
6 NEXT:FORQ=15TO9ØSTEP15:HLINE(Ø
,Q)-(2Ø,Q+15),PSET,B:HLINE(3ØØ,Q
)-(32Ø,Q+15),PSET,B:IFX=1THENHPA
INT(1,Q+1),3,4:HPAINT(3Ø1,Q+1),1
2,4:X=ØELSEHPAINT(3Ø1,Q+1),3,4:H
PAINT(1,Q+1),12,4:X=1
7 NEXT:HCOLOR1:HPRINT(5,3),"T H
E":HPRINT(26,9),"C H A M P":HCOL
OR4:HDRAW"BM5Ø,31R2ØD1ØL2ØG5D1ØF
5R2ØD1ØL25H1ØU2ØE1ØR5;BM7Ø,31D4Ø
R1ØU15R1ØD15R1ØU4ØL1ØD15L1ØU15L1
Ø;BM1ØØ,31D4ØR3ØU1ØL2ØU8R1ØU4L1Ø
U8R2ØU1ØL3Ø;BM145,31R2ØD1ØL2ØG5D
1ØF5R2ØD1ØL25H1ØU2ØE1ØR5"
8 HDRAW"BM165,31D4ØR1ØU1ØF1ØR1ØH
15U1ØE15L1ØG1ØU1ØL1Ø;BM195,31D4Ø
R3ØU1ØL2ØU8R1ØU4L1ØU8R2ØU1ØL3Ø;B
M225,31D4ØR1ØU1ØF1ØR1ØH15U5R1ØE5
U1ØH5L4ØBR25BD5R1ØF3D4G3L1ØU1Ø;B
M255,36E5R25D1ØL15G5R15F5D15G5L2
5U1ØR15E5L15H5U5"
9 FORQ=48TO273STEP+3Ø:IFX=ØTHENH
PAINT(Q,35),3,4:X=1ELSEHPAINT(Q,
35),12,4:X=Ø
1Ø NEXT:HCOLOR5:HPRINT(4,11),"(C
) MCMLXXXVIII by Marc Campbell"
11 POKE&HFFD8,Ø:FORQ=1TO4Ø:READA
$:PLAYA$:IFINKEY$<>""THENQ=4Ø:NE
XTELSEIFX=ØTHENPALETTE12,36:PALE
TTE3,Ø:X=1:NEXTELSEPALETTE12,Ø:P
ALETTE3,36:X=Ø:NEXT:EXEC43345
12 EX=1:EY=22:POKE&HFFD9,Ø:PALET
TEØ,Ø:PALETTE3,36:PALETTE12,Ø:HC
OLOR11:HPRINT(5,16),"PRESS CLEAR
 TO RESTART OPTIONS":HCOLOR4:HPR
INT(Ø,18),"Do you want to load a
 saved game?  (Y/N)"
13 GOSUB226:PLAYB$:HPRINT(Ø,18),
STRING$(4Ø,32):IFA$="Y"ORA$="y"T
HEN14ELSE18
14 HCOLOR4:HPRINT(3,18),"Load fr
om (1) disk or (2) cassette"
15 GOSUB226:IFA$<>"1"ANDA$<>"2"T
HENPLAYE$:GOTO15ELSEPLAYB$:IFA$=
"1"THEND=1ELSED=-1
16 X=3:Y=2Ø:GOSUB156:HPRINT(5,22
),"Press any key to load the gam
e":EXEC44539:POKE&HFFD8,Ø:OPEN"I
",#D,F$
17 FORX=1TOEOF(D):INPUT#D,NG(Ø),
NG(1):FORQ=ØTO11:INPUT#D,A(Q),B(
Q),C(Q),D(Q):NEXTQ:INPUT#D,TN,NP
,IT,GM,J(Ø),J(1):NEXTX:CLOSE#D:P
OKE&HFFD9,Ø:GOTO38
18 HCOLOR1:HPRINT(Ø,18),"  Do yo
u want to install scores? (Y/N)"
19 GOSUB226:PLAYB$:IFA$="Y"ORA$=
"y"THEN2ØELSE24
2Ø HCOLOR4:HPRINT(2,18)," Load f
rom (1) disk or (2) cassette "
21 GOSUB226:IFA$<>"1"ANDA$<>"2"T
HENPLAYE$:GOTO21ELSEPLAYB$:IFA$=
"1"THEND=1ELSED=-1
22 X=3:Y=2Ø:GOSUB156:HPRINT(4,22
),"Press any key to load the sco
res":EXEC44539:POKE&HFFD8,Ø:OPEN
"I",#D,F$
23 FORX=1TOEOF(D):INPUT#D,NG(Ø),
NG(1):NEXTX:CLOSE#D:POKE&HFFD9,Ø
:GOSUB222
24 HCOLOR13:HPRINT(2,18),"Press
1 for Player One vs CoCo Champ":
HPRINT(2,2Ø),"Press 2 for Player
 One vs Player Two"
25 GOSUB226:IFA$<>"1"ANDA$<>"2"T
HENPLAYE$:GOTO25ELSEPLAYB$:IFA$=
"1"THENNP=1ELSENP=2
26 IFNP=2THEN28ELSEHCOLOR1Ø:GOSU
B222:HPRINT(4,18),"How smart is
the Checkers Champ?":HPRINT(11,2
Ø),"1    DULL-WITTED":HPRINT(11,
21),"2  RUN-OF-THE-MILL":HPRINT(
11,22),"3    DEVESTATING"
27 GOSUB226:IFA$<>"1"ANDA$<>"2"A
NDA$<>"3"THENPLAYE$:GOTO27ELSEPL
AYB$:IFA$="1"THENIT=1ELSEIFA$="2
"THENIT=2ELSEIFA$="3"THENIT=3
28 GOSUB222:HCOLOR14:HPRINT(4,18
),"Press 1 to play classic check
ers":HPRINT(4,2Ø),"Press 2 to pl
ay all king version"
```

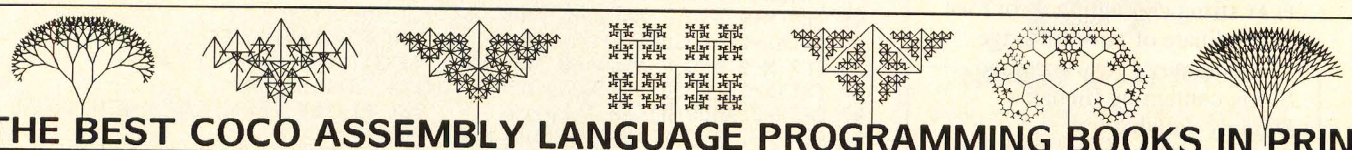
```
29 GOSUB226:IFA$<>"1"ANDA$<>"2"T
HENPLAYE$:GOTO29ELSEPLAYB$:IFA$=
"1"THENGM=1ELSEGM=2
30 GOSUB222:HCOLOR15:HPRINT(4,18
),"Player 1: RED      RIGHT JOYST
ICK"
31 IFNP=1THENHPRINT(4,19),"Playe
r 2: BLACK   COLOR COMPUTER"
32 IFNP=2THENHPRINT(4,19),"Playe
r 2: BLACK    LEFT JOYSTICK"
33 HPRINT(3,20),STRING$(34,32):H
PRINT(3,21),"Who goes first? (1)
 RED  (2) BLACK":HPRINT(19,22),"
(3) COMPUTER PICKS"
34 GOSUB226:IFA$<>"1"ANDA$<>"2"A
NDA$<>"3"THENPLAYE$:GOTO34ELSEPL
AYB$:IFA$="1"THENTN=0ELSEIFA$="2
"THENTN=1ELSEIFA$="3"THENTN=RND(
2)-1
35 J(0)=0:J(1)=0:FORQ=0TO11:A(Q)
=Q:B(Q)=Q+20
36 IFGM=2THENC(Q)=2:D(Q)=2ELSEC(
Q)=0:D(Q)=0
37 NEXT
38 EX=1:EY=0:POKE&HF015,&HAA:HCO
LOR,8:HSCREEN2
39 HCOLOR5:HLINE(2,0)-(319,7),PS
ET,BF:HCOLOR2:HLINE(1,1)-(1,8),P
SET:HLINE-(318,8),PSET:HLINE(0,2
)-(0,9),PSET:HLINE-(317,9),PSET
40 HCOLOR9:HLINE(64,183)-(256,19
1),PSET,BF:HCOLOR10,8:HPRINT(9,2
3),"OOPS  STAT  SAVE  QUIT":FORQ
=112TO208STEP48:HLINE(Q,183)-(Q,
191),PRESET:NEXT
41 HCOLOR11:HLINE(2,16)-(39,66),
PSET,BF:HCOLOR7:HLINE(1,17)-(1,6
7),PSET:HLINE-(38,67),PSET:HLINE
(0,18)-(0,68),PSET:HLINE-(37,68)
,PSET:HCOLOR8:HLINE(4,18)-(37,28
),PSET,BF:HCOLOR3:HLINE(4,43)-(3
7,53),PSET,BF
42 HCOLOR4:HLINE(280,150)-(318,1
60),PSET:HLINE-(280,170),PSET:HL
INE-(280,150),PSET:HPAINT(281,15
2),4,4:HCOLOR11:HLINE(280,171)-(
280,185),PSET
43 HCOLOR7:X=LEN(STR$(NG(1))):HP
RINT(1,4),STRING$(4-X,48)+RIGHT$
(STR$(NG(1)),X-1):X=LEN(STR$(NG(
0))):HPRINT(1,7),STRING$(4-X,48)
+RIGHT$(STR$(NG(0)),X-1)
44 POKE&HF015,&H21:PALETTE0,27:H
COLOR4:X=0:Z=0:FORR=16TO156STEP2
0
45 FORC=48TO244STEP28
46 HLINE(C,R)-(C+28,R+20),PSET,B
:IFX=0THENHPAINT(C+1,R+1),3,4:X=
1ELSEX=0
47 NEXTC:IFX=0THENX=1ELSEX=0
48 NEXTR
49 X=76:W=244:Y=16:FORQ=0TO31:BL
(Q)=0:P(Q,0)=X:P(Q,1)=Y:X=X+56:I
FX>W THENY=Y+20:IFZ=0THENX=48:W=
216:Z=1ELSEZ=0:X=76:W=244
50 NEXT
51 FORQ=0TO11:IFA(Q)=-2THEN52ELS
EBL(A(Q))=2:W=P(A(Q),0)+14:X=P(A
(Q),1)+10:HCIRCLE(W,X),10:IFC(Q)
=2THENHDRAW"BM"+STR$(W+2)+","+ST
R$(X+2)+"C1L8U6F4E2F2E4D6L8C4":H
PAINT(W+2,X+1),1,1
52 IFB(Q)=-2THEN53ELSEBL(B(Q))=1
:Y=P(B(Q),0)+14:Z=P(B(Q),1)+10:H
CIRCLE(Y,Z),10:HPAINT(Y,Z),3,4:I
FD(Q)=2THENHDRAW"BM"+STR$(Y+2)+"
,"+STR$(Z+2)+"C1L8U6F4E2F2E4D6L8
C4":HPAINT(Y+2,Z+1),1,1
53 NEXT
54 GOSUB129:GOSUB89:GOTO163
55 HPRINT(1,0),"Select your piec
e"+STRING$(23,32):GOSUB83
56 IFBUTTON(TN*2)=1THENGOSUB135:
GOTO57ELSE54
57 FORQ=0TO31:IFX>P(Q,0)ANDX<P(Q
,0)+28ANDY>P(Q,1)ANDY<P(Q,1)+20T
HEN58ELSENEXT:PLAYE$:GOTO54
58 P=Q:IFTN=1THEN59ELSEFORQ=0TO1
1:IFB(Q)=P THENN=Q:GOTO60ELSENEX
T:PLAYE$:GOTO54
59 FORQ=0TO11:IFA(Q)=P THENN=Q:G
OTO60ELSENEXT:PLAYE$:GOTO54
60 GOSUB89:HPRINT(1,0),"Make you
r move"+STRING$(26,32):GOSUB83
61 IFBUTTON(TN*2)=1THENGOSUB135:
GOTO62ELSE60
62 FORQ=0TO31:IFX>P(Q,0)ANDX<P(Q
,0)+28ANDY>P(Q,1)ANDY<P(Q,1)+20A
NDBL(Q)=0THEN63ELSENEXT:PLAYE$:G
OTO54
63 M=Q
64 IFTN=1 ANDC(N)<>2 THEN71
65 IFJ>0THEN68
66 IF(P AND4)=4 THENIFP-M=5 ANDI
NT(P/4)<>P/4 ORP-M=4THEN77
67 IFP-M=3 AND(P AND4)=0ORP-M=4T
```

as four blocks surrounding it. Assuming that P represents the number of the blocks being examined, we can determine its neighbors with the Boolean algebra formulas mentioned previously (see Figure 2).

Of course there is an exception to every rule. Our formulas do not yield accurate results when a block at the very edge of the board is examined simply because there aren't four possible directions in which to move.

We must test P by ANDing 4 because only diagonal moves are allowed on the checkerboard. To demonstrate this concept, let's take a look at how we arrived with our system of eight formulas. Find Block 9 in Figure 1. Notice that 5, 6, 13 and 14 are the only possible moves a piece in Block 9 can make without jumping. We derive four formulas from our observations: 9-6=3 (P-3 in the top right), 9-5=4 (P-4 in the top left), 14-9=5 (P+5 in the bottom right), and 13-9=4 (P+4 in the bottom left). We really ought to test a few other blocks just to see if our formulas are universal, so why not 26? Fortunately for us, we still get Block 26's neighbors when we plug in the numbers: 23(P-3), 22 (P-4), 31 (P+5), and 30 (P+4). To prove that we are bona fide mathematicians, we'll try 14 for good measure. Our formulas spit out 11 (P-3), 10 (P-4), 19 (P+5), and 18 (P+4). Only 10 and 18 are adjacent; they do not even fit the pattern of top right, top left, bottom right and bottom left. Now what do we do?

Here is where staggering rows comes into play. Since every other row is offset, we need two sets of formulas. Which set of formulas should be used? It just so happens that every block in a row beginning with a multiple of eight equals zero when ANDed with four. Also, every block in a row that does not begin with a multiple of eight equals four when ANDed with four. This is a neat, sure-fire method of finding the neighbors of any block in any row on any standard checkerboard. While it's much more



THE BEST COCO ASSEMBLY LANGUAGE PROGRAMMING BOOKS IN PRINT

"Assembly Language Programming for the CoCo" (The Book) and the CoCo 3 (The Addendum). Professionally produced (not just skimpy technical specifications). THE CoCo reference books.

THE BOOK - 289 pages of teaching assembly language for the CoCo 1 & 2. It's used as a school text and is an intro to Computer Science. It describes the 6809E instructions, subroutines, interrupts, stacks, programming philosophy, and many examples. Also covered are PIAs, VDG, SAM, kybd, jystk, sound, serial port, and using cassette and disk. $18.00 + $1.50 s/h.

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

COCO 3 SPECIAL Start your CoCo library right. See what the CoCo can really do and save money - buy the BOOK and ADDENDUM for only $27.00 + $2.00 s/h.

US check or money order. RI orders add 6% sales tax

TEPCO
68 James Court
Portsmouth, RI 02871

See Us On DELPHI

practical for human beings to simply scrutinize a checkerboard to look for moves, all this Boolean is right up the Color Computer's alley.

The computer decides which move to make by looking at each of its remaining pieces and all the possible moves each piece can make. Each move is assigned a priority value and poked into Lo-Res graphics screen memory; naturally the higher the priority, the better chance the move in question is chosen. Depending on the level of difficulty, the computer determines a move's priority based on whether or not a piece can jump, be kinged, or block a possible jump.

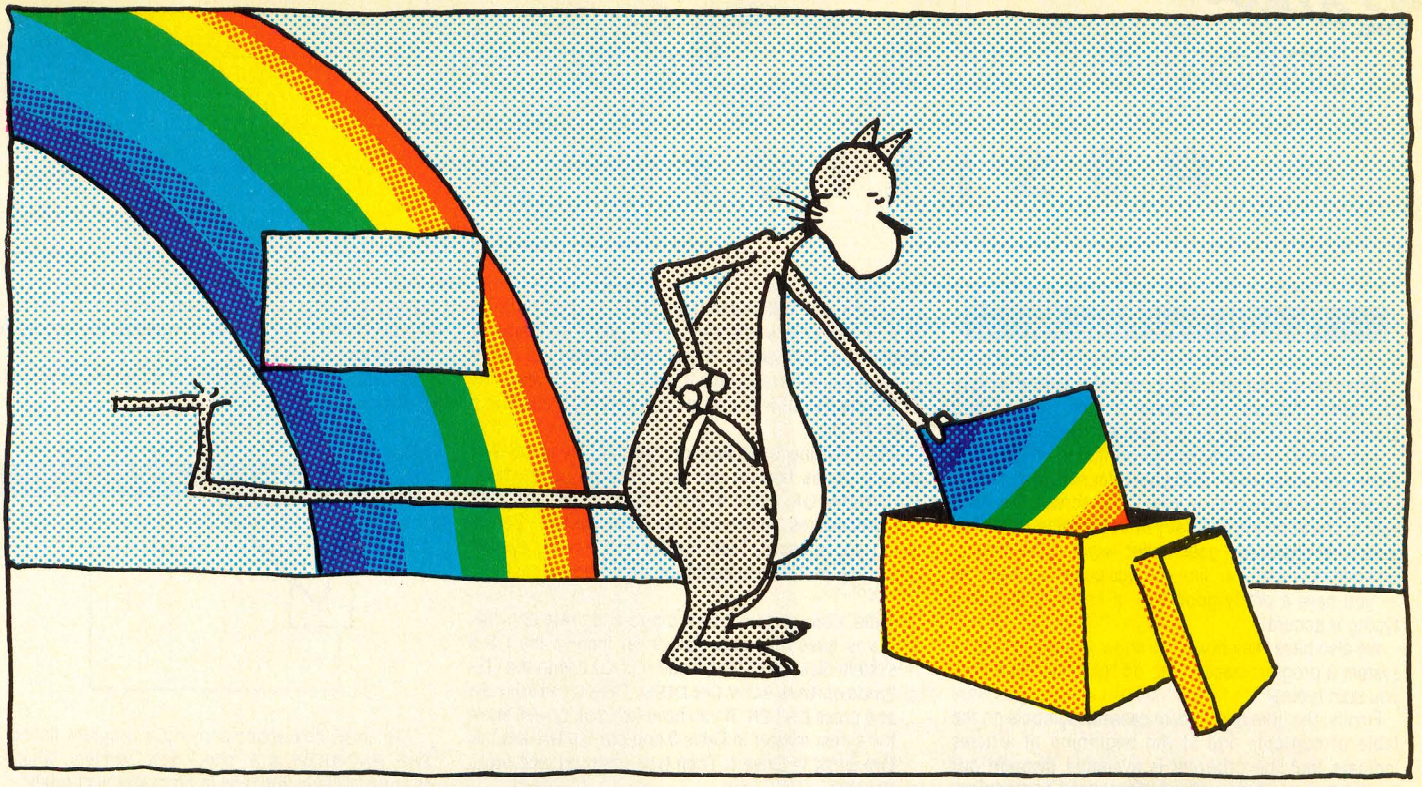
After all the possible moves are evaluated and their priorities tabulated, the computer chooses the move with the highest priority. In the event that two or more moves have the same priority, one of them is randomly selected.

This explanation barely skims the surface of the fascinating subject of artificial intelligence. As you may suspect, there is much more going on inside your Color Computer when *The Checkers Champ* "thinks." If you are still intrigued, dissect the program listing on your own or drop me a line.

Variables List

A$	Dummy string
A(X)	Array containing location of Black #X
B$	PLAY string containing beep tone
B(X)	Array containing location of Red #X
BK	Memory location of stored moves to block potential jumps
BL(X)	Array containing block's status: 0=empty, 1=Red-occupied, 2=Black-occupied
C	Dummy variable
C(X)	Returns a 2 if Black #X is a king
D	Device number being accessed
D(X)	Returns a 2 if Red #X is a king
E$	PLAY string containing error tone
EX	*x* coordinate of error message
EY	*y* coordinate of error message
F$	String containing filename
F	Dummy variable
GM	Returns a 1 if regular checkers, a 2 if all-king version
GR	Returns a 1 if score is being saved
IT	Level of difficulty (1-3)
J	Returns a 1 if move is a jump
J(X)	Array containing number of jumps (Red=X=0; Black=X=1)
M	Block to which a piece is moving
ML	Memory location where computer searches for possible blocks
MP	Memory location where current move is stored

```
HEN77
68 IFP-M=9 AND(P AND4)<>((P-4)AN
D4) ANDINT(P/4)<>P/4 THEN9Ø
69 IFP-M=7THEN9Ø
7Ø IFTN=ØAND D(N)<>2 THENPLAYE$:
GOTO54
71 IFJ>ØTHEN74
72 IF(M AND4)=4 THENIFM-P=5 ANDI
NT(M/4)<>M/4 ORM-P=4THEN77
73 IFM-P=3 AND(M AND4)=ØORM-P=4T
HEN77
74 IFM-P=9 AND(M AND4)<>((M-4)AN
D4) ANDINT(M/4)<>M/4 THEN9Ø
75 IFM-P=7THEN9Ø
76 PLAYE$:GOTO54
77 HGET(P(P,Ø)+1,P(P,1)+1)-(P(P,
Ø)+27,P(P,1)+19),2:HCOLOR8:HLINE
(P(P,Ø)+1,P(P,1)+1)-(P(P,Ø)+27,P
(P,1)+19),PSET,BF:HPUT(P(M,Ø)+1,
P(M,1)+1)-(P(M,Ø)+27,P(M,1)+19),
2,PSET:HCOLOR4:EXEC43345
78 IFJ(TN)=12THEN146
79 IFTN=ØANDM>-1ANDM<4ANDD(N)<>2
THEND(N)=2:GOSUB151
8Ø IFTN=1ANDM>27ANDM<32ANDC(N)<>
2THENC(N)=2:GOSUB151
81 IFTN=ØTHENB(N)=M:BL(P)=Ø:BL(M
)=1:IFJ>ØTHEN1Ø4ELSETN=1:GOTO54
82 IFTN=1THENA(N)=M:BL(P)=Ø:BL(M
)=2:IFJ>ØTHEN1Ø4ELSETN=Ø:GOTO54
83 QX=JOYSTK(Ø):QX=JOYSTK(1):X=5
Ø+JOYSTK(TN*2)*3.5:Y=18+JOYSTK(T
N*2+1)*2.5:X=INT(X):Y=INT(Y)
84 IFY=175 THENY=185:IFX>253THEN
X=253ELSEIFX<64THENX=64
85 IFY>145ANDX=27ØTHENF=1:HCOLOR
4,8:HLINE(28Ø,15Ø)-(318,16Ø),PRE
SET:HLINE-(28Ø,17Ø),PRESET:HSET(
28Ø,17Ø,11):FORQ=1TO1ØØ:NEXT:HLI
NE(28Ø,15Ø)-(318,16Ø),PSET:HLINE
-(28Ø,17Ø),PSET:GOTO88
86 F=Ø:HGET(X,Y)-(X+4,Y+4),1:HDR
AW"C1BM"+STR$(X)+","+STR$(Y)+"NR
2ND2F4C4":FORQ=1TO5Ø:NEXT:HPUT(X
,Y)-(X+4,Y+4),1,PSET
87 HPUT(X,Y)-(X+4,Y+4),1,PSET
88 RETURN
89 IFTN=ØTHENHCOLOR3:RETURNELSEH
COLOR8:RETURN
9Ø J=1:FORQ=ØTO11
91 IFTN=ØTHENOP=A(Q)ELSEIFTN=1TH
ENOP=B(Q)
92 IFTN=1 ANDC(N)<>2 THEN98
93 IFP-M=7 AND(P AND4)=4 AND P-4
=OP THENX=OP:GOSUB154:GOTO1Ø3
94 IFP-M=7 AND(P AND4)=Ø AND P-3
=OP THENX=OP:GOSUB154:GOTO1Ø3
95 IFP-M=9 AND(P AND4)=4 ANDP-5=
OP THENX=OP:GOSUB154:GOTO1Ø3
96 IFP-M=9 AND(P AND4)=Ø ANDP-4=
OP THENX=OP:GOSUB154:GOTO1Ø3
97 IFTN=Ø ANDD(N)<>2 THEN1Ø2
98 IFM-P=7 AND(M AND4)=4 AND M-4
=OP THENX=OP:GOSUB154:GOTO1Ø3
99 IFM-P=7 AND(M AND4)=Ø AND M-3
=OP THENX=OP:GOSUB154:GOTO1Ø3
1ØØ IFM-P=9 AND(M AND4)=4 ANDM-5=O
THENX=OP:GOSUB154:GOTO1Ø3
1Ø1 IFM-P=9 AND(M AND4)=Ø ANDM-4
=OP THENX=OP:GOSUB154:GOTO1Ø3
1Ø2 NEXT:J=Ø:PLAYE$:GOTO54
1Ø3 J(TN)=J(TN)+1:HCOLOR8:HLINE(
P(X,Ø)+1,P(X,1)+1)-(P(X,Ø)+27,P(
X,1)+19),PSET,BF:GOTO77
1Ø4 P=M:FORQX=ØTO3:PP(QX)=-1Ø:PJ
(QX)=-1Ø:NEXT:IFTN=1AND C(N)<>2
THEN1Ø8
1Ø5 IF(P AND4)=4 THENPP(Ø)=P-4:I
F((P-5)AND4)=((P-4)AND4)THENPP(1
)=P-5
1Ø6 IF(P AND4)=Ø THENPP(1)=P-4:I
FINT((P-3)/4)<>(P-3)/4THENPP(Ø)=
P-3
1Ø7 IFTN=ØAND D(N)<>2 THEN111
1Ø8 IF(M AND4)=4 THENPP(2)=M+4:I
F((M+3)AND4)=((M+4)AND4)THENPP(3
)=M+3
1Ø9 IF(M AND4)=Ø THENPP(3)=M+4:I
FINT((M+5)/4)<>(M+5)/4THENPP(2)=
M+5
11Ø IFTN=1 AND C(N)<>2 THEN114
111 IF(PP(Ø)AND4)=4 THENPJ(Ø)=PP
(Ø)-4:IF((PP(1)-5)AND4)<>(PP(1)A
ND4)THENPJ(1)=PP(1)-5
112 IF(PP(Ø)AND4)=Ø THENPJ(1)=PP
(1)-4:IF((PP(Ø)-3)AND4)<>(PP(Ø)A
ND4)THENPJ(Ø)=PP(Ø)-3
113 IFTN=ØAND D(N)<>2 THEN116
114 IF(PP(2) AND4)=4 THENPJ(2)=P
P(2)+4:IF((PP(3)+3)AND4)=((PP(3)
+4)AND4)THENPJ(3)=PP(3)+3
115 IF(PP(2) AND4)=Ø THENPJ(3)=P
P(3)+4:IFINT((PP(2)+5)/4)<>(PP(2
)+5)/4THENPJ(2)=PP(2)+5
116 GOSUB131
117 FORQ=ØTO3:PB(Q)=Ø:NEXT:FORQX
=ØTO3
118 IFPJ(QX)<ØTHENPB(QX)=1ELSEIF
BL(PJ(QX))>ØTHENPB(QX)=1
119 NEXTQX
12Ø IFTH=1THENRETURN
121 IF PB(Ø)=Ø OR PB(1)=Ø OR PB(
2)=Ø OR PB(3)=Ø THEN122ELSE54
122 FORQX=ØTO3:IFPP(QX)=-1THEN12
6
123 IFTN=ØTHENIFBL(PP(QX))=2 AND
 PB(QX)=Ø THEN127
124 IFTN=1THENIFBL(PP(QX))=1Ø TH
ENBL(PP(QX))=1
125 IFTN=1THENIFBL(PP(QX))=1 AND
 PB(QX)=Ø THEN127
126 NEXTQX:GOTO54
127 GOSUB89:IFTH=2THEN219ELSEHPR
INT(1,Ø),"Continue your jump"+ST
RING$(21,32)
128 GOSUB83:IFBUTTON(TN*2)=1THEN
GOSUB135:GOTO62ELSE128
129 IFJ=ØTHENRETURNELSEIFTN=ØTHE
NTN=1ELSETN=Ø
13Ø J=Ø:RETURN
131 FORQX=ØTO3:IFPJ(QX)<Ø ORPJ(Q
X)>31 THENPJ(QX)=-1
132 NEXT
133 FORQX=ØTO3:IFPP(QX)<ØOR PP(Q
X)>31THENPP(QX)=-1
134 NEXT:RETURN
135 PLAYB$:IFY<185ANDF=ØTHENRETU
RN
136 IFF=ØTHEN138ELSEF=Ø:GOSUB89:
HPRINT(1,Ø),"Are you sure you wa
nt to surrender?":EXEC44539:A$=I
NKEY$:PLAYB$:IFA$<>"Y"ANDA$<>"y"
THEN54
137 IFTN=ØTHENTN=1:GOTO146ELSETN
=Ø:GOTO146
138 IFX>63ANDX<112THEN54
139 IFX>111ANDX<16ØTHENHCOLOR2:M
$="Red:"+STR$(12-J(1))+"  Black:
"+STR$(12-J(Ø)):M$=M$+STRING$(39
-LEN(M$),32):HPRINT(1,Ø),M$:GOSU
```



HOW DO YOU GIVE A RAINBOW?

It's simple — Give a RAINBOW gift certificate . . .

Let a gift subscription to THE RAINBOW carry the premier Color Computer magazine right to your friend's doorsteps. THE RAINBOW is *the* information source for the Tandy Color Computer.

Each month, your friends will enjoy the intelligent programs, reviews and articles written exclusively for their CoCo.

First, your gift will be announced in a handsome card. Then, all year 'round, they'll remember you and your thoughtfulness when they get each edition of THE RAINBOW — pages loaded with delightful programs, regular columns and plenty of helpful hints and tips.

Generosity benefits the giver, too. There'll be no more tracking down borrowed copies of THE RAINBOW. Your collection will be safe at home.

Give a RAINBOW gift certificate and let your friends in on the fun. THE RAINBOW is the perfect companion for the Color Computer!

Get your order to us by November 25 and we'll begin your friends' subscriptions with the January issue of RAINBOW.

Please begin a one-year (12 issues) gift subscription to THE RAINBOW for:

Name _____

Address _____

City _____ State _____ ZIP _____

From:

Name _____

Address _____

City _____ State _____ ZIP _____

☐ My payment is enclosed.

Bill to: ☐ VISA ☐ MasterCard ☐ American Express

Acct. # _____ Exp. date _____

Signature _____

Mail to:
Rainbow Gift Certificate, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST.
All other inquiries call (502) 228-4492.

Subscriptions to THE RAINBOW are $31 in the United States; U.S. $38 in Canada. The surface rate to other countries is U.S. $68; the air rate, U.S. $103. Kentucky residents add 5% sales tax. **U.S. currency *only*, please.** All subscriptions begin with the current issue. Please allow 6 to 8 weeks for delivery. In order to hold down non-editorial costs, we do not bill.

How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with ORIGIN or EQUATE statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I, VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F80.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, `read.me.first`, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/` *filename* `/d0/cmds/` *filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/` *filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

RAINBOW CERTIFICATION SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

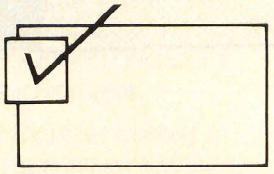
Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Still pounding away at that keyboard?

Save Time and Money with a Combination Subscription!

SAVE up to 19%

when you buy a joint subscription to the magazine and either RAINBOW ON TAPE or RAINBOW ON DISK! A one-year subscription to THE RAINBOW and RAINBOW ON TAPE is only $91 in the U.S., $108 in Canada, $153 foreign surface rate and $188 foreign airmail. A one-year subscription to THE RAINBOW and RAINBOW ON DISK is only $115 in the U.S., $138 in Canada, $183 foreign surface rate and $218 foreign airmail.*

Every month, these convenient services bring you as many as 24 ready-to-run programs. Using the current issue of THE RAINBOW as documentation, all you have to do is load and run them. A one-year combination subscription to THE RAINBOW and RAINBOW ON TAPE or RAINBOW ON DISK give you more than 230 new programs! The typing time you save can be spent enjoying your CoCo!

RAINBOW ON TAPE For No-Fuss Fun

Back issues of RAINBOW ON TAPE are available beginning with the April 1982 issue. A single copy of RAINBOW ON TAPE is $10 within the United States; U.S. $12 in all other countries. The annual subscription rate for RAINBOW ON TAPE is $80 within the U.S.; U.S. $90 in Canada; and U.S. $105 for all other countries.*

RAINBOW ON DISK Offers OS-9 Programs

In addition to all the programs offered on tape, part of one side of RAINBOW ON DISK is formatted for the OS-9 operating system. That means you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. Back issues of RAINBOW ON DISK are available beginning with October 1986. Subscriptions to RAINBOW ON DISK are $99 a year in the U.S. Canadian rate is U.S. $115. All other countries, U.S. $130. Single copy rate is $12 in the U.S.; U.S. $14 in Canada; and U.S. $16 in all other countries.*

To order by phone (*credit card orders only*), call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

Look for our envelope located between pages 66 and 67 for ordering individual subscriptions to THE RAINBOW, RAINBOW ON TAPE and RAINBOW ON DISK.

YES! Sign me up for a joint 1-year subscription (12 issues) to:

☐ THE RAINBOW and RAINBOW ON TAPE
☐ THE RAINBOW and RAINBOW ON DISK
☐ NEW ☐ RENEWAL (attach labels)

Name _____

Address _____

City _____ **State** _____ **ZIP** _____

Payment Enclosed ☐ (*payment must accompany order)
Charge: ☐ VISA ☐ MasterCard ☐ Am. Express
Account Number _____
Signature _____ **Exp.** _____

*U.S. currency only, please. In order to hold down costs, we do not bill. Kentucky residents add 5% sales tax. Please allow 6 to 8 weeks for delivery of first copies. Joint subscriptions to THE RAINBOW and RAINBOW ON TAPE or RAINBOW ON DISK begin with the current issue.

Please note: While group purchases of RAINBOW ON TAPE and RAINBOW ON DISK are permitted (and multiple subscriptions are even discounted, if purchased in one order from a club), no license to make copies is conveyed or implied. Yes, your group may even purchase a subscription to our disk/tape services, but such purchase in no way authorizes that *any* copies be made of that original disk/tape. Specifically, this means that the original disk/tape itself may indeed be kept in a club library for use by members. However, a group purchase *does not* entitle club members, individually or as a group, to copy that disk/tape.

Unauthorized copying of any copyright product is strictly illegal. The copyright (right to make copies) is in no way conveyed in the purchase transaction.

MORE BAUD LESS BUCKS

Save Time and Money with a Surprisingly Affordable 2400/1200/300 BPS Hayes - Compatible Modem for any Computer.

Don't be fooled by the low cost of these 2400 baud modems. These are high quality modems made in the USA, with performance features unmatched by competitors costing three times as much.

This is full-featured Hayes compatible modem that works with any computer. It features superior Hayes compatibility, advanced digital signal processing, and adaptive equalization for great performance and reliability. All of this in a compact, attractive go-anywhere package that's not not much larger than a paperback book.

Convenience features like call progress tone detection, auto-dial and auto-answer, a call progress speaker with volume control, a second jack for a local phone, on board diagnostics.

Money saving premiums for sign-up and connect time for Delphi, The Source, CompuServ, etc. Software available: ProcComm (PC) + 5; QuickLink (Mac) + 5; WizPro is free (shareware).

Backed by two year mfg. warrantee, so you can buy with confidence that comes with 11 years of telecommunication experience.

2400/1200/300 BPS modem $125.00

(Please add 2.50 shipping and handling)
Dealer inquiries welcome.

GCS FILE TRANSFER UTILITIES

See: Review - December Rainbow.
Dale Puckett - November Rainbow.

The **GCS File Transfer Utilities** provide a simple and quick method to transfer text and binary files from and to a variety of floppy disk formats.

Just place the **PC (MSDOS), RSDOS, FLEX** or **MINI-FLEX** disk into your disk drive - enter a simple command and the file is copied into a **OS-9** file. File transfer back is just as simple. Under Multi-Vue version, just select command from one of three menus.

Commands **Dir** of PC, RS or FLEX disk
Dump disk sector of PC, RS or FLEX
Read file from PC, RS or FLEX disk
Write file to PC, RS or FLEX disk
Rename file on PC disk
Delete file from PC disk
Format PC disk

Extensive Options Single, Double sided disks.
Single, double density disks.
35, 40 or 80 track floppy drives.
8 or 9 sectors (PC).
First level sub-directories (PC).
Binary files. Use pipes for direct and multiple transfers.

Requires OS-9. 2 drives (one can be hard or ramdisk - one floppy 40 T DD DS). Multi-Vue for Multi-Vue version. SDISK (SDISK3 for COCO III).

GCS File Transfer Utilities for CoCo

Multi-Vue	**version**	**$54.95**
Standard	**version**	**$44.95**
SDISK or SDISK3		**$29.95**

Standard diskettes are OS-9 format (5.25") add $2.50 for 3.5". Orders must be prepaid or COD. VISA/MC. Add $1.75 S&H, COD is additional.

GRANITE COMPUTER SYSTEMS
Route 2 Box 445 Hillsboro, NH 03244
(603) 464-3850

OS-9 is a trademark of Microware Systems Corporation and Motorola Inc. MS-DOS is a trademark of Microsoft Corp. FLEX is a trademark of TSC, Inc.

MX	Dummy variable
MY	Dummy variable
MZ	Dummy variable
N	Number of piece being moved or examined
NP	Number of players
OP	Number of opponent's piece
P	Block where piece to move is currently located
P(X,Y)	Array holding *x* and *y* coordinates of each block
PA(X)	Array containing surrounding blocks of any given piece
PB(X)	Returns a 1 if Direction #X is blocked
PJ(X)	Array containing jumps possible by any given piece
PP(X)	Array containing moves possible

