Tools of the Trade
Our Utilities Issue

Including “housekeeping” programs for tape-to-disk transfer, quick graphics, curing tape I/O errors, hiding your BASIC listings, color text, shorthand disk commands and a graphics directory!

Plus, Novices Niche: Eight program shorties, just for beginners.

And
More on the CoCo 3 and a report on OS-9 Level II
Bouncing Boulders is a new, fast paced arcade-style game for your Coco. As you race your man around the screen you try to collect enough stars to open the exit to the next level. You can drop rocks to kill aliens that follow you around the screen trying to catch you. But beware of the falling and bouncing boulders as they will crush your man if you get trapped under one. The many different screens with lots of puzzles will keep you playing for hours on end.

**64K REQUIRED**

**TAPE OR DISK**

$38.95 U.S.  
$38.95 CAN.

---

You've asked for it and now it's here, a wrestling game for your color computer. Play a single match or play a tag team match in this 1 to 4 player game. Wrestle against the computer or wrestle against your friend in a single or tag team match. Use punches, kicks, body slams, back breakers and many other moves as you attempt to pin your opponent. Super graphics and realistic play action make this a great game for all.

**64K AND JOYSTICK**

**REQUIRED**

**TAPE OR DISK**

$28.95 U.S.  
$38.95 CAN.

---

Gantelet

**MISSION F-16 ASSAULT**

**MARBLE MAZE**

---

**THE GATES OF DELIRIUM**

---

**ALSO AVAILABLE**

— Paper Route, Knock Out, Karate, each game requiring 64K. Tape or disk.

$28.95 U.S.  
$38.95 CAN.

---

— Paper Route, Knock Out, Karate, each game requiring 64K. Tape or disk.

$28.95 U.S.  
$38.95 CAN.

---

We accept:

![VISA](logo.png)  
![MasterCard](logo.png)  

24 hr. order line:  
(416) 878-8358  
personal service 9-5

---

Please add $2 for shipping & handling. Ontario residents add 7% sales tax.  
C.O.D. Canada only.  
Dealer inquiries invited.  
Looking for new software.
From Computer Plus to YOU...

PLUS after PLUS after PLUS

Color Computer 3
w/128K Ext. Basic $169

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

Tandy 200 24K $649
Tandy 600 32K $1,269
Tandy 102 24K $395

Color Computer 3
w/128K Ext. Basic $169

Tandy 1000 EX $569.00
Tandy 1000 SX $839.00

DMP-130 $269

Big Savings on a Full Complement of Radio Shack Computer Products

Computers

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandy 1000 EX 1 Drive 256K</td>
<td>569.00</td>
<td></td>
</tr>
<tr>
<td>Tandy 1000 SX 2 Drive 384K</td>
<td>839.00</td>
<td></td>
</tr>
<tr>
<td>Tandy 3000 HL 1 Drive 512K</td>
<td>1229.00</td>
<td></td>
</tr>
<tr>
<td>Model IVD 64K with Deskmate</td>
<td>889.00</td>
<td></td>
</tr>
</tbody>
</table>

Printers

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Shack DMP-105 80 CPS</td>
<td>145.00*</td>
<td></td>
</tr>
<tr>
<td>Radio Shack DMP-130 100 CPS</td>
<td>269.00</td>
<td></td>
</tr>
<tr>
<td>Radio Shack DMP-430 180 CPS</td>
<td>559.00</td>
<td></td>
</tr>
<tr>
<td>Radio Shack DWP-230 DaisyWheel</td>
<td>310.00</td>
<td></td>
</tr>
<tr>
<td>Star LV-1210 120 CPS</td>
<td>199.00</td>
<td></td>
</tr>
<tr>
<td>Star NX-10 120 CPS</td>
<td>279.00</td>
<td></td>
</tr>
<tr>
<td>Star SG-15 120 CPS</td>
<td>410.00</td>
<td></td>
</tr>
<tr>
<td>Panasonic P-1091 120 CPS</td>
<td>259.00</td>
<td></td>
</tr>
<tr>
<td>Panasonic P-1092 180 CPS</td>
<td>339.00</td>
<td></td>
</tr>
<tr>
<td>Okidata 292 200 CPS</td>
<td>529.00</td>
<td></td>
</tr>
<tr>
<td>Okidata 192 200 CPS</td>
<td>375.00</td>
<td></td>
</tr>
<tr>
<td>Epson LX-80 100 CPS</td>
<td>275.00</td>
<td></td>
</tr>
<tr>
<td>Epson FX-85 160 CPS</td>
<td>419.00</td>
<td></td>
</tr>
</tbody>
</table>

