Serving the CoCo Community for

The RAINBOW 10 YEARS

THE COLOR COMPUTER MONTHLY MAGAZINE

October 1990 Vol. X No. 3

Canada $4.95 U.S. $3.95

Graphics

Paint your own pictures with *Spectra 3*

Display and create images under OS-9 Level II

Learn what graphics formats are all about

0 10 44254 00001

From Computer Plus to YOU . . .

PLUS after PLUS after PLUS

Tandy 1400 HD $1069*
Tandy 102 32K $439*
Tandy WP-2 $279

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

Tandy 1000 RL $499
Tandy 1000 TL/2 $779

DMP-134 $269

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

TandyFax $759

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS	
Tandy 1000 HX 1 Drive 256K	259.00*
Tandy 1500 HD 1 Drive 640K	1579.00
Tandy 2500 XL 1 Drive 1 Meg	1119.00
Tandy 2800 HD 1 Drive 1 Meg	2299.00
Tandy 1100 FD 1 Drive 640K	689.00

PRINTERS	
Radio Shack DMP-107 120 CPS	219.00
Radio Shack DMP-302 270 CPS	469.00
Radio Shack DMP-134 160 CPS	269.00
Radio Shack DWP-230 Daisy Wheel	179.00
Tandy LP-950 Laser Printer	1299.00
Tandy DMP-240 192 CPS 8 color	415.00
Panasonic KXP 1180 192 CPS	199.00*
Panasonic KXP 1191 240 CPS	259.00*
Panasonic KXP 1124 192 CPS	329.00*
Okidata 320 300 CPS	369.00
Okidata 390 270 CPS 24 Wire HD	515.00
OKI Laser 400 4PPM	999.00

MODEMS	
Radio Shack DCM-6	52.00
Radio Shack DCM-7	85.00
Practical Peripheral 1200 Baud	149.00
Practical Peripheral 2400 Baud	179.00

COLOR COMPUTER MISC.	
Radio Shack Drive Contoller	79.00*
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
COCO 3 Service Manual	29.95
Serial to Parallel Converter	59.95
Radio Shack Deluxe Joystick	19.95
Magnavox 8135 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	24.95
PBJ 512K COCO 3 Upgrade	99.00
Tandy OK COCO 3 Upgrade Board	29.95
Tandy 512K COCO 3 Upgrade	129.00

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 Publishing 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 10/31/90

CALL TOLL FREE
1-800-343-8124

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

VISA · 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.

Serving the CoCo Community for RAINBOW

Table of Contents

October 1990
Vol. X No. 3

Features

10
Picture This!
Tom George
Feature-packed graphics with the CoCo 3

44
Displaying Picture Files
Tim Kientzle
Picture-storage formats and displaying images under OS-9 Level II
44

92

54
The Assembly Line, Part V: A New RAM
William P. Nee
Teaching your computer to read and modify BASIC programs

92
All the Knight Moves
Rick Cooper
An original idea for chess players

Novices Niche

37
A Winning Combo
Bill Bernico

37
Hi-Res Input Editor
Bill Bernico

51
Descriptive Error Messages
Geoff Friesen

87
Last Line Recall
Geoff Friesen

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 page 65.

Product Reviews

In the Limelight
MVCanvas/*HyperTech* ____ 83

1990 CoCo Tax Estimator/*Puritas Springs Software* 75
Classic Solitaire/*Eversoft Games, Ltd.* ____ 80
Education Galore/*Sebastian S. La Spada* ____ 78
Elite*Xfer/*Elite Software* ____ 74
Hot Coco!/*Rulaford Research/MusicWare* ____ 72
Print5/*G.T.T.D. Software* ____ 76
Pyramid Solitaire/*ColorSystems* ____ 74
Revelation/*Robert E. Offerman* ____ 77
Spectral Forces/*Marc Campbell Innovations* ____ 79
Tuty/*CB Games* ____ 78

Departments

Advertisers Index ____ 96
Back Issue Info ____ 42
CoCo Gallery ____ 18
Letters to Rainbow ____ 4
Received & Certified 82

Columns

38
Barden's Buffer
William Barden, Jr.
Programming structure

30
BreakPoint
Greg Law
Easy access

52
CoCo Consultations
Marty Goodman
Just what the doctor ordered

68
Delphi Bureau
Eddie Kuns
New machines coming, plus the database report

58
KISSable OS-9
Dale Puckett
OS-9 graphics primitives

8
Print#-2
Lonnie Falk
Editor's notes

64
Turn of the Screw
Tony DiStefano
EPROM programmer, Part III

34
Wishing Well
Fred Scerbo
Between numbers

95
Wrapping the Rainbow
Cray Augsburg
The year ahead

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., 1990. **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. $88, 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
Submissions/Reviews Editor Tony Olive
Technical Editor Greg Law
Technical Assistants Ed Ellers, Gregory Shultz
Editorial Assistant Julie Hutchinson, Wendy Falk Barsky
Contributing Editors
William Barden, Jr.
Steve Blyn, Tony DiStefano
Martin Goodman, M.D.
Dale Puckett, Fred Scerbo
Richard White
Art Director Heidi Nelson
Designers Sharon Adams, O'Neil Arnold, Teri Kays
Consulting Editors Judi Hutchinson
Typesetter Debbee Diamond

Falsoft, Inc.

President Lawrence C. Falk
General Manager Bonnie Frowenfeld
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
Corporate Business Technical Director Calvin Shields
Word Processor Manager Patricia Eaton
Customer Service Manager Beverly Bearden
Customer Service Representative Carolyn Fenwick
Chief of Printing Services Melba Smith
Dispatch Tim Whelan
Business Assistant Laurie Falk
Chief of Building Security and Maintenance Lawrence Johnson
Development and Advertising Manager Ira Barsky
Advertising Representatives Belinda Kirby, Kim Vincent
Advertising Assistant Debbie Baxter
(502)228-4492

Cover art was created in *CorelDRAW* By Heidi Nelson

For RAINBOW Advertising and Marketing Office Information, see Page 95

Letters to the RAINBOW

Protecting THE RAINBOW

Editor:

I enjoy THE RAINBOW very much, and you have my continued support. However, I do have a problem. I like the new binding because I can fold the magazine to enter listings, but my copy gets ripped before it even gets to my home. The magazine used to come in a plastic bag. Could you start doing this again?

Scott Lukens
Osceola Mills, Pennsylvania

Editor:

When the August 1990 issue came, there was no plastic bag around it and my copy was mutilated. I was very disturbed that you no longer protect our magazines from the abuse they get in the postal system. I like to keep all my RAINBOWs for reference, and all of them are in good condition — except the last one.

Robert F. Long
Walkersville, Maryland

After receiving many similar requests, we have decided to return to the plastic polybags you used to find protecting your monthly copies of THE RAINBOW. Its an investment worth preserving.

Barden to the Rescue

Editor:

I received my August 1990 issue of THE RAINBOW today, and I'm finding it very interesting — there is more information on how to use my CoCo, as well as new products for it. My primary interests are in how to use the computer as a tool. I am an "operator" rather than a programmer.

If THE RAINBOW had come just two days later, I would have purchased an MS-DOS system. But I changed my mind after reading "Barden's Buffer" (Page 60). It was a difficult decision, but the CoCo has served me well. In fact, using *TX-80*, a word processor by Fred Kolesar, I have found many uses for my CoCo.

A.J. Cryder
St. James City, Florida

Why Upgrade to the 68K?

Editor:

In recent issues, I have seen several ads for the so-called "CoCo 4." From what I can tell, it is just a CoCo 3 that can be upgraded to use the 68000 microprocessor. I see no point in upgrading to a 68000. After all, what do we end users need with a more powerful microprocessor and OSK?

We have what we need in a computer. If anything, a new machine should be a portable version of the CoCo 3 with minor enhancements like a full-screen editor, or perhaps *ADOS* or OS-9 built-in. This is what I would be looking for — not a dedicated OSK system.

Matthew Brannigan
Rockville, Maryland

While the CoCo 3 allows access to 512K (and more) of memory, the 68B09E is limited to a 64K address space. This limitation continues to get in the way of programmers wanting to write sophisticated applications. The CoCo has served us well over the years, but we won't say no to an upgrade option offering more power to those users who want it—especially when the upgrade is a direct ascension from the 68XX family. Until now, "upgrading" has meant moving to an MS-DOS system, or an Atari or Amiga, and leaving behind all that is CoCo.

. . . and a Different View

Editor:

Being one who fell into the InterTan "trap," I believed the CoCo was dead. So I sold my entire collection of CoCos and purchased an MS-DOS machine. I like my new machine, but I am thinking of entering the CoCo market once again.

I have seen the ads for the new Tomcat and MM/1 machines and I am excited. It is great to see the CoCo evolve. I can remember others telling me the CoCo would never last. Now we are gaining access to the 68000 world and OSK.

I am glad to see the Tomcat is designed to maintain CoCo compatibility. Those of us who left the CoCo and are considering coming back will like this. It feels great to be returning to the CoCo.

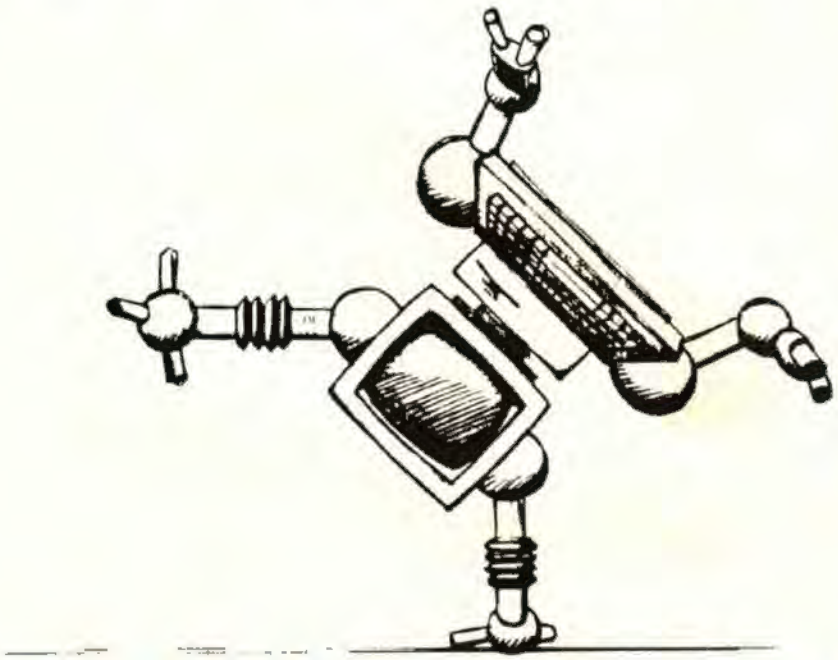
Basil V. Fitze
Abotsford, British Columbia

The Price of Progress

Editor:

Lately I've noticed when you print a listing of assembly-language programs, you no longer print the object code to the left of the line numbers. Many of us don't have access to *EDTASM+*, so we write BASIC programs to poke the object code into mem-

We Can Make Your CoCo Do Things You Just Wouldn't Believe



Stupendous Software at Silly Prices! There's no reason to wait.

System Requirements

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

Max-10...~~$79.95~~ $39.95

Max-10 is the ultimate word processor. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview with graphics. *Rainbow* stated "Max-10 takes a back seat to none". Without a doubt, Max-10 will add excitement to your word processing, and that's no small task!
PRINTERS SUPPORTED: EPSON FX,MX,RX,LX & COMPATIBLES; DMP 105,106,130; 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.....~~$29.95~~ **$14.95**
Max-10 and CoCo Max Fonts aren't interchangeable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10.....~~$29.95~~ **$14.95**

CoCo Max III...~~$79.95~~ $49.95

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise. *Rainbow* called it "the ultimate program." **Its major features include:** Huge picture area (2 full hires 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. 2 color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.
PRINTERS SUPPORTED: EPSON RX, FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX-10,NX-1000, DMP100,105, 106,110,120,130,200; OKI 82A,182,192; CGP-220(B&W)
Color Drivers. See below.

CoCo Max 3 and Max 10

Get both incredible programs at a stunning price.....~~$149.95~~ **$59.95**

CoCo Max 3 Addons

- **Max Fonts set A, Max Fonts set B.** Each set has two disks and over 40 fonts.....~~$29.95~~ **$14.95**
Both sets (95 fonts)..... **$49.95**
- **Max Edit** Create new fonts or edit existing ones.....~~$19.95~~ **$14.95**
- **Color Printer** drivers NX-1000 Rainbow, CGP-220, and Okimate 20.....~~$19.95~~ **$14.95**

Digitizer

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max 3 or Max-10. **DS-69** Requires Multipak. 2 pix per second **$99.95**

A·Bus

Data Acquisition and Control boards. Call Alpha Products at number below.

Call or Write Now

(203) 656-1806
Weekdays 9-5 Eastern Time

242 West Avenue,
Darien CT 06820

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

COLORWARE

ory. Without this information, we have no easy means of doing this. You have published many machine-language programs that I would like to use. But without the object code, I am out of luck. Will you start listing these codes again?

Steven Martin Bump
Muscle Shoals, Alabama

Before THE RAINBOW was produced via desktop publishing (DTP), it was easy to provide the object code in assembly listings. After all, EDTASM+ *provided this information in its "list on assembly" mode. But* EDTASM+ *doesn't allow us to "list on assembly" to a disk file, and that is what we need if we are to publish the object code with DTP. Where possible, we provide BASIC programs to poke the machine-language code into memory. Also,* EDTASM+ *is still available through Radio Shack's Express Order Software system.*

Looking for 512K

Editor:

I want to upgrade my CoCo 3 to 512K and I wonder if I need any other accessories along with the upgrade board. I also wonder if you could recommend any upgrades that are easy to install and are not too expensive.

Dwaine Acker
P.O. Box 923
Shelburne, NS B0T 1W0
Canada

You shouldn't need any accessories beyond the items included when you buy your 512K upgrade. For more information, check Marty Goodman's article "Upgrading the Color Computer's Memory" (March 1989, Page 34).

A Friendly Situation

Editor:

As a result of your publishing my previous letter in the August issue I have now received seven responses, each from a different state — all were helpful. I answered the letters and suggested that the effectiveness of THE RAINBOW as a means of data exchange is (to me) a proven plus.

One caller, previously unknown to me, is a CoCo veteran who lives just a couple of miles away. We have met, swapped shop talk, and plan to continue this association. In view of this, accept my thanks for your assistance.

Robert Willard
Carriere, Mississippi

We're glad we could help.

Redefining OS-9 Control Keys

Editor:

One common use for the OS-9 `xmode` command is to change the printer baud rate. Less often does one hear of its use in altering the configuration of the CoCo keyboard. Personally, I have always found CTRL-A (used to repeat a command line) and CTRL-W (to pause the screen) to be both awkward and unwieldy. A simple remedy is to use `xmode` to redefine other keys for these functions.

Since SHIFT-left arrow deletes the current line, let's redefine SHIFT-right arrow to recall the last line typed. Using the "OS-9 Keyboard Codes" table (Level II manual, "OS-9 Commands," Page C-1) as a guide, you see the code for SHIFT-right arrow is $19. Simply change the *dup* character from its default ($01) to $19 using `xmode`. In a similar fashion you can change the *psc* character from $17 to $60 to change the pause-screen key from CTRL-W to SHIFT-@ (just like Disk BASIC). If you add the line:

```
xmode /term dup=19 psc=60
```

to the `startup` file, the changes will be in place after booting OS-9. You can take this even farther by adding the *pause* and *pag* characters to give you control over all the windows you use. Replace `/term` with */wx*, where *x* is the number of the window in question.

Gerry Gerhart
Huntsville, Ontario

Pirate Notice

Editor:

Thank you for running my request for pen-pals. In the June issue, you stated "Only those parties who have signed our non-piracy agreement form appear in the listings of Intercom". I never received such a form before my request was printed. I also noticed the statement doesn't appear in the August issue. Does this mean you don't require the agreement any more? The agreement is a very good idea and should be continued. We programmers spend alot of time working on our programs and anything to reduce the chance of piracy is welcomed.

Also, my address has been changed and I'm still interested in pen-pals. Thank you for bringing me closer to those who share my interest in the CoCo.

Tika Carr
199 Rossmore Street
Rochester, NY 14606

Pen-pals seem to be self-governing as far as piracy is concerned. However, please inform us if you do *receive an invitation from a pirate.*

What's in a C Compiler?

Editor:

I'm a beginning C programmer, and I purchased the C compiler from Tandy. Upon booting the software I found that the module `cc2` is missing. `cc2` is designed to take advantage of Level II's enhanced memory management. I called Tandy and the person I talked with has no idea what I'm talking about. So I then called Microware. It turns out they know what I'm talking about, but Microware isn't supporting the 6809 anymore.

Also, I am interested in locating patches to allow me to put the compiler and the library on one 40-track disk. I would be grateful for any help.

Ernest Bazzinotti, Jr.
93 Auckland Street, Apt #2
Dorchester, MA 02125

The difference between the Level I and Level II versions of the C compiler is that both passes are performed by the `c.comp` *modules in the Level II version. Tandy licensed only the Level I version from Microware. However, you can find versions of* `cc1` *that take advantage of Level II features on Delphi, CompuServe and many bulletin boards.*

A Vote of Confidence

Editor:

I am writing to commend you on your excellent August issue of THE RAINBOW. I am encouraged that you are giving more coverage to OS-9, and I hope this will continue. I am also looking forward to articles on the new machines and OS-9/68K.

Frank Pittenger
Raleigh, North Carolina

Can CoCo Tell Time?

Editor:

I recently built an expansion-relay board that was advertised in THE RAINBOW. Having just bought a new house, I want to secure my home with a CoCo 3 alarm system.

I am an experienced BASIC programmer, and I understand 6809 machine language at an intermediate level. I am looking for a real-time clock program with output that can be displayed on the 40- or 80-column screen while the computer is executing a BASIC program to scan windows, doors and

Continued on Page 88

CoCo Graphics Designer Plus

Create beautiful greeting cards, signs and banners for holidays, birthdays and other occasions. Features easy-to-use point and click interface and user-friendly operation. Picture, font and Border collections included. **Only $29.95** (Req CoCo 2/3, disk drive, mouse or joystick, Printers: EPSON, GEMINI, Star, DMP, Panasonic KXP 1080/90/91/92, Citoh 8510, Okidata 92/93/182/183 & more)

Picture Disk #2, #3, #4: $14.95 each
Font Disk A,B: $14.95 each Border Disk #1: $14.95

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 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 w/ proof of purchase. (See Review in September 1989 Rainbow)

MUSIC

COLOR MIDI INTERFACE: Connect CoCo to MIDI world. Contains 1 MIDI input & 4 MIDI outputs to hookup to 4 MIDI devices. Multipak or Y Cable NOT REQUIRED! Only **$99**

SYNTRAX 2.0: Very sophisticated MIDI Seq. Ability to control multiple music synthesizers, rhythm machines or any other MIDI devices. Only **$59**

SYNLIB: Multi-instrument Librarian. Uses the MIDI port to save/dump patterns from almost every instrument. Only **$49**

Musica II: Best Music Composition program for the CoCo 1,2 & 3. Disk Only **$29.95**

Lyra: MIDI Based Music Composition program for CoCo 1,2 & 3. Only **$49.95**

The Lyra Companion (Book): $9.95

Studio Works: Superb Digital Audio Sampler. **$39.95** w/ Cable: **$54.95**

Label Designer

Print Labels with text and graphics; mail merge option; disk directory option; serial numbering option; easy to use graphics user interface. Only **$29.95**

ADOS

EXTENDED ADOS 3: Here it is! Highly acclaimed DOS from Spectrosystems with built-in Ramdisk, Point-and-Pick & much more. **Only $39.95**

Driver for Disto RTC: $5 28-pin Adapter: $10
Smartwatch RTC: $34.95 Drivers: $10

ADOS 3: $34.95 ADOS: $27.95

From Colorware...

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 / CGP 220 Driver: **$19.95**
CoCo Max II: **$69.95** CoCo Max I (Tape): **$59.95**
MAXPATCH (Run Max 2 on CoCo 3): **$19.95**

Terminal & BBS Software

Autoterm: Modem Software for CoCo 1,2,3: **$39.95**

VTERM: Terminal Software for CoCo 3 with VT Emulations, Xmodem, Ymodem, RAMDISK like Buffer, Conference mode, 35/40/80 track drive support. Only $39.95

CEBBS

The absolute best BBS for CoCo 3. Features XMODEM, Up/Downloading, menus, login, message base, clock/calendar, execution of external programs, full Sysop Control & remote system access. Even HYPER-IO Compatible. **Only $49.95**. Min. Req. CoCo 3, 1 Drive & RS232

THE WORLD OF OS9

Window Writer OS9

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

Dynaspell: 102,000 word spelling checker! Only **$19.95**

Start OS9

Excellent hands-on guide to OS9 Level II for beginners. Req. 512K, 2 drives & Monitor. Book/Disk **$32.99**

Goldberg Utilities

Vol 1: 15 Power-packed utilities such as sort, lost-file location, disk pack & more. **$24.95**

Vol 2: New utilities for OS9 such as file compare,protection, enhanced delete/ move/ dir/ sort/ dump, strip and much more. Only **$24.95**

Multi-Edit

Create, edit Application Information files & icons from multivue. Only **$24.95**

OS9 RAMDISK

In-memory disk drive! A must for every OS9 user. Req 512K. Disk Only **$29.95**

From Burke & Burke

RSB v1.3: The revolutionary program that allows you to use Basic from under OS9 Level II. **$39.95**

Wild & MV Version 2.1: Use wildcards w/ OS9 & rearrange directory tree. Only **$19.95**

EZGen Version 1.6: Powerful OS9 Bootfile editor. Change names, add/delete modules, patch bytes, etc. Only **$19.95**

From Alpha Software

OS9 Level II BBS: Best BBS for OS9. Comes with terminal program. Req. 512K & RS232 Pack. Only **$29.95**

Level II Tools: 25 Utilities such as windowing, wildcards, tree, etc. **$29.95**

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

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

Zapper: Patch disk errors. $19.95

Multi-menu: Create own pop-down windows. Req. 512K & Multivue. **$19.95**

Presto Partner: Notepad, calculator, calendar, phonebook, clock at your fingertips. Req. 512K. **$29.95**

Transfer Utilities

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

PC-Xfer Utilities: Format/ transfer files to/from MSDOS to CoCo under Level 1/2. Req SDISK/SDISK 3. Only **$44.95**

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

SDISK: $29.95

From R3 Systems

Screen Control Utility: Gain control of text screen. Only **$19.95**

Menuing Utility: Memory resident menuing system. Only **$19.95**

Point-and-Shoot File Selection: $19.95

From Frank Hogg...

Dynastar: Popular OS9 word processor. Only **$99.95**

Dynastar + Dynaspell: $119

Wiz: Terminal Prog. **$59.95**

Sugar Software

OS9 Calligrapher: $24.95
Font Massager: $19.95

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester NY 14618

To Order: Refer to Page 19 of our 6-page series (Pgs 7-19)

VISA MasterCard AMERICAN EXPRESS DISCOVER

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

Tech Info (between 4-8 pm), Order Status, Info: 716-383-8830. To Fax your order: 716-383-0026

UPS 2ND DAY AIR

Graphically Speaking

As I was discussing the theme for this month's issue of THE RAINBOW, it occurred to me that most of the major advances in the CoCo over the years have been graphics-oriented.

Ask any of the older (in terms of years of involvement, not necessarily age) members of the CoCo Community and they will probably tell you about the wonder they felt the first time they saw a real, "live," space invader crawl across the top of their screen.

In an early issue of a small magazine called *Color Computer News*, Tom Rosenbaum of Spectral Associates in Tacoma, Washington, demonstrated how to create a space-invader type game in machine language and how to animate it.

I know that sounds pretty crude today. But back then, when all we had were some not-so-exciting ROM Paks from Radio Shack, the Spectral invader was quite a marvel. Naturally, it did not do anything except move across the screen. To actually *play* the game, you had to buy the program from Spectral. And there it was, in living color.

Tom Rosenbaum's invader game was probably the third most spectacular sight I have ever seen on my CoCo. The Number 1 ranking, interestingly, belongs not to a graphics program at all but, yet, one which was more of a graphics program than anything else.

Early on, when Howard Cohen wrote *Telewriter* for his company, Cognitec of Del Mar, California, he set out to write a word processing program and immediately ran into a problem that bugged everyone who was working with the Color Computer — a text screen only 32 characters wide.

Howard solved this problem — and fathered an entire new age in the CoCo world — by drawing letters on the graphics screen and providing 64- and 85-column displays. I heard that members of the Greater Cincinnati TRS-80 User's Group actually applauded when Dick White demonstrated *Telewriter* for the first time.

So graphics is as graphics does, I guess. Today, of course, we have even more fine screen definitions, and many people are doing all sorts of things with the CoCo: word processing, desktop publishing, sign-making and the like. Graphics have taken over the world of games as well, and that is as it should be, since games are an important part of the computer world.

Tandy, as you are aware, originally conceived the Color Computer as a machine on which people could play games — throwing in the "computer" as a sort of bonus. It was originally marketed as competition for the home game devices of its day and happened to perform spectacularly. Of course, what happened to be "thrown in" — the computer — became CoCo's mainstay. It still is.

What has always been interesting to me is to see the programmers in the Color Computer world expand their horizons. In the last couple of years that has happened more so in the graphics area. I suspect graphics and graphics capabilities will always be a prime factor in the world of Color Computing.

What is most interesting to me, though, is the role graphics plays in non-graphic areas. Sure, we "celebrate" graphic inventiveness with such features here as our "CoCo Gallery," but the truth is that graphics are employed in almost all commercial products on the CoCo today.

Cohen opened up a whole world of applications and a way to "get around" the 32-column display. That idea was and is used by everything from database programs to desktop publishers. Quite a legacy, Howard.

* * * * *

Before you ask and I end up with a thousand letters to answer, the Number 2 gee-whiz, to me anyway, was the concept of *Motion Picture Programming* developed by a gentleman named Arnold Pouch. I still do not totally understand how it works, and Arnold passed away about a year after he developed the concept (although there are some tutorials in some older issues of THE RAINBOW).

Without needing to draw true animated screens, *Motion Picture Programming* animates the CoCo screen. I thought Arnold's neatest venture was a craps game in which a hand actually shook the dice and then rolled them onto a table.

Because mighty oaks do indeed grow from small acorns, I have wondered from time to time what advances Arnold and those who would have used his technology would have brought about. It is a shame we will never know.

* * * * *

Now that you've had a month to cogitate on the matter, I'll give you the answers to last month's little geography quiz. The Allegheny and Monongahela rivers meet at Pittsburgh, Pennsylvania, and form the Ohio River, and this area is called the Golden Triangle.

— Lonnie Falk

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

Word Power 3.3

The Best Just Got Better!

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

SPEED

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

MEMORY

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

DISPLAY

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

EDITING

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

SPOOLER

Print and Edit documents at the same

SORTING

Sort lists in a flash!

CALCULATOR

Built-in 4 function calculator!

2 COLUMN PRINTING

Align your text in 2 columns with a few keystrokes!

GRAPHICS

Insert **graphics** in your documents! Allows you to im-port PMODE 3/4, HSCREEN and CoCo Max

SPLIT-SCREEN EDITING

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

MAIL MERGE

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

SAVING / LOADING

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

MACROS

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

SPELLING CHECKER

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

PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks,

PUNCTUATION CHECKER

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

DOCUMENTATION

Word Power 3.3 comes with a well-written instruction manual & reference card which makes writing with Word Power as easy as pie. Word Power 3.3 comes on an unprotected disk.

Only

$79.95

Upgrade Policy: Word Power 3.2 owners can get Word Power 3.3 by sending original Word Power disk and $15 to the address listed below.

MICROCOM SOFTWARE, 2900 Monroe Ave, Rochester,NY 14618

All Word Power 3.3 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

Picture This!

by Tom George

Feature-packed graphics with the CoCo 3

I am the first to admit I lack great artistic ability. Although I like the graphics programs available for the Color Computer 3, I've never purchased one because, with my minimal talent, I could not justify spending the money. I also did not need a program that could use 100 fonts and 40 brushes, but I did want to create simple graphic icons and print text with graphics.

CoCoDraw, by Darin Herr, is just such a program for the CoCo 2; however, it is not easily modified because it is built around the PCOPY command, which cannot be used with the CoCo 3 Hi-Res screen. Inspired by *CoCoDraw*, I wrote *Spectra 3* to take advantage of the CoCo 3.

Spectra 3 requires 512K with one disk drive, an RGB monitor and a self-centering joystick. The Hi Resolution Joystick Interface needed on some commercial drawing packages is not necessary, thanks to a modification by John G. Williams. *Spectra 3* is ideally suited for beginning artists and persons with simple graphics needs.

Although it's easy to use, *Spectra 3* is a program powerhouse with features such as rays, cubes and ellipses. It paints in vertical patterns and has fast machine language screen refresh, disk save/load and memory management.

Tom George has a PhD in organic chemistry and is a specialist in clinical chemistry with a hospital in the Philadelphia area. His Color Computer interests include machine-language programming and working with the OS-9 operating system.

You draw by pointing on the main menu and pressing the fire button to initiate a command. This menu can be turned on or off to allow drawing with the full screen in view, unlike other programs that draw on only part of the screen or require you to scroll to the hidden areas.

Two pull-down menus are also provided. The Files/Exit menu lets you save and load pictures and exit to BASIC. The Clear/Mode menu lets you set the Get/Put mode, which clears the screen and sets the colors. You can select a palette of 16 colors from the 64 colors available. The colors are saved to disk with the picture and restored when the picture is loaded.

In addition to using it as a drawing program, *Spectra 3* can also be used as a simple desktop publisher. You can write with the standard HPRINT font or use Bold or Old English. To get started, using a freshly formatted disk, enter and save listings 1 and 2, then RUN "MAKESPEC". A machine-language file (SPECTRA3/BIN) is created and saved. Be sure to make a backup copy of this disk. It can hold up to four picture files. Enter RUN "SPECTRA" and you are ready to draw.

Main Menu

On startup the main menu appears at the top of the screen. It contains twenty icons representing drawing tools. Below it are 16 palette colors and four patterns. The menu can be turned off by moving the pointer to the top left corner and pressing the fire button. To restore the menu, move to the top right corner and press the button. Below the palette are three boxes. Pressing the button in the Files/Exit box activates a pull-down menu that automatically enters the Load File option. If the disk contains picture files, the files are listed. Use the joystick to scroll to the desired file and press the button to load the picture.

To use the other options in Files/Exit, hold the button down when entering the menu. Use the joystick to scroll to the desired option, then release the button to activate the selection. When entering text remember that lowercase is used unless you hold down the SHIFT key. Use the left arrow key to backspace and erase text if necessary.

Although *Spectra 3* does not have a graphics-screen dump, space has been left in the menu if you want to add one to

Line 5240. If your dump is written in machine language, place it between $7D00 and the top of RAM ($7FFF) to avoid overwriting the BASIC program.

Since the BREAK key is disabled, there are only two ways to exit the program without turning off the computer. The Exit/BASIC option leaves the program in memory; you can continue by typing RUN. You can also exit by pressing the Reset button, which restarts the computer and erases program memory but not video memory. Any pictures not saved before exiting can still be partially recovered using the Oop icon to restore the picture. The areas under the menus cannot be recovered.

You can save or edit HSCREEN2 pictures from other programs the same way; however, you must use the Palette option to manually restore the colors. Pictures are lost if the computer is turned off, and you cannot save screens from OS-9 programs.

The Background box sets the background color. On startup the background is white. To change it, position the pointer anywhere in the box and press the button. You can then select any of the 16 colors by moving the pointer to a color and pressing the button. The Clear Screen option in the Clear/Mode menu erases the entire screen to the background color. This color is the border at which painting stops when using Paint. When using the Enlarge command, the background color appears when a pixel is turned off. The background color is also used to erase the HPRINT text by backspacing. Finally, background color is used for pull-down menus. You cannot use a pattern as a background color.

The Clear/Mode box opens another pull-down menu similar to Files/Exit. Hold the button down and scroll to the desired Put mode option or Clear Screen. If you clear the screen accidentally, use Oop to restore. Selecting Palette presents 16 colored boxes. Change the palette with the right and left arrow keys and select the color with the F1 and F2 keys. Starting from Number 63 (white), F1 decreases the color number and F2 increases the color number. Remember that Palette 8 (black) is the pointer color, and changing it may make the pointer difficult to see.

Commands

To select a command, move the arrow to a command icon and press the fire button. The icon border changes color, and you can use the tool on the screen directly below the menu or underneath by turning the menu off. The command remains active until you select another or use the Oop command. The commands are, from left to right:

Digitized Pen: After selecting this command, move the pointer to the desired location and press the button. The pointer disappears. You can then draw lines by pressing one of eight keys. W moves up, E up and right, D right, C down and right, X down, Z down and left, A left and Q up and left.

Line	Module /Subroutine
10 - 60	Initialization
100 - 170	Main Menu
200 - 330	Main Loop
1000 - 5820	Subroutines
1000 - 1150	Pen
1400 - 1410	Box
1600 - 1610	Box Fill
1800 - 1810	Circle
2000 - 2020	Paint
2200 - 2200	Oop
2400 - 2410	Line
2600 - 2620	Cube
2800 - 2810	Point kRay
3000 - 3020	Get
3200 - 3290	Put
3400 - 3510	Enlarge
3600 - 3640	Foreground Color
3800 - 3810	Roller Brush
4000 - 4010	Ellipse
4200 - 4210	Ray
4400 - 4410	Text
4600 - 4630	Bold Text
4800 - 4830	Old Text
5000 - 5270	Files/Exit
5300 - 5320	Background
5400 - 5480	Clear/Mode
5500 - 5610	Palette
5620 - 5670	Joystick routine
6000 - 7880	Font Data

Table 1: Modules and Subroutines

The keys are arranged in their order of movement on the keyboard, and repeat automatically if held down. Try holding down a key and simultaneously pressing a second key for some interesting angles and pixel spacing. To increase line size press 2; to decrease press 1. Toggle the pen up and down by pressing 3. A blinking pixel shows the draw position. Press ENTER to end and restore the pointer.

I have never been able to master freehand drawing with a joystick, but those who want to draw freehand can add this by deleting lines 1000 through 1150 and adding the following two lines. Press and release the button to start and end.

```
1000 GOSUB5780:FORJ=1TO1000:NEXT
:HLINE(X,Y)-(X,Y),PSET:REM * PEN
1010 GOSUB5650:HLINE-(X,Y),PSET:
IFFB=0THEN1010ELSERETURN
```

Spray Can: Sprays paint in a rectangular box. Move the pointer to the upper left corner of the area to be sprayed and hold the fire button down. Move the box down and to the right, then release the button. Paint is sprayed in the box until the button is pressed. Note that while you can position the box upward from the starting point or down and to the left, no paint is sprayed.

Box: Draws a rectangular box. Position the pointer and hold the button while moving the box to the desired position.

Box Fill: Same as the box command except the box is filled.

Circle: Hold the button and move the joystick forward and left to decrease the circle or backward and right to increase it.

Paint: The object to be painted must be completely enclosed by the background color, or the entire screen will be painted. If this happens, move the pointer to the upper right corner and press the button to restore the menu, then select the Oop command to restore the picture. You cannot use a pattern as a border color, and you cannot paint over a pattern made up of a border color.

Oop: Cancels the previous command. Restores the Hi-Res picture in memory on startup.

Line: Draws a line of any length in the specified direction.

Cube: Move the joystick right to project the cube right and change size. Move left to project the cube left and change size. Move the joystick forward to increase the depth of the cube and backward to decrease it. When the cube hits the borders of the screen it breaks up.

Point Ray: Draws lines to a central point. Position the pointer and press the button. You can either hold the button to position the line or position the pointer and press the button to draw the line. Note that when using Point Ray with the menu off, you must double-click the button to restore the main menu.

Get: You can pickup or "get" a portion of the screen, up to a maximum of 62-by-62 points. Position the pointer at the upper left corner, hold the button and move the pointer to highlight the image. Releasing the button picks up the image.

Put: Pressing the button quickly Puts down the image from Get so it can be positioned by moving the joystick. The way the image is Put depends on the mode setting in the Clear/Mode menu. Press the button again to set the image. Move the joystick to the top of the screen to restore the pointer.

HEART & SOUL

Breathe Life Into Your Color Computer. Gain complete control over your CoCo with these Pokes, Peeks 'n Execs Books. The books will 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. Everyone from the novice to the professional will find these books a wealth of information.

500 Pokes Peeks 'n Execs $16.95

500 commands such as Basic Program Autostart, Rompak Transfer to Tape, Commands/Keys Disables and much much more! For CoCo 1,2 & 3

Supplement to 500 Pokes Peeks 'n Execs $9.95

200 additional commands such as Rompak transfer to disk, double-sided drive support, 40/80 track drive support & much more! For CoCo 1,2,3. 500 Pokes, Peeks 'N Execs is a prerequiste.

300 Pokes Peeks 'n Execs for CoCo 3 $19.95

All new commands for the CoCo 3!!!

All 3 Poke Books: $39.95

UNRAVELLED SERIES

For the Weekend Hacker to Professional Programmer! Complete, Commented Uninterrupted Memory Maps of the ROM. These Books Are A MUST !

DISK BASIC UNRAVELLED $19.95
Includes source code for DOS 1.0/1.1 (2.0/2.1).

EXTENDED COLOR BASIC UNRAVELLED $39.95
Includes source code for Color Basic and Extended Color Basic ROM.

SUPER EXTENDED BASIC UNRAVELLED $24.95
Contains source code for Super Extended Color Basic (CoCo 3 Enhancements)

All Three Unravelled Books $59.95

Both the Unravelled Series and Pokes Books: $94.95 (Regular $132.95)

COCO LIBRARY

CoCo 3 Service Manual **$39.95**
CoCo 2 Service Manual **$29.95**
Multipak Service Manual **$19.95**
(specify 26-3024/3124)
Full Turn of the Screw - Disto **19.95**
Assembly Language Programming **$18**
Addendum For CoCo 3 **$12**
Color Computer Disk Manual **$29.95**
Start OS9 (Book & Disk) **$32.99**
Inside OS9 Level II **$29.95**
Complete Rainbow Guide to OS9 **$19.95**
Complete Rainbow Guide (2 Disks) **$29.95**
Rainbow Guide To OS9 Level II **$19.95**
Rainbow Guide To Level II Disk **$19.95**

COCO 3 GAMES

(All Programs Require Min 128K Unless Specified)

Sinistar (Req. 512K): $34.95
Those Darn Marbles (Req. 512K): $32

Warrior King: $29.95
In Quest of the Star Lord: $34.95
Hint Sheet: $3.95
Quest for the Spirit Stone: $18
Five Towers of Trafa-Zar: $25
Kyum-Gai: $29.95
Mine Rescue: $24.95
Overlord: $29

Games for CoCo 1,2,3

(All Programs require Min. 32K CoCo unless specified)

Wizard's Castle $19.95. Hi-res graphics adventure filled with tricks, traps & treasure. 64K Req.
Pinball Factory $34.95. Design, build, edit & play the Classic game of pinball. 64K Req

Hall of the King 1, 2, 3 $29.95 each
Hall of the King Trilogy: $74.95
Kung Fu Dude: $24.95
Dragon Blade $19.95
Champion $19.95
Paladin's Legacy $24.95
Seventh Link: $38
Caladrial 2: Weatherstone's End: $54

Slots & Cards: $39.95
White Fire of Eternity $19.95
Treasury Pack #1: $29.95. Lunar Rover Patrol, Cubix, Decathalon, Qix & More.
Treasury Pack #2: $29.95. Lancer, Ms Gobler, Froggie, Madness & Minotaur, Ice Castles, Galagon, Devious.
Space Pac: $29.95. Color Zap, Invaders, Planet Invasion, Space Race, Space War, Galax Attax, Android Attack, Whirly-bird, Space Sentry, Storm Arrows.
Classic Pack **$74.95**. TP1, TP2 & Space Pac ($90)

Speed Racer $34.95 Pole Position type race.
Demon Seed $19.95 Battle diving, bloodthirst bats.
Cashman $29.95 40 levels of animation & sound effects.
Fury $24.95 Airborn dogfight simulation.
Time Bandit $29.95 300 screens of full animation.
Outhouse $19.95 A funny, fast action game
Mudpies $29.95 Crazy circus fun.
Rommel 3D: $34.95. Exciting 3D Tank Combat Game.

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester NY 14618

To Order: Refer to Page 19 of our 6-page series (Pgs 7-19)

VISA MasterCard AMERICAN EXPRESS DISCOVER

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

UPS 2ND DAY AIR

Tech Info (between 4-8 pm), Order Status, Info: 716-383-8830. To Fax your order: 716-383-0026

Enlarge: Hold the button down and move the rectangle over the area you want to enlarge. A 22-by-22 enlarged grid appears, and you may edit any pixel to any color. To change color move the pointer over a color on the palette at the right and press the button. Then move the pointer over a background pixel. Pressing the button changes the color of that pixel. Pressing the button again resets the color to the background color set in the main menu. You can change an entire row or column by holding the button down and slowly moving the pointer up or down, left or right. You cannot use Enlarge with the foreground color set to a pattern.

Foreground Color: The drawing color for all commands. After selecting this command, move the pointer over any color or pattern and press the button.

Roller Brush: Allows you to paint with a 5-by-5 pixel brush by holding the button and moving the joystick. Note that you can also use the brush as an eraser by setting the foreground color to the background color.

Ellipse: While pressing the button, moving the joystick up and left elongates and shortens the ellipse top-to-bottom. Moving down and right flattens and lengthens the ellipse left-to-right. Adjust the joystick slowly since small movements can sometimes produce large changes.

Ray: Hold the button down and move the joystick in any direction to produce rays.

T (Text): Position the pointer where you want to print text and press the button. Enter up to 40 characters of text. Hold down the SHIFT key for capital letters. You can use the left arrow to backspace over mistakes if the background color is the same as the background on which you are entering text. Press ENTER when finished.

Addresses/Variables

SM -	Save menu (ML)
RM -	Restore menu (ML)
SUM -	Save Under menu (ML)
RUM -	Restore Under menu (ML)
SS -	Save Screen (ML)
RS -	Restore Screen (ML)
FB -	Firebutton status
F -	Foreground Color
B -	Background Color
CP -	Put mode status
S -	Command number
M -	Main Menu status
X,Y -	Present screen location
XX,YY -	Last screen location
L -	Length of input string
R -	Palette register
C -	Palette color
P -	Pattern/Pen color
R -	Pen radius

Strings

A$ -	General input
C$ -	Cube length/Disk input
E$ -	Cube depth/Disk input
P$ -	Up arrow character
Q$ -	Text input
D$ -	Disk picture files

Arrays

DP -	Non-linear pointer data
B -	Bold text data
O -	Old text data

Table 2: *Spectra 3* Variables

B (Bold) and O (Old English): The same as Text except backspacing over mistakes is not allowed.

Spectra 3 is modular in construction. There are five main program modules. Initialization sets palettes and buffers, defines the machine-language execution addresses, draws the pointer and sets up the non-linear joystick array. You can define your own palette on startup by changing or adding PALETTE commands to Line 40; you can set the foreground and background colors by changing F and B in Line 30.

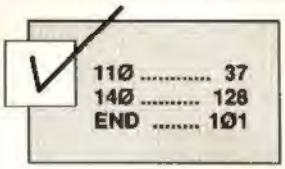
The Main Menu module draws the main menu without displaying it and saves it to memory. The first two pokes in Line 170 disable the BREAK key and the next poke restarts the computer when the reset button is pressed.

Main Loop takes input from the joystick and branches to the appropriate command or menu. The high-speed poke is used in Line 30 and 5220 and remains on except during disk access.

The Subroutines module is divided into subroutine functions, all marked by REM comments. Table 1 lists major program lines for these modules and subroutines, and Table 2 lists program variables. This information should help if you want to modify any function to suit your particular needs.

Font Data is a list of strings for the Bold and Old English fonts. You can modify these strings to change any character or write a whole new font. A detailed explanation of the machine language portion of *Spectra 3* would require a separate article, but if enough readers express an interest, I would be happy to write a tutorial. ❑

512K CoCo 3 Disk



Listing 1: MAKESPEC

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 CLEAR 400,31999
20 CLS:L=110:P=4000
30 READ A$,CS:S=0
40 PRINT@0,"WORKING ON LINE";L
```

Continued on Page 20

Hint . . .

Recently I have been encountering I/O errors with Drive 0 under OS-9. This frustrating problem was causing me grief to the point where I was ready to take the drive back to Radio Shack for repairs. However, being the inquisitive type, I decided to poke around inside the drive to see if I could solve the great and mysterious I/O problem.

Using a small program on the OS-9 Level II Boot/Config disk I checked the drive speed. In almost all cases, the drive speed was too slow. With the case removed, I began to move the door and noticed the drive would spin at normal speed with the door opened slightly. After repeated trials, I confirmed the door was indeed the problem, but how to adjust it?

I found a broken piece on the lower side of the door causing it to close too far, thereby placing extra pressure on the rotating disk. I managed to eliminate the problem by gluing a small piece of wood to the bottom of the door. (A Popsicle stick works just fine!) Not only did I fix the problem, I saved myself the cost of getting the drive fixed at Radio Shack.

Terry Alexander
St. Johns, Newfoundland

For this hint, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and tape.

CoCo Graphics Designer Plus

Create beautiful greeting cards, signs and banners for holidays, birthdays and other occasions. Features easy-to-use point and click interface and user-friendly operation. Picture, font and Border collections included. **Only $29.95** (Req CoCo 2/3, disk drive, mouse or joystick, Printers: EPSON, GEMINI, Star, DMP, Panasonic KXP 1080/90/91/92, Citoh 8510, Okidata 92/93/182/183 & more)

Picture Disk #2, #3, #4: $14.95 each
Font Disk A,B: $14.95 each Border Disk #1: $14.95

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, 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 w/ proof of purchase. (See Review in September 1989 Rainbow)

MUSIC

COLOR MIDI INTERFACE: Connect CoCo to MIDI world. Contains 1 MIDI input & 4 MIDI outputs to hookup to 4 MIDI devices. Multipak or Y Cable NOT REQUIRED! Only **$99**

SYNTRAX 2.0: Very sophisticated MIDI Seq. Ability to control multiple music synthesizers, rhythm machines or any other MIDI devices. Only **$59**

SYNLIB: Multi-instrument Librarian. Uses the MIDI port to save/dump patterns from almost every instrument. Only **$49**

Musica II: Best Music Composition program for the CoCo 1,2 & 3. Disk Only **$29.95**

Lyra: MIDI Based Music Composition program for CoCo 1,2 & 3. Only **$49.95**

The Lyra Companion (Book): $9.95

Studio Works: Superb Digital Audio Sampler. **$39.95** w/ Cable: **$54.95**

Label Designer

Print Labels with text and graphics; mail merge option; disk directory option; serial numbering option; easy to use graphics user interface. Only **$29.95**

ADOS

EXTENDED ADOS 3: Here it is! Highly acclaimed DOS from Spectrosystems with built-in Ramdisk, Point-and-Pick & much more. **Only $39.95**

Driver for Disto RTC: $5 28-pin Adapter: $10
Smartwatch RTC: $34.95 Drivers: $10

ADOS 3: $39.95 ADOS: $27.95

From Colorware...

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 / CGP 220 Driver: **$19.95**
CoCo Max II: **$69.95** CoCo Max I (Tape): **$59.95**
MAXPATCH (Run Max 2 on CoCo 3): **$19.95**

Terminal & BBS Software

Autoterm: Modem Software for CoCo 1,2,3: **$39.95**

VTERM: Terminal Software for CoCo 3 with VT Emulations, Xmodem, Ymodem, RAMDISK like Buffer, Conference mode, 35/40/80 track drive support. Only $39.95

CEBBS V2.1

The absolute best BBS for CoCo 3. Features XMODEM, YMODEM, Up/Downloading, menus, login, message base, clock/calendar, execution of external programs, X-ON/OFF, ANSI & full Sysop Control & remote system access. **Only $49.95**. Requires RS232 Pack.

THE WORLD OF OS9

Window Writer OS9

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

Dynaspell: 102,000 word spelling checker! Only **$19.95**

Start OS9

Excellent hands-on guide to OS9 Level II for beginners. Req. 512K, 2 drives & Monitor. Book/Disk **$32.99**

Goldberg Utilities

Vol 1: 15 Power-packed utilities such as sort, lost-file location, disk pack & more. **$24.95**

Vol 2: New utilities for OS9 such as file compare,protection, enhanced delete/ move/ dir/ sort/ dump, strip and much more. Only **$24.95**

Multi-Edit

Create, edit Application Information files & Icons from multivue. Only **$24.95**

OS9 RAMDISK

In-memory disk drive! A must for every OS9 user. Req 512K. Disk Only **$29.95**

From Burke & Burke

RSB v1.3: The revolutionary program that allows you to use Basic from under OS9 Level II. **$39.95**

Wild & MV Version 2.1: Use wildcards w/ OS9 & rearrange directory tree. Only **$19.95**

EZGen Version 1.6: Powerful OS9 Bootfile editor. Change names, add/delete modules, patch bytes, etc. Only **$19.95**

File System Repack: Unfragments your files. Only **$29.95**

From Alpha Software

OS9 Level II BBS: Best BBS for OS9. Comes with terminal program. Req. 512K & RS232 Pack. Only **$29.95**

Level II Tools: 25 Utilities such as windowing, wildcards, tree, etc. **$29.95**

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

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

Zapper: Patch disk errors. $19.95

Multi-menu: Create own pop-down windows. Req. 512K & Multivue. **$19.95**

Presto Partner: Notepad, calculator, calendar, phonebook, clock at your fingertips. Req. 512K. **$29.95**

Transfer Utilities

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

PC-Xfer Utilities: Format/ transfer files to/from MSDOS to CoCo under Level 1/2. Req SDISK/SDISK 3. Only **$44.95**

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

SDISK: $29.95

From R3 Systems

Screen Control Utility: Gain control of text screen. Only **$19.95**

Menuing Utility: Memory resident menuing system. Only **$19.95**

Point-and-Shoot File Selection: $19.95

From Frank Hogg...

Dynastar: Popular OS9 word processor. Only **$99.95**

Dynastar + Dynaspell: $119

Wiz: Terminal Prog. **$59.95**

Sugar Software

OS9 Calligrapher: $24.95

Font Massager: $19.95

For the first time, a community has banded together to design their next computer -- a revolutionary computer, designed by you. The MM/1.

Power.

The Color Computer™ era began ten years ago with an affordable, upgradeable computer with great sound and graphics. The MM/1™ continues that tradition with powerful graphics, crystal clear sound, fantastic multi-tasking, and easy to use windows.

Excite your eyes with high resolution graphics that surpass the famed Commodore Amiga™. Mix in hot music with a MIDI musical keyboard or the built-in IBM PC style music hardware. Or buy the Extended System to play back digitally sampled horns, drums -- even your own voice! And the MM/1 will never be out of date, because its optional 32-bit bus has both the power you need for the future and the compatibility with PC hardware you need for today. In business and pleasure, the MM/1 is ready for you.

Software.

Interactive Media Systems, Inc. is working around the clock to bring you the best of the MS-DOS™ and UNIX™ software catalogs. New titles are being added each month. Ask for our catalog or for a subscription to The Insider newsletter to find out about the amazing software support for the MM/1 -- support from the Color Computer, ST, Amiga, UNIX, and DOS markets.

For no extra charge, the MM/1 includes software worth over one thousand dollars: OS-9/68000™, C compiler, Basic, IBM PC File Manager for reading and writing DOS disks, tape backup support, print spooling, a graphics editor, and more.

Specs.

The MM/1 is packed with features that make it ideal for business and home use. For $779, you get

- slimline professional PC case with room for 2 - 5.25" drives and 3 - 3.5" drives; includes 200 watt power supply
- one Megabyte of memory
- graphics resolution up to 720 x 540
- up to 256 colors from its built-in palette of 16.7 million colors
- PC style sound for exciting games and friendly business applications
- true multitasking operating system
- windows, applications, and utilities worth over $300!
- 2 serial ports for printers, mice, terminals ...
- MIDI capable for the music hobbyist and professional
- built-in networking interface for low-cost connection at 100 KBaud to over 120 other MM/1s! Perfect for school and business
- PC keyboard port for professional XT style keyboard
- Uses CM-8™ and dozens of other monitor brands
- 15 MHz CPU -- runs circles around the Amiga!
- built-in graphics coprocessor for fast logic and pixel acceleration
- expandable with optional high speed bus
- high density 1.4 Megabyte floppy disk drive
- OS-9/68000 in EPROM for ease of use -- or you can boot off floppy or hard drive
- Direct Memory Access (DMA) for smooth access to floppies and hard drive while multitasking

The optional second board (the I/O Board) includes DMA SCSI host adapter, up to three more serial ports, two bidirectional parallel ports, powered serial mouse port, CoCo 8-bit analog joystick port, Realtime battery-backed clock, dual channel DMA-able 8-bit sound ports for play and record, and memory expansion that brings a full system to 3 or 9 Megabytes! For easy of use, power, and multimedia, the MM/1 is the revolution you've been waiting for.

Systems	
MM/1 Personal (above features all standard)	$779
MM/1 Pro (add 101-key professional keyboard)	$859
MM/1 Pro Station (add keyboard and RGB monitor)	$1149
MM/1 Extended (Personal Plus Second Board)	$1125
Extras	
MM/1 T-Shirt ("The Revolution Starts With Me")	$8.95
MM/1 Video (interviews,demos)	$9.95
The Insider newsletter	$9.95

Financing is available with monthly payments less than $35! Call for details.

IMS Interactive Media Systems

1-800-866-9084

Copyright © Interactive Media Systems, Inc., 1990.
OS-9/68000 is a trademark of Microware Systems Corporation. MM/1 is a trademark of Interactive Media Systems, Inc. Color Computer and CM-8 are trademarks of Tandy Corporation. MS-DOS is a trademark of Microsoft Corporation. UNIX is a trademark of AT&T. Amiga is a trademark of Commodore Business Machines.

DISTO PRODUCTS

All Disto Products now carry a 1-Year Warranty. All Disto Add-Ons (& Super Controller II) include OS9 Driver Disks, 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 II: $34.95**
- **4-in-1 Board**: Parallel Port, RT Clock, RS232 & Hard Disk Interface: **$129.95**

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

Systems w/ Seagate Hard Drive, Controller, Cables, CoCo XT Interface, Cables, Case (with fan, Power Supply and room for second drive), Software & Instruction Manuals. Assembled/Tested/Formatted. Just *Plug'N'Run*. Req. Multipak.

Seagate 20 Meg System: $459!
Seagate 40 Meg System: $549!

HARD DRIVE SALE

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. Only **$29.95**
HYPERIII: RAMDisk & Spooler to CoCo 3 HYPER I/O. **$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**

DRIVES

2 Drive System $299

There are a lot of dealers selling disk drives for the CoCo. Why buy from us? **First**, all our drives are BRAND NEW DOUBLE SIDED Drives. They are sleek, fast (6ms!), quiet and have a reputation of superb performance 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 Full-Height Case/Power Supply: **$59.95** Power Splitter: **$9.95**
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**
Toshiba **3 1/2" 720K Drive** w/ Power Supply & Case: **$149** 3 1/2" Bare Drive: **$99**

MONITORS

MAGNAVOX 1CM135 RGB Monitor

Razor Sharp picture quality for your CoCo! Has 14" Screen, Analog/TTL, RGB, Composite & Super VHS Inputs for CoCo 2/3, Stereo Sound,Text Display Switch, Tilt /Swivel Stand & 2 Year Warranty. Compatible with CoCo, IBM, a VCR & more! Only **$298** (add $12 S&H/$40 in Canada)

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

Other 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**
Advanced Gravis Joystick: Features tension, rotary-centering, free floating with 3 buttons. Only **$59.95**
Deluxe 2-Button Joystick: Only $16.85
Multipak Locking Plate (Specify CoCo 2/3 and 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: $1.29 each
5 1/4" Disk Case (for 70 disks): **$9.95**
3 1/2" Disk Case (for 40 disks): **$7.50**
Black Ribbon: $8.50
NX1000 Color Ribbon: $12.95

Microcom Serial to Parallel Interface

- Run your printer at high speed (300-9600)
- Designed by Marty Goodman so you know its quality.
- Unlike other converters, this uses CRYSTAL oscillator which is VERY reliable at higher baud rates and different temperatures.

Only **$44.95**
w / Serial Modem Switch: **$54.95**

512K CoCo 3

Brand new **Color Computer 3** with **512K Installed and tested!**

Comes with complete manuals and $100 worth of software!

Only $259
Please Add $10 S&H
512K Installat. Voids Warranty

MICROCOM SOFTWARE 2900 Monroe Ave, Rochester NY 14618
To Order: Refer to Page 19 of our 6-page series (Pgs 7-19)

VISA

Credit Card Toll Free Orderline 1-800-654-5244
(9AM-8PM 7 Days/Week)
Tech Info (between 4-8 pm): Order Status, Info: 716-383-8830 To Fax your order: 716-383-0026

UPS 2ND DAY AIR

CoCo Gallery

SHOWCASE YOUR BEST!

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

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

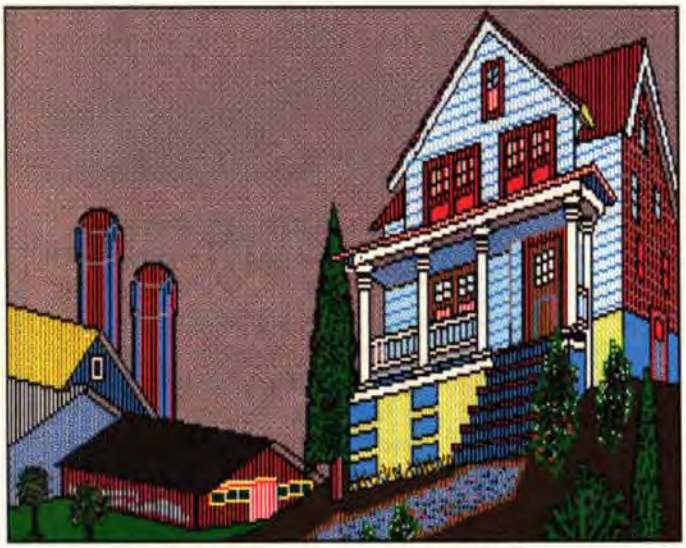
We will award one first prize of $25, one second prize of $15 and one third prize of $10.

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

--Tony Olive, Curator

1st Place

Farmnite
John Murvine



John, of Ebensburg, Pennsylvania, used *CoCo Max III* to create this picture. To see more of John's work, reference your back issues of "CoCo Gallery."

2nd Place

Red Sun
Dorothea Clement

Dorothea, of Amityville, New York, is a senior in a three generation CoCo family. This graphics image was developed with *CoCo Max III*.

3rd Place

The Farm
Kathy Rumpel

Kathy, of Arcadia, Wisconsin, has lived on a dairy farm all her life. She designed this *CoCo Max III* picture to show what a typical summer day on the farm looks like.

512K UPGRADES

Fully assembled and TESTED. Our design allows a firm contact and mounting chips on top to prevent any heating problems. Fast 120ns chips. No soldering; Easy picture 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**

$99

The absolute best 512K Upgrade Available! Only $99

0K Board (with 512K Ramtest/Ramdisk/Spooler): **$39.95**

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**

1 MEG UPGRADE

- Upgrade your CoCo 3 to 1 MEG!
- Kit includes 512K Memory and necessary Hardware
- Includes OS9 Drivers by Kevin Darling
- Requires 512K CoCo 3 and soldering experience.

Zero K Kit: $119 **1 MEG Kit: $159**

BIG BASIC (from Danosoft)

Get **92K** from your 128K CoCo 3 and **476K** on 512K for Basic Program and variables!! Only **$39.95**

Super Big Basic (for Disto 1 MEG Upgrade): $49.95

COMMUNICATIONS EXTRAVAGANZA 2400

(1) **ZOOM 2400 Modem:** Fully Hayes Compatible 300/1200 /2400 w speaker, Auto Dial/Answer & **Seven Year** Warranty!

(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 **$169.95**

Zoom 2400 Modem: $129

Avatex 1200e Modem Only : $85

Communications Extravaganza 1200: Includes Avatex 1200e w/ 2 Year Warr., cable, Compuserve Offer, software & 2nd Day Air Shipping. Only **$109.95**

EPROM

INTRONICS EPROM PROGRAMMER: Programs 2516, 27xx/xxx series and more! Includes software & complete documentation. Latest version. 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

2764 Eprom: $8 **27128 Eprom: $9**

ROMPAK (w/ Blank PC Board, 27xx Series): $12.95

BLANK CARTRIDGE (Disk Controller Size): $10.95

Eprom Burning Service: $15 (Eprom Extra)

KEYBOARDS

6 Feet Keyboard Extension Cable. Have up to 2 keyboards hooked up to your CoCo. 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)

CABLES

Magnavox 8505/8515/8CM643 RGB Cable: $24.95

Magnavox 1CM135 RGB Cable: $24.95

Serial-to-Parallel Interface: Use your parallel printer at high speed (300-9600 baud) with CoCo. Comes with all cables. 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 Pos. Switcher: Hook 2 devices to serial port. **$29.95**

HI-RES Joystick Interface: $11.99

CHIPS, ETC...

Genuine RS Disk ROM 2.1 (Needed for CoCo 3): $29.95

68B09E Chip: **$14.95** **68B21 Chip**: **$5.95**

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

Genuine RS Multipak PAL Chip w/ complete instructions (Specify 26-3024/3124): $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, Discover & Amex (3% surcharge for Amex), check, MO & School PO's. COD Orders (for orders less than $100) within US add $5 extra. Please add 5% (min. $3) S&H in Continental US & 10% (min. $5) for Canada, Hawaii, Alaska & Puerto Rico. All foreign orders except Canada pay actual shipping charges (min $5) for US Air Parcel Post/Surface Mail (specify). 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)

UPS 2ND DAY AIR

Tech Info (between 4-8 pm), Order Status, Info: 716-383-8830. To Fax your order: 716-383-0026

Continued from Page 14