```
B145:GOTO54
140 IFX>207ANDX<256THENHCOLOR2:H
PRINT(1,0),"Are you sure you wan
t to quit? (Y/N)"+STRING$(3,32):
EXEC44539:A$=INKEY$:PLAYB$:IFA$=
"Y"ORA$="y"THENGOSUB235:POKE&HFF
D8,0:CLS:RGB:HSCREEN0:POKE41598,
3:POKE41599,3:ENDELSE54
141 IFX>159ANDX<208THENIFJ>0THEN
54ELSEHCOLOR2:HPRINT(1,0),"Save
to (1) disk or (2) cassette?"+ST
RING$(6,32)
142 EXEC44539:A$=INKEY$:IFA$=CHR
$(12)THEN54ELSEIFA$<>"1"ANDA$<>"
2"THENPLAYE$:GOTO142ELSEPLAYB$:I
FA$="1"THEND=1ELSED=-1
143 X=1:Y=0:GOSUB156:IFGR=1THENR
ETURNELSEHPRINT(1,0),"Press any
key to save your game"+STRING$(8
,32):EXEC44539
144 POKE&HFFD8,0:OPEN"O",#D,F$:P
RINT#D,NG(0);NG(1);:FORQ=0TO11:P
RINT#D,A(Q);B(Q);C(Q);D(Q);:NEXT
:PRINT#D,TN;NP;IT;GM;J(0);J(1);:
CLOSE#D:POKE&HFFD9,0:GOTO54
145 IFBUTTON(TN*2)-0THEN145ELSEP
LAYB$:RETURN
146 HCOLOR2:IFTN=0THENHPRINT(1,0
),"Red is the winner"+STRING$(22
,32):NG(0)=NG(0)+1:IFNG(0)>999TH
ENNG(0)=0
147 IFTN=1THENHPRINT(1,0),"Black
 is the winner"+STRING$(20,32):N
G(1)=NG(1)+1:IFNG(1)>999THENNG(1
)=0
148 POKE&HFFD8,0:FORQ=255TO0STEP
-1:POKE140,Q:EXEC43345:NEXT:PLAY
"L303CGL16FEL12DO4L3CO3GL16FEL12
DO4L3CO3GL16FEFL3DO2P6DP6L2.CL12
P12CC":POKE&HFFD9,0
149 HPRINT(1,0),"Do you want to
play again? (Y/N)"+STRING$(7,32)
150 EXEC44539:A$=INKEY$:PLAYB$:I
FA$="Y"ORA$="y"THENHSCREEN2:GOTO
12ELSEGOSUB235:POKE&HFFD8,0:CLS:
RGB:HSCREEN0:POKE41598,3:POKE415
99,3:END
151 J=0:HCOLOR2:HPRINT(1,0),"Gre
etings. Your Highness":HDRAW"BM"
+STR$(P(M,0)+16)+","+STR$(P(M,1)
+12)+"C1L8U6F4E2F2E4D6L8":HPAINT
(P(M,0)+16,P(M,1)+11),1,1
152 POKE&HFFD8,0:PLAY"L1203CEGL6
04CL24CCO3L6GL24GGL12EGEL6CP6L12
CEGL6O4CL24CCO3L12ECGL6CP6L1203C
EGO4L6CO3L12GO4L6C":POKE&HFFD9,0
153 RETURN
154 IFOP=A(Q)THENA(Q)=-2:BL(OP)=
0:RETURN
155 IFOP=B(Q)THENB(Q)=-2:BL(OP)=
0:RETURN
156 HPRINT(X,Y),"What is the fil
ename? "+STRING$(18,32):F$="":F=
0:HPRINT(22+X,Y),CHR$(127)
157 EXEC44539:A$=INKEY$:IFA$=CHR
$(8)THENF=F-1:IFF<0THENPLAYE$:F=
0:GOTO157ELSEF$=LEFT$(F$,F):HPRI
NT(22+X+F,Y),CHR$(127)+" ":GOTO1
57
158 IFA$="/"ORA$="."THENPLAYE$:G
OTO157
159 IFA$=CHR$(13)THENHPRINT(22+X
,Y),F$+" ":PLAYB$:RETURN
160 IFASC(A$)<32THENPLAYE$:GOTO1
57
161 F$=F$+A$:F=F+1:IFF=9THENPLAY
E$:F$=LEFT$(F$,8):F=8:GOTO157
162 HPRINT(21+X+F,Y),A$+CHR$(127
):GOTO157
163 IFTN=0THENTH=0:GOTO55ELSEIFN
P=2THEN55ELSEGOSUB89:HPRINT(1,0)
,"Thinking..."+STRING$(28,32):TH
=1:MP=3584:J=0
164 FORMX=0TO11:IFA(MX)=-2THEN17
0ELSEM=A(MX):N=MX
165 GOSUB104
166 FORMY=0TO3:IFPP(MY)=-1THEN16
7ELSEIFBL(PP(MY))<>1THENPB(MY)=1
167 NEXTMY
168 FORMW=0TO3:IFPB(MW)=1THEN169
ELSEXX=MW:PR=0:GOSUB224:POKEMP,M
X:POKEMP+1,PP(MW):POKEMP+2,PJ(MW
):GOSUB197:POKEMP+3,PR:MP=MP+4
169 NEXTMW
170 NEXTMX
171 IFMP=3584THEN179ELSEXW=PEEK(
3584):XX=PEEK(3585):XY=PEEK(3586
):XZ=PEEK(3587):FORMX=3584TO MP-
1STEP4
172 PC=PEEK(MX):PP=PEEK(MX+1):PJ
=PEEK(MX+2):PR=PEEK(MX+3)
173 IFPR>XZ THENXW=PC:XX=PP:XY=P
J:XZ=PR
174 IFPR=XZ THENIFRND(10)<RND(10
)THENXW=PC:XX=PP:XY=PJ:XZ=PR
175 NEXTMX
176 P=A(XW):M=XY:N=XW:FORMZ=0TO1
1:IFB(MZ)=XX THEN177ELSENEXT
177 X=B(MZ):B(MZ)=-2:BL(X)=0:MZ=
11:TH=2:J=1:GOTO103
178 FORMZ=0TO3:IFPB(MZ)=0 ANDPJ(
MZ)>-1 THENXY=PJ(MZ):XX=PP(MZ):G
OTO176ELSENEXT
179 BK=6656:POKEBK,255:MX=0
180 IFA(MX)=-2THEN188ELSEM=A(MX)
:N=MX
181 GOSUB104:GOSUB228
182 IFIT=1THEN186ELSEIFPA(1)>-1
ANDPA(2)>-1 THENIFBL(PA(2))=0 AN
D BL(PA(1))=1 THENFORQ=0TO11:IFD
(Q)=2ANDB(Q)=PA(1)THENPOKEBK,PA(
2):BK=BK+1ELSENEXTQ
183 Q=12:IFPA(0)>-1 ANDPA(3)>-1
THENIFBL(PA(3))=0 ANDBL(PA(0))=1
 THENFORQ=0TO11:IFD(Q)=2ANDB(Q)=
PA(0)THENPOKEBK,PA(3):BK=BK+1ELS
ENEXTQ
184 Q=12:IFPA(1)>-1 ANDPA(2)>-1
THENIFBL(PA(1))=0 AND BL(PA(2))=
1 THENPOKEBK,PA(1):BK=BK+1
```

	by any given piece
PR	Priority of a move
Q	Dummy variable
QX	Dummy variable
R	Dummy variable
TH	Returns 1 or 2 if computer is "thinking"
TN	Returns 0 on Red's turn, 1 on Black's turn
W	Dummy variable
X	Dummy variable
XW	Dummy variable
Y	Dummy variable

(Questions or comments concerning this article may be addressed to the author at 266 Riverview Drive, Ephrata, PA 17522. Please include an SASE when requesting a reply.) ❑