Modems

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hayes 300 Baud Modem</td>
<td>85.00</td>
<td></td>
</tr>
<tr>
<td>Program Pac</td>
<td>99.00</td>
<td></td>
</tr>
<tr>
<td>Radio Shack DC Modem</td>
<td>179.00</td>
<td></td>
</tr>
<tr>
<td>Hayes 300 Baud Modem</td>
<td>169.00</td>
<td></td>
</tr>
</tbody>
</table>

Color Computer Software

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach Control Simul.</td>
<td>29.95</td>
</tr>
<tr>
<td>Mustang P-51 Flight Simulator</td>
<td>29.95</td>
</tr>
<tr>
<td>Spectral Typing Tutor</td>
<td>19.95</td>
</tr>
<tr>
<td>Dungeon Quest</td>
<td>24.95</td>
</tr>
</tbody>
</table>

Call Toll Free 1-800-343-8124

- Lowest Possible Prices
- Best Possible Warranty
- Knowledgeable Sales Staff
- Timely Delivery
- Shopping Convenience

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

Since 1973

In Massachusetts Call (617) 486-3193

1TR-80 is a registered trademark of Tandy Corp.
FEATURES

Invisilist/Glen Dahlgren
PROGRAM UTILITY Renegade hackers beware

Murder at the Hotel CoCo/Dale Lear
GAME A Rainbow staff imposter is bent on mayhem!

CoCo Can Play Cupid, Too/Ernie DiZazzo
GRAPHICS Love is in the air . . . and on the screen

CoCo Bright/David C. Billen
GRAPHICS UTILITY Text with graphics and more

Cycle-delic Palette/Becky F. Matthews
COCO 3 GRAPHICS A rainbow kaleidoscope for fun

The Limousine Utility/Roger Schrag
DISK UTILITY A tape-to-disk transfer utility

The RAINBOWest Reporter/Cray Augsburg
SHOW NOTES A report from the Princeton show

Get the Picture/Chris W. Brown
GRAPHICS A picture directory for your graphics disks

Take Command/Michael N. Jorgenson
DISK UTILITY A handy disk utility for the CoCo 3

Instant Graphics/Courtney Powers
GRAPHICS UTILITY Create fast, detailed Adventure graphics

CoCo ROS, Part III/Dennis H. Weide
HARDWARE PROJECT Interfacing the robotics program

Relief for Tape-Loading Headaches/Mark Nelson
TAPE UTILITY A quick cure for I/O Errors

NOVICES NICHE

Hand-Me-Downs 120 David Hutchinson
Decisions, Decisions 122 Robert Rodgers
A Public Service Message 124 Ruth Golias
Cassette Organization 125 J. E. Rittenhouse

Sound Off 125 Dave Lengel
Echo 126 John Stewart
Joystick Directory 126 Dale Atwater
Planning Ahead 127 Bill Bernico

Cover illustration copyright © 1986 by Fred Crawford

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 ads on pages 198 and 187.

NEXT MONTH: Whether bullish or bearish, the March RAINBOW is sure to carry something of interest for the financial genius in your home. Our focus will be on business and finance, and you'll discover again that our CoCo is more (much more) than a "game machine."

Get all the angles — get the March RAINBOW, the number one source for your Color Computers 1, 2 and 3!
Editor:

After reading RAINBOW for four years, I have to write and let you know I enjoy it very much. But I have never seen such a fine piece of workmanship as the article by Marty Goodman, "RTTY for the Color Computer" on Page 36 of the November 1986 issue. I use this program quite a lot. Thank you and I hope to see more of this kind of programming. Keep up the good work.

Gerry Farmer
Calgary, Alberta

Where Are They?

Editor:

I was searching for one-liners in my November 1986 RAINBOW, but to my surprise, I could not find even one. Did you discontinue them? Or did I just miss them?

Michael Jacobs
Brooklyn, NY

A one-liner junkie, eh? Well, never fear, that was just a short break. We get dozens of one-liners monthly and plan to keep publishing them indefinitely.

BACK TALK

Editor:

In the November 1986 issue, Page 8, a reader asked about using the CoCo to control a model railroad layout. I suggest that he contact the Model Railroad, Kalmbach Publishing Co., 1027 N. Seventh Street, Milwaukee, WI 53233. They probably have an article in one of their back issues.