```
50 FOR X=0 TO 63
60 V=VAL("&H"+MID$(A$,X*2+1,2))
70 POKE P,V:S=S+V:P=P+1:NEXT
80 IF CS<>S THEN PRINT "DATA ERR
OR IN LINE";L:END
90 L=L+10:IF P<4320 THEN 30
100 SAVEM"SPECTRA3",4000,4320,40
00:PRINT"SPECTRA3/BIN SAVED":END
110 DATA "1A50CC302FFDFFA48D6BCC
3C3DFDFFA4391A50CC302BFDFFA48D5A
CC312CFDFFA48D52CC322DFDFFA48D4A
CC332EFDFFA48D42CC292AFDFFA48D3A
20CD1A50CC", 8946
120 DATA "2830FDFFA48D2ECC2C31FD
FFA48D26CC2D32FDFFA48D1ECC2E33FD
FFA48D16CC2A29FDFFA48D0E20A11A50
CC2F30FDFFA48D1320958E8000108EA0
00EC81EDA1", 8452
130 DATA "8CA00026F7398E8000108E
A000EC81EDA18C99A026F7391A50CC30
29FDFFA48DE516FF661A50CC2930FDFF
A48DD816FF598D0FDDBD10448601976F
8EFFB0A680", 8364
140 DATA "AD9FA0028CFFC026F58E80
008D41A6808D4FAD9FA0028CF80025F1
0F6F398EFFB0C6108601976FBDA176A7
805A26F88E80008D2D0D702609BDA176
8D12A78020", 7602
150 DATA "F10F6F0F70BD1037BD1009
8D0FB13934061A50CC3031FDFFA4CC32
33FDFFA635863406CC3C3DFDFFA4CC3E
3FFDFFA63586FF00000000FFFFFFFF00
000000FFFF", 7739
160 REM * END OF LISTING
```

50	54	3480	254	5680	103	7120	236
120	192	3510	211	5750	39	7220	253
150	72	3810	55	6000	63	7300	9
220	104	4620	29	6110	249	7370	27
300	224	5010	249	6210	77	7430	53
1020	125	5080	219	6300	135	7480	56
1090	187	5130	51	6390	106	7530	217
1220	4	5200	215	6470	52	7590	182
2010	76	5270	90	6550	145	7660	203
2620	121	5410	103	6640	245	7730	171
3020	244	5470	226	6730	146	7810	243
3270	51	5530	131	6810	115	END	56
3440	22	5600	30	7040	225		

Listing 2: SPECTRA

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 REM * INITIALIZATION
20 PCLEAR1:CLEAR700:SM=4000:RM=4
105:SUM=4151:RUM=4164:SS=4017:RS
=4061:RGB:LOADM"SPECTRA3":EXECSU
M:EXECSS:HSCREEN2:HSCREEN0
30 WIDTH40:PRINT"INITALIZING..."
:F=2:B=4:POKE230,2:POKE282,0:POK
E59078,18:POKE59079,18:POKE65497
,0:HCLSB:HCOLOR8
40 PALETTE9,17:PALETTE10,7:PALET
TE11,49:PALETTE12,34:PALETTE13,5
0:PALETTE14,32:PALETTE15,15
50 HBUFF1,15:H8UFF2,15:HBUFF3,39
20:HBUFF4,3920:HDRAW"BM0,0R3G3U3
F4":HGET(0,0)-(4,4),1:HCLSB:HCOL
ORF:EXECSUM
60 DIMOP(63),B$(90),O$(90):FORJ=
0TO63:N=J-31:OP(J)=INT(.5+(ABS(N
)*N/50)):NEXT:M=1:CP=1:P$=CHR$(9
4):GOSUB6010
100 REM * THE MAIN MENU
110 HDRAW"BM0,0R319D16L319NU16DR
319BD12L319DR319BD10L80NU10L159N
U10L80":FORJ=0TO304STEP16:HLINE(
J,0)-(J,16),PSET:NEXT
120 HDRAW"BM12,2G9D2GE2DRE8L2UR3
HLBM21,5D9R6U3L3U3R3D2U5L6E3DRFB
M35,3R10D10L10U10BM70,4R3F3D3G3L
3H3U3E3BM87,2D5EF3U2RFD5HU4G5H5E
4BM100,5BM99,5D6R2U6L2BR4D6R2U6L
2BR4ND6R2D3L2BM115,3F10BM131,13U
6NR6E4R6NG4D6G4NL6U6
130 HDRAW"BM153,8M156,3BM153,8F5
H5M151,14BM153,8M146,11BM165,5L2
D6R2U2BU4BR4L2D3R2L2D3R2BR3U6LR2
8M179,8R2U3L2D6BR4BU6D6R2U6BR2R2
LD6BM198,2G3D2F3R5F3DH3LF3BL2BU5
E2U2H3NL3DL4G2D2F2R4E2U2H2BM212,
10NR3D2NR2D2BR8L2HU2ER2BM209,6R1
5
140 HDRAW"BM238,12L10D2R10UL12U4
R7U3LU4R2D4":HC1RCLE(248,8),6,,.
6:HDRAW"BM259,11U6R2D3LDFDBR2U6R
2D3LRD3BR3U3LU3BR2D3BM276,5U2R7D
2HL5R2D8GR3HU7BM292,3R6ND9FD3GNL
3FD3GL4NU9L2EU8BM309,3ND9R5FNL5D
8GNU8L5HNR6U8
150 HLINE(51,3)-(61,13),PSET,BF:
HLINE(208,1)-(224,8),PSET,BF:HPR
INT(0,4),"Files/Exit  Background
":HPRINT(30,4),"Clear/Mode"
160 FORJ=0TO15:HCOLORJ:HLINE(J*1
6,18)-(J*16+16,28),PSET,BF:NEXT:
FORP=2TO4:GOSUB5690:HLINE(P*16+2
24,18)-(P*16+240,28),PSET,BF:NEX
T:P=22:GOSUB5690:HLINE(304,18)-(
319,28),PSET,BF:GOSUB5700:HCOLOR
F,8:EXECSM:HSCREEN2:POKE59078,14
1:POKE59079,16
170 POKE41598,255:POKE41599,255:
POKE113,0:ONERR GOTO5680
199 REM * MAIN LOOP
200 FORJ=1TO200:NEXT:IFS=6THEN21
0ELSEGOSUB5620
210 IFX=0ANDY=0ANDM=1THENEXECRUM
:M=0:GOTO200
220 IFX=319ANDY=0ANDM=0THENEXECS
UM:EXECRM:GOSUB330:M=1:IFS=6THEN
300ELSE200
230 IFM=0THEN300ELSEIFY>30ANDY<4
1ANDX<80THENGOSUB5000
240 IFY>30ANDY<41ANDX>80ANDX<239
THENGOSUB5700:HCOLOR3:HLINE(80,3
0)-(239,40),PSET,B:IFF<15THENGOS
UB5300ELSEGOSUB5690:GOSUB5300
250 IFY>30ANDY<41ANDX>239THENGOS
UB5400
260 IFY>40THEN300
270 IFY<16THENS=INT(X/16)+1:EXEC
RM:PLAY"O3T8C"
280 IFF<16THENGOSU8320ELSEGOSUB3
30
290 IFS=7ORS=14THEN300ELSEIFS=6T
HENEXECSS:ELSE200
300 XX=X:YY=Y:ONS GOSUB1000,1200
,1400,1600,1800,2000,2200,2400,2
600,2800,3000,3200,3400,3600,380
0,4000,4200,4400,4600,4800
310 IFM=0THENEXECSUM:GOTO200ELSE
IFS=10ORS=14THEN210ELSE200
320 IFS=0THENRETURNELSEHCOLOR3:H
LINE((S-1)*16,0)-(S*16,16),PSET,
B:IFF<16THENHCOLORF:RETURNELSERE
TURN
330 IFF>15THENGOSUB5700:GOSUB320
:GOSUB5690:RETURNELSEGOSUB320:RE
TURN
999 REM * SUBROUTINES
1000 GOSU85780:R=0:P=F:REM * PEN
1010 A$=INKEY$:IFA$=CHR$(13)THEN
RETURNELSEIFBUTTON(0)THEN1010
1020 IFPEEK(343)=254THENY=Y-1:IF
Y<41ANDM=1THENY=41ELSEIFY=-1THEN
Y=0ELSEX=X+1:IFX=320THENX=319:Y=
Y+1
1030 IFPEEK(342)=254THENX=X+1:IF
X=320THENX=319
1040 IFPEEK(341)=254THENX=X+1:IF
X=320THENX=319ELSEY=Y+1:IFY=192T
HENY=191:X=X-1
1050 IFPEEK(338)=247THENY=Y+1:IF
Y=192THENY=191
1060 IFPEEK(340)=247THENY=Y+1:IF
Y=192THENY=191ELSEX=X-1:IFX=-1TH
ENX=0:Y=Y-1
1070 IFPEEK(339)=254THENX=X-1:IF
X=-1THENX=0
1080 IFPEEK(339)=251THENY=Y-1:IF
Y<41ANDM=1THENY=41ELSEIFY=-1THEN
Y=0ELSEX=X-1:IFX=-1THENX=0:Y=Y+1
1090 IFPEEK(345)=251THENY=Y-1:IF
Y<41ANDM=1THENY=41ELSEIFY=-1THEN
Y=0
1100 IFPEEK(340)=239THENR=R+1:IF
R>10THENR=10
1110 IFPEEK(339)=239THENR=R-1:IF
R=-1THENR=0
1120 IFPEEK(341)=239THEN1FP=F TH
ENP=B ELSEP=F
1130 IFR<>0THENHC1RCLE(X,Y),R,P:
GOTO1150
1140 HSET(X,Y,P)
1150 IFP=B THENHSET(X,Y,F):FORJ=
1TO100:NEXT:HSET(X,Y,B):GOTO1010
ELSEGOTO1010
1200 GOSUB5780:REM * SPRAY
1210 HLINE(XX,YY)-(X,Y),PSET,8:G
OSUB5790:IFF8=1THEN1210
1220 J=XX+RND(X-XX):K=YY+RND(Y-Y
Y):HSET(J,K):IFBUTTON(0)=0THEN12
20ELSERETURN
1400 GOSUB5780:REM * BOX
```

```
1410 GOSUB5790:HLINE(XX,YY)-(X,Y
),PSET,B:IFFB=1THEN1410ELSERETUR
N
1600 GOSUB5780:REM * BOX FILL
1610 GOSUB5790:HLINE(XX,YY)-(X,Y
),PSET,BF:IFFB=1THEN1610ELSERETU
RN
1800 GOSUB5780:REM * CIRCLE
1810 GOSUB5790:HCIRCLE(XX,YY),(X
+Y)/4:IFFB=1THEN1810ELSERETURN
2000 REM * PAINT
2010 GOSUB5620:IF(Y<41ANDM=1)OR(
X=319ANDY=0ANDM=0)THENRETURNELSE
EXECSS:HPAINT(X,Y),,B:IFM=0THENE
XECSUM
2020 GOTO2010
2200 EXECRS:EXECRM:S=0:RETURN:RE
M * OOP
2400 GOSUB5780:REM * LINE
2410 GOSUB5790:HLINE(XX,YY)-(X,Y
),PSET:IFFB=1THEN2410ELSERETURN
2600 GOSUB5780:REM * CUBE
2610 GOSUB5790:IFX<XX THEN2620EL
SEC$=STR$(ABS(XX-X)):E$=STR$(INT
(ABS(XX-X)/((INT(Y/10)+2)/5))):H
DRAW"BM"+STR$(XX)+","+STR$(YY)+"
R"+C$+"D"+C$+"L"+C$+"U"+C$+"E"+E
$+"R"+C$+"NG"+E$+"D"+C$+"G"+E$:I
FFB=1THEN2610ELSERETURN
2620 GOSUB5790:IFX>XX THEN2610EL
SEC$=STR$(ABS(XX-X)):E$=STR$(INT
(ABS(XX-X)/((INT(Y/10)+2)/5))):H
DRAW"BM"+STR$(XX)+","+STR$(YY)+"
L"+C$+"D"+C$+"R"+C$+"U"+C$+"H"+E
$+"L"+C$+"NF"+E$+"D"+C$+"F"+E$:I
FFB=1THEN2620ELSERETURN
2800 GOSUB5780:REM * POINT RAY
2810 GOSUB5790:HLINE(XX,YY)-(X,Y
),PSET:IFFB=1THEN2810ELSEP9=XX:R
9=YY:GOSUB5620:IF(Y<40ANDM=1)OR(
X=319ANDY=0ANDM=0)THENRETURNELSE
XX=P9:YY=R9:EXECSS:GOTO2810
3000 GOSUB5780:XX=X:YY=Y:REM * G
ET
3010 X=JOYSTK(0)-1:Y=JOYSTK(1)-1
:IFXX+X>318THENX=318-XX ELSEIFYY
+Y>191THENY=191-YY ELSEIFINT(X/2
)<>X/2THENX=X+1
3020 HLINE(XX,YY)-(XX+X,YY+Y),PR
ESET,B:HLINE-(XX,YY),PSET,B:EXEC
RS:IFBUTTON(0)THEN3010ELSEHGET(X
X,YY)-(XX+X,YY+Y),3:FORJ=1TO8:HP
UT(XX,YY)-(XX+X,YY+Y),3,NOT:NEXT
:PX=X:PY=Y:X=XX:Y=YY:RETURN
3200 GOSUB5780:REM * PUT
3210 GOSUB5650:IFY<1THENRETURNEL
SEIFX+PX>318THENX=318-PX
3220 IFY+PY>191THENY=191-PY ELSE
IFINT(X/2)<>X/2THENX=X+1
3230 HGET(X,Y)-(X+PX,Y+PY),4:ONC
P GOSUB3250,3260,3270,3280,3290:
IFFB<>1THENHPUT(X,Y)-(X+PX,Y+PY)
,4,PSET
3240 GOTO3210
3250 HPUT(X,Y)-(X+PX,Y+PY),3,PSE
T:RETURN
3260 HPUT(X,Y)-(X+PX,Y+PY),3,PRE
SET:RETURN
3270 HPUT(X,Y)-(X+PX,Y+PY),3,AND
:RETURN
3280 HPUT(X,Y)-(X+PX,Y+PY),3,OR:
RETURN
3290 HPUT(X,Y)-(X+PX,Y+PY),3,NOT
:RETURN
3400 IFF>15THENRETURNELSEGOSUB57
80:IFB=3THENHCOLOR4,8ELSEHCOLOR3
,8:REM * ENLARGE
3410 GOSUB5650:IFX>298THENX=298
3420 IFX/2<>INT(X/2)THENX=X+1:IF
Y>170THENY=170ELSEIFY>170THENY=1
70
3430 HLINE(X,Y)-(X+21,Y+21),PRES
ET,B:HLINE-(X,Y),PSET,B:EXECRS:I
FBUTTON(0)=0THENHGET(X,Y)-(X+21,
Y+21),3:ELSE3410
3440 XM=X:YM=Y:HSCREEN2:HLINE(5,
5)-(187,187),PSET,B:HLINE(4,4)-(
188,188),PSET,B:HLINE(204,171)-(
258,188),PSET,B:HLINE(260,171)-(
314,188),PSET,B:HLINE(205,25)-(2
28,48),PSET,B:HLINE(205,81)-(228
,104),PSET,B
3450 HCOLOR5:HPRINT(27,1),"ENLAR
GE":HPRINT(30,4),"Cut":HPRINT(30
,11),"Paste":HPRINT(30,18),"Colo
r":HPRINT(27,22),"Done  Undo"
3460 FORJ=0TO15:HCOLORJ:HLINE(29
9,J*10)-(319,J*10+10),PSET,BF:NE
XT
3470 HPUT(206,26)-(227,47),3,PSE
T:HPUT(206,82)-(227,103),3,PSET:
HCOLORF:HLINE(205,137)-(229,158)
,PSET,BF:FORJ=26TO47:YY=(J-26)*8
+9:FORK=206TO227:XX=(K-206)*8+9:
MC=HPOINT(K,J):HCOLORMC:HLINE(XX
,YY)-(XX+6,YY+6),PSET,BF:NEXTK,J
:HCOLORF:MC=F
3480 GOSUB5620:IFX>298ANDY<160TH
```


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: 9 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: Available for the *May 1989* through *July 1990* 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)-758-7094

Sorry, no C.O.D.'s or credit cards; Foreign & Canadian orders, please use **U.S. money orders**. U.S. checks, allow 3-4 weeks for receipt of first issue/back issue.

Copyright (C) 1989 OS-9 is a trademark of Microware Systems Corp. and Motorola, Inc.

Rainbow Seal of Certification

BANKING MASTER FOR CHECKING & SAVINGS

$ $ $ PROBLEMS $ $ $

Banking Made Easy!
Balancing made Simple!
NO More Statement Blues!

>>> $20.00 + $3.00 S/H <<<

INVENTORY MASTER

FOR: Small Business Collecters, Home Any items!

Like: Name & Addresses Periodicals Parts lists & vendors

APPROX. 5000 items per Disk
4 Drives X 5000 = 20,000 items

>>> $40.00 + $3.00 S/H <<<

Requirements: COCO3/1 disk for: TV or Monitor

RUSS GRIGGS
1118 PERRY AVE
32 YEARS EXPERIENCE
BREMERTON, WASHINGTON 98310

```
ENMC-INT(Y/10):HCOLORMC:HLINE(20
5,137)-(229,158),PSET,BF:GOTO34B
0
3490 IFY<185ANDX<185ANDY>8ANDX>8
THENX-INT((X-9)/8):Y-INT((Y-9)/8
):XX-X*8+9:YY-Y*8+9:IFHPOINT(XX,
YY)-B THEN3510ELSEHCOLORB:GOTO35
10
3500 IFX>259ANDX<315ANDY<189ANDY
>170THENHGET(206,26)-(227,47),3:
HPUT(206,82)-(227,103),3,PSET:GO
TO3470ELSEIFX>203ANDX<259ANDY<18
9ANDY>170THENHGET(206,82)-(227,1
03),3:EXECRS:HPUT(XM,YM)-(XM+21,
YM+21),3,PSET:HCOLORF,B:RETURNEL
SE3480
3510 HLINE(XX,YY)-(XX+6,YY+6),PS
ET,BF:HSET(X+206,Y+82):X-XX+1:Y-
YY+1:HCOLORMC:GOTO3480
3600 REM * FOREGROUND COLOR
3610 GOSUB5620:GOSUB5700:IFY>320
RY<16THENEXECRM:RETURNELSEF-INT(
X/16):PLAY"O3T8C":IFF<16THENEXEC
RM:HCOLORF:HLINE(209,1)-(223,8),
PSET,BF:EXECSM:RETURN
3620 IFF-16THENP-2:GOSUB5690ELSE
IFF-17THENP-3:GOSUB5690
3630 IFF-18THENP-4:GOSUB5690ELSE
IFF-19THENP-22:GOSUB5690
3640 EXECRM:HLINE(209,1)-(223,8)
,PSET,BF:EXECSM:RETURN
3800 GOSUB5780:REM * ROLLER BRUS
H
3810 GOSUB5650:HLINE(X,Y)-(X+5,Y
+5),PRESET,BF:HLINE(X,Y)-(X+5,Y+
5),PSET,BF:IFFB-1THEN3810ELSERET
URN
4000 GOSUB5780:REM * ELLIPSE
4010 GOSUB5790:HCIRCLE(XX,YY),(X
*4+Y)/5,,13.9-SQR(Y):IFFB-1THEN4
010ELSERETURN
4200 GOSUB5780:REM * RAY
4210 GOSUB5650:HLINE(XX,YY)-(X,Y
),PSET:IFFB-1THEN4210ELSERETURN
4400 GOSUB5780:REM * HPRINT TEXT
4410 I-INT(XX/8):K-INT(YY/8):L-4
0:GOSUB5710:RETURN
4600 GOSUB5780:REM * BOLD TEXT
4610 HDRAW"BM"+STR$(X)+","+STR$(
Y)
4620 A$-INKEY$:IFA$=""THEN4620EL
SEIFA$-CHR$(13)THENRETURNELSEIFA
SC(A$)<31THEN4620
4630 HDRAWB$(ASC(A$)-32):GOTO462
0
4800 GOSUB5780:REM * OLD TEXT
4810 HDRAW"BM"+STR$(X)+","+STR$(
Y)
4820 A$-INKEY$:IFA$=""THEN4820EL
SEIFA$-CHR$(13)THENRETURNELSEIFA
SC(A$)<31THEN4820
4830 HDRAWO$(ASC(A$)-32):GOTO482
0
5000 REM * FILE/EXIT
5010 GOSUB5810:EXECSS:D-0:L-8:I-
2:K-39:HDRAW"BM89,41D49L89R2DR88
U48RD49L89":HLINE(0,41)-(88,89),
PRESET,BF:HPRINT(0,6),"Save File
":HPRINT(0,7),"Load File":HPRINT
(0,8),"Kill File":HPRINT(0,9),"S
creen Dump":HPRINT(0,10),"Exit/B
ASIC"
5020 HGET(1,K+I*8)-(87,K+8+I*8),
4:HPUT(1,K+I*8)-(87,K+8+I*8),4,N
OT
5030 XX-JOYSTK(0):YY-JOYSTK(1):F
ORJ-1TO250:NEXT:IFBUTTON(0)-0THE
NONI GOTO5080,5090,5200,5230,526
0ELSEIF(YY>22ANDYY<42)THEN5030
5040 HPUT(1,K+I*8)-(87,K+8+I*8),
4,PSET
5050 IFYY<23THENI-I-1:IFI<1THENI
-1
5060 IFYY>41THENI-I+1:IFI>5THENI
-5
5070 GOTO5020
5080 GOSUB5770:IFFREE(0)<14THENH
PRINT(7,9),"DISK FULL. USE NEW D
ISK":FORJ-1TO4000:NEXT:EXECRS:GO
TO5220ELSEHPRINT(7,9),"SAVE FILE
NAME:":GOSUB5710:POKE65496,0:OPE
N"O",1,Q$+"/PIC":EXEC4177:CLOSE:
GOTO5220
5090 D-0:I-1:K-63:HLINE(51,64)-(
172,116),PSET,B:HLINE(52,65)-(17
1,115),PRESET,BF:POKE65496,0:DSK
I$0,17,3,C$,E$:FORJ-1TO128STEP32
:GOSUB5100:NEXT:C$-E$:FORJ-1TO12
8STEP32:GOSUB5100:NEXT:GOTO5130
5100 Q$-MID$(C$,J,14):IFLEFT$(Q$
,1)-CHR$(0)THENRETURN
5110 IFASC(Q$)>127THENRETURN
5120 IFMID$(O$,9,3)<>"PIC"THENRE
TURNELSED-D+1:D$(D)-LEFT$(Q$,8)+
"/"+"PIC":RETURN
5130 IFD-0THENHPRINT(7,9),"NO FI
LES SAVED":FORJ-1TO3000:NEXT:GOT
O5220ELSEFORX-1TOD:HPRINT(7,8+X)
,D$(X):NEXT:HPRINT(7,8+X),"Exit
to Menu"
5140 HGET(53,K+I*8)-(170,K+8+I*8
),4:HPUT(53,K+I*8)-(170,K+8+I*8)
,4,NOT
5150 FB-BUTTON(0):XX-JOYSTK(0):Y
Y-JOYSTK(1):IFFB-1ANDI-D+1THENGO
TO5220ELSEIFFB-1THENHCLSB:OPEN"I
",1,D$(I):EXEC4222:CLOSE:GOTO522
0ELSEIFYY>22ANDYY<42THEN5150
5160 HPUT(53,K+I*8)-(170,K+8+I*8
),4,PSET
5170 IFYY<23THENI-I-1:IFI<1THENI
-1
5180 IFYY>41THENI-I+1:IFI>D+1THE
NI-D+1
5190 GOTO5140
5200 GOSUB5770:HPRINT(7,9),"KILL
 FILENAME:":GOSUB5710:GOSUB5800
5210 A$-INKEY$:IFA$=""THEN5210EL
SEIFA$-"Y"ORA$-"y"THENKILLQ$+"/P
IC"ELSEIFA$-"N"ORA$-"n"THEN5220E
LSE5210
5220 EXECRS:POKE65497,0:F-F9:RET
URN
5230 EXECRS:EXECRUM:REM * SCREEN
 DUMP
5240 REM * ADD YOUR SCREEN DUMP
HERE
5250 GOTO5220
5260 GOSUB5800
5270 A$-INKEY$:IFA$=""THEN5270EL
SEIFA$-"Y"ORA$-"y"THENPOKE65496,
0:POKE282,255:RGB:STOPELSEIFA$-"
N"ORA$-"n"THEN5220ELSE5270
5300 REM * BACKGROUND
5310 GOSUB5620:GOSUB5700:BG-B:IF
Y>320RY<16THENEXECRM:RETURNELSEB
-INT(X/16):IFB<16THENEXECRM:HCOL
OR,8:HLINE(185,32)-(225,38),PRES
ET,BF:EXECSM:RETURN
5320 IFB>15THENEXECRM:B-BG:RETUR
N
5400 REM * CLEAR/MODE
5410 GOSUB5810:EXECSS:I-3:K-39:H
DRAW"BM222,41D74R97L2DL96U73LD74
R97":HLINE(223,41)-(319,114),PRE
SET,BF:HPRINT(28,6),"Palette":HP
RINT(28,7),"Clear Screen":HPRINT
(28,8),"PUT Mode":HPRINT(31,9),"
Set":HPRINT(31,10),"Reset"
5420 HPRINT(31,11),"And":HPRINT(
31,12),"Or":HPRINT(31,13),"Not":
HPRINT(29,CP+8),">"
5430 HGET(224,K+I*8)-(319,K+8+I*
8),4:HPUT(224,K+I*8)-(319,K+8+I*
8),4,NOT
5440 XX-JOYSTK(0):YY-JOYSTK(1):F
ORJ-1TO250:NEXT:IFBUTTON(0)-0THE
NONI GOTO5500,5590,5600,5610,561
0,5610,5610,5610ELSEIFYY>22ANDYY
<42THEN5440
5450 HPUT(224,K+I*8)-(319,K+8+I*
8),4,PSET
5460 IFYY<23THENI-I-1:IFI<1THENI
-1
5470 IFYY>41THENI-I+1:IFI>8THENI
-8
5480 GOTO5430
5500 R-B:C-63:REM * PALETTE
5510 HCOLORF,B:HSCREEN2:HPRINT(1
0,1),"PALETTE COLOR CHANGER":HPR
INT(2,3),"Left & Right Keys -> S
elect Palette":HPRINT(5,5),"F1 &
 F2 Keys   -> Select Color"
5520 FORJ-0TO15:HCOLORJ:HLINE(J*
16+28,60)-(J*16+44,100),PSET,BF:
NEXT:HPRINT(R*2+4,13),P$:HPRINT(
7,18),"Press Fire Button when do
ne"
5530 A$-INKEY$:IFA$-CHR$(8)THENR
-R-1:IFR--1THENR-0ELSEHCOLORB:HP
RINT(R*2+6,13),P$:HCOLORF:HPRINT
(R*2+4,13),P$
5540 IFA$-CHR$(9)THENR-R+1:IFR-1
6THENR-15ELSEHCOLORB:HPRINT(R*2+
2,13),P$:HCOLORF:HPRINT(R*2+4,13
),P$
5550 IFA$-CHR$(103)THENC-C-1:IFC
--1THENC-63:PALETTER,C ELSEPALET
TER,C
5560 IFA$-CHR$(4)THENC-C+1:IFC-6
4THENC-0:PALETTER,C ELSEPALETTER
,C
5570 IFBUTTON(0)THENEXECRS:F-F9:
RETURN
5580 GOTO5530
5590 HCLSB:EXECSUM:EXECRM:F-F9:R
ETURN
5600 EXECRS:F-F9:RETURN
5610 CP-I-3:EXECRS:F-F9:RETURN
5620 GOSUB5650:GOTO5640:REM * JO
YSTICK
5630 HGET(X,Y)-(X+4,Y+4),2:HPUT(
X,Y)-(X+4,Y+4),1:GOSUB5650:HPUT(
XX,YY)-(XX+4,YY+4),2:IFFB-1THENR
ETURN
5640 XX-X:YY-Y:GOTO5630
5650 X-X+DP(JOYSTK(0)):Y-Y+OP(JO
YSTK(1)):FB-BUTTON(0):IFX<0THENX
-0ELSEIFX>319THENX-319
5660 IFY<0THENY-0ELSEIFY>191THEN
Y-191ELSERETURN
5670 RETURN
5680 EXECRS:F-F9:GOTO280:REM * E
RROR ROUTINE
5690 POKE59291,196:POKE59292,P:R
```

```
ETURN:REM * PATTERN ENABLE
5700 POKE59291,212:POKE59292,181
:RETURN:REM * RESTORE CODE
5710 Q$=STRING$(L," "):FORJ=0TOL
-1:REM * HPRINT INPUT
5720 A$=INKEY$:IFA$=""THEN5720EL
SEIFA$=CHR$(13)THEN5760
5730 IFA$=CHR$(8)THENJ=J-1:IFJ>-
1THENA$=" ":MID$(Q$,J+1,1)=" ":H
LINE((I+J)*8,K*8)-((I+J)*8+8,K*8
+7),PRESET,BF:J=J-1:GOTO5750
5740 IFJ<0THEN5750ELSEIFASC(A$)<
32THENJ=J-1ELSEMID$(Q$,J+1,1)=A$
:HPRINT(I+J,K),A$
5750 NEXT
5760 Q$=LEFT$(Q$,J):RETURN
5770 I=22:K=9:L=8:HLINE(52,64)-(
245,87),PSET,B:HLINE(53,65)-(244
,86),PRESET,BF:RETURN
5780 GOSUB5620:EXECSS:RETURN
5790 EXECRS:GOSUB5650:RETURN
5800 HLINE(67,82)-(260,101),PSET
,B:HLINE(68,83)-(259,100),PRESET
,BF:HPRINT(10,11),"ARE YOU SURE
? <Y/N>":RETURN
5810 F9=F:IFF>15THENGOSUB5700:F=
15
5820 IF8=8THENHCOLOR0:RETURNELSE
HCOLOR8:RETURN
5999 REM * FONT DATA
6000 REM * BOLD TEXT
6010 B$(0)="BR7"'SPACE
6020 B$(1)="BRD4RU4BD6LBR4BU6"'!
6030 B$(2)="DRUBR2DRUBR2"'"
6040 B$(3)="BRD6RU6BR2D6RU6BRBD2
L6BD2R6BU4BR3"'#
6050 B$(4)="BR2RFRL4GRDR3DRG2LEL
3BR8BU5"'$
6060 B$(5)="BDORUBR5G5LE5BD4DRUB
U5BR3"'%
6070 B$(6)="BR4FGU2L2DLF5LH4DGRG
RDR2BU6BR5"'&
6080 B$(7)="BRDGREUBR2"''
6090 B$(8)="BR3G2D2F2LH2U2E2BR3"
'(
6100 B$(9)="F2D2G2RE2U2H2BR5"')
6110 B$(10)="BRBDF4RH4D2L2R7LHG3
LE4RBU2BR3"'*
6120 B$(11)="BR2BDD4RU2NL3NR2U2B
UBR4"'+
6130 B$(12)="BD5BRD2NLEUBR2BU5"'
,
6140 B$(13)="BD3R5BU3BR2"'-
6150 B$(14)="BD5DRUBR2BU5"'.
6160 B$(15)="BR6G6RE6BR2"'/
6170 B$(16)="BRD6R3U6L3GD4NE3RE4
D4BU5BR2"'0
6180 B$(17)="BR2NGD6L2R3NR2U6BR4
"'1
6190 B$(18)="BDRUR3DRDLDL2G2DNE2
R5HRBU5BR2"'2
6200 B$(19)="BDRUR3FDGNL2FDGNU5L
3ULBU5BR7"'3
6210 B$(20)="BD3E3RG4R4NU3DGR3HE
LU4BR3"'4
6220 B$(21)="BD5RDR3NU3EU2HL4ELU
R5BR2"'5
6230 B$(22)="BD2D3FNU2R3U2FUHL3U
2RUR2BR3"'6
6240 B$(23)="DRUR3D2G2D2RU2E2U2B
R2"'7
6250 B$(24)="BRGDFGDFNU5R3NU5EUH
NL2EUHL2BR5"'8
6260 B$(25)="BRGDFNU2R4G3LR2E2U3
GU2L2BR5"'9
6270 B$(26)="BD5DRUBU3LURBR2BU"'
:
6280 B$(27)="BRBD5DGREUBU3LURBUB
R2"':
6290 B$(28)="BR3G3F3RH3E3BR2"'<
6300 B$(29)="BD2R5BD3L5BU5BR7"'=
6310 B$(30)="F3G3RE3H3BR5"'>
6320 B$(31)="BDR4G3BD2RBU2E2UHNL
2BR3"'?
6330 B$(32)="BR5L4GD4FNU5R4BU2L2
UR3UL3RERHBR3"'@
6340 B$(33)="BR3D2HD3NR2HD3HDBR7
UGU3GU3GU2BR5"'A
6350 B$(34)="R5FDGNL2FDGNU5L5ENU
4RU5BR6"'B
6360 B$(35)="BR3LDLGD2FNU3RDR3UR
BU4LHRBR3"'C
6370 B$(36)="RD5GR2U6RF2D2G2RE2U
2H2BR4"'D
6380 B$(37)="RNR4D3NR3D2GR2NU6R4
ULBU4RUBR2"'E
6390 B$(38)="RD5GR3HU2NR2U3R3DRU
BR2"'F
6400 B$(39)="BR2DLND3GD2F2UFR2U2
HR2ND2BU2LUL2BR5"'G
6410 B$(40)="D6RU3NR2U3BR3D6RU6B
R2"'H
6420 B$(41)="R2D6L2R5LHU5R2BR2"'
I
6430 B$(42)="BD4DED2R3NU5EU5L3BR
5"'J
6440 B$(43)="RD5GR2NU6BR4UGU2LHR
URU2FUBR3"'K
6450 B$(44)="RD5GR6ULBL3U5RBR5"'
L
6460 B$(45)="D6RU5F2DHR2UED5RU6B
R2"'M
6470 B$(46)="D6RU6NF3DF4NU5DRU6B
R2"'N
6480 B$(47)="BR3LDLND3GD2FRDR2UR
NU3EU2HLUBR4"'O
6490 B$(48)="RD5GR3HU2NU3R3EUGU2
L2BR5"'P
6500 B$(49)="BR3LDLND3GD2FRDR2UF
2LU5RND2HLUBR4"'Q
6510 B$(50)="RD5GR2U3NU3RF3RH3RE
LELUL2BR6"'R
6520 B$(51)="BD5RDR3URUL2EL3EL2E
LER3DRHBR3"'S
6530 B$(52)="DERD5GR3HU5RFUBR2"'
T
6540 B$(53)="ND5RD6R3NU6EU5BR2"'
U
6550 B$(54)="DED3ED3ED2RU2FU3FU3
FUBR2"'V
6560 B$(55)="ND6RD6EURUFDFNU6RU6
BR2"'W
6570 B$(56)="F6RH6BR5G6RE6BR2"'X
6580 B$(57)="DED2RDRD2GR3HU2RURU
2FUBR2"'Y
6590 B$(58)="DRUR5G6R6ULGLHE4U8R
2"'Z
6600 B$(65)="BD2BRR3FD2FLHGL2HER
3UBU3BR4"'a
6610 B$(66)="RD5U2R2ERND3FD2GL3U
6BR6"'b
6620 B$(67)="BD3BR5LUL3ND3GD2FR3
URBU5BR2"'c
6630 B$(68)="BR3RD5GL2NU3HU2ERF4
LU6BR3"'d
6640 B$(69)="BD2BRR3DRDL4ULD2RDR
3BU6BR3"'e
6650 B$(70)="BRBDDGRD2GR3HUELU3R
2DRHBR3"'f
6660 B$(71)="BD7RDR3URULUL3ULURU
```


GAMES

Rupert Rythym CC3, Disk **ONLY $24.95**
Space Invaders CC3, Disk **ONLY $24.95**
Donut Dilemma CC2/3, Disk **ONLY $19.95**

RASCAN—2

RASCAN is back in a new and improved version. RAS*MAX optional (SEE BELOW) You can digitize video from any B&W or color camera, VCR or videodisk player in near photo quality. The BEST & only color video digitizer for the CoCo. W/Software; 4096 CLRS Req. 512K.
CoCo3, 128/512k. 1 disk **ONLY 189.95**

SPRITE-BASIC

CREATE graphic SPRITES & write your own video games with BASIC. Adds 18 new commands to BASIC. This is a complete new system to create & control SPRITES.
CoCo3, 128k, 1 disk **ONLY $44.95**

SUPER-BOOK

The ultimate reference manual for BASIC & M/L programming. Memory maps, hints & tips, well organized easy to use. More than just PEEKs & POKEs. All in one BOOK. For beginner to hacker.
Covers CoCo1, 2 &3. **ONLY $14.95**

SUPERSOUND

Digitize any sound for your programs or add sound effects to animated graphics. Easy to use with BASIC demos. W/Supershow.
CoCo3, 128k, disk **ONLY $44.95**

SAY'N'SPELL

Let your CoCo3 help your 1st grade & up child learn their spelling words in YOUR voice.
CoCo3, 128k, disk **ONLY $24.95**

ULTRAED

The BEST CoCo3 assembler/disassembler available. Two work buffers, online help file & true source code disassembly. 80 col. screen, disk I/O. Requires EDTASM+ cart, 1 time.
CoCo3, 128k, disk **ONLY $24.95**

COLOR GRAPHICS

Our *MAX graphics drivers offer: True What-You-See-Is-What-You-Get colors. ON-SCREEN color editing/preview. T-shirt prints, partials, & more.

STAR NX1000 RIBBONS

BLACK **$6.95** 4 color **$9.95**
Heat Transfer (T-shirt) 4 color **$12.95**

RAS*MAX

Print 4906 & 16 color RASCAN pictures on the NX1000, DMP-240, GSX-140, CGP-220, now prints B&W on CGP-220 printer. Even edit 16 color RASCAN on-screen.
CoCo3, 128k, disk **ONLY $24.95**
WITH RASCAN 2 **ONLY $14.95**

STAR*MAX

Print CM3, MGE, HSCREEN2 etc., pictures on NX1000, DMP-240 & EPSON compatables.
CoCo3, disk **ONLY $21.95**

CGP*MAX

Same as STAR*MAX but for the CGP-220.
CoCo3, 128k, disk **ONLY $18.95**

PM*PRINT

PMODE3/4 (B&W or colors) on NX1000 or compatable color printers.
CoCo1,2,3, 32k, disk **ONLY $18.95**

SUPERSOFT, INC.