```
185 IFPA(0)>-1 AND PA(3)>-1 THEN
IFBL(PA(0))=0 AND BL(PA(3))=1 TH
ENPOKEBK,PA(0):BK=BK+1
186 FORMW=0TO3:IFPP(MW)=-1THEN18
7ELSEIFBL(PP(MW))>0THEN187ELSEPO
KEMP,MX:POKEMP+1,PP(MW):PR=4:GOS
UB204:POKEMP+2,PR:MP=MP+3
187 NEXTMW
188 MX=MX+1:IFMX<12THEN180
189 IFIT<3THEN191ELSEFORML=3585T
O MP-1STEP3:FORQW=6656TO BK-1:IF
PEEK(ML)=PEEK(QW)THENPOKEML+1,PE
EK(ML+1)+1
190 NEXTQW,ML
191 IFMP=3584THEN137ELSEXW=PEEK(
3584):XX=PEEK(3585):XY=PEEK(3586
):FORMX=3584TO MP-1STEP3
192 PC=PEEK(MX):PP=PEEK(MX+1):PR
=PEEK(MX+2)
193 IFPR>XY THENXW=PC:XX=PP:XY=P
R
194 IFPR=XY THENIFRND(10)>RND(10
)THENXW=PC:XX=PP:XY=PR
195 NEXTMX
196 P=A(XW):M=XX:N=XW:GOTO77
197 M=PJ(XX):N=MX:GOSUB104
198 FORMY=0TO3:IFPP(MY)=-1THEN19
9ELSEIFBL(PP(MY))<>1THENPB(MY)=1
199 NEXTMY
200 FORMY=0TO3:IFPB(MY)=0THEN201
ELSE203
201 IFC(N)=2THENBL(PP(MY))=10
202 XX=MY:PR=PR+1:GOTO197
203 NEXTMY:RETURN
204 IFIT=1THEN208ELSEM=A(MX):P=M
:GOSUB228:IFPA(1)>-1 ANDPA(2)>-1
 THENIFBL(PA(2))=0 AND BL(PA(1))
=1 THENFORQ=0TO11:IFD(Q)=2ANDB(Q
)=PA(1)THENPR=PR+1ELSENEXTQ
205 Q=12:IFPA(0)>-1 ANDPA(3)>-1
THENIFBL(PA(3))=0 ANDBL(PA(0))=1
 THENFORQ=0TO11:IFD(Q)=2ANDB(Q)=
PA(0)THENPR=PR+1ELSENEXTQ
206 Q=12:IFPA(1)>-1 ANDPA(2)>-1
THENIFBL(PA(1))=0 AND BL(PA(2))=
1 THENPR=PR+1
207 IFPA(0)>-1 AND PA(3)>-1 THEN
IFBL(PA(0))=0 AND BL(PA(3))=1 TH
ENPR=PR+1
208 IFPP(MW)>27ANDPP(MW)<32ANDC(
N)<>2 THENPR=PR+1
209 M=PP(MW):P=M:GOSUB228
210 IFPA(1)>-1 ANDPA(2)>-1 THENI
FBL(PA(2))=2 ANDA(MX)=PA(2)AND B
L(PA(1))=1 THENFORQ=0TO11:IFD(Q)
=2ANDB(Q)=PA(2)THENPR=PR-1ELSENE
XTQ
211 Q=12:IFPA(1)>-1 ANDPA(2)>-1
THENIFBL(PA(2))=0 ANDBL(PA(1))=1
 THENFORQ=0TO11:IFD(Q)=2ANDB(Q)=
PA(2)THENPR=PR-1ELSENEXTQ
212 Q=12:IFPA(0)>-1 ANDPA(3)>-1
THENIFBL(PA(3))=2 ANDA(MX)=PA(3)
ANDBL(PA(0))=1 THENFORQ=0TO11:IF
D(Q)=2ANDB(Q)=PA(3)THENPR=PR-1EL
SENEXTQ
213 Q=12:IFPA(0)>-1 ANDPA(3)>-1
THENIFBL(PA(3))=0 ANDBL(PA(0))=1
 THENFORQ=0TO11:IFD(Q)=2ANDB(Q)=
PA(3)THENPR=PR-1ELSENEXTQ
214 Q=12:IFPA(1)>-1 ANDPA(2)>-1
THENIFBL(PA(1))=2 ANDA(MX)=PA(1)
 AND BL(PA(2))=1 THENPR=PR-1
215 IFPA(1)>-1 ANDPA(2)>-1 THENI
FBL(PA(1))=0 ANDBL(PA(2))=1 THEN
PR=PR-1
216 IFPA(0)>-1 AND PA(3)>-1 THEN
IFBL(PA(0))=2 AND A(MX)=PA(0)AND
 BL(PA(3))=1 THENPR=PR-1
217 IFPA(0)>-1 ANDPA(3)>-1 THENI
FBL(PA(0))=0 AND BL(PA(3))=1 THE
NPR=PR-1
218 RETURN
219 FORMY=0TO3:IFPP(MY)=-1THEN22
0ELSEIFBL(PP(MY))<>1THENPB(MY)=1
220 NEXTMY
221 GOTO178
222 FORQ=18TO22:HPRINT(0,Q),STRI
NG$(40,32):NEXTQ:RETURN
223 RETURN
224 IFC(N)=2THENBL(PP(MW))=10:PR
=PR+1
225 RETURN
226 EXEC44539:A$=INKEY$:IFA$=CHR
$(12)THENGOSUB222:GOTO12ELSERETU
RN
227 POKE&HFFD9,0:PLAYE$:HPRINT(E
X,EY),"E R R O R    Press any ke
y to continue ":EXEC44539:HPRIN
T(EX,EY),STRING$(40,32):IFEY=0TH
ENX=160:GOTO141ELSE156
228 FORQ=0TO3:PA(Q)=-10:NEXT:IF(
PAND4)=4THENPA(0)=P-4:IF((P-5)AN
D4)=((P-4)AND4)THENPA(1)=P-5
229 IF(P AND4)=0 THENPA(1)=P-4:I
FINT((P-3)/4)<>(P-3)/4THENPA(0)=
P-3
230 IF(M AND4)=4 THENPA(2)=M+4:I
F((M+3)AND4)=((M+4)AND4)THENPA(3
)=M+3
231 IF(M AND4)=0 THENPA(3)=M+4:I
FINT((M+5)/4)<>(M+5)/4THENPA(2)=
M+5
232 FORQ=0TO3:IFPA(Q)<0ORPA(Q)>3
1THENPA(Q)=-1
233 NEXTQ
234 RETURN
235 GR=1:HPRINT(1,0),"Do you wan
t to save the score? (Y/N)"+STRI
NG$(3,32):EXEC44539:A$=INKEY$:PL
AYB$:IFA$<>"Y"ANDA$<>"y"THEN237
236 X=160:GOSUB141:GR=0:HPRINT(1
,0),"Press any key to save the s
core":EXEC44539:POKE&HFFD8,0:OPE
N"O",#D,F$:PRINT#D,NG(0);NG(1);:
CLOSE#D:POKE&HFFD9,0
237 HCLS8:HCOLOR0:PALETTE0,18:FO
RQ=191TO0STEP-1:HLINE(289,Q)-(30
,Q),PSET:NEXT:RETURN
```


PERRY COMPUTERS
The Ideal Buy
1-800-248-3823

TANDY COMPUTERS

Tandy 1000-HX 256K 5 1/4"	535.00
Tandy 1000-SL 384K 5 1/4"	675.00
Tandy 1000-TL/2 640K 3 1/2"	955.00
Tandy 1400FD Portable	1210.00
Tandy 1400HD Portable	1975.00
Tandy 3000-NL 512K 3 1/2"	1275.00
Tandy 4020-LX 1 Meg 3 1/2"	2950.00
Tandy 4025 LX 2 Meg 3 1/2"	3650.00
Tandy 4000-SX 1 Meg 3 1/2"	2075.00
Tandy 5000MC 2 Meg 1 Drive	3825.00
Tandy 5000MC 2 Meg 40 Meg	4955.00
Tandy 5000MC 2 Meg 84 Meg	5395.00
Tandy 102 24K	430.00
Tandy Color 3 128K	155.00

MONITORS & CARDS

VM-5 Monochrome Green	115.00
CM-5 Color RGB	220.00
CM-11 Color RGB	315.00
Magnavox 9CM053 Color EGA	395.00
Packard Bell Monochrome TTL	89.00
Amdek 410 Monochrome	155.00
Amdek 732 VGA Color Analog	425.00
NEC 2A 14" Super VGA Color	545.00
NEC 3D 14" Digital Monitor	710.00
Tandy EGA Card	205.00
Paradise Basic EGA Card	99.00
Video 7 Vega/Deluxe	239.00

DISK DRIVES

5 1/4" External Drive 1000HX	180.00
Tandy 20 Meg Hard Card	450.00
30 Meg Hardcard	395.00
Weltec 5 1/4" for Tandy 1400	215.00
Seagate 20 Meg Drive & Card	269.00

MODEMS

Prac. Peripherals 1200B Internal	75.00
Prac. Peripherals 2400B Internal	175.00
Packard Bell 2400B Internal	140.00

PRINTERS

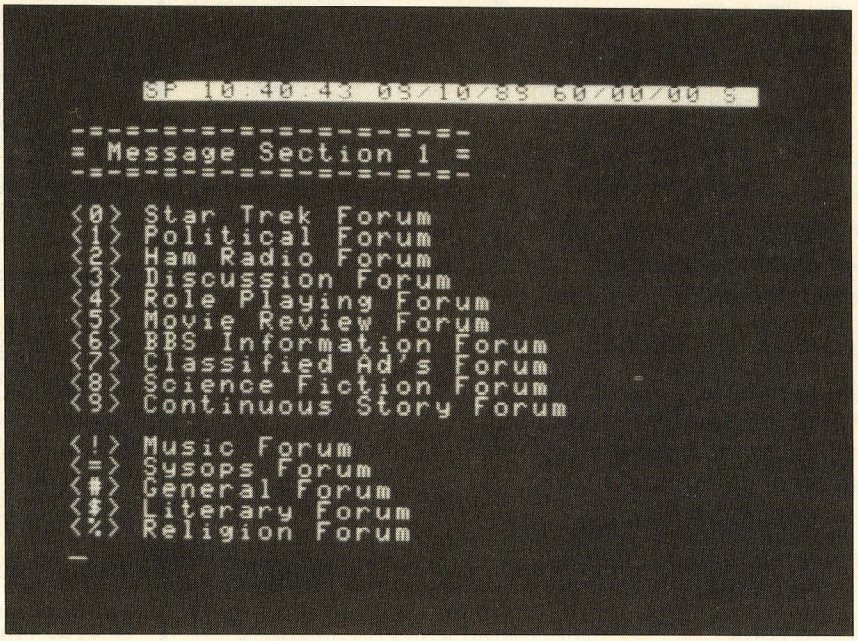
DMP-107 Dot-Matrix	210.00
DMP-133 Dot-Matrix	279.00
DMP-300 Dot-Matrix	479.00
Epson LX-810 Dot-Matrix	195.00
Epson FX-850 Dot-Matrix	365.00
Epson LQ-510 Dot-Matrix	345.00
Epson LQ-850 Dot-Matrix	585.00
Epson FX-1050 Dot-Matrix	485.00
Panaonic KX-P1180 Dot-Matrix	205.00
Panasonic KX-P1191 Dot-Matrix	265.00
Panasonic KX-P1124 Dot-Matrix	365.00

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted add 2% (minimum charge $10.00). M.C., Visa add 2%. All non defective items require return merchandise authorization. Call for RMA Number before returning. Delivery is subject to product availability. Add 1½% for shipping and handling. $5.00 minimum charge.

TM - Registered Trademark of Tandy, Epson, and IBM

Monday thru Friday 9am - 5pm EST.

PERRY COMPUTERS
124 South Main Street, Perry, MI 48872
CALL 1-517-625-4161 or TOLL-FREE
1-800-248-3823



Software CoCo 3

CEBBS— A BBS You Can Live With

Bulletin board systems (BBSs) have increased in popularity dramatically over the years. As more and more people acquire home computers, the number of those owners who decide to set up a BBS has also risen. In order to run a good board, you need a quality BBS program. One of the newest additions to the CoCo BBS market is *CEBBS*, a software package I believe to be easy enough for the average computerist to use and powerful enough to satisfy the SysOp (System Operator, the person who runs the board). Running a BBS is an adventure that usually requires close contact and interaction with the board, almost like having a roommate; *CEBBS* is a BBS you can live with.

CEBBS requires a CoCo 3, an RS-232 pack and a Multi-Pak (or a Y-cable). You also need an auto-answer modem with a DTR lead, which stands for Data Terminal Ready. This is used by the BBS to quickly disconnect users. At least one disk drive is also necessary, but the more the better. If you have 512K in your CoCo 3, you can significantly increase the speed of the BBS by using a RAM disk program. However, the software allows use of only drives 0 through 3, so RAM disk programs that expand drive numbers to the range of 0 to 5 don't work fully with this BBS. The author is presently working on a modification to make those RAM disks work with *CEBBS*. If you have Disk BASIC 1.0 or are using a DOS that has been modified to overlap the GAT (Granule Allocation Table) to allow more than 35 tracks (such as *ADOS*), you can also experience problems when using the message base. This can easily be avoided by putting all message-related files (`MESSAGES.SYS`, `HEADERS.SYS` and `INDEX.SYS`) on one drive.

CEBBS comes with an extensive 43-page manual, which I found to contain a few typographical errors but no technical ones. The use of the BBS and the functions available are documented in great detail, and there are only a few sections that could have benefited from a little expansion. A commented source code listing of the machine language driver would have been useful but is not necessarily customary for this type of package and is not needed for proper use of the board.

CEBBS operates with a bread-board-type scheme, a method of allowing the SysOp flexibility in the design and operation of the board, primarily through the use of menus. Those of you who have used the *COBBS* program (published in the November 1985 RAINBOW) will find *CEBBS* in some ways similar.

There are several different programs used by *CEBBS*. Six of them are actually used while the BBS is running. The first is MAIN.SYS, which contains the main body of the BBS and handles most of the functions. MESSAGE.SYS, loaded when the message base is accessed, handles the various message functions. UPLOAD.SYS contains the BASIC code and ML driver for the checksum Xmodem upload, and DOWNLOAD.SYS is its counterpart. LOGON.SYS, which controls a user's initial logon, is the program that resides in the CoCo's memory while the BBS is waiting for a caller. It also contains the routines that obtain the necessary information from new users. LOGOFF.SYS is a short program responsible for correctly logging users off the system.

Four of the programs on the disk are used when *CEBBS* is booted up. BOOT.BAS is the program that is run to start the system. It loads and executes CLOCK.BIN (the software clock), DRIVER.BIN (the ML driver) and OPTIONS.BIN (sets up the USR routines).

The remaining seven programs are editors used by the SysOp to update and maintain various data used by the BBS. MESSAGE.EDI allows modification and purging of the message base. USERLOG.EDI performs the same features for the userlog. QUOTES.EDI is used to add and delete "Quotes of the Day," which are displayed to users at logon. This Quote of the Day feature adds a nice touch to the board and is popular with users. The program DESCRIPT.EDI is used for the download descriptions. If you have chosen to have the system tracer data sent to the disk, you can use TRACER.EDI to either view the information on the screen or send it to the printer. The tracer records who logged on and what functions they accessed while online, as well as any errors that occur.

TEXT.EDI is a mini text editor used in place of a word processor for text file and menu creation (discussed later). The final program, CONFIG.EDI, is used to configure *CEBBS* to match your particular computer system as well as your personal tastes. Various features of the BBS can be altered with it, and the program also obtains information from the SysOp concerning which disk drives contain which programs. Before starting up the board, you must determine which drives hold the various programs needed to operate the BBS. The programs must remain in the appropriate locations and cannot be moved unless CONFIG.EDI is run again.

All the editors operate well and are simple to use, making the SysOp's job a little easier — good support utilities are the part of a BBS that the SysOp appreciates greatly and becomes very familiar with. I did find one error, and that was in the configuration program (CONFIG.EDI) at Line 330. The 410 at the end of the line should be 360 instead. This corrects an error that causes those choosing to have tracer data sent to the printer to miss 11 configuration options.

The programming in all areas of the BBS is very crisp and clear. The BASIC programs are not *extremely* well documented but contain sufficient remarks that, combined with the straightforward code, make reading them a snap. This should make it easy for those who want to modify the system (a desire that seems very common among SysOps). The BASIC code is surprisingly easy to read considering that it is BBS software. The normal preponderance of peeks and pokes is absent due to the excellent use of USR function calls to communicate with the ML routines. And the ML code is also well-written and not too difficult to follow, even without comments. Much of the speed and clean quality of this BBS is due to the author's no-nonsense programming.

The Driver

The machine-language driver program for *CEBBS* is a very fast, effective driver that adds much to the power of this BBS. It contains crisp ML programming with some impressive code, and I find no errors in it. The author's use of USR commands to allow BASIC to access various driver functions is well done and makes using it easy and straightforward.

This driver operates similarly to others that hook into CONSOLE OUT to send output to both the screen and the modem. However, instead of hooking into CONSOLE IN, it modifies BASIC's KEYIN routine to jump to the new code, which then returns to the KEYIN routine. This allows both the INPUT and INKEY$ commands to work perfectly for receiving data from the modem.

The driver supports features commonly found in such drivers. It can be set to output a specific character, such as an asterisk (*) in place of the regular output; this is nor-

Computing on Cocoa Beach

Kevin Berner lives and programs in beautiful Cocoa Beach, Florida. He founded KB Enterprises in January of this year to serve as an outlet for his many excellent programs; most of the sales are through dealers or mail order, and the company is off to an excellent start.

A member of the CoCo community for many years, Kevin began with the old gray-case 16K CoCo (with standard BASIC) and has remained with the CoCo ever since. He has been programming for just as long, and the code contained in *CEBBS* is indicative of a great deal of programming experience and knowledge. He currently has a BBS running with his *CEBBS* software and is also a routine user of the many other BBSs in the Cocoa Beach area.

He has produced several programs that work with Burke & Burke's *Hyper-I/O*, including the *Hard Drive Utilities* package, *Disk Doctor*, *Hard Drive Zap* and *Autopark*, which automatically parks the hard drive head after a period of inactivity. *CEBBS* is designed to be compatible with *Hyper-I/O* and is structured to make full use of the storage a hard drive makes available. *CEBBS* is the result of an extensive three-year project that incorporated much of Kevin's programming knowledge and experience with BBSs. Its precise manual is a result of his good communication abilities.

Kevin has just completed *Basic Windows*, a program that allows a 512K CoCo 3 to have six separate complete windows of BASIC running independently. And he is continually working to improve *CEBBS*.

Not yet out of college, this excellent programmer has much yet to contribute to the CoCo Community in the future.

Anatomy of a BBS

The BBS is an exciting aspect of computer technology that has found an important place in today's society. We are said by some to be in the "Information Age," and the BBS is a perfect example of the flow of information that characterizes communication in this fast-paced world. National bulletin boards such as Delphi serve as integral parts of the computer industry in all its aspects. Local boards are also becoming important bases for the exchange of information and data and as think tanks for programmers and developers. The private BBS is an interesting combination of hardware and software that results in a powerful computing tool.

CEBBS operates in a fashion common to most of the CoCo BBSs. The bulk of the code is in BASIC, with machine-language drivers to tie the input and output to the modem. This scheme is popular due to several factors. The ML code provides the speed necessary to send data at the rate of 300 bytes *per second* when running at 2400 baud. (For you typists, that is about *3600* words per minute!) BASIC makes it easy for the SysOp to customize the board as desired and is also a good language for programming the type of input, output and processing a BBS uses.

The hardware starts with the computer itself. The CoCo makes an excellent host computer, except for the lack of a built-in real-time clock; keeping the correct time is often important for a BBS. Software clocks keep fair time, but many SysOps choose to use one of the real-time clocks available for the CoCo.

Data storage is a major factor when dealing with a BBS, especially one that offers upload and download capabilities. I have used (and run) excellent BBSs based solely on a few floppy drives, but hard drives are a popular addition now due to their low cost. CoCo 3 boards often use a RAM disk to provide lightning fast access to most-used programs; they can make all the difference between a board that appears quick and smooth and one that appears slow and choppy.

An auto-answer modem is also needed, and many users expect at least 1200 baud for a serious board. The final consideration is the means used to connect the modem to the computer. The serial port has been popular for a low-cost board, but speed considerations have demanded an RS-232 pack for faster and smoother data transfer; use of a pack will require a Multi-Pak (more reliable than a Y cable).

Many CoCo users who desire to start BBSs already have the hardware requirements taken care of and simply need good software to get them going. *CEBBS* is one key that opens the door to your own BBS.

mally used to mask the user's password as it is being typed in. The driver can be set to either send or not send linefeeds with each carriage return; this is used for some users whose computers normally expect the linefeed. You can tell it to accept both upper- and lowercase as input or to convert all input to uppercase. You *cannot* choose to have all input converted to lowercase. Output can be sent as both upper- and lowercase or as just uppercase. Output to and input from the current online user can also be turned off, useful for when the SysOp is performing local functions that should not be viewed by the user.

The driver also works with the software clock (which keeps adequate but not perfect time because of interrupt masking) to provide several additional features to the BBS. The user's time allowed and time used is constantly compared, and the user is disconnected as soon as that limit is reached. After eight minutes of no activity from the user, disconnection also occurs.

In addition to the normal error trapping, the system can be set to lock up if it breaks into BASIC's direct mode, thus keeping users from gaining access to your system files. The SysOp can turn this protection on or off from the host computer at any time.

One minor problem, which is also found in other drivers designed to be used with the RS-232 pack, is that no output can be sent to the modem unless a carrier is detected. Normally this check for a carrier is desired, but I like to be able to send commands to my modem (such as to turn the speaker off so the annoying carrier signal isn't broadcast all over the house) from within the program while no user is online.

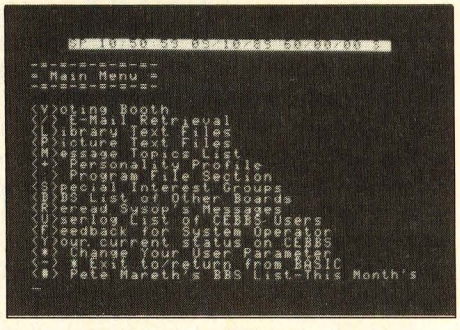
I liked the driver for this BBS and think that the features it has, along with its excellent integration with BASIC, give *CEBBS* much of its power.

The Menus

The popularity of the bread-board type system is due primarily to the board's configuration being completely in the SysOp's hands. The menus with which the users are prompted and the commands available at each menu are determined by the SysOp and can easily be changed. The procedure used to create menus with this board are similar to those used with *COBBS*, except that *COBBS* uses a special editor to work with the menus. *CEBBS* simply uses menus in the form of text files created with a word processor (a mini text editor is included with the BBS in case a word processor isn't available to you). This makes menu creation easier and also makes changes simpler. Also with *CEBBS*, you can have as many menus as you have disk space for.

Menus are created by adding *command lines* that contain the text shown to the user and the command the system executes if the user chooses that option. For example, a command line such as `<C>hat with SysOp\(C)(A)(C)` prints the text before the '\' to the user. The first letter in parentheses is the key the user must press to activate the command, in this case a C. The next letter, an A, is a *privilege character* that must be contained in the user's userlog file in order for that user to be able to access this command. This is different from the privilege system used in *COBBS*, which involves flags and a privilege level. And the final C is the function activated by this command, in this case a call to the Page SysOp routine.

There are several other functions that can be accessed by the menus, such as a call to the message base, which allows the user access to the specified *forum* (message section) for reading and posting messages. This function is explained in greater detail below. Other functions allow the user to print a specified text file, go to a different



menu, run an external program, upload a file, download a file, view descriptions of available downloads, view time and date, show status of the current user, list users of the system, change user parameters (such as password, upper/lowercase, etc.), exit into BASIC (allows remote operation by the SysOp), and log off the system. The BBS comes with three sample menus so you can

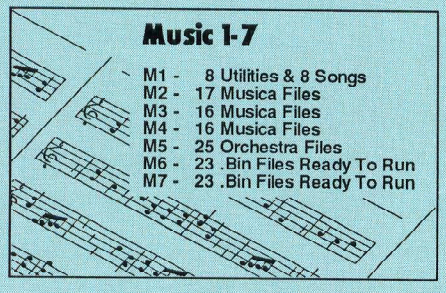
NEW BEST PUBLIC DOMAIN PROGRAMS ! NEW

FROM T&D SUBSCRIPTION SOFTWARE

T&D SUBSCRIPTION SOFTWARE HAS ACCUMULATED OVER 1.000 PUBLIC DOMAIN PROGRAMS FOR THE COLOR COMPUTER.

WE ARE SELLING 630 OF THE BEST. JUST THE GOOD STUFF !

Music 1-7



M1 - 8 Utilities & 8 Songs
M2 - 17 Musica Files
M3 - 16 Musica Files
M4 - 16 Musica Files
M5 - 25 Orchestra Files
M6 - 23 .Bin Files Ready To Run
M7 - 23 .Bin Files Ready To Run

ADVENTURES 1,2

Each Disk/Tape Contains
9 Great Adventures
Ready To Run

Order A1 Or A2

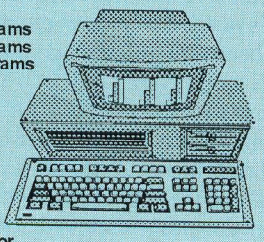
TELECOMMUNICATIONS 1-3

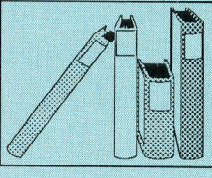
T1 - Haysae, Kermit, Mterm
T2 - Cobster Terminal Package
T3 - Mikeyter Terminal Package

RAINBOW CERTIFICATION SEAL

GRAPHICS 1-4

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





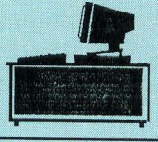
EDUCATION 1-4

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

HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

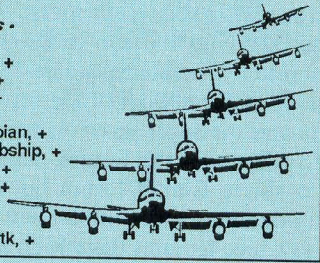
H1 - Checkbook, Database, Word Processor, +
H2 - Cash Journal, Investments, Mail List, +
H3 - Finance, Int. Rates, Stocks, +
H4 - Spelling Fix, Spelling Checker, +

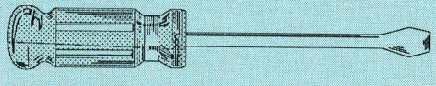


GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

GA1 - 3Dtictac, Missle, Poker, Tycoon, +
GA2 - Chess, Motojump, Rider, Slots, +
GA3 - Battship, Golf, Lander, Robots, +
GA4 - Abm, Cartel, Subchase, Trek, +
GA5 - Blackjack, Laser, Raceway, Utopian, +
GA6 - Kings, Navyguns, Poolgame, Subship, +
GA7 - Connect4, F-16, Life, Mazeland, +
GA8 - Chute, Football, Othello, Slither, +
GA9 - Civilwar, Flight, Prix, Stock, +
GA10 - Cave, Fly, Pedro, Scramble, +
GA11 - Bunkers, Craps, Gunner, Nukeattk, +

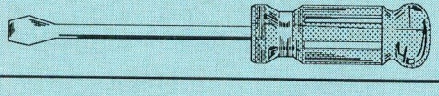




UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

U1 - Backup35, Diskzapr, Romcopy, Timer, +
U2 - Customize, Diskfix, Disktest, Multback, +
U3 - Diskaid, Dsklibry, Mldata, Playmac, +
U4 - Macpix, Stat-Log, Unarc, Unmaster, +
U5 - Assemblr, Mcbase, Squeezw, Writer, +
U6 - Chr-Ed3, Hgrcolor, Minidos, Updnlist, +
U7 - Head Print With 30 Mini Pictures
U8 - Fig Forth Language With Tutiorial



BUY ALL 53 DISKS/TAPES FOR ONLY $145.00 !

MAIL TO:

T&D Subscription Software
2490 Miles Standish Drive
Holland, Michigan 49424
(616) 399-9648

Call or write for a FREE catalog !

PRICES:
1- 5 disks/tapes....$6.00 each
6 or more.....$5.00 each
All 53 disks/tapes $145.00

VISA MasterCard

• WE SEND 1ST CLASS - NO CHARGE •
• PERSONAL CHECKS WELCOME •

Name_____

Address_____

City_____ State____ Zip_____

Credit Card #_____

Expires_____

TOTAL AMOUNT $_____

CIRCLE ISSUES DESIRED

M1	GR1	E1	U1	GA1
M2	GR2	E2	U2	GA2
M3	GR3	E3	U3	GA3
M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

PLEASE CIRCLE

TAPE DISK

Please turn to pages 31 & 55 for our Subscription Software!

see how they should be prepared. Note: The sample Logoff menu contains an error that must be fixed in order for the "quick disconnect" function to work properly.

The menu system used by *CEBBS* is easy to operate, and it provides the flexibility available to boards of this type. The actual processing of the menus and output to the user is quick, thanks to the efficient coding found in the program, and this added to the overall smoothness of the board's operation.

The Message Base

In general the message base is the most used and most important part of any BBS, often making or breaking a board. All the *CEBBS* message functions work as intended, and its design enables the SysOp to set up an extensive message section. The commands needed to access the message base have been streamlined and made simple to use. A menu command such as `<G>eneral Messages\(G)(A)(M)GENERAL` loads the message base program and uses `GENERAL` as the forum name to search for in the messages. All message functions are handled within the program itself so that it is no longer necessary to have separate menu commands for reading, scanning, posting, etc. The only problem with this setup is that some flexibility is lost. It is not possible to give a user `READ` access to a message forum without allowing that user to also `POST`. In addition to a separate forum designed for private E-mail only, all of the forums can have private messages saved on them. While some SysOps want this feature, others might want a single E-mail forum but need to modify the program to implement this.

A few nice features have been added to the *CEBBS* message section. One appreciated addition is a string-replacement line-editing feature, found on most boards, that allows replacement of individual words or letters within a line without re-typing the entire line. The author is also on the right track with the message indexing he uses. While it is not as fast or complex as some true indexing schemes, it does allow quicker searches through the messages. This is very helpful considering that at logon every single message is scanned, and the same is done for individual messages until the desired one is found.

The message section seemed not to flow as well as the rest of the board and is lacking in some features that would have been helpful. However, it functioned perfectly and is both stable and reliable.

Conclusion

I used *CEBBS* for almost a month in place of my normal board in order to be able to fully test it in the intended environment; in that time not a single error occurred. As a SysOp I find the BBS easy to install and maintain. As a programmer I appreciate the nice coding in both BASIC and machine language. As a BBS user I find *CEBBS* to be lacking a few features found on some other boards, but it *is* the best BBS I have seen for the CoCo.

If you are looking for a board that comes ready-to-run on a CoCo 3, is easy to install and use, is powerful and can make full use of a hard drive, has checksum Xmodem up- and downloading and crisp and concise code, *CEBBS* is for you. (I want to thank those who were helpful in the review process for *CEBBS*: Duane Banks, Charles Curran, Todd Miller, Tim Johnsrude, Jeff Lemieux, Brad Hampton, Darrell Stewart, and all the other users who participated. Thanks!)

CEBBS is available through Microcom Software, or directly from KB Enterprises.

(KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, 407-799-3253; $49.95 introductory)

—Michael G. Toepke

Software CoCo 1, 2 & 3

Art-Deli II— A Second Helping of Ready-Made Graphics

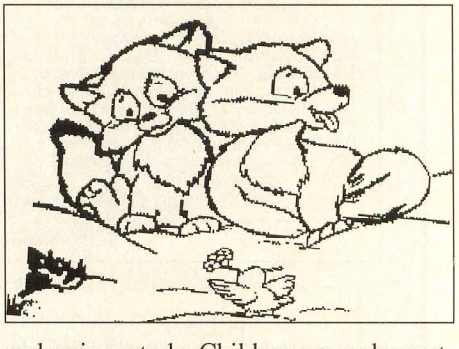
Art-Deli II is a follow-up to *Art-Deli*, a 440-picture clip-art library reviewed in October 1987's issue of THE RAINBOW. *Art-Deli II*'s pictures are `PMODE4` black-and-white scanned images that can be loaded into a graphics editor (I loaded them into *CoCo Max III*) or a desktop publisher (*Max-10*), or dumped to the printer using a screen dump program. Each disk includes a viewing utility that allows the pictures to be viewed once or continuously.

Art-Deli II consists of five double-sided disks (packed in a 10-disk holder) containing the following categories of pictures: Kid Sports, Baby Animals, Birds, Ducks, Animated Favorites I and II, Cars, Boats, Shapes and Road Signs. The disks are "flippies" so they work fine with single-sided drives. The package includes a small (4½-by-5½-inch) catalog, so you can look for a picture to fit your needs without having to load and page through the disks. The complete set is $49.95, but single disks can be purchased for $9.95 each plus $3 shipping and handling.

Each disk side covers one category, and each category contains 22 picture files with `.ART` extensions, a `BOOT.BAS` file and a `SYSTEM.BIN` file. `BOOT.BAS` loads `SYSTEM.BIN`, which brings up the viewing utility. It asks if you want to page continually through the pictures or view them only once. The utility puts each picture onscreen for a few seconds then automatically displays the next screen. I found that after going through one disk you can insert a second disk and see its pictures without having to reload the utility.

Each picture is actually a *CoCo Max II* compatible picture. To load an image into *CoCo Max III*, change the .ART extension to .MAX, then load it through *CoCo Max III*'s TRANSLAT program

Art-Deli II's pictures can be put to many uses. They can enhance newsletters, bulletins, cards, posters, etc. There are many applications for school use, for both fun and serious study. Children can make posters and signs featuring Mickey Mouse, the Pink Panther, Garfield the Cat and more. If your class project is writing about the evolution of water travel, the Boat category might come in handy; it shows representative vessels from Indian dugouts to viking ships to pirate ships to modern battleships and luxury liners.



Each picture is actually a *CoCo Max II* compatible picture. To load an image into *CoCo Max III*, change the `.ART` extension

to .MAX, then load it through *CoCo Max III*'s TRANSLAT program. (I had to call Specialty Projects to find out how to do this; it would have been nice if the instructions were included in my review copy.) I have a suggestion for Specialty Projects: How about incorporating a utility that backs up each disk and renames the files for the most popular graphics editors? This would eliminate the tedious renaming process. Also, for those who are not familiar with disk commands or do not want to become overly computer literate, it would allow quick and friendly access to the program. In my job as a microcomputer support person, I have often had to walk my customers through simple procedures simply because they refuse to learn the specifics of their operating system.

You can manipulate the picture within *CoCo Max III* but, as the earlier review mentioned, coloring the pictures with the Paint function is difficult. These pictures were meant to serve as clip art for newspapers and newsletters, where color is rarely involved. I used *Max-10*'s picture translator, also, to import *Art-Deli II* pictures, once again changing the .ART extension to .MAX. This type of setup is where *Art-Deli* is most useful—as clip art for your desktop publishing applications.

I recommend *Art-Deli II* to anyone needing clip art for desktop publishing, printing cards and bulletins, etc. It is easy to use and needs very little documentation.

(Specialty Projects, 4810 McCrory, Memphis, TN 38122, 901-682-8737; $9.95 per disk; $49.95 for the set plus $3 S/H.)

—Kay Cornwell

Software

CoCo 3

BASIC Windows— Multitasking in 512K Without OS-9

So you just plopped down your hard-earned cash and got that 512K upgrade for your beloved CoCo. You found the price a little unsettling, to say the least. You're undecided on the OS-9 question, and at the price advertised ($71.95) it just doesn't seem to be the answer to your dreams. Besides, you're not really sure you could justify that kind of negative cash flow to your better half.

How about finishing that BASIC program you've been working on, while referring to the flowchart you wrote for it, and enjoying a continuing game of solitaire all at the same time. Imagine being able to accomplish all that without the long, lonely nights and colorful language often associated with OS-9 — and without thinning your checking account.

K.B. Enterprises has developed an economical utility called, of all things, *BASIC Windows*. This fast-loading little gem gives the CoCo 3 six windows under Disk BASIC. Each window is clearly labeled with its number so users can tell which window they are currently in.

Unlike OS-9 the whole loading process takes less than 5 seconds, and there are no volumes of commands to memorize. To use the system you must remember only that the F1 key is the window-shifting key and Window 1 is the only one that supports the high-resolution commands of BASIC. These commands are basically — no pun intended — the H commands. All other commands are available on all windows.

I was able to run *Disk EDTASM* in Window 3, the *CoCo Flow* program (March '86 RAINBOW) in Window 2, and *Solitaire 3* (December '88 RAINBOW) in Window 1. Remember, Window 1 is the only high-

Telepak II ..... See Review This issue! $49.95

The Telepak II is fast becoming the new standard for Color Computer Telecommunications. Baud rates to 19,200 baud. Comes complete with 3' DB25 cable that will connect directly with any standard modem or terminal. The latest in microchip technology. Does NOT require a multipak interface. Gold connectors.

2400 baud Modem only $139.95

3/12/2400 baud. Auto-dial /answer. AT command set. 2 year warranty and 6 foot cable. (4-pin or DB25- please specify)

New 80 track-double sided drives---$39.95!

Full height - Bare drives. Limited quantities.
Great for OS-9, Hyper I/O, and ADOS 3
Order yours now!

UP DOS - Coco III DOS - What your Coco should have been born with. ONLY $24.95
Load/Save CM3-MGE grfx. Auto-boot even OS-9! Easy ML config prgm.
Choose Boot-up Screen width,palettes, baud rates, step rates,35/40 trk.

Alpha Software

Disk manager tree$29.95
Multi-Menu.....$19.95
OS-9 Level 2 BBS..$29.95
Warp One.....$34.95
Presto-Partner.....$29.95
The Zapper.....$19.95
Level II Tools.....$24.95

V-term.....$39.95
version 3.02. RSDOS

Supercomm..$29.95
New! for OS-9 LII

512K Ram Upgrade

*Premium 120ns RAM chips
*Complete with installation instructions and RamDisk, Print spooler, & Ram test!
Only.....$109.95
OK board /software $39.00

Cables .. 4-pin to DB25...$12.95 (specify modem or printer)
DB25 M-M / M-F-6'..$9.95
Magnavox RGB....$14.95

TECHNOLOGIES

Visa, MC, C.O.D. or your personal check accepted.
Add $3.00 shpg/hldg.
C.O.D. - add $3.00
P.O. Box 63196
Wichita, KS 67203
316-946-0440

resolution window. All these programs were running at the same time and without any apparent effect on each other. It was not unlike having six different CoCos in the same box. Each window reports a total of 22,820 bytes of memory available on startup, regardless of the number of windows running programs.

The program is not copy-protected, thank goodness, and it takes up only one granule of disk space. This allows for the incorporation of the utility to any disk containing programs you might want to use. For example, you can run the finance program by Dale Tinklepaugh (April '88 RAINBOW) in the third window and the modified spreadsheet program by Saul Mooallem (March '88 RAINBOW) in Window 6, along with the inventory program by Bill Tottingham (April '88 RAINBOW) in Window 4. All this at the same time without the OS-9 beast rearing its head! You can even play *Les Lutins* by Louis Parson (June '87 RAINBOW) in Window 1 whenever the mood strikes.

It doesn't take much to recognize the potential of this program, and at $34.95 it seems a reasonably good deal. There are, however, a few things you might want to consider before deciding to purchase it.

The first is its relative low cost when compared to OS-9 and *Window Master*. This low cost includes a greater degree of difficulty in learning as well as financial outlay. Another thing to consider is the availability of inexpensive software (RAINBOW ON DISK) that can be used under this utility as opposed to the requirement to purchase OS-9-based software for whatever task you're looking to perform.

The program could use the additional ability of shifting back to the previous window, something in the way of the SHIFT-CLEAR key under OS-9. If you're working in Window 3 and want to go back to Window 2, you must pass through windows 4 through 1 before you can get to Window 2. Also, any program running in any window runs *very slowly* so your score in *F15 Eagle* (August '87 RAINBOW) should improve greatly.

Yet another consideration is that each window supports only a relatively small BASIC or machine language program due to the available memory of 22,820 bytes in each window.

If you use a printer, you will find it is controlled by only one window at a time via the F2 key. The window you are in when you press the F2 key is the controlling window for the printer. The pokes for printer speed control are fully supported, as is the DRIVE command of BASIC. CoCo 3 systems with two disk drives can change the default drive of any window to any drive, allowing the use of two disks at the same time.

The documentation consists of three typewritten pages with a cover sheet. The instructions for loading and operating are very clear and informative. There is even a handy table describing the BASIC commands available to each window.

The program requires a 512K CoCo 3 to run, and if you're looking for an easy-to-operate, cost-effective alternative to some of the other windowing environments, *BASIC Windows* may just be the answer to your needs.

On the other hand, you should keep in mind that, unlike the 8088 IBM XT machines (*yuk!*), software is still being developed for the CoCo. In order to take full advantage of our *incredible* machine, you should give serious consideration to taking that big step into the world of OS-9.

(K.B. Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, 407-799-3253; $34.95 plus $1.50 S/H)

—Terry Parks

Software CoCo 1, 2 & 3

Danosoft's Disk Utilities— Must-Have Software for the Disk User

In the past few years some remarkable software and hardware for the CoCo has been coming out of Canada. Everyone should be familiar with CRC Computers in Quebec and their Disto products created by Tony DiStefano. Oblique Triad and Magus Systems are familiar names, and there are several others who advertise in THE RAINBOW from time to time. In the past few months, a new name has made its debut from our neighbors to the north, namely Danosoft, of Mississauga, Ontario. I reviewed Danosoft's *Big Basic* memory utility for THE RAINBOW (October '89), and now I bow to Danosoft's superior work again. This month let's take a look at DanoSoft's *Disk Utilities* package, a great product at a moderate price.

There are plenty of alternate disk operating systems out there to let you use double-sided disk drives with the CoCo, and quite a few that allow the CoCo to access all 40 tracks on a side. This being the case, why buy a utility to do the same thing? That's easy: compatibility and price.

Danosoft's *Disk Utilities* consist of a half-dozen of the utilities you've always wanted at a price ($17.95 U.S.) far lower than the competition's, less than $3 per program. At that price, how much of a bargain can they be? Read on! A single disk contains all six utilities, and they are quite efficient, none using more than one granule; most of them don't even consume any user RAM. Bigger isn't always better, especially when you're trying to wring the last sector out of every disk.

BURIED BUXX

Crashin' for Cash

It's here. Buried Buxx for the CoCo III.
Better Graphics, more Color, non-stop action.
Pilot your Chopper into enemy territory and recover the loot. Game configuration screen, high score save and more. Joystick required. $24.95

FREE SHIPPING
on orders recieved prior to
December 15, 1989

Many more programs available
Call or write for a complete listing.

JR & JR SOFTSTUFF
P.O. BOX 118 • Lompoc, CA • 93438 • (805) 735-3889

MasterCard Orders Accepted 24 Hours a Day. VISA
All Programs on Diskette Only.
All orders add $3.00 shipping. C.O.D. orders $4.00 additional.

At the top of my personal wish list lately has been a program that would access both sides of a disk on a full 40-track 360K drive, like the big boys do it. I found it with *Big Disk*. Once loaded, *Big Disk* allows you to DSKINI a blank floppy on both sides at once, giving you a continuous 80 tracks — using both sides of the disk — instead of two independent 40-track sides. Say you're writing that Great American (or Great Canadian) Novel and you're tired of telling the word processor which side of which disk the next chapter goes on. Or you're making up that great disk of short BASIC programs you've always wanted, and Drive 0 with Drive 2 is a bit awkward when you've only got one drive with 250K or so of programs on it. *Big Disk* formats and reads both sides of any double-sided drive with 158 granules and 360K of storage space. It also maintains compatibility with your 35-track disks, reading them normally, with 68 sectors. But is it compatible with other software? My "fussy" word processor thinks so! It says that this disk has 27 granules used up on it, with 131 granules to go. Playing around with the surliest, most stubborn software I can find, everything works just fine. Case closed.

Some people like to have their disks' sides separated. The president of my CoCo club decided long ago he wanted Drive 0 and Drive 2 together and Drive 1 and Drive 3 on the same floppy. He might prefer DOUBLE40. This utility initializes each side of each floppy with 40 tracks, using the arrangement mentioned above. Even so, it too maintains compatibility with the "little" 35-track disks and reads commercial software packages normally. It only uses the double-40 format with disks initialized while it's installed.

Well enough, I suppose, but what do I do with a six-year collection of 35-track disks? Hmmm. Here's CONVERT/DSK. What does it do? Danosoft says I can LOADM CONVERT/DSK, then put in my favorite old disk and DSKINI it. What, and erase my disk? No, trust me, friends: CONVERT/DSK gently adds five new tracks to the regular 35, then formats the flip side with 40 more. It also works to set up disks to function under either *Big Disk* or DOUBLE40, using a modified DSKINI function. Danosoft does recommend that you cold start your computer before and after using CONVERT/DSK, however, because it does some strange things to memory.

QUIKDRIV/6MS is the fourth program of the set. It offers a faster stepping rate for the read/write head of the disk drive, jumping from the built-in speed of 30 milliseconds to a hurry-up speed of just 6ms from track to track. Neither Danosoft nor I really recommend this speed, but it seems to be in demand so it is supplied here. It does speed disk access time — great when you're doing a lot of on-and-off disk work (as with database applications), but it may also cause undue wear and tear on your equipment. I found with similar utilities years ago that DSKINI and BACKUP work a little funny with a 6ms step rate, and Danosoft warns against the same thing. Let the user beware, but nobody says you have to use it, and it isn't force-fed to you as in any alternate DOS.

QUIKDRIV/30M is a different sort of utility, one I can't seem to recall needing or even seeing before, but I think it grows on you. You've probably noticed that drives keep on running after they are accessed, and the red light stays on after the OK prompt appears on the screen. Fine, but for that two seconds, you can't access the drives while they spin down. This is a built-in function, like 35 tracks, left over from the Bad Old Days when CoCo drives were just slightly modified Tandy Model I hardware and not too dependable mechanically. Now the software retains these allowances for the old dinosaur drives only because it's too much work for Tandy to modify the DOS. (Is it time for a Color Extended Disk BASIC 1.3?) Anyway Danosoft comes to the rescue again with a little utility that shuts off the drives in about a quarter of a second, or 1/8 the usual time. Very handy for backup and copy functions.

SETFEED is the only program of the six that I couldn't find much immediate use for, but it may still be just the ticket for some jobs. It adjusts the characters per line and spacing between lines for just about any printer you can hook up to a CoCo. What can it be used for? I've grown fond of using it for program listings, of all things. If I'm modifying a long BASIC program, I can use SETFEED to put, say, four spaces between each line so I can pencil in comments or new code. And I can set the printer to keep each line just 32 or 40 characters long, to make "finger entry" easier for me or someone else. Maybe that's how they keep those 32-column listings so neat in THE RAINBOW!

OK, it's acid-test time. Are Danosoft's *Disk Utilities* compatible with the popular alternate operating systems? I tried to "stretch" a disk under CONVERT/DSK, then ran it on my "fussy" word processor to write this review. Then I cold-started the CoCo 3, booted up under my favorite alternate DOS (all right, it's SpectroSystems' *ADOS-3*), and loaded the word processor again. I still had 80 contiguous tracks (well, 78; two are used for the directory and its granule allocation table) and a full 78 granules per side. 100-percent compatibility and all the files were still accessible! What does this mean to you? Well, you can make an 80-track disk with the Danosoft disk utility of your choice and give it to a friend who uses another 80-track DOS, and you won't have to give him a pirated copy of these utilities just so he can use the files. Of course, at this price, who needs to pirate? (Just say *no* to hot software!)

Now the bad news. I usually dedicate a paragraph in every review to what I would change or what I don't like, but this time I haven't anything to say. Danosoft has developed a package of bug-free utilities at

*** EXTENDED * ADOS-3**

*** Built-in RAMdisk * Point-and-pick file select menu ***

Not a new version of ADOS-3, but a new product that shares space with ADOS-3 in a 16K EPROM. Arrow-key selection of files to execute, LOAD, COPY, KILL or SCAN. The BACKUP command is doubled in speed for full disks, proportionately faster for partly full disks. (BACKUPs to or from the RAMdisk typically take 5 to 20 sec.) • BACKUP-with-format • Wild-card COPY and KILL, with optional prompting for individual files • Date (or date/time with hardware clock) displayed for files in the directory, printed on LLISTings • DATE$ function • Key repeat • Block move/copy of BASIC program lines • Text screen printer dump • Auto-reboot of a BASIC program or the DOS command • Parallel printing • Read/write/format 35/40 tracks on 80-track drives • Supports 3 double-sided drives plus 2 RAMdrives • Allows different numbers of tracks on different drives • Shares the original's excellent compatibility with commercial software. For 128K CoCo 3 with ADOS-3 (RAMdisk use requires 512K). Includes information on having an EPROM burned (cost is $15) after configuring Extended ADOS-3. Disk, **$39.95.** Extended ADOS-3 plus ADOS-3, **$64.95.** Driver for Disto real-time clock, **$5.** Adapter for controllers lacking 28-pin socket, **$10.** SmartWatch real-time clock (Tandy 25-1033 equiv.), **$35** (Driver included; for 28-pin socketed controllers only).

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

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

ADOS-3 (reviewed July 1987)
Customize default startup message, colors, screen width, baud rate, step rates, processor speed, number of tracks (35, 40, or 80). Disk I/O and printing are reliable at double CPU speed. Extra commands such as FAST, SLOW, AUTO, RUNM, SCAN, CAT, PRT ON/OFF. Keystroke macros, arrow-key scroll through BASIC programs, edit/repeat of last command, auto-edit of error line, ML monitor, lots more. Usable as a disk utility or in EPROM. 128K Coco 3. EPROM-burning (cost is $15-20) information provided. Disk, **$34.95.**

ADOS for Coco 1 and 2 (reviewed June 1987) Disk, **$27.95.**

SPECTROSYSTEMS
11111 N. Kendall Dr.
Suite A108
Miami, FL 33176
(305) 274-3899

PLEASE ADD $2 SHIPPING • NO DELAY ON PERSONAL CHECKS
WE CANNOT ACCEPT CREDIT CARDS

an incredible price. Users are warned that *Big Disk*, DOUBLE40 and CONVERT/DSK overwrite the cassette access part of the CoCo's built-in operating system, but it's been at least nine months since I've even had the cassette plugged in; you other disk users probably don't use it much either. If you do need it, I suggest formatting the disk as you need it under the utility of your choice, cold starting your machine, and then copying your cassette files to the new disk conventionally. You can even use BACKUP or COPY later to move the files to the 10 new granules or the back of the disk.

If you've been holding out buying an alternate DOS because of cost or compatibility questions, or just didn't need all they offer, or you're just looking for a bargain on utilities, look no further! Danosoft offers must-have utilities at a can't-wait price.

(Danosoft, Box 124, Station A, Mississauga, ON L5A 2Z7, Canada, 416-897-0121; $17.95 U.S., $21 CDN, add $2.50 S/H)

—Fred Toon

Software CoCo 3

The O.S.I.T.E. File— Reporter Investigates Alien Rumors

As a reporter for a famous newspaper, you have been chosen to investigate recent occurrences at the Outer Space Intelligence Transmission Enterprises (O.S.I.T.E.). Rustan Straun, its president and CEO, has agreed to let reporters tour the top-secret interplanetary communications installation.

Your inquiring mind wants to know — what about the now-secret wings made inaccessible to the media? What about the disappearance of a scientist last seen here? Is it true that O.S.I.T.E. has contacted alien worlds? Just what is going on here? As you sit in the lunchroom with other reporters waiting for the tour guide, you decide to answer your own questions by embarking on a one-reporter tour.

The O.S.I.T.E. File is a graphics Adventure game on disk or tape for the CoCo 3. The disk is not copy-protected, easily allowing a backup play disk to be made. The three-page, typed instructions tell you to RUN "BOOT" to begin the program that "sets up the mainframe." BOOT asks what type of monitor you're using and then provides a detailed game scenario. After paging through the instructions you then load and run OSITE to start the game. Unfortunately you must run BOOT the first time you play the game after a cold start because it sets up the graphics, etc. (I would like to see an option here allowing the experienced user to go straight into the setup without having to page through the three or four screens of instructions.)

The O.S.I.T.E. File is a typical Adventure responding to verb-noun commands,

Proving O.S.I.T.E. and its president guilty of harboring alien intelligent life forms is the object here

such as GET KEY. Only the first three letters of each word need to be typed in to be recognized. As in most Adventures, you get an inventory of what you are carrying and also some help. A unique feature is the random VERB command. Type VERB and "a random verb is selected for the user's aid." Many times it seems the random verb is exactly the verb I need. The available directions are shown onscreen, and moving is accomplished with one-letter commands. A description of each room is given along with a simple graphic of the objects of interest.

Being a reporter, naturally, most of your important clues are found by snooping. You jot down clues in your notebook, which is accessed through the RECORD command. Typing in RECORD brings up a text screen with space for 15 lines of notes. It is important to take notes because, at the end of the game, you are asked a series of random questions. You must answer the questions correctly to win.

Proving O.S.I.T.E. and its president guilty of harboring alien intelligent life forms and exposing them as a counterfeit alien organization is the object here. Unfortunately I found doing that rather easy. I solved the game in four hours. I do not consider myself an expert Adventurer: I have solved Mark Data's graphic tape games, *Dallas Quest* and Sierra On-Line games yet have attempted many more games than I have solved. I find *O.S.I.T.E* to be straightforward, very easy and possibly too generous with help. In fact I would have solved *O.S.I.T.E.* in less time had there been a Game Save feature eliminating the need to start at the beginning each time I died.

The O.S.I.T.E File is in the spirit of graphics Adventures found within the pages of THE RAINBOW. In fact the author, Michael Anderson, has had two of his programs place third and fourth in the RAINBOW Adventure Contests: *The Adventures of Johnny Zero* and *The Park of Mystery*. I have not seen either of these programs so I cannot compare them to *The O.S.I.T.E. File*. Within the pages of RAINBOW or on the RAINBOW Adventure tapes, *The O.S.I.T.E. File* would be a great beginner's Adventure, but I don't feel that it stands alone as a $19.95 program. It is just difficult enough (you die once or twice) and yet not too hard for a novice Adventurer. If you have more than one or two Adventures under your belt, *The O.S.I.T.E. File* will leave you wanting.

(Tothian Software, Inc., Box 663, Rimersburg, PA 16248; $19.95 plus $2 S/H)

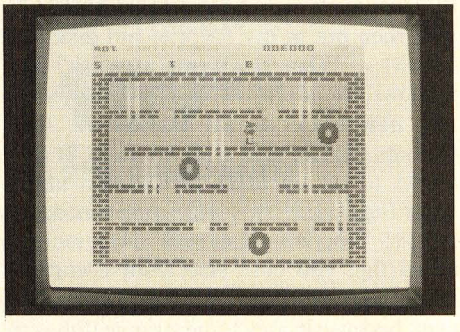
—Kay Cornwell

Software CoCo 1, 2 & 3

Donut Dilemma— Sharpen Your Sweet Tooth!

There is trouble at the donut factory when angry Angelo has the machines running out of control. Your mission in *Donut Dilemma* is to enter the building from the bottom floor and work your way up, battling the crazed machines until you reach the top floor. There you must shut down the factory's generator, thus restoring law and order.

Along the way you encounter many maniacal machines such as fat spurters, sugar sprinklers, conveyer belts and even a berserk bucket. Monstrous donuts are there



to thwart your progress. If you pick up a bag of donut mix, you can "pop" the evil donuts by throwing it at them. After you destroy the mad donuts, you are able to climb ladders, jump platforms and ride elevators to reach the top floor where the power generator is located.

Have I mentioned that you must not

A New High In Printer Performance!

MULTI-FONT PRINTER NX-1000II

Now a Blazing 180 characters per second!

The NX-1000II gives you plenty of print options for attractive printing. Four typestyles. Four pitch sizes, in standard and italics for a total of 32 NLQ modes. The NX-1000 Rainbow gives you all these features plus online access to 7 color printing and graphics. Black, blue, red, yellow, green, violet, and orange. Both models have a 1 year warranty and a 30 day online trial.

NX-1000II SPECS: 180 cps Draft, 42 cps NLQ (18 x 23 dot matrix), 4 NLQ Fonts, Italics, Sub & Superscripts, Emphasized, Doublestrike, Proportional, Condensed, International, Downloadable, Quad Tall, Double Tall, Underline, 9+ Pitchs, Forward and Reverse n/216" Line Feeds, Absolute or Relative Vert. & Horz. Tabs, Left, Center or Right Justification, 8 Graphics Modes to 1920 dpi, Macro Instruction, Bidirection, Adjustable Tractor Feed, 200+ Printable Characters, Semi Auto Sheet Feed, Front Panel Soft Touch Control, Epson and IBM Emulate, 4k Data Buffer, Hex Dump. **NX-1000 Rainbow:** 144 cps Draft, 36 cps NLQ, rest same as NX-1000II plus color.

NX-1000II SYSTEM INCLUDES:
- Star NX-1000II Printer
- Blue Streak Ultima
- Software Support Trio

$208.88 +$10 Shipping

COMPLETE

NX-1000 RAINBOW SYSTEM INCLUDES:
- Star NX-1000 Colour Printer
- Blue Streak Ultima
- Software Trio
- Color Super Gemprint

$269.95 +$10 Shipping

COMPLETE

The Smallest, Sleekest, Fastest Serial To Parallel Converter You Can Buy!

7 Switchabel Baud Rates

300 • 600 • 1200 • 2400 • 4800 • 9600 • 19200

Use this "smart" cable to connect a Centronics parallel printer to any version CoCo or use it to improve performance of your current printer. The cables are long-life, high quality shielded cables with moulded plugs for extra durability.

Try a Blue Streak Ultima on your system for 30 days RISK FREE. One year warranty.

The Blue Streak Ultima

Powered version add $6.00.

$39.95 +$2 Shipping

FREE with purchase of any NX-1000 System

Software Support Trio

Type Selection/Tutorial

Online instructional program that will select 24 special features of your printer or display methods to incorporate them into your programs.

Super Gemprint

Will transfer Pmode 0, 1, 2, 3, or 4 picture screen to printer 8"x11" hardcopy. Black/white, white/black or grey level shading for color.

Hi-Res Super Gemprint

Disk software that will transfer a Hscreen 1, 2, 3, or 4 picture screen to printer. Grey level shading for color.

FREE with purchase of any NX-1000 Printer

All Three Programs $19.95

Color Super Gemprint

Print your Graphics Screen in Color on your NX-1000 Rainbow!

Use your favorite program to create a pmode or hi-res graphic image, but don't stop there! Run our color graphics software and print a color image using a palette of 81+ colors on your NX-1000 Rainbow from a CoCo 1, 2, or 3. Requires 32k ECB Disk.

$19.95

FREE with purchase of any NX-1000 Rainbow System

Price, availability and specifications subject to change without notice.

Order Your System Today... Call (513) 885-5999

DAYTON ASSOCIATES of W.R. Hall, INC.

9644 Quailwood Trail • Spring Valley, Ohio 45370

Visa & Master accepted within the continental U.S.
Ohio residents add 6.5% sales tax
COD add $3.00

Shipping charges to Canada, P.R., HI, AK, APO, FPO are double. Triple charge to all other countries.

forget to turn on the three circuit breakers to activate the elevator in order to leave each room? This is not necessarily an easy task! Each floor level is depicted with a variety of ladders, walkways and devious donuts that you must outwit in order to proceed. There are some rather clever obstacles. The game requires patience to solve some of the dilemmas, speed and accuracy to solve the others.

Donut Dilemma is a simple, enjoyable arcade game. It has 10 colorful screens to keep you on edge. The game starts out easy to play, then becomes progressively harder to master. I was able to get to the third level before I became bogged dough-deep in trouble. There is a practice game feature that gives unlimited lives to help you learn the ropes.

My two sons, ages 12 and 15, enjoyed this game for hours, trying to conquer it — not as easy as it first might seem! *Donut Dilemma* uses the keyboard for control. This game is designed for older children (and adults) who have the dexterity to manage the keys. Instructions are provided to have you playing the game within minutes, but mastering the keys requires some practice.

Donut Dilemma was originally designed for the Tandy Color Computers 1 and 2, but has been updated to work on the CoCo 3. It requires a disk drive and can be used with a TV set or RGB monitor.

(Game Point Software, P.O.Box 6907, Burbank, CA 91510, 800-877-2232; $19.95 plus $3 S/H)

Software CoCo 3

Disk Handyman— CoCo 3 Utilities

Disk Handyman, despite its sexist title, is about as user-friendly as a CoCo 3 utility can be. The package's cover letter recommends that you run DOCS first.