Jules Stickle
Coombs, British Columbia

COCO 3

Editor:

I'm an engineering student at Ohio State University, and my CoCo 2 served mainly as a word processor (I use VIP Library). The VIP Library seems to function on the new machine, but I have high expectations of a new "super-processor" to come out in the near future. The purpose of this letter is to simply let the software companies know that we (the new generation of CoCo 3 users) are interested in new programs and programming techniques as soon as they are available.

Randy Harrison
Columbus, OH

Didn't Have Him in Mind

Editor:

Finally! The CoCo 3 I had ordered in August was in the store waiting to be picked up. I got it Friday, returned it Monday.

I have no interest in games or graphics. I use two CoCo 2s in my business for bookkeeping, billing, record-keeping and to automate my recording studio's audio/video synchronization system. I write all my own programs in BASIC, and that's the catch.

Unfortunately, the folks at Tandy didn't seem to have had people like me in mind when they developed the CoCo 3. It offers very little that I don't already have using a 64K CoCo 2 and Computerware's excellent Screen Expander. All the extra memory and faster operation are not accessible from BASIC.

So how about a software package that has Hi-Res screen with simple PRINT$(x,y) syntax, printing at the beginning of a line that doesn't wipe out the rest of the line, all keys repeat if held down, type-ahead buffer and more memory for program and variable storage (without toggling, banking, or special commands). For 512K versions: a RAM disk that can be used as if it were Drive 3, using regular Disk BASIC commands, and a print spooler.

In short, could somebody market a program-that would make the CoCo 3 as exciting for a BASIC user like me as it is for the rest of the CoCo Community?

Rob Edward
Greenwich, CT

The Primary Guide

Editor:

Being the new owner of a CoCo 3, I would like to make a few comments on my experiences. First, I was pleased to find a large number of my CoCo 1 software would run on CoCo 3. These included Teletwiter 64, Spectacular, Grafplot, DeskMate, Ark Royal games, etc. One program that would not run was my VIP Database. Softlaw told me they had no plans for CoCo 3.

I have also received no help from the local Radio Shack centers, who seem to be uninformed about CoCo 3 capabilities, software changes, or when OS-9 Level II will be available. Regarding any technical questions, I am usually referred to Fort Worth Headquarters (with a toll number, of course). It seems to me that the advice available from Radio Shack centers has deteriorated significantly since I bought my first CoCo in 1981.

Once again, we CoCo users can be very thankful for THE RAINBOW. You are the only source of information we need to achieve the full capability of our favorite computer. The manual for CoCo 3 does not even mention how to gain use of the full 128K. The excellent articles that have appeared in RAINBOW since the CoCo 3 debut have served as the primary guide to the CoCo 3.

Mel Siegel
North Palm Beach, FL

Some Tips to Pass Along

Editor:

I have been working with my new CoCo 3 and would like to pass along some observations.

The 16K version of JDOS (Version 1.23) is not compatible with the CoCo 3 in the 64K mode (the mode at power-up). If you have JDOS disks, the COPY command seems to work, as does DSKIN, so you can copy your files individually from a JDOS disk to an RS-DOS disk. LOAD and LOADM do not work; neither does DDS. The reason for this seems to be that on the new CoCo, only the first 8K of the cartridge memory is reserved for ROM packs. The upper 8K is dedicated to the Super Extended BASIC. However, I
WORLD’S SMARTEST
GOOD LOOKIN’

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled. The screen’s top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN’

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOPI! This ERROR-BEEBOP can be on/off. Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 44,000 characters (32,000 in HI-RES). DUAL PROCESSING lets you review & edit while more data is coming in. XMODEM for disk file transfer.

FULLY SUPPORTS D.C. HAYES AND OTHER INTELLIGENT MODEMS.

YOU'LL ALSO USE AUTOTERM FOR SIMPLE WORD PROCESSING AND RECORD KEEPING

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session. Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN’

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file. Editing is super simple with the cursor. Find strings instantly, too. Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

NEW DISK VERSION 5 IS NOW AVAILABLE

At start-up, AUTOTERM can set parameters, dial, sign-on, interact, read/write disk, sign-off, etc. Timed execution lets AUTOTERM work while you sleep or play. Print while on line, with J&M Parallel Printer Port, Radio Shack Modem Pak or RS-232 Pak. AUTOTERM’s buffering lets slow printers fall behind without losing data.