363 Oakwood Ave., Jackson, MI 49203
(517) 787-3610 $2.50 S/H per order
Visa/M.C. Check, M.O., MI res add 4% sales tax

```
R2FDRU2RBR2BU2"'g
6670 B$(72)="RD5GR2U6D3RERND4FD3
BU6BR2"'h
6680 B$(73)="BD2RD3GR3HU3BU2LBR4
"'i
6690 B$(74)="BD6RDR3NU5EU4BU2LBR
3"'j
6700 B$(75)="RD5GR2U3F3RH2E2LG3U
5BR6"'k
6710 B$(76)="RD5GR3HU5BR3"'l
6720 B$(77)="BD2D4RU4F2EURD4RU3B
R2BU3"'m
6730 B$(78)="BD2D4RU4R3D4RU3BU3B
R2"'n
6740 B$(79)="BD3D2RU3R3ND3FD2GL3
BE6"'o
6750 B$(80)="BD2RD4GR3HU3ER2DRDL
DL2BE5"'p
6760 B$(81)="BR6BD2GD3FL2U5L3D2H
DFR2BE5"'q
6770 B$(82)="BD2RD3GR3HU3FERFDLU
BE3"'r
6780 B$(83)="BD6R4URHL3HRUR4BE2"
's
6790 B$(84)="BD2ED4FNU6REBU3LRBE
2"'t
6800 B$(85)="BD2D3FNU4R2EU3RD4RB
U6BR2"'u
6810 B$(86)="BD2D2FNU3RDEDENU3EU
2BE2"'v
6820 B$(87)="BD2ND2RD4RUEUDFDRU4
RND2BE2"'w
6830 B$(88)="8R5BD2G4LE2H2RF4RH2
E2BE2"'x
6840 B$(89)="BD2ND2RD3R2G2LR2E2N
U3EU2BE2"'y
6850 B$(90)="BD3UR4NG4RG4R4UBU5B
R2"'z
7000 REM * OLD TEXT
7010 O$(0)="BR12"'SPACE
7020 O$(1)="BDFND5LD7BD3D2ED3BU1
6BR3"'!
7030 O$(2)="BD2D3ED4BR3U4GU3BUBR
4"'"
7040 O$(3)="BD3BFR8GL88D3BFR8GL8
BR2BD3U12ED12BR3DU12ED12BU12BR6"
'#
7050 O$(4)="BR4ND14DG3DF2U5FR2EG
2BD4ND4F2DG2L3UHDLGBU13BR12"'$
7060 O$(5)="BRBDGFEBR6DRL2G6LFE7
BD7GFEBU11BR5"'%
7070 O$(6)="BR2BDG2DF2G2DFNU2FRE
3D3FNE2U3ENRGH2LNFHNH2E2UHND2HBU
BR9"'&
7080 O$(7)="BDD2ED2GBU5BR4"''
7090 O$(8)="BR3NR2G3D9F3R2LH3U9E
3BR3"'(
7100 O$(9)="R2F3D9G3NL2UE2U9H2BU
BR6"')
7110 O$(10)="BRBD3NF3RF4NL5NR4NF
4NG4OG3LHBR8BDH3U3NE2RE2FBU4BR3"
'*
7120 O$(11)="BR5BD2D9GU5NU4NL4NR
5BU7BR9"'+
7130 O$(12)="BD9D2ED2GBU13BR4"',
7140 O$(13)="BD7R9DL9BU8BR12"'-
7150 O$(14)="BD14NR2DR2BU15BR2"'
.
7160 O$(15)="BR10G10DE10BUBR3"'/
7170 O$(16)="BR3G3D8NF3NERNF3RF3
E3U8GU2GU2GU2LDBU8R7"'0
7180 O$(17)="BR3NG3D14NEHNHU11BU
2BR5"'1
7190 O$(18)="BR3G2DE3NRDR2ND4FD3
NG6LG6ND3FDRFR3URURBU12BR3"'2
7200 O$(19)="BR3NG3RNG2DRF2ND3LD
3GNL2FND3RD3G3ULNHDH3BU11BR11"'3
7210 O$(20)="BR6ND12G6DR7NFG2D4N
R2NFNHU11BU2BR6"'4
7220 O$(21)="BRR5GL4D7RE2R2ND5FD
4G3LEL2ULHBU11BR10"'5
7230 O$(22)="BR4F2NEL2ULG3D7F3RE
2NU5EU4H2L2GLD5F2RBU13BR6"'6
7240 O$(23)="BRNR7GR7D2G3ND7GD7B
U14BR8"'7
7250 O$(24)="BR2G2D2NF6RF6D2G2L3
HNU3HU2E3RE2NU3EU2H2L3BR9"'8
7260 O$(25)="BR3G3D3NFRF2E3ND5U2
H2LURF3D7G4U2GULGBU13BR10"'9
7270 O$(26)="BRBD2GR2GBD5GR2GBU1
1BR4":'
7280 O$(27)="BD2DRDBD6HDFGBU12BR
5";'
7290 O$(28)="BR6G6F6UH5E5BUBR3"'
<
7300 O$(29)="BD4RBBD5L8BU9BR12"'
-
7310 O$(30)="F6G6UE5H5BUBR9"'>
7320 O$(31)="BR2NG2R2DRND2FDNG4D
G4BD3D2ED2BU14BR6"'?
7330 O$(32)="BR5BDR5F3ND2UHD4G3U
4LD2ND2G3NU3HU2E2NRBL5E3NRG3ND5G
D4F2UF2R5EREBU11BR4"'@
7340 O$(33)="BR4G4D3F2R2NG5E2NE3
U2LGBD4NR5BD2NL2GR2GR3GLBR6ELNU1
4LHRU11LEL6NG3UR4BR7"'A
7350 O$(34)="BR4NG4R5GNL4G4ND8GD
6NG3DFNR4FR3E4NU2LNG2U3LU2G5ENU4
EU4E4D4EU3BUBR3"'B
7360 O$(35)="BR5G4ND7GD6F2U2FD2F
NU10NR5ER5E2BU10GLDLUGU2GU2G2NG2
D8BU11BR10"'C
7370 O$(36)="BR4NG4RNG2R7ND12GNL
6GRD11G2L2UGUGU2GULUNG3NU7EU7E4R
R7"'D
7380 O$(37)="BR5NG5RNG3R4GNL3G5N
D5GD6NG2R6D2R2ENL6E2BL8NU5EUNU4E
RNR4E6G3U3FL2U2ENG5BUBR6"'E
7390 O$(38)="BR6G3ERE2R4GNL3G4D8
EU7BR2D8G4UH2LG2ER3FERE3U2E2NFG2
U6E4F2DH2DFBU4BR4"'F
7400 O$(39)="BR4G3ND8GD7F4NR5UNU
10R6ENU4EU4L7ND4NU5E7GL2DLU2GU2N
G4BR8"'G
7410 O$(40)="BR4NG4RNG2R4GNL3G4D
4GU5BD7LNG2R2DED2ENR2DR3BR3NU10E
U10LG6D2U5RD4U5E5BR4"'H
7420 O$(41)="BR3NG3RNG2R4GNL3G3N
D6GD6BD2LNG2RNF2R2DRNU9EU9E4BR"'
I
7430 O$(42)="BR5NG3RNG2R4GNL3G3N
D6GDGHGBR3D5BD3H3LNF3LNGF3R2E3NU
7EU7E4BR"'J
7440 O$(43)="BR3NG3RNG2R4GNL3G3N
D6GD6BD2LNG2NR3RFNE2NR3FR3BR3NE2
UELEL2HNL3E4LENL3HL2G3D2U5LND6E5
D2EDR2EBU"'K
7450 O$(44)="BR3NG3RNG2R4GNL3G3N
D6GD6BD2NG2R3NU8NR3DR6GNL2E2BU2B
L6U7E4D2ED2EDE2BU"'L
7460 O$(45)="BR3NG3RNG2RGR3EG4ND
7GD7NG3DR2GNR4FR3E2LNU12LU5LGERN
U7RE2BD8BRFNU14E2LU12HG3BU3BR7"'
M
7470 O$(46)="BR2NG2DED12NG3DRGNR
3FRLBU13D2RD2RD2RD2RD2FU15GR2
UFGNR2FRE2BU"'N
7480 O$(47)="BR4G3NDBGD7FED2ED2N
R6FNU11R5E3NU7EU7NH4LNH4LH4DLG3E
2ND9BU28R11"'O
7490 O$(48)="BR4G2RD2L2GER2D3L2G
ER2D7GLHBR4BUNU12F2REBU7BL4NF2UF
3E2NU6EU5HL2G3BU3BR9"'P
7500 O$(49)="BR4G3ND8GD7FED2ED2N
R6FNU11R5E2H2LGER2F3RE2BL4NU7EU7
NH4LNH4LH4DLG3E2ND9BU2BR11"'Q
7510 O$(50)="BR3NG3RNG2R4GNL3G3N
D6GD6BD2LNG2R2DNR3FNR3U2EU7NE5RD
6BD4BR4NU4ENU2EUH3DHLRE3NU5RNG2U
5HBR4"'R
7520 O$(51)="BR13G3NL4GL2U2NL2UL
G3F8UH7GF7DGH7UF6D2NL4DL2UHNL3HL
2G2DFRE2BU14BR10"'S
7530 O$(52)="BR3NG3RNG2R5GL2NL2G
3ND7GD6FED2ED2FR5E3G2L6U3NU6RU8N
G2E2RGNR3FR2E2BUBR2"'T
7540 O$(53)="BR4ND11G2RD2GLGEFED
7G2ER3GR3FNL3EFNU14E2LU12HNG2BR5
"'U
7550 O$(54)="BR4ND11G2RD3L2GEFRD
6NG3DR2GR2GRE4NU10EU9HNG2BR4"'V
7560 O$(55)="BR4ND11G2RD3L2GEFRD
6G2ER3GRDE2RU13NG2FD13ED2E3NU11E
U10HNG2BR4"'W
7570 O$(56)="BR2NF11DF11LNG2H11G
BD5BR2R10BD7BL12E2R3GR3GLBU2BL3E
11GL3EL3ERBR7"'X
7580 O$(57)="BR3ND7G2RD3L2GEFRD2
G2ER3GR3GLR6D3GL5EL3GBR10BU2UHU1
0HND10NG2BR5"'Y
7590 O$(58)="BR3NG2R3GR3DNL2R4EG
5NR3NL4G9ERE2R5FNL6GLR4GLR2E2BU1
3BR3"'Z
7600 O$(59)="R5G5NU4BD2E7F7G7H7B
D2D5R5NH4BR4R5U5NG4BU4U5L5NF4BL2
BD3G4F4E4H4BD3GFEBU7BR6"
7610 D$(60)="R15D15L15U14BR2BDR1
1D11L11U10BR2BDR7D7L7U6BR2BDR3D3
L3U2BU7BR10"
7620 O$(61)="BR3G2NUDLD5NF7EDF6N
E6RE6NHU5LU2LNL3HL2G2NRNH2DH3DLB
UBR11"
7630 O$(65)="BRBD4NR3GDF3HGND5GD
4FERENU8F2EGHU9NL2EBR4BU4"'a
7640 O$(66)="BR3GND13GHFD11LF2E2
RNU6EU5HG2BU8BR6"'b
7650 D$(67)="BR2BD4ND10R2F2GUHL3
GRD7F2URE2BU12BR3"'c
7660 O$(68)="F7RH7RF6EGD6GNU5LG2
U2GH2RNU6FU7EBU5BR8"'d
7670 O$(69)="BR3BD4G3RD6LF2UNU8N
E3U4RERURELUNL4HL2BU58R7"'e
7680 O$(70)="BR7GLULGND13GD2NL2N
R3D9LF2E2BU13BR5"'f
7690 O$(71)="BD4BR2ND9G2RD6GRFR2
NE5NG5R3FD2G2L4HR5EU12HND9NG3BR6
BU4"'g
7700 O$(72)="BR3GND12GHFD10LF2EB
R2DFHUNU7EU6HG2BU7BR6"'h
7710 O$(73)="BR2DLDBD4EFLND8GLFD
5LF2EBU14BR3"'i
7720 O$(74)="BR4DLDBD4NENR2NGD5R
NU4DRDG2LNH2URBU14BR5"'j
7730 O$(75)="BR3GND13GHFD11LF2EB
U7E2ND4FD3G2LRFND2RD3E2BU13BR3"'
k
7740 O$(76)="BR3GND13GHFD11LF2EB
U14BR3"'l
7750 O$(77)="BR2BD4G2RD7LF2ELU9F
E2D10FELU9FE2D10FNE2U10EBR4BU4"'
m
7760 O$(78)="BR2BD4G2RD7LF2ELU9F
E2D10FNE2U10FBU6BR4"'n
7770 O$(79)="BR4BD4G2ND7GD6LF2RE
2NU8RU6RH2BU5BR5"'o
```

```
7780 O$(80)="BR3BD5G2RD6NG2D6GE2
FHU4NU8RFENU8EFHU7HNG2BU5BR5"'p
7790 O$(81)="BR2BD6ND8G2RD5LF2RE
2NU6D5GE2FHU9EGHLULBU6BR7"'q
7800 O$(82)="BR4BD13G2NU10H2RU7L
E2FDENRURF2GBR4BU7"'r
7810 O$(83)="BR3BD4GND3GD2FR6ND3
FD2NG3LG2GUGU2GUL2GE9GL3ENL3HLBU
4BR8"'s
7820 O$(84)="BR4G2D2L2R2D9LF2NE2
U11R2L2U2UEBR4"'t
7830 O$(85)="BR2BD4ND10G2RD7LF2E
3NU7D2R2GU11G2BU6BR6"'u
7840 O$(86)="BR2BD3G2DEDND9RD9E2
RNU7EU6RHUG2BU6BR6"'v
7850 O$(87)="BR2BD3G2DED9LDR2UNU
7E2ND3U7F2LD7RE2ND3U7F2LD7RBU14B
R3"'w
7860 O$(88)="BD5F10UH9GF9BL9U3RD
2E9D3LU3BU5BR4"'x
7870 O$(89)="BR2BD5ND9G2RD6LF2E3
NU5D2FD3L5GER2DR2E2U2HU8RHG2BU7B
R6"'y
7880 O$(90)="BR3BD4NG3RNG2RFNL2D
R2EG4NL3NR3G5ER2DNR3FR2NE3UEBU13
BR5"'z
7890 RETURN
7900 REM * END OF LISTING
```

Listing 3: SPECTRA3

```
00100          ORG     &4000
00110 SM       DRCC    #80
00120          LDD     #$302F
00130          STD     $FFA4
00140          BSR     SBLOCK
00150 OUT      LDD     #$3C3D
00160          STD     $FFA4
00170          RTS
00180 SS       ORCC    #80
00190          LDD     #$302B
00200          STD     $FFA4
00210          BSR     SBLOCK
00220          LDD     #$312C
00230          STD     $FFA4
00240          BSR     SBLOCK
00250          LDD     #$322D
00260          STD     $FFA4
00270          BSR     SBLOCK
00280          LDD     #$332E
00290          STD     $FFA4
00300          BSR     SBLOCK
00310          LDD     #$292A
00320          STD     $FFA4
00330          BSR     SBLOCK
00340          BRA     OUT
00350 RS       ORCC    #80
00360          LDD     #$2B30
00370          STD     $FFA4
00380          BSR     SBLOCK
00390          LDD     #$2C31
00400          STD     $FFA4
00410          BSR     SBLOCK
00420          LDD     #$2D32
00430          STD     $FFA4
00440          BSR     SBLOCK
00450          LDD     #$2E33
00460          STD     $FFA4
00470          BSR     SBLOCK
00480          LDD     #$2A29
00490          STD     $FFA4
00500          BSR     SBLOCK
00510          BRA     OUT
00520 RM       ORCC    #80
00530          LDD     #$2F30
00540          STD     $FFA4
00550          BSR     MBLOCK
00560          BRA     OUT
00570 SBLOCK   LDX     #32768
00580          LDY     #40960
00590 MENU1    LDD     ,X++
00600          STD     ,Y++
00610          CMPX    #40960
00620          BNE     MENU1
00630          RTS
00640 MBLOCK   LDX     #32768
00650          LDY     #40960
00660 MENU2    LDD     ,X++
00670          STD     ,Y++
00680          CMPX    #39328
00690          BNE     MENU2
00700          RTS
00710 SUM      ORCC    #80
```


BANKMAN

NEW!

Checkbook Program

A user friendly, menu-driven program for continuously up-dating your check book. Allows you to keep a running record of deposits, checks and accounts. Files can be saved, edited and printed out. Also, lets you reconcile and analyze particular accounts. Includes manual. Uses 32K. ONLY $39.95

COCO LABELS. Creates a double-column multipage screen index. Printout 1, all or many copies of the same label. Print each line in a different font using Tandy (R) printer. Uses 32K. NOW $29.95

ENVELOPE WRITER. For Daisy Wheel printers. Prints mailing and return address directly on the envelope. Custom fonts with Tandy (R) printer. Ideal for small jobs or the occasional envelope. saves on time, frustration and labels! Uses 16K. JUST $19.95

TRADING POST
Send check or money order.
P.O. Box 3453, Carbondale, IL 62902
Specify CoCo 1, 2 or 3. Add $3.00 S/H.

Alpha Software Technologies

NEW!

DATA WINDOWS NEW!

IT'S HERE!!!! The package that all COCO owners have been looking for. Finally a complete comprehensive database system for the COCO. Full database support includes user definable fields, multiple key fields, automatic sorting (by key fields), fast searching, browsing, user definable editing, user definable windows (database views), import/export/merge capability, cut/copy, paste, and even full report generation and mailing label facilities!. Makes full use of Multi - Vue, but does not require it to run! Multi - Vue type interface makes it easy to use! This will quickly become the standard for OS9 database use! 512k OS9 Level II Required $59.95

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 any OS9 user. 512k OS9 Level II 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) $29.95

LEVEL II TOOLS

Without the right tools OS9 is difficult...These ARE the right tools! With these great utilities anyone can use OS9 like a pro! Complete wildcard, tree and windowing commands make OS9 easy to use! If you want to start using OS9, this is what you need! If you already use OS9, these tools will save you hours of time and headaches! 25 great utilities. OS9 Level II Required $24.95

OS9 LEVEL II BBS RELEASE 3.0

System comes complete and ready to run. Use the built 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

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 & RS-232 (or COMM-4) Pak Required $34.95

THE ZAPPER

This wonderful utility allows you to patch anything! Patch commands directly on disk and fix CRCs automatically! Patch the OS9 Boot 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

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, up to 4 users at one time! Special pulsed IRQ line helps to prevent lockups! External IRQ line allows you to connect to an IRQ hack mod. Totally compatible 6551 technology, no special drivers needed! Comes complete with networking software that allows multiple computers to share peripherals! A must for any BBS user! A perfect match for OS9 Level II BBS! COCO 3 Required $124.95

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! Makes non Multi - Vue software run under Multi - Vue! 512k OS9 Level II & Multi - Vue Required. $19.95

Alpha Software Technologies

(504) 649-5176(voice) 210 Bluefield Dr., Slidell, LA 70458 (504)649-5761(BBS)

Please add $3.00 Shipping & Handling. COD Order $2.50 Extra

```
00720            LDD     #$3029
00730            STD     $FFA4
00740            BSR     MBLOCK
00750            LBRA    OUT
00760 RUM        ORCC    #80
00770            LDD     #$2930
00780            STD     $FFA4
00790            BSR     MBLOCK
00800            LBRA    OUT
00810 SAVE       JSR     RS
00820            JSR     RUM
00830            LDA     #1
00840            STA     $6F
00850            LDX     #65456
00860 MENU3      LDA     ,X+
00870            JSR     [$A002]
00880            CMPX    #65472
00890            BNE     MENU3
00900            LDX     #32768
00910 MENU4      BSR     GRAPH
00920            LDA     ,X+
00930            BSR     BASIC
00940            JSR     [$A002]
00950            CMPX    #63488
00960            BLO     MENU4
00970            CLR     $6F
00980            RTS
00990 LOAD       LDX     #65456
01000            LDB     #16
01010            LDA     #1
01020            STA     $6F
01030 MENU5      JSR     $A176
01040            STA     ,X+
01050            DECB
01060            BNE     MENU5
01070            LDX     #32768
01080 MENU6      BSR     BASIC
01090            TST     $70
01100            BNE     END
01110            JSR     $A176
01120            BSR     GRAPH
01130            STA     ,X+
01140            BRA     MENU6
01150 END        CLR     $6F
01160            CLR     $70
01170            JSR     SUM
01180            JSR     RM
01190            JSR     SS
01200            RTS
01210 GRAPH      PSHS    D
01220            ORCC    #80
01230            LDD     #$3031
01240            STD     $FFA4
01250            LDD     #$3233
01260            STD     $FFA6
01270            PULS    D,PC
01280 BASIC      PSHS    D
01290            LDD     #$3C3D
01300            STD     $FFA4
01310            LDD     #$3E3F
01320            STD     $FFA6
01330            PULS    D,PC
01340            END
```


The Rainbow Bookshelf

The Rainbow Book of Simulations
20 award-winning entries from THE RAINBOW's first Simulations contest.

The Second Rainbow Book of Simulations
The 16 Winners from our second Simulations contest.

The Complete Rainbow Guide to OS-9
Authors Dale Puckett and Peter Dibble demonstrate OS-9's multitasking and multiuser features.

The Complete Rainbow Guide to OS-9 Level II Vol.I: A Beginners Guide to Windows
Puckett and Dibble uncover the mysteries of the new windowing environment.

The First Rainbow Book of Adventures
Contains 14 winning programs from our first Adventure contest.

The Second Rainbow Book of Adventures
Featuring 24 of the most challenging Adventure games ever compiled.

The Third Rainbow Book of Adventures
The Excitement continues with 19 new Adventures.

The Fourth Book of Adventures
Fourteen fascinating new Adventures from the winners of our fourth Adventure competition.

A Full Turn of the Screw

The Rainbow Introductory Guide to Statistics
Dr. Michael Plog and Dr. Norman Stenzel give a solid introduction to the realm of statistical processes.

Name _____
Address _____
City _____
State _____ Zip _____
❑ Payment Enclosed, or ❑ Charge to:
❑ VISA ❑ MasterCard ❑ American Express
Account Number _____
Card Expiration Date _____
Signature _____

❑ **The Rainbow Book of Simulations** (first)	~~$ 9.95~~	$ 3.50	_____
❑ Rainbow Simulations Tape (first)	~~$ 9.95~~	$ 3.50	_____
❑ First Simulations Package	~~$19.90~~	$ 6.00	_____
❑ **The Second Rainbow Book of Simulations**	~~$ 9.95~~	$ 4.95	_____
❑ Second Rainbow Simulations Tape	~~$ 9.95~~	$ 4.95	_____
❑ Second Rainbow Simulations Disk	~~$10.95~~	$ 4.95	_____
❑ Second Simulations Package with Tape	~~$19.90~~	$ 8.95	_____
❑ Second Simulations Package with Disk	~~$20.90~~	$ 8.95	_____
❑ **The Complete Rainbow Guide to OS-9**	~~$19.95~~	$12.95	_____
❑ Rainbow Guide to OS-9 Disk Set (2 disks)	~~$31.00~~	$19.95	_____
❑ Rainbow Guide to OS-9 Package	~~$47.95~~	$29.95	_____
❑ **The Windows & Applications Disk for** The Complete Rainbow Guide to OS-9 Level II, Vol. I		$19.95	_____
❑ **The Rainbow Book of Adventures** (first)	~~$ 7.95~~	$ 2.00	_____
❑ Rainbow Adventures Tape (first)	~~$ 7.95~~	$ 2.00	_____
❑ First Adventure Package	~~$15.90~~	$ 3.50	_____
❑ **The Second Rainbow Book of Adventures**	~~$13.95~~	$ 6.95	_____
❑ Second Rainbow Adventures Tape	~~$13.95~~	$ 6.95	_____
❑ Second Adventure Package	~~$27.90~~	$11.95	_____
❑ **The Third Rainbow Book of Adventures**	~~$11.95~~	$ 6.95	_____
❑ Third Adventures Tape	~~$ 9.95~~	$ 6.95	_____
❑ Third Adventures Disk Set (2 disks)	~~$14.95~~	$ 7.95	_____
❑ Third Adventure Package with Tape	~~$21.90~~	$11.95	_____
❑ Third Adventure Package with Disk	~~$26.90~~	$12.95	_____
❑ **The Fourth Rainbow Book of Adventures**	~~$10.95~~	$ 7.95	_____
❑ Fourth Adventures Tape	~~$ 9.95~~	$ 6.95	_____
❑ Fourth Adventures Disk	~~$14.95~~	$11.95	_____
❑ Fourth Adventure Package with Tape	~~$20.90~~	$13.90	_____
❑ Fourth Adventure Package with Disk	~~$25.90~~	$18.90	_____
❑ **A Full Turn of the Screw**		$19.95	_____
❑ **Introductory Guide to Statistics**	~~$ 6.95~~	$ 2.95	_____
❑ Guide to Statistics Tape or Disk (indicate choice)	~~$ 5.95~~	$ 2.95	_____
❑ Guide to Statistics Package (indicate choice of tape or disk)	~~$12.90~~	$ 4.95	_____
Add $2 per book Shipping and Handling in U.S.			_____
Outside U.S., add $4 per book			_____
Kentucky residents add 6% sales tax			_____
(Allow 6 to 8 weeks for delivery)		Total	_____

FILL OUT YOUR COCO LIBRARY WITH THESE SELECTIONS

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. To order by phone (*credit card orders only*) call (800) 847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call (502) 228-4492.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book for loading and operating instructions. OS-9 is a registered trademark of the Microware Systems Corporation.

Why Don't You Buy a Computer For BOTH Sides of Your Brain?

(A practical business side, an artistic graphics side. Two operating systems: MSDOS & UNIX Clone) Many of you are now considering an alternative to the Color Computer to run OS/9. Are you really going to invest in an untried alternative with very limited software? FAR less than 1% of existing software programs run under OS/9. Why not buy a computer that will run a UNIX Compatible (OS/9 like) operating system AND MS-DOS. According to published articles, this combination of industry-standard operating systems would run more than 90% of ALL of the software that has EVER been written. We call these systems the OWL ATOMS™ and they are headed by the computer of the 21st century the OWL 2001. (A 64-bit monster) On-site service available most areas.

These highly adaptable computers we call the **OWL ATom™** series. They are not newcomers to the computer world, but are the current versions of computers which we have been building for more than 6 years. All systems can be configured with your choice of hard drive, graphics monitor, and 6 different processors. The systems described here are typical of the new versions of our line which offer 2 industry-standard operating systems.

OWL ATom™ ET

For general features of our OWL ATom including expansion capabilities, check out the table below. Comparisons are also given to several Tandy™ computers. The resolution of the optional VGA is also given.

Typical system components:
Processor: 80286 12 MHz
Floppy drive: 1.2 or 1.44 Meg
Memory: 1MB
Hard Drive: 40 MB, 28 ms.
Monitor: TTL Monochrome (720X350)

MS-DOS Software:
MS-DOS (with all utilities)
GWBASIC
Integrated Software including:
Desktop Organizer with tracker
Outliner
Word Processor
Spelling Checker
Spreadsheet
Data Base
Graphics program
Communications

UNIX Compatible Software:
Coherent™ (A UNIX Compatible Operating System)
C Compilier
Full Screen Editor
Line Editor
Text Formattor
AWK Language
Standard UNIX utilities

Documentation: Over 1500 pages

One of the best features is the price:

$1395. (This typical system).

First year on-site service $45 (Most areas)
VGA Color (800X600X256 colors) $400.
Call 215-837-1917 for other options

FEATURES	OWL ATom	2500 XL*	1000 TL/2*
Processor (Speed)	80286(12)	80286(10)	80286(8)
Total Slots	8	3	4
16 Bit Slots	6	3	0
Standard Memory	1024K	1024K	640K
Max. on Board RAM	4096K	1024K	768K
Graphics Output	VGA	VGA	CGA
Max. Resolution	1024X768	640X480	640X200
Drive Slots	5	3	3
Hard Drive Interface	Yes(16 Bit)	Yes(16 Bit)	Yes(8 Bit)
Floppy Drive	1.2 or 1.44 Meg	1.44 Meg	720K
Power Supply (Watts)	200	70	67
Warranty (Parts and Labor)	1 Year	90 Days	90 Days

* Trademarks as follows: Model numbers - Tandy Corporation, MS-DOS- Microsoft, Inc., OS/9 -MicroWare, Inc., UNIX- AT&T, Inc.

OWL-WARE
P.O. Box 116
Mertztown, PA 19539
Call to Order: (800)245-6228
PA and Support: (215)837-1917

Proven

On the Razor's Edge of

The New Frontier:

The Most Advanced Color Computer Drive Systems Ever Offered!

Fast No-Halt SCSI Floppies Using Optional SCSI Controller

Proven Performance for Demanding Home or Business Users

This is the most advanced, fully assembeled CoCo hard drive system offered. **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**

Interface Price only: $85.
Real Time Clock-RAM: $25.

	20 Meg.	40 Meg.	80 Meg.
System Prices: (Includes Hard Drive, case, & fan, SCSI Controller*, LR/OWL Interface, Software. Fully assembled and tested.)	**$495.**	**$609.**	**$875.**
Super System Prices: (LR/OWL System as above but OMTI 5200 SCSI Controller AND 3.5" or 5.5" HD 80 Track Floppy in same case)	**$615.**	**$729.**	**$1059.**(2 cases)

*SCSI controller is OMTI 5100. Add $75 for OMTI 5200 with FDC.

Introducing the *Quick-Link*™ Interface

Provides both a 64K Printer Buffer and Serial and Parallel Interfaces.

Serial to Parallel Printer Interface (64K Buffer) $65.

Converts serial computer output to parallel printer and also provides a 64K buffer in front of the printer. Serial side Female DB-25 and Parallel side is Centronics. Includes Centronics to Centronics cable and power AC-adapter. If you need an adapter from the CoCo 4-pin serial to DB-25 add $9. From 300-38,400 Baud.

Parallel to Serial Interface (64K Buffer) $49.

Same as above except it converts Centronics parallel computer output to DB-25 Female serial. Plug into an IBM printer cable to provide output to a serial plotter.

Parallel to Parallel (64K Buffer) $45.

This is parallel printer buffer with no conversion.

Drive System Parts

Hard Drives

20 Meg	ST225	$249.
40 Meg	ST251-1	365.
80 Meg	ST4096	640.

SCSI Controllers

OMTI 5100	HD Only	$89.
OMTI 5200	HD/FD	189.
OMTI 5400	HD/FD/Tape	225.

(Note: We have no drivers for tape yet)

Cases and Cables

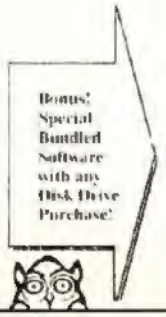
Case, 45 Watt PS, Fan	$105.
Cable set (3 pieces)	25.

Drives have a 1-year limited warranty. Other parts are 90-day warranty. Please Note - At these prices, only very limited support can be given.

Technology

the Color Computer Frontier

DISK DRIVES



Floppy Drive Systems

The Highest Quality for Years of Service

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$189.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$115.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$155.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (0,1,2,3) $285.

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 $119. 500 or 501 **Model $115.** 502

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
Fax: 1-215-837-1942
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.)

3 UTILITIES

A copy verify, copy, and DOS utility.

2 GAMES

We will select 2 games from our stock. These are sold for more than $20 each.

Do not mistake this software with cheap "Public Domain" software which others offer. 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!!

512K Upgrade

Again at a popular price. Fully assembled and tested before shipping. Easy to install. Uses fast 120 ns. chips.

Only $85.

Now includes **memory test, Ram Disk Lighting, Printer Lighting, and Back-up Lighting.** All with an upgraded manual exclusive with OWL!

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

Easy Access

by Greg Law
Technical Editor

Developing your own programs to manipulate files may quickly lead you to discover a minor nuisance. BASIC09 does not allow you to open a file that does not exist. Nor does it allow you to create a file that already exists. This may not be much of a nuisance except that in BASIC09, like many dialects of BASIC, error detection and correction require workarounds by the programmer. Unlike BASIC on the CoCo 1 and 2, however, BASIC09 does offer some assistance.

Open Sesame

If you are quick on your feet, you may see an advantage to this method of opening and creating files. Because the `OPEN` command doesn't automatically create the file, you can't accidentally create an empty file. By the same token, you can't overwrite an existing file without explicitly deleting the existing file first.

Let's study some examples to determine the ramifications of all this. Assume we need to open a file, but we do not know in advance if the file exists. Our first option is to open the file and abort with an error if the file is not found. As you might guess, this is usually not an acceptable solution. An alternative is shown in Listing 1.

Immediately before attempting to open the file, we use `ON ERROR GOTO 10` to branch to Line 10 if the file cannot be opened. The first statement in Line 10 is `ON ERROR`. This tells BASIC09 to abort the program if it detects an error. The reason is that if BASIC09 cannot open or create the file, it is probably caused by a hardware error such as a defective disk or an invalid filename. In either of these cases there is nothing we can do about it. Finally, the file is created and control passes to the regular logic of the program.

Because the OPEN command doesn't automatically create the file, you can't accidentally create an empty file.

If the file is successfully opened, the error-correction logic is skipped by branching to Line 20. Enter the program and run it twice to verify it works as advertised. When run the first time, the program prints a line to inform you that it created the file. The second time the program prints a line to inform you that it opened the file — unless you deleted the `test.dat` file or swapped disks.

Now let's assume we need to create a file that does not have any information stored in it. If the file already exists, it should be deleted. One solution is shown in Listing 2, which is similar to the first, except we attempt to create the file first. If an error is detected, we use the `DELETE` command to delete the file and create it again. In this case, we can make the program shorter by attempting to delete the file first. Examine Listing 3 to see how this is done. Notice that Listing 3 continues into the main logic of the program regardless of whether or not the file is deleted. Here `ON ERROR GOTO 10` is used to continue program execution if the file does not exist, instead of trapping an error.

Random Length Files

A common problem you may run into is the need to read a file that contains an arbitrary number of records. For example, in Listing 4 we use `RND(100)` to store a random number of records into a file. The actual number of records stored in the file is between one and 100, depending on the outcome of `RND(100)`, and it is different each time the program is run.

How can we determine the number of records stored in the file? Perhaps the simplest solution is to read each record sequentially until an error is detected. This solution, however, is impractical for most applications. A better solution is to use the `EOF` command, which returns `TRUE` if the end of the file has been reached. As shown in Listing 5, we use `WHILE NOT(EOF(#Path)) DO` to read each record sequentially until end-of-file is reached. Enter listings 4 and 5, and run both several times.

Although we are using a direct access file, this technique works very well and is the preferred solution with sequential access files. But why read direct access files sequentially? Sure, we could read all of the records until we reach the end of the file and count the number of records, but that's time-consuming and a waste of effort. As you recall, all records in a direct access file are the same size. Doesn't it seem logical that the file size could be used to tell us how many records are stored in the file? Sure it does! Once we know the file size, we can divide it by the size of each record to obtain the number of records stored in the file. This technique, based on the `SS.Size` Get Status call, is shown in Listing 6.

First we define the registers structure needed by the `SysCall` module and the

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

OUR LATEST 30 ISSUES

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
CITY

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

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

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
*DRAGONIAN

ISSUE #82, APR. 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

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

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

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

ISSUE #90, DEC. 1989
MUSIC-4 VOICE
HONEYCOMB
POINT OF SALE
ORBS ADVENTURE
IBM - COCO
CIVIL WAR
LIST UTILITIES
BREAK-IN COCO III
LABYRINTH MASTER
*COLOR CAR ACTION

ISSUE #91, JAN 1990
TRENCH FIGHTER
COCVERT3
SPEED GAMES
BUSINESS STARTER
CAVERN QUEST3 PT. 2
BUILDERS HELPER
TARZAR IV
ADDRESS IT
ANIMAL GRAPHICS
*SKYWAY

ISSUE #92, FEB 1990
PENTA-SAME
ROTISSERIE LEAGUE
NICK'S QUEST
SOLITAIR
EDUCATION 4
IBM - BASIC
BASEBALL CARD ORG.
MUNCHY 3
RIVER RAID 3
*CUBER

ISSUE #93, MAR 1990
MR. MOVIE
INVADERS
COCO3 RECIPE MACHINE
SILVERCAPE 3 ADV.
BABY-SITTER'S BASE
BIBLE SCRIPTURE
VOCABULARY QUIZ
DROP PACK
DOCTOR WHO 3
*GRABBER

ISSUE #94, APR. 1990
FLASH CARD
REAL ESTATE LISTINGS
BIBLE QUESTIONS 1
SPELLING QUIZ 1
NO LEFT 3
PICTURE VIEWER 3
TANK SHOWDOWN
TARZAR 5 ADVENTURE
GENESIS
*FOURCUBE

ISSUE #95, MAY 1990
DREAMTIME ADVENTURE
XT/AT SYSTEMS
BIBLE QUIZ 2
16 FLAGS
FRACTIONS
SOLITIARE PUZZLE 4
512K RAM DRIVES 3
FOOD FACTORY 3
WHO PART 2
*TRAPFALL

ISSUE #96, JUN 1990
ENTREPENEUR
DR. PHREDI
PRINTER FONT CODES
BIBLE QUESTIONS PT. 3
CALO ADVENTURE
FORM MAKER
DRAGON ESCAPE
PLANE EXPLORER
WHO PART 3
*MS MAZE

EACH ISSUE CONTAINS 10 PROGRAMS READY TO LOAD.

AVAILABLE ON TAPE OR DISK.

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 96 ISSUES	$ 250.00

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

VISA MasterCard

COCO I, II, AND III

- **All Programs Include Documentation.**
- **We Send 1st Class - No Charge!**
- **For Information on Subscription Prices.**

Turn to Pages 71 & 93

ONE YEAR SUBSCRIPTION ONLY $ 70.00 !

RAINBOW CERTIFICATION SEAL

*TOM MIX PROGRAMS

Mail Or Call

T&D

T&D 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	89
2	10	18	26	34	42	50	58	66	74	82	90
3	11	19	27	35	43	51	59	67	75	83	91
4	12	20	28	36	44	52	60	68	76	84	92
5	13	21	29	37	45	53	61	69	77	85	93
6	14	22	30	38	46	54	62	70	78	86	94
7	15	23	31	39	47	55	63	71	79	87	95
8	16	24	32	40	48	56	64	72	80	88	96

Name _____

Address _____

City _____ State ____ Zip _____

Card # _____ Total $ _____

structure of the records used in the data file. According to the description of the SS.Size Get Status call, Register A should be assigned the path number, and Register B should be assigned the value of SS.Size ($02). Next we assign the value of I$GetStt ($8D) to CallCode and run SysCall. On return, Register X contains the most significant 16-bits of the file size, and Register U contains the least significant 16-bits. Therefore we multiply Regs.X by 65536 (2^{16}) and add Regs.U to get the actual file size. To get the number of records stored in the file, divide the file size by the size of each record using the SIZE command. You can use these results to validate each record number requested from the file.

Another common technique is to use the first record in the file as a configuration record. Instead of storing data, it is used to store the number of records in the file and other needed information. In our listings, Rec.Number can be used to store the number of records in the file, and Rec.Name can be blank (not used) or used to store some other piece of information such as a user password. ❑

Listing 1: Open_Test

```
PROCEDURE Open_Test
 0000       DIM Path:BYTE
 0007
 0008       ON ERROR GOTO 10
 000E       OPEN #Path,"test.dat":UPDATE
 0021       PRINT "File opened."
 0031       GOTO 20
 0035
 0036 10    (* Trap any possible errors from above. *)
 0063       ON ERROR
 0066       CREATE #Path,"test.dat":UPDATE
 0079       PRINT "File created."
 008A
 008B 20  (* Continue with the regular logic of the program.
*)
 00C3       CLOSE #Path
 00C9       END
```

Listing 2: Create_Test

```
PROCEDURE Create_Test
 0000       DIM Path:BYTE
 0007
 0008       ON ERROR GOTO 10
 000E       CREATE #Path,"test.dat":UPDATE
 0021       PRINT "File created."
 0032       GOTO 20
 0036
 0037 10    (* Trap any possible errors from above. *)
 0064       ON ERROR
 0067       DELETE "test.dat"
 0073       CREATE #Path,"test.dat":UPDATE
 0086       PRINT "File deleted and created."
 00A3
 00A4 20    (* Continue with the regular logic of the
program. *)
 00DC       CLOSE #Path
 00E2       END
```

Listing 3: Delete_Test

```
PROCEDURE Delete_Test
 0000       DIM Path:BYTE
 0007
 0008       ON ERROR GOTO 10
 000E       DELETE "test.dat"
 001A       PRINT "File deleted."
 002B
 002C 10    ON ERROR
 0032
 0033       CREATE #Path,"test.dat":UPDATE
 0046       PRINT "File created."
 0057       CLOSE #Path
 005D       END
```

Listing 4: Create_File

```
PROCEDURE Create_File
 0000       TYPE Record=Name:STRING[15]; Number:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Path:BYTE
 0027       DIM Count:INTEGER
 002E       DIM High:INTEGER
 0035
 0036       ON ERROR GOTO 10
 003C       DELETE "test.dat"
 0048       PRINT "File deleted."
 0059
 005A 10    ON ERROR
 0060       CREATE #Path,"test.dat":UPDATE
 0073       Rec.Name:="Record #"
 0086       High:=RND(100)
 0090       PRINT "Adding "; High; " records."
 00AB
 00AC       FOR Count:=1 TO High
 00BD         Rec.Number:=Count
 00C9         PUT #Path,Rec
 00D3       NEXT Count
 00DE
```

Listing 5: Read_File

```
PROCEDURE Read_File
 0000       TYPE Record=Name:STRING[15]; Number:INTEGER
 0016
 0017       DIM Rec:Record
 0020       DIM Path:BYTE
 0027
 0028       OPEN #Path,"test.dat":UPDATE
 003B
 003C       WHILE NOT(EOF(#Path)) DO
 0047         GET #Path,Rec
 0051       ENDWHILE
 0055
 0056       PRINT Rec.Number; " records read."
 006F       CLOSE #Path
 0075       END
```

Listing 6: Records

```
PROCEDURE Records
 0000       TYPE Registers=CC,A,B,DP:BYTE; X,Y,U:INTEGER
 0025       TYPE Record=Name:STRING[15]; Number:INTEGER
 003B
 003C       DIM Regs:Registers
 0045       DIM Rec:Record
 004E       DIM Path:BYTE
 0055       DIM CallCode:BYTE
 005C       DIM NumRecs:INTEGER
 0063       DIM FileSize:REAL
 006A
 006B       OPEN #Path,"test.dat":UPDATE
 007E
 007F       Regs.A:=Path
 008B       Regs.B:=$02 \(* SS.Size *)
 00A4       CallCode:=$8D \(* I$GetStt *)
 00BA       RUN SysCall(CallCode,Regs)
 00C9
 00CA       FileSize:=Regs.X*65536.+Regs.U
 00E5       NumRecs:=FileSize/SIZE(Rec)
 00F5     PRINT "The file contains "; FileSize; " bytes and
"; NumRecs ; " records."
 012D       CLOSE #Path
 0133       END
```

Unlock The Real Power of Your CoCo !

"BIG BASIC" Basic Users get full control of managing all CoCo memory

COCO 3'S MISSING LINK

"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.
- BIG BASIC creates programming windows where you can put up to 58 separate running programs, or up to 58 parts of one large program or database. Concept permits big programs to run fast.
- Chain in unlimited sized programs, or program parts, or data ,from disk(s) without erasing existing programming or variables. Also works with the RGB-DOS Hard Disk system and ADOS3.
- 3 new simple basic words create the power.
- Provides for holding as many as 28 Hi-Res Graphics Screens in Memory for instant recall. Up to 4 HSCREEN1's in a 128 K CoCo.
- Modifies your basic operating system in some 70 locations but does not occupy user memory. 100 % M.L. runs in background.
- Includes 7 Demo Programs and Manual. Any disk version RS-DOS.

ONLY $39.95 U.S. or $46.50 CDN. + $2.50 S & H (Add 8% PST in Ont.)

"BIG RAMDISK" (512k CoCo3 V.2.0 or V.2.1)

"Danosoft's *Big Ramdisk* is a thoroughly useful utility that combines a great product with the ease of use that marks a winner." - Rainbow, April 1990.

- Copy or backup your programs or data to "BIG RAMDISK" and get the speed of program/data saving or loading to an "in memory" M.L. device. ("COPYDISK" Utility included.)
- Great for use with all other programs on this page (except "Simply Better") and most commercial software.
- You can install, re-install, format and reformat from direct mode or from a program without erasing programming or variables. Does not occupy user memory, but can be user located elsewhere if needed.
- NEW! Works double if you have CRC/DISTO's 1 Meg. Memory Board.
- 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.) Allows 4 physical drives and 2 ramdisks. (4 ramdisks to 720K with 1 Meg. Board.)
- Ramdisk files and directory do not erase with a reset or if a program crashes. This lets you use some programs that need a Coldstart to exit.

ONLY $12.95 US or $14.95 CDN. + $2.50 S & H (Add 8% PST in Ont.)

NEW! "SUPER BIG BASIC" Same as "BIG BASIC" except it also accesses 1 Meg. of Memory if you have CRC/DISTO's Board. $49.95 U.S. or $57.95 CDN. Upgrade with Proof of Purchase: $9.90 U.S. or $11.50 CDN. Add $2.50 S&H (Add 8% PST in Ont.).

"GRAPHICS UTILITY" If you want to store multiple Hi-Res Graphics screens in CoCo3 memory for instant recall, this Tutorial is for you. Load/Save graphics screens to memory from disk. Instantly switch them into your program. Max capacity is: HSCREENS 1 & 3 : 512K = 27 ; 128K = 3 . HSCREENS 2 & 4: 512K = 13 , 128K =1 Has Disk & Demo. Only $8.95 U.S. or $10.50 CDN. + $2.50 S&H (Add 8% PST in Ont.)

"BABY BASIC" If you need more memory for Basic program lines, this Tutorial will show you how to store and execute them from anywhere in memory; and how to chain in any number of program modules from disk without erasing variables. Includes Disk with 7 basic enabling subs and a demo program. For any CoCo with 64K or more. Doesn't replace "Big Basic". Only $8.95 U.S. or $10.50 CDN.+$2.50 S&H (Add 8% PST in Ont.)

"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. Restore killed files.
- Fast entry of M.L. Listings.
- Dual Windows! Runs 2 Basic Programs at once!
- Disk chains unlimited amounts of program sections or data.
- Includes Demo Program and Manual.
- Any CoCo (at least 64K) with 1.1 or 2.1 Disk Extended Basic.

Only $24.95 U.S. or $28.95 CDN. + $2.50 S & H (Add 8% PST in Ont.)

"UTILITIES PACKAGE"

ACCESS BOTH SIDES OF YOUR DRIVES

"Must - have software for the disk user" - Rainbow, Nov. /89.

"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. 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.

All are Machine Language Running in Background

For any CoCo (at least 64K) with 1.1 or 2.1 Disk Extended Basic

Only $17.95 U.S. or $20.85 CDN. + $2.50 S & H (Add 8% PST in Ont.)

NOW FROM DANOSOFT! DALE RICKERT'S

Feature Packed

"Simply Better"

•Run 2 interactive Wordprocessors at once • Mail -Merge • Create Indexes • Table of Contents • Print-Fill Forms • Displays Fonts in Colors • Displays Underlining • Print Spooling • Auto Saves • Print/Save Blocks of Text • To 480K of Text Storage • Sorts Text • Numbering • Indenting • Calculator • Tasks • Headers • Footers • Paging • Finds • Case Reversal • Help Screens • Preview "WYSIWYG" • Many More Features.

BEST WORD PROCESSOR

Easy to use. Includes some Database Features

Will hold a customer list of more than 5000 in memory for quick recall or editing.

"Significantly Better? Mais Oui! " - Rainbow, Feb., 1990

"..... An excellent choice at an unbelievable price." - Rainbow, April /89

Includes extensive, well indexed Manual, with Tutorials.

128k or 512k CoCo3. Any disk version RS - DOS.

ONLY $39.95 U.S. or $46.50 CDN. + $2.50 S & H (Add 8% PST in Ont.)

Add $7.00 U.S. or $8.20 CDN. for French Version of Manual

Need more info? See the Rainbow Reviews of these Programs.

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

Between Numbers

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

A few months ago I presented *In-Between*, a program designed to help youngsters determine how to put letters in alphabetical order. This month I drop the other shoe by offering you *In-Between 2*, a program to help a preschooler or early elementary student learn number placement with numbers from one to 10.

As with all recent early childhood programs I have written, *In-Between 2* is designed to work with a minimum of input from the keyboard, using only the space bar and ENTER key. I have found this method to be most successful with very young children because it lets the child concentrate on the material being presented on the screen rather than having them toil over the location of the correct answer on the keyboard. This may not seem like a big thing, but it can make a very big difference in the speed and the ease with which children under the age of six use the program. I like to think the program is kid friendly.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

The Shell

Without going into great detail as to the format this program uses, you may recognize it has the BASIC shell introduced in the program *Opposites*. Although the shell has undergone some modifications in recent issues, the concept still remains the same.

The main objective is to teach number relationships by having the user select a number that goes in-between a set of given numbers.

Only the graphics, which can be time-consuming to create, differ from program to program.

One good point is that you don't have to create the graphics; I've done that for you. You only need to type in the program as listed or load it from a RAINBOW ON TAPE or RAINBOW ON DISK.

The main objective of *In-Between 2* is to teach number relationships by having the user select a number that goes in-between a set of given numbers. While I could go into some interesting possibilities with other number sets, for the present I deal with only the numbers one through 10.

While using *In-Between 2*, the student sees a graphics portrayal of each number in a large, chunky style. These are not just stick numbers but nice thick drawings that a young child can visually understand.

The review section of the program lets the student count through the numbers shown on the screen by pressing ENTER. This section is chosen by selecting A from the menu.

Sections B and C quiz the student on the material. The difference between the two choices is that one lets you match the number, while the other lets you match the blank.

The student advances to the correct choice by pressing the space bar until the correct picture is surrounded by the flashing cursor. There is no need to worry if the student passes the right answer. By pressing the space bar several times, the right answer can be selected again. When the student has the desired answer, he must press ENTER to record the answer. The screen clears and the correct match is shown again. Pressing ENTER brings up the next screen.

As always, pressing @ brings up the scorecard early. Pressing C on the scorecard lets the student continue. A new try can be run by pressing Y.

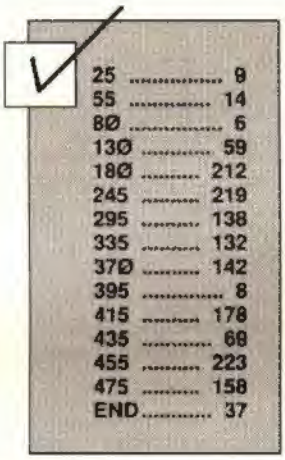
Conclusion

Judging from reader mail, this format still seems to be one of the best ways to convey new material to young users. If you stop to think about it, the possibilities for educational material are almost unlimited. (Just think, we've done music, numbers, letters, opposite concepts, etc.)

If you have an idea for this format, drop me a line. I am always looking for new ways to use this concept.

Next month we'll use graphics as an aid in learning the 50 states. ❑

32K Extended



The Listing: BETWEEN2

```
1 REM*****************************
2 REM*    IN-BETWEEN VOL.2       *
3 REM*   COPYRIGHT (C) 1990      *
4 REM*     BY FRED B. SCERBO     *
5 REM*     60 HARDING AVENUE     *
6 REM*  NORTH ADAMS, MA 01247    *
7 REM*****************************
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,188);STR
ING$(32,204);:FORI=1TO160:READA:
PRINTCHR$(A+144);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,179);
25 DATA93,88,93,80,93,88,16,45,4
4,44,34,45,44,45,37,44,45,44,45,
37,40,,45,36,46,45,36,46,45,37,3
2,37
30 DATA85,,85,89,85,,,37,,,42,37
,,33,36,,37,,36,37,,,37,,42,33,,
42,33,37,41,37
35 DATA85,,85,80,93,,28,37,44,44
,34,37,44,45,,,37,,,37,,34,37,,4
6,45,,46,45,37,32,45
40 DATA85,,85,,85,,,37,,,42,37,,
32,,,37,,,37,,42,37,,42,32,,42,,
37,,37
45 DATA87,82,87,82,87,82,,39,35,
34,40,39,35,39,,,39,34,,37,35,43
,39,33,43,39,33,43,39,37,,37
50 PRINT@358," AN INTRODUCTION T
O  ";:PRINT@390," SEQUENCE IN NU
MBERS ";
55 PRINT@422,"  BY FRED B.SCERBO
   ";:PRINT@454," COPYRIGHT (C)
1990  ";
60 X$=INKEY$:IFX$<>CHR$(13)THEN6
0
65 DIM P$(10,2),A$(6),B$(10),C$(
10),A(10),N(10),B(4),C(4),D(4),E
(4),F(4),AO(10)
70 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO10:READP$(I,1),P$(I,
2):NEXT
75 COLOR1,0
80 CLS:PRINT:PRINTSTRING$(32,"-"
);:PRINT@102,"AN INTRODUCTION TO
":PRINT@134,"SEQUENCE IN NUMBERS
```


ATLANTA COCOFEST

October 6, 1990—11 A.M. to 6 P.M. October 7, 1990—10 A.M. to 4 P.M.

Holiday Inn Northlake (Off I-285)

Exhibits and demonstrations (and special show prices) from leading CoCo vendors such as Microcom, Second City Software, Burke & Burke, Gimmesoft, T & D, Zebra, CoCoPRO!, and MANY others! A GREAT opportunity to "try before you buy" those items you have had your eyes on!

Introductions of striking NEW products, such as the long-awaited MM-1 from KLE/IMS, and several SURPRISE introductions from other vendors!

Free chances to win valuable door prizes, courtesy of participating vendors and the Atlanta Computer Society! **Grand prize - a BRAND NEW MM/1 !!**

Fellowship and fun with thousands of CoCo enthusiasts JUST LIKE YOURSELF!

Free, informative seminars conducted by leading CoCo experts, such as Chris Burke, Kevin Darling, Art Flexser, and others...along with several SURPRISE guests!

The opportunity to turn unused/unwanted CoCo soft- and hardware into CASH!

Tickets for the Atlanta CoCoFEST are available NOW at a special advance price of $10 for one day, $15 for both days. Onsite hotel lodging available at $49/nite + tax, single or double. To receive the special room rate, your reservation MUST be placed through CoCoPRO!

For tickets, hotel reservations, or further information, contact us at CoCoPRO!--(313)-481-DAVE (3283) 1-8 P.M., 7 days. Modem users may place ticket/room orders using VISA or MC, by calling our BBS at 313-663-6207 (3 lines, 7-E-1,3-1200 on all lines).

COCOPRO!

1334 BYRON YPSILANTI, MI 48198
(313) 481-DAVE (3283)

```
":PRINT@199,"A) REVIEW NUM8ERS":
PRINT@263,"B) QUIZ SPACES":PRINT
@327,"C) QUIZ NUMBERS"
85 PRINT@388,"<<<SELECT YOUR CHO
ICE>>>"
90 PRINT:PRINTSTRING$(32,"-");
95 X$=INKEY$:X=RND(-TIMER):IFX$=
"A"THEN350ELSEIFX$="B"THEN100ELS
EIFX$="C"THEN480ELSE95
100 CLS0:PMODE0,1:PCLS1
105 LINE(0,0)-(254,170),PRESET,B
110 LINE(6,4)-(122,82),PRESET,BF
115 LINE(128,4)-(248,82),PRESET,
B
120 LINE(6,86)-(122,164),PRESET,
B
125 LINE(128,86)-(248,164),PRESE
T,B
130 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
135 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
140 PAINT(2,2),0,0:PCOPY1TO3
145 PMODE0,4:PCLS1
150 LINE(0,0)-(254,170),PRESET,B
F
155 LINE(8,6)-(120,80),PSET,BF
160 PCOPY4TO2:PMODE0,1:SCREEN1,1
165 DATA"S4BM2,8C1","S4BM130,8C0
","S4BM2,90C0","S4BM130,90C0","S
4BM2,48C0","S4BM130,48C0"
170 FORI=1TO10
175 A(I)=RND(10):IFN(A(I))=1THEN
175
180 N(A(I))=1:NEXTI:FORY=1TO10:C
OLOR1,0
185 FORI=2TO4
190 B(I)=RND(3)+1:IFN(B(I))=0THE
N190
195 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
200 B=RND(10):IFB=A((Y))THEN200
205 C=RND(10):IFC=B OR C=A((Y))T
HEN205
210 DRAW A$(1):DRAWP$(A(Y),1)
215 DRAW A$(B(2)):DRAWP$(B,2)
220 DRAW A$(B(3)):DRAWP$(C,2)
225 DRAW A$(B(4)):DRAWP$(A(Y),2)
230 COLOR1,0
235 Z=0
240 PMODE0,4
245 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
250 DRAW A$(B(2))+"C1":DRAWP$(B,
2)
255 DRAW A$(B(3))+"C1":DRAWP$(C,
2)
260 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2)
265 PMODE0,1:SCREEN1,1
270 LINE(8,6)-(120,80),PSET,B
275 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$="@"THEN490
280 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO270
285 Z=Z+1:IFZ=4THENZ=1
290 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
295 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$=CHR$(13)THEN305ELSEIFX$="@
"THEN490
300 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO290
305 IFZ+1=B(4)THEN315
310 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO290
315 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
320 DRAW A$(5):DRAWP$(A(Y),1)
325 DRAW A$(6):DRAWP$(A(Y),2)
330 SCREEN1,1
335 X$=INKEY$:IFX$<>CHR$(13)THEN
335
340 PMODE0,1
345 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO490
350 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
355 FORI=1TO10:DRAW A$(5):DRAWP$
(I,1)
360 DRAW A$(6):DRAWP$(I,2)
365 X$=INKEY$:IFX$<>CHR$(13)THEN
365
370 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
375 RUN
380 DATA"BR56BD44R16U6L4U26L8GBD
2R6D16L4D6BD10BL10D10R10U10NL10B
R6ND10F10NU10BR6NR6U6NR6U4R6"
385 DATA"BR22BD50H4U24E4R20F4D24
G4NL20BH6U1BL8D18R8BG6BR10R4BR4R
4BR4R4BR4R48R6R28U12L6D4L14U4E4R
10E4U8H4L18G4D4R6E2R8F2D2L10G8D1
2"
390 DATA"BR4BBD44R28U12L6D4L14U4
E4R10E4U8H4L18G4D4R6E2R8F2D2L10G
8D12BD12BL6NL6NR6D10BR12NU10R6NU
10R6U10BR6R10D10L10U10"
395 DATA"BR22BD50R16U6L4U26L8GBD
2R6D16L4D6BR24R4BR4R4BR4R4BR4R4B
R26BU16E4U8H4L18G4D4R6E2R8F2D4L1
0G4F4R10D4G2L8H2L6D4F4R18E4U8H2"
400 DATA"BR70BD28E4U8H4L18G4D4R6
E2R8F2D4L10G4F4R10D4G2L8H2L6D4F4
R18E4U8H2BL48BD24R6ND10R6BR6D10U
6R10U4D10BR6U10R10D4L10R4F6BR6NR
10U6NR10U4R10BR6NR10D4NR10D6R10"
405 DATA"BR18BD50R28U12L6D4L14U4
E4R10E4U8H4L18G4D4R6E2R8F2D2L10G
8D14BR34R4BR4R4BR4R4BR4R4BR16BU1
8NR8U14L8D14L10U14L8D22R18D10R8U
10R8U8"
410 DATA"BR74BD28NR8U14L8D14L10U
14L8D22R18D8R8U8R8U8BD24BL48NR10
D4NR10D6BR16U10R10D10NL10BR6NU10
R10NU10BR6U10R10D4L10R4F6"
415 DATA"BR38BD34E4U8H4L18G4D4R6
E2R8F2D4L10G4F4R10D4G2L8H2L6D4F4
R18E4U8H2BD14BR4R4BR4R4BR4R4BR4R
4BR4BU32R30D6L22D8R18F4D10G4L24H
2U4R20U6L20U18"
420 DATA"BR46BD14R30D8L22D6R18F4
D8G4L24H2U4R20U4L20U18BD36BL12NR
10D4NR10D6BR16NU10BR12H4U6BR8D6G
4BR12NR10U6NR10U4R10"
425 DATA"BR38BD32NR8U14L8D14L10U
14L8D22R18D10R8U10R8NU8BD10BL4R4
BR4R4BR4R4BR4R4BR6BU32R30D8L22D8
R18F4D8G4L24H2NU28BE4BR4R14U4L14
D4"
430 DATA"BR46BD14R30D8L22D6R18F4
D8G4L24H2NU26BE4BR4R14U4L14D4BD1
4BL12NR10D4R10D6NL10BR8NU10BR8E6
NH4NE4F6"
435 DATA"BR16BD18R30D6L22D8R18F4
D10G4L24H2U4R20U6L20U18BD30BR32R
4BR4R4BR4R4BR4R4BU32R30D8M-12,+2
4L12M+12,-24L20U8"
440 DATA"BR46BD14R30D8M-12,+22L1
2M+12,-22L20U8BD38BL8L10D4R10D6N
L10BR6NR10U6NR10U4R10BR6D6F4E4U6
BR6NR10D4NR10D6R10BR6U10F10U10"
445 DATA"BR16BD18R30D8L22D8R18F4
D8G4L24H2NU28BE4BR4R14U4L14D4BD6
BR16R4BR4R4BR4R4BR4R4BR6BU32R26F
4D8G4F4D8G4L26H4U8E4H4U8E4BD6BR4
R18D6L18U6BD14R18D6L18U6"
450 DATA"BR50BD14R26F4D6G4F4D8G4
L26H4U8E4H4U6E4BD4BR4R18D6L18U6B
D14R18D6L18U6BD20BL24NR10D4NR10D
6R10BR6U10BR6NR10D10R10U6NL6BR6N
U4ND6R10D6U10BR6R6ND10R6"
455 DATA"BR14BD18R30D8M-12,+24L1
2M+12,-24L20U8BD32BR32NL4BR4R4BR
4R4BR4R4BR6BU32R26F4D24G4L26H4U2
R26U10L22H4U8E2BD4BR6R18D4L18U4"
460 DATA"BR50BD14R26F4D22G4L26H4
U2R26U8L22H4U8E2BD4BR6R18D4L18U4
BD32BL14ND10F10U10BR6D10BR6U10F1
0U10BR6NR10D4NR10D6R10"
465 DATA"BR12BD18R26F4D8G4F4D8G4
L26H4U8E4H4U8E4BD6BR4R18D6L18U6B
D14R18D6L18NU6BD6BR28R4BR4R4BR6R
16U6L4U26L8G8D2R6D16L4D6BR30H4U2
4E4R20F4D24G4L20BU6BR4R12U20L12D
20"
470 DATA"BR36BD44R16U6L4U26L8G8D
2R6D16L4D6BR30H4U24E4R20F4D24G4L
20BU6BR4R12U20L12D20BD14BL30R6ND
10R6BR6NR10D4NR10D6R10BR6U10F10U
10"
475 DATA"BR14BD18R26F4D24G4L26H4
U2R26U10L22H4U8E2BD4BR6R18D4L18U
4BD26BR28R4BR4R4BR6R16U6L4U26L8G
8D2R6D16L4D6BR26R16U6L4U26L8G8D2
R6D16L4D6"
480 CLS0:FORI=1TO10:TEM$=P$(I,1)
:P$(I,1)=P$(I,2):P$(I,2)=TEM$:NE
XT
485 GOTO100
490 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
495 PRINT@229,"WHILE DOING"NW"WR
ONG."
500 NQ=NC+NW:IF NQ=0THEN NQ=1
505 MS=INT(NC/NQ*100)
510 PRINT@293,"YOUR SCORE IS"MS"
%."
515 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
520 X$=INKEY$:IFX$="Y"THEN RUN
525 IFX$="N"THENCLS:END
530 IFX$="C"THEN265
535 GOTO520
```

A Winning Combo
by Bill Bernico

Have you ever wanted to play a game but couldn't find a pair of dice? Or maybe you've created a game program and are looking for some onscreen dice. Let CoCo help in your quest. *Dice* is a short program that draws a pair of dice on the CoCo 3's high resolution screen. To roll the dice, just press a key.