DOCS has all the documentation needed, and you can whip through it in just a few minutes. Being a typically cautious Co-Coist, I made a backup copy of the disk before I loaded any of its programs into my trusty machine. Since I don't own any of the lightning-speed, one-pass backup utilities one sees advertised in THE RAINBOW, my backups take about five minutes of computing time and numerous flips of the single-drive door latch as I obey the CoCo's prompts. *Disk Handyman* makes a usable copy in three passes, taking three minutes or less on a single drive. You are also given the option to work with 40-track disks. People with 512K CoCos can knock a copy off in a single pass.

Since there are other utilities on the market that back up a disk in one pass on a 128K system, this three-pass option might not seem impressive. What is impressive, if you or a friend happen to possess a Multi-Pak, is the ability to copy disks between two computers, using each of your Drive 0s. Using two slots of the Multi-Pak for the disk controller interfaces, *Disk Handyman* treats one drive as Drive 1 and the other as Drive 0. If that doesn't seem like enough value for $25, read on.

The Read Error routine is handy for counting the number of read glitches on a disk. The target disk is zipped through rapidly, and the contents are flashed on-screen in an impressive blur. The routine pauses for input whenever a granule error is encountered, and at the end you get an asterisk (*) for each error found. I fooled around with this for a while, but — considering the lockout routine that follows — I found no real need for it.

The lockout routine offered by *Disk Handyman* also finds the aforementioned glitches. The bad granules are then locked out so data isn't stored there, avoiding grief later when you attempt retrieval. For a partially filled disk that you don't want written to by mistake, this routine also locks out all available space. Be certain, however, that you don't plan on using any more space on the target disk since the procedure is apparently irreversible.

If you have a disk with a DOS track, you are given the option to auto-execute any BASIC program on that disk by entering DOS. If you start to encode a disk with the DOS command and the routine finds something already on the DOS track, it advises you that something is there. Pause here to decide if you want to continue encoding your disk so it will auto-execute the program of your choice. Chances are there is a favorite BASIC program living on the DOS track. Chances are you will kill that favorite program if you continue the encoding sequence, so follow the prompts carefully to avoid problems.

To sum up: Except for a few minor spelling errors in the documentation, *Disk Handyman* is a well-prepared utility for the CoCo 3. If there were a routine included to reverse the granule lock utility, it would be a more complete package.

But the program does exactly what it claims to do. Functionally it's built like a sports car, speedy in operation and difficult to crash. Pricewise, it compares fairly to similar offerings.

(Micro Data Systems, 205 Baldwin Ave., Princeton, KY 42445, 502-365-3967; $24.95 plus $3 S/H)

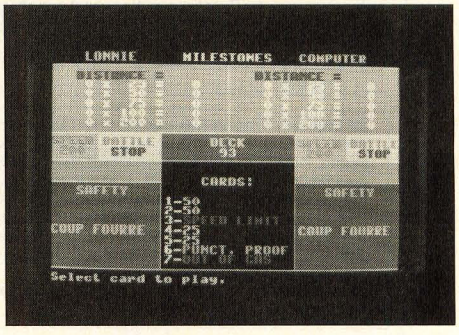
—Mike Shay

Software CoCo 3

Milestones— Card Game and French Lesson in One

Milestones is a new CoCo 3 card game from JR & JR Softstuff. It comes on an unprotected disk with five sheets of instructions (and hints). The object of *Milestones* is to win a 1000-mile road rally.

A road rally is a type of race that is won on points and not necessarily by crossing the finish line first. When the game boots, the player is given the options of joystick or keyboard interface, RGB or composite monitor, and the name of the player. Next



the board screen comes up and the player is told the computer is shuffling the deck of 106 cards. There are four categories of cards: distance cards to move; hazard cards to slow or stop the computer; remedy cards to offset the hazard cards; and safety cards to protect from the use of hazard cards. Points are awarded for miles traveled, the playing of safety cards, finishing the rally first, making a safe trip, achieving a shut-out, and completing a *coup forre* (the French lesson is coming).

The screen is divided into three sections; the left side displays miles traveled, speed limits and status. The right side of the screen is the CoCo's, and the bottom center of the screen displays the cards in the player's hand.

As stated above, either joysticks or the keyboard can be used to play. I prefer the keyboard because it seems easier and faster than using my joystick. The game is really very simple. You begin a turn with six cards in your hand, draw a seventh card by

pressing ENTER, then if possible play a card to move your car. If there are no playable cards, one card must be discarded.

There is one exception to this play (now it's time for the French lesson). Suppose that dirty-playing CoCo plays a hazard card — say a "flat tire" card — on you, and you are holding the "puncture proof" safety card. You can play that "puncture proof" card before drawing another card. This play is called a *coup forre* (pronounced *coo foo-ray*). You receive 100 points for playing the safety card and 300 points for the *coup forre* and get to watch the screen turn all different colors. *Coup forre* is a French fencing term that basically means if your opponent tries to smack you upside of the head, you block him and then smack *him* in the side of *his* head (French isn't so hard).

Milestones is a card game, so no matter how good a player you are — or the CoCo is — the deal of the cards can have a lot to do with the outcome of a game. The results of the games I played ranged from my winning big to my losing badly, with some very close games too. Since every game is different because of the deal, *Milestones* is not so simple that you will get bored with it, nor so difficult that you will get frustrated with it. To be honest, I took satisfaction in playing "accident" cards on my CoCo and imagining it running into the wall at 200 mph after some of the beatings it gave me. So if you're into card games with a twist, consider *Milestones* for your CoCo library. The price is right.

(JR & JR Softstuff, P.O. Box 118, Lompoc, CA 93438, 805-735-3889; $19.95 plus $3 S/H)

—Steve Griffith

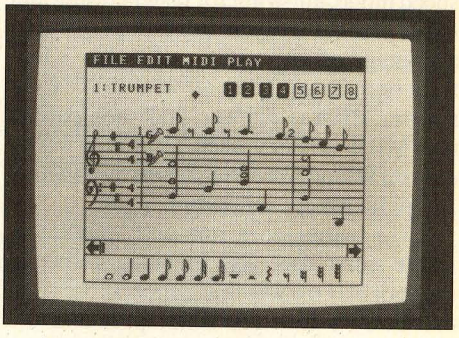
~~Software~~ CoCo 1, 2 & 3

~~Hardware~~

Lyra 2.62— An Upgraded CoCo MIDI Sequencer

The union of electronic computers and electronic sound synthesizers has been in existence for nearly as long as electronic computers have been around, but only recently has this powerful combination been available to the average consumer. With the CoCo and since the introduction of *Lyra* just four years ago by master programmer Lester Hands, this marriage of computers and synthesizers is not only available to *all* 64K CoCo users but *very* accessible as well.

Lyra (currently available as Version 2.62) is a combination software and hardware package that gives the electronic musician access to the latest MIDI functions available in MIDI-compatible synthesizers, while at the same time offering an operating



environment that even the beginning music student will find easy to use. All music data in *Lyra* is graphically displayed in standard music notation. A Macintosh-style, point-and-click, menu-driven environment makes *Lyra* easy to learn and use.

Lyra works with any CoCo with a minimum of 64K, a disk drive (Radio Shack Disk Extended Color BASIC required), and

DISTO SUPER RAM III 512K UPGRADE $90 (free software included)

CRC COMPUTERS

4 IN 1 MULTIBOARD ADAPTER 130$
Parallel printer port, real time clock, Serial port, hard disk adapter

DISTO

Mini Controller 1
The No-Extra-Cost Controller
• 2 DOS Switcher (switch included)
• NO clumsy jumpers to move
• Accepts 24 or 28 pin EPROMs
75$ DOS included (add 10$ for 2nd DOS)

See page 123, March 89 Rainbow for more info

RS-232 SuperPack 55$
• A Stand-Alone (Multi-Pak rqd.) adapter that gives the user a true RS 232 Serial Port. • Completely compatible with OS-9's ACIA software.
• Compatible with software that requires the Tandy Deluxe RS-232 Pack.
• DB-25 cable included.

MEB Adapter II 35$
To plug in your DISTO Super Add-Ons (Multi-Pak required)

Super RAM 3
ZeroK Board 25$
Free software included

RGB to Monochrome 35$
Video/Audio Adapter
See page 123. March Rainbow 89

The only floppy disk Controllers that ELIMINATES the need of a Multi-Pak

Super Controller I
Along with the included DOS, plug-in three more software selectable DOSes or 2764 or 27128 EPROMs burned to your liking.
The internal M.E.B. (Mini Expansion Bus) lets you add DISTO's incredible Super Add-ons.
99$/110$(2 DOSes)

See page 122, March 89 Rainbow for more info

Super Controller II
NOW AVAILABLE AT YOUR LOCAL RADIO SHACK STORE
Part no: 90-2009
• Under OS-9:
• Buffered Read/Write sector achieved without halting the CPU.
• Continual use of keyboard even while reading or writing to disk.
• System's clock no longer looses time during Read & Write.
• NMI is blocked & transferred to IRQ in software for low CPU overhead. • Completely Interrupt driven for fast & smooth Multi-Tasking operations.
• Drivers written by KEVIN DARLING 130$

Don't let anyone tell you otherwise, the WD 1773 does not have any problems with COCO 3s.
!! Only bad designs do !!

RADIO SHACK (R) which has more experience with COCO controllers than any other supplier now carry the DISTO SUPER CONTROLLER II

DISTO SUPER ADD-ONS
75$ 3 in 1 Multi Board Adapter
Parallel Printer Port, Real Time Clock and a true RS-232 Serial Port.
External DC adapter required.
(OS-9 Driver included)
35$ Real Time Clock & Printer Interface
OS-9 Driver (20$)
55$ Mini EPROM Programmer
40$ Hard Disk Adapter
Works with SASI & SCSI interface.
No Multi-Pak needed if used with SC1 or SC2.
Compatible with RGB DOS and Burke & Burke Hyper I/O. OS-9 Driver included.
70$ Hard Disk Adapter with RS-232

CRC COMPUTERS INC.
11 Boul. Des Laurentides, Laval, (Quebec), Canada H7G 2S3
Call for Canadian Prices Include S&H of $4 or $8 if order exceeds $75
Sorry: No personal cheques
Master Card and Visa Accepted
1-514-967-0195

a mouse or joystick. The *Lyra* editor is displayed on the high-resolution PMODE 4 screen (your choice of buff and black or green and black display colors). The display is acceptable on a TV or composite monitor. But since *Lyra* makes no use of "artifact" colors, the display works very well (and of course is much sharper) on an RGB monitor. If *Lyra* is running on a CoCo 3, it automatically puts itself into double-speed mode, allowing for faster editing and faster playing tempos, but it does not take advantage of any additional CoCo 3 features or memory. In an effort to make *Lyra* a better MIDI sequencer, once-compatible non-MIDI devices such as Tandy's *Orchestra 90* and Speech Systems' *Symphony 12* are no longer supported.

Lyra comes on a non-copy-protected, single-sided disk and includes a special six-foot MIDI cable that connects between the CoCo's four-pin serial port and the standard five-pin DIN MIDI IN port of a MIDI-capable instrument (most MIDI instruments have both MIDI OUT and MIDI IN ports and sometimes a MIDI-THRU port as well; your instrument must have a MIDI IN port to work with *Lyra*). *Lyra* is also compatible with the CoCo MIDI Pack previously available from Speech Systems and now offered as a part of the *CoCo MIDI 3* package from Rulaford Research. There is a very readable 35-page manual that adequately covers all of *Lyra*'s features. The *Lyra* disk includes ready-to-play sample music files along with a printer utility for printing *Lyra* music scores on a dot-matrix printer. Printers currently supported include Tandy, Epson and Okidata 92; the manual has a listing of relevant printer codes to assist users with printers not on the list.

Lyra is a professional-quality, graphics-oriented, eight-voice MIDI composition system (not a MIDI recorder) for creating playable music MIDI data. While it does have the capability to play, to a limited extent, through the television/monitor speaker (or audio jack on the CoCo 3), *Lyra* really struts its stuff when used in conjunction with a MIDI-capable synthesizer.

To say it another way, if you have a CoCo with at least 64K and a MIDI synthesizer, you *must* have *Lyra*. To take the greatest advantage of all of *Lyra*'s features, your MIDI synthesizer should be eight-note polyphonic, multi-timbral and velocity-sensitive (meaning it can simultaneously play eight notes with eight different sounds and allow MIDI control of individual sound volumes).

A simple LOADM command gets the all-machine language program up and running. Most of *Lyra*'s screen is devoted to its display of a grand staff, the pairing of two five-line music staves divided into bass and treble clefs as is standard in transcriptions for piano. Key and time signatures are displayed in standard format as well as bar lines connecting the two staves. Musically speaking, with *Lyra* what you see is what you get. Across the top of the display is a menu bar for instant access to a host of editing, playing and file-management features. Along the display's bottom are a selection of notes and rests, with corresponding values from whole to 64th. Aside from menu boxes that open and close during the course of operations, you never lose sight of this main display.

Entering music into *Lyra* is as easy as pointing and clicking. To place a note anywhere on the grand staff, you first select the desired note value (whole note, quarter note, etc.) by moving the cursor to the note options at the bottom of the screen, positioning the cursor over the desired value and clicking the mouse or joystick button once. The cursor then becomes the selected note value. If you then want to enter that note value as a Middle C, for example, you position the cursor (which looks like the current note value) at the Middle C position between the bass and treble clefs and click once. A copy of the note is made at the correct position. Click again, and you've entered another note, and so on. This pointing and clicking is the essence of *Lyra*'s interactive, graphics-oriented environment.

Of course there is much more to *Lyra* than simply picking up notes and putting them on staves. With room enough for over 14,000 notes/events — and because *Lyra* allows for up to eight separate voices — you can compose and play up to eight simultaneous lines of music, or compose music with full eight-voice chords. All eight lines/voices of music can be displayed and played simultaneously, or you can select just the voices you want to see and hear. Once you have entered some music, a host of editing features goes beyond simply inserting and deleting notes. Using block-editing functions, entire sections of music can be copied, moved, transposed and deleted. The block editing functions can be selected to act on all the voices or just the voices you choose. You can scroll through the music a note at a time or jump directly to specific measures or relative positions in the composition. Music can be played at any time and from any position in the composition during the editing process.

All the standard music composition tools are available in *Lyra*. The grand staff spans over four octaves, and you have the option of raising or lowering voices an additional octave. All key signatures are available as well as sharps, flats, accidentals and naturals. You can define most time signatures, with the exception of signatures where the upper number is greater than the lower number (such as 12/8) and some with odd numerators (such as 7/4). The velocity (loudness) of each voice can be controlled and modified throughout a composition. Tempo is controlled locally through the insertion of individual tempo indicators, and a Master Tempo controls the overall tempo.

"Simply Better" Word Processor

*RUN 2 INTERACTING WORD PROCESSORS SIMULTANEOUSLY * PERFORM MAIL-MERGES * CREATE INDEXES * CREATE TABLE OF CONTENTS * PRINT-FILL FORMS * DISPLAYS FONTS IN SELECTED COLORS * DISPLAYS UNDERLINING * PRINT SPOOLING * AUTO SAVES FILES * SERIAL/PARALLEL OUTPUT * PRINT/SAVE BLOCKS OF TEXT * HEARING IMPAIRED MODE * UP TO 480K OF TEXT STORAGE * SORT SECTIONS OF TEXT * MANY MORE FEATURES *

". . . An excellent choice at an unbelievable price." — Rainbow Magazine

RAINBOW CERTIFICATION SEAL

New Simply Better Version 2.0 . . . ~~$34.95~~
(Holiday Special thru Dec. 15th...$29.95)

SEE REVIEW AND ARTICLE IN APRIL '89 RAINBOW, SEE WHY . . .

When It Comes To Word Processing, we're... "Simply Better"

Call for a Free Brochure
All Orders, Call... 1-800-248-8420
For Color Computer 3 only. Please add $3 S/H

MasterCard VISA

Simply Better Software
P.O. Box 20726
Portland, OR 97220
In Australia (07) 3419061

TECHNICAL ASSISTANCE
9 AM - 5 PM
(503) 254-7225

There is an easy-to-use instrument table for the inclusion of 16 different instrument sounds. Working in somewhat the same way as the CoCo 3's color PALETTE feature, you can establish a palette of 16 instrument sounds (drawn from however many instruments are available on your particular synthesizer) and assign a specific instrument to each of the eight voices. These instrument-to-voice assignments can be changed throughout the composition. Please note that velocity or instrument selections are ignored when playing *Lyra* through devices other than MIDI synthesizers that are sensitive to such inputs.

All of the file-management controls are also accessed by *Lyra*'s point-and-click interface. Disk drives can be selected; directories displayed; and files loaded, saved, appended and deleted. While instrument tables are automatically saved with each music file, they can also be saved and loaded separately. If you want continuous play of all the *Lyra* files on a disk, a Play All option automatically loads and plays *Lyra* files in the order they appear in the disk directory.

For more advanced use *Lyra* allows access to MIDI features that go beyond basic channel selection and program changes. Velocity is controlled through eight dynamics indicators (*ppp* through *fff*), each of which can be defined as having a value from 0 to 127. There is a powerful Filter option that allows you to withhold up to five different kinds of MIDI events during play. An optional MIDI clock is included for use with MIDI drum instruments. For MIDI control at the byte level, individual MIDI byte messages can be output from anywhere in the music. In addition, each *Lyra* file is allowed up to four multibyte MIDI event messages that can be custom-made for your particular synthesizers and can be continuously called upon during play. If you would like to create a MIDI event that has a very large number of bytes, a BASIC file of MIDI bytes can be created and called upon from *Lyra*.

While *Lyra* is not as feature-packed as some sequencing software offered (at much higher prices) for other computers, it *is* an impressive demonstration of the CoCo's capabilities. *Lyra* is a program that has come a long way, and it is still in the process of enhancement and improvement. While some earlier *Lyra* versions had a few annoying quirks, the latest version is in all operations crash-proof.

I use *Lyra* a great deal. If I had to think hard about possible faults, one thing I would mention is that there have been a few, very rare instances in which *Lyra* was suddenly unable to recognize and load one of its own files. Here the solution is the same as for any computer operation: Always maintain current backup copies of everything. The only other minor fault I've come across is that in the Goto Measure option, if you accidentally enter too many digits, unwanted characters appear on the display, but these have never caused file damage and can be cleared by saving the current file and rebooting the program.

One special note should be made concerning the difference between *Lyra* versions 2.61 and 2.62 that is not mentioned in the manual: Version 2.62 includes the addition of "stay awake" MIDI signals to accommodate certain MIDI instruments that automatically turn themselves off if they don't receive any MIDI input after a certain amount of time. Under certain circumstances, during play this feature causes notes in the first measure of music to come on and then abruptly shut off, with the music then playing normally from the second measure onward. The remedy is to make the first measure of a composition a measure of rests and have all the music begin in the second measure. This is a good practice regardless, because by placing all the initial program changes and other MIDI data at the beginning of the first measure and starting the music in the second measure, your synthesizer has time to fully configure itself before the music begins playing.

Beyond being an outstanding benchmark quality CoCo MIDI music composition program, *Lyra* defines a quality standard in overall programming features. *Lyra*'s combination of power, speed, efficiency and ease of use makes it a model from which all CoCo program writers should find inspiration. For amateur and professional maestros, *Lyra* really does the job.

(Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, 619-690-3648; $59.95)

—Walter Myers

Book

The Lyra Companion— Expert Help for the *Lyra* User

Attention *Lyra* users: Did you know that there is more to *Lyra* than just what's printed in the *Lyra* manual? Did you know that key signatures can be changed in the middle of a composition? Or that there are ways to compose using unusual time signatures such as 12/8 or 7/4? Did you know that help is available for everything from transcribing a song to using advanced MIDI control techniques? You will find this and more in *The Lyra Companion*, a new book by musician and author Michael Stute.

The Lyra Companion is a soft-bound laser-printed handbook with over 100 pages of helpful information and illustrations just for users of the popular *Lyra* CoCo MIDI music editor by Lester Hands. *The Lyra Companion* is written by a professional rock guitarist and studio musician who has

been an enthusiastic user of the CoCo and *Lyra* since their beginnings. As a professional musician, Mr. Stute has written nearly 300 songs and independently produced two of his own albums with *Lyra* controlling all the MIDI instruments. He currently uses *Lyra* exclusively for all his songwriting. Born of the author's professional use of *Lyra* and also his correspondence with Lester Hands, *The Lyra Companion* is filled with information for beginning to advanced users.

Suggesting you first read the *Lyra* manual and familiarize yourself with *Lyra*'s operating environment, *The Lyra Companion* begins by taking you option-by-option through *Lyra*'s features. All the basics are covered, from the first `LOADM"LYRA"` to instrument and voice selection, to advanced file management and block editing techniques. Current up to *Lyra* Version 1.60, the book also advises you when features and options in this version of *Lyra* differ from earlier versions.

Once you have gotten a handle on the fundamentals, you are introduced to techniques for transcribing existing music (such as a classical piano transcription) into *Lyra*. You are shown how to keep a transcription log and how to create a "structure map," a method for identifying, sorting and labeling different parts of a song. By keeping a transcription log you can take on and be in control of even very large projects, consistently making the best use of your time and *Lyra*'s abilities. If you want to compose some of your own music, *The Lyra Companion* details steps for transcribing music you hear in your "mind's ear."

Helping you to expand *Lyra*'s capabilities is detailed information on special editing techniques going beyond the confines of the *Lyra* manual and drawing from the author's real-world *Lyra* experience. For example, while the manual states that key signatures can be defined only at the beginning of each song file, you are shown how they can be changed in the middle of a composition as many times as you like.

> Procedures are provided for taking advantage of *Lyra*'s ability to output specific user-defined MIDI codes, allowing you to get "inside" your synthesizer and effect changes from *Lyra* to any MIDI-controllable feature

Solutions are outlined for another inherent *Lyra* limitation: the inability to enter time signatures in which the top number is larger than the bottom number (such as 12/8) or in which the top number is odd (such as 7/4). Step-by-step procedures are described for making *Lyra* work with these unusual (though not unknown) situations. Continuing to go beyond the *Lyra* manual, there is information on different ways to create *staccato* effects, and a method is offered for simulating *legato*. If your synthesizer has no "pedal" mode, a straightforward method for creating true pedal effects is described and illustrated.

While note entry, instrument selection, tempo and velocity controls available to all *Lyra* versions are thoroughly explored, *The Lyra Companion* also delves into the mysterious world of "MIDI events" and "MIDI bytes," options available in the latest versions of *Lyra*. Here explanations and procedures are provided for taking advantage of *Lyra*'s ability to output specific user-defined MIDI codes, allowing you to get "inside" your synthesizer and effect changes from *Lyra* to any MIDI-controllable feature. There is advice on how to read MIDI implementation charts and help for finding your way through the maze of binary, decimal and hexadecimal MIDI codings. For transmitting large amounts of data to your synthesizer, you are shown how to create and call upon a BASIC file from *Lyra*.

Speaking of synthesizers, *The Lyra Companion* goes beyond *Lyra* operations and explores the world of MIDI instruments. MIDI and MIDI sequencers are defined, and synthesizer fundamentals are explained. Here you are privy to the wealth of the author's practical knowledge. Capabilities such as *monophony*, *polyphony* and *multitimbre* are explained. You learn what it means to put a synthesizer into different modes and what the differences are between four-, eight- and 16-voice capabilities. There are step-by-step instructions for getting the most from your system, and trouble-shooting advice is given for specific problems you may encounter along the way. If you're considering a synthesizer purchase, there is information on features to consider, how they relate to *Lyra*, and what you should expect to pay for certain abilities.

The Lyra Companion covers a lot of territory and touches upon nearly everything that is *Lyra*, MIDI and music. It attempts to fill a real need in the CoCo music community, and in doing so it tries to fill very big shoes indeed. In light of such high expectations, there is some room for improvement. Information is very accessible in presentation, but there are some flaws in content. While the text appears to have had the benefit of a spelling checker, there are a number of content errors that may be confusing to the beginner.

The writing style is also at times distracting; I get the feeling the author is a musician first and a writer second. Complicated subjects are frequently taken on, but sometimes the explanation ends up more complicated than the subject.

In another area of concern, *The Lyra Companion* has chapters on music theory for the beginning student of music. Indeed, *The Lyra Companion* accommodates readers who know nothing of *Lyra or* music. Covering everything from music notation, to scale and chord theory, to help with harmonizing your own songs, *The Lyra Companion* makes a commendable attempt at being a music theory tutorial as well as a *Lyra* handbook. While a fresh perspective on music fundamentals is of value to even the experienced musician, I found the music theory discussions to be at times unnecessarily complex and occasionally even misleading. For example, the 12-tone chromatic scale is described as having "15 notes"; whether this is a reference to certain "named" notes or key signatures or just a typographical error is not clear. *The Lyra Companion* would benefit from a lot less theory and more of the author's valuable practical experience.

As it stands, *The Lyra Companion* is off to a promising start. It is clearly indexed,

Nearly 200 Color Computer Software Titles!

Call today to get your new 1990 Express Order Software Buyer's Guide. Choose from popular games, educational packages, productivity software and more. It's the fast and easy way to get the software you really want.

EXPRESS ORDER℠
A DIVISION OF TANDY CORPORATION

1-800-321-3133

nicely presented and contains a wealth of useful information for the *Lyra* user at any level of experience. This is one "companion" to keep by your side.

(Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, 619-690-3648; $9.95)

—Walter Myers

Hardware

TelePak II— Next-Generation RS-232 Pack

As with many other support items for the CoCo that Tandy has stopped selling, a third party has stepped in to fill the void. In this case it's the disappearance of the Tandy RS-232 Pak. TelePak II, an RS-232 pack by Orion Technologies, is an updated version of TelePak and TelePak+, which were reviewed in April 1989's RAINBOW.

The first thing that struck me about TelePak II was the design and neatness of it. I'd been running an older Tandy RS-232 Pak, and TelePak II is half the size. Terrific! It makes it a little more difficult for the cat to dislodge it when he walks across my CoCo. The unit is a nice cream color so it blends in and makes all those pieces of equipment seem like a whole. TelePak II also comes with the necessary cable and standard DB-25P connector attached to the pack.

It's very evident that some thought went into the placement of the cable on the pack. If TelePak II is plugged directly into the console, the cable goes straight back instead of up and over. If it's plugged into a Multi-Pak, the cable goes out the right side of the pack and back. In either case the cable stays nicely out of the way, so I can't knock against it as easily while reaching across my crowded computer desk for something. Orion Technologies has printed its address and phone number right on the label fixed to the pack. How much time have you spent searching for a manual or warranty card when you needed to call a company for help? No problem with this company, even if you do lose the manual.

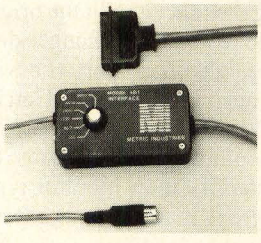
Continuing with my examination of this product, I noticed it has a gold-plated edge connector. Because I like to know what makes things run, I peeked into the inner workings (something that voids the 30-day warranty). But I got special permission to peek from the company when I called to verify the price. I found the support people eager to help in any way they could.

Now, on to the inside. Comparatively there are very few pieces and parts inside. That's good — it means fewer parts to give you trouble. I have to admit that I don't know my way thoroughly around chips and circuitry, but I can recognize some of the more important pieces. The TelePak II has a voltage converter built in so it can be used with any CoCo. Also, the chips that do the most work are socketed for easy replacement if anything goes wrong.

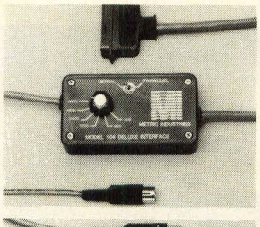
Orion guarantees the pack for 30 days. If the warranty expires you can have the unit repaired or replaced for a service charge any time up to six months from the date of purchase.

TelePak II will set the carrier detect on your modem on high if it needs to be; and it works with either Disk BASIC or OS-9 software and any Color Computer, Multi-Pak or Y-cable. If you happen to have a rare modem and can't get the TelePak II to work with it, call Orion Technologies for help.

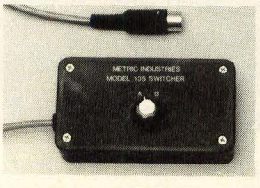
The packaging looks nice, and the working parts look sturdy enough — but does it work? I tested TelePak II on a CoCo 2 with



Model 101
Serial to Parallel Printer Interface
- ★ Works with any COCO
- ★ Compatible with "Centronics" Parallel Input Printers
- ★ Just turn the knob to select any one of 6 baud rates 300-9600
- ★ Comes complete with cables to connect to your printer and computer
- ★ Can be powered by most printers



Model 104 Deluxe Interface with "Modem Switch"
- ★ **Same Features as 101 Plus**
- ★ Built in Serial Port for your Modem or other serial device
- ★ Switch between Serial Output and Parallel Output
- ★ Comes with cables to connect to your computer and printer
- ★ Can be powered by most printers



Model 105 Serial Switch
- ★ Connects to your COCO to give you 2 switch selectable Serial Ports
- ★ Comes with a 3 foot cable to connect to your computer
- ★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
- ★ Does not require power

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

METRIC INDUSTRIES, INC.

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

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

Write or call for more information or for technical assistance.

Price List

Model 101	**35.95**
Model 101P	41.95
Model 104	44.95
Model 104P	51.95
Model 105	14.95
Cassette Label Program	6.95
Pin Feed Cassette Labels:	
White	3.00/100

4 Pin Din Serial COCO Cables:

Male/Male 6 foot	4.49
Male/Female 6 foot	4.49
Female/Female 6 foot	4.49

Other Lengths Available.

All items covered by a 1 year warranty

Ordering Info
- ★ **Free Shipping** in the U.S.A. (except AK and HI) on all orders over $50
- ★ On orders under $50 please add $2.50 for shipping and handling
- ★ On orders outside the U.S.A. please write or call for shipping charges

You Can Pay By:
- ★ VISA or MasterCard
- ★ Or send check or money order payable in U.S. funds

Metric Industries Inc.
P.O. Box 42396
Cincinnati, OH 45242

(513) 677-0796

a couple of terminal programs and two different modems. I used an Avatex 1200 and a Capetronics with *Mikeyterm* and *Greg-E-Term*. I then enlisted the help of one of our local users group members, who tested it on a CoCo 3. There were no problems with either machine, either computer-to-computer or using any of the area BBSs. Admittedly I didn't test it at speeds over 2400, nor could I test it with all the available modems and communications programs. But based on its performance with those I used, I believe it will work with most anything.

The manual explained the warranty information, features and installation procedure (all necessary, I suppose, for first-timers), with the last three pages devoted to cable wiring, pinouts and programming information for those of you who are interested in that. Programming the pack isn't necessary, though, because it already functions identically to Tandy's RS-232 Pak.

I recommend TelePak II because of its sturdy construction, attached cable and connector, the very reasonable price and the company support that is only a phone call away. This is definitely a good buy.

(Orion Technologies, P.O. Box 63196, Wichita, KS 67203, 316-946-0440; $49.95 plus $3 S/H)

—Gail Allore

Software CoCo 3

World at War— Global Conflict and the CoCo

Well, what's in the mailbox today? Let's see: bill — bill — junk mail — ah, my new issue of RAINBOW — bill — *great*, a new review assignment. This is going to be a wonderful day. I can't wait to see what this one is.

Opening the package, I find a program called *World at War* from Greg Wittmeyer of GSW Software. It consists of a 5¼-inch disk and an instruction manual. The disk is not write-protected — refreshing. A CoCo 3 with at least 128K, a disk drive and a TV/composite monitor are the minimum requirements. Joysticks are optional. Because the program has been written for the CMP mode, my CM-8 RGB monitor does not always yield the colors described in the manual.

Starting the program is as easy as entering LOADM"WAR". The program automatically executes, loads the default war and starts off at the main menu. There you have a choice of 16 options to get you started. The default war is totally blank, one in which you create your own maps and icons, edit your own armies, etc. If you want to play immediately, you can load one of five ready-to-run wars. You can choose a medieval battle with knights in shining armor, a recreation of the biggest battle in the Civil War, a WWI battle, a WWII battle or a "future" confrontation.

I created some of my own terrain icons and was able to create detailed runways complete with yellow lights and a white center stripe — even a helicopter landing pad with a circle and an X in it. They looked great on the map

I loaded the Civil War battle first. As the battle map came up on the screen, I was a little disappointed that the icons were in black and white (black for the black army, white for the white). I have seen other programs in which the icons are colorful and detailed. I switched to the world map and again was disappointed, this time by the appearance of a screen that looked as if it were composed of ASCII graphics on the CoCo 2 screen but more detailed. However, after beginning game play, I realized these were just aesthetic details with no bearing on the outcome of the game.

I do feel the graphic screens could have been better implemented. From what I am able to tell, it appears the 320-by-192 setting is used. The screen area used for the graphics is roughly the size of the old 32-column text screen. The rest of the screen is just wasted.

I do want to compliment Mr. Wittmeyer on the terrain graphics. They are really good. I created some of my own terrain icons and was able to create detailed runways complete with yellow lights and a white center stripe — even a helicopter landing pad with a circle and an X in it. They looked great on the map.

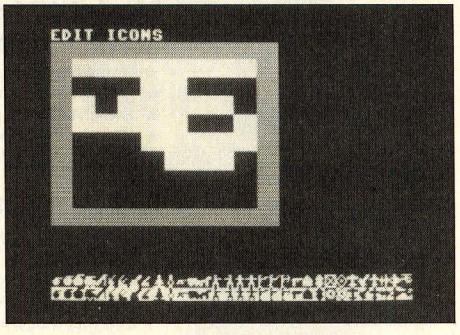
I would like to have seen a Fill feature — one that would let me draw an outline and then fill it with a color, rather than having to change each block by hand.

Creating your own war is probably the most fun. I can create any type of scenario I envision, with units from cannons, magicians and dragons to space ships. One of my scenarios I set in modern times. I designed helicopters, jet fighter planes, bombers, nuclear ships, naval transports, tanks and infantry. I designed my map from scratch. Playing against the computer proved to be humorous: It did not use the naval transports to carry the tanks across the ocean but, rather, had the tanks out in the ocean as if they were ships. I could have adjusted the tanks' attributes to prohibit them from crossing water, but that would only have resulted in their staying on the mainland.

A word of advice: When you are in the process of creating units, write them up on paper first. When all the units are complete and meet with your satisfaction, *then* put them in the CoCo. This saves re-editing.

The 22-page manual accompanying *A World at War* is well-written, taking you step-by-step through each menu option. If you have never played a game like this one, the manual is invaluable.

Because of the difference in colors on my monitor, I wrote a letter to Mr. Wittmeyer describing my problem. His answer was prompt, informing me that with a disk editor program I can change the color values on a working disk (*never* edit the original). I was unable to make the changes due to the lack of foresight on my part. (I never thought I would need a disk editor.) I am in hopes that Mr. Wittmeyer will incorporate a prompt at the beginning of the program to allow users to identify their monitor type and let the program make the necessary adjustments.



All in all, I enjoyed *A World at War*. If you do not have a war-designer game of this type, I recommend this one. Mr. Wittmeyer has done well with the program. I look forward to seeing what else he offers in the future.

(GSW Software, 8345 Glenwood, Overland Park, KS 66212, 913-341-3411; $25)

—Greg Snow

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.*

1988 CoCo Federal Tax, 6th Ed., a tax-preparation program for the 1040 form, schedules A, B, C, D and E. Also covers Form 4562. Requires a CoCo 1, 2 or 3 with 64K and one disk drive. *Puritas Springs Software, The Ameritrust Building, 17140 Lorain Ave., Cleveland, OH 44111, (216) 251-8085; $39.95.*

◈ **Action Arcade Pack, Volume 1**, a set of two public-domain games, *Laser Blitz* and *Kung-Fu Fighter*, for 64K CoCos. In *Kung-Fu Fighter*, players punch and kick their way to the Shao-Min temple. In *Laser Blitz*, players adjust horizontal and vertical laser cannons to blast alien invaders. *Christopher English Communications, 40-25 College Point, Blvd. #8G, Flushing, NY 11354, (718) 445-6589; $9.95 plus $3 S/H.*

CIII Pages, a CoCo 3 desktop publishing program with 256 fill patterns, 24 fonts and a collection of clip art. Features a point-and-click, pull-down menu-driven interface with dialog boxes and icons. Requirements include a 128K or 512K CoCo 3, an RGB or mono monitor, at least one disk drive (two recommended), a Tandy Hi-Res Joystick Interface, joystick or mouse and a printer (supports DMP-105, NX-1000, Gemini and Epson compatibles). *Coless Computer Design, dist. by Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, (800) 654-5244; $49.95, $59.95 with Hi-Res Interface, $79.95 with Hi-Res Interface and mouse.*

◈ **CycleJump**, an arcade game written in BASIC for the CoCo 3 that has users gunning motorcycles up ramps, over barrels and across El-Gato River Canyon. Requires a CoCo 3, a disk drive and a joystick. *J.T. Rawlinson Software, #361 St. Germain Ave., Toronto, ON M5M 1W6, Canada (416) 782-5718; $14.95 plus $2 S/H.*

Data Form III, a program that lets CoCo 3 users create customized databases with up to 17 fields and that can use up to 63 granules for storage space. *E.Z. Friendly Software, 118 Corlies Ave., Poughkeepsie, NY 12601; $19.95 plus $1.50 S/H.*

◈ **Easy-Type 1.1**, a CoCo 3 shareware program that emulates an electronic typewriter. Features include word wrap, a save/load function, a line/page editor and selectable baud rates. *Christopher English Communications, 40-25 College Point, Blvd. #8G, Flushing, NY 11354, (718) 445-6589; $5 for unregistered version, $10 for registered.*

File System Repack, a collection of utilities for defragmenting/optimizing OS-9 floppy and hard disks. Features command-line options for reclaiming "lost" sectors. It sorts files in order of increasing file descriptor sector address. Requires OS-9 Level I or II system with at least one disk drive and 42K free. *Burke & Burke, P.O. Box 58342, Renton, WA 90058, (800) 237-2409; $29.95 plus $3 S/H.*

K1 Librarian, a program by Allen Huffman that allows users to transfer voice patches between a CoCo and a Kawai K1/K1R/K1M synthesizer. Requires a CoCo with at least 32K, a disk drive and the CoCo MIDI Interface or compatible. *Rulaford Research, P.O. Box 143, Imperial Beach, CA 92032, (619) 690-3648; $29.95.*

KJV on Disk #2, the book of Genesis, chapters 30 to 50, of the King James Version of the Bible on disk in ASCII files for the CoCo 1, 2 and 3. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

Slam Bam, a one- or two-player slam-dunking game for the CoCo 3. Features a High Score board and 27 kinds of slams. Requires a 128K CoCo 3, a joystick and a disk drive or a cassette player. *Erich Sweaney, P.O. Box 45434, Tacoma, WA 98445, (206) 535-9733; $10.*

Studio Works, a digital sampling/editing system that features up to 56 sound samples in memory at once (on a 512K CoCo 3). Includes a sequencer, a clipboard for cutting/pasting sounds, a "speaking clock" demo and a utility to load and play *Studio Works* files from machine-language and BASIC programs. Requires at least a 128K CoCo 3, a disk drive, joystick or mouse, and an optional cable (one end plugs into the left joystick port; the other end can be attached to a home stereo or "Walkman" source). *Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada (416) 877-8149; $54.95 U.S. or $64 Cdn., with cable; $39 U.S. or $49 Cdn., without cable.*

Supersound, a menu-driven sampling program that records sound in both single and double tracks. An included cable connects cassette recorders or radios to the right joystick port. Sounds can be edited, looped and played backward. The manual includes instructions for adding sound to your own programs. With *CoCo Max III*, graphics animation is possible. Requires a CoCo 3 with at least 128K; 512K is supported for longer recordings. *Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, (517) 787-3610; $39.95 plus $2.50 S/H.*

◈ **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

A deeper look at MaxIc's modules

Clearing the Board

By Dale L. Puckett
Rainbow Contributing Editor

This is the final installment of a three-part tutorial series exploring the icon editor *MaxIc*. It should help you write a few *Multi-Vue* based application programs in BASIC09. The source code and packed binary code is available on the August issue of RAINBOW ON DISK. The code may also be downloaded from the Rainbow section of Delphi's OS-9 Online database.

BASIC09 is a natural tool for modular programming. This makes it much easier to break down big projects into small manageable ones. *MaxIc* contains 27 modules. This month we'll look at the last nine files: `geticon`, `saveicon`, `readicon`, `showicon`, `writeicon`, `editor`, `updatbuf`, `errmsg` and `loadbar`.

I have attempted to publish *MaxIc*'s modules in groups that work together. This project wraps up with the icon editor and the modules needed to get, read, show, save and write icons. I'll discuss a few miscellaneous modules first.

Telling the User What You're Doing

The short module `loadbar` helps *MaxIc* let the user know what it is doing. You see its output when you pick up an icon from the icon directory with the mouse and move it into the edit window. After the load button appears and you push the mouse button, `loadbar` writes the name of the icon over the edit window. Then it prints the message `Loading Icon` in the edit window.

The procedure `loadbar` is run by the procedure `readicon`. The name of the icon is passed to `loadbar` in the name field of the variable `Ic`. `Ic` has been dimensioned as type `Mic`, one of the two special data types used throughout *MaxIc*. A variable of type `Mic` holds a 32-byte long string, a single byte and two integers that hold the *x* and *y* position of the cursor.

The `loadbar` procedure begins by using the `param` statement to reserve room for the string containing the name of the icon it expects to receive from `readicon`. It then uses the `gfx2 color` command to change the foreground and background colors and the `gfx2 bar` command to draw a filled box over the edit window. This done, it uses the `gfx2 curxy` command to move the cursor into the bar where it uses BASIC09's print-using facility to center the name of the icon.

Now `loadbar` reverses the foreground and background colors and moves the cursor into the edit window where it prints the message `Loading Icon`. You'll see the message until the routine drawing the fatbits icon in the edit window covers it up.

Reporting Errors

The procedure `errmsg` gives *MaxIc* a universal method of reporting errors and is used by many of *MaxIc*'s modules. When another module calls `errmsg`, it passes a single parameter of type `BYTE`.

The procedure begins by reserving enough memory for the parameter `errnum`, a string and two integers. The two integer variables hold the horizontal and vertical position of the mouse pointer. They are passed to the procedure `getkey`, along with a string variable named `Key`.

To turn on proportionally spaced type and create an overlay window `errmsg` first uses `gfx2` calls. It then runs the *MaxIc* procedure `winset` to draw a double box border in the window and places the cursor at the upper right-hand corner of the window with `gfx2`'s `curxy` command.

With the cursor in place, it prints the message `Error - 216 - encountered`. If the error number `errsmsg` receives in the parameter `errnum` is 2, then the user has pressed the BREAK key. In this case, `errmsg` closes its window using the `gfx2 owend` command and ends.

If the error number received has any other value, `errmsg` uses a BASIC09 call to OS-9's shell to print an English-language error message generated by the OS-9 utility command `error`. It then moves its cursor down three lines and prints the message `Press Key`. This lets the error message stay on the screen until the user has time to read it and analyze the problem.

Editing the Icon

Two of *MaxIc*'s procedures — `editor` and `updatbuf` — form the heart of the icon editor. `editor` is run by the procedure `main`, which passes three parameters containing just about anything you would ever want to know about *MaxIc*'s universe. The first parameter, `MS`, is of type `MicSys` and contains the directory name, an array containing the names of up to 48 icons, a 144-byte long buffer containing the bit map of the icon being edited, the group number of the buffer being used, the buffer number, and the number of the icon.

The other two parameters, `Ic` and `Dr`, are of type `Mic` and hold a string, a byte and two integers. The data type `Mic` is presented in detail in our description of the procedure `loadbar` above.

The main purpose of `editor` is to exercise the procedure `updatbuf`. It begins by reserving enough memory to receive its three parameters from the procedure `Main` and the variables needed to hold information about the position of the mouse pointer. The variable `regs`, of the data type `registers`, is a structure that looks like the 6809 microprocessor in the Color Computer 3. `RatPak` is a 32-byte array that holds the data about the mouse pointer.

`editor` immediately enters an endless loop that uses an OS-9 system call to continuously poll the Color Computer mouse. Each time the user presses the mouse button, `editor` immediately calls the procedure `updatbuf`. It passes the parameter `MS`, which contains everything `editor` knows about the icon being edited and the current position of the mouse pointer.

Doing the Work

When `updatbuf` receives the location of the mouse pointer from `editor`, it knows which pixel to edit. Its first task is to compute which byte in the bit map holds the pixel. This done, it uses some additional calculations to remove the individual pixel from the byte. It gets the byte from the array

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.

Addr	0 1	2 3	4 5	6 7	8 9	A B	C D	E F	0 2 4 6 8 A C E
0000	0000	0000	0000	0000	4040	4200	0000	1151	........@@B....Q
0010	0A80	0000	0554	0A80	0000	1445	0100	0000	.....T.....E....
0020	1555	0100	0004	1405	0540	0014	0554	0500	.U.......@...T..
0030	0001	0150	1100	0000	4040	4100	0000	1555	...P....@@A....U
0040	0100	0000	0150	0100	0000	0150	0100	0001	.....P.....P....
0050	4150	0000	0044	1550	0000	0050	0550	0000	AP...D.P...P.P..
0060	0054	0514	0000	0000	1405	0000	0000	1401	.T..............
0070	4000	0000	1501	5400	0000	0000	0000	0000	@.....T.........
0080	0000	0000	0000	0000	0000	0000	0000	0000	....

Table 1. *MaxIc* Icon Dump

that holds the buffer containing the bit map of the icon passed in the byte field of the parameter `MS`. (Now say *that* three times, fast!)

Once `updatbuf` knows the location of the pixel, it sets the pixel to the color selected in the box along the top of *MaxIc*'s screen and puts the pixel back in the same byte in the buffer where it found it. It then changes the color of that pixel in the edit window so the user can see what has been accomplished. However, in the edit window each pixel appears as a bar eight pixels wide and four pixels high. I guess that's why they're called fatbits.

After `updatbuf` reprints the bit map in the edit window, it reprints the actual-size image of the icon in the box at the upper left-hand corner of *MaxIc*'s screen. It does this by using the `gfx2 put` command to place the updated buffer holding the icon at that location. When these changes are made, `updatbuf` ends and control returns to the procedure `editor`, which continues to monitor the position of the mouse pointer — waiting for the user to push the button so it can call `updatbuf` again.

Reading, Saving and Showing Icons

The remainder of *MaxIc*'s modules deal

ALPHA SOFTWARE TECHNOLOGIES

COMM - 4

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

OS9 Level II BBS Release 3.0

System comes complete and ready to run. Use the bouilt in menus or create your own. Run your own programs or games on-line! Complete message system included. File transfer system supports Xmodem and Ymodem plus automatic validation with keyword searching! Even comes with its own terminal program free! Now includes ANSI graphics menus and editor! See board while it runs! For a DEMO call (504) 649-5761 (3/12/2400 baud). Galactic Conflict game also included! 512k OS9 Level II and RS-232 (or COMM-4) pak required..... $ 29.95

Presto - Partner

This is what you have been waiting for! Finally RAM-Resident software for your COCO 3! Runs in the background while you do other work! Includes a note-pad that does automatic number calculations, a calendar with alarm, a phone book that can auto-dial your phone, a real-time clock and much, much, more! This program will organize your entire life! 512k OS9 Level II Required (Hayes compatible modem required for auto-dial) 512k OS9 Level II Required..... $ 29.95

Level III Tools

Without the right tools OS9 is difficult...These ARE the right tools! With these great utilities anyone can use OS9 like a pro! Complete wildcard, tree and windowing commands make OS9 easy to use! If you want to start using OS9, this is what you need! If you already use OS9, these tools will save you hours of time and headaches! 25 great utilities!..... $ 24.95

Disk Manager Tree

This versatile utility makes your OS9 life a breeze! No more fighting with complex directory structures! No more searching for files and typing long path names! Everything is displayed using windows! Allows you to change, create, and delete directories with single keystrokes! Also allows you to copy, view and delete files just as easily! A must for the OS9 beginner. A great time saver for the experienced OS9 user. Save hours of time and headaches! 512k OS9 Level II Required..... $ 29.95

Multi - Menu

This great Multi - Vue utility allows you to easily create your own pop-down menus! No programming experience is required, because no programming is done! You will be able to run any OS9 command or program from a menu! Menu creation is super simple, super easy! Actually see the menu as it develops. A must for Multi - Vue users! Make that non Multi - Vue software run in Multi - Vue! 512k OS9 Level II and Multi - Vue required..... $ 19.95

Warp - One

Finally, a complete OS9 Level II windowing terminal program. Many features include Auto-dial & macro, X & Y modem, ANSI graphics, buffer capture, on-line timer, chat mode, windows, and much, much, more! Perfect for any BBS user! More power than you'll ever need! 512k OS9 Level II Required..... $ 34.95

The Zapper

This wonderful utility allows you to patch anything! Patch commands directly on disk and fix CRCs automatically! Patch the OS9Boot file! Save lost files! Fix crashed disks! One use of this program could be worth the price! 64k OS9 Level I or II required..... $ 19.95

Send check or money order to: Alpha Software Technologies, 1500 I-10 Service Rd. Box 61, Slidell LA. 70461 (504)649-5176 (voice) (504)649-5761 (BBS)

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

with moving the icon to be edited into the edit window and displaying it on the screen. To help understand what these routines are doing, study the format of OS-9's icon files by looking at the dump of the file `icon.maxic` shown in Table 1.

It also may help you to study the list below, which shows the buffer number *MaxIc* uses to hold its action buttons and the icon being edited.

Buffer #	Contains
41	Load buffer
49	Icon being edited
50	Empty buffer
51	*MaxIc* icon
52	Open button
53	Save button
54	Kill button

The *MaxIc* procedure `main` runs the procedure `geticon` when the mouse button is pressed. This happens while the pointer is located over the small window at the upper left-hand corner of the screen. `geticon` receives the parameters `MS`, `Dr` and `Ic` from `main`. It begins its work by clearing the small icon window. It then follows the mouse pointer and displays the appropriate buffer at the location of the pointer.

If the mouse pointer is located in the window displaying the directory, `geticon` displays the save button and runs the procedure `saveicon` to do the job. If the pointer is located near the *MaxIc* icon with the wastebasket above the edit window, `geticon` displays the Kill button and runs the procedure `clearbuf` to clear the icon buffer. It knows where the mouse pointer is located by reading the horizontal and vertical fields of the parameter `MS` it received from the procedure `main`. Before it exits, `geticon` always updates the icon directory's display by running the procedure `showdir`.

MaxIc uses the procedure `readicon` to load an icon from the icon directory into a buffer so it may be edited. It begins its work by displaying the hourglass pointer to let the user know it's working. Then it opens a path to the icon file, using the name it received in the parameter `Ic.name`. After it has successfully opened the file, it reads the icon data one line at a time. As it reads each line, it converts each pair of Hex bytes into two single bytes and stores those two bytes into the 144-byte array `MS.byt`.

The `gfx2 gpload` command is used to load each of the 144 bytes into the buffer. This done, the `gfx2 put` command is used to display the icon in the update window at the upper left-hand corner of the screen. Before ending, `readicon` runs the procedure `loadbar` to tell the user which icon it is loading, and the procedure `showicon` to display that icon in the edit window.

`showicon` receives the 144-byte buffer as a parameter, and displays it in the edit buffer. It does this by displaying an eight-pixel-wide-by-four-pixel-deep bar to present each actual pixel in the icon. This done, it exits.

`ba`	Sets allocation bitmap bits for a specified LSN or range.
`bd`	Clears allocation bitmap bits for a specified LSN or range.
`ccheck`	Scans disk for defective sectors and identifies any files stored in defective regions.
`fcheck`	Generates a fragmentation report.
`hdb`	Streaming device-based hard disk backup with data compression.
`hdr`	Streaming device-based hard disk restore with data expansion.
`repack`	Hard disk optimizer; merges segments and reorganizes storage.
`stash`	Marks files or directories that should not be repacked.
`zap`	Erases a file's directory entry.

Table 2. File System Repack Utility Programs

Editors Note: While all of the procedures required for MaxIc appeared on the August 1989 issue of RAINBOW ON DISK, only the procedures listed here are on this month's disk.

Listing 1: geticon