YOU COULD FALL IN LOVE WITH AUTOTERM!
IT TURNS YOUR COLOR COMPUTER INTO THE
WORLD’S SMARTEST TERMINAL

GOOD LOOKIN’

FULLY SUPPORTS D.C. HAYES AND OTHER INTELLIGENT MODEMS.

YOU’LL ALSO USE AUTOTERM FOR SIMPLE WORD PROCESSING AND RECORD KEEPING

SMOOTH WALKIN’

NEW DISK VERSION 5 IS NOW AVAILABLE

YOU COULD FALL IN LOVE WITH AUTOTERM!
IT TURNS YOUR COLOR COMPUTER INTO THE
WORLD’S SMARTEST TERMINAL

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

NO OTHER COMPUTER IN THE WORLD CAN MATCH YOUR COCO’S AUTOMATIC TERMINAL CAPABILITIES!

AVAILABLE IN CANADA
from
Kelly Software Distributors
Edmonton, Alberta

CASSETTE $39.95
DISKETTE $49.95
Add $3 shipping and handling
MC/VISA/C.O.D.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

Please hire the mentally retarded. They are sincere, hard working and appreciative. Thanks! Phyllis.
tried POKE &HFFDE, converting to the 32K mode, and all the JDOS commands seemed to work.

When operating with JDOS, the new Super Extended commands will not work, and they will not be converted to the proper codes if you are writing a program under JDOS. If you write a program under JDOS, using the new commands, you can save the program in ASCII format under JDOS and then load it under RS-DOS and it will work.

OS-9 Version 01.00.00 will not boot, but Version 02.00.00 will. I had hoped that the 80-column driver would work with the new screen is in effect. Error -t rapping routine. This goes a long way and they will not be converted to the proper compatibility with the new Star NX-10 Version 02.00.00 will. I had hoped that the 40- or 80-column display will not attempt to load while the 40- or 80-column screen is in effect.

One nice feature of the new system is its error-trapping routine. This does a good job in smoothing out the operation of a program since crashes can be bypassed when errors are encountered. However, the manual supplied with the computer gives only the codes for the BASIC errors (see Page 321), and did not give the codes for disk errors, which, to me, is where the codes really fulfill their purpose. By experimenting, I found most of the codes. I will give the numbers with the symbols, but will not attempt to explain them.

25=UF 31=FN
26=NE 32=FS
27=VR 33=AE
28=DF 34=FO
29=OB 35=SE
30=WP 37=ER

This sequence follows the same order as JDOS, so I would suspect that Error 36 should be VF.

After setting up an error trap, it can be turned off later in the program by inserting the command ON ERR GOTO 0. This puts you back in the normal mode in which the program is aborted and the error message is displayed.

David Breeding
Russell Springs, KY

---

HINTS AND TIPS

Editor: I've noticed from time to time, people writing in seeking help dumping graphics to the DMP-110. Put the printer into elongation mode before initiating the dump.

David Nicol
Pacific, MO

---

CoCo Max Compatibility

Editor: I recently obtained CoCo Max for use with my 64K CoCo 2 and Star NX-10 printer. The results have been fantastic. Initially, a problem arose with CoCo Max's compatibility with the new Star NX-10 printer. The printer was not shown or listed as being supported and Colorware could not offer any suggestions. I was surprised and somewhat dismayed that CoCo Max did not work by entering the other Gemini/Star printers as given. I took a long shot and tried it with the Epson FX series (printer Line 5 in the program) and it worked! I would like to pass this on to any others who might initially experience CoCo Max compatibility problems with the new Star NX-10 printer.

Phil Kyburz
Amarillo, TX

---

Under Separate Covers

Editor: I'm a 13-year-old CoCo 2 owner and I've had my computer for two years. The RAINBOW ON DISK is great, but one thing bothers me. Why can't you send the disk with the magazine?

Paul Michael Dumin
Southington, CT

RAINFLOW magazine is published and printed in Louisville, Kentucky, while the disks are produced in another state. The magazine is shipped second class mail, while the disks are shipped by first class mail.

---

REQUEST HOTLINE

Editor: I would like to request that readers who have a video digitizer please send me a printout of a picture made using the digitizer. Please include what digitizer, printer and camera you used.

Kevin Mortenson
254 Clinton Street
Binghamton, NY 13903

---

Educational Software Hunt

Editor: I'm looking for educational software focusing on calculus, mechanics and thermodynamics for mechanical engineering studies at a university. How do I locate information on how to purchase this type of software?