Dice uses the RND function to select two numbers between 1 and 6 to be displayed as dots on the faces of the dice. Since the HDRAW command is used to draw the dice, you can incorporate the routine into your own program and use the scale subcommand to scale the dice to the desired size.

The Listing: DICE

```
1 'DICE ROUTINE BY BILL BERNICO
2 ATTR0,0:HSCREEN2:HCLS4:HCOLOR8
,4:DT$="RDLU2R2D3L3U3F":DI$="BL4
BUR22D22L22U22E5R22NG5D22NG5U22L
22G5BF3":B=RND(6):HDRAW"BM112,94
"+DI$:Z=B:GOSUB4:C=RND(6):HDRAW"
BM152,94"+DI$:Z=C:GOSUB4:T=B+C:H
PRINT(11,8),"YOU ROLLED"+STR$(T)
:HPRINT(13,16),"HIT A KEY
3 EXEC44539:GOTO 2
4 IF Z=1THENHDRAW"BR7BD8"+DT$
5 IF Z=2THENHDRAW"BR2BD2"+DT$+"B
R10BD12"+DT$
6 IF Z=3THENHDRAW"BR2BD2"+DT$+"B
R5BD6"+DT$+"BR5BD6"+DT$
7 IF Z=4THENHDRAW"BR2BD2"+DT$+"B
R10BD12"+DT$+"BU12"+DT$+"BD12BL1
0"+DT$
8 IF Z=5THENHDRAW"BR2BD2"+DT$+"B
R10BD12"+DT$+"BU12"+DT$+"BD12BL1
0"+DT$+"BU6BR5"+DT$
9 IFZ=6THENHDRAW"BR2BD2"+DT$+"BD
6"+DT$+"BD6"+DT$+"BR10"+DT$+"BU6
"+DT$+"BU6"+DT$:RETURNELSERETURN
```


Hi-Res Input Editor
by Bill Bernico

Input 3 demonstrates a programming routine that allows graphics-screen input and backspacing. With this routine, you can build your own BASIC programs in which users can enter and edit their responses on the Hi-Res graphics screens. Run INPUT3 to see how it works. The input and backspace subroutine is in lines 5 through 11 and is called in Line 3.

The Listing: INPUT3

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 'INPUT TEXT 3 BY BILL BERNICO
2 RGB:HSCREEN2:HCLS4:HCOLOR8,4:H
PRINT(5,2),"COCO 3 TEXT INPUT RO
UTINE":HPRINT(7,4),"(BACKSPACE T
O ERASE)":HCIRCLE(80,65),20:HDRA
W"BM130,47R35D35L35U35BR90G35R70
H35":HPAINT(80,65),6,8:HPAINT(13
5,48),3,8:HPAINT(235,70),2,8
3 HPRINT(5,13),"NAME:":Z$="":GOS
UB5:HPRINT(2,21),"IS "+Z$+" CORR
ECT? (Y/N)
4 X$=INKEY$:IFX$="Y"THEN13ELSEIF
X$="N"THEN2ELSE4
5 HLINE(80,103)-(320,111),PRESET
,BF:Z$="":X=10
6 Y$=INKEY$:IFY$=""THEN6
7 IFY$=CHR$(13)THENRETURN
8 IFY$=CHR$(8)AND LEN(Z$)>0THENZ
$=LEFT$(Z$,LEN(Z$)-1):HCOLOR4,4:
HLINE((X*8)-8,95)-(X*8,111),PRES
ET,BF:HCOLOR8,4:X=X-1:GOTO6
9 Z$=Z$+Y$
10 HPRINT(X,13),Y$:X=X+1
11 IFLEN(Z$)>30THENRETURN
12 GOTO6
13 CLS:PRINT"NOW WORK IT INTO YO
UR PROGRAM!":END
```

Signs, Banners & Greeting Cards
Coco Graphics Designer Plus.....$29.95

Labels with Text & Graphics
Label Designer $34.95

The CGDP and Label Designer require a 64K CoCo II or 3 with a disk drive and mouse or joystick. Many popular printers are supported. Consult previous ads or call Zebra. Include $3 Shipping plus $3 more for CODs. VISA/MC accepted. PA residents add sales tax.

Zebra Systems, Inc., 121 S. Burrowes Street, State College PA 16801 (814) 237-2652

Programming Structure

by William Barden, Jr.
Contributing Editor

BASIC, as a built-in operating system in your CoCo 1, 2 or 3 is different from BASIC09 used under OS-9. For one thing, Extended Color BASIC and Disk BASIC were developed by Microsoft, while BASIC09 was developed by Microware. It would have been difficult for Microware to develop a BASIC identical to Microsoft's Extended Color BASIC because of the design of OS-9, the operating system under which BASIC09 runs. Also, aside from making it easy to switch between the two BASICs, it wouldn't necessarily be desirable, since BASIC09 offers some powerful features. BASIC09 is somewhat harder to use than Extended BASIC, but it is faster, it is a structured language, and certain aspects of it are more powerful.

Just to clear the air, BASIC09 does have its disadvantages as well. First, you must work under OS-9 to use it. Fortunately, running BASIC09 is probably the easiest thing to do under OS-9, and it's worth the effort. Secondly, BASIC09 is not as *interactive* as the Microsoft BASICs on the CoCo. BASIC09 is harder for a beginner to use, although OS-9 aficionados might disagree.

It's worthwhile, however, to take a long look at BASIC09 just on the basis of its benefits. There's no question that BASIC09 is about three to 10 times faster than Extended or Disk BASIC on the CoCos, so I won't belabor that point. I'll talk instead about the basic structured philosophy of BASIC09 and why that's important. In the course of investigating that question, I'll uncover some of the powerful aspects of BASIC09.

It's worthwhile to take a long look at BASIC09 just on the basis of its benefits.

Spaghetti Code

BASIC has a reputation of resulting in *spaghetti code*, that is, a tangled mess of interwoven strands of computer pasta. Statements in typical programs aren't executed in sequence from beginning to end, but rather as a series of GOTO's that take you every which way through the code. Typical BASIC programs are hard to follow with all of their loops, nooks and crannies.

Spaghetti code programs are hard to maintain and debug. Even the programmer who writes such a program will find it difficult to decipher when he or she pulls it out of a drawer six months after using it. Because of the huge amounts of money spent in industry on program maintenance (about 90 percent of the total cost of programming projects), a great deal of effort was expended to develop *structured* programming languages to eliminate such convoluted programs. The result is Pascal, C, Ada and structured BASIC languages, among others. BASIC09 fits into the structured BASIC niche.

Structured languages are much easier to understand because of the way they are written and printed. Although they tend to be verbose — lots of words, white space and print formatting — they are definitely *in*. No self-respecting college teaches spaghetti BASIC in their computer science curriculum — it's all structured. Industry hires many programmers who write in structured languages. New languages such as Modula-2 are designed along structured lines.

Structured-Language Elements

Although you won't find this as gospel in courses about structured programming, "Barden's Buffer" maintains there are five elements of structured languages. I'll list them, explain them, and show you some examples in BASIC09. First the list. BASIC09 and other structured languages:

- generally don't use line-numbered statements.
- are modular.
- use several types of loops.
- use local variables.
- use data types.

Line Numbers

It's impossible to write a program without line numbers in Extended BASIC, but in BASIC09, it's the usual case. Although line numbers can be used optionally, most BASIC09 programs do not use them. Think about it. Line numbers in Extended BASIC are used as place markers for GOTOs and GOSUBs. You can still use GOTOs and GOSUBs in BASIC09, but most of the code flows from beginning to end with loops in the middle. An Extended BASIC loop doesn't need line

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

numbers. There's a loop control variable that controls the loop instead. For example:

```
100 FOR I=1 TO 100
110 IF A(I)<100 THEN T1=T1 + A(I
) ELSE T2=T2 + A(I)
120 NEXT I
```

In BASIC09 this would be written in much the same way but with more indentations and physical structure:

```
FOR i:=1 TO 100
 IF a(i)<100 THEN
  t1=t1 + a(i)
 ELSE
  t2=t2 + a(i)
 ENDIF
NEXT i
```

How do you call a subroutine or get back to different points in a program without line numbers? Subroutines are generally written as their own procedures in BASIC09 — separate programs that are given their own names. They're called by this name as well. Instead of using a GOSUB 10000 statement, you might use a RUN Total(t2) instead. (Naming subroutines makes their functions a lot more understandable.) As far as getting back to a point in a program, you'd normally want to do this for a loop condition. Structured languages force you to recognize that loop and use one of several types of loop control structures, which I'll talk about in a moment. As a matter of fact, the whole concept of spaghetti code is blamed on licentious use of GOTOs. In a classic letter to a computer science magazine, E. W. Dijkstra deemed GOTOs "harmful" and started the whole controversy over spaghetti code, so you won't see too many GOTOs in structured programs, although many languages begrudgingly allow them.

Modularity

Extended and Disk BASIC programs are one humongous program. Programs in BASIC09 and other structured languages tend to be collections of *modules*. A module is a collection of BASIC code that performs a certain function — adding the elements in an array, printing a record in a particular format, or inserting a record in a list, for example. There's no limit to the number of lines of code that can be used, but most modules are less than 100 lines or so. Unlike Extended and Disk BASIC, BASIC09 modules are entered at the beginning and exited at the end. In spaghetti code, of course, you can break out of code and GOTO any place in the program, or enter code in the middle of a routine.

These BASIC09 modules are called *procedures* and are given names. A large program would have several procedures with many different RUN statements to call them. A BASIC09 program to read a mailing list entry, search an existing mailing list for the entry to eliminate duplicates, insert the entry, and then print the entry might look like this:

SUPER BACKUP UTILITIES

** Requires minimum 64K **
* Copies either standard or OS-9 disks
* Does not abort on errors; allows you to copy disks that contain bad sectors
* Errors are reported by track and sector number
* Utilizes all your RAM. 512K version will make multiple copies of a disk after loading the data only once
* A must for single-drive backups:
Copies 10 tracks at a time using 64K
Copies 19 tracks at a time using 128K
Copies an entire 80-track disk using 512K!
Less disk swaps mean a big savings in time

SUPER BOOT

** COCO-3 ONLY **
* BOOT your DECB (RS-DOS) disks by typing DOS
* Automatically sets printer baud rate
Supports 300, 600, 1200, 2400, 4800, 9600
* Automatically sets number of disk tracks/sides
Supports 35, 36, 40, 80--single or double
* Automatically sets drive step rate
Supports 6, 20, 30
* Displays directory in two columns, up to four 'pages'. As many as 128 entries can be displayed without scrolling off the screen
* Auto-starts file named STARTUP or select file to LOAD or LOADM using arrow keys

Each program $15.00 (U.S.). Both $25.00
Send check or money order to:
C. ENGLAND
128 Shepherd Dr. N.E.
Calhoun, GA 30701

* 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** (Drivers for Ext. ADOS-3 and OS-9 included; usable in 28-pin socketed controllers or in Rompack, **$10**).

"...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 Disk, **$27.95**.

FOR OS-9: SmartWatch real-time clock with driver, **$30.00**; in Rompack, **$40.00**.

SPECTROSYSTEMS
11111 N. Kendall Dr.
Suite A108
Miami, FL 33176
(305) 274-3899

PLEASE ADD $2 S-HIPPING • NO DELAY ON PERSONAL CHECKS
WE CANNOT ACCEPT CREDIT CARDS

```
PRINT "Getting next entry..."
RUN GetEnt (LS)
RUN SearchL (FND)
IF fnd THEN
PRINT "Entry exists!"
 ELSE
 RUN InsertL (LS)
 RUN PrintE (LS)
ENDIF
```

You can look upon the procedures as nice, neat, little subroutines with names used in place of GOSUBs with line numbers. Of course, if you don't use a lot of subroutines in Extended or Disk BASIC, you need to change your coding philosophy! (The truth of the matter is that you should have been using neat, modular subroutines in Extended and Disk BASIC as well . . .)

Structured Loops.

Another key to structured programming is the use of several types of loops. In Extended or Disk BASIC there's really only one type of loop, the FOR...TO loop. Because line numbers are discouraged in BASIC09 (and other structured languages) there's not only the FOR...TO loop but three other loops as well. Here are examples of each, all of which accomplish the same thing — adding the number of parts on hand for 10 items in an inventory:

```
WHILE i<11 DO
 total:= total + oh(i)
 i:= i + 1
ENDWHILE
REPEAT
 total:= total + oh(i)
 i:= i + 1
UNTIL i=11
LOOP
 total:= total + oh(i)
 i:= i + 1
EXITIF i=11 THEN
ENDEXIT
ENDLOOP
```

There are some subtle differences between the three types of loops. The WHILE loop is executed only if the WHILE condition is true. The loop won't be executed at all if the condition is false. The REPEAT loop is always executed at least once before a terminating condition can be checked. The LOOP structure is also executed at least once before the terminating condition can be checked. FOR...TO loops in both Disk BASIC and BASIC09 check the terminating condition before the loop is executed.

As with Extended BASIC, BASIC09 loops can be large or small and can contain any number of nested loops — loops within loops.

Local Variables

Once a variable in Extended BASIC programs is referenced, it can't be used for anything else. It exists as that variable throughout the entire program. Woe to a BASIC programmer who uses the same variable name later in the program, forgetting that he used it earlier. That variable will be clobbered by the second use. A global variable is one recognized throughout the entire program. All variables in Extended BASIC are global variables.

Structured languages, however, such as BASIC09 use local variables. Variable names are recognized only within the procedure in which they are referenced. You can use the same variable name in many different procedures without problems. This makes the whole problem of mistakenly using the same variable later in a program much less of a possibility. It also allows different programmers to write different modules of a larger program without regard to variable names used by the other programmers.

Every program must have global variables, the main variables in the program where key elements are stored. These can be established and maintained in a main procedure. When subroutines are run as procedures, variables can be passed as parameters to and from the procedure in the calling sequence. The following call inserts an entry in a mailing list and returns the size of the list in another variable:

```
RUN InsertEl(Entryl, Sizel)
```

In Extended BASIC, parameters are not really passed; they just exist from being previously defined, and they are manipulated by all parts of the program, including subroutines.

BASIC09, like other structured languages, also allows you to pass variables by *value* or *reference*. When variables are passed to a procedure by value, they are not changed by that procedure. This protects the contents of variables while allowing procedures (subroutines) to operate on them. Of course, the variable can still be changed by the procedure that calls the lower-level procedure that uses the variable.

There are times, though, when you want the called procedure to change the parameter. In this case the parameter is passed by reference. The location of the variable is passed to the procedure, which then changes the actual value of the variable. This is especially valuable in a type of procedure called a recursive procedure in which a procedure calls itself many times for operations on the same data until some terminating condition is reached.

The important thing to remember here is that BASIC09 allows either local variables that do not change the content of variables passed as parameters or an alternative condition that allows procedures to change the content of variables. In short, it's everything you'd want to do.

Data Types

In Extended BASIC, there are only two variable types. A numeric data type is treated as either an integer or *floating-point* mixed number. A string data type provides for character data. Structured languages, though, allow many different types of variables. BASIC09 allows five different data types — BYTE, INTEGER, REAL, BOOLEAN and STRING. BYTE variables are whole numbers from 0 to 255; INTEGER variables are whole numbers from -32768 to +32767, and REAL variables are mixed (floating-point) numbers. BOOLEAN variables can hold only two values, TRUE or FALSE. STRING variables are similar to Extended or Disk BASIC variables.

Variables are typed by defining them in DIM (dimension) statements in BASIC09. If a variable is not typed, it is assumed to be type REAL. Here are some typical BASIC09 DIM statements:

```
DIM name1, name2: STRING
DIM count, size: INTEGER
DIM sex: BOOLEAN
```

There are several good reasons for using data types. First, it helps to define the variables and forces you to consider the ranges of numbers that can be used with them. Secondly, data types can be very efficient in terms of memory. A BOOLEAN data type, for example, takes up only one bit in most languages. While you can accomplish the same thing in an Extended or Disk BASIC variable, it will take 40 times the amount of storage, five bytes vs. one bit.

The Bottom Line

BASIC09 differs from Extended BASIC because of the structure of OS-9 and contemporary thought about computer languages. There's no question that you can do a lot using only Extended BASIC. However, you can accomplish those things and more with BASIC09, at higher speeds. In the process, you'll learn a structured language whose concepts are very easy to translate into such popular languages such as Pascal, C and Ada. You'll also learn good programming techniques that will free you from the horrors of spaghetti code. Finally, you'll be able to apply some advanced techniques such as recursion that are simply not possible in Extended BASIC on the CoCo.

See you next month with more CoCo topics.

Sugar Software

☞ New CoCo Calligrapher V2 for CoCo III! ☜

The popular RS-DOS version of the Calligrapher has been upgraded for the CoCo III! This new version has some of the advanced features that were only available in the OS9 Calligrapher. **$24.95** (upgrade your old V1 version for $12.50).

CALLIGRAPHER

CoCo Calligrapher V2 - Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful flyers, certificates, labels and more. Includes three ½ inch high fonts. Over 135 additional fonts are available (see below). Version V1 is available for any CoCo, Tape or Disk; Version V2 requires CoCo III and Disk; **$24.95**.

Calligrapher V2 - 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. Disk only. Specify RS-DOS, OS9 or MS-DOS format.

Sample Calligrapher CliPix Pictures

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

Calligrapher CliPix - The Calligrapher may now include graphics pictures along with the text it prints. There are currently 9 different CliPix disks available, each one has over 60 different graphic pictures. While the OS9/MS-DOS Calligrapher may easily combine both text and CliPix, the RS-DOS (CoCo) Calligrapher may also print out the CliPix. **$9.95** each.

- **ClIPix #1** - Animals
- **ClIPix #2** - Astrology/Mythology
- **ClIPix #3** - Jobs (Occupations)
- **ClIPix #4** - KidStuff
- **ClIPix #5** - Miscellaneous
- **ClIPix #6** - Occasions
- **ClIPix #7** - Sports
- **ClIPix #8** - Vehicles
- **ClIPix #9** - X-Rated

SPECIAL INTEREST

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

DATA BASE

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

TIMS (The Information Management System) - Tape or disk, fast and simple general data base program. Create *files* of *records* that can be quickly sorted, searched, deleted and updated. Powerful printer formatting. Select records to print: all, from screen or a range. Up to 8 *user* fields, sort on up to 3 fields. Tape/Disk; **$19.95**.

TIMS Mail - Tape or Disk based mailing list program. Files are compatible with TIMS. Fast and simple to use. Supports labels 1, 2 or 3 across, 2¼ to 4 inches wide. Tape/Disk; **$19.95**.

TIMS Utility - Utility companion for TIMS and TIMS Mail for multi-term search (*AND* and *OR* logic), global change and delete, split large files and more! Tape/Disk; **$14.95**.

EDUCATIONAL

The Educational Combo - Learning stuff has never been so much fun! The Combo includes these educational (and entertaining) games:

- **Silly Syntax** - (ages 5 and up)
- **Galactic Hangman** - (ages 7 and up)
- **The Presidents** - (ages 10 and up)
- **The Great USA** - (ages 9 and up)
- **Trig Attack** - (ages 9 and up)

All five programs on one disk for only **$29.95**!

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.

GET 'EM WHILE THEY'RE STILL HOT

BACK ISSUES STILL AVAILABLE

Have you explored the wealth of information in our past issues? From our very first, four-page issue to many with more than 300 pages of material, it's all just for CoCo users — a great way to expand your library!

A WORLD OF INFO AT A BARGAIN PRICE

All back issues sell for the single issue cover price. In addition, there is a $3.50 charge for the first issue, plus 50 cents for each additional issue for postage and handling if sent by United Parcel Service. There is a $5 charge for the first issue, plus a $1 charge for each additional issue on orders sent by U.S.Mail. UPS will not deliver to a post office box or to another country.

MOST ISSUES STILL AVAILABLE

Issues July 1981 through June 1982 are available on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 5 percent sales tax. In order to hold down costs, we do not bill, and no C.O.D. orders are accepted.

Due to heavy demand, we suggest you order the back issues you want now while supplies last.

To check availability and order, review and fill out the form below and mail it with your payment.

For greater convenience, order through the Rainbow Magazine Services area of our Delphi CoCo SIG.

RAINBOW INDEX

A complete index for July 1981 through June 1984, is printed in the July 1984 issue. Separate copies are available for $2.50 plus 50¢ handling.

Indexes for subsequent years are published annually in the July issues of THE RAINBOW.

TOTAL _____

KY RESIDENTS ADD 6% _____

U.S. MAIL CHARGE _____

SHIPPING & HANDLING _____

U.P.S. CHARGE _____

TOTAL AMOUNT _____

ENCLOSED _____

Article Reprints

In instances where a given issue is now out of print and not available for purchase, we do provide photocopies of specific articles. The cost for this service is $1.50 plus 50 cents S/H per article. This service is provided *only* in the case of out-of-stock issues.

Name _____

Address _____

City _____ State _____ Zip _____

❑ Payment Enclosed, or

Charge to my: ❑ VISA ❑ MC ❑ AE

CARD # _____

EXPIRATION DATE _____ PHONE ( ) _____

SIGNATURE _____

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.

send to:

THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

Please send me the following back issues:

	VOLUME 1		
JUL 81	Premier Issue	$2.00	❑
AUG 81		$2.00	❑
SEP 81	Education	$2.00	❑
NOV 81		$2.00	❑
DEC 81	Holiday	$2.00	❑
FEB 82		$2.00	❑
	VOLUME 2		
JUN 83	Printers	$2.95	❑
	VOLUME 3		
AUG 83	Games	$2.95	❑
SEP 83	Education	$2.95	❑
OCT 83	Graphics	$3.95	❑
MAR 84	Business	$3.95	❑
APR 84	Gaming	$3.95	❑
MAY 84	Printer	$3.95	❑
JUN 84	Music	$3.95	❑
JUL 84	Anniversary	$3.95	❑
	VOLUME 4		
AUG 84	Games	$3.95	❑
SEP 84	Education	$3.95	❑
OCT 84	Graphics	$3.95	❑
NOV 84	Data Comm.	$3.95	❑
DEC 84	Holiday	$3.95	❑
JAN 85	Beginners	$3.95	❑
FEB 85	Utilities	$3.95	❑
MAR 85	Business	$3.95	❑
APR 85	Simulations	$3.95	❑
MAY 85	Printer	$3.95	❑
JUN 85	Music	$3.95	❑
JUL 85	Anniversary	$3.95	❑
	VOLUME 5		
AUG 85	Games	$3.95	❑
SEP 85	Education	$3.95	❑
OCT 85	Graphics	$3.95	❑
NOV 85	Data Comm.	$3.95	❑
DEC 85	Holiday	$3.95	❑
JAN 86	Beginners	$3.95	❑
FEB 86	Utilities	$3.95	❑
MAR 86	Business	$3.95	❑
APR 86	Home Help	$3.95	❑
MAY 86	Printer	$3.95	❑
JUN 86	Music	$3.95	❑
JUL 86	Anniversary	$3.95	❑
	VOLUME 6		
AUG 86	Games	$3.95	❑
SEP 86	Education	$3.95	❑
OCT 86	Graphics	$3.95	❑
NOV 86	Data Comm.	$3.95	❑
DEC 86	Holiday	$3.95	❑
JAN 87	Beginners	$3.95	❑
FEB 87	Utilities	$3.95	❑
MAR 87	Business	$3.95	❑
APR 87	Home Help	$3.95	❑
MAY 87	Printer	$3.95	❑
JUN 87	Music	$3.95	❑
JUL 87	Anniversary	$3.95	❑
	VOLUME 7		
AUG 87	Games	$3.95	❑
SEP 87	Education	$3.95	❑
OCT 87	Graphics	$3.95	❑
NOV 87	Data Comm.	$3.95	❑
DEC 87	Holiday	$3.95	❑
JAN 88	Beginners	$3.95	❑
FEB 88	Utilities	$3.95	❑
MAR 88	Business	$3.95	❑
APR 88	Home Help	$3.95	❑
MAY 88	Printer	$3.95	❑
JUN 88	Music	$3.95	❑
JUL 88	Anniversary	$3.95	❑
	VOLUME 8		
AUG 88	Games	$3.95	❑
SEP 88	Education	$3.95	❑
OCT 88	Graphics	$3.95	❑
NOV 88	Data Comm.	$3.95	❑
DEC 88	Holiday	$3.95	❑
JAN 89	Beginners	$3.95	❑
FEB 89	Home Help	$3.95	❑
MAR 89	Hardware	$3.95	❑
APR 89	Business	$3.95	❑
MAY 89	Printer	$3.95	❑
JUN 89	Summer Fun	$3.95	❑
JUL 89	Anniversary	$3.95	❑
	VOLUME 9		
AUG 89	Beyond BASIC	$3.95	❑
SEP 89	Education	$3.95	❑
OCT 89	Graphics	$3.95	❑
NOV 89	Data Comm.	$3.95	❑
DEC 89	Holiday	$3.95	❑
JAN 90	Beginners	$3.95	❑
FEB 90	Home Help	$3.95	❑
MAR 90	Hardware	$3.95	❑
APR 90	Business	$3.95	❑
MAY 90	Printer	$3.95	❑
JUN 90	Summer Fun	$3.95	❑
JUL 89	Anniversary	$3.95	❑
	VOLUME 9		
AUG 90	OS-9	$3.95	❑
SEP 90	Education	$3.95	❑
OCT 90	Graphics	$3.95	❑

TANDY® ADD-ONS

SPECIAL OF THE MONTH

DRIVE CARDS

For model 1000, SX, TX, SL, TL, 3000, 3000NL

20 Meg Drive Card	65 MS	$269.95
20 Meg Drive Card	45 MS	$289.95
32 Meg Drive Card	45 MS	$299.95
40 Meg Drive Card	60 MS	$339.95
49 Meg Drive Card	32 MS	$399.95
64 Meg Drive Card	23 MS	$539.95

Call for current pricing

TDP/2

$699.95

30-Day Money Back Guarantee - you can't lose!

TDP/2 versus Tandy® TL/2

TDP/2	Tandy® TL/2
• 12 MHZ 80286 Processor	• 8 MHZ 80286 Processor
• Built in hard drive controller (2) interface supports up to (2) hard drives	• Built in hard drive controller (1) interface
• Built in floppy drive controller supports 1.2 Meg, 1.44 Meg, 720K, 360K floppies	• Built in floppy drive controller supports 720K, 360K floppies
• Built in printer port	• Built in printer port
• Built in 2 serial (RS232) ports, COM1, COM2	• Built in serial port COM1
• Joystick port	• 2 Joystick ports
• 512K memory expandable to 6 Meg	• 640K memory expandable to 768K
• 1.44 Meg floppy drive	• 720K floppy drive
• Video supports Hercules, monochrome graphics and EGA color graphics	• Video supports Hercules, monochrome graphics and CGA color graphics
• 1 serial, 0 - 19.2K baud	• 0-9.6K baud
• 200 watt power supply	• 67 watt power supply
• Real time clock	• Real time clock
• 101 enhanced keyboard	• 101 enhanced keyboard
• Math co-processor socket	• Math co-processor socket
• 2 UART's - 1 with buffer	• 2 UARTS
• Software: PC Write, PC Calc, PC File	• Software: Deskmate, 3.0 Windows
• 62 DSK	• 58 DSK

TDP/2 Options:

• 12" monochrome monitor	$89.95	• 1.44 Meg floppy	$119.95
• 14" CGA monitor	$279.95	• 720K floppy	$99.95
• 14" EGA monitor & card	$499.95	• 360K floppy	$99.95
• 14" VGA monitor card	$599.95	• 20 Meg drive	$279.95
• 1.2 Meg floppy	$119.95	• 40 Meg drive	$349.95

External Hard Drives for Tandy® EX, HX Computers

Complete System - just plug in (requires 384K min.)

20 Meg **$389.95** 30 Meg **$429.95** 40 Meg **$499.95**

Now we carry IDE Drives for new Tandy®s

20 Meg - CALL **40 Meg - CALL**

100, SX, TX, SL, TL, 3000, 4000

2nd Floppy

360K	TEAC	$119.95
720K	Mitsubishi	$99.95
3½"	Mitsubishi	$119.95

1000, SX, TX, SL, TL

Hard Drive Controller

Will run 1 or 2 Hard Drives
Supports drives up to 120 megabytes

$99.95

1000, 1000A

Memory Board with 512K

Expands memory to 640K

$199.95

1000, SX, TX, SL, TL, 3000, 4000

Memory Upgrades

From

$50

Tandy® EX, HX

360K or 720K External Floppy

For EX or HX

$139.95

Tandy® EX, HX

External Hard Drive

10 Meg	$299.95
20 Meg	$389.95
30 Meg	$429.95
40 Meg	$499.95

Tandy® EX, HX

384K Memory Expansion Card

Includes 384K

$189.95

Color Computer

Drive O

Includes floppy drive, case & power supply, controller & software

$179.95

Tandy® 1400 LT

360K External Floppy

$199.95

Tandy® 1400 LT

720K External Floppy Drive

$199.95

Tandy® 1400 LT

20 Meg Internal Hard Disk Drive

$699.95

Color Computer

Drive O + 1

Includes 2 floppy drives, case & power supply, controller & software

$269.95

Tandy® is a registered trademark of Tandy Corporation

1ST QUALITY MERCHANDISE
QUALITY CUSTOMER SERVICE
508-278-6555
TECHNICAL ASSISTANCE
508-278-6556
FOR YOUR PROTECTION WE CHECK FOR STOLEN CREDIT CARDS

TRUE DATA PRODUCTS

P.O. Box 347, 115 So. Main Street
Uxbridge, MA 01569

Tel. 508-278-6555
1-800-635-0300

Hours: 9 a.m.-6 p.m., Sat. 10 a.m.-4 p.m.

CORPORATE P.O.'s WELCOMED
ALL PACKAGES SHIPPED UPS EXCEPT CANADA AND A.P.O.'s. C.O.D.'s ADD $3.30. MASTERCARD/VISA ADD 2%
ALL RETURNS MUST HAVE RMA# (CALL 508-278-6555). YOU MAY BE SUBJECT TO A RESTOCKING FEE. SHIPPING/HANDLING CHARGES NON-REFUNDABLE
1 YEAR WARRANTY UNLESS OTHERWISE NOTED. PRICES/TERMS/CONDITIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Picture-storage formats and displaying images with OS-9 Level II

Getting the Picture With OS-9

by Tim Kientzle

This is the first of a series of articles that discusses various picture storage formats and presents programs for displaying some of these formats under OS-9 Level II. Although written with the OS-9 Level II user in mind, the information in this series is very useful to CoCo 3 users as well. I compare the three most popular CoCo 3 picture storage formats and present a BASIC09 program to display an uncompressed VEF picture. In future articles I will eventually build up this program to handle more sophisticated formats.

	MGE	CM3	VEF
Palette data	Yes	Yes	Yes
Different resolutions	No	Yes[1]	Yes[2]
Number of lines	200	192, 384[1]	200
Horizontal resolution	320	320	160, 320, 640[2]
Number of colors	16	16	2,4,16[2]
Animation information	1 kind	2 kinds	None
Compression	Poor	Good	Fair[3]
Picture title	Yes	No	No
Patterns	No	Yes	No

Notes:
1) CM3 stores either one or two 320-by-192, 16-color "pages."
2) VEF handles 320-by-200 in four or 16 colors, 640-by-200 in two or four colors, and 160-by-200 in 16 colors.
3) "Squashed" VEF is newer and not yet widely supported.

Table 1: Format Comparisons

How We Got Here

In the days of 16K Extended Color BASIC, saving and loading pictures was easy. You knew where graphics screens started in memory and how big they were, so you could simply CSAVEM that section of memory to cassette. But like everything else, storing graphics has become more complicated, primarily because graphics images are a lot bigger.

When *CoCo Max* made its debut, the largest pictures used a whopping total of 12K. Nowadays CoCo 3 users routinely work with 60K or 90K graphics images, and pictures from other systems can contain 256K or more of graphics data. In order to save both disk space and download time, we need to find some way to reduce the size of these images. For this reason many modern storage formats incorporate compression schemes to reduce the total size of the file. Also, it is now considered necessary to store additional information with the picture data, such as palette data, picture resolution and size, the picture's name, and information about animation.

All of this gets confusing, especially since each new graphics editor seems to use its very own storage format. Including the older CoCo 1 and 2 formats, there are easily 15 distinct graphics formats for the CoCo. When you consider formats used on other machines, there are hundreds of storage methods.

Graphics and OS-9

Many people think using graphics with OS-9 is difficult. Two major reasons for this involve memory considerations and confusion about window types. Let's address the second issue first.

A window in OS-9 Level II is some part of a screen. There are two types of screens. One type is the VDG screen, named after the Video Display Generator of the CoCos 1

Tim Kientzle, currently pursuing a doctorate in mathematics at the University of California at Berkley, has worked with the CoCo since 1982. He is best known in the CoCo world as the database manager for the CoCo SIG on Delphi, and as the author of the V-Term *terminal emulator. He can be reached on Delphi as TIMKIENTZLE. Or you can contact him at 14 Croxton Avenue, Oakland, CA 94611.*

and 2. VDG screens exist in order to allow older OS-9 Level I programs using 32-by-16 text screens and 256-by-192 graphics to run under OS-9 Level II. These screens are handled by the `vdgInt` module, which doesn't support the type of graphics we'll be doing. In order to run the programs presented in this series, you need to be working on a screen handled by `grfint` or `windint`. Any window on a 40-by-24 or 80-by-24 text screen is sufficient. Check your OS-9 manual to learn how to create one of these windows. Or, better yet, see Dale Puckett's "KISSable OS-9" column on Page 58 of this issue.

Bytes	Description
1	Compression type:0=no compression; 128=Squashed
1	Picture resolution 0 - 320-by-200, 16 colors 1 - 640-by-200, 4 colors 2 - 160-by-200, 16 colors 3 - 320-by-200, 4 colors 4 - 640-by-200, 2 colors
16	Palette values

Figure 1: VEF Header Format

Unfortunately, by the time you get the OS-9 windows system running on a 128K CoCo 3, there isn't enough memory left to have both a high-resolution graphics screen and BASIC09 in memory at the same time. So the programs in this article won't run on a 128K system. If you use C or assembly language, you can create this type of graphics, but it requires a great deal of care in order to fit everything into the available memory.

You may want to put together a special disk to play with these graphics programs. Such a disk should contain (at a minimum) `shell`, `grfdrv`, `BASIC09`, `gfx2`, `syscall` and `runb` in the `CMDS` directory. It is also a good idea to create a `SYS` directory on this disk and copy `stdfonts` from your OS-9 Level II

Exclusive!

CIII PagesE v.2.0 ♦

Desktop Publishing, Greeting Card Designer, Form maker, Calligrapher or CAD for the CoCo3. Page size 640x384. Pull-down menus, icons and dialog boxes. Import ASCII text or enter from keybord, mix text with graphics, flow text around irregular shapes. Magnify, rotate, flip, enlarge, reduce, stretch and slide screen in seconds. Page preview, select printers from pull-down menu. Req: CoCo3, Tandy Hi-Res interface, RGB/CMP monitor, joystick/mouse, Epson or compatibles, DMP105/106, OGP220 B/W, Imagewriter, C.ITOH 8510 Prowriter printer... still only $49.95

CIII Clipart Set 1 Set 2

672 clip pieces each set for CIII Pages - each set: $19.95

Font Set 2

14 Banner fonts for CIII PagesE v.2.0 $14.95

CIII Clipart E 1500+ clipart for CIII PagesE. $34.95

CIII Fonts

59 "MAX" like fonts for the ColorMax, Newspaper series and the RAT... only $19.95

CIII Lettrex

Letter-quality text directly from your current ASCII files. 14 great NLQ text fonts. Req.64K CoCo 1/2/3, monitor, 1 drive, mouse, Epson or compatible printer.. $24.95

CIII D-Link

Disk to Disk Tele File Transfer Program. Graphics interface. Req. CoCo3, RGB or CMP monitor, modem, 1 Drive, joystick/mouse... only $24.95 2 for $29.95

♦ UPGRADE POLICY: CIII Pages V.1.0 owners can upgrade to CIII PagesE v.2.0 by sending the original system disk, copy of the sales slip and $12.00 to the address listed below.

Above programs sold exclusively through

Goless Computer Design

1917 Madero St. #8
Waukesha, WI 53186
Phone (414) 549-0750

Write/call for FREE catalog

Check or Money Orders - No COD's
All Orders add $3.00 S&H, WI Residents add 5% Sales Tax

Brainbusters NEW!

TEST WRITING PROGRAM

Designs multiple choice and true/false questions. Allows you to edit, save, load, select, display, randomize and print. Includes utilities for making a cover sheet, answer key and instructions. Uses 32K. ONLY $39.95

the EXAMINER

Permits Brainbuster quizzes to be taken on-screen rather than in written form. Ideal for classroom, home or office, for serious use or just-for-fun. Uses 32K. JUST $24.95

TRIVIA QUIZZES

Trivia-1 (25 Questions). . . $5.50
Trivia-2 (50 Questions). . .$10.95
Trivia-3 (50 Questions). . .$10.95
Trivia-4 (50 Questions). . .$10.95
(History, Sports, Arts & Sci., etc.)

TRADING POST

Send check or money order.
P.O. Box 3453, Carbondale, IL 62902
Specify CoCo 1, 2 or 3. Add $3.00 S/H.

disk so that after booting OS-9 you can merge the standard fonts into the system using:

```
merge /dd/sys/stdfonts
```

This loads the fonts that OS-9 uses on graphics screens into memory. When you start playing with graphics screens, this comes in useful; otherwise you may get stuck on a graphics screen, unable to see what you're typing!

One Problem, Three Answers

There are currently three popular storage formats for CoCo 3 images. Although there are others, these three seem to account for the bulk of the CoCo 3 graphics files currently available.

The MGE format was developed by Greg Miller and Erik Gavriluk for use in their *Color Max 3* graphics program. Public domain utilities to save and load images saved in this format were released early, making this format very popular. It is also a simple format, which has encouraged the writing of other programs to support it. The biggest drawback is that it uses a fairly simple compression method that actually lengthens many files. For this reason, MGE files are frequently stored uncompressed.

The CM3 format was created by Colorware for use in the *CoCo Max III* graphics program. Its greatest strength is that the compression method used works well, and it can handle double-height pictures and two kinds of animation effects. The format is, however, more complicated.

VEF format was developed by the people who developed OS-9 Level II for the CoCo 3. It has become a defacto standard for all OS-9 graphics work, due primarily to the fact that an OS-9 Level II viewer program for this format was available before OS-9 Level II was released. It is simple and many OS-9 utilities exist for converting, saving, loading and editing VEF images. It stores little extra information, and the compressed version, developed for use in *MVCanvas*, is new enough to not be widely supported yet.

The differences between the three graphics formats are summarized in Table 1. As you can already see, there are trade-offs involved. MGE is easy for most RS-DOS users to use, thanks to a simple format and the availability of public domain utilities. CM3 has an effective compression method and good animation support. VEF can store images in varying resolutions. We'll focus on the uncompressed formats in this article and talk in more detail about specific compression methods later.

The Listing, Please

Look carefully at the listing and enter it.

Bytes	Description
1	Zero for original MGE format
16	Palette data
1	Palette type:0=RGB, 1=CMP
1	Compression type:0=compressed, 255=uncompressed
30	Picture title terminated with a null (zero) byte
1	Color cycling speed
1	First and last palettes for cycling, encoded as First*16+Last.

Figure 2: MGE Header Format

You can remove the comments; they exist primarily to help you read and understand the listing. The program can be divided into roughly three parts:

1) open file and read header data
2) set up screen
3) read picture data from file and display it on the screen

OS-9 Level II 512K

The Listing: VEF

```
PROCEDURE VEF
 0000       (* Display a VEF format picture file on a window screen
 0037       PARAM Filename:STRING
 003E       BASE 0
 0040
 0041       (* Stores info about the screen we're using
 006C       (* sctype=OS9 screen type; bytes=bytes/line; width = pixels/line
 00AC       TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 00C3
 00C4     (* Since there are two different sizes of lines, we create a structure
 010A       (* with two different-sized arrays, so we can use fast GET and PUT
 014C       (* commands for I/O.
 0160       TYPE LineType=long(160):BYTE; short(80):BYTE
 017B
 017C       DIM palette(16):BYTE
 0188       DIM compress:INTEGER
 018F       DIM line:LineType
 0198       DIM scrn:ScrnType
 01A1       DIM path,scpath:BYTE
 01AC       DIM i:INTEGER
 01B3       DIM char:BYTE
 01BA
 01BB       (* First, open the file
 01D2       OPEN #path,Filename:READ
 01DE
 01DF       (* Get the header information
 01FC       RUN GetHeader(path,scrn.sctype,palette,compress)
 0218       (* Create the screen and set up "scrn" structure.
 0249       RUN SetScreen(scpath,scrn)
 0258
 0259       FOR i=0 TO 15 \(* Set the palettes
 027C         RUN GFX2(scpath,"Palette",i,palette(i))
 029D       NEXT i
 02A8
 02A9       FOR i=1 TO 8 \(* VEF convention is to skip top 8 lines
 02E1         RUN GetLine(path,scrn.bytes,compress,line)
 02FD       NEXT i
 0308       FOR i=0 TO 191 \(* Load and display each line
 0335         RUN GetLine(path,scrn.bytes,compress,line)
 0351         RUN PutLine(scpath,scrn,i,line)
 036A       NEXT i
 0375
 0376       RUN GFX2("Bell") \(* Tell the user we're done
 039D       GET #scpath,char \(* Wait for a key press
 03BE       RUN GFX2("KillBuff",1,1) \(* Kill the buffer we used
 03EE       RUN GFX2("Select") \(* Select the screen where we started
 0421       CLOSE #path \(* close the disk file
 043D       IF scpath>2 THEN  \(* If it's not StdI/O, close the screen
 0470         CLOSE #scpath
 0476       ENDIF
 0478       END

PROCEDURE GetHeader
 0000       (* Read header info from "path", return window type, palettes,
 003E       (* and compression code.
 0056       PARAM path:BYTE
 005D       PARAM wintype:INTEGER
```

Two-Liner Contest Winner . . .

Grab the kids and the dog and gather around the old CoCo to celebrate a traditional kid's favorite. Watch the stars twinkle on the screen as the CoCo plays a familiar tune.

The Listing:

```
5 PMODE4,1:PCLS:SCREEN1,1:C$="C5
BM128,70D20U10R5L10R5E5G10E5F5H1
0":O$="C0BM128,70D20U10R5L10R5E5
G10E5F5H10":S$="CCGGAAG":T$="FFE
EDDC":U$="GGFFEEDD"
10 O=RND(255):O=RND(191):PSET(O,
O):X=X+1:IFX=100THEN DRAW C$:PLA
Y S$:DRAW O$:PLAY T$:DRAWC$:PLAY
U$:DRAWO$:PLAYU$:DRAWC$:PLAYS$:D
RAWO$:PLAYT$:DRAWC$:FORX=1TO200:
NEXTX:DRAWO$:FORX=1TO200:NEXTX:D
RAWC$:DRAWO$:ELSE10
```

Shawn Gildroy
Mt. Pleasant, Pennsylvania

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

HOT NEWS

AT LAST - AFTER OVER TWO YEARS OF PROGRAMMING...
Three C's Projects proudly announces the release of

THE POWER STONES OF ARD II
The Five Towers of Trafa-Zar

A twist of fate has put you inside the stronghold of the evil wizard, Trafa-Zar. Ill prepared and inexperienced, your only hope of survival is to find the Mind Stone, the second of the three great Power Stones. As an apprentice of the great wizard, Niz, you must rely on your magical training, your wits and your cunning as you face the forces of evil that inhabit the towers.

This fast paced adventure game is really loaded with graphics. You will explore more than 600 rooms and come eye-to-eye with monsters from beyond your imagination. It features an improved, full game save and easy one key command inputs with over FIFTY commands including twenty spells and arrow key movement. It takes two full disks just to hold this much excitement !!!

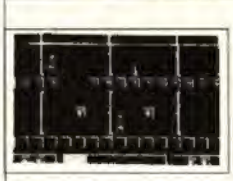
ONLY $25.00 And We Pay Shipping!*
Color Computer 3 and one Disk Drive required
N.C. residents add 5% sales tax
*Outside continental U.S. must send $3.00 shipping and handling

ARD I : The Quest for the Spirit Stone - $18.00
see review - Rainbow Aug 88

THREE C'S PROJECTS

send check or M.O. to: **Three C's Projects**, P.O. Box 1323, Hamlet, NC 28345, (919) 582-5121

IT'S SUPER SALE TIME AGAIN!!



BARBARIAN QUEST
Save your bride to be from the horrors of the evil Luthor's domain! Screen after screen of beautiful graphics and exciting arcade action with fully animated characters. Great digitized sound. Walk, run, jump, climb and fight. Game includes an optional continue feature that allows you to keep playing even if you loose! Set your own level of stress! It's great arcade action! Requires 512K and 1 disk drive. ~~$34~~ ON SALE!!!! JUST $29
Reviewed July '90

THE SUPER DISK
Never before have so many powerful disk utilities been assembled in one package. The manual contains NEVER BEFORE PUBLISHED information about copy protection techniques and the disk has ALL of the utilities you need to use that information. If you are an author, this is a MUST HAVE package! If you just like to SNOOP, this disk has everything you need to read & write any part of a disk, even the data you were not meant to see! If you want to create copy protected disks or copy your valuable originals, THE SUPER DISK is for you! ~~$39~~ ON SALE!!!! ONLY $29
Reviewed March '90

WARGAME DESIGNER II
WGD II is a complete graphic oriented war game design system. Create your own graphic icons for units and terrain features. Design your own maps. Assign each unit it's own unique attributes. Then play the games you want to , the ones YOU designed. It's easy. All modules are menu driven, no programing knowledge required. Comes complete with manual, 2 floppy disks and 4 ready to play scenarios. ~~$29~~ ON SALE!!!! JUST $24
Reviews August '88, July '89, September '89

WARGAME DESIGNER ICON DISK
This disk contains hundreds of ready to use icons for units and terrain features. Save hours of design time. Just transfer these icons to your WGD II game disk (automatically from menu) and you're ready to design a new scenario. A real bargain at just $15
Reviewed June '89

WEEKLY WINNER 3.0
Recently updated, WW 3.0 now handles 3,4,5,6 and 7 digit lottos. We've personally seen it pick 4 and 5 out of 6 in the Ohio SUPER LOTTO and have had reports of winnings from users in other parts of the US. Enhance YOUR chance! Invest in WEEKLY WINNER 3 today ONLY $15
MSDOS Version only $21.00

COCO 3 FLAGS
This is the BEST "RISK" play alike available for the COCO 3. Screen shows the entire world and zooms in on the area you choose. For 1 to 6 players. It's great entertainment for a mere ~~$24~~ ON SALE!!!! ONLY $19
Reviewed August '89

COCO 3 WHEEL
Outstanding party fun of 1 to 6 players! You can even design your own word puzzles. ~~$24~~ ON SALE!!!! JUST $19.
Reviewed May '89

VOCAB
If you like SCRABBLE, you'll love VOCAB. It even includes a family of computer opponents. For 1 to 6 players. ~~$24~~ ON SALE!!!! JUST $19

NEW!!! **GNOME** **NEW!!!**
Great addictive non-violent arcade action fun by Mike Snyder. See if you as Tel Hilar, the Gnome Prince can recover the Spirit Sword from the evil Jarane. Dozens of screens to conquer require quick reflexes and concentration. ML, COCO 3 128K Disk. INTRODUCTORY PRICE JUST $21.

NEW!! **FIRESPIRE** **NEW!!!**
Here comes the sequel to GNOME already! We should have waited but this is just too much fun to hold back! Now that you've recovered the Spirit Sword, it's time to find the Firespire. More screens, more action than GNOME. GNOME not required to play. ML, COCO 3, Disk. ALSO INTRODUCTORY PRICED AT $21.

Get both! GNOME and FIRESPIRE for JUST $32

All orders are shipped via first class mail within 24 hours of receipt. We accept VISA, MASTERCARD, MONEY ORDERS, PERSONAL CHECKS and COD orders. COD's add $3.00. Phone or mail your order in today!

SPORTSware 3524 River Road Toledo, Ohio 43614 (419) 389-1515

The *header* is the first part of the VEF picture file. The GetHeader procedure is responsible for reading the header and interpreting the results. For VEF format, the header consists of 18 bytes as shown in Figure 1.

Setting up the screen is done in the SetScreen procedure. Since some of the graphics operations we'll do later need the size of the window in pixels, or the number of bytes on a line, we set up that information in the scrn variable structure.

SetScreen does use one small trick. Instead of calling gfx2 for the DWSet and Select operations, we set up an array with the codes, so we can do both with just one PUT operation. If we use gfx2 to do these separately, OS-9 temporarily loses track of which screen it is displaying.

Get/Put buffers are very powerful tools for creating OS-9 Level II graphics, because we can't directly manipulate screen memory. We can, however, copy data between screen memory and Get/Put buffers and manipulate the data there. To get the program to run quickly, we read a line of data from the file, store it in a Get/Put buffer, then PUT it on the screen. Repeating this for each chunk of the graphics data puts the entire picture on the screen.

To put the data into the Get/Put buffer, we could either use the GPLoad command to load the data or we could map the buffer into our workspace and copy the data into the buffer directly. The latter method is noticeably faster and somewhat more difficult to understand.

I've isolated the parts of the program that might need to be changed later. In future articles I'll give you only the listings for the GetHeader and GetLine procedures, since they are the only ones that will change.

Some Homework Problems

You might be interested in modifying this VEF program to handle uncompressed MGE format pictures. Figure 2 shows the format of an MGE header to get you started.

Once you get the MGE program working, you can work on making several improvements. Here are some ideas:

- Display the picture title at the bottom of the screen while loading.
- Cycle the palettes while waiting for the user to press a key.

Tune in Next Month

Next month I'll talk about methods to reduce the size of files. In particular, I'll describe some of the many variations on a compression technique known as Run-Length Encoding. It is the simplest technique and, for that reason, one of the most popular compression techniques around. ❑

```
 0064       PARAM palette(16):BYTE
 0070       PARAM compress:INTEGER
 0077
 0078       (* Stores all the info in a VEF header in one variable
 00AE       TYPE VEFheader=comp:BYTE; VEFtype:BYTE; pals(16):BYTE
 00CA       DIM header:VEFheader
 00D3
 00D4       GET #path,header \(* Actually read the header info from path.
 0109
 010A       compress=header.comp \(* Set compression type
 012C       palette=header.pals \(* Set palettes
 0146     wintype=8-header.VEFtype \(* Convert VEF picture type into window type
 0180       IF wintype<7 THEN
 018C         wintype=wintype+1
 0197       ENDIF
 0199       END

PROCEDURE GetLine
 0000       (* Gets one line of graphics data from the file into "line".
 003C       (* "bytes" is the length of the line expected. "compress"
 0075       (* is the compression format
 0091       BASE 0
 0093       TYPE LineType=long(160):BYTE; short(80):BYTE
 00AE
 00AF       PARAM path:BYTE
 00B6       PARAM bytes:INTEGER
 00BD       PARAM compress:INTEGER
 00C4       PARAM line:LineType
 00CD
 00CE       IF bytes>80 THEN
 00DA         GET #path,line.long
 00E8       ELSE
 00EC         GET #path,line.short
 00FA       ENDIF
 00FC       END

PROCEDURE PutLine
 0000       BASE 0
 0002       TYPE LineType=long(160):BYTE; short(80):BYTE
 001D       TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 0034
 0035       PARAM scpath:BYTE
 003C       PARAM scrn:ScrnType
 0045       PARAM linenum:INTEGER
 004C       PARAM line:LineType
 0055
 0056       RUN GFX2(scpath,"gpload",1,1,scrn.sctype,scrn.width,1,scrn.bytes)
 008A       IF scrn.bytes>80 THEN
 0099         PUT #scpath,line.long
 00A7       ELSE
 00AB         PUT #scpath,line.short
 00B9       ENDIF
 00BB       RUN GFX2(scpath,"Put",1,1,0,linenum)
 00D9       END