```
PROCEDURE geticon
0000      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
001B      TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpID,BufNo,number
           ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0064      PARAM MS:MicSys
006D      PARAM dr,ic:Mic
007A      DIM button:BYTE
0081      ON ERROR GOTO 10
0087      (* place icon in update window
00A5      RUN gfx2("put",MS.GrpID,50,26,13)
00C1      RUN gfx2("color",1)
00D1      REPEAT
00D3        (* use non sleep mouser for this
00F3        RUN mouser(MS.horiz,MS.vert,button)
010D        (* keep track where we are and use the correct pointer
0143        IF MS.horiz>260 AND MS.horiz<590 AND MS.vert>30 AND MS.vert
             <160 THEN
0172          (* use save pointer
0185          RUN gfx2("gcset",MS.GrpID,53)
019D          RUN gfx2("put",MS.GrpID,49,26,13)
01B9        ELSE
01BD          IF MS.horiz>60 AND MS.horiz<130 AND MS.vert<25 THEN
01E0            (* use kill pointer
01F3            RUN gfx2("gcset",MS.GrpID,54)
020B          ELSE
020F            (* buffer pointer
0220            RUN gfx2("gcset",MS.GrpID,49)
0238            RUN gfx2("put",MS.GrpID,50,26,13)
0254          ENDIF
0256        ENDIF
0258      UNTIL button<>0
0263      RUN gfx2("color",MS.color)
0278      RUN gfx2("put",MS.GrpID,49,26,13)
0294      IF MS.horiz>260 AND MS.horiz<590 AND MS.vert>30 AND MS.vert
           <160 THEN
02C3        (* we want to save it
02D8        RUN saveicon(MS,dr,ic)
02EC      ENDIF
02EE      IF MS.horiz>60 AND MS.horiz<130 AND MS.vert<25 THEN
0311        (* no we want to kill it
0329        RUN clearbuf(MS,dr,ic)
033D        ic.name:=" "
0349        RUN gfx2("color",1)
0359        RUN gfx2("curxy",5,5)
```

A VERY MOVING SALE!!

We have moved into our very own building! No more paying off someone else's mortgage, now we have our very own mortgage to pay off!! Now THAT's a good reason to have a SALE! Our new building is twice as large and that gives us more room for service, support and friendly help. At FHL we have the best prices on software, hard drive systems and supplies and the help is FREE! Check our new 24 hour order line and make sure to get on our mailing list for our FREE newsletter. 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.

Here is what RAINBOW said about DynaStar:
"DynaStar is the best, most serious word processor under OS-9" , "Now that is word processing!"
Save OVER 50%! Now on Sale for **ONLY $69.95**
Save Even More!
Get DynaSpell with it for **ONLY $15.00!!!**

Here is what RAINBOW said about the Wiz:
"The Wiz: Unquestionably one of the finest OS-9 terminal programs available." , "The Wiz has it all."
Now on Sale for **ONLY $49.95!**
(Includes WizPro shareware disk)

Here is what RAINBOW said about "Inside OS-9 Level II":
Inside OS-9 Level II:*"authoritative and comprehensive look inside OS-9 Level II for the CoCo."*
On SALE for **ONLY $19.95**

Hard Drive Interfaces & Etc.

The Eliminator™	**Special 179.95**	~~199.95~~
	See Eliminator OPTIONS also	
WD1002-05 Disk Controller for Eliminator (Reguired for disk operation)		199.95
B&B XT PC style interface		69.95
B&B XT RTC interface w/clock/calendar		99.95
	See B&B OPTIONS also	
Hard Drive case with 60W P/S & Fan	~~99.95~~	89.95
SPECIFICATIONS: size 16" deep, 5.5" high, 7" wide. 60 Watt power supply with 3 drive type power connectors, quiet 12 volt DC fan, LED power indicator, color matches CoCo. Holds 2 1/2 height hard or floppy drives and has card guided space for a PCB the size of a drive (like the WD1002-05 controller)		
FBU Fast Hard disk Back Up CoCo OS-9 version	~~150.00~~	65.00
R.S.B. RS Disk Basic under OS9		39.95
Floppy Drives (5.25" and 3.5 FLOPPY DISKS)		
TEAC High Quality Drives - 1 Year Warr.		
FD55B 360K 40 Track DS 5.25"		118.00
FD55F 720K 80 Track DS 5.25:		151.00
FD35F 720K 80 Track DS 3.5" with 5.25 mounting bracket		117.00
(Bare drives, requires case and power supply)		

Here is what RAINBOW said about hard drives:
*"Frank Hogg Laboratories has been selling hard-drive systems **longer** than any other RAINBOW advertiser"*

FLASH! The Eliminator™ is now in STOCK!!!!

The Eliminator™ based kit includes Bruce Isted's new interface 'The Eliminator'™ the Western Digital WD 1002-05 high speed controller. Features; fastest system available, 1 megabyte transfer in only 37 seconds!! More than twice as fast as other systems! Supports 4 floppy and 3 hard drives, type ahead (No halt) for both floppy and hard disk, autoboot OS9 L1 or L2 from hard or floppy disk, 2 serial ports, 1 parallel port and Real Time Clock socket. Hard drive with WD 1002-05 controller, ST506 cable set, 3 foot 40 pin cable, Hard Drive Case with 60 watt power supply and fan, OS9 software for LI and LII with source, Complete instructions. Easy one evening assembly. We also sell the individual parts of the system, please call.

20 Meg Eliminator™ Kit Complete	799.00
40 Meg Eliminator™ Kit Complete	899.00
70 Meg Eliminator™ Kit Complete	1299.00
Assemble fmt & Test any of the above	60.00
Eliminator™ OPTIONS:	
Real Time Clock chip	30.00
Serial cable set (2 DB25)	30.00
Parallel cable (Centronics)	30.00
Floppy Cable Int & Ext	25.00

Burke&Burke Based Kits

	REG	SALE!
20 Meg B&B Kit Complete	~~498.00~~	450.00
30 Meg B&B Kit Complete	~~548.00~~	495.00
40 Meg B&B Kit Complete	~~618.00~~	575.00
Assemble fmt & test any of the above		50.00
B&B OPTIONS:		
B&B Real Time Clock (add to above)		30.00
B&B XT ROM Auto Boot from hard disk		19.95
B&B Hyper I/O DECB on hard drive		29.95

Burke & Burke based kit includes: Burke & Burke (B&B) XT PC interface. Hard drive with controller, 3 foot ST506 cable set. Hard Drive Case with 60 watt power supply and fan with room and power for a second hard drive! Includes OS9 LI and LII software. 1 megabyte transfer in only 45 seconds!! Twice as fast as other systems. Type ahead under OS9. (No halt) Complete instructions. Easy one evening assembly. We also sell the individual parts of the system, please call.

When it comes to service, customer support, and help, Frank Hogg Labs is **tops!**

ORDERING INFORMATION

VISA and M/C, check and C.O.D. Contential U.S. software shipping add $3.50 Ground - $6.00 Two Day Air. Hardware add $11 ground - $22 Two Day Air. Please call for Next Day Air costs and C.O.D. Foreign add 10% Shipping (Minimum $5 USD). NY residents please add 7% sales tax.

Frank Hogg Laboratory, Inc.
Since 1976
204 Windemere Road, Syracuse, NY 13205
***FAX** 315/474-8225*

Call 315/474-7856 24 Hours!!

MaxIc uses `writeicon` to write a Hex dump of the icon to a file or to the printer. When an icon is sent to the printer, its name is printed first on the first line and then the Hex code is listed. If the icon file is being written to a disk file, this first line is not written to the file.

From two string parameters that are passed to it, `writeicon` receives the name of the icon and the filename. An array containing the 144-byte bit map of the icon is passed to `writeicon` in another parameter. If the user is trying to print an icon that has been cleared, `writeicon` exits immediately. Otherwise it opens a path to the file or printer and proceeds to print each byte in the 144-byte array in Hex format. It prints two bytes at a time and then inserts a space. If you study the listing of the file `icon.maxic` in Table 1, you'll see this is the format used by all OS-9 icon files. Each icon file contains nine lines holding 16 bytes each.

MaxIc runs the procedure `saveicon` after the user has finished editing the icon and is ready to write it to disk. This procedure is called by the procedure `files`, which is called in turn by the procedure `main` when the user clicks the mouse button over the File entry in the menu bar. Save is Item 3 in the File menu, and `saveicon` is run when you click the mouse button over the word.

`saveicon` receives three parameters from the procedure files — `MS`, `Dr` and `Ic`. All three have been described previously in this article. The first action taken by `saveicon` is to prompt the user for a filename. It does this by running the procedure `getname`.

If the file already exists, it prompts to find out if you want to overwrite the old file. It uses the procedure `getans` to accomplish this. Just before it opens a path to a file with the name supplied by the user, `saveicon` searches through the icons in the current icon directory until it gets a match. When it finds the icon request, it puts the buffer number and icon name in the proper fields of the variable `MS`.

Once the file is open, `saveicon` uses the `gfx2 gpload` command to move the icon from the screen into the 144-byte array, `byt`, in Variable `MS` and into the file. It then runs the procedure `showdir` to update the display of the icon directory. This means the freshly edited icon appears in the directory in its new form. If the icon file you request does not already exist, `saveicon` creates it. After `saveicon` writes an icon to a new disk file, it uses the BASIC09 `shell` statement to run the OS-9 utility command `attr` to set the private and public execute attributes of the file.

This wraps up our three-part tutorial series covering Robert Moody's icon editor *MaxIc*. I hope we have helped you learn a