PROCEDURE SetScreen
 0000       (* Creates the screen, and sets the "scrn" variable
 0033       TYPE ScrnType=sctype:INTEGER; bytes:INTEGER; width:INTEGER
 004A       PARAM scpath:BYTE
 0051       PARAM scrn:ScrnType
 005A
 005B       DIM scrncode(14):BYTE
 0067       DIM i:INTEGER
 006E       FOR i=1 TO 14
 007E         READ scrncode(i)
 0087       NEXT i
 0092     (* This is the "magic" sequence that will set up the new screen right.
 00D8       (* It has the codes for DWSet, Select, CurOff
 0105       DATA $1B,$20,$08,$00,$00,$28,$18,$00,$01,$00,$18,$21,$05,$20
 0141
 0142       scrn.width=320 \(* Width is the width of the screen in pixels
 017B       IF scrn.sctype=5 OR scrn.sctype=7 THEN
 0194         scrn.width=640
 01A0       ENDIF
 01A2
 01A3       scrn.bytes=160 \(* Linesize is number of bytes per line.
 01D6       IF scrn.sctype=5 OR scrn.sctype=6 THEN
 01EF         scrn.bytes=80
 01FA       ENDIF
 01FC
 01FD       OPEN #scpath,"/w":UPDATE \(* Create a new window
 0220       (* scpath = 1 \ RUN GFX2(scpath,"DWEnd") \ (* Use the same window
 0261
 0262       RUN GFX2(1,"Select") \(* Select our StdOut screen
 028E
 028F       scrncode(3)=scrn.sctype \(* Byte 3 is the screen type
 02B9     scrncode(6)=scrn.width/8 \(* Byte 6 is the screen width in characters
 02F5       PUT #scpath,scrncode
 02FF       END
```

Pyramix

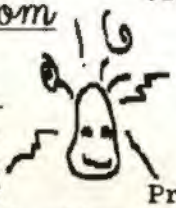
This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. **Disk: $19.95**

The Freedom Series

Vocal Freedom

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 prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. 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. Will run on a CoCo 1, 2, or 3. Vocal Freedom **Disk: $34.95.** Optional Hacker's Pac **Disk: $19.95. Disk for both: $49.95**

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? You control the action with your thoughts and emotions. Your goal is to materialize and levitate objects with the power of your mind while avoiding the insidious cobra. Mental Freedom teaches peace of mind in the face of adversity. Mental Freedom even talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675. Will run on a CoCo 2 or 3 but not CoCo 1. **Disk: $24.95**

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 Lightning. **Disk: $19.95**

Printer Lightning

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! **Disk: $19.95**

Backup Lightning

Reads your master disk once and then makes super fast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives. This utility requires 512K. **Disk: $19.95**

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. Will run on CoCo 1, 2, or 3. **Disk: $69.95**

VDOS the UnDisk

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only. Available only on tape: **$24.95**

VDUMP, backup Undisk files to single tape file. Requires VDOS. **Tape: $14.95**

VPRINT, Print Undisk directory. Requires VDOS. **Tape: $9.95**

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 Hot Line
(502) 969-1818
Visa, MC, COD, Check

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.

reviews by independent reader reviewers take the

Novices Niche

Descriptive Error Messages

by Geoff Friesen

Error messages generated by the Color Computer BASIC interpreter are not user-friendly. For example, if a Syntax Error occurs then ?SN ERROR is displayed instead of the more readable BAD SYNTAX. The interpreter is capable of displaying more descriptive error messages.

ERRMSG is a program which, when run, installs a new error message display mechanism. ERRMSG takes a few seconds to install and must be reinstalled whenever the Reset button is pressed. When an error occurs, a more descriptive error message is displayed.

ERRMSG has been designed to cooperate with other machine language programs that have been installed above the BASIC work space. It accomplishes this feat in lines 130, 140, 720, 730 and 740. Lines 130 and 140 obtain the last address used by BASIC by examining locations $0027 and $0028. Location $0027 contains the most significant byte. This last address is stored in locations $8045 and $8046. These last two locations are used by Extended BASIC. Can we get away with this? Yes. Extended BASIC begins at $8000 and the first 100 bytes or so contain code that is executed only once to initialize Extended BASIC when the power is turned on or the Reset button is pressed. It is not otherwise executed. Since the BASIC image is restored before the initialization code is executed, there are no problems.

Line 720 obtains the last address from $8045 and $8046 and reduces the amount of memory that BASIC can use by 63 bytes (the 63 bytes contain the machine language used by ERRMSG). Lines 730 and 740 obtain the starting address for the machine language routine (which is really the new last address used by BASIC plus one).

If ERRMSG is loaded after other machine language programs, there should be no conflicts. ERRMSG works with *BASIC+* (which I introduced in the September 1989 issue of THE RAINBOW) if ERRMSG is loaded last.

Note that the UR error message in *BASIC+* does not have a more descriptive counterpart in ERRMSG. Hence, UR ERROR is displayed if this error occurs even after ERRMSG has been installed.

Error messages are stored in virtual memory beginning at $6E000. Lines 180 and 310 use the memory manager to access this region. If a RAM disk or some other program uses virtual memory beginning at $6E000, you will have problems.

The Color Computer BASIC interpreter can appear more professional and user-friendly through the use of more descriptive error messages.

The Listing: ERRMSG

```
0 ' COPYRIGHT 1990  FALSOFT,INC
100 REM ------
110 REM ERRMSG
120 REM ------
130 POKE &H8045,PEEK(&H27)
140 POKE &H8046,PEEK(&H28)
150 CLEAR 200,&H4000
160 P1=&H4000
170 P2=&H4050
180 POKE &HFFA2,&H37
190 FOR EM=1 TO 40
200 READ EM$
210 L=LEN(EM$)
220 POKE P1,P2/256
230 POKE P1+1,P2 AND 255
240 P1=P1+2
250 FOR I=1 TO L
260 POKE P2+I-1,ASC(MID$(EM$,I,1
))
270 NEXT I
280 P2=P2+L+1
290 POKE P2-1,0
300 NEXT EM
310 POKE &HFFA2,&H3A
320 DATA NEXT WITHOUT FOR
330 DATA BAD SYNTAX
340 DATA RETURN WITHOUT GOSUB
350 DATA NEED MORE DATA
360 DATA BAD FUNCTION PARAMETER
370 DATA OVERFLOW
380 DATA OUT OF MEMORY
390 DATA UNDEFINED LINE
400 DATA BAD ARRAY SUBSCRIPT
410 DATA ARRAY WAS DIMENSIONED
420 DATA DIVISION BY ZERO
430 DATA USE ONLY IN PROGRAM
440 DATA TYPES DO NOT MATCH
450 DATA OUT OF STRING SPACE
460 DATA STRING TOO LONG
470 DATA COMPLEX STRING FORMULA
480 DATA CANNOT CONTINUE
490 DATA BAD FILE DATA
500 DATA FILE ALREADY OPEN
510 DATA BAD DEVICE/DRIVE NUMBER
520 DATA INPUT/OUTPUT ERROR
530 DATA BAD FILE MODE
540 DATA FILE NOT OPEN
550 DATA INPUT PAST END OF FILE
560 DATA DIRECT STATEMENT
570 DATA UNDEFINED FUNCTION
580 DATA FILE NOT FOUND
590 DATA BAD RECORD NUMBER
600 DATA DISK FULL
610 DATA OUT OF BUFFER SPACE
620 DATA DISK WRITE PROTECTED
630 DATA BAD FILE NAME
640 DATA BAD FILE STRUCTURE
650 DATA FILE ALREADY EXISTS
660 DATA FIELD OVERFLOW
670 DATA SET TO NONFIELDED STR
680 DATA VERIFY DETECTS FLAW
690 DATA WRITE/INPUT PAST EOR
700 DATA HIRES GRAPHICS ERROR
710 DATA HIRES PRINT ERRDR
720 CLEAR 200,PEEK(&H8045)*256+P
EEK(&H8046)-62
730 SA=PEEK(&H27)*256
740 SA=SA+PEEK(&H28)+1
750 FOR I=1 TO 40
760 READ EM$
770 NEXT I
780 FOR I=SA TO SA+38
790 READ B$: POKE I,VAL("&H"+B$)
800 NEXT I
810 DATA 1A,50,86,37,B7,FF,A2,8E
820 DATA 40,00,3A,AE,B4,CE,00,00
830 DATA A6,B0,A7,C0,4D,26,F9,86
840 DATA 3A,B7,FF,A2,1C,AF,8E,00
850 DATA 00,BD,B9,9C,7E,AC,6B
860 POKE SA+14,(SA+39)/256
870 POKE SA+15,(SA+39) AND 255
880 POKE SA+31,(SA+38)/256
890 POKE SA+32,(SA+38) AND 255
900 POKE &HAC60,&H7E
910 POKE &HAC61,SA/256
920 POKE &HAC62,SA AND 255
930 POKE &HE48C,&H7E
940 POKE &HE48D,&HAC
950 POKE &HE48E,&H57
960 POKE &HE4A3,&H7E
970 POKE &HE4A4,&HAC
980 POKE &HE4A5,&H57
990 CLS: NEW: END
```

Disk-Drive Blues

by Marty Goodman
Contributing Editor

I have what seems like disk drive or controller problems with my CoCo 3 system. When I attempt to get a directory listing, the listing comes back garbled, often with each letter of the filenames repeated. Yet when I switch the controller and drive to another CoCo 3, they work perfectly. More confusing, when the disk controller is not in that CoCo 3, the CoCo appears to perform perfectly as an Extended BASIC computer. Is this a disk drive, controller or possibly a CoCo 3 motherboard problem?

Steve Ricketts (STEVEPDX)
Boring, Oregon

I've seen problems like the one you describe, which are usually caused by a defective 6809 chip (68B09E in the case of the CoCo 3). Several times I have seen a bad 6809 that produced no symptoms whatsoever when a disk controller was not connected to the computer. The only apparent symptom was that with the controller in, disk access failed or was garbled. This can be explained by a failure of the NMI or HALT circuitry in the 6809 itself.

If possible, get another disk system or bring your suspect CoCo 3 to a place that has one. See if another disk system misbehaves when used with your CoCo 3. If this is the case, the problem is in your CoCo 3 and you will likely have to replace the 68B09E chip. This is a tricky task as the 40-pin chip is soldered in place.

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.

Steve responds.

It appears it is my CoCo 3. How should I replace the 68B09E?

I recommend destructive removal in this situation. Open the CoCo, remove the motherboard and the ground-plane sheet. Save the clips that hold the ground plane in place. Next use a solder sucker and soldering iron to clean as much solder as possible from each pin of the 6809 chip. Use a fine, small wire cutter (preferably one with angled jaws) to sever each of the 40 pins that hold the chip to the board. The chip will fall out.

Next use a soldering iron and long-nosed pliers to heat and gently lift out all the stubs of the clipped pins. Use the soldering iron and solder sucker as needed to clean any remaining solder in the holes the chip was in. Finally insert and solder a 40-pin socket where the 68B09E used to be. Insert the new 68B09E in the socket.

This technique minimizes the chance of damaging the delicate traces and pads on the circuit board at the expense of totally destroying the original chip.

End-All Monitors

Can you recommend an RGB monitor for the CoCo 3? How about if I am considering getting an MM/1 or Tomcat system? I also want to maintain compatibility with IBM VGA protocols?

Ernest N. Dotson
Charleston, West Virginia

As you may know, two monitors I strongly recommended for CoCo 3 users (the Magnavox 8CM515 and the Sony KV1311CR) are no longer in production. The Magnavox 8CM515 has been replaced by an updated unit, the Magnavox 1CM135. This monitor (available from Microcom and Howard Medical) has the same resolution and overall quality of the older 8CM515 but features, in addition, provisions for stereo audio inputs and chromanance-luminance video inputs used by the old Commodore 64 and by S-VHS style VCRs.

This monitor should work reasonably well with the standard video output on both the MM/1 and Tomcat systems. It is not compatible with IBM VGA-type systems, because it cannot sync above 15.75 KHz and its dot size is only .41mm. If you want sharper resolution and more flexible video inputs, you must use one of the lower-end multisync monitors. Some of these are available for $400 or less. Do not buy a standard VGA monitor, which implies VGA only. Such a monitor does not work with either the CoCo 3 or the newer OS-9/68K computers.

Just Say No to Halt

Is there any practical way to modify a normal Tandy-style disk controller to make it a no-halt controller? No-halt operation would be so convenient for my OS-9 system.

Philip Brown (THEFERRET)
San Rafael, California

No, you would have to add and modify too much to achieve no-halt operation for any retrofit to existing controllers. It just isn't practical.

Jumper Search

I cannot find jumpers for drive selection on my 5¼-inch Tandon 360K drive. It seems to be jumpered as Drive 0. I want to select it as Drive 1.

Clayton G. Kunz
Colorado Springs, Colorado

The older full-height Tandon (TM100-2) drives have a 16-pin DIP IC socket used for drive selection. Those drives actually have two sockets labeled 2F and 1E in silk-screen on the PC board. You want the one labelled 1E and located near TP11. In this socket should be obvious jumpers or some plastic

item with jumpers in it. Move the jumper up one space to the next pair of holes in the socket, and you will change the selection from Drive 0 to Drive 1. The other socket should be empty; it is the terminator resistor socket and the added drive should not have a terminator resistor.

Newer half-height Tandon 5¼-inch floppies usually have a visible jumper or switch. In some cases the jumper in question (DS0, DS1, etc.) may consist of a wire soldered directly to pads on the drive's logic board. In that situation you have to cut the old jumper and solder a new one.

Analog TTL Monitor

Is there any way I can hook my CoCo 2 to my Tandy CM-5? How else might I get around using a TV with my CoCo 2?

A.W. Stone
Fernley, Nevada

There is no practical way to hook the CM-5 to the CoCo 2, because the CoCo 2 does not produce any video output remotely compatible with the CM-5's CGA TTL video input. Some CoCo vendors, at one time, sold adaptors that allowed hooking a composite color monitor to the CoCo 2, but these may no longer be available. In any case, composite color monitors are relatively hard to find at prices competitive with cheap or used color TV sets.

Y-Cable Connectors

Where can I purchase the Kell Am style 40-pin male and female edge connectors needed to make a CoCo Y-cable?

Bill Flinn
San Diego

It may be the case that EAP Corporation (P.O. Box 14, Keller, Texas; 817-498-4242) still sells such connectors in small quantities to the public. If so, you are in luck. If not, I know of no other place to get them in quantities under a hundred.

To make such cables you must use Kell Am brand, female card-edge connectors with the Kell Am male or another brand of *row-reversing* connectors. The Kell Am male card-edge connectors hook to the cable in a mirror image of the ordinary female connector. Also, crimping a Kell Am male card-edge connector to a cable is a bit tricky. You must push each pin individually with some blunt tool after the initial crimping unless you own a special $150 die made specifically for crimping such connectors.

PoCo/CoCo Connection

Can a CoCo be used to read and write a Tandy Portable Disk Drive disk? This is the sort of disk formatted on the Brother 3½-inch disk drive used with the Tandy Model 100, 102, 200 and WP2 lap computers.

Bruce Isted (OS9UGVP)
Calgary, Canada

The disks used are normal and ordinary enough, but the format used is 40-track single density. With proper assembly language modifications to the DSKCON routine, I believe you could have the CoCo reading and writing that kind of information.

I *think* the data is written in IBM format — the sort readable by the Western Digital controller chip used in CoCo controllers. I'm not familiar with the directory and file allocation structure on such disks.

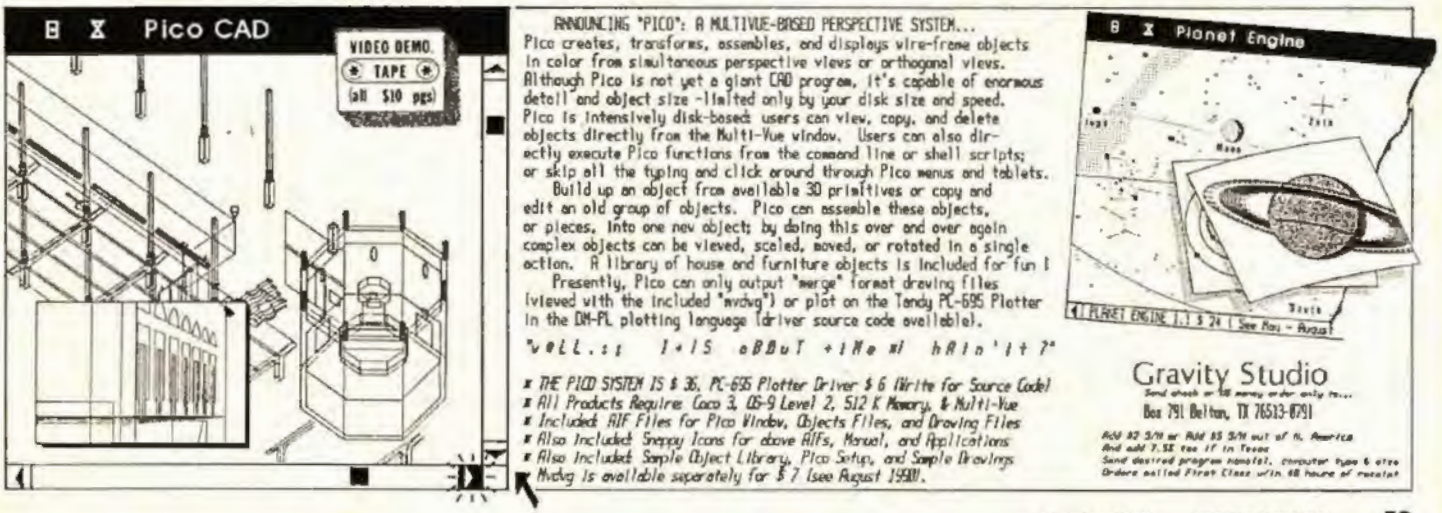
Some persons have found it easier to decipher the codes used to talk to the Brother unit via the serial line and use the entire Brother unit connected with the CoCo or IBM PC via a serial cable. To do that, you need to incorporate a level converter in the serial cable, because the lines coming out of the Tandy Portable Disk Drive are RS-232 in timing, but TTL in level. Travelling Software's LAPDOS does exactly this. Its integral cable incorporates an MC145406P CMOS level converter chip, which they cleverly power from the PC's serial line using diodes and capacitors.

I note with some amusement that the IBM PC's standard floppy disk controller, unlike that of the CoCo, would be utterly unable to read Model 100 style disks directly in a 3½-inch drive, because that controller is, by convention, hard-wired for double density and cannot read or write single density under software control.

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

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

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.



The Assembly Line,
Part V: A New R.A.M.

by William P. Nee

Welcome to Part V. This month we'll teach your computer how to read and modify a BASIC program while it's running. To get started, let's first review *tokens* (not the subway type), and program lines and how the computer processes them.

All Aboard

There are many keywords in BASIC — those commands used over and over again like FOR, NEXT, PMODE, RND, etc. When the computer reads the lines in a BASIC program, it first looks for those keywords. If it finds one, the computer replaces it with a *token* — either a one-byte number from $80 to $E0 or a two-byte number from $FF80 to $FFA7. Tokens are a map telling the computer in a roundabout way where a specific ROM routine is stored. These tokens are usually shorter than the words they replace, so the line is reduced in length and made easier for the computer to process. Anything that is not a keyword is replaced by its ASCII value.

Where does the computer store this new coded line? Locations $0019 and $001A contain the address of the beginning of the first line in the BASIC program currently in memory. The location of the first line may bounce around, depending on how much memory you PCLEAR, whether you have a disk, and other factors, but it's always stored in $0019 and $001A.

Bill Nee reversed the snowbird trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo. He can be contacted at Rt. 2, Box 216C, Mason,

The format of this new line starts with a two-byte number as the location of the next line — sort of a computer line number.

Teaching your computer to read and modify BASIC

Another two-byte number represents the BASIC program line number. If the BASIC program starts with Line 10, it is translated as $000A. This is followed by the line itself, using tokens whenever possible or the character's ASCII value. Finally, a zero signifies the end of a line.

Let's look at an example of a computer line and translate it to BASIC. Assume $0019 and $001A contain $2601; start there and read everything through the end of the line up to zero:

```
2601-26 11 00 0A C8 34 2C 31 3A
BC 3A BF 31 2C 30 0
```

The first two bytes indicate the next line begins at memory address $2611; the next two are the current BASIC line number — $000A or 10. Since the next byte is greater than $7F, it must be a token, and, sure enough, $C8 equates to PMODE. $34 is the hexadecimal ASCII value of 4, $2C represents a comma, and $31 represents a 1. The next value, $3A, stands for a colon.

At this point I'd like to point out the advantage of combining lines. Every line uses at least four bytes of memory: two for the next line location and two for the line number. By combining lines you can save those four bytes, reduce memory, and decrease execution time. You must add a colon for each combined line, but you also eliminate the zero at the end of lines. Back to the example. Finished decoding yet? Yes, it's just the BASIC PMODE, PCLS and SCREEN commands.

Play by Play

Now let's put what we've learned to some use. This is definitely a job for machine language. I learned this while I was working on a BASIC program in which I wanted to define variables without stopping the BASIC program, but the system wouldn't let me. I could enter an actual number but not an assignment for a variable, even if it was previously defined. I had to modify the program as if I were rewriting it each time with new variables. Machine language provides a good solution to this problem.

Listing 1 is a machine-language program that lets you modify a given line in your BASIC program; then the BASIC program runs as if you had rewritten it. Just tell the machine language routine the line number you want to modify and enter the change.

Let's modify Line 40 (of Listing 2),

which presently reads DEF FNF(X)= followed by a lot of spaces. (Make sure to read the Up and Running section before entering Listing 2.) So far, 12 spaces of that line have been used by the computer — two for the location of the next line, two for the BASIC line number, one for the token for DEF, a space, one for the token for FN, four for the ASCII values for F(X) and one for the token for "equals." Sart with the 13th location and begin replacing those spaces with your own tokens or ASCII values.

The BASIC line number passed to the ML program is stored in LINE. Next the program loads Register Y with the location of the first program line and Register X with the BASIC line number. This is compared to the value in LINE; if it's not the same, Register Y is reloaded with the location of the next line and Register X with that line number. Eventually, Register X will be the same as LINE.

When a match is found, the location in Register Y is increased by 13 since this is where we will begin storing our information. The subroutine at $A390 stops the program and waits for the input. When you've finished, the program begins to *parse*, or read, what you just entered. Since the goal of our sample session is to modify a math program, we'll only look for tokens related to math functions (+, -, SIN, SQR, EXP, etc.). At the end of the subroutine the information is stored in a buffer starting at $02DD, and Register B contains the length of the input (not tokenized) plus one.

To begin, load Register X with $02DD and decrease Register B by one. Now load Register A with the first buffer character and compare it to a plus sign. If the comparison is true, store the token for a plus sign ($AB) at the location in Register Y, increase Register Y by one, and decrease Register B by one. If the first character isn't a plus sign, go to the next check for a minus sign.

Take a look at the LOG check (Line 500). If the first character is L, the program assumes you typed LOG, since no other keyword in this program begins with L. Now move the input location in Register X over a total of three spaces, decrease Register B by three, and add $FF99 (the token for LOG) to the line. What if two keywords begin with the same letter? If the character read is an A, this could mean ATN or ABS.

In Lines 860 through 900 you can see that after reading the A, the program has to check the next character. If it's a T, you must have typed ATN; if it's not, you entered ABS. In either case, eliminate three characters from the input by moving Register X over three spaces and decrease Register B by three.

The only other problem arises when the routine comes across an E. At the beginning of the BASIC program I defined P as 3.14159 (PI) and E as 2.71828 (natural log base). So, when the routine encounters an E, does this mean the variable or the keyword EXP? In lines 1180 through 1240 the routine must again check the next letter; this time if it's not an X, you meant to use just E. If it is an X, the program inserts the token $FF97 into the line. You can define other variables

Hyper-Tech Software

MVCanvas 2.0

Finally a professional full screen editor for OS-9 Level II and Multi-Vue. MVCanvas is the only CoCo graphics editor to support multiple resolutions with up to 16 colors of 64 displayed in 320 x 200 mode with palette animation and full functional clipboard.

MVCanvas also supports multiple fonts with inverse, bold underline, and proportional options. Printer support includes: Epson, Star, C.Itoh, DMP (Tandy), with color printer supported for Star NX-1000 R, Citizen GSX-140, Tandy DMP-240 amd CGP-200, Epson LQ-2550 and compatables.

ShellMate 2.2

ShellMate is the epitome of what a point and click file management system was meant to be. With ShellMate, you have access to commands such as copy, move, delete, rename, makdir and free at the touch of a button. It also gives you point and click access to the Public Domain picture display utilities VEFShow and GIFOS9, as well as the archive utility Ar.

The biggest benefit of ShellMate is that it allows you to manipulate large batches of files with one mouse click when either copying, moving, deleting or arcing. You can also easily move through simultaneously displayed Source and Destination directory trees by either double clicking on a subdirectory name, or clicking on the "Parent" command.

System Requirements (both programs)
CoCo3, OS-9 LVL II, Multi-Vue, Disk Drive and 512k
MVCanvas $49.95
ShellMate $24.95
$3.00 S/H $2.50 C.O.D (U.S. only) Nev. res. add 6% sales tax

Send Check / Money Order
Hyper-Tech Software / 4341 Gannet Cir. #174 / Las Vegas, NV 89103
Phone: (702) 362-5346

NORTHERN TECHNOLOGIES

6030 North 43 Road, Manton, MI 49663
(616)824-6633 BBS(616)824-6826

CARD COLLECTOR

Keep track of your card collection with this, OS9 Level II, program. List to the screen or printer, by name, team or position. Edit, expand, or shrink files. ONLY $9.95 + $2.00 S&H

PRINTERS

Star Micronics NX-1000 Rainbow, 7 color printing, 144 cps draft/36 cps N.Q, 6.5k print buffer, 'paper parking', friction and tractor feed, Hi Res graphics. ONLY $268.00 + $12.00 S&H

MODEMS

Avatex 1200e, 300/1200 transmission speed, auto dial/auto answer, 8 front panel lights, two year manufacturer's warranty. ONLY $88.00 + $3.00 S&H

SmarTeam 2400AT, 300/1200/2400 transmission speed, auto dial/auto answer, call progress detection, 6 self test modes, 8 indicator lights, AT command set, two year manufacturer's warranty. ONLY $175.00 + $3.00 S&H

Smart One 2400i, 300/1200/2400 transmission speed, auto dial/auto answer, 8 indicator lights, two year manufacturers warranty, Hayes compatible, made in the U.S.A. ONLY $168.00 + $3.00 S&H

DISKS

5 1/4" DSDD.....$.40 ea
3 1/2" DSDD.....$1.30 ea
5 1/4" DSHD.....$.80 ea
All disks please include $2.00 shipping and handling.

DISK FILES

5 1/4" Disk Holder, holds 75 5 1/4" disks.....ONLY $8.75 ea
3 1/2" Disk Holder, holds 45 3 1/2" disks.....ONLY $7.50 ea
5 1/4" Locking Holder, holds 75 5 1/4" disks, keep your disks away from unauthorized users. ONLY $12.50 ea
Copy Holder, w/top copy clip, non skid feet, detachable line guide. Only $12.95 ea

DISK CLEANER KITS

5 1/4" kit.....Only $6.95 ea
3 1/2" kit.....ONLY $6.50 ea
All above items add $2.00 S&H.

Cash, Check or Money Order. No COD's please.....

in the BASIC program; just don't let them be the first letter of any of the keywords.

If you were only going to run the program once, it could end here. But if you ran it again and defined a function with fewer characters, all those leftover ones from the old function would still be in the line — a guaranteed crash. The program must keep inserting blank spaces in the line until it reaches zero (the actual end of the line). Anything in the line from a previous run has been erased.

Up and Running

After you've entered Listing 1, check for errors with `A/NO/NS/WE`; when it's error-free, save the source code with `W INPUT.SRC` and assemble it with `A INPUT.BIN /NS/WE`.

Listing 2 is the BASIC program. It automatically loads the machine language portion if necessary. Extended BASIC defines ten USR locations you can identify (USR0 through USR9); use just one. Line 10 defines `USR0=&H7000`, the execution address. Now any number can be passed to the machine language program. Line 30 does this with `ZZ=USR0(40)` passing 40 as the line number to be modified; ZZ is just a dummy variable. Lines 70 and 90 pass 80 and 100 to the machine language program as two other lines to be modified. Be sure to type lines 40, 80 and 100 as written, leaving enough blank spaces — each line presently has 27 spaces after the equal sign (=), which are represented as vertical bars in the listing.

Notice that the variables in lines 80 and 100 will also come out thirteen spaces over, but that's no problem. The BASIC program is used to calculate the value of any integral function between Value A and Value B. Using the Gauss formula for the approximate integral:

```
(B-A)(FN F((B+A)/2+(B-A)/2/SQR3)
+FN F((B+A)/2-(B-A)/2/SQR3))/2
```

The program computes 1024 intervals, adding them together and keeping track of the absolute value as it goes along. This is useful for finding the area between any two functions or the area between a function and the *x* axis. When the program asks for the lower and upper limits, you can enter a number or variable P, E, SQR(3), etc. Try doing that in BASIC.

There is room for two different sets of lower/upper limits — usually A, B, B, C or A, B, C, D. When the program has finished computing the value, it indicates possible roots (where the function crosses the *x* axis) and what fraction of P the roots are — so many integrals involve a solution with P. You can then request a plot of the function between your lowest and highest limits. The computations can handle division by zero, but the plotting cannot without error trapping.

Let's try a simple example. The integral of $1/x$ between 1 and any number is the LOG of that number. Run the program and enter `1/X` as the function; for the lower limit enter 1 and for the higher, enter 10. You can see both the actual value and absolute value increasing. After 1024 intervals you get the answer 2.30258509. Break the program and type `PRINT LOG(10)`. Of course the computer does this a little more quickly. Now run the program and enter a function of `SIN(X)+COS(X)` from `-P/2` to `+P/2`. The actual value is 2, the absolute value is 2.828, and there is a root at `-P/4`. Plot the function and see if it looks like the answer.

Here's one more example. Try a function of `SIN(X)-LOG(X)+EXP(X)` between .2 and 1.4; you should get a result of 4.0509.

Experiment with the number of intervals N in Line 110 — a smaller number gives quicker but less accurate results. Functions you can use in this program are:

```
SIN   ATN   SQR   COS   LOG
INT   TAN   EXP   ABS
```

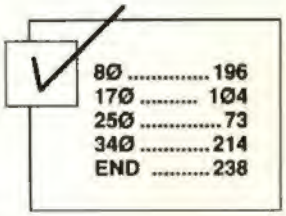
Try adding the machine language routine to your own program with your own vocabulary. Just be sure to pass the next line after the `ZZ=USR0` function. In the next article we'll use any leftover tokens to take a bus ride on an endless tour. ❑

64K Disk

Listing 1: INPUT

```
00100          ORG     $7000
00110 START    JSR     $B3ED
00120          STD     LINE
00130          LDY     $19
00140 AGAIN    LDX     2,Y
00150          CMPX    LINE
00160          BEQ     CONT
00170          LDY     ,Y
00180          BRA     AGAIN
00190 CONT     LEAY    13,Y
00200          JSR     $A390
00210          LDX     #$2DD
00220          DECB
00230
00240 READ     LDA     ,X+
00250 ADD      CMPA    #'+
00260          BNE     SUBT
00270          LDA     #$AB
00280          LBRA    INPUT
00290
00300 SUBT     CMPA    #'-
00310          BNE     MULT
00320          LDA     #$AC
00330          LBRA    INPUT
00340
00350 MULT     CMPA    #'*
00360          BNE     DIVD
00370          LDA     #$AD
00380          LBRA    INPUT
00390
00400 DIVD     CMPA    #'/
00410          BNE     POWER
00420          LDA     #$AE
00430          LBRA    INPUT
00440
00450 POWER    CMPA    #'^
00460          BNE     LOG
00470          LDA     #$AF
00480          LBRA    INPUT
00490
00500 LOG      CMPA    #'L
00510          BNE     COS
00520          LEAX    2,X
00530          SUBB    #2
00540          LDA     #$FF
00550          STA     ,Y+
00560          LDA     #$99
00570          LBRA    INPUT
00580
00590 COS      CMPA    #'C
00600          BNE     TAN
00610          LEAX    2,X
00620          SUBB    #2
00630          LDA     #$FF
00640          STA     ,Y+
00650          LDA     #$95
00660          BRA     INPUT
00670
00680 TAN      CMPA    #'T
00690          BNE     INT
00700          LEAX    2,X
00710          SUBB    #2
00720          LDA     #$FF
00730          STA     ,Y+
00740          LDA     #$96
00750          BRA     INPUT
00760
00770 INT      CMPA    #'I
00780          BNE     ATN
00790          LEAX    2,X
00800          SUBB    #2
00810          LDA     #$FF
00820          STA     ,Y+
00830          LDA     #$81
00840          BRA     INPUT
00850
00860 ATN      CMPA    #'A
00870          BNE     SQR
00880          LDA     ,X++
00890          SUBB    #2
00900          CMPA    #'T
```

```
00910           BNE     ABS
00920           LDA     #$FF
00930           STA     ,Y+
00940           LDA     #$94
00950           BRA     INPUT
00960
00970 ABS       LDA     #$FF
00980           STA     ,Y+
00990           LDA     #$82
01000           BRA     INPUT
01010
01020 SQR       CMPA    #'S
01030           BNE     E
01040           LDA     ,X++
01050           SUBB    #2
01060           CMPA    #'Q
01070           BNE     SIN
01080           LDA     #$FF
01090           STA     ,Y+
01100           LDA     #$9B
01110           BRA     INPUT
01120
01130 SIN       LDA     #$FF
01140           STA     ,Y+
01150           LDA     #$85
01160           BRA     INPUT
01170
01180 E         CMPA    #'E
01190           BNE     INPUT
01200           LDA     ,X
01210           CMPA    #'X
01220           BEQ     EXP
01230           LDA     #'E
01240           BRA     INPUT
01250
01260 EXP       LEAX    2,X
01270           SUBB    #2
01280           LDA     #$FF
01290           STA     ,Y+
01300           LDA     #$97
01310
01320 INPUT     STA     ,Y+
01330           DECB
01340           LBNE    READ
01350
01360 FILL      LDA     ,Y
01370           BEQ     DONE
01380           LDA     #32
01390           STA     ,Y+
01400           BRA     FILL
01410 DONE      RTS
01420 LINE      RMB     1
01430           END     START
```



Listing 2: INPUTBAS

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 CLEAR500,&H7000-1:DEFUSR0=&H7
000:IF PEEK(&H7000)<>189 THEN LO
ADM"INPUT":POKE &HFF40,0
20 CLS:E=EXP(1):P=4*ATN(1)
30 PRINT"F(X)=";:ZZ=USR0(40)
40 DEF FN F(X)=||||||||||||||||
||||||||||
50 PRINT@32,"";:INPUT"HOW MANY I
NTEGRALS [1] ";XX:IF XX<=0 THEN
XX=1 ELSE IF XX>2 THEN 50
60 FOR QQ=1 TO XX:PRINT"INTEGRAL
"QQ"="
70 PRINT"LOWER LIMIT ";:ZZ=USR0(
80)
80 A(QQ)=||||||||||||||||||||||
||||
90 PRINT"UPPER LIMIT ";:ZZ=USR0(
100)
100 B(QQ)=||||||||||||||||||||||
|||||
110 PRINT:NEXTQQ:TA=0:AA=0:RR=0:
MX=0:N=1024
120 FOR QQ=1 TO XX:SU=0:SA=0
130 XH=(B(QQ)-A(QQ))/N:X2=XH/2:X
R=X2/SQR(3)
140 S1=A(QQ)-X2-XR:S2=A(QQ)-X2+X
R
150 S=SGN(FNF(S1+XH)+FNF(S2+XH))
160 FOR K=1 TO N
170 SS=SGN(FNF(S1+K*XH)+FNF(S2+K
*XH)):IF SS<>S THEN S=SS:RR=RR+1
:R(RR)=A(QQ)+(B(QQ)-A(QQ))*(K-1)
/N
180 VV=FNF(S1+K*XH)+FNF(S2+K*XH)
:IF ABS(VV)>MX THEN MX=ABS(VV)
190 SU=SU+VV:SA=SA+ABS(VV)
200 PRINT@32*(4*QQ-2)+13,USING"#
### +###.########";K,SU*X2
210 PRINT@32*(4*QQ-1)+18,USING"+
###.########";SA*X2:NEXTK
220 SU=SU*X2:TA=TA+SU:SA=SA*X2:A
A=AA+SA:NEXTQQ
230 PRINT@32*(4*XX+1),USING"TOTA
L AREA  +###.######";TA
240 PRINTUSING"ABS   AREA  +###.
######";AA
250 IF RR<>0 THEN PRINT"ROOT CHA
NGES AT -":FOR R=1 TO RR:PRINTUS
ING"+###.###### P*+##.##";R(R),R
(R)/P:NEXTR
260 INPUT"ANY NEW LIMITS (Y/N) -
";A$:IF A$<>"Y" THEN 280
270 FOR N=1 TO 14:PRINT@32*N,STR
ING$(31,32);:NEXT:GOTO 50
280 INPUT"WANT A PLOT (Y/N) -";A
$:IF A$="Y" THEN 300
290 STOP
300 PMODE4,1:PCLS:SCREEN1,1
310 LINE(128,0)-(128,191),PSET:L
INE(0,96)-(255,96),PSET
320 A=A(1):B=B(XX):YF=180/MX:IF
ABS(B)>ABS(A) THEN XF=100/ABS(B)
 ELSE XF=100/ABS(A)
330 LINE(128+XF*A,96)-(128+XF*A,
96),PSET
340 FOR N=A TO B STEP 1/(B-A)/XF
350 Y=FN F(N):Y=INT(YF*Y+.5)
360 IF ABS(Y)>90 THEN 380
370 LINE-(128+XF*N,96-Y),PSET
380 NEXT
390 LINE(128+XF*B,96-Y)-(128+XF*
B,96),PSET
400 EXEC &HADF8
410 GOTO 260
```


The CAT is Out of the Bag ...

NEW FOR YOUR COCO COMPUTER!

The CAT- An A.T. Case which neatly houses all componets except the monitor and keyboard.

It contains one power supply (200W) connecting COCO 3, SPBI (seven pack bus interface), and any combination of floppy and hard disks.

To receive a free CAT demo disk write:

NMSA Computer Group
P.O Box 1718
Merrimack, N.H 03054

OS-9 Graphics Primitives

by Dale L.Puckett
Contributing Editor

Many BASIC09 programs have appeared in the pages of this magazine over the past several years, but few of them have paid tribute to the graphics end of things. To help you understand OS-9 graphics and how you can use them in your own programs, let's review some OS-9 graphics primitives. I'll show you how to use them from the command line or from within a procedure file. Then, I'll discuss how to use them within your own BASIC09 programs.

Getting Ready

Before you can exercise the drawing commands built into OS-9 you must ensure that your system is set up properly. Otherwise, you'll be swimming in error messages. First and most importantly, you must be working in a graphics window.

OS-9 supports six window types. Two of these display text only; if you attempt to draw on a text window, an error message appears, which often does not indicate the real problem. Text windows have several advantages. Because they're much faster, they're handy for people who write text-based applications like word processors or databases. Information is displayed three to four times faster, and a text window uses less memory.

Each of the four OS-9 graphics windows give you a choice of resolution and number of colors you can use. Both of these factors affect the amount of memory required to use the window. For example, a Type 5 window allows you to display 640-by-192 pixels in two colors, and uses only 16K of memory. To use four colors at this resolution requires 32K of memory. Unfortunately, you cannot use more than four colors at this resolution. To get more, you must switch to a window with a resolution of 320-by-192 pixels. A four-color, low-resolution window uses 16K of memory, while a 16-color window gobbles up 32K. Table 1 lists the OS-9 window types and characteristics.

Type	Size	Colors	Memory
01	40 x 24 text	8	2K
02	80 x 24 text	8	4K
05	640 x 192 pixels	2	16K
06	320 x 192 pixels	4	16K
07	640 x 192 pixels	4	32K
08	320 x 192 pixels	16	32K

Table 1: OS-9 Window Types

Color	Number
White	0
Blue	1
Black	2
Green	3
Red	4
Yellow	5
Magenta	6
Cyan	7
White	8
Blue	9
Black	10
Green	11
Red	12
Yellow	13
Magenta	14
Cyan	15

Table 2: Default Colors

I usually use a Type 7 window for most of my projects, since it presents the best compromise between resolution and the number of colors. Speaking of colors, you also need to know each color's palette number before you can issue the proper command to set the foreground, background and border colors of your windows and various drawing tools. The default colors are listed in Table 2.

Before you can draw, you need to make a number of decisions regarding the type, size, location and color of the window you want to use. Once you've made up your mind, you must translate the numerical values to the proper numbering system. If you are sending graphics commands to OS-9 from the command line (OS9: prompt), you must speak in hexadecimal notation. When you're programming in BASIC09 and running `gfx2` commands to do your drawing, you'll be able to send commands with decimal numbers.

Several other commands must also be issued before you can use OS-9's drawing commands. For example, since you are using graphics windows, you must merge a set of fonts into the system. Otherwise, you won't be able to see the commands you are typing. Do this by entering:

```
merge /dd/sys/stdfonts >/w
```

You must also merge a set of pointers and patterns into the system. Use the following commands:

```
merge /dd/sys/stdptrs >/w
merge /dd/sys/stdpats_4 >/w
```

OS-9 uses the images stored in the `stdfonts` file to draw letters on your graphics windows when you type. The images stored in the `stdptrs` file are used to draw the various mouse pointers on the screen, and the `stdpats_4` file makes it easy to fill

---

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.

an enclosed area in a window with a number of standard patterns. You'll want to add these commands to your `startup` file, since they're needed each and every time a graphics window is opened.

You can change the type of OS-9 window currently selected. In fact, most applications set up the type of window required. Indeed, one of the handiest tools you can have is a procedure file or *merge file* you can use to create a desired window type on the fly. I have three of these files stored permanently in my root directory (`/dd`) — `mtw`, `mgw5` and `mgw7`. To change the window I'm working in to an 80-by-24 text window, I type:

```
merge /dd/mtw
```

The transformation occurs almost as fast as you can blink your eyes. First, the original window goes blank. Then a second later, a new window pops onto the screen, followed by the prompt for the Shell I'm running in the window. Let's create these files for you.

To get the job done, you need to close the device window you're using, create a new window, select the font to be used in the window and select the window we have just created. These individual commands will do the job:

```
display 1b 24
display 1b 20 2 0 0 50 18 1 0 4
display 1b 3a c8 01
display 1b 21
```

This sequence is used to create my `mtw` file. To create `mgw5` and `mgw7`, substitute one of the two lines below for the second of the previously listed commands:

```
display 1b 20 5 0 0 50 18 1 0 4
display 1b 20 7 0 0 50 18 1 0 4
```

Notice that only the number that determines the type of window has been changed. Notice also that when you use the display command to send graphics commands to OS-9, you must use hexadecimal numbers. The upper right corner of the window is at coordinate 0,0. Each is 50 hexadecimal characters (80 decimal characters) wide. Likewise, the hexadecimal 18 creates a window 24 (decimal) lines deep. Stand by! It gets more complicated when you start dealing with 640 pixels on a line and have to write that in hexadecimal.

Next use the `build` or `edit` command to store the four-line sequence in a file named `MakeTW`. Assuming it is stored in your current data directory, type `MakeTw` at the Shell prompt and OS-9 will treat it as a procedure file to change your window type.

Now let's add two additional steps to the process and make a merge file that works a bit faster than a procedure file. First note that you do not need to type all four of the lines above. Rather, you can type:

```
display 1b 24 1b 20 7 0 0 50 18
1 0 4 1b 3a c8 1 1b 21
```

Action	Code	Coordinates
Arc	1b 52	Radius, Area
Bar	1b 4a	Opposite corner
Bar (relative)	1b 4b	Offset to opposite corner
Box	1b 48	Opposite corner
Box (relative)	1b 49	Offset to opposite corner
Circle	1b 50	Radius
Ellipse	1b 51	Horiz & Vert radius
Line	1b 44	Opposite end
Line (relative)	1b 45	Offset to opposite end
Line (and move)	1b 46	Opposite end
Line (relative & move)	1b 47	Offset to opposite end
Point	1b 42	Location
Point (relative)	1b 43	Offset to location
Action	**Code**	**Parameters**
Kill device window	1b 24	
Kill overlay window	1b 23	
Make device window	1b 20	Type, location,size, colors
Make overlay window	1b 22	Save switch, location, size
Position draw pointer	1b 40	Location
Position draw ptr (rel.)	1b 41	Offset to location
Position graphics cursor	1b 4e	Location
Change background color	1b 33	Color number
Change border color	1b 34	Color number
Change default color	1b 30	
Change foreground color	1b 32	Color number
Change palette color	1b 31	Palette #, Color Table #
Change working area	1b 25	Location, size
Bold text	1b 3d	0 for plain, 1 for Bold
Proportional text	1b 3f	0 for plain, 1 for Proportional
Transparent text	1b 3c	0 for plain, 1 for transparent
Select drawing logic	1b 2f	0 for none, 1=AND, 2=OR, 3=XOR
Select font	1b 3a	Group #, Buffer #
Select graphics cursor	1b 39	Group #, Buffer #
Select pattern	1b 2e	Group #, Buffer #
Select window	1b 21	Group #, Buffer #
Fill screen area	1b 4f	
Get screen image	1b 2c	Group, buffer, location, size
Put screen image	1b 2d	Group, buffer, location
Scaling	1b 35	0=Off, 1= On

Table 3: Display codes for graphics commands

Better yet, store this line in a procedure file named MakeGW7. Then type the following line at the Shell prompt:

```
makegw7 >mgw7
```

If you're curious, type dump mgw7 and look at the contents of the file. If not, just type merge mgw7 and press ENTER.

Viola! You should now have a four-color, Type 7 graphics window in front of you. Notice that all of the commands above assume that you created the procedure file in your current data directory and are still in the same directory when you try to use it. Again, since I use the files almost every few minutes, I leave them stored in my root directory (/dd). This lets me get at them instantly from anywhere in OS-9's hierarchical directory system without needing to remember which directory I stored them in. It also saves typing.

Let's examine the four-line sequence above a little closer. The word display merely runs the OS-9 display command. You can use this utility to print characters on the screen that aren't really printable. The 1B is the escape character. It tells the Input/Output routines that the next character is special. The two-character sequence 1b 24 tells OS-9 to end or close the current device window. When CC3IO sees this sequence, it calls an internal routine named DWEnd for Device Window End. Likewise, the sequence 1b 20 calls DWSet, and 1b 21 calls DWSelect. Perhaps this BASIC09 code that does the same job will make it easier to understand:

```
RUN gfx2("DWEnd")
RUN gfx2("DWSet",7,0,0,80 24,1,0,4)
RUN gfx2("Font",200,1)
RUN gfx2("Select")
```

Drawing From the Command Line

If you want to maintain your sanity while working with graphics using display commands, you need a table of codes at your fingertips. Table 3 should fill the bill.

When you draw with the display commands, you are giving the location of the various objects using hexadecimal notation. The horizontal coordinates can be any number from 0 to 639. There are 192 available pixels vertically, from 0 to 191. Because remembering the Hexadecimal value of 540 — or any random number — can be quite taxing, you'll want to get a decimal-to-Hex conversion chart. Perhaps you can write a BASIC09 program to print one, using the HEX$ function.

Before you begin to draw using the drawing commands, it is helpful to sketch a plan on a piece of graph paper. Most graph paper is numbered from 0 to 24 along the horizontal axis and from 0 to 18 along the vertical axis. If you multiply every horizontal grid position by 30, you will have grids representing pixels 0 through 660 in 30-pixel increments. In the vertical direction, you can let each grid represent 10 pixels. This gives you pixels 0 through 180 — just 12 pixels short of the 192 displayed by your CoCo.

When you draw with the display commands, you must give the location of the various objects using hexadecimal notation.

With this prep work out of the way, you can pencil in a rough sketch of the final drawing. The first step is to draw a rectangle on a piece of graph paper. Make it 640 dots wide by 180 dots high. The rectangle represents the entire (almost) screen.

To successfully draw with the built-in graphic functions, you need to consider two more issues. First, remember that you are speaking hexadecimal when you work with the display command. Because of this, you must convert all pixel locations from decimal to hexadecimal before typing them. Secondly, remember the location of the invisible draw pointer.

For example, if you intended to place the draw pointer at a position 16 pixels over and down from the upper left corner of the window, you would immediately assume you should type, display 1b 40 16 16. Not so! Decimal 16 is 10 in hexadecimal notation. If you knew this already, you are a prime target for the next most common mistake! You would just type, display 1b 40 10 10, right? Wrong!

The internal data structures within the graphics handling routines expect to receive integer parameters. The display command sends byte-wide data to the standard output path. What to do? Simple, just send the high-order byte of the integer, followed by the low-order byte. For example, to place the draw pointer 16 pixels down and over from the upper left corner of the screen, type:

```
display 1b 40 00 10 00 10
```

If you plan on typing graphics commands interactively using display, consider another problem. If you are drawing in the same window you are using to type the commands, the prompts printed and the characters you type can overlap your drawing. It's not a pretty picture. Conversely, if you redirect your drawing to a window on another screen, you will need to use the CLEAR key to move to the other screen before you can see the results of your latest command.

The solution is to create a small window at the bottom of the screen, since you want to see the picture as soon as you press ENTER. In that small four-line window, you can start a Shell. From its prompt, you can redirect drawing commands to the larger window in the top part of the screen. Enter the following lines in a procedure file using the build command or your favorite editor.

```
wcreate -z
/w1 -s=7 0 0 80 20 2 0 4
/w2 0 20 80 4 2 7

display 1b 21 >/w2
shell i=/w2&
```

To run this procedure file, make sure it is stored in your current data directory, then type its name. Also, the wcreate, display and shell commands must already be loaded into memory or stored in your current execution directory. After you run this procedure file, you can move to the Shell in the green control window (/w2) by pressing the CLEAR key until the cursor moves to a position behind the prompt in that window.

While you are drawing, you must also know whether OS-9's automatic scaling feature is turned on or off. To turn it on, type this line:

```
display 1b 35 1 >/w1
```

To turn it off, type the following:

```
display 1b 35 0 >/w1
```

If you draw with scaling turned off, be absolutely certain the coordinates you pass to the drawing commands are indeed within the window you are using. If you tell OS-9 to draw outside the window, you'll receive an Error 189 — Illegal Coordinates. If you

Listing 1: `Objects.scr`

```
display c ;* clear screen
display 1b 32 2 ;* foreground color black
display 1b 40 0 46 0 a ;* place cursor
display 1b 48 0 8c 0 3c ;* draw box
display 1b 40 1 4a 0 20 ;* draw pointer to circle center
display 1b 50 0 32 ;* draw circle
display 1b 40 1 e0 0 14 ;* position pointer
display 1b 48 2 60 0 28 ;* draw another box
display 1b 40 0 68 0 5a ;* position for ellipse
display 1b 51 0 58 0 12 ;* draw ellipse
display 1b 40 0 e8 0 46 ;* position for another box
display 1b 48 1 a8 0 60 ;* draw box
display 1b 40 2 1a 0 5a ;* position for second ellipse
display 1b 51 0 40 0 12 ;* draw ellipse
display 1b 40 0 10 0 80 ;* position cursor
display 1b 48 0 c8 0 96 ;* draw another box
display 1b 40 1 4a 0 80 ;* position cursor
display 1b 50 0 30 ;* draw a circle
display 1b 32 3 ;* make foreground green
display 1b 40 1 e0 0 80 ;* position
display 1b 4a 2 60 0 96 ;* draw bar
display 1b 32 2 ;* color back to black
display 1b 40 1 4a 0 8c ;* move into circle
display 1b 2e cc 01 ;* select dot pattern
display 1b 4f ;* flood circle with dots
display 1b 40 0 20 0 90 ;* move inside rectangle
display 1b 32 3 ;* make it green
display 1b 2e cc 02 ;* vertical line pattern
display 1b 4f ;* and fill it
display 1b 2e 0 0 ; * you MUST turn pattern off
;* now you write the commands to fill the rest
;* before you draw again
display 1b 32 1 ;* make color blue
display 1b 40 0 5 0 5 ;* to upper left corner
```

have scaling turned on, your objects may not be drawn exactly where you expected because OS-9 scales them to fit. The scaling feature is useful because it gives you a way to draw an object to full scale (640-by-192 pixels) but display it in a smaller window. The more pixels you have available while drawing, the better your finished product looks.

While you're drawing, remember to keep track of the draw pointer at all times. Issue a *position draw pointer* command before each drawing command, unless you want several objects drawn from the same starting position. Type the procedure file shown in Listing 1 to get a feel for how the OS-9 graphics commands work.

Notice that since this is an OS-9 procedure file, we will be feeding it to a Shell for processing. For this reason, I used the semicolon to separate the actual commands on each line from the comments that tell you what to expect will happen. The asterisk is the comment symbol. (If you are using *Shell+*, be sure to disable wildcards if you enter the comments!) Also notice that if you need to print a text message in your window, you must use `display` to send a string of characters to the window. If you use the `echo` command instead, you send a

Burke & Burke
P.O. Box 733
Maple Valley, WA 98038

U.S. ORDER DESK:
(800) 237-2409

INT'L & TECHNICAL:
(206) 432-1814

OS9 Software (* >= 256K; ** >= 512K required):

FILE SYSTEM REPACK -- Disk defragmenter.	$29.95
R. S. B.* -- Real Disk BASIC for Level 2 (BASIC ROM required).	$39.95
EZGEN 1.08 -- Bootfile editor. NEW VERSION!	$19.95
PERTASCII* -- Multi-user scrambled letter word game.	$19.95
WILD & MV -- Wildcard & move directory entry utilities.	$19.95

BASIC Software (* >= 256K; ** >= 512K required):

HYPER-I/O -- Hard disk / big floppy BASIC. B&B or DISTO HD's.	$29.95
HYPER-I/O HD UTILITIES -- K. Berner's wild copy, delete, search.	$21.95
DISK DOCTOR -- K. Berner's GAT editor; also hides media defects.	$17.95
BEST OF BERNER -- HARD DISK UTILITIES and DISK DOCTOR deal.	$39.90
HYPER-III -- RAM disk** and print spooler for CoCo 3 HYPER-I/O.	$12.95
DAGGORPATCH -- Disk patch for Dungeons of Daggorath.	$ 9.95
RGB-DOS FOR B&B -- Now compatible with B&B hard drives!	$34.95

Affordable Color Computer Hardware:

COCO XT -- Adapts PC hard drives to CoCo. OS9 S/W included.	$69.95
COCO XT-RTC -- CoCo XT, with battery backed real-time clock.	$99.95
XT-ROM -- Boots OS9 from B&B hard disk automatically.	$19.95
4' B&B HARD DISK CABLE SET -- Extra long -- not the usual 24".	$17.50

They're Back: 0K, 128K, 256K, & 512K QuarterMeg Boards as low as $29.95! All boards include instructions for 512K.

0K QuarterMeg (Add 8 memory chips for 256K, piggyback to 512K)	$29.95
256K QuarterMeg (128K on-board + your CoCo 3's existing 128K)	$54.95
Deluxe 512K booster kit (Upgrades 256K board to 512K, w/chips)	$64.95
Bare 512K booster kit (Same as DELUXE, but no memory chips)	$29.95

About HYPER-I/O and RGB-DOS . . .

Both HYPER-I/O and RGB-DOS are hard disk operating systems supplied on floppy disk. Each can be used as-is or burned into an EPROM for use with 64K software. HYPER-I/O requires a 16K EPROM and allows large floppy disks, hard disk directories as large as 3MB, and good machine-language compatibility. RGB-DOS requires an 8K EPROM and features superior compatibility with existing machine language software, but limits each hard disk directory to 160K. We recommend HYPER-I/O for BBS systems or BASIC programmers, and RGB-DOS for customers who mostly use commercial ML S/W.

MasterCard VISA

WASHINGTON RESIDENTS ADD 8.1% SALES TAX.
U.S. COD's add $3.30. Min. U.S. shipping $3.00. Min. shipping to Canada $4.00. Please allow 2 weeks for delivery. Overnight or 2-day delivery available for in-stock items. Software upgrades $5.00 each with receipt, including U.S. shipping.

carriage return to the window and move the objects you have drawn.

To try the procedure file above, use an editor to enter it into a file named Objects. After you've saved the file, type:

```
objects >/w1
```

The objects drawn should pop onto the screen rather quickly.

Now that you understand the graphics primitives built into OS-9, it's time to get creative. You can use a procedure file similar to Objects to handle many chores, such as drawing a startup screen for an application program. How about using it for a To Do list or a telephone message form? Just about anything you can draw by hand can be drawn with these graphics primitives.

Getting and Putting Images in a Buffer

With your drawings created on the screen, you can save them into a buffer and display them instantly whenever you need them. Here's an example. Let's recreate the first circle from our procedure Objects, capture the image on the screen into a buffer and print it elsewhere in the window. Listing 2 does just this.

After clearing the screen with the first line, move the draw pointer to the upper right portion of the screen and draw a circle. Then use the GetBlk commands to capture the image into a buffer in memory. Once that buffer is in memory you can print it wherever you like, whenever you like. I printed three — one in the upper left corner of the screen and two low on the screen just to each side of the center. Note that if you make a mistake while typing the display codes for the GetBlk command, you must kill that buffer using the command display 1b 2a *group buffer* before retyping the line to GetBlk Pixels.

Listing 3 shows the BASIC09 code that does exactly the same job for you. Notice that the pixel locations here are expressed in decimal instead of hexadecimal.

Finally, the start of a generic calendar you can build on is shown in Listing 4. Perhaps it will be the first of many screen forms you can use daily on your Color Computer. The listing draws the lines for the calendar. You need to use the proper display commands to position the text cursor and then use display to print the names of the month and the individual days, as well as the actual numerical date.

If you want to get snazzy, draw some symbolic images, put them in a buffer and print them in the squares to represent various dates. Once you have your calendar the way you like it, you can merge the display codes into a merge file and display it on the screen whenever you like. Perhaps you'll want to see it every time you boot OS-9 on your CoCo. Have fun experimenting!

Another Special Treat

Kevin Darling, the OS-9 guru, uploaded a new gfx2 package to the OS-9 SIG on Delphi and the OS-9 SIG on CompuServe in mid-July. This new gfx2 package is far superior to the original gfx2 from Tandy. If you have access to Delphi or CompuServe, by all means jump online and download it. If not, find a friend who can download it for you. It is a *must have*! While you're at it, get a copy of Kevin's fast graphics patch from one of these online services. You'll find graphics routines run a full five times faster. Your programs will be much more impres-

```
display 1b 48 2 7b 0 9b :* draw box around everything
display 2 29 33 :* position text cursor
:* Print a closing message
display 20 54 68 61 74 27 73 20 41 4c 4c 20 46 6f 6c 6b 73 21 20
```

Listing 2: GetPutDemo.scr

```
display c :* clear screen
display 1b 40 1 4a 0 20 :* draw pointer to center of circle
display 1b 50 0 32 :* draw circle
* Now store the circle in group #80, buffer #1
display 1b 2c 50 1 1 16 0 0 0 70 0 48 :* get image in buffer
display 1b 2d 50 1 0 0 0 0 :* put one in upper left
display 1b 2d 50 1 0 9f 0 6f :* another near center
display 1b 2d 50 1 1 30 0 6f
```

Listing 3: GetPutDemo.b09

```
PROCEDURE GetPutDemo
DIM WinPath:BYTE
OPEN #WinPath,"/W1":WRITE
RUN gfx2("clear") \ (* Clear Screen
RUN gfx2("Circle",330,32,50) \ (* Draw circle
RUN gfx2("Get",80,1,278,0,112,72) \(* Get circle into buffer
RUN gfx2("Put",80,1,0,0) \(* Put it in upper left corner
RUN gfx2("Put",80,1,159,111) \(* Put in lower left center
RUN gfx2("Put",80,1,304,111) \(* Put in lower right center
RUN gfx2("Killbuff",80,1)
END
```

Listing 4: Calendar.scr

```
display c ;* clear screen
display 1b 40 0 30 0 19 :* position cursor
display 1b 48 2 3f 0 9f :* draw outside edge
display 1b 40 0 31 0 1a :* make it
display 1b 48 2 3e 0 9e :* double thick
display 1b 40 0 30 0 37 :* start of first line
display 1b 44 2 3f 0 37 :* draw it
display 1b 40 0 30 0 55 :* start of second line
display 1b 44 2 3f 0 55 :* draw it
display 1b 40 0 30 0 73 :* and third
display 1b 44 2 3f 0 73 :* do it
display 1b 40 0 30 0 91 :* just above last week
display 1b 44 0 30 0 91 :* put it on screen
* Now do vertical dividing lines
display 1b 40 0 46 0 19 :* top of first line
display 1b 44 0 46 0 9f :* draw it
display 1b 40 0 96 0 19 :* top of second line
display 1b 44 0 96 0 9f :* draw it
display 1b 40 0 e1 0 19 :* top of third line
display 1b 44 0 e1 0 9f :* draw it
display 1b 40 1 2c 0 19 :* top of fourth line
display 1b 44 1 2c 0 9f :* draw it
display 1b 40 1 77 0 19 :* top of fifth line
display 1b 44 1 77 0 9f :* draw it
display 1b 40 1 c2 0 19 :* between Friday and Saturday
display 1b 44 1 c2 0 9f :* draw it
```

Listing 5: DrawBox.b09

```
PROCEDURE DrawBox
 0000       DIM Grp_Ptr,Ptr_Arr,Ptr_Pen:INTEGER
 000F       Grp_Ptr:=202 \Ptr_Arr:=1 \Ptr_Pen:=2
 0024       DIM WR_Cntnt:INTEGER
 002B       WR_Cntnt:=0
 0032       DIM valid,fire,mx,my,area,sx,xy:INTEGER
 0051       DIM startx,starty,currx,curry:INTEGER
 0064       DIM scanrate,timeout,follow:INTEGER
 0073       scanrate:=3 \timeout:=1 \follow:=1
 0088       DIM ButtonDown,ButtonUp:INTEGER
 0093       ButtonDown:=1 \ButtonUp:=0
 00A1       RUN gfx2("SetMouse",scanrate,timeout,follow)
 00C0       RUN gfx2("GCSet",Grp_Ptr,Ptr_Pen)
 00D7       RUN gfx2("logic","xor")
 00EA       RUN gfx2("clear")
 00F7
 00F8       (* Main Loop *)
 0107       REPEAT
 0109         RUN gfx2("Mouse",valid,fire,mx,my)
 012A       UNTIL fire=ButtonDown
 0136
 0137       startx:=mx \starty:=my
 0147       currx:=mx \curry:=my
 0157       RUN gfx2("SetDPtr",startx,starty)
 0170
 0171       WHILE fire=ButtonDown DO
 017E         RUN gfx2("Mouse",valid,fire,mx,my)
 019F         IF currx<>mx OR curry<>my THEN
 01B4           RUN gfx2("box",currx,curry)
 01C9           currx:=mx \curry:=my
 01D9           RUN gfx2("box",currx,curry)
 01EE         ENDIF
 01F0       ENDWHILE
 01F4
 01F5       RUN gfx2("logic","off")
 0208       RUN gfx2("box",currx,curry)
 021D       RUN gfx2("GCSet",0,0) \(* Turn graphics cursor off
 024B       END
```

sive as your menus begin to pop down instead of slurp down.

The new gfx2 not only makes it easy for you to write point-and-click BASIC09 programs with windows and menus (like *MVFinance* in our April and July columns), but it can make it very easy for you to experiment with drawing programs using the BASIC09 compiler.

To get started, I rewrote the code for the DrawBox procedure from our *KISSDraw* series to use the new gfx2 routines, SetMouse and Mouse. The DrawBox procedure is a simple program that clears the screen, turns on the mouse and lets you draw one box.

To learn how to integrate DrawBox into a full-fledged drawing program, compare the code here to that in our *KISSDraw* series. You can easily combine the menu routines in the *MVFinance* program with the drawing routines from *KISSDraw*, modified like DrawBox here, to roll your own quick and dirty graphics editor. You'll have a lot of fun in the process. If there's enough demand, maybe we can redo the project here in "KISSable OS-9."

Next month we'll cover Communications. I'll come up with something for fellow hams. Until then, 73, put on the shoulder pads and keep on hacking!

Quality OS9 Level 2 Software

from

ColorSystems

WPShel – A Word Processing Oriented Graphics Shell (Editor/Formatter/&Spelling Checker NOT included!) $22 complete. (Add $3 for overseas shipments.)

GAMES:

KnightsBridge – *BRAND NEW!* It's you against the CoCo, with an element of chance thrown in!

CoCothello – The popular board game adapted for your Color Computer 3.

CoCoYahtzee – The well known "Dice Poker" games. (requires 80 column monitor)

Pyramid Solitaire – *The best just got better!* V3.0 of this popular game is now available.

All game programs just ***$10*** each or any three for ***$25***. I'll pay the shipping! All programs require at least 256K except CoCothello which will run in 128K. All are Mouse Controlled and require the WindInt module.

Send check or Money Order to:
ColorSystems
P.O. Box 540
Castle Hayne, NC 28429-0540
(NC residents please add 5% sales tax.)

BASEBALL STATS NEW!

CALCULATOR PROGRAM
MANY APPLICATIONS!
Has 7 memory banks. Includes manual. 16K.
NOW $14.95

FUNSTATS
A GENERAL STATISTICS PROGRAM
Computes 50 stats. Very easy to use. Includes manual. 32K.
JUST $39.95

MAJOR LEAGUES
MINOR LEAGUES
ROTISSERIE

A professional yet easy to use database program that will allow you to keep track of your favorite teams by year, game no. and player. Keeps track of 20 stats, including batting ave., ERA, hits, ratio, at bats, HR's, RBI's, walks, wins, errors, earned runs, innings pitched, stolen bases, losses, saves & final game scores! Uses 32K.
ONLY $39.95

TRADING POST
Send check or money order.
P.O. Box 3453, Carbondale, IL 62902
Specify CoCo 1, 2 or 3. Add $3.00 S/H.

EPROM Programmer Part III

by Tony DiStefano
Contributing Editor

I assume you have finished building the EPROM programmer and are reasonably sure it works. Of course you have tested it using the guidelines in Part II of this series. As we all know, hardware is only half of this project; the other half is software. The software I have written for the EPROM programmer is simple, but it does the job. It is written completely in assembly language.

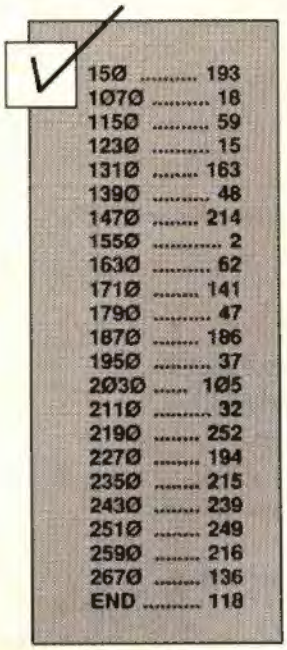
We present this software in such a way as to accommodate everyone. The most common denominator here is BASIC — all CoCo users have it, and just about everyone knows enough about BASIC to be able to enter the driver software in the form of a BASIC program, as shown in the listing.

Enter the listing using THE RAINBOW's Check Plus system. This method works well and is necessary with this type of program — if you have just one character wrong, the whole program may crash. With a formatted disk in the drive, run MAKEPROM to generate the machine-language EPROM programmer software. Once you have the software for the EPROM programmer, all you have to do is load and EXEC it.

Next month I'll provide a manual of sorts that explains how to use the software and the programmer. This is required reading for programming an EPROM. Some of you more experienced users may be able to use the programmer and software without the reading the manual, but there is one piece of information you will need — the data buffer for the programmer starts at $3000 and is as long as the selected EPROM. Good Luck! ❑

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

32K Disk



```
150 ..... 193
1070 ..... 18
1150 ..... 59
1230 ..... 15
1310 ..... 163
1390 ..... 48
1470 ..... 214
1550 ..... 2
1630 ..... 62
1710 ..... 141
1790 ..... 47
1870 ..... 186
1950 ..... 37
2030 ..... 105
2110 ..... 32
2190 ..... 252
2270 ..... 194
2350 ..... 215
2430 ..... 239
2510 ..... 249
2590 ..... 216
2670 ..... 136
END ..... 118
```

The Listing: MAKEPROM

```
10 ' PROGRAM TO GENERATE THE
20 ' EPROM PROGRAMMER SOFTWARE
25 ' ON DISK.
30 ' BY TONY DISTEFANO FOR
40 ' TURN OF THE SCREW.
50 '
60 ' MUST DO A "PCLEAR 8" BEFORE
70 ' STARTING THIS PROGRAM.
90 CLEAR 500
100 FOR I = &HE00 TO &H14EB
110 READ A$
120 X = VAL("&H"+A$)
130 POKE I,X
140 NEXT I
150 SAVEM"EPROMDR/BIN",&HE00,&H1
4EC,&HE00
160 END
1000 DATA 7F,FF,40,1A,50,BD,A9,2
8,30,8D
1010 DATA 4,81,17,3,19,CE,FF,51,
17,3
1020 DATA 5D,B7,3,89,81,31,27,11
,81,32
1030 DATA 27,8,81,33,27,4,81,34,
26,DD
1040 DATA CC,40,0,20,3,CC,20,0,F
D,3
1050 DATA 80,C3,30,0,FD,3,86,17,
2,FC
1060 DATA 10,8E,0,0,6F,C4,6F,42,
7F,3
1070 DATA 83,5F,86,D0,97,8C,8E,0
,0,9F
1080 DATA 8D,BD,A9,62,5C,26,FA,8
E,5,4A
1090 DATA 9F,88,17,3,13,81,30,2E
,2,20
1100 DATA F7,81,36,2E,F3,AD,9F,A
0,2,34
1110 DATA 12,30,8D,5,E3,17,2,A9,
35,12
1120 DATA 81,31,27,21,81,32,10,2
7,0,FD
1130 DATA 81,33,10,27,2,22,81,34
,10,27
1140 DATA 0,37,81,35,27,8,81,36,
10,27
1150 DATA 0,4B,27,8D,16,91,8A,30
,8D,5
1160 DATA ED,17,2,78,8E,30,0,17,
3,83
1170 DATA 86,FF,BC,3,86,10,27,3,
97,A1
1180 DATA 5F,27,7,30,1,17,2,E0,3
0,1F
1190 DATA 17,2,C,30,1,20,E7,30,8
D,5
1200 DATA D7,17,2,53,8E,30,0,17,
```

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 6% 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.

```
3,5B
1210 DATA A6,5F,A7,80,BC,3,86,27
,5,17
1220 DATA 1,EF,20,F2,16,3,67,30,
8D,5
1230 DATA F5,17,2,35,C6,4,17,94,
A1,10
1240 DATA 25,2,F0,8E,2,DD,17,3,6
0,86
1250 DATA D,AD,9F,A0,2,1F,10,17,
3,1
1260 DATA 1F,98,17,2,FC,86,20,AD
,9F,A0
1270 DATA 2,A6,84,17,2,F1,86,20,
AD,9F
1280 DATA A0,2,7F,3,88,17,2,52,8
1,5E
1290 DATA 27,51,81,A,27,52,81,D,
10,27
1300 DATA FF,B,81,30,25,EB,81,39
,23,8
1310 DATA 81,41,25,E3,81,46,22,D
F,B7,2
1320 DATA DD,AD,9F,A0,2,17,2,2A,
81,30
1330 DATA 25,F9,81,39,23,8,81,41
,25,F1
1340 DATA 81,46,22,ED,87,2,DE,AD
,9F,A0
1350 DATA 2,7F,2,DF,34,10,8E,2,D
D,17
1360 DATA 2,EF,1F,10,1F,98,35,10
,A7,80
1370 DATA 16,FF,84,30,1F,16,FF,7
F,30,1
1380 DATA 16,FF,7A,B6,3,89,81,32
,10,2E
1390 DATA 0,87,30,8D,5,3A,17,1,9
0,8E
1400 DATA 30,0,C6,CC,E7,C4,A6,80
,A7,5F
1410 DATA CA,20,E7,C4,7F,3,82,86
,1,17
1420 DATA 1,39,7C,3,82,B6,3,82,8
1,F
1430 DATA 27,E,C4,7B,E7,C4,A6,5F
,CA,84
1440 DATA E7,C4,A1,1F,26,E3,B6,3
,82,48
1450 DATA 48,17,1,19,34,16,BF,3,
84,9E
1460 DATA 88,17,1,F9,86,20,AD,9F
,A0,2
1470 DATA B6,3,82,C6,5,3D,1F,98,
17,2
1480 DATA 24,9F,88,35,16,B6,3,82
,81,F
1490 DATA 26,10,C4,7B,E7,C4,A6,5
F,CA,84
1500 DATA E7,C4,A1,1F,10,26,1,F,
BC,3
1510 DATA 86,10,27,0,9C,17,0,C7,
A6,80
1520 DATA A7,5F,17,1,D6,20,8F,30
,8D,4
1530 DATA B3,17,1,9,8E,30,0,86,3
,89
1540 DATA 81,33,27,4,C6,DC,20,2,
C6,D4
1550 DATA E7,C4,A6,80,A7,5F,CA,2
0,E7,C4
1560 DATA 7F,3,82,86,1,17,0,BD,7
C,3
1570 DATA 82,B6,3,82,81,F,27,E,C
4,7B
1580 DATA E7,C4,A6,5F,CA,84,E7,C
4,A1,1F
1590 DATA 26,E3,B6,3,B2,48,48,17
,0,9D
1600 DATA 34,16,BF,3,84,9E,88,17
,1,67
1610 DATA 86,20,AD,9F,A0,2,B6,3,
B2,C6
1620 DATA 5,3D,1F,98,17,1,92,9F,
88,35
1630 DATA 16,B6,3,82,81,F,26,10,
C4,7B
1640 DATA E7,C4,A6,5F,CA,84,E7,C
4,A1,1F
1650 DATA 10,26,0,7D,BC,3,B6,27,
C,17
1660 DATA 0,37,A6,80,A7,5F,17,1,
46,20
1670 DATA 91,86,FF,A7,5F,C4,DF,E
7,C4,16
1680 DATA 1,A0,30,8D,4,9,17,0,6E
,8E
1690 DATA 30,0,17,1,76,A6,80,A1,
5F,27
1700 DATA 3,17,0,DC,BC,3,B6,27,5
,17
1710 DATA 0,5,20,ED,16,1,7D,31,2
1,10
1720 DATA 8C,10,0,26,7,10,8E,0,0
,5C
1730 DATA E7,C4,6F,41,39,34,10,C
4,F7,E7
1740 DATA C4,8E,0,6F,30,1F,26,FC
,4A,26
1750 DATA F6,CA,8,E7,C4,35,90,34
,10,C4
1760 DATA EF,E7,C4,8E,0,6F,30,1F
,26,FC
1770 DATA 4A,26,F6,CA,10,E7,C4,3
5,90,6F
1780 DATA 42,6F,C4,BF,3,84,30,8D
,2,2C
1790 DATA 17,0,6,17,0,AD,16,FD,1
D,34
1800 DATA 10,8E,5,A3,9F,88,35,10
,34,12
1810 DATA A6,80,81,4,27,6,AD,9F,
A0,2
1820 DATA 20,F4,35,92,34,32,BD,A
9,28,30
1830 DATA 8D,2,BC,8D,E5,B6,3,89,
81,31
1840 DATA 27,E,81,32,27,10,81,33
,27,12
1850 DATA 30,8D,2,D6,20,10,30,8D
,2,88
1860 DATA 20,A,30,8D,2,88,20,4,3
0,8D
1870 DATA 2,B9,8D,BE,30,8D,2,2,8
D,B8
1880 DATA 35,B2,34,14,AD,9F,A0,0
,26,1A
1890 DATA A,94,26,E,C6,B,D7,94,9
E,88
1900 DATA A6,84,88,10,8A,8F,A7,8
4,8E,4
1910 DATA 5E,BD,A7,D3,20,E0,C6,2
0,E7,9F
1920 DATA 0,88,35,94,F7,3,83,34,
16,BF
1930 DATA 3,84,30,8D,2,8F,17,FF,
74,17
1940 DATA 0,1B,30,8D,2,89,17,FF,
73,17
1950 DATA 0,4D,30,8D,2,8A,17,FF,
69,A6
1960 DATA 5F,17,0,41,17,0,1C,35,
96,34
1970 DATA 16,BE,3,84,30,1F,1F,10
,83,30
1980 DATA 0,FD,3,84,17,0,2A,B6,3
,85
1990 DATA 17,0,24,35,96,AD,9F,A0
,0,81
2000 DATA 3,26,D,32,64,B6,FF,A7,
41,C4
2010 DATA DF,E7,C4,16,FC,44,81,2
0,26,8
2020 DATA AD,9F,A0,0,81,20,26,F8
,39,34
2030 DATA 2,44,44,44,44,81,A,25,
4,8B
2040 DATA 37,20,2,8B,30,AD,9F,A0
,2,A6
2050 DATA E4,84,F,81,A,25,4,8B,3
7,20
2060 DATA 2,8B,30,AD,9F,A0,2,35,
82,6F
2070 DATA 42,86,3,89,81,33,26,4,
C6,40
2080 DATA 20,2,C6,48,E7,C4,34,10
,8E,0
2090 DATA 0,30,1F,26,FC,35,10,39
,7D,3
2100 DATA B3,26,7,30,8D,1,FB,17,
FE,D2
2110 DATA 16,FB,E3,CC,0,0,34,6,A
6,80
2120 DATA 81,30,25,26,81,39,23,A
,81,41
2130 DATA 25,1E,81,46,22,1A,80,7
,80,30
2140 DATA 68,61,69,E4,68,61,69,E
4,68,61
2150 DATA 69,E4,68,61,69,E4,A8,6
1,A7,61
2160 DATA 20,D4,4D,35,90,D,D,20,
20,54
2170 DATA 48,45,20,44,49,53,54,4
F,20,45
2180 DATA 50,52,4F,4D,20,50,52,4
F,47,52
2190 DATA 41,4D,4D,45,52,D,20,20
,20,20
2200 DATA 20,20,20,42,59,20,54,4
F,4E,59
2210 DATA 20,44,49,53,54,45,46,4
1,4E,4F
2220 DATA D,20,20,20,20,20,20,20
,20,20
2230 DATA 20,20,20,20,56,20,31,2
E,33,D
2240 DATA D,D,20,20,20,20,20,20,
20,20
2250 DATA 31,20,2D,20,32,37,36,3
4,D,20
2260 DATA 20,20,20,20,20,20,20,3
2,20,2D
2270 DATA 20,32,37,31,32,38,D,20
,20,20
2280 DATA 20,20,20,20,20,33,20,2
```

```
D,20,32
2290 DATA 37,32,35,36,20,31,2F,3
2,D,20
2300 DATA 20,20,20,20,20,20,20,3
4,20,2D
2310 DATA 20,32,37,32,35,36,20,3
2,2F,32
2320 DATA D,D,D,20,43,48,4F,4F,5
3,45
2330 DATA 20,31,2C,20,32,2C,20,3
3,20,4F
2340 DATA 52,20,34,3F,20,4,45,50
,52,4F
2350 DATA 4D,20,4E,4F,54,20,50,5
2,4F,47
2360 DATA 52,41,4D,4D,45,44,20,5
0,52,4F
2370 DATA 50,45,52,4C,59,20,20,2
0,20,41
2380 DATA 54,20,41,44,44,52,45,5
3,53,3A
2390 DATA 20,4,D,20,20,31,2D,45,
50,52
2400 DATA 4F,4D,20,45,52,41,53,4
5,44,20
2410 DATA 3F,D,20,20,32,2D,50,52
,4F,47
2420 DATA 52,41,4D,20,45,50,52,4
F,4D,2E
2430 DATA D,20,20,33,2D,56,45,52
,49,46
2440 DATA 59,20,45,50,52,4F,4D,2
E,D,20
2450 DATA 20,34,2D,52,45,41,44,2
0,45,50
2460 DATA 52,4F,4D,2E,D,20,20,35
,2D,52
2470 DATA 45,54,55,52,4E,20,54,4
F,20,42
2480 DATA 41,53,49,43,D,20,20,36
,2D,45
2490 DATA 58,41,4D,49,4E,45,2F,4
3,48,41
2500 DATA 4E,47,45,20,4D,45,4D,4
F,52,59
2510 DATA D,D,D,43,4F,4D,4D,41,4
E,44
2520 DATA 3A,20,D,D,53,54,41,54,
55,53
2530 DATA 3A,D,4,20,20,45,50,52,
4F,4D
2540 DATA 20,53,45,4C,45,43,54,4
5,44,20
2550 DATA 49,53,20,41,20,4,32,37
,36,34
2560 DATA D,4,32,37,31,32,38,D,4
,32
2570 DATA 37,32,35,36,20,31,2F,3
2,D,4
2580 DATA 32,37,32,35,36,20,32,2
F,32,D
2590 DATA 4,41,54,20,4,20,45,58,
50,45
2600 DATA 43,54,45,44,20,4,20,46
,4F,55
2610 DATA 4E,44,20,4,20,2D,20,4F
,4B,21
2620 DATA D,4,20,20,20,20,20,20,
20,20
2630 DATA 20,20,20,20,20,20,20,2
0,20,20
2640 DATA 20,20,20,20,20,20,20,2
0,20,20
2650 DATA 20,20,20,20,20,20,20,2
0,20,20
2660 DATA 20,20,20,20,20,20,20,2
0,20,20
2670 DATA 20,20,20,20,20,20,20,4
,43,48
2680 DATA 45,43,4B,49,4E,47,20,4
6,4F,52
2690 DATA 20,46,46,27,53,4,4D,4F
,56,49
2700 DATA 4E,47,20,45,50,52,4F,4
D,20,54
2710 DATA 4F,20,4D,45,4D,4F,52,5
9,4,56
2720 DATA 45,52,49,46,49,4E,47,2
0,45,50
2730 DATA 52,4F,4D,4,50,52,4F,47
,52,41
2740 DATA 4D,4D,49,4E,47,20,41,4
4,44,52
2750 DATA 45,53,53,3A,20,4,53,54
,41,52
2760 DATA 54,20,41,44,44,52,45,5
3,53,3F
2770 DATA 20,4,0,0,0,0,0,0,0,0
```


Super Controller II

UNDER OS-9: Buffered read/write sector achieved without halting the CPU means no loss of time or keyboard strokes. Mini Expansion Bus for 1 Super Add-On. One DOS included. **$105**

Super Controller I

- Sockets for 4 DOSes
- Mini Expansion Bus for 1 Super Add-On. **$80**

Mini Controller I

- Lowest Price Anywhere!
- Sockets for 2 DOSes **$65**

NEW ! From Rainbow's author, Tony DiStefano:

"A Full Turn of the Screw"

The complete collection of "Turn of the Screw" articles from Jan '83 to Jul '89. **$15**

DISTO **HOT SUMMER SALE!**

NEW! GET 1 MEG

Of memory in your COCO 3 with DISTO's

1 MEG Upgrade Kit.

- Requires a 512K COCO 3 and soldering experience.
- Kit includes 512K mem and all necessary hardware.
- OS9 Drivers, by Kevin Darling, included.
- Compatible with DANOSOFT's software.
- Works with OBLIQUE TRIAD's "Studio Works",
- AND more to come! Ask your favorite software dealer to support the 1 meg COCO 3.
- Zero K Kit $120.

ONLY $150

• 512K Upgrade $65

YOU GET! • 120ns Prime DRAM memory chips.
• FREE SOFTWARE included.
• 1 FULL YEAR limited Warranty.

Zero K Board $25.

4IN1 Multi-Board Adapter
Hard Disk, Real Time Clock Serial & Parallel Ports. **$100**

3IN1 Multi-Board Adapter
Real Time Clock, Serial & Parallel Printer Ports. **$65**

RTC & Printer Interface
Rtime & Parallel Port. **$35**

MPROM Adapter
EPROM Programmer. **$45**

HDisk Adapter + RS-232
SCSI / SASI & RS-232 **$50**

Hard Disk Adapter $40

RS-232 Adapter $34

MEB II
A carrier for add ons. **$25**

RS-232 PAK $55

RGB to MONO
Monochrome video & Audio adapter. **$30**

Project Board $10

Serial to Parallel
Converter **$40**

CRC Inc. 11 Boul. Des Laurentides, Laval, Quebec, Canada H7G 2S3
Include S&H of $4 or $8 if order exceeds $65 MC/Visa Accepted
1-514-967-0195
Sorry: No personal cheques

New Machines Coming

by Eddie Kuns
CoCo SIG Database Assistant

The biggest news in the OS-9 databases this month concerns the new computers being sold (hopefully, by the time you read this) by Kenneth Leigh Enterprises, the MM/1; and Frank Hogg Laboratories, the Tomcat. Several postings, including Marty Goodman's RAINBOWfest news (posted from the April '90 Chicago RAINBOWfest), discuss these two systems. Also, Paul Ward of Kenneth Leigh Enterprises posted a press release containing information about the MM/1 in the CoCo SIG Product Reviews & Announcement section of the databases. The SIG forums are abuzz with discussion and excitement about the new machines!

The OS-9 utility `OS9Arc` creates archive files in the popular MS-DOS `.ARC` archive format. The *Extractor* provides easy, menu-driven access to Ar and *Pak*, two popular archiving programs under OS-9. *DAM* graphically illustrates how fragmented your hard drive is.

The patch to `CCheck` allows it to work on floppy drives. Matt Singer's upload in the OS-9 Telecom section of the databases describes how to convert a Deluxe RS-232 Pak so it can be used at the same time as an unmodified one. As you might guess, *Disney Dwarves* contains VEF pictures of the lovable Disney dwarves. `PicWin09` is a graphics editor that requires a Hi-Res mouse and *Multi-Vue*.

The CoCo SIG CoCo 3 Graphics section of the databases saw the most action this month. `SPLITTER.IMG`, uploaded by Richard Trasborg, is a demo picture that Michael Trammell produced using a color splitter. Richard also submitted a number of digitized pictures in various formats. Donald Ricketts' patch to *DS69View* allows the program to create and view 16-level pictures and to use 40 tracks on a disk.

> When I'm writing the "Database Report," the entry log is all I have to go on to find people's real names.

Alvin Kimball contributed a RAM disk, including patches to allow it to be used with EDTASM. Rick Adams released the latest version of *Delphiterm Version 3.0*.

The Entry Log

One useful feature of Delphi is the Entry Log. If you want to find the last time someone logged on, all you need to do from either SIG prompt is type `ent` *username*. If you're not at either SIG prompt, but within the forums (for example), you can type `/ent` *username* instead. For example, to find the last time I logged into Delphi, type:

```
OS9> ent eddiekuns
Eddie Kuns (EDDIEKUNS) last on at
25-JUN-90 23:45:55
```

Notice that the command also shows my real name. When you joined the CoCo or OS-9 SIG, you were prompted for your name; this is the name shown when anyone uses the Entry Log. Try this on yourself to find out how your name is defined.

When I'm writing the "Database Report," the entry log is all I have to go on to find people's real names; so if you want to be referred to in a particular way, you might want to set your name. To do this, type `set name` from either SIG prompt. Each SIG keeps track of your name separately, so you may want to set your name in both SIGs if you belong to both. ❑

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

Database Report

OS-9 SIG:

General Information:

The MM/1 is here	
MARTYGOODMAN	Marty Goodman
Games froaim ColorSystems	
ZACKSESSIONS	Zack Sessions
Murphy's Law	
NES	Eric Stringer

Utilities:

OS9Arc	
POLTERGEIST	Brian Wright
SIZE.AR	
COMPER	Glen Hathaway
The Extractor V1.0	
KMTHOMPSON	Kelly Thompson
Dam Improved for Speed	
KMTHOMPSON	Kelly Thompson
REN - Rename with Wildcards	
TRED	Robert DeBolt

Patches:

Dump Patch	
DUANO	Duane Penzien
CCheck Patch	
COCOXT	Chris Burke

Telcom:

Use 2 RS-232 Paks at Once
MATTSINGER — Matt Singer

Graphics & Music:

Disney Dwarves
ZACKSESSIONS — Zack Sessions

Mandelbrot Fractals in VEF
FRANCALCRAFT — Frances Calcraft

Chinese Folks Songs
BAMBOO — John Kou

HSCREEN2 to VEF Conversion
ZACKSESSIONS — Zack Sessions

Coke 4096 VEF
MIKEHAALAND — Mike Haaland

Ballade Pour Adeline 2
MIKEHAALAND — Mike Haaland

Picture Window
LL — Tom Wood

CoCo SIG

General Information:

More RAINBOWfest News
MARTYGOODMAN — Marty Goodman

The MM/1 is Here!
MARTYGOODMAN — Marty Goodman

Quick Rfest Progress Report
MARTYGOODMAN — Marty Goodman

Pokes, Peeks and Execs
ROMULATOR — Dan Konopka

CoCo 3 Graphics:

SPLITTER.IMG
TRAS — Richard P. Trasborg

Melonie Haller
TRAS — Richard P. Trasborg

Maud Adams
TRAS — Richard P. Trasborg

Candid Camera 1
TRAS — Richard P. Trasborg

Car Wash
TRAS — Richard P. Trasborg

Car Wash 2
TRAS — Richard P. Trasborg

Ingrid1
TRAS — Richard P. Trasborg

Bob Guccione's Girls, April
STEVEPDX — Donald Ricketts

Bob Guccione's Girls, May 1990
STEVEPDX — Donald Ricketts

DS69View Patches
STEVEPDX — Donald Ricketts

Baywatchable - 4096
BERNIEO — Bernie Olsen

Alf-Radio Operator
N3FWE — Steve Hancock

Printer Animation 1
ROGERH — Roger Hallman

Madonna, Geddy and Wimona
TRIUMPH — Dan Shargel

CHICAGO.GIF
DONHUTCHISON — Don Hutchison

Miami Mice (GIF)
DONHUTCHISON — Don Hutchison

Mickey Mouse Picture CM3
CHASGIBSON — Charles Gibson

Utilities & Applications:

RAMDisk for EDTASM
ALKIMBALL — Alvin Kimball

Product Reviews & Announcement:

Home-PAC
DESKMAN — Bill Condie

NEW MM/1 Computer for CoCoists
PKW — Paul K. Ward

Telecommunications:

DelphiTerm Version 3.0
RICKADAMS — Rick Adams

COMPUTER ISLAND EDUCATIONAL SOFTWARE

PROGRAMS ON SALE THIS MONTH

$15 each-tape or disk

Spanish Baseball
French Baseball
Cloze Exercises-Grade 3,4,5,6 or7
(Please Specify Grade)
Context Clues- Grade2-3,4,5,6,7
(Please Specify Grade)
Chemistry Tutor
Graph Tutor
Graph-It (algebraic equations)
Punctuation Practice
Story Details-Grade 2-3 or 4-5
(Please Specify Grade)
Drawing Conclusions-Grade 3-4 or
5-6 (Please Speicfy Grade)
Math Quiz

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

Sundog Systems

Now is the time to complete your Sundog collection!

We're gearing up for our new Fall line of Color Computer software to complement our already exceptional products. If you are missing out on any of our titles, you cannot afford to pass over this limited time offer.

Buy two or more of the following Sundog products and we'll slash off 10% from your entire purchase.

Product Title	Price	-10%	Product Title	Price	-10%
Kyum-Gal	$29.95	$26.95	In Quest of Star Lord	$34.95	$31.45
Sinistaar	$34.95	$31.45	Warrior King	$29.95	$26.95
SoundTrax	$34.95	$31.45	Kung-Fu Dude	$24.95	$22.45
Paladin's Legacy	$24.95	$22.45	White Fire of Eternity	$19.95	$17.95
Hall of the King 1, 2, 3	$29.95	$26.95	Dragon Blade	$19.95	$17.95
Hall of the King Trilogy	$74.95	$67.45	Champion	$19.95	$17.95

Offer expires October 31, 1990. See previous issues of Rainbow for product descriptions and reviews.

Check, money order (US currency), Visa and Mastercard, and COD orders accepted. Only US COD orders, please. All foreign orders must be credit card or US currency money orders. Include $2.50 for domestic shipping, including Canada $5.00 for foreign shipping. $3.00 extra for COD orders. PA residents please add 6% sales tax. Authors: we're looking for new software!

Sundog systems

VISA

21 Edinburg Drive, Pittsburgh, PA 15235
(412) 372-5674

MasterCard

PCM

The *Premier* Personal Computer Magazine for Tandy® Computer Users

Not only does Tandy produce our favorite CoCo, we think it produces the best portable and MS-DOS computers as well. We've found that when satisfied Color Computer users decide to add portability or MS-DOS to their computing habits, many stick with Tandy. For these people we publish PCM, The *Premier* Personal Computer Magazine for Tandy Computer Users.

Each month in PCM, you'll find information and programs for the Tandy 100, 102 and 200 portable computers. And you'll find even more coverage for Tandy's MS-DOS machines — from the graphics of the 1000 to the power of the 5000.

PROGRAMS AND PROGRAM DISKS!

We learned from THE RAINBOW that readers want programs to type in, so each month we bring you an assortment of them: games, utilities, graphics, and home and business applications. For those who don't have time to type in listings, we offer a companion disk with all the programs from the magazine. Also included in PCM each month is the *Software Shopper*, an "onmail" database service from which you can order the latest shareware products from our Delphi databases for Tandy MS-DOS and PC users — even if you don't have a modem!

TUTORIALS AND PRODUCT REVIEWS!

As if all this weren't enough, we offer regular tutorials on *DeskMate*, telecommunications and hardware; assembly language, BASIC and PASCAL programming tips; and in-depth reviews of the new software, peripherals and services as they are released. Add it all up and we think you'll find PCM to be the most informative and fun magazine for this market today!

YES! Please send me a one year (12 issues) subscription to PCM for only $28.* A savings of 22% off the newsstand price.

Name _____

Address _____

City _____

State _____

ZIP _____

In order to hold down costs, we do not bill.

My check in the amount of _____ is enclosed.

Charge to my:

❑ VISA ❑ MasterCard ❑ American Express

Acct. # _____

Exp. Date ____ Signature _____

To order by phone (credit card orders only) call 800-847-0309, 8 a.m. to 5 p.m. EST. For other inquiries call 502-228-4492.

* Canadian subscribers U.S. $38. Surface rate elsewhere $64, airmail $85. Allow 6 to 8 weeks for first copy. Kentucky residents add 6% sales tax. U.S. currency *only*, please.

Mail to: PCM, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

BEST PUBLIC DOMAIN PROGRAMS !

FROM T&D SUBSCRIPTION SOFTWARE

"Great service and great software"
Jim Garner
Ft. Worth, Tx

"Your programs are the greatest!"
Christine Rapoza
Tiverton, RI

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 > Requires Musica
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

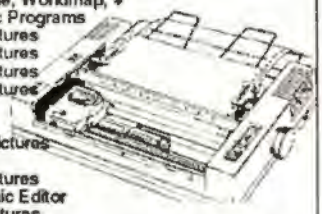
TELECOMMUNICATIONS 1-3

T1 - Haysae, Kermit, Mikeyterm, TeleTerm
T2 - Cobbs BBs Terminal Package
T3 - GETERM Communications

RAINBOW CERTIFICATION SEAL

GRAPHICS 1-14

GR1 - Atlanta, Cube, Space, +
GR2 - Objects, Wargame, Worldmap, +
GR3 - 9 Coco 3 Graphic Programs
GR4 - 22 Coco Max Pictures
GR5 - 22 Coco Max Pictures
GR6 - 22 Coco Max Pictures
GR7 - 15 Coco Max Pictures
GR8 - 22 .Bin Pictures
GR9 - 22 .Bin Pictures
GR10 - 14 Large .Bin Pictures
GR11 - 8 Mge Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures



•• See Our Ad Containing 250 Graphic Pictures Elsewhere in This Magazine

EDUCATION 1-4

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

HOME MANAGEMENT 1-4

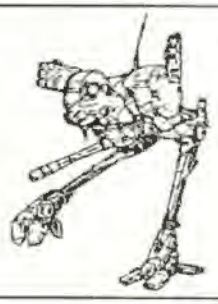
• 12 Programs Each Disk/Tape •

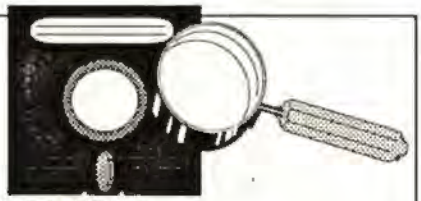
H1 - Checkbook, Loan, Word Processor, +
H2 - Cash Journal, Invest, Maillist, +
H3 - Life, Database, Stocks, +
H4 - Spelling Fix, Spelling Checker, +

GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

GA1 - 3D Tic Tac, Missile, Poker, Tycoon, +
GA2 - Amazing, Balloons, Motor Jump, Slots, +
GA3 - Battleship, Golf, Lander, Zero G, +
GA4 - ABM, LunarWorld, Protect, Subchase, +
GA5 - Blackjack, Lazer, Tipan, Utopia, +
GA6 - Kings, Maze, Shuffle, Tempest, +
GA7 - Chess, City, Life, StarTrek, +
GA8 - Chute, Germ, Hurkle, Lunar, +
GA9 - Civil War, Go-Fish, Stock, UFO Maze, +
GA10 - Cave, HiLow, Scramble, Word Hunt, +
GA11 - Biorythms, Craps 3, Gunner, Martians, +





UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

U1 - Backup 35, Basicmap, Timer, Tape-to-Disk, +
U2 - Customize, DiskTest, MasterDisk, Offset, +
U3 - View 64, DiskAid, Disk Library, Atari, +
U4 - AutoBoot, MacPicture, StateLog, UniBack, +
U5 - Disassembler, Graph, PaintPot, Squeeze, +
U6 - Clock, Llist 32, , MiniDos, Pixcomp, +
U7 - Head Print With 30 Mini Pictures
U8 - Fig Forth Language With Tutorial

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 & 93 for our Subscription Software!

Reviews

Education | CoCo 1, 2 & 3

Writest 3.3

Writest, a program for helping teachers, allows you to create matching, multiple-choice, and short/long answer tests. It requires a CoCo 1, 2 or 3 with a minimum of 32K ECB, a disk drive or cassette recorder, and a printer. While the program is not copy-protected and is available on tape or disk, this review is of the disk version.

The instructions for *Writest* are supplied as a file on the disk. Included is an option to send the directions to the screen or the printer, though I would only recommend screen printing as a last ditch effort. The on-screen directions fill 43 screens. They are printed in upper- and lowercase, making for difficult reading in the 32-column mode. You'll want to make a printed copy for easier reference.

You create a test by following the menu prompts. Once the test is complete, you can supply a header, such as English Quiz 3 - Fourth Period. Next, you may print the test or save it to disk for printing at a later date. *Writest* also allows you to print a key test with correct answers. This is very useful for grading papers. Another convenient feature is the ability to randomize the answers for multiple-choice and matching tests.

We've seen programs before that let us print simple text on paper. A handy feature of *Writest* is its ability to support special printing needs. The program includes printing codes for using different type sizes, underlining, graphing quadrants, using math symbols and multiple fonts, and more. It's almost like having a word processor just for making tests.

My first reaction to programs claiming to use printer codes is usually negative — I wonder what page of the printer manual I'll have to read. *Writest* simplifies the process by merging the print driver of choice to your *Writest* file. Now, you need only enter the desired codes, which are listed on a handy print-codes chart. The package even includes a BASIC program, CODECARD, to create a chart for you.

An added feature of this new version of *Writest* is the print drivers. Earlier versions limited printing to the Epson RX-80. Currently *Writest* supports Epson, Panasonic, Seikosha, Star (SG10/15), and Tandy (DMP and DWP) printers.

I was bothered by the clarity of the instructions provided with *Writest*. In its present form, I find the instruction manual somewhat difficult to decipher. I strongly recommend the author have a novice try the program and update the documentation accordingly. This could only improve an otherwise useful program.

I find *Writest* easy to use in creating and modifying tests. If you are a teacher and spend long hours at the typewriter creating tests, this program is for you. It will save you time and your students may appreciate the appearance of their tests and quizzes.

(CoCosoft, Beech and Broadway, Box 665, New House, NM 88121; 505-279-6455; $15 plus $2 S/H)

— Tony Olive

Audio Tape

Hot CoCo!

The goal of today's personal computer is to provide enjoyment while making the things we do somewhat easier to accomplish. A perfect example of meeting this goal is found in *Hot CoCo!*, a music audio tape from MusicWare.

Hot CoCo! is a collection of original compositions created on the Color Computer using *Lyra* and CoCo MIDI 3, and recorded using various synthesizers. Featured on the cassette tape are selections written by Val Burke, Lester Hands, Mike Stute and Mark Steele.

Val Burke, who has written articles for THE RAINBOW, is obviously a jazz man. Three of his four compositions, "Cantor O'Reilly's Song," "What?" and "Lest I Forget," offer a swing mood with a very loose rhythm and blues feel. In "Lest I Forget," Val's use of dynamics and reverb give the music a very realistic depth. It almost sounds as if a full band is playing.

In a serious turn, those who were moved by the crisis in Beijing last year will appreciate the emotion captured by "I Cry For Tian Anmen." Throughout the piece, you'll hear a rhythmic, oriental background melody. For me, the fact that it didn't vary was very effective in illustrating a society in which the controlling force is resistive to change.

Also on Side A are four compositions by Lester Hands, author of *Musica* and *Lyra*. These include "Wish," "Jinx," "Mists" and "Quartet." In contrast with Val Burke's predominantly swing style, the first three pieces tend toward a New Age/relaxation style. You'll hear lots of strings and softer instruments. Each piece really fits its title, and little effort is required to get the feel of the music.

With "Quartet," Lester Hands shows he knows what the Baroque era was all about. This score gives the listener an idea of how Bach or Gabrielli might sound, were they alive today. Effective creation of New Age music takes a lot of talent, and Lester has done a magnificent job.

Starting off Side B is Mike Stute, author of "The Lyra Companion." Mike provides two works: "Stage of the World" and *The Order of Time*. While it is harmonically clean, I miss the point of the former. "Stage" is slow, trudges along and attempts to build to a melody but never quite gets there. It would probably fit well as background music in movies such as "Risky Business" or "Kill Me Again."

"The Order of Time" makes more sense to me, as it traces a time line from beginning to end. The first three movements "Genesis," "Eve of Destruction" and "Calm Before the Storm" fit together well musically. I was a little disappointed, though, upon hearing the final movement, "Armageddon." I expected a climactic ending but didn't get one. The music builds and builds, but offers no closure. Perhaps this is a way of saying time doesn't end?

The final musician featured on *Hot CoCo!* is Mark Steele. In *Fanfare & Overture in G* and "Invention #2 in D Minor" Mark does an excellent job of mixing classical styles with progressive techniques to achieve a clean, New Age sound. He composes with the accuracy of Mozart, the harmony of Bach and the precision of the more contemporary Mannheim Steamroller.

Mark's third piece, "March of the Miniature ET Warriors" is a delight. It is a complete story told musically, and it incorporates very effective use of dynamics and sound effects.

I particularly enjoyed "My Thirtieth Year." This mellow ballad prompted me to take time to both reflect on the past and look forward to new beginnings. Very well done, indeed!

In all, *Hot CoCo!* provides a superior example of the CoCo's capabilities in a form anyone can enjoy. I was amazed, although I really shouldn't have been, at the talent displayed by the four musicians featured on the tape. I encourage MusicWare

Color Computer Software

CBASIC Editor/Compiler

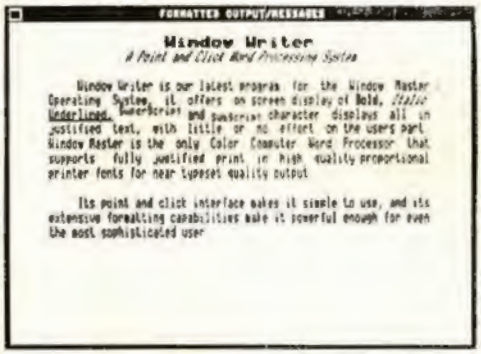
The ULTIMATE Color Computer Basic Compiler!!!

If you want to write fast machine language programs but you don't want to spend the next few years trying to write them in Assembly Language , 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 color computer 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 Extended Disk Color Basic, into fast efficient machine language programs easily and quickly.

"The most complete Editor/Compiler I have seen for the CoCo..."-The RAINBOWMarch1986

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or M.L. 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. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/PUT, PLAY and H/DRAW, all with 99% syntax compatibility.

Specify Coco 1, 2 or 3 Disk $149.00



October Specials

Window Master and Writer....$99.00
Window Master, Adv. Programmers Guide and Desk Accessory Pak $99.00
Edt/Asm III and The Source...$89.00
CBASIC Editor/Compiler.....$125.00

512K Only $99

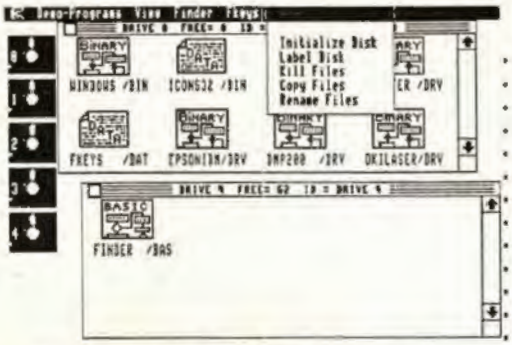
Give your COCO 3 all the power it deserves with this easy to install (no soldering/plug in) 100% Tandy compatible 512K memory upgrade. Completely assembled and tested. Includes Ramdisk & Memory Test software described below. $99 or **512K + Window Master $149**

CoCo 3 Turbo Charger

Turbo Charge your 512k Coco 3 with this ALL Machine Language program that will run your machine at double speed all the time even for floppy disk access and give you 2 ULTRA High Speed Ram Disks. It's Reset protected so it won't disappear like other Ramdisk programs. You also get a 512K memory tester program, it performs several bit tests as well as an address test.

Requires 512K & DISK $19.95

Window Master V3.0



The Ultimate User Friendly Point & Click operating enviornment for your Coco 3. Simple enough even for children to use, just point and click to run programs, select files, do disk or file maintenance or almost any task you currently do by typing commands. You also get things like a print spooler, Programmable Function Keys, a Buffered Keyboard, Ramdisk, Serial I/O port and Deluxe Pak support along with Windows, Icons, Buttons, Pull Down Menus, Edit Fields and Mouse functions all in one program. It has multiple fonts in 54 possible sizes and styles, Enhanced Basic Editing and much much more. It add over 50 commands and Functions to Basic to fully support the Point & Click System without the need for OS9.

"..it offers so many features that it is probably underpriced. I recommend this software to all CoCo3 owners." -The Rainbow Feburary 1989

It is completely compatible with existing Basic programs and takes absolutely no memory away from basic. It requires 1 Disk Drive, R.S. hires interface & Joystick or Mouse. Includes 128 & 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

"Window Writer is a powerful wordprocessor that is fun to use, very user friendly..... The Enviornment compares favorably to that of Microsoft Windows " - RAINBOW Dec. 1989

Requires Window Master & 512K - $59.95

Window Writer/W - same as above for non Window Master owners, 512K & Disk $79.95

Window Basic Compiler -similar to CBASIC only it compiles all the Window Basic Statements to create super fast Machine Language programs & Desk Accessories. $99.00

Window Edt/Asm - A full featured Editor & Assembler for Window Master. $49.95

Font/Icon Editors - A utility disk with the Font & Icon Editors to create or edit 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 point & Click concentration game, lots of fun. $19.95

Desk Accessory Pak- Installs up to 7 resident D.A. programs, including: Font & Icon Editors, Function Keys, Terminal program, Graphics Editor & Calendar and more. $39.95

DataPack III Plus V1.1

AUTOPILOT and AUTO-LOG Processors
X-MODEM DIRECT DISK FILE TRANSFER
VT-100 & VT-52 TERMINAL EMULATION

- No lost data even at 2400 Baud on the Serial I/O 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 Key Buffers or Disk.
- Display on Screen or Print the contents of the Buffer.
- Freeze Display & Review information On line .
- Built in Command Menu (Help) Display.