```
036C          PRINT "                    "
0383        ENDIF
0385        MS.horiz:=0 \MS.vert:=190
039B        dr.name:=""
03A6        (* now let's see what we did
03C2        RUN showdir(MS,dr)
03D1        END
03D3 10     MS.ErrNum:=ERR
03E0        (* was error doing nothing in update window
040B        RUN gfx2("put",MS.GrpID,49,26,13)
0427        RUN errmsg(MS.ErrNum)
0434        END
```

Listing 2: saveicon

```
PROCEDURE saveicon
 0000       TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 001B       TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpID,BufNo,number
             ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 0064       PARAM ms:MicSys
 006D       PARAM Dr,Ic:Mic
 007A       DIM path:BYTE
 0081       DIM ok:BOOLEAN
 0088       ON ERROR GOTO 10
 008E       (* is the editor name blank
 00A9       IF Ic.name=" " THEN
 00B9         (* if so let's try to get one
 00D6         RUN getname(Ic.name)
 00E3         IF Ic.name="" THEN
 00F2           (* could not get one so let's end
 0113           END
 0115         ENDIF
 0117       ENDIF
 0119       (* let's show the disk is busy
 0137       RUN gfx2("gcset",202,4)
 014A       (* start at the top of buffer +1
 016A       ms.Iname(ms.number+1):=Ic.name
 0182       ms.BufNo:=ms.number+1
 0194       FOR x:=1 TO ms.number+1
 01AD         (* did we find a match
 01C3       EXITIF Ic.name=ms.Iname(x) THEN
 01DA         (* yes so use the same buffer
 01F7         ms.BufNo:=x
 0204         ms.Iname(x):=Ic.name
 0217       ENDEXIT
 021B       NEXT x
 0226       OPEN #path,ms.Dname+"/"+Ic.name:WRITE
 0240       (* did it open a old file
 0259       (* if so do we want to over write it
 027D       RUN getans(ms,ok,"Over Write "+Ic.name)
 02A1       IF ok<>TRUE THEN
 02AC         (* no so close it and end
 02C5         CLOSE #path
 02CB         END
 02CD       ENDIF
 02CF       (* yes so keep going
 02E3       RUN gfx2("curxy",5,5)
 02F6       RUN gfx2("color",1)
 0306       PRINT USING "s15^",Ic.name
 0316       RUN gfx2("logic","off")
 0329       RUN gfx2("gpload",ms.GrpID,ms.BufNo,6,24,24,144)
 0353       FOR x=1 TO 144
 0365         PUT #path,ms.byt(x)
 0377         PUT #ms.GrpID,ms.byt(x)
 038C       NEXT x
 0397       CLOSE #path
 039D       IF ms.number=0 THEN
 03AC         ms.number:=1
 03B7         RUN gfx2("color",0,1)
 03CA         RUN gfx2("color",ms.color,0)
 03E2       ENDIF
 03E4       (* now let's the new changes
 0400       RUN showdir(ms,Dr)
 040F       END
 0411 10    ON ERROR GOTO 20
 041A       (* could not open old file so let's try to make a new one
 0453       FOR x:=1 TO ms.number+1
 046C         (* did we find a deleted icon
 0489       EXITIF ms.Iname(x)="icon.XXXX" THEN
 04A5         (* yes so let's use it
 04BB         ms.BufNo:=x
 04C8         ms.Iname(x):=Ic.name
 04DB       ENDEXIT
 04DF       NEXT x
 04EA       (* are we going to use a unused buffer
 0510       IF ms.BufNo=ms.number+1 THEN
 0526         (* yes so update the number of them used
```

```
054E            ms.number:=ms.number+1
0560            RUN gfx2("propsw","off")
0574            RUN gfx2("color",0,1)
0587            RUN gfx2("propsw","on")
059A            RUN gfx2("color",1,0)
05AD          ENDIF
05AF          (* now make a new icon
05C5          CREATE #path,ms.Dname+"/"+Ic.name:WRITE
05DF          RUN gfx2("curxy",5,5)
05F2          RUN gfx2("color",1)
0602          PRINT USING "s15^",Ic.name
0612          RUN gfx2("logic","off")
0625          RUN gfx2("gpload",ms.GrpID,ms.BufNo,6,24,24,144)
064F          FOR x=1 TO 144
0661            PUT #path,ms.byt(x)
0673            PUT #ms.GrpID,ms.byt(x)
0688          NEXT x
0693          CLOSE #path
0699          (* error in ow window
06AE          ON ERROR GOTO 30
06B4          RUN gfx2("owset",1,5,5,25,8,3,1)
06D6          RUN winset(4)
06DE          RUN gfx2("curxy",1,0)
06F1          (* now let's change the attr on it
0713          PRINT "ATTR "; Ic.name; " pe e"
072B          RUN gfx2("curxy",1,2)
073E          SHELL "attr "+ms.Dname+"/"+Ic.name+" e pe"
0761          (* give time to see the job was done
0785          FOR x:=1 TO 3000 \NEXT x
07A3          RUN gfx2("owend")
07B0          (* error no ow window
07C5          ON ERROR GOTO 20
07CB          (* let's see the new icon
07E4          RUN showdir(ms,Dr)
07F3          END
07F5 20       ms.ErrNum:=ERR
0802          (* report error
0811          RUN errmsg(ms.ErrNum)
081E          END
0820 30       ms.ErrNum:=ERR
082D          (* error in attr ow window
0847          RUN gfx2("owend")
0854          RUN errmsg(ms.ErrNum)
0861          END
```

Listing 3: readicon

```
PROCEDURE readicon
 0000       TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 001B       TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpId,BufNo,number
              ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 0064       PARAM MS:MicSys
 006D       PARAM dr,IC:Mic
 007A       DIM temp:STRING[39]
 0086       DIM path,count:BYTE
 0091       DIM Tbyt1,Tbyt2:STRING[3]
 00A1       (* start at number 1
 00B5       count:=1
 00BC       ON ERROR GOTO 10
 00C2       (* show we are busy
 00D5       RUN gfx2("gcset",202,4)
```

few of the techniques you must master to write fantastic mouse-driven programs under OS-9's *Multi-Vue* environment.

Getting Rid of Disk Fragments

Occasionally I notice a lot of confusion in the Color Computer community about file fragmentation. The topic is a real concern because OS-9 constantly moves files between main memory and your hard or floppy disks. The work is done by RBF — OS-9's Random Block File manager. RBF keeps track of where data is stored on your disks by dividing your disk into three regions: an identification sector, an allocation bitmap and the file system.

There are many myths about file fragmentation. Chris Burke of Burke & Burke posted an outstanding file concerning the subject on CompuServe. It's recommended reading. In summary Burke says fragmentation is a natural side effect of disk operation. It is caused by the constant rearrangement of disk data as files are created, modified and deleted.

Three problems caused by fragmentation are disk errors (Segment List Full and Device Full), slower disk access and increased mechanical wear. Although backups don't affect fragmentation, you can reduce or eliminate it by periodically backing up and restoring your hard drive or by using a hard disk optimizer program. You may especially want to check out Chris's tutorial file if you experience either of these symptoms:

Error 217 — Segment list full. The file has reached the built-in fragmentation limit of 48 segments.

Error 248 — Device full. When you run `ezgen`, `cobbler`, `config` or `os9gen`, this error code means that OS-9 couldn't find any group of clear ABM (Allocation Bit Map) bits large enough to create a single-

NEW: *Low Power* **512K CoCo3 Ram Expansion Board** (call for current $)

SDISK - Standard disk driver module replacement allows full use of 40 or 80 track double sided drives with OS-9 Level I. Full compatibility with CoCo 35 track format and access all other OS-9 non-CoCo formats. Easy installation. **$29.95**

SDISK+BOOTFIX - As above plus boot directly from a double sided diskette.**$35.95**

LEVEL 1 OS-9 ONLY

LEVEL 2 OS-9 ONLY

SDISK3 - Level II version of SDISK driver. Same features as level I (except bootfix not required to boot from double sided). **$29.95**

MSF - MS-DOS file manager. Complete file transfer capabiltites. **REQUIRES SDISK3 $45.00** or with SDISK3 for **$65.00**

L1 UTILITY PAK 40 utilities including MACGEN **$49.95**

L2 UTILITY PAK Level 2 Ram Disk and Printerr driver plus 10 more **$39.95** **BOTH L1+L2** Paks for **$75.00**

PC-XFER File transfer utilities read/write/format MS-DOS format disks under COCO OS-9, REQUIRES SDISK or SDISK3. **$45.00**

FORTH09 A FORTH-83 Standard implementation specially taylored for OS-9. Includes complete forth 6809 assembler and more. Programs written in forth can instantly be saved as compact executable machine language modules. Supplied with complete printed documentation. **$150.00** (+ $3 S&H).

SEND S.A.S.E FOR LATEST CATALOG

All diskettes are in CoCo OS-9 format unless otherwise requested; other OS-9 formats can be supplied for $2.00 additional charge. All orders must be prepaid or COD, VISA/MC accepted, add $2 S&H for first software item, + .50 for each additional item, additional charge for COD.

D. P. Johnson, 7655 S.W. Cedarcrest St.
Portland, OR 97223 (503) 244-8152

(You may best reach us between 9AM-NOON Pacific Time, Mon.-Fri.)

OS-9 is a trademark of Microware and Motorola Inc., MS-DOS is a trademark of Microsoft, Inc., FORTH09 is a trademark of D. P. Johnson

segment file. The disk may actually be full, or it may be badly fragmented.

If you would rather solve the problem than read about it, Burke & Burke has a solution for you. It's written a new utility package called File System Repack (FSR), a collection of nine OS-9 disk utility programs. The programs included are listed in Table 2.

The most important of these programs is `repack`, the hard disk optimizer. `repack` scans a disk's OS-9 file system and rewrites any files or directories that are stored inefficiently. Here are a few of `repack`'s advantages.

- Individual files processed by `repack` are optimized permanently. Only editing or otherwise modifying the file undoes its optimization.
- Command line options allow `repack` to reclaim lost sectors on a disk.
- `repack` sorts files in order of increasing file descriptor address. In this way `repack` preserves the general order of your disk files without changing their order in the directory.
- No free disk space is needed; `repack` can even repack a completely full hard disk.
- It works on any type or brand of OS-9 hard/floppy disk.

OS-9 for DOS and Mac

OS-9 Users Group MOTD editor Bill Brady and I flew to Chicago's O'Hare airport in August for the introduction of two new OS-9 implementations. One port runs on an IBM PC, XT or AT with the help of a plug-in card called the PC68K1. The plug-in card has two standard DB9 serial ports that can run to 19.2 kilobaud asynchronous or synchronous and two eight-bit, bi-directional parallel ports. The card runs OS-9 concurrently while MS-DOS runs on the PC itself. The two operating systems can communicate with each other. Power users may plug the Memiox 10-port serial expansion board into the PC68K1 and run with a dozen users. We'll be detailing the PC68K1 in an article for RAINBOW's sister magazine PCM.

There are three Mac implementations. All use the Macintosh *Quickdraw* and disk operating system for I/O. This means new OS-9 device drivers won't need to be written for each piece of hardware added to your Macintosh. It also means that any piece of hardware that runs with the Macintosh should be ready for use by OS-9. The three implementations are for the Plus and SE, which use the Motorola 68000 processor, the Mac II and its 68020 processor, and the SE 30 and Mac IIX, which use a 68030 microprocessor.

```
00F8        OPEN #path,IC.name
00F5        (* nine lines to read
010A        FOR x:=1 TO 9
011C          (* read them as strings
0133          READ #path,temp
013D          (* the string is fourty bytes long so stop at every 5th spot
0179          FOR xx:=1 TO 40 STEP 5
0191            (* now make the next two a hex string byte size
01C0            Tbyt1:="$"+MID$(temp,xx,2)
01D3            Tbyt2:="$"+MID$(temp,xx+2,2)
01EA            (* now make them bytes
0200            MS.byt(count):=VAL(Tbyt1)
0211            MS.byt(count+1):=VAL(Tbyt2)
0225            (* move it up by two
0239            count:=count+2
0244          NEXT xx
024F          (* get next string to read
0269        NEXT x
0274        CLOSE #path
027A        RUN gfx2("gpload",MS.GrpId,41,6,24,24,144)
029F        FOR x=1 TO 144
02B1          PUT #MS.GrpId,MS.byt(x)
02C6        NEXT x
02D1        (* done so place it in the update window
02F9        RUN gfx2("put",MS.GrpId,41,26,13)
0315        (* blank the editor
0328        RUN loadbar(IC.name)
0335        (* now load it with the icon
0351        RUN showicon(MS.byt)
035E        END
0360 10     MS.ErrNum:=ERR
036D        RUN errmsg(MS.ErrNum)
037A        END
```

Listing 4: showicon

```
PROCEDURE showicon
0000        PARAM Byt(144):BYTE
000C        DIM x,y,Bit:INTEGER
001B        DIM pixel,color:BYTE
0026        DIM BtNum,PixNum:INTEGER
0031        ON ERROR GOTO 10
0037        BASE 0
0039        (* get pixel from the byte
0053        PixNum:=0
005A        (* start from top left move down
007A        FOR y:=60 TO 175 STEP 5
008F          (* first go right in step of 9
00AD          FOR x:=32 TO 239 STEP 9
00C2            (* convert bytes to four pixels
00E1            BtNum:=PixNum/4
00EC            Bit:=3-MOD(PixNum,4)
00FA            pixel:=4^Bit
0108            (* and get the color of it
0122            color:=LAND(Byt(BtNum),pixel*3)/pixel
0138            RUN gfx2("color",color)
014A            (* and draw it in the editor
0166            RUN gfx2("bar",x,y,x+8,y+4)
0189            (* move over to next pixel
01A3            PixNum:=PixNum+1
01AE          NEXT x
01B9        NEXT y
01C4        END
01C6 10     RUN errmsg
01CD        (* report errors
```

Listing 5: writeicon

```
PROCEDURE writeicon
0000        PARAM Name,Tname:STRING
000B        PARAM Bytes(144):BYTE
0017        DIM path,ErrNum:BYTE
0022        (* is the name chr$(32)
0039        IF Name=" " THEN
0046          (* yes so end
0053          END
0055        ENDIF
0057        ON ERROR GOTO 10
005D        (* we are busy so time for the hour glass
0086        RUN gfx2("gcset",202,4)
0099        (* let's try to open old file
00B6        OPEN #path,Name:WRITE
00C2        (* start at 0
00CF        xx:=0
```

COCO 3'S MISSING LINK:

"BIG BASIC"

BASIC USERS GET FULL POWER OF MEMORY MANAGEMENT IN WINDOWS!

"Danosoft has a winner in *Big Basic*, and I would recommend it to anyone wanting to get the most out of a Color Computer 3." - Rainbow, Oct./89.

Now you can access up to 472K of memory in a 512K CoCo or up to 92K in a 128K machine with any mix of programs and/or data . At last, you can do sizable basic programming with a CoCo 3. (Also offers simplified memory management for M.L. programmers.)

Magically fast, executes one big program or database in basic; or up to 58 separate basic programs running at once from computer memory in up to 58 separate windows! Saves programs or variables with their currently running parameters and loads back that way as if you never left the program.

Chain in unlimited sized programs or data from disk(s) without erasing existing programming or variables. Also works with the RGB-DOS Hard Disk system.

- 3 new simple basic words create the power.
- Provides for variable exchange between windows.
- Programs can be saved over multiple disks or use our BIG DISK Utility. (See below)
- Modifies your basic operating system in some 70 locations but does not occupy user memory.
- Includes 7 Demo Programs and Manual.
- Disk use only; any version RS-DOS.
- ONLY $39.95 U.S. or $46.35 CDN. + $2.50 S & H
  Ontario residents add 8% PST.

"BIG RAMDISK" (512k CoCo3 V.2.0 or V.2.1)

- Copy or backup your programs or data to "BIG RAMDISK and get the speed of program/data saving or loading to an "in memory" device. ("COPYDISK" Utility included.)
- Great for use with all other programs on this page and most commercial software.
- You can install, re-install, format and reformat from direct mode or from a program without erasing programming or variables. It's in machine language, does not occupy user memory, but can be user located elsewhere if needed.
- Your choice of one big 158 granule ramdisk (80 tracks-360k) or two 68 or 78 granule ramdisks (35-40 tracks to 360k total), depending on your DOS. (i.e. RS-DOS, "BIG DISK", "DOUBLE40", etc.)
- Ramdisk files and directory do not erase with a reset coldstart (ALT/CTRL), and are preserved if a program crashes. This lets you use some programs that need a Coldstart to exit.
- "BIG RAMDISK" with "BIG DISK" or "DOUBLE40" (see below) & two double-sided drives => 1 MEG. on line.

ONLY $12.95 US or $14.95 CDN + $2.50 S & H.
Ont. Residents add 8% PST

For any CoCo (at least 64K) with 1.1 or 2.1 Disk Extended Basic:

"UTILITIES PACKAGE"

6 HANDY M.L. RESIDENT UTILITIES FOR BASIC

"BIG DISK"	• Makes computer see double-sided drives as one 360K (80tk) drive; 158 granules.
"DOUBLE40"	• Sets drives for 40 tracks each side.
"CONVERT/DISK"	• Formats 40 tracks on each side of a disk without disturbing the first 35. Instantly doubles all your present storage.
"QUIKDRIV/6MS"	• Sets fast drive stepping rate.
"QUIKDRIV/30M	• Fast drive shut off.
"SET FEED"	• Sets line spacing for printouts.

Only $17.95 U.S. or $20.80 CDN. + $2.50 S & H.
Ont. Residents add 8% PST.

RAINBOW CERTIFICATION SEAL

"MEMORY MASTER"

OUR FAVORITE PROGRAMMING TOOL

"*Memory Master* is a unique hacker's program offering about all you could ask for in a disk and memory utility." - Rainbow, Sept./89.

Scan, Edit, Copy, Printout any memory in your computer or on disk. Fix disks.

Fast entry of M.L. Listings.

Dual Windows! Runs 2 Basic Programs at once!

Disk chains unlimited amount of program sections or data.

Includes Demo Program and Manual.
$24.95 U.S. or $28.95 CDN. + $2.50 S & H.
Ont. Residents add 8% PST

DANOSOFT
Box 124, Station "A"
Mississauga, Ontario L5A 2Z7

10% Discount
on purchase of 3 or more items at the same time.

Order by Phone or Mail
(416) 897-0121
Shipped Airmail Same Day

VISA
MasterCard

The *Quickdraw* terminal emulator was not finished at show time, so we did not get to see the Mac run OS-9 on its own screen in Chicago. However, both Bill and I have signed up as Beta testers of the new OS-9 implementations. This means we should have plenty to say sometime soon. In the meantime it's a great step forward for our favorite operating system.

Dr. Erich Gibbs, president of Gibbs Laboratories, the company that designed these new OS-9 products, is on the right track. His goal? "To greatly enhance the productivity of popular personal computers conveniently and inexpensively."

Gibbs believes his contributions will "go a long way toward restoring a healthier competitive balance between the computing power of small organizations and that of large organizations." He noted that the benefit of his new products will be "especially significant on the broad lower rungs of the economic ladder where getting the most from a personal computer is a matter of practical importance."

The OS-9 approach just may be appealing. The alternative is networking. When computers are networked, companies must buy a full-fledged computer for each workstation. Many small companies cannot afford to buy a half dozen computers. "But they could afford to buy one computer and a half dozen inexpensive terminals," Gibbs said. "OS-9 can handle the job nicely. We think we have a winner."

For OS-9 users, Gibbs Laboratories' innovation could be a boon. OS-9 may suddenly be available on machines that you can buy off the shelf at any computer store anywhere. We just may see some new software. I'll keep you posted.

Color Canvas

Mike Haaland's *MVCanvas* will more than likely be shipping by the time you read this column. It's a fantastic new package that should make RS-DOS users sit up and take notice. It's 100-percent mouse- and menu-driven and offers support for most printers.

MVCanvas supports Files, Edit, Goodies, Tools and Font Menus. It needs *MultiVue*, a 512K CoCo 3 and one disk drive. Essentially it's an easy-to-use VEF format graphics editor that features a clipboard, palette switching and multiple fonts. It can import digitized pictures and edit full 320-by-200, sixteen-color VEF pictures.

Give Haaland a call at Hyper-Tech Software, 4341 Gannet Circle, Suite 174, Las Vegas, NV; (702)-362-5346. This one really sings!

That's it for November. Enjoy your turkey and keep on hacking. ❑