Supports: Modem-Pak & Deluxe Pak or Serial Port.

Specify Coco 1, 2, 3 Disk $49.95

"The Source"

The SOURCE will allow you to easily and quickly Disassemble machine language programs directly from disk and generate beautiful, Assembler Source Code. And " The Source" has all the features and functions you are looking for in a Disassembler .

- Automatic Label generation.
- Allows specifying FCB, FCC and FDB areas.
- Disassembles programs directly from Disk.
- Automatically locates addresses.
- Output listing to the Printer, Screen or both.
- Generates Assembler source directly to disk.
- Built in Hex/ASCII dump/display.
- 8 Selectable Display formats 32/40/60/80.
- Built in Disk Directory and Kill file commands.
- Menu display with single key commands.
- Written in Ultra fast machine language.

Specify Coco 1, 2 or 3 Disk $49.95

EDT/ASM III

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features of the COCO 3. It has 8 Display formats from 32/40/64/80 columns. The disk also contains a free standing ML Debug Monitor.

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

- Local and Global string search and/or replace.
- Full Screen line editing.
- Load and Save standard ASCII formatted files.
- Block Moce & Copy, Insert, Delete, Overtype.
- Create and Edit files larger than memory.

The Assembler features include:

- Conditional If/Then/Else assembly.
- Disk Library files up to 9 levels deep.
- Supports standard Motorola directives.
- Allows multiple values in FCB/FDB directives.
- Allows assembly from Buffer, Disk or both.

Specify Coco 1, 2 or 3 Disk $59.95

To order products by mail, send check or money order for the amount of purchase, plus $4.00 for shipping & handling to the address below.
To order by VISA, MASTERCARD or COD call us at
1-800-383-8529
(Monday thru Saturday, 8am to 5pm PST).

CER-COMP Ltd.
5566 Ricochet Avenue
Las Vegas, Nevada 89110
1-800-383-8529

to provide an encore as soon as possible. At $9.95, *Hot CoCo!* is an exceptional purchase, and I recommend it for all, whether or not they have a CoCo.

(Rulaford Research, P.O. Box 530328, San Diego, CA 92153; 619-690-1181; or MusicWare, Hamlet Route, Box 1261, Seaside, OR 97138; 503-738-0119; $9.95)

— Cray Augsburg

Utility	MS-DOS

*Elite*Xfer*

Some CoCo users, myself included, have ventured into the world of the IBM PC and its variants. Some do it because of their jobs, some to gain access to particular programs unavailable to CoCoists any other way. My own interest in the PC domain began when I had to write a paper that grew to nearly one hundred pages and required extensive formatting. CoCo word processors were just not up to the job. The software selection available for PCs is vast. Moving some (or all) of your work to another operating system brings with it a great deal of frustration. Files must either be left behind or transferred to the new system.

For me this meant hours of transferring files between my CoCo and my PC clone using a serial cable and communications programs at both ends. This is an acceptable alternative if the job has to be done only once, and if the cables and communications programs are available for both machines. But if you want to use both machines, it becomes a real inconvenience. This is especially true if the computers are in different locations. What is needed is a program that can translate disk files from one format to the other. Until now, I have not found a workable program to do the transfer; I've tried a couple, but none were very good.

Then I found *Elite*Xfer* by Elite Software. This is a disk of programs that run on an IBM computer (or clone), not on a CoCo. *Elite*Xfer* allows you to freely move files between RS-DOS and MS-DOS. It also has utilities that allow you to do some housekeeping of CoCo disks. All the options are described below. *Elite*Xfer* requires an IBM PC/XT/AT/PCJr or true compatible with at least 128K bytes of memory and at least one 5¼-inch floppy drive. You must be running PC-DOS or MS-DOS 2.0 or higher. These requirements are minimal. I would guess that more than 99 percent of MS-DOS computers exceed them. There are separate program versions, one for color monitors and one for black-and-white, monochrome and LCD monitors. The versions are identical in their operation. Installation is a snap, especially when compared to many other MS-DOS programs. The disk is not copy-protected and can be easily installed on a hard disk. The disk is accompanied by a well-written manual that explains all program features in detail.

The main function of *Elite*Xfer* is to move files between MS-DOS and RS-DOS disks. The CoCo stores ASCII test files with lines terminated by only a carriage return character. MS-DOS ASCII files have lines terminated by a carriage return character, followed by a line feed character. Translation between the two formats is taken care of automatically by *Elite*Xfer*.

There is also an option to copy files exactly with no end of line translation. This option is not usually useful but could be handy in special circumstances. Before a file is transferred, it's usually a good idea to know what files are available and what their contents are. These tasks are also taken care of by *Elite*Xfer*. It displays a standard CoCo-style directory, allows you to view ASCII files, and shows binary files using a display similar to the OS-9 `dump` utility program. Thus, you know what it is you're transferring before you do so.

Files can also be deleted from a CoCo disk to make room for other files you may want to transfer. If *Elite*Xfer* could do no more than the things described above, it would be a boon to many of us, and I would recommend it highly. But, there's more!

Elite Software publishes *Elite*Xfer*, which lets you transfer *Elite*Word* documents to MS-DOS disks directly without saving them in ASCII format. Owners of *Elite*Word* can save all kinds of aggravation and time using *Elite*Xfer* to move files to MS-DOS. More important to the rest of us are the other options such as the ability to format a CoCo disk on the MS-DOS machine. This may seem like a little thing until you realize that the two machines can be in different locations and you don't have a formatted disk available. Disks can also be checked by *Elite*Xfer*. This option allows you to verify that every sector of a CoCo disk can be read correctly. If there is a problem, unreadable sectors are repaired by filling them with either * or 0 characters. This allows you to salvage files from an otherwise unusable disk.

The final option is sector display and editing. Using this option you can look at any sector on the CoCo disk in hexadecimal and ASCII format. You can also edit any sector, byte-by-byte. This is another powerful option that can be used to perform all sorts of miracles such as directory repair. Used carelessly, it can render a disk unusable. Caution is strongly advised.

The flexibility of *Elite*Xfer* is enhanced by its ability to change which drive is for MS-DOS files, which drive is for RS-DOS files and the density of each drive. Files can be selected using MS-DOS wildcard characters and whole disks can be copied in either binary or ASCII format. The program designers did their job of anticipating user needs. The execution is flawless.

If you routinely have a need to move files between RS-DOS and MS-DOS computers, you need *Elite*Xfer*.

(Elite Software, Box 11224, Pittsburgh, PA 15238, 412-795-8492; $69.95 plus $3 S/H — limited offer: $44.50 plus $3 S/H)

— Don McGarry

Game	OS-9 Level II

Pyramid Solitaire

Pyramid Solitaire is a one-player game written for OS-9 by Zack Sessions of Color-Systems. It requires a CoCo 3 with a minimum of 256K, OS-9 Level II, a monitor or color TV, the `Windint` module from *MultiVue* and a mouse or joystick.

For those unfamiliar with this type of solitaire, cards are arranged in a pyramid — one card, two cards that partially cover it, and so on. The final row has seven cards. Leftover cards are laid in a pile and may be used during play. The object of the game is to get rid of all the cards in the pyramid. You do this by removing any pair of free cards whose face values total 13.

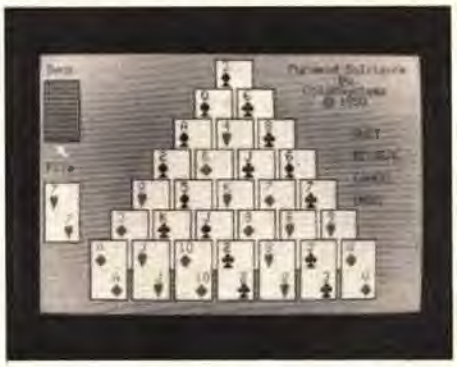
Both numerical and face cards are used (values are given in the manual). A free card is any card on the pyramid not covered by another card or the top card on the pile. Two cards from the pyramid or a pyramid card and a pile card may be teamed. Cards in the pile may be turned over three at a time. One round takes two or three minutes to play. The game is extremely easy to learn and may be enjoyed by *children* of all ages.

Pyramid Solitaire is graphics-based,

supporting RGB and CMP color sets. The cards are drawn on the screen in clear colors, using the standard symbols for the four suits (a diamond for diamonds, etc.). The game runs in a Type 6 window, and its 40 columns make the cards and menu words big enough to be easily read. The game is played entirely by pointing and clicking with a mouse or joystick. A player may use the mouse to select cards or to turn over cards on the pile. A menu lets you cancel a chosen card if it does not have a card to go with it, undo a move, redeal or quit playing. One super nice feature of this game is that you don't have to type, but can just point and click.

The disk contains the program, an application information file, an icon for *MultiVue* users, and a backup copy of the manual. *Pyramid Solitaire* is not copy-protected, so it may be backed up. The program runs from any directory or subdirectory on a hard or floppy drive. I keep mine in a GAMES directory on the hard drive. The program ran smoothly, with no problems. It is a very enjoyable game that even a novice will have no problems running.

The manual is nine pages long, thorough, clear and well-organized. Author Zack Sessions offers full support for registered owners by giving you his online and U.S. mail addresses as well as a telephone number. I have had occasion to contact him about this and other programs he has written, and I have always received fast, helpful and courteous service.



The game was originally available as shareware. The commercial *Version 3.0* adds the undo feature, online help, and the ability to start from any type device window. The original window attributes are restored when the game ends. Registered owners of earlier versions may upgrade for $7, which includes postage.

Being able to play this game on my CoCo is a definite plus. No more finding the cards, laying them out on the table, or discovering, after 16 losing games, that one of my cats has eaten a card or two. When I win, I even receive a congratulatory sound from my CoCo.

I use OS-9 almost exclusively, so it's good to see a new game for OS-9, especially one that can be enjoyed by the whole family. I like *Pyramid Solitaire*. The game has simple playing rules yet requires some strategy to win. I recommend it to any adult or to children old enough to add two numbers to get 13.

The program's $10 price includes shipping and handling and is reasonable, considering that I have played for hours and still enjoy it as much as I did the first time.

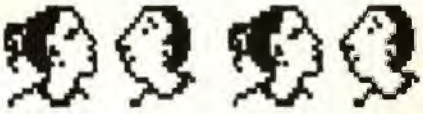
(ColorSystems, 4616 Castle Hayne Road, Castle Hayne, NC 28429; 919-675-1706; $10.)

— Toni Long

Finance	OS-9 Level II

1990 CoCo Tax Estimator

If you deal with the Internal Revenue Service only once a year, you need not continue reading this review. However, a number of taxpayers are, for a variety of



EVERYONE'S TALKING ABOUT...

DUAL HI-RES JOYSTICK ADAPTER
Colorware Hi-Res Tandy Hi + Low Res, cassette jack $40

HI & LO-RES JOYSTICK ADAPTER
Tandy Hi + Lo-Res $27

HAWKSoft keyboard cable $25
DOMINATION war game $18
MYDOS extended DOS for you! $15

HAWKSoft
P.O. Box 7112 Elgin, Il 60121
(708) 742-3084 eves and ends
SASE for more info and price list.
S/H (US & CAN) always included
M.O. Check C.O.D. no credit cards
1 year warranty on ALL hardware !!

For over 7 years, MusicWare has given the CoCo community some of the best music programs around. Now, we've done it again with a high quality professional MIDI recorder/sequencer!

CoCo MIDI Pro, which requires a CoCo 3 with 512K memory, will record music from any MIDI synthesizer. It is the equivalent of a sophisticated 16 track recording studio in your own home that would otherwise costs thousands of dollars! But hurry, *you must order before October 31* to get the great price of $100 for both program AND MIDI interface!

We've also got Lyra, the ever popular music program that makes it easy to play, transcribe, or compose music. Only $37.00. This includes a copy of the 100 page *Lyra Companion*.

Don't miss Hot CoCo, a 50 minute tape of great music produced by CoCo users. On sale for $7.50 (regularly $9.95)

The quarterly *MusicWare News* is free for the asking.

MusicWare Hamlet Route Box 1261, Seaside, OR 97138. (503) 738-0119. Ask for Lester Hands. Mastercard or Visa welcome.

reasons, required to file an estimated tax form known as the 1990 1040 ES. This is a fairly simple form to fill out, but since we all have computers, why not let the machine do the work?

1990 CoCo Tax Estimator, from Puritas Springs Software, is a program designed to assist the taxpayer in determining estimated 1990 income taxes. The program is written in BASIC09 and requires OS-9 Level II. In addition, you should have 512K of memory and an 80-column display. An AIF file and an icon are provided for those who use *Multi-Vue*. The program is provided in I-code format, so there is no possibility of modification.

The program is easy to install. Simply copy the program, icon and AIF files to the appropriate directories. To execute from the Shell prompt, select a standard 80-by-24 text window (Type 2) and type `estimate90`. From *Multi-Vue*, simply double-click on the program's icon. Remember, this is BASIC09 I-code, and `RunB` must be in memory or the current execution directory. A menu appears with options to open, edit, load, save, display and print the file. Another option provides access to the disk menu that provides options to change and display both the execution and working directories. Since you are starting new, just choose the option Open File and proceed to enter the required IRS data as the program prompts. After completing data entry, you can save, display or print the results. If you need to make changes later in the year, you can load the file, correct the data and recalculate for the new figures.

Using my 1990 estimated form, which I prepared in April, I proceeded to enter the data into the program. After completing the data entry, I displayed the results and found excellent agreement with the previously calculated tax. By choosing the print option, I obtained a nice printout, which I promptly filed in my 1990 tax folder.

Assuming you understand the IRS and Form 1040 ES, the *CoCo Tax Estimator* is a very easy to use program. At first I wondered what was the advantage of using it. Form 1990 ES is not extensive and can be easily completed with a standard calculator. Alternatively, you can easily write a spreadsheet, which I have done for a number of years, and accomplish the same thing. But after using the program, I find it nice to have a neat package that can be easily modified as my income changes. Of course, as tax laws change it may become necessary to obtain a revision. In the program's one-page documentation, Puritas Springs Software does not comment on the possibility of future revisions.

I found problems with the Disk submenu, which does not provide displays of the current and execution directories. Also, when I selected Return to Main Menu, the program asked for the name of the new directory. While the features on the submenu do not affect program operation, with respect to completing the estimated tax, I was annoyed that Puritas Springs did not fully debug their program prior to my review. These bugs have been corrected on the final version.

1990 CoCoTax Estimator is free to all who send Puritas Springs Software a 35-track formatted disk with a return mailer and return postage.

(Puritas Springs Software, The Ameritrust Building, 17140 Lorain Avenue, Cleveland, Ohio 44111; 216-251-8085)

— Donald Dollberg

Utility	OS-9 Level II

Print5

I was always told to never judge a book by its cover. As an avid reader of science fiction and fantasy, I've learned the truth within this phrase. Knowing that, I still became very skeptical when I heard that I would be reviewing something called *Print5*. And when I heard the description, OS-9 print utilities, I became so skeptical that I almost went into a coma. I have to admit that I put the review off for a few hours. *Print5* patiently sat there on the desk, waiting to be reviewed. Occasionally I would glance over and see it, but quickly look away. I hoped that somehow it would just disappear. But it didn't. So, a few hours after receiving it, I began flipping through the manual.

I found I was wrong about *Print5*. Before I tell you just how wrong I was, I'll briefly list the equipment required for *Print5*. First you will need a CoCo 3, preferably with 512K, and OS-9 Level II. At least one disk drive is needed, but two disk drives might be more useful. You will also need a DMP-105/130 or compatible printer. The manual recommends a Hi-Res monitor and a copy of *The Complete Rainbow Guide to OS-9 Level II*. You should make a few backup copies of the *Print5* disk. I suggest you put the *Print5* modules on your main system disk in `CMDS` directory.

To use the modules, you'll need to have the `tmode` and `display` modules from your `CMDS` directory in memory. Three of the four modules can't use the normal text screen at the beginning, so you'll need types 1, 2 and 5 windows to use them. There are programs to help you set up the windows. If you have 128K you will probably be able to use only one of these at a time.

The one module that you can use from your start-up window is called `ps`. This little module will dump the current screen to the printer. So what? So what indeed. This handy device saved my life a couple of times. You see, I use a public domain word processor called *Ed*. *Ed* is a fine program, but it has a tendency to cause a stack overflow and drop to the Shell. This means everything is lost, unless you've printed it or saved it to disk. Not long after I received *Print5*, *Ed* did just that. I thought the story I had written was a goner. Then I remembered `ps`, which I used to make a dump of the screen to save the text. I lost what had already scrolled off the screen, but at least the text still on the screen was saved. I had to re-type everything from the screen dump, but it's still better than losing it altogether, or writing it by hand and then re-typing it.

The `ps` module offers other beneficial features, which can be invoked using parameters. For example, if you type `ps 35 10` it prints the top 10 rows of text, with a margin of 35 columns. If you type `ps 20`, the entire screen is printed with a margin of 20.

Is this really a beneficial feature? If you had a text file of approximately 22 lines with carriage returns at the 40th column, you would not want all the text printed on the left. You wouldn't want to load a word processor and insert 20 spaces in front of every line, either. Instead with *Print5* you merely enter:

```
display c; list text.file; ps 20
```

It is important to clear the screen, list the file, and run the `ps` module all in one line so as not to dump any text that is not supposed to be dumped. There are also many other uses for the `ps` module.

The next module is called `pg`, which requires a Type 5 graphics screen. `pg` is used to create a sideways screen dump. The left margin, as well as the number of lines to be printed, can be specified. This feature can be very helpful, especially when working with two text files. It can be used if one file is to be dumped normally while the other is to be dumped sideways. For example, let's say the first file is an ad for a used car, and the second file is a phone number printed several times. You want the printed copy arranged so that several people can tear a copy of the phone number from the page. To do this you would enter:

```
display c; list car.ad; ps
display c; list phone.num; pg
```

The number of uses for the `pg` module are

limited only by the boundaries of your own imagination.

The next module is called pgw. It is the same as pg, but the printout is twice as wide which makes the copy look twice as tall when looking at it sideways.

The final module is phc. There are four parameters for this one — type style, left margin, the number of lines to print and the number of columns to print. Condensed, elite and pica are the type styles from which you can choose. Since the number of columns can be specified, it is also very convenient to choose the type style to be used.

Some of the more common errors that occur with the *Print5* package are explained in the manual. Solutions for these errors are also given. I encountered no errors while using the modules, so errors aren't necessarily commonplace when using them.

There is still more to *Print5*. The second part of the manual lists a couple of BASIC09 procedures that are on the disk, and how to use them. For these, it is highly recommended that you have 512K. Even though you will run out of memory quickly, 128K will work.

You will need to start BASIC09 in a Type 5 window. The procedure bf.b can be used to scale down and dump graphics images. Even though I did not have a tremendous need to print graphics, some people will find this to be a worthwhile feature and drivers are included for Epson- and IBM-compatable printers. The bf.b graphics routine can be used to make your ads more artistically appealing.

One understandable, though annoying problem with pg, pgw and phc is that they seem to print rather slowly. ps is capable of working at normal speed, however.

Even though there is more to the *Print5* package, I have covered the main areas of interest. It is a valuable package and the ps module alone makes it worth the price.

(G.T.T.D. Software, P.O. Box 187, Pablo, MT 59855; 406-883-2306; $23.95, $2 S/H)

— Jeff Byers

Utility	CoCo 3

Revelation!

Revelation! is a prophecy of things to come and an introduction to the CoCo Community by the program's author, Mr. Robert Offermann. Improvements made to the CoCo by *Revelation!* include Hi-Res graphics screens that use a larger number of pixels, acceptance of lowercase commands, 62 preprogrammed macro keys and many other useful additions.

With *Revelation!*, the CoCo's screen height is 225 pixels rather than 192 — enough for 28 lines of text! The program reverses the CLEAR and backslash keys to prevent accidental screen erasures during input. The function keys have been programmed to allow you to switch between fast and slow modes (to change the speed of the CPU) and to provide a shift-lock key. While in the high-speed mode the CPU is temporarily slowed down for disk access. The ALT key combines with other keys to produce *macros*. Macros are key combinations that produce a longer sequence of useful characters such as commands. For example, holding ALT down and pressing A prints ATTR on the screen. The user can't modify the macros, however.

Revelation! prints the full names of errors. For example, instead of ?SN ERROR the screen displays ?Syntax Error. Also the OK prompt has been replaced with the word Ready.

You can enter PCLEAR values from 0 to 18 to reserve from 0 to 18 graphics pages. PALETTE RGB and PALETTE CMP now reset all 16 palettes, rather than 15. The CLS command allows the use of numbers up to 255, clearing the screen in various ways. This is similar to my program CLS255, printed in the January 1989 issue of THE RAINBOW.

During DSKINI the verify (second) sweep across the disk has been bypassed, thereby greatly speeding up the process. (Verification errors are very rare during DSKINI.)

Revelation! doesn't work with *ADOS* or *C-DOS*, even with their respective DISABLE/UNDO commands. I have a controller that can hold up to four DOSs. I normally have only an *Extended ADOS-3* EPROM in my controller. When I found I couldn't run *Revelation!* with *ADOS*, I remembered I had a Disk BASIC ROM, which I immediately inserted into my controller as well. *Revelation!* worked perfectly.

Words on the screen are very hard to read on a TV. *Revelation!* is meant to be used with a composite or RGB monitor. In addition, it will work with Color Venture's RAM disk.

A label on the disk reminds the user to make a backup copy. One problem I discovered was that when I typed PCLEAR 0, then CLEAR 0, there was no memory left. It repeatedly printed Out of String Space, and I had to reboot the program. [*Editor's Note: Mr. Offerman has confirmed that this bug has been fixed and* PCLEAR 0:CLEAR 0 *works with no problems. In addition, he says the problem existed only in the review copy, and no production copies were released with this error.*]

Even though commands may be entered in lowercase, I discovered that filenames must be entered in uppercase letters. At

New Modems

RAINBOW CERTIFICATION SEAL

(1) Two versions of SendFaxModems
Send any text file and most graphics files from your computer to any Fax machine in the world. Both external and internal (for PC) models. And with full 2400 Baud data modem capability.

(2) V.42/V.42bis 2400 Baud data modems.
These have both error correction and data compression (gives much higher effective throughput, as much as 9600 Baud).

All are high quality modems made by Zoom Telephonics in the USA, with performance features unmatched by competitors costing three times as much.

Fully Hayes compatible. Work with any computer.

All the features you expect in state of the art modems. With seven year mfg warrantee.

Money saving premiums for Delphi, GEnie, CompuServe, etc.

ProcComm (PC) + $5 QuickLink (Mac) + $5
WizPro is free (shareware)

Send Fax external modem	**$149.00**
Send Fax internal modem (for PC)	**$139.00**
Come with software for PC or MAC your choice (ask about Granite Computers OSK telcom software)	
2400 v.42/v.42bis external modem	**$235.00**
2400/1200/300 BPS external modem	**$115.00**
internal modem (for PC)	**$105.00**
Please add: USA - shipping and handling	$3.50
Canada - Air PP and Insurance	$7.46

GCS FILE TRANSFER UTILITIES
now updated to Version 3.0

The GCS File Transfer Utilities provide a simple quick method to transfer text and binary files to and from a variety of floppy disk formats.

Need to transfer files to and from PC (MSDOS), RSDOS, FLEX or MINI-FLEX disks on your OS-9 system? You need GCS File Transfer Utilities.

Commands Dir, Dump, Read, Write, Rename, Delete, Format PC
Dir, Dump, Read Write RS of FLEX disk

Version 3.0 handles most 5.25 and 3.5 formats. Any level sub-directories (PC). Binary files. Use pipes for direct and multiple transfers. Multi-Vue version can be used under Multi-Vue or as stand alone Shell commands.

Requires OS-9 L2 for COCO 3 L1 for COCO 1 or 2
2 drives (one can be hard or ramdisk, one floppy 40 T DD DS).
Multi-Vue for Multi-Vue version
SDISK3 for COCO 3
SDISK for COCO 1 or 2

GCS File Transfer Utilities for CoCo	
Multi-Vue version	$54.95
Standard version	$44.95
Version 3.0 update - either version (provide disk number)	$15.00
D. P. Johnson SDISK or SDISK3	$29.95
L1 & L2 Utilities	$75.00
Ask about FORTH09 (6809 & OSK)	

Standard diskettes are OS-9 format (5.25") - add $2.50 for 3.5" Orders must be prepaid or COD. VISA/MC accepted. Add $1.75 S&H. COD is additional.

GRANITE COMPUTER SYSTEMS
571 Center Road 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.

first, I couldn't get any program, BASIC or machine language, to load under *Revelation!*. Each time I entered a filename I got a File Not Found Error — the name I typed didn't exactly match the name on the disk in terms of case. Some graphics demonstration programs are included on the disk to show off the expanded screen. They are exciting to watch on the larger monitor.

Included with the program is a registration form. Not only can it be used to register the purchaser as an owner who will receive future upgrades, it includes a questionnaire about the user's system and personal software preferences.

A lot of thought and planning went into this program and its documentation. The documentation includes a reference card explaining the macros, control characters, etc. More complete instructions are included on the disk. The documentation on the screen is colorful and uses several fonts.

Robert Offermann states in the onscreen documentation that he is buying a Commodore system and plans to study software products developed for it, with the intention of producing similar programs for the Color Computer. I like the fact that he is "spying" on the competition!

Revelation! is a revelation of things to come if the CoCo Community accepts and supports it.

(Robert E. Offermann, II, 2447 Oak Park Way, Orlando, FL 32822; 407-282-6272; $25)

— Lee Deuell

Education | CoCo 2 & 3

Education Galore

This review covers a collection of short, much-needed educational programs written by Sebastian La Spada, intended for use on the CoCo 2 or 3. The five programs I reviewed are *Math Quiz*, *Vocabulary*, *Homonyms*, *Spelling* and *Number Guess*.

The programs require 64K RAM and come on disk or cassette tape. All the programs are written in BASIC. My review copy came on disk accompanied by a handmade 13-page, dot-matrix printed manual. The manual actually covers 11 different programs and contains more of a brief description of each than actual user instructions. This is not a real handicap since the programs are pretty much self-instructing and very easy to operate.

There are certain features common to all five programs. They include the use of sound and tunes, colorful block graphics and the use of random pattern generation. All programs ask how many questions you want to answer and provide a final score at the end. If you answer correctly, the program responds with words like Great or Super. An incorrect answer usually solicits a displeasing sound and the program informs you of the correct answer. It may also ask you the same question later on.

These five educational programs use sound, graphics and random patterns for teaching.

Math Quiz is by far the most complex of the five programs. This program offers addition, subtraction, multiplication, division and times tables at four levels of difficulty: easy, intermediate, difficult and challenging. Addition on the easy level is at about the second grade level, while the advanced and challenging levels can require you to use a pencil and paper. The times table is especially useful for drilling young children on their multiplication tables. The program would be of more value, however, if it corresponded to the way in which children study these tables in school. They normally do a twos table then a threes table and so on. As it is, the program presents all the tables at random and the child may not be at a given level yet.

Vocabulary presents you with a series of definitions and asks you to match each with the correct word, presented in multiple-choice fashion. There are 100 possible definitions. These words are definitely for adults and high school or college students. A few examples are *procrastinate*, *misanthropist* and *obsequious*.

Homonyms is a program written at the elementary school level. Homonyms are words that sound alike but are spelled differently and have different meanings. Here you are presented a sentence and must complete it with the correct word that fits the context of the sentence. An example of this is `HOW MANY DAYS ARE THERE IN A _____? (1) WEAK OR (2) WEEK.`

Spelling is a little like the homonyms program in that you must select from a list of words to correctly complete the sentence. The main difference here is that you have the same word spelled two different ways, one of which is incorrect. Some of these words exercise the various rules of spelling like the old *i before e except after c* rule. Typical examples are the choice between `(1) BELIEVE OR (2) BELEIVE` and the choice between `(1) MUSTACHE OR (2) MUSTASH`. One small glitch I found in *Spelling* is that the program ends with the question `WOULD YOU LIKE TO REVIEW MORE HOMONYMS?`, even though I was in the *Spelling* program. *[Editor's Note: Mr. La Spada assures us this minor bug is now fixed.]*

Last but not least is the *Number Guess* program. This one is just plain fun. The computer picks a random number and you try to guess what it is. The program gives you clues such as `YOU'RE TOO LOW` until you guess the correct number. Some clues are a little misleading, however. Let's say the computer has picked 61 and you enter 65 as a guess. You see a clue such as `YOU'RE ALMOST THERE`, to which you guess 66. Then you might be told `CAN'T GET MUCH CLOSER` even though your guesses are getting farther away from the chosen number. This is odd, but the game lasts much longer. All numbers are chosen in a range between 1 and 100.

All programs in the collection work as advertised. They are designed for elementary to high school students. Not a bad buy for $8.

(Sebastian S. La Spada, 531 Main Street, Dunkirk, NY 14048; 716-366-5261, disk, $8)

— Larry Birkenfeld

Game | CoCo 1, 2 & 3

Tuty

Pull up a chair, Kenny Rogers, for a little gamblin' CoCo style. I'm talkin' Vegas minus Wayne Newton — just you, some fruit and Lady Luck.

The slot-machine type game, Tuty (fruity), by CB Games appeals to the gambler in all of us. You simply roll the fruit and cross your fingers. Well, actually there's more to this game.

There are up to six different fruits that can appear onscreen in various combinations. Each fruit combination is worth a designated number of points. After each roll, your job is to pick out the worthless fruit and discard it. If you are able to save at least one good piece of fruit, you can roll again, filling the remaining fruit slots. Once more you pick out the bad fruit, keeping the pointers. If you fill all of the slots with good

fruit, you can take another turn, risking all of the points you've won, or you can pass the turn to your opponent. If you do not fill all of the slots, you are left with what points you've earned and your turn passes to another player. The objective of the game is to obtain a set number of points before your opponent. Despite the fact that playing *Tuty* doesn't require much strategic skill, the program moves quickly and kept me interested in rolling fruit all afternoon.

Tuty's success as a slot-machine type game is its ability to stir up an atmosphere of gambling excitement. It puts you on a winning streak, during which you continually roll, say, pineapples and watermelons. Then unexpectedly *Tuty* ends your spree by dishing out a plate of dud fruit. It lures you into gambling, then takes away your winnings — well, not always. Not always means you're left always trying to decide if you should take a chance. That's the excitement of gambling. Only with *Tuty*, you won't lose the house.

One player may challenge *Tuty*, or up to four players may compete against each other. The graphics and sound are average. A CoCo 1, 2 or 3 is required; a joystick and RGB monitor are optional.

(CB Games, P.O. Box 2496, Kalispell, MT 59901; 406-257-3832; $24.95)

— Kelly Goff

Game CoCo 3

Spectral Forces

"The battle calls! To the brave, to the cunning, to the true soldier, the battle calls! Is there one who will answer? Is there one who will save our village of Adaling? Is there one who dares to test the evil Garth? Is there but one true warrior? Who? Who dares to accept the challenge?"

"I will," you answer. "I dare!"

Well, you stuck your foot in your mouth again! You, Lars, the philosopher. What kind of an adventurer are you? You had better be a darned good one if you are going to beat Garth and his legion of evil in *Spectral Forces*.

Spectral Forces is an Adventure for the 128K CoCo 3 with at least one disk drive. It uses, at your option, either the 32-, 40- or 80-column screen. You may also select between all uppercase or upper- and true lowercase combined.

Forces takes place in and around the corrupt little village of Adaling, a den of thieves ruled by Lord Fandel, a miserly old dog who lives in luxury's lap while his subjects live in rotting wooden sheds. It's no wonder the only law in the land is prejudiced toward outsiders. Justice means little in this town. Like it or not, you had better learn their thieving ways real fast.

As in most Adventures of this sort, magic abounds in a variety of forms. The magic is both mysterious and predictable. Secret passages secured by magic often lead to more magic, and all of it is confusing, misleading and by all means deadly.

The cast of characters is as deadly as the magic itself. Meet and defeat, if you can, the Dragon, who can be found guarding valuable treasures. Beware of his fiery breath as he attacks.

NEW!!!

ALL COMMANDS AT YOUR FINGERTIPS

NO MORE SEARCHING THROUGH MANUALS

KEYBOARD TEMPLATES FOR YOUR COCO

ALL Commands for CoCo 1-2-3 on ONE Template $6.95
Telewriter 64 Template 5.95
Telewriter 128 Template 5.95

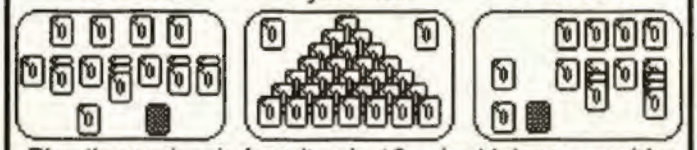
Please add $2.00 Shipping & Handling for each Template

(NC Residents Add 5% Sales Tax)

PLEASE SEND CHECK OR MONEY ORDER ONLY

P&M PRODUCTS
1003 Shalimar Drive
High Point, North Carolina 27262
(919) 887-2236

Classic Solitaire
Klondike • Pyramid • Canfield



Play these classic favorites in 16 color high-res graphics
128K CoCo3 One Disk Drive Joystick $14.95

La Belle Lucie
Deal 52 cards into 18 stacks, then try to reconcile them into 4 foundations. This solitaire is not for the faint of heart! Hoyle rules. 128K Coco3, disk, joystick $14.95

Zenix Arcade. Color graphics. 32 levels of play. Awesome speed. Sound.
128K CoCo3 One Disk Drive Joystick $29.95

Tazman (CoCo3)(requires OS9/II & 512K).....$24.95
Armchair Admiral (CoCo3).....$14.95
Riddle of the Ring (CoCo3/CoCo2).....$10.00
Games Pack I (CoCo3/CoCo2).....$10.00
Zenix Demo Disk (CoCo3)..... FREE

Software Submissions Invited
Checks, Money Orders, MasterCard & Visa
$2.00 S&H. COD additional $2.00. WA addresses add 8.1% sales tax. 30 day money back guarantee.

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

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

Perhaps you'll have better luck against the Catoblepas, the Hydra, the Succubus or one of nearly a score of other nasties, each of whom is more than willing to introduce you to the ultimate enemy, death!

Spectral Forces is efficiently written and response time is good. It should provide several hours of entertainment for the experienced adventurer.

Forces offers several interesting features. The BREAK key has been disabled, preventing accidental interruption of the game when pounding one's keyboard in frustration. (Or am I the only one who does this?)

One of the most interesting is the Scribe feature. By simply typing `SCRIBE ON` you can obtain a hard copy of what is being printed on your screen. This is handy when you forget what just scrolled off the top screen. Don't need the scribe anymore? Just type `SCRIBE OFF`. A very nice feature!

The text for the location descriptions is stored on disk. This allows for more extensive descriptions while taking up little memory.

Since this is a text Adventure, one of the challenges is to create your own map. Good luck! Counting all the twists and turns in the maze of tunnels, you have in excess of 225 locations to map.

Documentation is just six single-sided, typewritten sheets but is more than adequate. The story of the village of Adaling in itself makes for interesting reading.

Since *Spectral Forces* was written for the CoCo 3, I would like to see it take advantage of a few more of its features. For example, a short routine at the beginning to select foreground and background colors and save other default settings would be nice.

The game also lacks the ability to restart without rerunning. If you quit or die and want to play again, it's back to the beginning and back through the title page and options screens.

The most annoying item I found was the statement, "I don't understand." If you use a noun or verb, the game doesn't understand. If you try to go in a direction not permitted the program says,"I don't understand." A little variety would be nice here. Why not have the program say, "You can't go that way," or "Say that again," or even "Hey dummy! The door is locked!" to add a little variety.

Despite these minor shortcomings *Forces* plays quite well. It is efficiently written and response time is good. It should provide several hours of entertainment for the experienced adventurer.

And so, with trusty falchion in hand, I prepare to defend and protect Adaling. Willingly I will face mammoth spiders, ghouls, giants and squonk, if you will, but someone please answer this question — what the heck is a falchion?

(Marc Campbell Innovations, 266 Riverview Drive, Ephrata, PA 17522; 717-939-3181; $24.95 plus $2 S/H)

— Randy Cassel

Game	CoCo 3

Classic Solitaire

After programming for several hours, I often like to play a video game to relax. With many of the arcade/action games, it's hard to do that. You have to shoot this thing, watch out for that thing, and so on. But recently I found a video game that I can *relax* with.

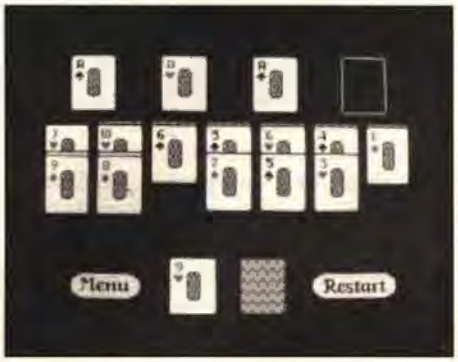
The game is *Classic Solitaire* by Eversoft Games, Ltd. It actually consists of three different solitaire card games. *Classic Solitaire* requires a CoCo 3 (128K is okay), a disk drive and one joystick. An RGB monitor enhances the program's 16-color Hi-Res display, but a composite monitor or TV is very comparable as far as colors and legibility goes. Kudos to the programmers for this compatibility.

To get the games running, enter `RUN"MENU"`. The font used on the menu screen is a refreshing departure from the standard fonts you see with other programs.

Klondike is the most common form of solitaire. The game requires you to make a row of seven stacks of cards, then build suits on each ace encountered, in a row above, in ascending order.

The second game, *Canfield*, puts 13 cards in a stack called *the stock*. You make a row of four cards, then one card is used as the aces are in *Klondike* to start the suits in the foundation. All built suits must start with a card of the same face value, and the suits are built in ascending order.

Finally, *Pyramid* has the cards laid in a pyramid shape, with one card at the top to a row of seven cards at the bottom. The object of this game is not to build suits but to match a pair of cards whose face values total 13. These cards are then removed from the pyramid, but only if they are not covered by other cards.



Classic Solitaire has four levels of playing difficulty: *easy*, in which you go through your hand one at a time as many times as you want; *medium*, which requires you to flip through the hand three at a time; *hard*, in which you can only go through the hand three times; and *expert*, in which you are allowed to go through the hand only once. *Pyramid* lets you use the expert option.

When you switch games by returning to the menu screen, you must have the disk in the drive, because the program accesses the disk when the menu is selected. Make a backup of the game disk onto a RAM disk if you have one. This can save you a little wear and tear on the disk. If you notice that your disk is wearing out, Eversoft Games Ltd. will replace the original disk for a fee of $5.

All in all, if you want non-violent games or just like playing a nice, relaxing game of solitaire, then *Classic Solitaire* deserves a look. I enjoyed playing *Classic Solitaire*, but I still can't win that darn *Pyramid* game!

(Eversoft Games, Ltd., P.O. Box 3354, Arlington, WA 98223-3354; 206-653-5263; $14.95)

— Richard L. McNabb

New Star 24-Pin 240 cps Printer!

24 Wire Color Printing!

MULTI-FONT PRINTER XB-2410

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

XB-2410 SYSTEM INCLUDES:
- XB-2410 Printer
- Color Upgrade Kit
- Blue Streak Ultima
- Software Support Trio**

$499.95 +$15 Shipping & Insurance

COMPLETE

XB-2415 SYSTEM **$699.95**
- Same as above only witha 15" wide carriage

+$20 Shipping & Insurance

COMPLETE

All Dayton Associate's products have a 30 day moneyback guarantee. All printer systems are "Plug 'n' Go for the CoCo".

****The Software Support Trio**
A Dayton Associates exclusive that comes with any printer purchase. It consists of a CoCo Installation Tutorial, a CoCo Graphics Screen Color Dump Utilities and a Control Code Tutorial. Provided to help you get the most out of your system!

NX-1000 RAINBOW

7 Color Printer!*

The NX-1000 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.

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-1000 RAINBOW SYSTEM INCLUDES:** **$259.95**
- Star NX-1000 Colour Printer
- Blue Streak Ultima
- Software Trio*
- Color Super Gemprint

+$10 Shipping

COMPLETE

NX-1000II SYSTEM INCLUDES:
- Star NX-1000II Printer
- Blue Streak Ultima
- Software Support Trio*

$199.95 +$10 Shipping

COMPLETE

The Smallest, Sleekest, Fastest Serial To Parallel Converter You Can Buy!

7 Switchable 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.

The Blue Streak Ultima

Powered version add $6.00.

$39.95 +$2 Shipping

FREE with purchase of any NX-1000 or XB-2410 System

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.

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.

PM*Print, for printing PMODE3 color or PMODE4 black-and-white artifact color on the NX1000 or compatible printer. Includes four PMODE print drivers, big/small black-and-white, big/small color, that can be loaded and executed from your BASIC program or used as stand-alone programs. Includes BASIC programs useful for editing colors and other special tasks. Works with most Epson-compatible color printers for color. Requires a CoCo 1, 2 or 3 and a disk drive. *Supersoft, Inc, 363 Oakwood Avenue, Jackson, MI 49203, (517) 787-3610; 18.95 plus $2.50 S/H.*

Sprite-BASIC, a program that lets you create sprites, (which are objects that can be moved around the screen without disturbing the background graphics picture). Gives you all the new commands needed to create your own BASIC games. Does not require expert programming skills. Requires a CoCo 3 and a disk drive. *Supersoft, Inc, 363 Oakwood Avenue, Jackson, MI 49203, (517) 787-3610; $44.95 plus $2.50 S/H.*

CIII PagesE V.2.0, an upgraded version of CIII Pages. Includes desktop publishing, Hi-Res paint, form maker, greeting card designer, calligrapher or CAD program utilizing HSCREEN 3. Requires a CoCo 3 128/512K, RGB or composite monitor (no TV), at least one disk drive, High Resolution Joystick Interface, joystick or mouse, and a printer. *Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186, (414) 549-0750; $49.95 plus $3 S/H.*

CIII Lettrex, an NLQ program designed primarily for the earlier versions of Epson or compatible printers without NLQ capability. Features 14 different NLQ fonts, graphics point-and-click interface and pull-down menus. Allows importing of ASCII text from CoCo word processors. Requires 64K CoCo 1 or 2, one disk drive, mouse/joystick and an Epson or compatible printer. *Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186, (414) 549-0750; $24.95 plus $3 S/H.*

CIII Clipart Set 2, a three-disk set collection of 672 pieces of clipart for all versions of the CIII Pages CoCo 3 desktop publishing program. Includes cartoons, D&D fantasies, radical concepts, education, animals, sports and more. Requires CIII Pages or CIII PagesE. *Coless Computer Design, 1917 Madera St., #8, Waukesha, WI 53186, (414) 549-0750; $19.95 plus $3 S/H.*

◆ **Monster Mash**, a CoCo 3 action/arcade game featuring 16-color Hi-Res graphics and full joystick play control. Lets user travel through over 70 rooms, collecting gold and fighting monsters. Requires player to gather magic mirrors needed to defeat Medusa. *Biware Enterprises, c/o Kandi Stinson, Box 265, Allen, OK 74825, (405) 857-9932; $22.*

◆ **The Entity**, a text Adventure written in machine language. Places user in the role of an alien trying to accomplish 10 good deeds that will speed up the development of the earth by 150 years. Requires a CoCo 3 and a disk drive. *Biware Enterprises, c/o Kandi Stinson, Box 265, Allen, OK 74825, (405) 857-9932; $18.*

◆ **Labelbase**, an OS-9 labeling program with many features. Works with your currently configured printer. Can be run in an 80-column text or graphics window. *Constellation Computer Consultants, P.O. Box 423, Sanford, ME 04073; $14.95 plus $2 S/H introductory offer.*

◆ **Connecting the CoCo to the Real World**, by William Barden, Jr., an easy-to-use book explaining safe, inexpensive projects for the CoCo 1, 2 and 3. Includes descriptive information on the internal design of the Color Computer. Shows reader how to measure wind direction, make a water detector, capture and playback sounds, create a multi-circuit burglar alarm and more. *William Barden, Jr., 8 San Timoteo, Rancho Santa Margari, CA, 92688; $19.95.*

KJV on Disk #11, I Samuel from the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. Word processor or text editor is recommended for viewing the files. Requires at least 32K and one disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

The Goldberg Utilities, two volumes of powerful OS-9 utilities. Over twenty utilities in all. Volume I includes append, cls, copy, count, d, grep, head/tail, lower/upper, pk/unpk, sort, unload, val, zcopy, plus an explanation of CoCo 3 memory allocation and how to use it best. *Kenneth Leigh Enterprises, 1840 Biltmore Street, NW, #10, Washington, DC 20009, (202) 462-1210; each volume $24.95 plus $2.50 S/H.*

CoCo Cassette #94, a monthly collection of software programs that includes: *Flash Card* (educational program), *Real Estate Listings* (house listing database for realtors), *Bible Questions 1, Spelling Quiz 1, No Left 3* (game), *Picture, Picture Viewer 3* (graphics), *Tank Showdown* (game), *Tarzar 5 Adventure, Genisis* (strategy game), and *Fourcube* (3-dimensional tic-tac-toe). *T&D Software, 2490 Miles Standish Drive, Holland, MI 49424, (616) 399-9648; $8, $70 for yearly subscription.*

Ras*Max 1.0, a program that enables printing of 16- and 4096-color or black-and-white RASCAN pictures. Works with NX-1000, DMP-240 and GSX-140 printers. CGP-220 prints color images only. Lets user edit colors of RASCAN 16-color images. (RASCAN not required for printing IMG images.) *Supersoft, Inc, 363 Oakwood Avenue, Jackson, MI 49203, (517) 787-3610; $24.95 plus $2.50 S/H.*

Star*Max+, program that lets you print CM3, MGE and HSCREEN 2 pictures using NX-1000, DMP-240 and other Epson-compatible printers. Has full-color editing and RGB to CMY conversion process to create a picture with real WYSIWYG colors. Black-and-white drivers with gray-scaling included. *Supersoft, Inc, 363 Oakwood Avenue, Jackson, MI 49203, (517) 787-3610; $21.95 plus $2.50 S/H.*

SoundTrax, a sound-sequencing system for the Color Computer 3. Has four-voice, polyphonic capability; reads digitized sounds accurately. Uses a point-and-click editor. Lets you compose music with your CoCo. Requires a disk drive and mouse/joystick. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; $34.95 plus $2.50 S/H.*

Demo Disk of SoundTrax files, three files that let you hear the sound quality obtainable using *SoundTrax*. Contains "Louie Louie", "Kyum-Gai Rap", and a surprise song. *Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, (412) 372-5674; $4.95 plus $2.50 S/H.*

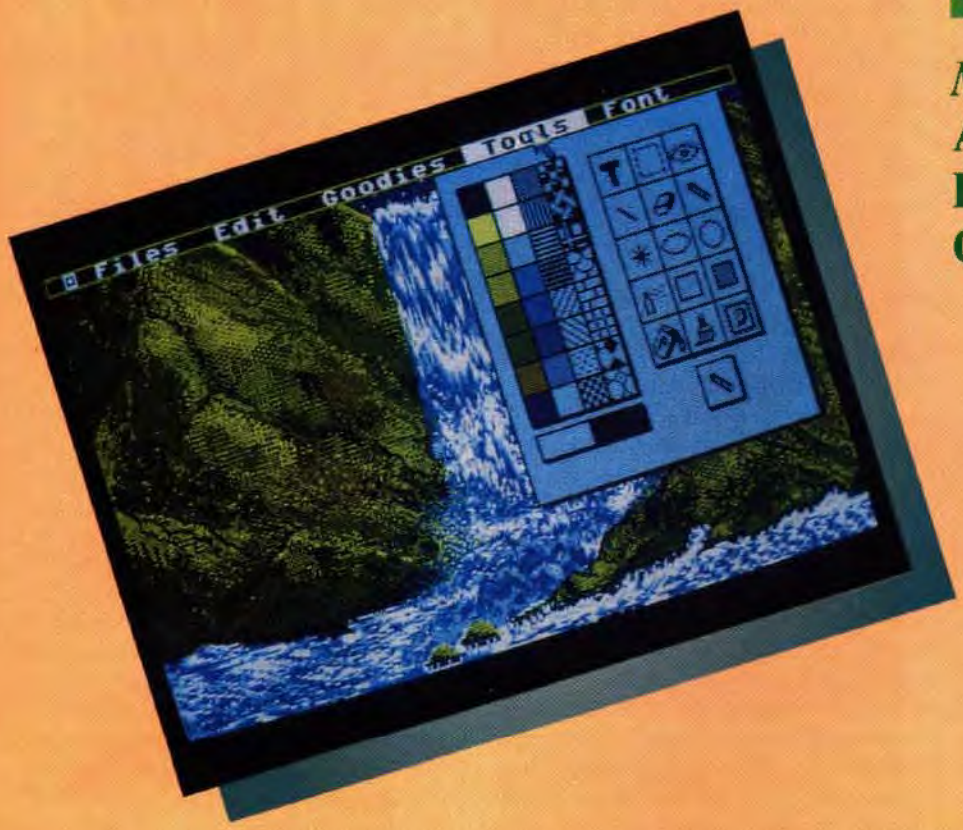
◆ **First product received from this company**

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.

Graphics CoCo 3

MVCanvas -- A Hi-Res Graphics Editor for the OS-9 Family



When I was first assigned this review by THE RAINBOW, I asked myself, "What? Another graphics editor for the CoCo 3? I already have a full-featured graphics editor with a whole library of pictures by yours truly." But wait, this graphics editor is a little different.

MVCanvas lets you choose from four different screen resolutions; it operates under the OS-9 *Multi-Vue* environment; and it can convert most Disk BASIC graphics images to its native VEF format. That means I can enter the uncharted world of 640-by-200 resolution graphics, have access to my existing library of pictures, and enjoy all the advanced features of OS-9 and *Multi-Vue* — multiple windows, directories, multitasking and more!

MVCanvas is a full-featured, bit-map graphics editor that runs completely under OS-9 Level II and *Multi-Vue*. The program lets you create full-screen VEF-format pictures at four different screen resolutions: 320-by-200 with four or 16 colors and 640-by-200 with two or four colors. Because *MVCanvas* runs under its own window, all of *Multi-Vue*'s features and utilities are easily accessible. Memory permitting, you can even run other OS-9 programs along with *MVCanvas*. You can also take further advantage of OS-9's windowing abilities by displaying one or more full-screen *MVCanvas* pictures while simultaneously editing another. Pictures may be saved to disk and printed using a variety of dot-matrix and color inkjet printers.

MVCanvas requires a CoCo 3 with a minimum of 256K, the OS-9 Level II operating system, *Multi-Vue* and at least one disk drive that can handle single-sided, 40-track disks, such as the Tandy FD-501. For those more proficient at OS-9, instructions are provided for running *MVCanvas* without *Multi-Vue*. I used a 512K CoCo 3 with an RGB monitor, two Tandy FD-501 single-sided disk drives, a Tandy mouse with the High Resolution Joystick Interface and the DMP-105 and DMP-132 dot-matrix printers.

The *MVCanvas* package comes with two OS-9 formatted disks and a 32-page manual. One disk contains the editor and printer drivers; the other contains utilities.

The editor disk is formatted for 40 tracks. If your OS-9 system and disks are set up for 35 tracks, run a procedure file (included on the utilities disk) to change the /d0 device descriptor from 35 tracks to 40 tracks. This procedure temporarily (until you reboot) enables your system to read, format and backup 40-track disks. More about installing *MVCanvas* later.

Once backup copies are made, you run *MVCanvas* by booting from the *Multi-Vue* disks and, using the mouse or keyboard, double-clicking on the *MVCanvas* icon. A new window opens automatically, leaving the *Multi-Vue* window intact and just a CLEAR key away. With each startup, *MVCanvas* refers to an environment file that you can edit to set default directory paths.

The editor lets you view and have access to almost the entire graphics screen area — the only part of the picture missing is the

top 16 pixels hidden by the menu bar. You can easily gain access to that strip by using a Scroll command that scrolls the entire picture up or down 16 pixels.

All of *MVCanvas*'s options and tools are invoked "*Multi-Vue*" style by pointing and clicking the cursor on the appropriate menu option or tool icon. In keeping with the *Multi-Vue* protocol, most of the options can also be called using two-key ALT combinations from the keyboard.

MV Canvas offers the features you expect from a comprehensive graphics editor.

MVCanvas offers the features you expect from a comprehensive graphics editor. All the standard drawing tools are included: Pencil, Line, Ray, Box, Circle, Ellipse, Brush, Fill, Spray Can, Bar (a filled box), Text and Eraser. Advanced graphics editing options such as Cut & Paste are also available. For fancy animation effects, palette switching is supported, allowing you to rotate eight of the 16 (or two of the four, depending upon screen resolution) palette slots at definable cycle speeds.

MVCanvas supports full point-and-click file management. Directories can be displayed and directory paths modified. If you need more OS-9 command power, an OS-9 overlay window with a shell can be summoned temporarily and then deleted. Picture files are saved through an optional file compression *run-length-encoder* routine that reduces the disk space taken up by a screen to two-thirds to one-sixteenth the space it would otherwise require, depending upon the screen's complexity. A separate "uncompression" routine is provided should you ever want to reverse the compression of your screens for use by another application.

Once you have *MVCanvas* running, you can begin creating your masterpiece right away. The toolbox is opened by selecting the Tools option on the menu bar. A menu box opens, revealing icons for 16 different tools and a color palette showing 2, 4 or 16 colors. Also displayed is a palette of 16 different, pre-defined patterns including dots, bricks, tiling and more. An RGB sliding bar color mixer lets you build and modify your color palette for each picture. You also have the option of changing the border color.

If you don't like what you've just drawn, you can use the Eraser to erase with a selectable background color, or you can use the Undo command to delete the last drawing operation performed. For close-up work, use the Fat-bits zooming option. With access to the full-color palette, Fat-bits lets you edit the colors of single pixels within an enlarged 24-by-24 pixel block, while a separate window simultaneously displays the changes on an actual-size view of the edit area. If you don't like the changes made, you can select the Cancel option before exiting Fat-bits and start again.