```
00D7        (* is it to the printer
00EE        IF Name="/p" THEN
00FC          (* yes so let's print out a name
011C          PRINT #path USING "s40^",Iname
012D        ENDIF
012F        (* write it in steps of 2
0148        FOR x:=1 TO 144 STEP 2
0160          PRINT #path USING "h2",Bytes(x);
0174          PRINT #path USING "h2",Bytes(x+1);
018C          (* with a blank space between them
01AE          PRINT #path," ";
01B9          (* move it up by one
01CD          xx:=xx+1
01D9          (* did we reach number 8 yet
01F5          IF xx=8 THEN
0202            (* yes so send a chr$(13) out
021F            PRINT #path
0225            (* move it back to 0
0239            xx:=0
0241          ENDIF
0243        NEXT x
024E        PRINT #path
0254        CLOSE #path
025A        END
025C 10     ON ERROR GOTO 20
0265        (* did not find a old file so make a new one
0291        CREATE #path,Name:WRITE
029D        (* and do the same thing here
02BA        xx:=0
02C2        FOR x:=1 TO 144 STEP 2
02DA          PRINT #path USING "h2",Bytes(x);
02EE          PRINT #path USING "h2",Bytes(x+1);
0306          PRINT #path," ";
0311          xx:=xx+1
031D          IF xx=8 THEN
032A            PRINT #path
0330            xx:=0
0338          ENDIF
033A        NEXT x
0345        CLOSE #path
034B        END
034D 20     ErrNum:=ERR
0356        (* report error
0365        RUN errmsg(ErrNum)
036F        END
```

Listing 6: editor

```
PROCEDURE editor
0000        TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpId,BufNo,number
              ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0049        PARAM Ms:MicSys
0052        TYPE registers=dp,a,b,cc:BYTE; x,y,u:INTEGER
0077        DIM regs:registers
0080        DIM Callcode:BYTE
0087        DIM RatPack(32):BYTE
0093        ON ERROR GOTO 10
0099        (* let stay here for a while
00B5        LOOP
00B7          (* use small cross hire pointer
00D6          RUN gfx2("gcset",202,7)
00E9          REPEAT
00EB            (* mouse info
00F8            regs.a:=0
0103            regs.b:=$89
010F            regs.x:=ADDR(RatPack)
011D            regs.y:=0
0128            Callcode:=$8D
0130            RUN syscall(Callcode,regs)
013F            (* set horiz pos for cross hire
015E            Ms.horiz:=RatPack(25)*256+RatPack(26) \Ms.horiz:=Ms.horiz
                 +Ms.horiz/17+3
0192            (* set vert for cross hire
01AC            Ms.vert:=192*(RatPack(31)*256+RatPack(32))/176+3
01CD            Ms.horiz:=(Ms.horiz-32)/9*9+32
01F8            Ms.vert:=(Ms.vert-60)/5*5+60
0203            IF Ms.horiz<30 OR Ms.horiz>246 OR Ms.vert<58 OR Ms.vert
                 >177 THEN
0230              (* we are out of bounds so end it
0251              RUN gfx2("gcset",0,0)
0264              Ms.horiz:=1
026F              END
0271            ENDIF
0273          UNTIL RatPack(9)<>0
0280          (* button down so so let's update
02A1          RUN updatbuf(Ms)
02AB          (* and look for a new spot
02C5        ENDLOOP
02C9        END
02CB 10     Ms.ErrNum:=ERR
```

```
02D8        (* report error
02E7        RUN errmsg(MS.ErrNum)
02F4        END
```

Listing 7: updatbuf

```
PROCEDURE updatbuf
0000        TYPE MicSys=Dname,Iname(48):STRING; byt(144),GrpId,BufNo,number
              ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
0049        PARAM MS:MicSys
0052        DIM PixNum,Ph,Pv,pixel:INTEGER
0065        DIM Bit,BtNum:BYTE
0070        DIM xcor,ycor:INTEGER
007B        ON ERROR GOTO 10
0081        xcor:=(MS.horiz-32)/9
0092        ycor:=(MS.vert-60)/5
00A3        BASE 0
00A5        (* get the pixel out of the byte
00C5        PixNum:=xcor+ycor*24
00D4        BtNum:=PixNum/4
00DF        Bit:=3-MOD(PixNum,4)
00ED        pixel:=4^Bit
00FB        Bit=LAND(MS.byt(BtNum),pixel*3)
0110        (* now put it back in the byte with the selected color
0146        MS.byt(BtNum):=MS.byt(BtNum)-Bit+pixel*MS.color
016A        (* and let's show it on the editor in big size
0198        Ph:=xcor*9+32
01A6        Pv:=ycor*5+60
01B4        RUN gfx2("bar",Ph,Pv,Ph+8,Pv+4)
01D7        (* now update the buffer
01EF        RUN gfx2("logic","off")
0202        RUN gfx2("gpload",MS.GrpId,49,6,24,24,144)
0227        FOR x:=0 TO 143
0239          PUT #MS.GrpId,MS.byt(x)
024E        NEXT x
0259        (* and put back on the update window
027D        RUN gfx2("put",MS.GrpId,49,26,13)
0299        END
029B 10     MS.ErrNum:=ERR
02A8        RUN errmsg(MS.ErrNum)
02B5        END
```

Listing 8: errmsg