From the Tools menu you have the option of adding text to your pictures. While you are limited to one size of text (8-by-8 pixels) and screen positioning (in 8-by-8 pixel increments), there are five fonts to choose from (many more are available from electronic bulletin boards), and each font can be made plain, bold, transparent, reversed, underlined or proportional. Some of the font options such as bold, proportional and underline can be combined.

Once you've got some graphics drawn, you can make use of *MVCanvas*'s advanced editing features. Selected portions (up to 25 percent of the screen) can be cut (clipped), copied, pasted and saved to disk. By saving clips to disk you can create an entire scrapbook library of individual images. For even fancier editing effects, an image cut from the screen or just a selected area of the screen can be flipped 180 degrees horizontally or vertically, inverted (reverse the order of the palette colors), swapped (exchange colors in two palette slots) or remapped (change the palette slot of all pixels of one color to another palette slot). For a cut-and-paste shortcut, there is a useful tool called Stamp that enables you to quickly select somewhat smaller areas of the screen and then "rubber-stamp" as many copies of that selected area as you want.

Your pictures can be displayed independent of the editor with a utility called `VEFShow`. `VEFShow` automatically opens a separate full-screen window for each picture displayed, allowing you to simultaneously display as many different pictures as memory will permit (determined in part by the individual resolutions of each picture). `VEFShow` also allows you to enable palette scrolling and adjust the scrolling speed from the keyboard for each picture. Pictures and their windows can be deleted with a click of the mouse button.

If you would like a hard copy of your creation, *MVCanvas* allows to you print your picture on a variety of dot-matrix and color inkjet printers. Printers supported include Tandy DMP-105 and DMP-110, Epson, IBM, Okidata, Star, Gemini, C.Itoh, color printers by Epson, the Tandy CGP-220 and DMP-240, Star NX-1000 and Citizen GSX-140. While there was a bug in the printer driver that caused problems with my DMP-132 (and is currently being fixed by the author), I had no problem getting good results with my DMP-105. At 600 baud, it took about 25 minutes to print a 5½-by-8 inch fully-shaded hard-copy of a 16 color 320-by-200 screen.

Printing can be executed from the *MVCanvas* editor or from a separate OS-9 window, allowing for simultaneous printing of one screen while editing another. This is a somewhat dubious option though, as it slows down both the editor and the printing process and makes for a rather noisy working environment. There are no additional options for controlling how or where the graphics screen is printed.

MVCanvas includes additional utilities for importing graphics screens created by other major-brand Disk BASIC-based screen editors and video digitizers. Before importing any screens, you need a separate utility to convert the picture files to OS-9 format. This utility is not provided with *MVCanvas*, so I used a program called `RS-OS9.BAS` (available on Delphi). Using `RS-OS9.BAS` and *MVCanvas*'s conversion utilities, I successfully converted screens to VEF format from three different sources: *CoCo Max 3* (CM3), *Color Max* (MGE) and Rascan (IMG). The results were, as best as I could tell, absolutely perfect. I was very impressed. *MVCanvas* also supports digitized images created by the DS-69 and DS-69B, but I did not have an opportunity to test these formats. OS-9 graphics images from *DeskMate* 3 or *The Color Computer Artist* are not currently supported by *MVCanvas*.

MVCanvas has all the features I would normally look for in a pixel-oriented graphics editor. I particularly liked having over 90 percent of the picture visible at one time. Overall, I found the editor works very well, although it responds somewhat slower and is not quite as full-featured as some of its Disk BASIC-based cousins. I assume the speed problem is not a programming issue (*MVCanvas* is written in C), but because *MVCanvas* is operating in the OS-9 environment where other processes are simultaneously supported.

I found I could speed up my favorite tool, Fat-bits, by loading it into memory first. Even when residing in memory though, Fat-bits still took about eight seconds to zoom in on a selected area. But once zoomed in, things moved quickly. Scrolling while in Fat-bits is not supported. The Clip routine is also a separate module that can be loaded into memory, speeding up cut-and-paste functions.

Put away your wallet and pick up the phone. Now the MM/1 is yours for as little as $56.00 a month.

Making the future possible.

Interactive Media Systems, Inc. is pleased to announce that you can acquire the revolutionary MM/1 computer for as little as $56 per month, with a low down payment of $112. With this unique lease-to-buy option, you can start using your MM/1 as soon as your application is approved. Just imagine, now you can take advantage of the revolutionary MM/1 in the most affordable way.

Keeping the future in your hands.

IMS, Inc. is committed to bringing you the best in affordable computer power. The MM/1 is the first example of our dedication to this cause. But it won't be the last computer we build and if you ever want to move up to the next system we build, you can do it easily, conveniently, and affordably.

How it works.

All you have to do is call our toll free number and request our application. You can either have it mailed to your private address, or you can fill out the information with our operator. We can process your application in less than a week in most cases. Once your application is approved and you pay the low deposit, IMS will send your system. It couldn't be easier to get an MM/1 multimedia computer.

How much will it cost?

Because IMS, Inc. has streamlined the finance process, you pay no application fee. Once your application is approved, all you pay is the deposit and monthly fee from the schedule below:

System	*Deposit*	*Payment*
MM/1 Pro Station (retail $1149)	$114	$57
MM/1 Extended (retail $1125)	$112	$56

What's the catch?

There is no catch. In fact, you should call us to find out why our lease-to-buy option for the MM/1 can be an even better deal than using your VISA or MasterCard (both of which we gladly accept, by the way). It can be much less expensive than using a credit card, it's safer, and may even be tax-deductible. See your tax advisor for information.

So put down your wallet and pick up the phone.

IMS Interactive Media Systems

1-800-866-9084

238 Catawba Ave. • Davidson NC • 28036

Copyright © Interactive Media Systems, Inc., 1990
MM/1 is a trademark of Interactive Media Systems, Inc.
Leasing is offered by Commercial Finance Corporation, Chantilly, VA.

I found that I had the best cursor control when using a Tandy mouse along with the High Resolution Joystick Interface, but these are by no means required. I got good results working with the standard-resolution mouse, and working solely with the keyboard was surprisingly productive. *MVCanvas* is compatible with any Hi-Res joystick interface (including switchable models) that is compatible with OS-9.

While I did not conduct rigorous scientific testing of *MVCanvas*, I did discover two things that would consistently provoke the editor to a fatal crash: invoking the Undo option while still in the Fat-bits mode, and pressing ESC at the "Are you sure?" file save prompt. In each case, I lost the screen I was working on, up to the last disk save. The author has been advised of these problems and is currently investigating them.

You'll want to keep an eye on the available memory when using the Clip options since they sometimes require a lot of memory, and running out of memory during a Clip operation can cause the whole system to crash, requiring you to reboot. I find that *MVCanvas* runs most reliably when other concurrently running processes are kept to a minimum and plenty of free memory is available.

The manual, while very readable and generous with operational and technical information, is disorganized and lacks several key pieces of information regarding installation. I could not get *MVCanvas* running by referring just to the manual, so I called the program's friendly and helpful author, Mike Haaland. With Mr.Haaland's help I got *MVCanvas* running, and in the process I learned some things about OS-9.

Even with my intermediate-level knowledge of OS-9 and Mr.Haaland's help, I had a difficult time getting *MVCanvas* started. What is lacking are organized, explicit installation instructions and simplified installation procedures. Because of the difficulty of installation, I am concerned that *MVCanvas* might be currently beyond the reach of all but intermediate to expert OS-9 users.

To get *MVCanvas* working properly you need to know how to run a variety of OS-9 commands from the OS9: prompt and how to use an OS-9 text editor such as Microware's `edit` (included with the OS-9 Level II disks) to modify procedure files. You'll probably want to modify your *Multi-Vue* boot file as well to include `pipe`, `piper` and `pipeman`. This involves editing the *Multi-Vue* `bootlist` file and using `os9gen` to create a new *Multi-Vue* boot file.

MVCanvas also includes an optional patch that modifies `grfdrv`, enabling certain features to run faster — otherwise the program runs painfully slow. While the manual has plenty of information about the patch, it fails to mention that after executing the patch you must modify the attributes of the revised `grfdrv` with the command `attr grfdrv e w r`. Finally, if you decide to make 40-track device descriptors a permanent part of your system, you'll need to know how to use the `cobbler` command.

I was very impressed with *MVCanvas*, particularly with how well it co-exists with *Multi-Vue* and other OS-9 applications. Regarding its unique features, I especially liked being able to create graphics in the high-resolution four-color 640-by-200 mode: there *is* a difference. While there is still room for improvement, *MVCanvas* has the dedicated support and enthusiasm of a programmer new to the CoCo market, and I think we will see even better things from this new source in the future.

(Hyper-Tech Software, 4341 Gannet Circle #174, Las Vegas, NV 89103; 702-362-5346; $49.95 plus $3 S/H)

— Walter Myers

Call for package price

ACCOUNTING SYSTEMS

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. Additional 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 categories. Menu driven and user friendly.

$39.95

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, prepares 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 Accounting 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

Ordering Information
Add $3.00 shipping & handling, MN residents add 6% sales tax.
Visa, Mastercard, COD (add $3.50), personal checks.

(612) 633-6161

Novices Niche

Last Line Recall
by Geoff Friesen

LLR is a utility that redisplays the last line entered at the OK prompt or via the LINE INPUT statement. To initiate last-line recall, press the F2 function key. *LLR* can save a lot of time when the same data is to be repeated. It is also useful for repeating a command line (especially to correct a mistake in your previous entry).

The BASIC listing pokes the *LLR* object code into memory — just type RUN to install it. Note that the F2 key will have no effect after installing the program, until you enter a line. F2 also does nothing unless the cursor is at the beginning of a line (i.e., the left-most column).

LLR redirects the reset vector upon installation. When the Reset button is pressed, *LLR* automatically reintializes itself so it is always available.

LLR has been designed to be compatible with other machine language utilities and respects their memory space. However, they may not respect *LLR*. Therefore, *LLR* should be installed *after* installing other utilities.

I hope you enjoy using *LLR*. I am working on an upgrade which provides a history buffer for the last few lines.

The Listing: LASTLINE

```
0 ' COPYRIGHT 1990  FALSOFT, INC
100 '-----------------
110 'LLR: LAST LINE RECALL
120 '
130 '(C) 1990, RAINBOW
140 '-----------------
150 '
160 CLEAR 200,PEEK(&H27)*256+PEE
K(&H28)-375
170 SA=PEEK(&H27)*256
180 SA=SA+PEEK(&H28)+1
190 FOR I=SA TO SA+119
200 READ B$
210 POKE I,VAL("&H"+B$)
220 NEXT I
230 EXEC SA+10: CLS
240 PRINT "LLR INSTALLED": NEW
250 DATA 12,B7,FF,DF,8D,0F,6E,9D
260 DATA 00,6B,9E,72,AF,8D,00,65
270 DATA 30,8C,ED,9F,72,30,8D,00
280 DATA 13,BF,A3,AA,30,8D,00,38
290 DATA BF,A3,D5,86,7E,B7,A3,A9
300 DATA B7,A3,D4,39,81,08,26,03
310 DATA 7E,A3,AD,81,04,27,03,7E
320 DATA A3,B4,C1,01,27,03,7E,A3
330 DATA 9A,6D,8D,00,32,26,F7,33
340 DATA 8D,00,2D,A6,C0,4D,27,EE
350 DATA A7,80,5C,BD,A2,82,20,F3
360 DATA 4F,A7,8D,00,1A,8E,02,DD
370 DATA 33,8D,00,14,A6,80,4D,27
380 DATA 04,A7,C0,20,F7,A7,C4,8E
390 DATA 02,DC,7E,A3,D7,00,00,01
```

Model 101 $37.95 (101P $43.45)
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 $46.95 (104P $53.95)
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

All items covered by a 1 year warranty

SAVE $2 PER ITEM
BY SENDING CHECK OR M.O. WITH YOUR ORDER

Some of the Printers That Can –
Supply power for the 101 and 104 are Radio Shack, Star, Okidala, 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.

- **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
- Orders shipped in U.S.A. and Canada only

You Can Pay By:

- VISA or MasterCard
- Or send check or money order payable in U.S. funds, and deduct $2 per item
- Ohio customers add 6% sales tax

Metric Industries Inc.
P.O. Box 42396
Cincinnati, OH 45242
(513) 677-0796

Continued from Page 6

other devices. I would like to be able to peek at memory to find the time when a particular window is open.

Jean Gravelle
95 Bocage
Pointe-Gatineau, QU J8T 5W5
Canada

We know of no software clock for the CoCo that can maintain time accurately (the interrupts give these programs fits), but Disto/CRC offers a hardware real-time clock for users of its disk controller. Another option is ADOS and the SmartWatch real-time clock from SpectroSystems.

The Quest for Hints and Tips

Editor:

I would like to see more articles aimed at the new programmer, such as "Did You Hear The One About Hints and Tips" (January 1990, Page 60). I have read the CoCo 3 manual but it doesn't mention such things as EXEC44539, and the edit commands A, Q and E. There must be more hints and tips to pass along to programmers. I do not understand the techniques of using peeks and pokes in a program, either. The only poke I know is the one for the printer baud rate. This might be a good tutorial or series for THE RAINBOW.

I mostly write utilities and data storage programs, and I enjoy reading articles on BASIC programming, especially when they pertain to something other than graphics. I enjoyed reading Mr. Perlman's series on database programming. Although I did not enter his program, I have used several of his techniques. Just for the record I am a mother, grandmother, and artist, now delving into the world of compnter programming — and I am fascinated with it.

Virginia Hawxhurst
Milford, New York

Down on CoCo DTP

Editor:

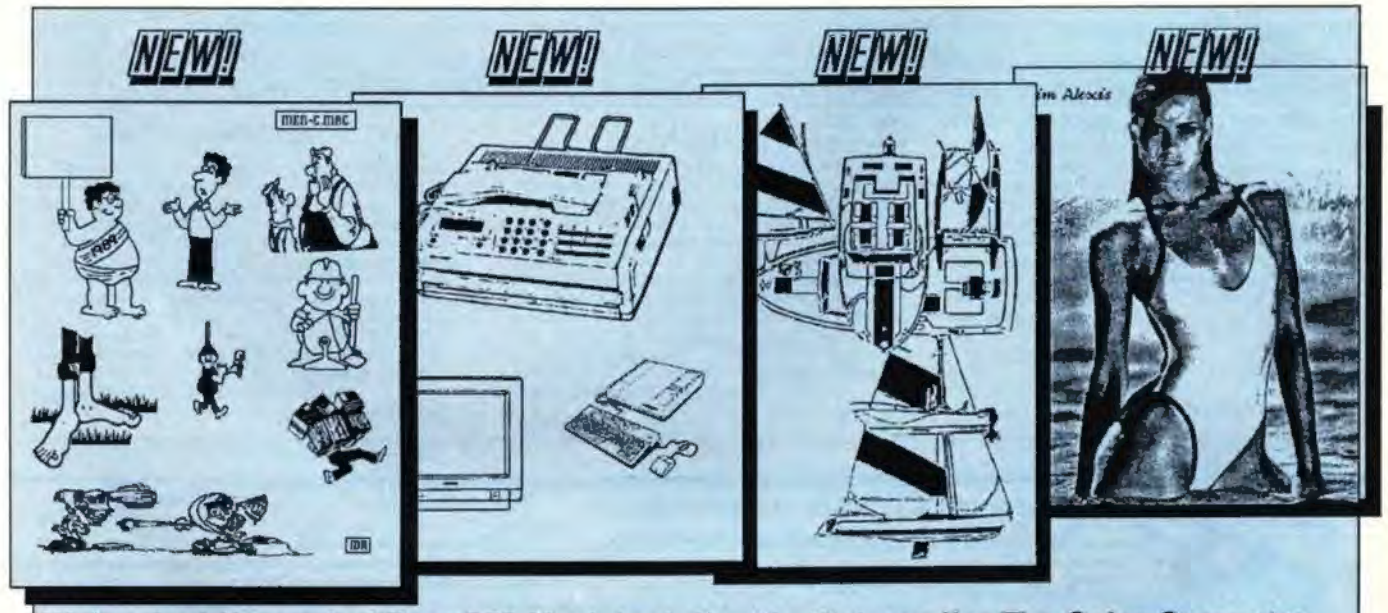
I have owned a CoCo 1 since 1982, and I purchased a CoCo 3 at the most recent RAINBOWfest in Chicago. Your article "The Future of the CoCo" fails to mention about the only thing this computer cannot do — desktop publishing. Laser printers are not compatible and, as you can see from the poor quality of my letter, *MAX-10* printouts are extremely crude and rough. I get better printouts with *Scripsit* and the NLQ mode on my DMP-132.

Carl Magna
Greenwood, Indiana

We disagree. We've had an HP LaserJet hooked to a CoCo for years and it works quite well. Of course, you do have a point —we haven't seen any laser printer drivers marketed with the popular graphics and DTP programs.

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.



We've Just Converted Over 250 Macintosh Quality Pictures For The Color Computer.
Each Set Includes An Excellent Graphics Editor! Pictures are CoCo-MAX II compatible.

Set #1	Set #2	Set #3
Clipart	Celebrities	Adult Only
Space Pictures	Cartoon Characters	R-Rated
Animals	Great Graphics	Beautiful Women
More	More	

Each Set Of 10 Disks
Only $35.00 !
Buy 2, Get One Free!

VISA MasterCard
Coco 1,2 And 3
32K Minimum
Disk Only

T&D Subscription Software • 2490 Miles Standish Dr., Holland, Mi 49423 • 616-399-9648

DELPHI'S 20/20 ADVANTAGE, VISIBLY SUPERIOR

$20

$100-$200

$120-$256

COST OF 20 EVENING HOURS

On DELPHI's 20/20 Advantage Plan, you get 20 hours of connect time each month for only $20. Additional time is only 2 cents/minute. No other full-featured online service even comes close!

And those are 20 hours of real online fun and productivity. Download files, chat with friends, send electronic mail, play multi-player games, and make travel reservations.

Join DELPHI now for only $29.95. You'll receive a copy of *DELPHI: The Official Guide* (a $19.95 value) and your first 20 hours will be free. With your CoCo and modem:

- Dial 1-800-365-4636
- At *Username:* type **JOINDELPHI**
- At *Password:* type **RAINBOW20**

Already a DELPHI member? Type **GO USING ADVANTAGE**

DELPHI

THE WORLD'S PREMIER ONLINE INFORMATION SERVICE

800-544-4005 • 617-491-3393

Frank Hogg LABORATORY INC.

Friendly Solutions Since 1976

Of *significant* importance to you, the **Tomcat** is manufactured by Frank Hogg Laboratory, a leader in the Color Computer market since its inception. FHL has been in business since 1976 and have manufactured 68000 CPU-based computers for more than six years. We have served many users since we started. Some of the more recognizable ones are:

3M, AT&T, ADP, AC, Air Canada, Allied, Autolite, Bell Aerospace, Bell & Howell, Boeing Airplane, Capitol Video Comm., Delco, Eastman Kodak, Fairchild Space Company, Fermilab, Firestone Tire & Rubber, Ford Aerospace, Ford Motor Co., GM, General Dynamics, GE, GMC, GTE, Hoffmann-La Roche, Honeywell, International Paper, McDonnell Douglas, Microware Systems, Monsanto, Motorola, NASA, Naval Weapons Center, Northern Telecom, NYS DOT, Okidata, Perkin-Elmer, Principal Group, RCA, Robertshaw, TRW., Texaco, Union Carbide, Unisys, US Info Agency, Pratt & Whitney-Canada, Western Electric, Wright Patton AFB, Universities of... Notre Dame, Nevada, So. Cal., Mo., NC, Montreal, Alberta, Ark., Calif., Kansas, Maryland, Mich., Pa., and Yale, to name just a few. As a FHL customer, you are in *very* good company.

Tomcat™

The CoCo 4 that Tandy *should* have made!

Tomcat is the **ONLY** non-Tandy computer that will use your existing hardware AND software!

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

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

Here's why.

Power and Performance

Tomcat's TC9 has 1024K (1 megabyte) on its main board. **Tomcat** has two *real* serial ports, a parallel printer port. It supports a serial mouse.

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

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

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

The Software Advantage

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

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

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

Its a New World

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

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

The Future

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

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

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

Your future is in your hands.

Tomcat Prices

Order Now

You can order your **Tomcat** now for delivery in October. Our knowledgeable sales staff will help you choose what is right for you today. And for tomorrow.

For a system with a rugged metal case, power supply, **TC9** board with 512K, prices start at only 499.95.

The **TC9** board alone with zeroK is 299.95 if you want to do some of the connection work yourself.

The **TC9** will hold two 512K banks of SIMM RAM. Each bank of 512K is 49.95 but only one bank is required to run. The second 512K bank requires the DAT board.

The second 512K (1 megabyte of RAM) with the DAT board is only 99.95. The DAT board alone is 59.95.

A 101 Key AT style keyboard is 49.95 with a Tomcat, 69.95 without.

Either way, this is the CoCo 4 you have always wanted.

Clarification: **Tomcat** is the name of the computer. **TC9** and **TC70** are components that go into a **Tomcat** to make it a system. We have 20+ additional components in stock to further customize your personal **Tomcat** computer system. Call or write for complete specifications and information on many other options too numerous to mention here.

FULL 1 year warranty.

Because we like to use our computers, not just sell them, we put all our knowledge and expertise into the **Tomcat** and believe it is the best choice for you. Please Call Today!

Cool Fall SALE!

till November 30th 1990

HARDWARE (FULL 1 year warranty.)	List	SALE
The Eliminator (2 RS232, 1 Parr, Hard/Floppy disk interface)	159.95	119.88
Battery backed Real Time Clock for The Eliminator	30.00	24.88
Western Digital WD1002-05 Eliminator hard/floppy controller	199.95	149.88
Eliminator 20 meg hard drive kit with 40 MS Fast Drive!	779.95	649.88
Eliminator 40 meg hard drive kit with 28 MS Fastest Drive!	939.95	799.88
Burke & Burke 20 meg hard drive kit with 40 MS Fast Drive!	495.95	449.88
Burke & Burke 30 meg hard drive kit with 40 MS Fast Drive!	530.95	479.88
Burke & Burke 40 meg hard drive kit with 28 MS Fastest Drive!	675.95	599.88
ALL B&B Stuff (Hard disk Interfaces, XT ROM, software etc.)	**5%OFF**	

SOFTWARE		
The WIZ communications with windows for RS OS9	79.95	39.88
FBU file backup for hard disk RS OS9	35.00	29.88
FBU file backup for hard disk **OS9/68000** (Includes 6809 ver.)	50.00	39.88
DynaStar word processor for RS OS9	150.00	69.88
DynaSpell spelling checker for RS OS9 only	20.00	15.88
DynaStar word processor for **OS9/68000** (Includes 6809 ver.)	400.00	139.88
IMS 4th G/L (A super database) for RS OS9	179.95	119.88
IMS 4th G/L (A super database) for **OS9/68000**	495.95	349.88
Super Sleuth for RS OS9 (Disassembler)	50.00	39.88
Super Sleuth for **OS9/68000** (Disassembler)	100.00	89.88
IBM PC Utility for QT's & Tomcat **OSK** (Read/write/format PC disks)	99.95	89.88
TOP 2.0 15 720K Disks of PD Utilities for **OS9/68000**	150.00	74.88
Alpha Software **10%OFF**		
SMART Word processor/Spreadsheet/Database for **OS9/68000**	1400.00	1199.88*

*Quantities Limited to stock on hand, includes both SMART books

BOOKS		
INSIDE OS9 LEVEL II	29.95	19.88
OS9 INSIGHTS (The only book on **OS9/68000**)	39.95	37.88
Using SMART	24.95	22.88*
SMART, Tips, Tricks and Traps	24.95	22.88*

*Price of book(s) can be applied toward purchase of SMART

NEW PRODUCT!! TOMCAT TC70. Shipments started in late August. Orders being taken now.

TC70 Computer System with 1.4 meg floppy	1499.95	1399.88
TC70 Computer System with 40 meg hard drive	1999.95	1899.88
TC70 Computer System with 100 meg hard drive	2399.95	2299.88
TC70 Computer System with 170 meg hard drive	2999.95	2799.88
60 Meg Internal Streaming Tape backup	599.95	559.88
TC70 Board only with Pro OSK, FBU, QCom, fu, BASIC and C		999.95

TC70 Systems Include: Prof. OS9/68K, C, Basic, Qcom, fbu, fu, Case, P/S, 101 Keyboard ,cables, drive(s) etc. Hard drive systems are loaded with PD software. All hard drives are hi-preformance 12 MS or faster state of the art drives, the best available. **WARRANTY** 1 year on all system components. Hard drives are 2 years from manufacter. **TC70 SPECS:** 15Mhz 68070 with 1.5 megabytes RAM expandable to 11.5Meg, Hi-Res Color Graphics display, 2 serial ports, 1 parallel port, Real Time Clock, DMA SCSI Hard Disk, DMA All Density Floppy, 8 bit hi-speed D to A, hi-speed A to D, AT Keyboard port, K-Bus expandable, size 5.25 x 8 - same as a drive.

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 315/469-8537

Call 315/469-7364

An original idea for chess players

All the Knight Moves

by Rick Cooper

Uncle Olaf once had a thing for bowling. Then he became interested in motor boats. Later he developed a passion for airplanes. It seemed that every few years he developed a new passion that consumed him until something newer came along. It became evident that Uncle Olaf and I shared one common trait — a passion for passions. Mine started with toy cowboys. As a teen I loved baseball cards and sports. During and after college it was chess and, later, the Color Computer. *Chess IQ* is a result of the latter two passions.

If you use a real chessboard, place four pawns at locations C3, C6, F3 and F6. Next place a knight at Location A1. The objective of the game is to move the knight to each successive, unoccupied square that is not attacked by a pawn. Of course you must use moves that are legal for the knight. This means finding a route that leads to your objective. The order in which you are to hit each square is from left to right on the first row, then on the next row from right to left. Follow this pattern for the other six rows until you reach the upper left square. You should try to do this as quickly and efficiently as possible.

Chess IQ puts letters on each square you can legally hit from the current location. Just press the letter of the square to which you want to move the knight. This allows non-chess players to try their hand. At the opening screen, you have a choice of seeing a demonstration or playing *Chess IQ*. To see a possible solution, use the demo. If you successfully complete *Chess IQ*, you are given an opportunity to record your attempt as the demo. Try the demo again and watch your effort as it is animated on the screen.

Now I'm off to find Uncle Olaf. I want to show him my new jigsaw puzzle program. I'm sure he'll be interested. ❑

Rick Cooper is a principal, teacher and coach in the Casey County school district. He enjoys programming the Color Computer for educational and recreational uses and believes the real joy of programming is in sharing his work with others. He may be contacted at P.O. Box 276, Liberty, KY 42539, (606) 787-5783.

CoCo 3

```
70 ..... 135
180 ..... 137
320 ..... 53
410 ..... 31
520 ..... 67
640 ..... 117
750 ..... 124
890 ..... 186
1000 ..... 135
1040 ..... 167
1110 ..... 201
1220 ..... 125
1320 ..... 125
1430 ..... 215
END ..... 9
```

The Listing: CHESSIQ

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 ********************************
2 '          COCO IQ             '
3 '              BY              '
4 '         RICK COOPER          '
5 '    COPYRIGHT (C) 1989        '
6 ********************************
10 DIM CB(12,12),LO(8,8,2),SL(8,
2),SX(8,2)
20 ON BRK GOTO 1480
30 ON ERR GOTO 1480
40 POKE &HFFD9,0
50 BS=&H6400
60 MD=0
70 FOR X=1 TO 12:FOR Y=1 TO 12:R
EAD CB(X,Y):NEXTY:NEXTX
80 READ A$
90 FOR X=1 TO LEN(A$):POKE BS+X,
ASC(MID$(A$,X,1))-65:NEXTX
100 FOR X=1 TO 8
110 FORY=1 TO 8
120 LO(X,Y,1)=Y*20+20
130 LO(X,Y,2)=X*20
140 NEXT Y,X
150 FOR X=1 TO 10:HBUFF X,300:NE
XTX
160 FOR X=11 TO 18:HBUFF X,100:N
EXTX
```


BEST

WE'VE CHOSEN THE BEST OF OVER 760 PROGRAMS (OVER 6 YEARS OF ACCUMULATING FINE SOFTWARE), AND PACKAGED THEM FOR YOU. 12 PROGRAMS EACH PACKAGE. COLOR COMPUTER I, II or III. SPECIFY TAPE OR DISK. ONLY **$29.95 EACH PACKAGE!** 5 NEW ONES!

#1 Home Mgmt I
Budget
Checkbook Balancer
Cost of Living
Trilycalc Spreadsheet
Electronic Datebook
Account Manager
Stock Market
Word Processor
Lottery Analyst
Coco Database
Coco Terminal
Bartender

#2 Education
Flash Card
Spanish Lessons
Typing Tutor
Creativity Test
Anth. Football
Cost of Living
Math Tutors 1, 2
Trigonometry Tutor
Typing Game
Word Tests
Talking Alphabet
Clown Dunk Math

#3 Adventures II
Dungeon Master
Hired: Tired, Fired
Icewor1d
Jungle
Keys
Amulet of Power
The Trip
Cookies
Barracks
Genesis Project
Rambo
Zigma Experiment

NEW

#4 Business Helper
Workmate
Word Processor
Spreadsheet
Calendar
Accounts Receivable
Accounts Payable
Income Property
Mail List
Small Business Helper
Stock Charting
Job Log
Asset Manager

DISK ONLY

#5 Games III
Sandy Rover
Gray Lady
Flippy The Seal
Abe Builders
Panzer
Mrs. Pac
Fire Runner
Cosmic Rays
Dig
Battle Tank
Kron
King Pede

NEW

#6 Electronics Tutorial
Electronics 1 + 2
Electronics 3 + 4
Electronics 5 + 6
Electronics 7 + 8
Electronics 9 + 10
Electronics 11 + 12
Electronics 13
Electronics 14
Electronics 15
Electronics 16
Electronics 17
Electronics 18

NEW

#7 Machine Lang. Tut.
Basic Compiler
ML Tutorial Pt. 1
ML Tutorial Pt. 2
ML Tutorial Pt. 3A, 3B
ML Tutorial Pt. 4
ML Tutorial Pt. 5
ML Tutorial Pt. 6
ML Tutorial Pt. 7
ML Tutorial Pt. 8
MLT Dictionary
Coco Technical Look
Coco Technical Look Pts. 1-3

#8 Gamble Issue
Horse Racing
Race Track
Black Jack
Slot Machine
Lottery Analyst
Coco Keeno
Lucky Money
Betting Pool
Baccarat
Draw Poker
Turtle Races
Hi-Lo Craps

NEW

#9 Coco 3 Only
Paint Coco 3
Convert Coco 3
Demons Castle
Function Keys
Bowling 3
Coco 3 ♦ Coco 2
Wizard
Coco 3 Drawer
Hi-Res Chess
FYR Draca 3
Wrammy 3
Coco 3 Screen Print

NEW

RAINBOW APPROVED

29.95 EACH SET
★ Special This Month ★
Buy 2 Packages and get 1 FREE

TURN TO PAGES 31 & 71 FOR A COMPLETE LISTING OF ALL OUR PROGRAMS

T & D Subscription Software • 2490 Miles Standish Dr. • Holland, MI 49424 • (616) 399-9648

‹‹‹ GIMMESOFT ›››

Toll Free Order Line

V-Term Terminal

Vax, Unix, Mainframe, and BBS systems Vt-100, Vt-52, Vidtex & Ascii emulations Serial port to 2400, RS-232 to 19,200 baud XModem, XModem-CRC, YModem, ASCII 15 entry autodial, 10 programmable macros Disk (128k or 512k CoCo 3 only) $39.95

Telepak II RS-232

A Truly Compatible RS-232 Interface! Includes 3 foot DB25 cable, gold edge contacts, and low voltage components. Telepak II & Manual $49.95

Turbo 512k Ram

Fully assembled and tested board, Premium 120ns 256x1 chips, Easy to follow instructions, Fast & easy installation, Complete with 512k software, RamDisk, RamTest, & Print Spooler.
512k board w/software $89.95
000k board w/software $34.95

Studio Works Pro

NEW! CD Quality 8 bit Rom Pak!

Disk Only .. $38.95 With Cable .. $53.95
With CD Quality 8 bit Rom Pak . $94.95

ZENIX

An extremely Fast & Exciting arcade style game with 32 levels of play! You must Blast your way through a race of spacefaring insectoids & ultimately reach & destroy their planet, ... ZENIX! For 128k CoCo 3, joystk & disk ... $29.95

Those Darn Marbles

This NEW 512k only, arcade style, 3D marble game features extra smooth screen scrolling, great sound effects & graphics, and incredible CoCo 3 action! For 512k CoCo 3, joystk & disk ... $31.95

Suprfile III

A powerful, easy to use, multi-purpose database! Uses: Mailing Lists, Checkbook Manager, Personal Items Inventory, Audio/Video lists. Features: Add, Delete, Search, Sort, and Print Labels & Reports. For 128k CoCo 3 disk systems ... $29.95

1-800-441-GIME

GIMMESOFT	**Add $3.00 S&H**
P.O. Box 421	**Add $3.00 COD**
Perry Hall, MD 21128	**MD add 5% tax**
301-256-7558	**Visa/MC,MO,Ck**

```
170 REM KNIGHT
180 PC$="R12U1H2R1U1H3E1R1F2E1U1
H1U1R2F1E1U1H2L1H3L2BD3D1R1U1L1B
U3L1H1L1G1D1G1D1G1D1G1D4F1G1D1R1
G2D1"
190 FOR X=0 TO 4:PALETTE X,0:NEX
TX
200 HCOLOR 0,1
210 HSCREEN2
220 HDRAW"BM102,98"+PC$
230 HPAINT(102,98),1,0
240 HLINE(100,100)-(120,80),PSET
,B
250 HGET(100,100)-(118,80),1
260 FOR X=11 TO 18
270 HCLS
280 HPRINT (14,10),CHR$(X+54)
290 HGET(111,79)-(119,87),X
300 NEXT X
310 HCLS
320 PALETTE 0,0:PALETTE 1,63:PAL
ETTE 2,60:PALETTE 3,0:PALETTE 4,
36
330 HCOLOR 4,0:HPRINT(30,4),"T H
 E":HPRINT(28,6),"C H E S S":HPR
INT(31,8),"I O"
340 HCOLOR 0,0:HPRINT(32,10),"by
":HPRINT(27,11),"Rick Cooper"
350 HPRINT(30,12),"C 1990"
360 HLINE(207,23)-(308,108),PSET
,B
370 HCOLOR 4,0:HLINE(208,24)-(30
7,107),PSET,B
380 HCOLOR 0,0:HLINE(209,25)-(30
6,106),PSET,B
390 HPRINT(27,15),"A) CHESS IQ":
HPRINT(27,16),"B) DEMO"
400 I$=INKEY$
410 IF I$<>"A" AND I$<>"B" THEN
400
420 HCOLOR 1,0:HPRINT(27,15),"A)
 CHESS IQ":HPRINT(27,16),"B) DEM
O"
430 IF I$="B" THEN MO=2 ELSE MO=
0
440 HCOLOR 0,0
450 HPRINT(30,16),"MOVES"
460 HPRINT(32,18),"0"
470 FOR X=1 TO 8
480 FOR Y=1 TO 8
490 HLINE(LO(X,Y,1),LO(X,Y,2))-(
LO(X,Y,1)+20,LO(X,Y,2)+20),PSET,
8
500 NEXT Y,X
510 FOR X=3 TO 10
520 IF X/2=INT(X/2) THEN C1=3 EL
SE C1=1
530 FOR Y=3 TO 10
540 GOSUB 910
550 IF C1=3 THEN C1=1 ELSE C1=3
560 NEXT Y
570 NEXT X
580 MO=0
590 X=8:Y=1
600 DI=1
610 N1=8:N2=1
620 HGET(LO(N1,N2,1),LO(N1,N2,2)
)-(LO(N1,N2,1)+20,LO(N1,N2,2)+20
),2
630 HPUT(LO(N1,N2,1),LO(N1,N2,2)
)-(LO(N1,N2,1)+18,LO(N1,N2,2)+20
),1
640 IF N1=X AND N2=Y THEN GOSUB
1200
650 GOSUB 960:REM GET NEW SQUARE
S
660 IF MD>0 THEN I=PEEK(BS+MO+1)
:GOTO 700
670 I$=INKEY$:IF I$="" THEN 670
680 I=ASC(I$)-65
690 IF I<0 OR I->T1 THEN 670
700 MO=MO+1
710 IF MD>0 THEN 730
720 POKE BS+MO,I
730 GOSUB 1140:REM MOVE KNIGHT
740 HPUT(LO(N1,N2,1),LO(N1,N2,2)
)-(LO(N1,N2,1)+20,LO(N1,N2,2)+20
),2
750 N1=SX(I,1):N2=SX(I,2):REM NE
W LOCATION OF KNIGHT
760 MO$=" "+STR$(MO-1):HCOLOR 1,
0:HPRINT(30,18),MO$
770 MO$=" "+STR$(MO):HCOLOR 0,1:
HPRINT(30,18),MO$
780 GOTO 620
790 DATA 0,0,0,0,0,0,0,0,0,0,0,0
800 DATA 0,0,0,0,0,0,0,0,0,0,0,0
810 DATA 0,0,1,1,1,1,1,1,1,1,0,0
820 DATA 0,0,1,1,1,1,1,1,1,1,0,0
830 DATA 0,0,1,1,2,1,1,2,1,1,0,0
840 DATA 0,0,1,2,1,1,2,2,1,2,1,0
850 DATA 0,0,1,1,1,1,1,1,1,1,0,0
860 DATA 0,0,1,1,2,1,1,2,1,1,0,0
870 DATA 0,0,1,2,1,2,2,1,2,1,0,0
880 DATA 0,0,1,1,1,1,1,1,1,1,0,0
890 DATA 0,0,0,0,0,0,0,0,0,0,0,0
900 DATA 0,0,0,0,0,0,0,0,0,0,0,0
910 L1=(Y-3)*20+45
920 L2=(X-3)*20+25
930 IF CB(X,Y)=2 THEN C2=4 ELSE
C2=C1
940 HPAINT(L1,L2),C2,0
950 RETURN
960 REM GET NEW SQUARES
970 T1=0
980 K1=N1+2:K2=N2+2
990 IF CB(K1-2,K2-1)=1 THEN SL(T
1,1)=LO(K1-4,K2-3,1):SL(T1,2)=LO
(K1-4,K2-3,2):SX(T1,1)=K1-4:SX(T
1,2)=K2-3:T1=T1+1
1000 IF CB(K1-2,K2+1)=1 THEN SL(
T1,1)=LO(K1-4,K2-1,1):SL(T1,2)=L
O(K1-4,K2-1,2):SX(T1,1)=K1-4:SX(
T1,2)=K2-1:T1=T1+1
1010 IF CB(K1-1,K2+2)=1 THEN SL(
T1,1)=LO(K1-3,K2,1):SL(T1,2)=LO(
K1-3,K2,2):SX(T1,1)=K1-3:SX(T1,2
)=K2:T1=T1+1
1020 IF CB(K1+1,K2+2)=1 THEN SL(
T1,1)=LO(K1-1,K2,1):SL(T1,2)=LO(
K1-1,K2,2):SX(T1,1)=K1-1:SX(T1,2
)=K2:T1=T1+1
1030 IF CB(K1+2,K2+1)=1 THEN SL(
T1,1)=LO(K1,K2-1,1):SL(T1,2)=LO(
K1,K2-1,2):SX(T1,1)=K1:SX(T1,2)=
K2-1:T1=T1+1
1040 IF CB(K1+2,K2-1)=1 THEN SL(
T1,1)=LO(K1,K2-3,1):SL(T1,2)=LO(
K1,K2-3,2):SX(T1,1)=K1:SX(T1,2)=
K2-3:T1=T1+1
1050 IF CB(K1+1,K2-2)=1 THEN SL(
T1,1)=LO(K1-1,K2-4,1):SL(T1,2)=L
O(K1-1,K2-4,2):SX(T1,1)=K1-1:SX(
T1,2)=K2-4:T1=T1+1
1060 IF CB(K1-1,K2-2)=1 THEN SL(
T1,1)=LO(K1-3,K2-4,1):SL(T1,2)=L
O(K1-3,K2-4,2):SX(T1,1)=K1-3:SX(
T1,2)=K2-4:T1=T1+1
1070 IF MD>0 THEN 1130
1080 FOR J=0 TO T1-1
1090 HGET(SL(J,1),SL(J,2))-(SL(J
,1)+20,SL(J,2)+20),3+J
1100 IF HPOINT(SL(J,1)+2,SL(J,2)
+2)=3 THEN C3=1 ELSE C3=0
1110 HPUT(SL(J,1)+4,SL(J,2)+4)-(
SL(J,1)+12,SL(J,2)+12),J+11
1120 NEXT J
1130 RETURN
1140 REM MOVE KNIGHT
1150 IF MD>0 THEN RETURN
1160 FOR J=0 TO T1-1
1170 HPUT(SL(J,1),SL(J,2))-(SL(J
,1)+20,SL(J,2)+20),3+J
1180 NEXT J
1190 RETURN
1200 HPUT(LO(N1,N2,1),LO(N1,N2,2
))-(LO(N1,N2,1)+20,LO(N1,N2,2)+2
0),2
1210 HPAINT(LO(N1,N2,1)+2,LO(N1,
N2,2)+2),2,0
1220 HGET(LO(N1,N2,1),LO(N1,N2,2
))-(LO(N1,N2,1)+20,LO(N1,N2,2)+2
0),2
1230 HPUT(LO(N1,N2,1),LO(N1,N2,2
))-(LO(N1,N2,1)+18,LO(N1,N2,2)+2
0),1
1240 IF DI=1 THEN Y=Y+1 ELSE Y=Y
-1
1250 IF DI=1 AND Y=9 THEN DI=2:Y
=8:X=X-1
1260 IF DI=2 AND Y=0 THEN DI=1:Y
=1:X=X-1
1270 IF HPOINT(LO(X,Y,1)+4,LO(X,
Y,2)+4)=4 THEN 1240
1280 IF X=0 THEN 1310
1290 SOUND RND(50)+30,1
1300 RETURN
1310 IF MD=2 THEN 190
1320 FOR X=1 TO 4
1330 PALETTE X,RND(64)-1
1340 NEXT X
1350 MD=0
1360 IF INKEY$="" THEN 1310
1370 HCOLOR 1,0:HPRINT(30,16),"M
OVES"
1380 HPRINT(30,18),MO$
1390 HCOLOR 0,1:HPRINT(26,16),"A
) RECORD DEMO"
1400 HPRINT(26,17),"B) MAIN MENU
"
1410 HPRINT(26,18),"C) QUIT"
1420 I$=INKEY$:IF I$="" THEN 142
0
1430 IF I$="A" THEN MD=1:GOTO 14
70
1440 IF I$="B" THEN MD=0:GOTO 14
70
1450 IF I$="C" THEN 1480
1460 GOTO 1420
1470 GOTO 200
1480 POKE &HFFD8,0
1490 RGB
1500 END
1510 DATA BFCAAECDBCEAEDBCCAAFBC
CAABDADCACFFCADACFAECBEFCCAEBCDC
BCBCBCFBAFDADGDABBFDBAACGADEACCE
BBAABCDAAACGABACAACAACBDABGCCGCC
BABEAADBCBCBAABBAEABBACCDCBACBAC
CDBBD
```

The Year Ahead

Once again, the time has come to make plans for the upcoming calendar year. During the past year we received quite a bit of mail with readers' personal wish lists. And we have done our best to make sure all readers will benefit. Without further ado, we now present THE RAINBOW's editorial calendar for 1991.

January - Foundations
Laying the groundwork with can't-live-without utilities that make your computing habit easier.
Submission deadline: 10/8/90

February - All in a Day's Work
Exploring software for managing small businesses and in-home organization.
Submission deadline: 11/8/90

March - Hard Wares
A look at the latest add-on products, projects and ideas for your computer.
Submission deadline: 12/8/90

April - Tuning Up
A compendium of sound (making) ideas and music software.
Submission deadline: 1/8/91

May - The Printed Word
An in-depth examination of printers, their features and the software that makes them work.
Submission deadline: 2/8/91

June - Binary Blueprints
Expert tips, techniques and other tools for the program builder.
Submission deadline: 3/8/91

July - 10th Anniversary Jubilee
A potpourri of programs in celebration of THE RAINBOW's 10th birthday.
Submission deadline: 4/8/91

August - At Easel!
Canvassing the world of graphics software and its many applications.
Submission deadline: 5/8/91

Our 1991 editorial calendar shows the themes we plan to cover in the coming year.

September - Back to School
A locker-full of educational programs for the '91-'92 school year.
Submission deadline: 6/8/91

October - The Shell Game
Taking the guesswork out of software that puts the OS-9 system to work.
Submission deadline: 7/8/91

November - On the Line
A guide to telecommunications: getting started and where to go from there.
Submission deadline: 8/8/91

December - 'Tis the Season
Great games and entertainment ideas for family and friends to enjoy throughout the holidays.
Submission deadline: 9/8/91

For those of you who are unfamiliar with it, the editorial calendar shows the monthly themes, or topics of interest, we plan to cover in the coming year. Our main purpose in providing this calendar here is to help you gear any programs you are writing to specific months in the year. Any programs/articles in our offices by the submission deadline dates shown above will be considered for publication in the issue for which that topic is appropriate.

Careful readers will notice we have reintroduced the Music/Sound and Games issues (April and December). And if you look closely, you'll find the main thrust of the January issue is utilities. Consider their return a result of numerous reader requests.

As always, we endeavor to provide technical "meat" as well as lots of fun things to help you gain the most from your Color Computing habit. And we work to furnish this information in a non-technical manner so all readers can learn from it. After all, we are all beginners in the big picture of life.

Take time to read the 1991 calendar for THE RAINBOW and plan your programs and articles around it. We look forward to seeing what you have to offer.

* * * * *

Join us next month for our annual Communications issue. We'll provide a discussion of Disk BASIC terminal programs and you can find out "all you ever wanted to know about modems but were afraid to ask."

— Cray Augsburg

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 Software Technologies	25	Hawksoft, Inc.	75	P & M Products	79
Burke & Burke	61	Howard Medical	98	Rainbow Back Issues	42
Carl England	39	Hypertech Software	55	Rainbow Binders	50
Cer-Comp	73	JWT Enterprises	21	Rainbow Bookshelf	26
CoCoPRO!	35	Kenneth Leigh Enterprises	16	Rainbow on Tape and Disk	65
Coless Computer Design	45	Kenneth Leigh Enterprises	85	Russ Griggs	21
ColorSystems	63	Metric Industries	87	SpectroSystems	39
Colorware	5	Microcom Software	7	SPORTSWARE	47
Computer Island	69	Microcom Software	9	Sugar Software	41
Computer Plus	IFC	Microcom Software	13	Sundog Systems	69
CRC\Disto	67	Microcom Software	15	Supersoft, Inc.	23
Danosoft	33	Microcom Software	17	T & D Software	31
Dayton Associates		Microcom Software	19	T & D Software	71
of W.R. Hall, Inc.	81	Microdeal	IBC	T & D Software	88
Delphi	89	Microtech Consultants Inc.	86	T & D Software	93
Delphi	97	MusicWare	75	Tandy/Radio Shack	BC
Dr. Preble's Programs	49	NMSA Computer Group	57	Three C's Projects	47
Eversoft Games, Ltd	79	Northern Technologies	55	Trading Post	25
Frank Hogg Laboratories	90	NRI Schools	insert	Trading Post	45
Frank Hogg Laboratories	91	Owl-Ware	27	Trading Post	63
Gimmesoft	93	Owl-Ware	28	True Data Products	43
Granite Computer Systems	77	Owl-Ware	29	Zebra Systems	37
Gravity Studio	53	PCM Magazine	70		

Call:
Belinda Kirby
Advertising Representative
(502) 228-4492

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

A DISK IS A TERRIBLE THING TO WASTE.

Join DELPHI and educate your disks with public domain programs from the world's premier online CoCo library. DELPHI's Color Computer area is managed by Marty Goodman, so you know you'll find lots of great stuff.

Downloads are only $6.00 per hour, with no surcharge for high speed access and no premium for dialing locally via Tymnet. If you have many floppy disks or a large hard disk, join DELPHI's 20/20 Advantage Plan and enjoy downloading 20 hours each month for $20.

As a *Rainbow* subscriber, you get a FREE lifetime DELPHI membership ($29.95 value) which includes a credit worth one evening hour of use. If you don't already subscribe to *Rainbow*, just request a subscription when you signup to DELPHI and, for the $28 subscription fee, you'll get the same great deal!

With your Color Computer and modem:

- Dial 1-800-365-4636
- At *Username:* type JOINDELPHI
- At *Password:* type RAINBOW, if you already subscribe to Rainbow
  type SENDRAINBOW, if you do not yet subscribe and wish to do so.

DELPHI

EDUCATING DISKS SINCE 1982

General Videotex Corporation • Three Blackstone Street • Cambridge MA 02139
800-544-4005 • 617-491-3393

KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

KB-1	Keyboard	$98.00
KB-A	CoCo Adaptor	$89.50
KB-1A	Keyboard & Adapt.	$149.00

MAGNAVOX 7622 AMBER OR 7652 GREEN

- 80 Column
- Built in Speaker

$98 (7 ship)

DISTO BOX

DC-7	Mini Controller	$ 75.00
DC-3	Super Controller	$ 98.00
DC-6	No Halt Controller	$129.00
MBA-1	3 in 1 Board	$ 69.45
MEB	Mini Expansion Bus	$ 30.00
RS232	RS-232 Port	$ 49.95
DC-3C	Clock and Parallel Port	$ 40.00

PRINTERS

STARNX-1000R	COLOR	$249.00
STARNX-1000II		$189.00
VA-1	Video Converter for CoCo 1&2	$29.45
HR-2	Dual Hi-res adapter	$39.45

DRIVE 0 PLUS

- Double sided 360K MPI 52
- Disto DC-7 controller and cable **$158.45**
- **Double Drive 0+** **$268.45**

Drive 0 + Drive 1 (TEAC)

MEMORY

• 512K Bare Board	$40
• Populated 512K & Software	$89
• 1 MEG Bare Board	$160*
• Populated 1 MEG	$200*

*requires 512K upgrade

FLOPPY DRIVES

52	MPI 5¼ Full Height 40 track Double Sided 360K	$39.45
92	MPI 5¼ Full Height 80 track Double Sided 720K	$78.45
55B	TEAC 5¼ Half Height 40 track Double Sided 360K	$98
53B	TEAC 5¼ Half Height 80 track Double Sided 720K	$108
235	TEAC 3½ Half Height 80 track Double Sided 720K	$89
FR-35	Frame Fits 3½ into 5¼ space	$12
502-C	Power Cable for 502	$12

SLOT-PACK II by Chris Hawks

- replacement for multipack
- 3 slots, 2 switchable
- X slot for RS-232 for modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP-II	slot pack II	$89.45
AC-12	12 volt adaptor	$14.95

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, * a 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.

RSB Access Basic thru OS-9 $39.45
FILE REPACK Un-Fragments disc $29.45

See Rainbow Reviews 8/89

HD-1	**10 Meg****	**$349**
HD-2	**20 Meg**	**$499**
HD-3	**30 Meg**	**$549**
HD-4	**40 Meg**	**$598**
HD-8	**80 Meg**	**$1,090**

*Burke & Burke **reconditioned

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.

MAGNAVOX 1CM135

- new analog with stereo sound and high grade composite screen
- 640 X 240 resolution @ 12 MHz with .42 dot pitch

CC-3 RGB Cable $19.95
Shipping 6/16/90 **$298** ($14 ship)

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

FLOPPY SALE $39.45 each MPI 52

Slots & Cards

VGA Graphics Depicted

Did you ever dream of visiting VEGAS, but you weren't sure what to expect — or if you would be able to afford it? Well, now you can play your favorite slot machine, or sit down at the blackjack table without even leaving the comfort of your home. Browse through different style slot machines (many different Multiplier slots). Visit the change booth if - or is that when? - you run out of cash, without feeling a pain in your wallet. Walk around the corner and sit down at any of a number of different style card games. Enjoy video five card draw poker - where it takes jacks or better to win. Or play Blackjack against the ever treacherous house dealer. Play Hi-Low and wager the max every chance you get. Do you like Keno? If so, choose your numbers, then sit back and wait to see if they are drawn!

All versions display vivid true to VEGAS graphics. Whatever your game, Slots & Cards has it for you! Slots & Cards is available for the IBM PC & Compatibles, Commodore Amiga, Atari ST and the CoCo III.

See your local dealer for orders and information or call us directly

microdeal

576 S. Telegraph
Pontiac, MI 48053
☎ (313) 334-5700

The *Best* in Software...for Your Color Computer.

For serious work or serious play, we've got the most popular titles for your home library

At Radio Shack, we're dedicated to offering you the latest and the best software to keep you going strong on your Color Computer.

So, we offer you a world of fun with a dazzling selection of exciting and challenging games, including popular Nintendo™ titles.

We also want to offer your children a head start in their education, with learning programs for kids of all ages that will provide hours of productive fun! Our selection includes programs that help develop lots of useful skills.

And for all of your personal needs, we've got programs that'll put your Color Computer to work where you need it most—like personal filing, word processing, spreadsheets and communications.

So send in this coupon for a free copy of our 1991 Software Buyer's Guide. Or pick one up at Radio Shack—your one-stop neighborhood software center.

Send me a new 1991 Software Guide.

Mail to: Radio Shack, Dept. 91-A-115-1
300 One Tandy Center,
Fort Worth, TX 76102

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

CREATING NEW STANDARDS

PROVEN LEADERSHIP

Over 7,000 USA locations, 39,000 employees, seven research and development centers, 31 USA and overseas manufacturing plants—NOBODY COMPARES!

GUARANTEED SATISFACTION

Over 35 million customers benefit annually from our satisfaction guarantee. Putting you first has made us #1 in PC compatibles—NOBODY COMPARES!

Radio Shack®
AMERICA'S TECHNOLOGY STORE℠

Nintendo/TM Nintendo of America, Inc.