```
PROCEDURE errmsg
0000        PARAM errnum:BYTE
0007        DIM key:STRING
000E        DIM horiz,vert:INTEGER
0019        RUN gfx2("propsw","on")
002C        RUN gfx2("owset",1,10,10,20,10,1,3)
004E        RUN winset(4)
0056        RUN gfx2("curxy",1,0)
0069        (* what was the errnum
007F        PRINT "Error -"; errnum; "- Incounted"
009C        (* if not the break key
00B3        IF errnum<>2 THEN
00BF          (* can't find error or errmsg goto 1
00E3          ON ERROR GOTO 1
00E9          SHELL "error "+STR$(errnum)
00F8 1        RUN gfx2("curxy",5,4)
010E          PRINT "Press Key"
011B          (* stay here till response
0135          RUN getkey(key.horiz.vert)
0149        ENDIF
014B        RUN gfx2("owend")
0158        END
```

Listing 9: loadbar

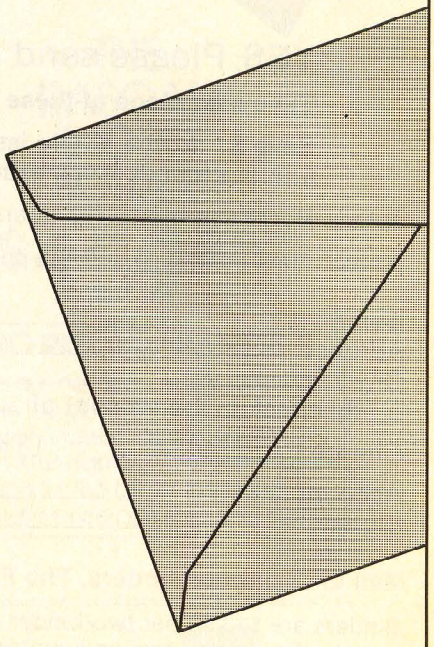
```
PROCEDURE loadbar
0000        (* fill the editor and show the name
0024        PARAM name:STRING
002B        RUN gfx2("color",1,0)
003E        RUN gfx2("bar",32,60,245,174)
0055        RUN gfx2("curxy",5,5)
0068        PRINT USING "s15^",name
0075        RUN gfx2("color",0,1)
0088        RUN gfx2("curxy",3,10)
009B        PRINT "Loading Icon"
00AB        END
```

About Your Subscription

Your copy of THE RAINBOW is sent second class mail. You must notify us of a new address when you move. Notification should reach us no later than the 15th of the month prior to the month in which you change your address. Sorry, we cannot be responsible for sending another copy when you fail to notify us.

Your mailing label also shows an account number and the subscription expiration date. Please indicate this account number when renewing or corresponding with us. It will help us help you better and faster.

For Canadian and other non-U.S. subscribers, there may be a mailing address shown that is different from our editorial office address. Send your correspondence to our editorial offices at Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. This applies to everyone *except* those whose subscriptions are through our distributor in Australia.



Protect and highlight your important magazine collection with sturdy RAINBOW binders

Distinctive, Durable RAINBOW Binders

THE RAINBOW is a vital resource to be referred to again and again. Keep your copies of THE RAINBOW safe in our quality, distinctive binders that provide complete protection.

These **attractive red vinyl binders** showcase your collection and ensure your RAINBOWs are in mint condition for future use. Each binder is **richly embossed with the magazine's name in gold** on the front and spine. They make a handsome addition to any room.

Put an End to Clutter

Organize your workspace with these tasteful binders. Spend more time with your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two binders, which holds a full 12 issues of THE RAINBOW, is only $13.50 (plus $2.50 shipping and handling).

Special Discounts on Past Issues

To help you complete your collection of THE RAINBOW, we're offering a **special discount on past issues** of the magazine.

When you place an order for six or more back issues of THE RAINBOW at the same time you order binders, you are entitled to $1 off the regular back issue price. To order, please see the "Back Issue Information" page in this issue.

Know Where to Look

You may purchase the "Official And Compleat Index To THE RAINBOW" for $1 when you purchase a set of binders. This comprehensive index of RAINBOW's first three years (July 1981 through July 1984) is usually priced at $2.50.

For greater convenience, order RAINBOW Binders through the shopping area of the CoCo SIG on Delphi!

_____ **YES**. Please send me _____ set(s) of RAINBOW binders

Take advantage of these special offers with your binder purchase:

_____ Save $1 off the single issue cover price for back issues. Minimum order of 6 magazines. Please enclose a back issue order form from a recent issue indicating magazines wanted.

_____ Purchase the "Official and Compleat Index to THE RAINBOW" for $1. (Regular price $2.50.)

(These offers good only with the purchase of a RAINBOW binder set)

Name _____

Address _____

City _____ State _____ ZIP _____

☐ My check in the amount of _____ is enclosed. (In order to hold down costs, we do not bill.)

Charge to: ☐ VISA ☐ MasterCard ☐ American Express

Account Number _____ Expiration Date _____

Signature _____

Mail to: **Rainbow Binders, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.**

Binders are $13.50 per two-binder set plus $2.50 shipping and handling. If your order is to be sent via U.S. mail to a post office box or foreign country, please add $2. Kentucky residents add 5% sales tax. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

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

All other inquiries call (502) 228-4492.

Join the Chorus!

Several years have passed since a reader survey appeared in THE RAINBOW. We have received thousands of letters with individual opinions over the years. And we have read and taken to heart each suggestion. But relying on reader mail doesn't allow us to see the complete picture very readily. To help us determine what you want, a comprehensive reader survey is in order.

On the following page you will find several questions regarding your Color Computer setup, your personal background, and your CoCo and RAINBOW habits. As you complete the survey, keep its purpose in mind. Answer all the questions as honestly as you can. It is also important to make the answers your own. We want *your* personal information and opinions. This is the only way we can effectively use the information you provide.

As with any poll or survey, it is most important that everyone take the time to respond. If the results indicate 90 percent of our readers want to see a lot of OS-9 articles, do I need to say what direction THE RAINBOW will take? Obviously, lop-sided results won't serve any of us well.

When you have finished, remove the page from the magazine, fold it and mail it to us at:

Reader Survey
The Rainbow
P.O. Box 385
Prospect, KY 40059

Alternatively, if you want to keep your RAINBOW magazine intact, photocopy the page after finishing and mail us the copy. Then you will have a record of your responses.

* * * * *

Hold the presses! Last month I reported our selection of a Courier typeface for the listings we publish. Further experimentation has provided a solution that makes RAINBOW listings even easier to read. Beginning with this issue we are using a Letter Gothic Bold typeface. This font is tight enough for us to use three-column listings and heavy enough that you shouldn't need to squint. Thanks for bearing with us as we undergo these changes.

Another change some of you may have noticed is the elimination of the Rainbowtech section of the magazine. No, this doesn't mean we are planning to cancel the columns that usually appear there (specifically "Barden's Buffer" and "KISSable OS-9"). Rather, we feel the Rainbowtech designation has outlived its purpose. We publish technical articles relevant to several aspects of the CoCo throughout THE RAINBOW.

The removal of the Rainbowtech designation also allows us to standardize the format of RAINBOW's features and columns. This gives the magazine a more flexible yet consistent layout.

Remember, our goal is to make THE RAINBOW as easy to read and as enjoyable as possible. You'll see many minor changes in the physical presentation of the magazine. On a larger scale, we depend on you to tell us the direction we need to take. Fill out and return the reader survey, and let your voice be heard.

— Cray Augsburg

COMPUTER ISLAND EDUCATIONAL SOFTWARE
PROGRAMS ON SALE THIS MONTH
$15 each-tape or disk

Moneypack
Math Invaders
First Games (Ages 3-6)
Arrow Games (Ages 3-6)
Cocowheel of Fortune (for Coco 2)
Cocowheel of Fortune (Coco3/RGB)
Spanish Baseball
French Baseball

COMPUTER ISLAND
227 Hampton Green
Staten Island,NY 10312
(718) 948-2748

Add $1.00 postage, NY res. add tax
VISA, MC - Send for free catalog

Rainbow Reader Survey

Except where indicated, circle the appropriate response.
Where text is required, please print legibly.

About Yourself

Gender: Male Female

Age:
Under 15 | 16-25 | 26-35 | 36-45 | 46-65 | Over 65

Occupation:
Agricultural | Business person | Clergy
Educator | Engineer/Tech | Laborer
Professional | Retired | Skilled trade
Student | Writer/Editor | Other

Household income:
Under $10,000 | $10,000-$20,000 | $21,000-$30,000 | $31,000-$40,000 | $41,000-$50,000 | Over $50,000

About Your CoCos (circle all that apply)

Computer:
CoCo 1 | CoCo 2 | CoCo 3
Color BASIC | Extended BASIC | Disk BASIC
4K | 16K | 32K
64K | 128K | 512K

Printer:
C.Itoh | Epson | Okidata
Radio Shack | Star/Gemini | Other

My printer is compatible with:
IBM | Epson | Tandy

Monitor:
B/W Television | Color Television | Monochrome
Color Composite | RGB | RGB/Composite

Alternate DOS:
Flex | ADOS | RGB DOS
JDOS | CDOS | Hyper-I/O

Do you have a hard drive? Yes No

If so, how do you use it?
Disk BASIC only | OS-9 only | Disk BASIC and OS-9

What percentage of the time do you use Disk BASIC?
0 10 20 30 40 50 60 70 80 90 100

What percentage of the time do you use OS-9 Level I?
0 10 20 30 40 50 60 70 80 90 100

What percentage of the time do you use OS-9 Level II?
0 10 20 30 40 50 60 70 80 90 100

Describe your *main* system: _____

_____

_____

_____

Describe any other computers you have and use: _____

_____

_____

_____

Your Wish List

On a scale of 1 to 5 (5 being the highest), rate your interest in each of the following:

Topics
___Amateur radio
___BASIC09
___Beginner's info
___Business
___C language
___Desktop publishing
___Education
___Games
___Graphics
___Hardware projects
___Home finance
___Home help
___Interviews
___Machine language
___OS-9
___Reviews
___Sound and music
___Technical Q&A
___Telecommunications
___Tutorials
___Utilities

Rainbow Columns
___Barden's Buffer
___BASIC Training
___BASICally Speaking
___CoCo Clubs
___CoCo Consultations
___CoCo Gallery
___Database Report
___Delphi Bureau
___Education Notes
___KISSable OS-9
___Letters to Rainbow
___One Liners
___Print#-2
___Received & Certified
___Scoreboard
___Scoreboard Pointers
___Turn of the Screw
___Wishing Well
___Wrapping the Rainbow

Do you receive Rainbow On Tape? Yes No

Do you receive Rainbow On Disk? Yes No

Do you type in Rainbow listings?
Frequently | Sometimes | Never

Are Rainbow listings
Too long | Too short | Just right

Regarding the listings, are there
Too many | Too few | Just right

Do you use Rainbow Check Plus? Yes No

Do you use Racksellers to locate The Rainbow? Yes No

Comments and Suggestions: _____

_____

_____

_____

Name _____

Address _____

City _____

State _____ Zip _____

Send completed survey to: Reader Survey, The Rainbow, P.O. Box 385, Prospect, KY 40059.

Sugar Software

☞ New Calligrapher Graphics Clipix! ☜

Introducing 8 disks of graphics pictures I call **Clipix**. Each disk has over 60 pictures. The introductory price of **just $49.95** (save $30) for the complete set is available through Dec. 31st, 1989. Specify RS-DOS, OS9 or MS-DOS format.

CALLIGRAPHER

CoCo Calligrapher - Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes three ½ inch high fonts. Works with many printers such as Epson, Gemini and Radio Shack. Over 135 additional fonts are available (see below). Tape/Disk (RS-DOS); **$24.95**.

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

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

Set #1 Reduced and reversed originals;
Set #2 Old Style and Broadway;
Set #3 Antique and Business;
Set #4 Wild West and Checkers;
Set #5 Stars, Hebrew and Victorian;
Set #6 Block and Computer;
Set #7 Small: Roman, Italics, Cubes, etc;
Set #8 Novelty fonts;
Set #9 Gallant and Spartan;
Set #10 Several Roman fonts;
Set #11 Gothic and Script;
Set #12 More Roman and Italic;
Set #13 Several Courier fonts;
Set #14 Modern and Screen;
Set #15 Tektron and Prestige.

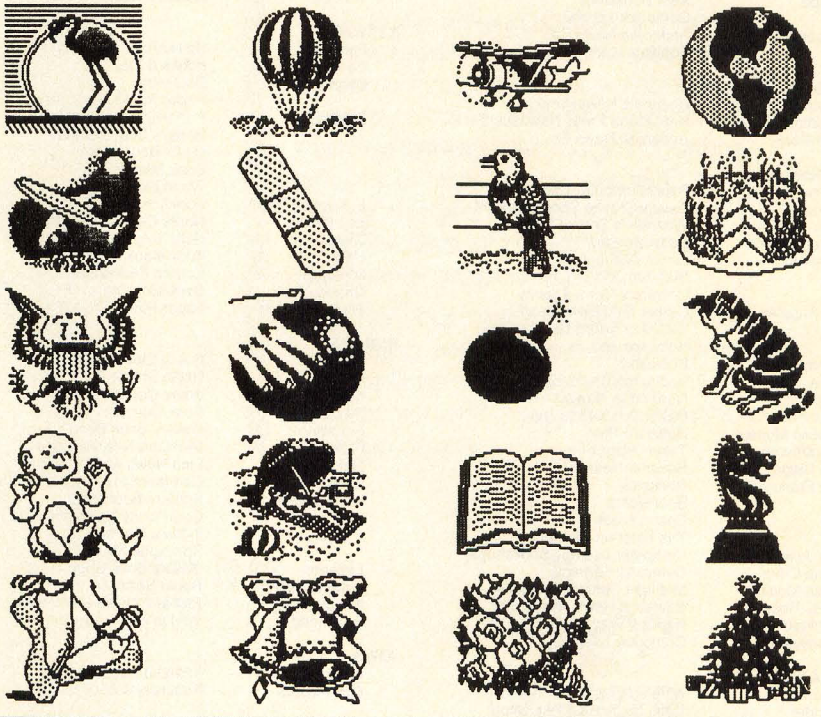
Economy Font Packages available on disk only, with 25 to 30 fonts; Specify RS-DOS, OS9 or MS-DOS format; **29.95** for any one or save by buying two or more at **$19.95** each:

Pkg #1 - Above font sets 1, 2 and 3;
Pkg #2 - Above font sets 4, 5 and 6;
Pkg #3 - Above font sets 7, 8 and 9;
Pkg #4 - Above font sets 10, 11 and 12;
Pkg #5 - Above font sets 13, 14 and 15.

Calligrapher Combo Package - Includes the Calligrapher and any two Economy Font Packages (your choice) for only **$59.95**. Specify RS-DOS, OS9 or MS-DOS.

New! Calligrapher Graphics Clipix

The Calligrapher may now include graphics pictures, known as **Clipix**, along with the text it prints. There are currently 8 different Clipix disks available, each one has over 60 different graphic symbols. While the OS9/MS-DOS Calligrapher (especially V2.0) may easily combine both text and Clipix, the RS-DOS Calligrapher may also print out the Clipix. Clipix #1) **Sports**, #2, **Miscellaneous**, #3) **Occupations**, #4) **Occasions**, #5) **Vehicles**, #6) **KidStuff**, #7) **Astrology/Mythology**, #8) **Animals**. Each Clipix disk is **$9.95**. *See special offer above.*



The Font Massager - This program allows you to do many things to Calligrapher font and Clipix files. Create new fonts, modify existing fonts, invert and compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. Specify OS9 or MS-DOS; **$19.95**.

This is a sample of the dot-matrix printer output from the OS9 MS-DOS Calligrapher set to full-justify the text within a 2.2 inch wide column. The font used is the 12-point Courier font from the font set #15 (or package #5).

For a complete catalog of Sugar Software products and fonts, send a stamp and a label.

RAINBOW CERTIFICATION SEAL

MasterCard VISA

*TRS-80 is a trademark of Tandy Corp.

SUGAR SOFTWARE
P.O. Box 7446
Hollywood, Florida 33081
(305) 981-1241

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

Racksellers

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA

Birmingham	Jefferson News Co.
	Little Professor Book Center
Brewton	McDowell Electronics
Florence	Anderson News Co.
Greenville	M & B Electronics
Montgomery	Trade 'N' Books
Tuscaloosa	Turtle's Records and Tapes

ALASKA

Fairbanks	Baker and Baker Booksellers

ARIZONA

Cottonwood	A & W Graphics Co.
Flagstaff	McGaugh's Newsstand
Phoenix	Houle Books
	Little Professor Book Center
	TRI-TEK Computers
Sierra Vista	Livingston's Books
Tempe	ASU Bookstore
	Computer Library
Tucson	Anderson News Co.
	Software, etc.

ARKANSAS

Eldorado	Howard's Newsstand
Ft. Smith	Hot Off the Press Newsstand
Little Rock	Anderson News Co.

CALIFORNIA

Benicia	Ryno Computer Systems
Berkeley	Dave's Smoke Shop/Lyon Ent.
	Whenlan's Smoke Shop
Citrus Heights	Software Plus
Hollywood	Levity Distributors
	Stef-Jen, Inc.
	Universal News Agency
Los Angeles	Center Fold Newsstand
	Circus of Books (2 Locations)
	Software, etc.
Marysville	Bookland
Napa	Bookends Bookstore
Northridge	Northridge Newsstand
Oakland	DeLauer's News Agency
Rancho Murieta	Software Plus
Sacramento	Tower Magazine
San Diego	Seventh Near B
San Francisco	Booksmith
	Bookworks
	Castro Kiosk
	The Kiost on Clement
San Jose	Computer Literacy Bookshops
Santa Clara	Computer Literacy
Santa Monica	Midnight Special Bookstore
Santa Rosa	Sawyer's News, Inc.
Stockton	Harding Way News
Sunnyvale	Computer Literacy

COLORADO

Aurora	Aurora Newsstand
Boulder	Eads News & Smoke Shop
Colorado Springs	Hathaway's
	McKinzey-White Books
Delta	Roundhouse Books
Glenwood Springs	The Book Train

DELAWARE

Dover	Plaza News, Inc.
Newark	Newark Newsstand

DISTRICT OF COLUMBIA

Washington, D.C.	Central Periodicals
	News Room
	The News World, Inc.
	World News, Inc.

FLORIDA

Boca Raton	Bookstop
Cocoa	The Open Door
Dania	Dania News & Books
Davie	Books Unlimited
	Software Plus More
Deland	the Family Bookshop
Ft. Lauderdale	Bookstop
	Clarks Out of Town News
Gainesville	Goering Book Center
Miami	Bookstop
	Joe's News
North Miami Beach	Almar Bookstore
Orlando	Bookstop
	Phoenix Books
Pensacola	Anderson News Co.
Pinellas Park	Wolf's Newsstand

FLORIDA(con't)

Plantation	Bookstop
Starke	Record Junction, Inc.
	Radio Shack Dealer
Sunrise	Sunny's at Sunset
Tallahassee	Anderson News Co.
West Palm Beach	Great American Book

GEORGIA

Atlanta	Border's
	U.S. News Inc.
Bremen	Bremen Electronics/Radio Shack
Cornelia	Electronic Connection
Forest Park	Ellers News Center
Riverdale	Riverdale Book & News
Savannah	Home Run Video

IDAHO

Boise	Book Shelf, Inc.
Moscow	Johnson News Agency

ILLINOIS

Belleville	Software or Systems
Centralia	Books & Co., Inc.
Champaign	Bookmark
	Pages for All Ages, Inc.
Chicago	Parkway Drugs
	Redig's Book Market
	U.I.C. Book Store
	Book Market
	World News
E. Peoria	Books 'n Stuff
Evanston	Norris Center Bookstore
Glencoe	Rehn Heurbinger Pharmacy
Lisle	Book Nook
Lombard	Empire Periodicals
Orlando Park	Book Link, Inc.
West Frankfort	Paper Place

INDIANA

Angola	D & D Electronics
	Radio Shack
Berne	White Cottage Electronics
Bloomington	Book Corner
Franklin	Gallery Book Shop
Ft. Wayne	Michiana News Service
Garrett	Finn News Agency, Inc.
Greenwood	Community Newscenter
Indianapolis	Borders Bookshop
	Community Newsletter
	Indiana News
	Southside News
Lebanon	Gallery Book Shop
Martinsville	Radio Shack
Nappannee	Richard's K-40 Electronics
Richmond	Voyles News Agency, Inc.

IOWA

Davenport	Interstate Book Store
Des Moines	Thackery's Books, Inc.

KANSAS

Leawood	Leawood Book Gallery
Liberal	CDS Ventures
Topeka	Palmer News, Inc.
Wellington	Dandy's/Radio Shack Dealer

KENTUCKY

Hazard	Daniel Boone Gulf Mart
Hopkinsville	Hobby Shop
Louisville	Hawley-Cooke Booksellers
	(2 Locations)

LOUISIANA

Baton Rouge	City News Stand
Lafayette	Oil Center Newsstand
New Orleans	Bookstore
	Oliver's Newsstand
	Sidney's News Stand Uptown
Slidell	The Book Shelf
	Northshore News

MAINE

Bangor	Magazines, Inc.
Brockton	Voyager Bookstore
Caribou	Radio Shack
Oxford	Books-N-Things
Sanford	Radio Shack

MARYLAND

Baltimore	Gordon's Booksellers
Gaithersburg	News 2 U
Ocean City	Hazel's Books

MARYLAND(con't)

Silver Spring	Capital Classics

MASSACHUSETTS

Boston	Eastern Newsstand
Cambridge	Out of Town News
Greenfield	World Eye Bookshop
Ipswich	Ipswich News
Lenox	Book Maze
Lexington	Colonial Pharmacy
Littleton	Computer Plus
Lynn	North Shore News Co.
Maynard	Paper Store, Inc.
Swansea	Newsbreak, Inc.

MICHIGAN

Allen Park	Book Nook, Inc.
Battle Creek	Mickey's Newsstand
Birmingham	Border's Book Shop
Durand	Robbins Electronics
E. Detroit	Book Center of E. Detroit
	Merit Book Center
Grand Rapids	Schuler Books, Inc.
Hillsdale	Electronics Express/Radio Shack
Holland	Fris News Company
Interlochen	Interlochen Bookstore
Kalamazoo	The Book Raft
Lansing	Readmore News Center
Lowell	Lowell Electronics
Midland	McCandless, Inc.
Mt. Clemens	Key Book Shop
Muskegon	First Edition Bookstore
	The Eight Bit Corner
Niles	Michiana News Service
Novi	Borders Bookshop
Oscoda	Readmore Book Store
Perry	Perry Computers
Pontiac	Waterford Bookshop
Portage	John Rollins Booksellers
Riverview	The Book Stop
Roseville	New Horizons Book Shop
Sterling Heights	Booklover's Shop

MINNESOTA

Blaine	Shinder's Northcourt Comm.
Burnsville	Shinder's Burnsville
Crystal	Shinder's Crystal Gallery
Edina	Shinder's Leisure Lane
Minneapolis	Baster's Books
	Shinder's (2 Locations)
Minnetonka	Shinder's Ridge Squar
Roseville	Shinder's Roseville
St. Paul	Shinder's Annex
	Shinder's Maplewood
	Shinder's St. Pauls

MISSOURI

Farmington	Ray's TV & Radio Shack
Flat River	Ray's TV & Radio Shack
Florissant	Book Brokers Unlimited
Jefferson City	Cowley Distributing
Kirksville	T&R Electronics
St. Louis	Book Emporium
	World News — Westport

NEBRASKA

Lincoln	Nebraska Bookstore
Omaha	Nelson News

NEVADA

Carson City	Bookcellar
Las Vegas	Hurley Electronics
	Steve's Books & Magazines

NEW HAMPSHIRE

Newington	Winebaum's Smoke Ring II
Salem	Booksmith
West Lebanon	Verham News Corp.

NEW JERSEY

Atlantic City	Atlantic City News Agency
Cedar Knolls	Village Computer & Software
Cliffside Park	Garden State News
Clinton	Micro World II
Hackettstown	Bach's Drug & Surgical
Morristown	Magazines Plus
Plainsboro	Cover-to-Cover Books, Inc.

NEW MEXICO

Albuquerque	Page One Newsstand
Santa Fe	Downtown Subscription

NEW YORK

Amherst	Village Green-Buffalo Books
Brooklyn	Cromland, Inc.
Buffalo	Elmwood Buffalo Books
Cortland	Reading World
Dansville	Book Den
Elmira Heights	Southern Tier News Co., Inc.
Fredonia	On Line: Computer Access Center
Hudson Falls	G.A. West & Co.
Huntington	Oscar's Bookshop
Mamaroncek	Reader's Market
New York	Barnes & Noble - Sales Annex
	Coliseum Books
	Eastern Newsstand
	Grand Central Station, Track 37
	200 Park Ave., (Pan Am #1)
	55 Water Street
	World Trade Center #2
	First Stop News
	Idle Hours Bookstore
	International Smoke Shop
	Jonil Smoke
	Penn Book
	State News
	World Wide Media Services
Rochester	Microcom Software
	Tandy Users Group
	Rochester Books, Inc.
	Village Green
	World Wide News
Troy	The Book End

NORTH CAROLINA

Cary	News Center in Cary Village
Chapel Hill	University News & Sundry
Charlotte	Newsstand Int'l
	Omnibus
	Papers & Paperbacks
Clemmons	K & S Newsstand
Gaffney	Gaffney Bookstore
Hickory	CBooks & Comics
Highpoint	K & S Newsstand
Kernersville	K & S Newsstand
Lexington	Martin's News Stand
Marion	Boomers Rhythm Center
Walkertown	K & S Newsstand
Winston-Salem	Book Nook
	K & S Newsstand (3 Locations)
	Rainbow News Ltd.

OHIO

Akron	Churchill News & Tobacco
	Manhattan Music, Inc.
Canton	Little Professor Book Center
Chagrin Falls	Inside Story
Chardon	Thrasher Radio & TV
Cincinnati	Cinsoft
Cleveland	Erieview News
Columbiana	Fidelity Sound & Electronics
Columbus	Beechcraft Newsstand
	B5 Software
	Headline Newsstand
	The Newsstand
Dayton	Books & Co.
	Huber Heights Book & Card
	Wilke News
Dublin	Book Barn
	Sibert Enterprises
Fairborn	News-Readers
	Sandbox Micro Systems
	Wilke's University Shoppe
Findley	Open Book
Fremont	The Open Book
Lakewood	Lakewood International News
Miamisburg	Wilke News
Tiffin	Paper and Ink
Toledo	Owl's Bookstore
Warren	Book Nook, Inc.
Xenia	Fine Print Books
Youngstown	Plaza Book & Smoke Shop

OKLAHOMA

Bartlesville	Betty's Book Rack
Stillwater	Caravan Books
Taklequah	Thomas Sales, Inc. dba Radio Shack
Tulsa	Steve's Book Store

OREGON

Beaverton	Tech Books
Eugene	Libra Books - Book Mark
Newport	Sea Towne Books, Inc.
Portland	Fifth Avenue News
Salem	Capitol News Center
	Checkmate Book

PENNSYLVANIA

Allentown	Owl Services
Altoona	Newborn Enterprises
Ambler	Ambler News Center
Feasterville	Global Books
King of Prussia	Gene's Books
Laureldale	Software Corner
Philadelphia	Popi, Inc. (2 locations)
West Chester	Chester County Book Co.
Wind Gap	Micro World
York	The Computer Center of York
	Tollgate Bookstore

RHODE ISLAND

Newport	Bellevue News

RHODE ISLAND(con't)

Pawtucket	Paperbacks Plus
Warwick	Reader's Market
West Warwick	A Novel Place, Inc.

SOUTH CAROLINA

Charleston	New Life Bookstore
Charleston Hts.	Software Haus, Inc.
Clemson	Clemson Newsstand
Columbia	Capital Newsstand
Florence	Ray's #1
Greenville	Palmetto News Co.
Spartanburg	Pic-A-Book, Inc.
	Software City

TENNESSEE

Brentwood	Bookworld #5
Chattanooga	Anderson News Co.
	Guild Books & Periodicals
Goodlettsville	Bookworld
Knoxville	Anderson News Co.
	Davis-Kidd Bookseller
Memphis	Computer Center
Nashville	Bookworld (locations)
	Davis-Kidd Booksellers
	Floppy's Disc Software
	Mosko's Place
	R.M. Mills Bookstore
Smyrna	Delker Electronics

TEXAS

Amarillo	Hastings Books & Records
Arlington	Bookstop
Austin	Bookstop
Big Spring	Poncho's News
Dallas	Bookstop
	Maxwell Books
Desoto	Maxwell Books
Elgin	The Homing Pigeon
Ft. Worth	Trinity News
Houston	Bookstop
San Antonio	Bookstop

VERMONT

Essex Junction	Gingeric, LTD
Manchester Center	Northshire Bookstore

VIRGINIA

Alexandria	King Street News
	MTV Central Newsstand
Falls Church	Skyline Newsstand
Franklin	The Bookhaven
Hampton	Benders
Lynchburg	Self Serve Software
Richmond	Book Gallery
	Volume 1 Bookstore
Springfield	Springfield Central
Woodbridge	Potomac Mill Central News

WASHINGTON

Port Angeles	Port Book & News
Seattle	Bulldog News
Tacoma	O'Leary's Books

WEST VIRGINIA

Huntington	Nick's News
Parkersburg	Valley News Service
South Charleston	Spring Hill News

WISCONSIN

Appleton	Badger Periodicals
Cudahy	Cudahy News & Hobby
Green Bay	Bosse's, Inc.
Kenosha	R.K. News, Inc.
Madison	Pic A Book
	20th Century Books
	University Bookstore
Milwaukee	Schwartz Bookshop
Racine	East Side Emporium
	U-W-M Bookstore
Waukesha	Holt Variety
Wausau	Janke Book Store

AUSTRALIA

Blaxland	Blaxland Computers
Kingsford	Paris Radio Electronics

CANADA:
ALBERTA

Banff	Banff Radio Shack
Bonnyville	Paul Tercier
Brooks	Double "D" A.S.C. Radio Shack
Calgary	Billy's News
Claresholm	Radio Shack Associated Stores
Drayton Valley	Langard Electronics
Edmonton	CMD Micro

ALBERTA(con't)

Fairview	D.N.R. Furniture & TV
Fox Creek	Fox City Color & Sound
	A.S.C. Radio Shack
Ft. Saskatchewan	Ft. Mall Radio Shack, A.S.C.
Grande Cache	The Stereo Hut
Grande Centre	The Book Nook
Hinton	Jim Cooper
Innisfail	L & S Stereo
Leduc	Radio Shack Associated Stores
Lethbridge	Datatron
Lloydminister	Lloyd Radio Shack
Okotoks	Okotoks Radio Shack
Peace River	Radio Shack Associated Stores
	Tavener Software
St. Paul	Walter's Electronics
Stettler	Stettler Radio Shack
Strathmore	Wheatland Electronics
Taber	Pynewood Sight & Sound
Westlock	Westlock Stereo
Wetaskiwin	Radio Shack

BRITISH COLUMBIA

Burnaby	Compulit
Burns Lake	VT. Video Works
Campbell River	TRS Electronics
Chilliwack	Charles Parker
Coquitlam	Cody Brooks LTD
Coortenay	Rick's Music & Stereo
Dawson Creek	Bell Radio & TV
Golden	Taks Home Furnishings
Langley	Langley Radio Shack
Nelson	Oliver's Books
New Westminster	Cody Books LTD
Parksville	Parksville TV
Penticton	D.J.'s
	Four Corner Grocery
Sidney	Sidney Electronics
Smithers	Wall's Home Furniture
Squamish	Kotyk Electronics
Vancouver	Active Components
	Friendlyware Computers
	Granville Book Co.
	Siliconnections Books LTD
100 Mile House	Tip Top Radio & TV

MANITOBA

Altona	LA Wiebr Ltd.
Lundar	Goranson Elec.
Morden	Central Sound
The Pas	Jodi's Sight & Sound
Selkirk	G.L. Enns Elec.
Virden	Archer Enterprises

NEW BRUNSWICK

Moncton	Jeffries Enterprises
Sussex	Dewitt Elec.

NEWFOUNDLAND

Botwood	Seaport Elec.
Carbonear	Slade Realties

NOVA SCOTIA

Halifax	Atlantic News

ONTARIO

Angus	Micro Computer Services
Aurora	Compu Vision
Concord	Ingram Software
Exceter	J. Macleane & Sons
Hanover	Modern Appliance Centre
Huntsville	Huntsville Elec.
Kingston	T.M. Computers
Listowel	Modern Appliance Centre
South River	Max TV
	Dennis TV
Toronto	Gordon and Gotch

QUEBEC

LaSalle	Messageries de Presse Benjamin
Pont. Rouge	Boutique Bruno Laroche

SASKATCHEWAN

Assiniboia	Telstar News
Estevan	Kotyk Electronics
Moose Jaw	D&S Computer Place
Nipiwan	Cornerstone Sound
Regina	Regina CoCo Club
	Software Supermarket
Saskatoon	Everybody's Software Library
Shellbrooke	Gec. Laberge Radio Shack
Tisdale	Paul's Service
Unity	Grant's House of Sound

YUKON

Whitehouse	H & O Holdings

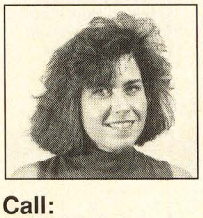
Also available at all B. Dalton Booksellers, and selected Coles and W. H. Smith in Canada, Waldenbooks, Pickwick Books, Encore Books, Barnes & Noble, Little Professors, Tower Book & Records, Kroch's & Brentano's, and Community Newscenters.

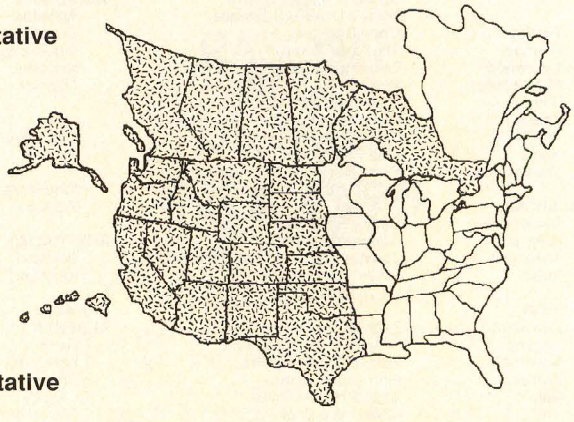
Advertisers Index

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning **THE RAINBOW** ***when you contact these firms.***

Alpha Products 21
Alpha Software Technologies 113
Arizona Small Computer Company 41
Burke & Burke 63
Cer-Comp 65
Cinsoft 41
CoCo Gallery on Disk 76
Colorware 19
Computer Island 123
Computer Plus 3
CRC/Disto 105
D.P. Johnson 117
Danosoft 119
Dayton Associates of W.R. Hall, Inc. 103
Delphi 77
Dorsett Educational Systems 84
Dr. Preble's Programs 53
E.Z. Friendly Software 29
Eversoft Games, Ltd. 23
Frank Hogg Laboratories 115
Gilbralter Software 51
Gimmesoft 81
Granite Computer Systems 92
HawkSoft, Inc. 67
Howard Medical ..... IBC
Howard Medical 130
JR & JR Softstuff 100
JWT Enterprises 66
Metric Industries 109
Microcom Software 7
Microcom Software 9
Microcom Software 11
Microcom Software 13
Microcom Software 15
Microcom Software 17
Microdeal ..... BC
Microtech Consultants, Inc. 59
NRI Schools ..... Insert
Oblique Triad 27
Orion Technologies 99
Owl-Ware 69
Owl-Ware 70
Owl-Ware 71
P&M Products 45
Paul & Tony's 79
Perry Computers 93
r3 Systems 55
Rainbow Binder 122
Rainbow on Tape & Disk 91
Rainbow Gift Subscription 89
Ramco Computer Supplies 75
RGB 29
RRA & Company 61
Rulaford Research 37
SD Enterprises 25
Second City Software 129
Simply Better Software 106
SpectroSystems 101
SPORTSware 43
STG 62
Sugar Software 125
Sundog Systems ..... IFC
Supersoft, Inc. 51
T & D Software 31
T & D Software 75
T & D Software 55
T & D Software 97
T & D Software 107
Tandy/Radio Shack 33
Tandy/Radio Shack 108
Tepco 87
Tothian Software 85
True Data Products 57
Wasatchware 60
WBD Software 25
Zebra Systems 79

Call:
Belinda Kirby
Advertising Representative
(502) 228-4497





Call:
Kim Vincent
Advertising Representative
(502) 228-4492

The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
FAX (502) 228-5121

UltiMusE III

The Ultimate Music Editor for the CoCo 3

"What if...

all CoCo music programs were this good?"

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

FINAL EDITION

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

STILL ONLY $48.95

'FINAL EDITION' is just a news print slogan meaning the very latest published issue. In the case of Newspaper Plus - Final Edition, it means the latest upgrade is NOW available. Here are some of the added features being offered;

* Text import with Left, Right, Centered & Justification
* RamDisk Utility (512k)
* Stretch, Shrink & Compress picture utility
* A new 'Design Your Own' layout feature
* Full Font import ability
* Text to Picture wrap-around
* Disk Transfer Utility (512k)

WORD SEARCH: $22.95
A Word Search Puzzle Generator Utility program. CoCo 1,2,&3 Disk

MORSE CW: $19.95
A complete Morse Code Totorial program. CoCo 1,2,&3 Disk

SPACE RAIDERS: $16.95
A FAST ACTION ARCADE GAME. Test your skills! CoCo 1,2,&3 Disk

STARPIC UTILITY: $19.95
DMP-PIC UTILITY: $19.95
GEM-PIC UTILITY: $19.95
A complete Graphics Printing Utility program for the Star NX-1000 or Tandy's DMP or the Gemini Dot Matrix printers. Works in an easy to use Point 'N Click pull down menu environment. A MUST HAVE printing utility. CoCo 1,2,&3 Disk

Check09MV: #2.1 $25.95
Check09MV interacts with MultiVue for FAST & EASY checkbook balancing. No more waiting for your bank statement for an ending balance. Check09MV will produce a check-by-check running total of your account in an easy to use format. End those monthly surprizes! 512k

MASTER CATALOG: $19.95
MASTER CATALOG 3: $19.95
Organize your floppy disks with Master Catalog. Supports single & double sided drives, alphabetize, sort, and search & find up to 3,000 filenames. Program supports a Column Format Hard Copy and is 100% ML for lightning response. When ordering, please specify CoCo 1,2, or 3 version.

START OS-9 $32.95
An Enjoyable, Hands-On Guide To OS-9 Level 2 On The Color Computer 3. Work from a step-by-step easy to follow tutorial book and program disk. Requires 2 drives, 512K and an 80-column monitor. START OS-9...NOW NO MORE EXCUSES.

Basic Screen Editor $19.95
A-DOS 3 ..... $34.95
MY-DOS $14.95
EPROM BURN SERVICE $15.00
Ram Disk Lightning $16.95
Printer Lightning $16.95
BackUp lightning $16.95
VIP Library $149.95
VIP Writer III $79.95
VIP Calc III $69.95
VIP DataBase III $69.95
OS-9 Solution $24.95
Schematic Drafting Processor $24.95
Tape to Disk/Disk to Tape $19.95
Multi-Pak Crack $24.95
TelePatch $24.95
BlackJack Royale $16.95
CoCo Calender Deluxe $19.95

NewsArt A thru Z
26 disks filled with useable clip art for Newspaper Plus & Newspaper Plus - Final Edition. $100.00 for the complete set.

SECOND CITY SOFTWARE

APBBS Ver: 3.00.00 SPECIAL INTRODUCTORY PRICE OF $39.95

QUESTION: Have you ever wondered how someone can sell and support two different BBS programs while claiming both to be the BEST? Good question you ask...we think so too!!! With the exclusive SCS commercial release of Mike Guzzi's APBBS program we end a years quest for a POWERFUL, HIGH QUALITY, and AFFORDABLE BBS program. Besides these three requirements, we also demanded full author assistance to help answer your questions and lend technical support. Mike Guzzi has not only written such a program in APBBS but has also offered his expertise and knowledge as the programmer and a SYSOP. Giving you FULL SUPPORT AFTER THE SALE! APBBS requires a CoCo3 w/512k memory, at least two double sided floppy drives (a hard drive is strongly recommended), OS-9 Level2, and RS-232 pak. APBBS is not for everyone. It is designed and intended for the SYSOP who demands performance and support.

MASTER CARD - VISA
C.O.D. - MONEY ORDERS

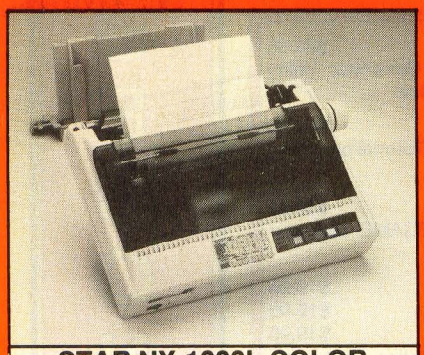
ADD $2.50 SHIPPING
($4.50 FOREIGN) AND
AN ADDITIONAL $2.50
FOR C.O.D. ORDERS

Allow 1 to 3 weeks delivery

P.O. BOX 72956
ROSELLE, IL
60172

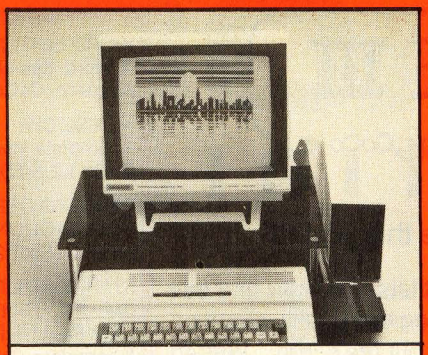
Note: As of 11/89
Area Code will be 708

ORDER
312-653-5610
BBS
312-307-1519



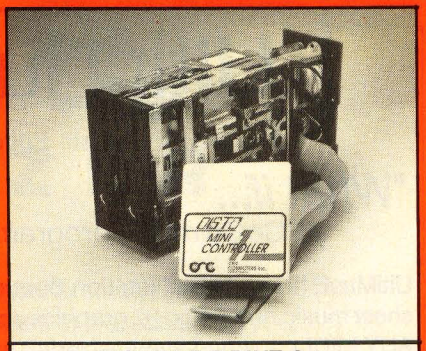
STAR NX-1000L COLOR
- Built in back tractor paper feed converter add $40

$249 (5 ship)



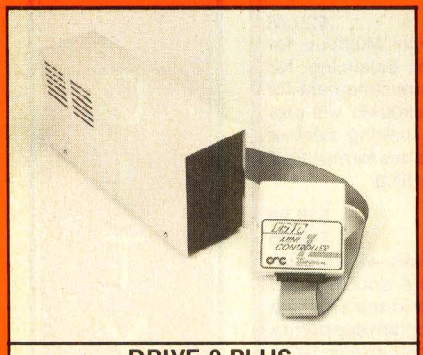
MAGNAVOX 7622 AMBER
- 80 Column **OR 7652 GREEN**
- Built in Speaker

$98 (7 ship)



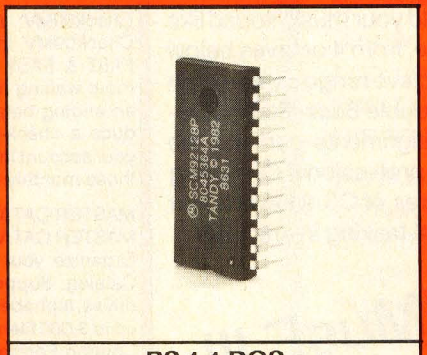
DOUBLE DRIVE 0 +
- Two double side 360K Teac 55B
- Disto controller & cable

$310 (8 ship)



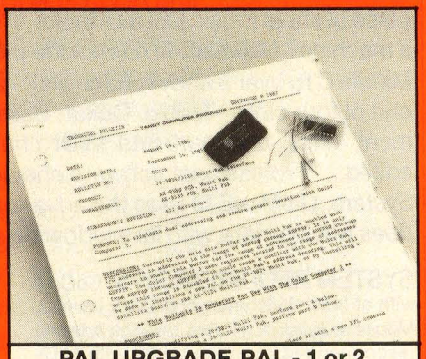
DRIVE 0 PLUS
- Double sided 360K MPI 52
- Disto Controller and cable

$178.45 (5 ship)



RS 1.1 DOS
- ROM Chip for Disk Controller
- Works for CoCo 2 or 3

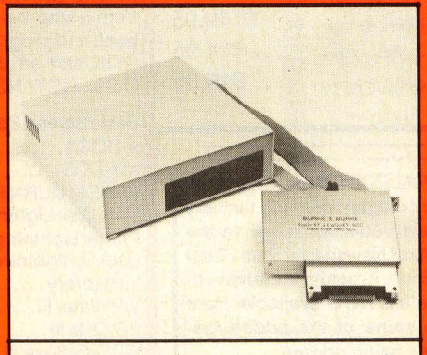
$25 (2 ship)



PAL UPGRADE PAL - 1 or 2
Makes multi-pack interface work with CoCo 3. Specify 26-3024 or 26-3124. $14.95 (2 ship)

DISTO DC-7
- Mini Disk Controller for CoCo 1, 2, 3
- Includes RS 1.1 Modified to access Double-sided Drive

$75 (2 ship)



HARD DRIVE

20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface,* heavy duty case, power supply and fan and a 1 year warranty. This 20 meg Hard Drive will also work with Tandy and IBM clones. Basic driver, $29.95, lets you access this hard drive without need for OS-9.

See Rainbow Reviews 8/89

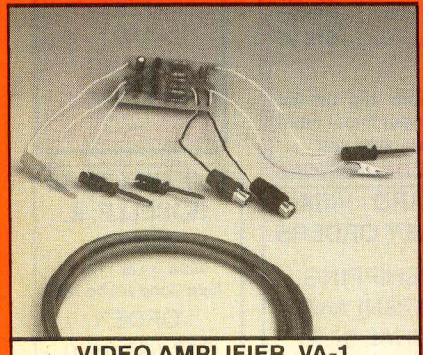
(9 ship)

HD-1 10 Meg**	**$349**
HD-2 20 Meg	**$499**
HD-3 30 Meg	**$549**
HD-4 40 Meg	**$598**

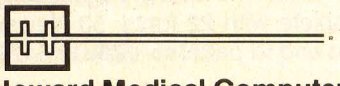
*Burke & Burke **CDC drive

30 Day Money Back Guarantee

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



VIDEO AMPLIFIER VA-1
required in CoCo 1 or 2 to drive monitor $29.45 (2 ship)

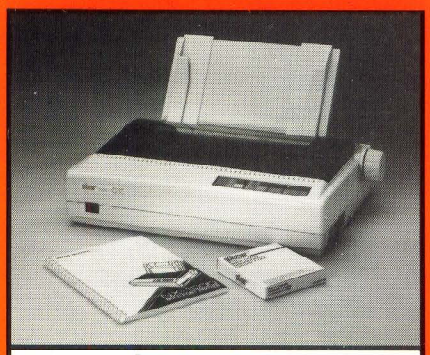


Howard Medical Computers
1690 N. Elston
Chicago, Illinois 60622

Order Status and Inquiries
312-278-1440

Show Room Hours
8:00 - 5:00 M-F
10:00 - 3:00 Sat.

Order Line
800-443-1444



STAR NX 1000

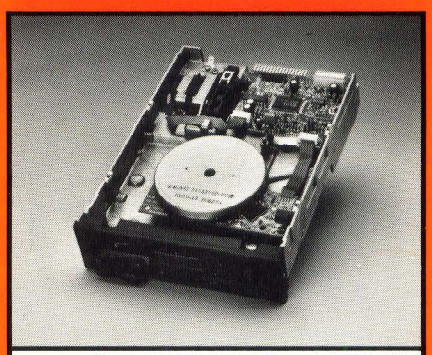
- Dot Matrix; 144 CPS
- Back Tractor & Friction Feed

Needs SP-C **$189** (5 ship)

BROTHER M-11 PRINTER

- Built-in Serial & Parallel Interface
- Dot Matrix: Tractor/Fricton Feed

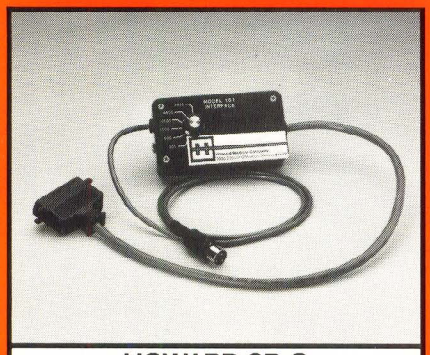
$156 (5 ship)



TEAC 55B

- 360K Double Sided Half Ht. Floppy
- Fits R.S. 501 & 502

CA-2 cable $29.50 **$98** (2 ship)



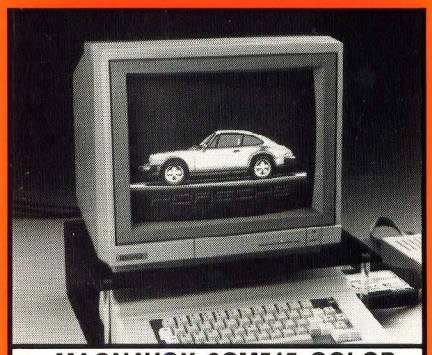
HOWARD SP-C

- Serial to Parallel Converter
- Connect CoCo to Parallel Printer

$68.45 (2 ship)

BURKE & BURKE BOX

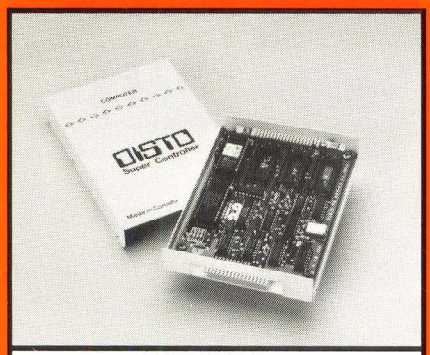
Hard disk Interface	69.45
with clock	99.45
RSB ver 1.3	39.45
Hyper I/O ver 2.6C	29.95
XT-ROM ver 2.3	19.45
File repack	29.45



MAGNAVOX 8CM515 COLOR

- 80 Column
- Use with Coco, Tandy 1000's, IBM PC

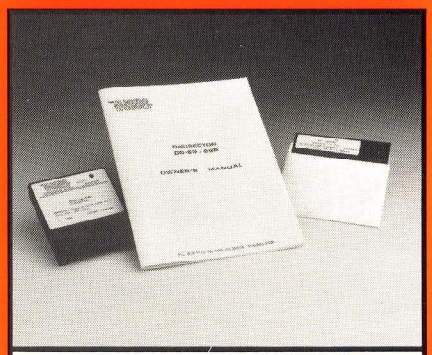
CC-3 RGB cable 19.95 $269 (14 ship)



DISTO DC-3

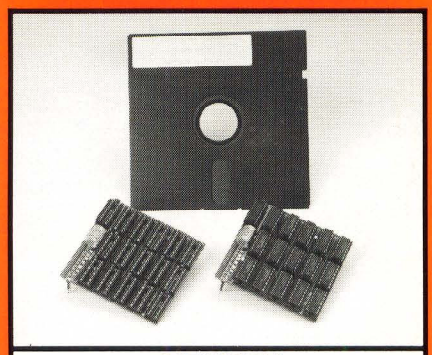
- Original Disto Controller
- 2 ROM Slots; Gold Platted Contacts

$98 (2 ship)



MICRO WORKS DIGITIZER

- DS-69B Color 1.5 Second/Picture **$150**
- DS-69 B&W 2 Second/Picture **$100**



MEMORY

- 512K Bare Board $40
- Populated 512K & Software $119
- 64K 8 Chip for CoCo 2 $30

A. DISTO 3 in 1 Board **$69.45**
B. DISTO MEB $30.00
C. DISTO RS-232 $49.95

MULTI BOARD ADAPTER $70
EPROM PROGRAMMER $49

Howard Medical Computers
1690 N. Elston
Chicago, Illinois 60622

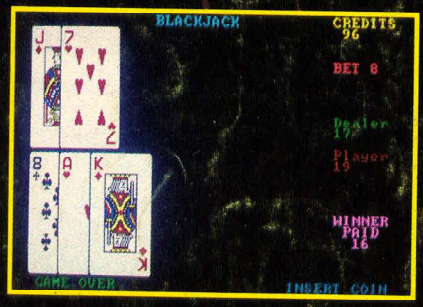
Order Status and Inquiries
312-278-1440

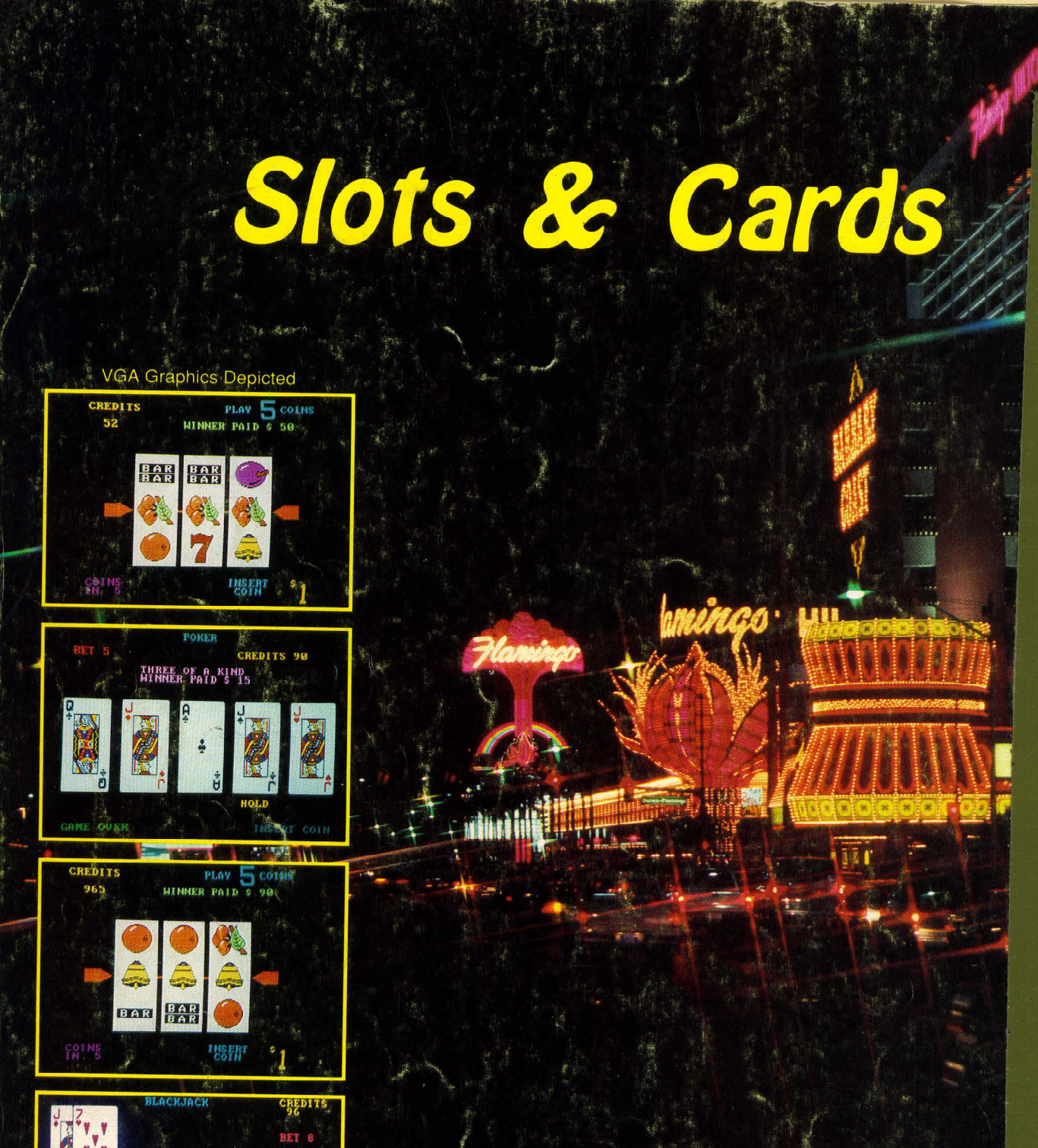
Master Card • Visa • Discover
American Express
C.O.D. • School P.O.'s

Order Line
800-443-1444

Slots & Cards

VGA Graphics Depicted





Did you ever dream of visiting VEGAS, but you weren't sure what to expe
would be able to afford it? Well, now you can play your favorite slot m
down at the blackjack table without even leaving the comfort of your h
through different style slot machines (many different Multiplier slots). Vi
booth if - or is that when? - you run out of cash, without feeling a pain in
Walk around the corner and sit down at any of a number of different style
Enjoy video five card draw poker - where it takes jacks or better to w
Blackjack against the ever treacherous house dealer. Play Hi-Low and w
every chance you get. Do you like Keno? If so, choose your numbers, then
wait to see if they are drawn!

All versions display vivid true to VEGAS graphics. Whatever your ga
Cards has it for you! Slots & Cards is available for the IBM PC &
Commodore Amiga, Atari ST and the CoCo III.

See your local dealer for orders and information or call us d

microdeal®

576 S. Telegraph
Pontiac, MI 48053
☎ (313) 334-5700