Bill Snyder
565 Leighton Avenue
Youngstown, OH 44512

---

Keeper of the Troops

Editor: I'm looking for software that can run records for my Boy Scout troop. I can only find the type that will run on Apple, IBM or Commodore. Does anyone make it for the CoCo?

Louis D. Cioccio
2603 Jackson Avenue
Erie, PA 16504

---

Lamborghini Challenge

Editor: I am looking for an artist who will take up the challenge to draw a Lamborghini Countach. For a long time I wanted to see my favorite computer draw my favorite car. If anyone wants to give it a shot, write me.

Omri Goren
18933 Kittridge Street, No. 64
Reseda, CA 91335

---

CoCo Version Wanted

Editor: I've found just the program I'm looking for -- it's a database program that keeps a record of a collection of videotapes and also prints out labels for the tapes. It's called Video Tape Tracker. The problem is that it's available only in MS-DOS and TRS-DOS. I called the company, Prosoft, to see if they made a version for the CoCo, but no luck. I'd like to see something like that for the CoCo. Some of you software entrepreneurs develop such an animal. I'm sure you'd find a market, especially with the increased popularity of the CoCo 3!

Paul Whiting
2330 Lakeland Avenue
Madison, WI 53704

---

INFORMATION PLEASE

Editor: I have been delighted with the use of Harry Hardy's programs INIT36 and HI-DEDIR that were published on Page 46 of the October 1983 issue. Has anybody modified the two programs to save the spare directory on a 40-track drive? If anyone can help in this endeavor, please write to me.

James K. Knight
11403 48th Drive N.E.
Marysville, WA 98270

---

Lost Without a Map

Editor: Is it possible to publish the complete memory map to the CoCo 3? I'm a technician to the College de Granby and I want to introduce the advantage of the CoCo 3. I write many programs in machine language and the memory map would be helpful to me.

Martin Scott
233 Roy
Granby, Quebec
Canada J2G 5R6

---

We have considered publishing an article about the CoCo 3 memory map, however, such an extensive report would have to be done over a period of several months and would take many pages. It is unlikely in the near future. We do ask that you watch for separate publications dealing with such subjects advertised in future issues of THE RAINBOW.

For your information, we did publish a complete memory map of the Color Computer in the July, August, September and December 1983 issues of RAINBOW. While this series by Bob Russell will be of little assistance, it will give you some idea of the breadth of the project.
NEVER BEFORE has this information of vital significance to a programmer been so readily available to everyone. This book will help you "GET UNDERNEATH THE COVER" of the Color Computer and develop your own HI-QUALITY Basic and ML programs.

DISK TUTORIAL
(2-Disk Package)

An indispensable tutorial for serious disk Basic/ML programmers. Gives almost everything you MUST know about the disk system. Some features:
- Learn about track/sectors/granules
- How the Directory is organized
- Useful disk utilities
- Useful ROM routines
- How to use double-sided/40/80 track drives
- Information security on disk
- Insight into common disk errors
- Many Tips/Hints/Secrets you won’t find elsewhere!
- And Much Much More!

Only $36.95

PICTURE DISK #1
This disk includes OVER 100 pre-drawn pictures for use with the CoCo Graphics Designer.

Only $14.95

THE COCO III WORD-PROCESSOR
This superb word processor uses the 80 COLUMN display of the CoCo III and includes the following features: Justification, Headers, Footers, Pagination, OVER 20 Line Editing Commands such as Character Insert/Delete, skip over words, breaking a line and more. Comes with a comprehensive manual. Requires a 128K CoCo III with Disk Drive.

Only $49.95

COCO DISK ZAPPER
Are you frustrated with crashed disks? If so, this program can save hours of labor by restoring complete or part of the information from the disk. It’s indispensable!

Requires minimum 32K/64K disk system

CoCo 1, 2 & 3

Only $24.95
Friends in Need

Editor:
The Kadima School for Special Children, located in Israel, just had a catastrophe. Our three CoCos have died due to a faulty drive controller. With no available funds, and now without our computer, we need the help of the CoCo Community.

If anyone wishes to donate a Color Computer and/or drive controller, we would gratefully appreciate it. We would send a receipt of the donation (tax deductible in the USA and England) for the full purchase price of the machine, including shipping. Please mark all packages "Gift," and on the customs form write the current resale value.

I wish to compliment Linda and company at Moreton Bay Software. Not only is their service the best available to the CoCo Community, but they are also just nice people. Recently an order of Moreton Bay Products was lost by the local postal authorities. Without delay, they reshipped the order, at no charge to me. Now that's what I call service.

J. Krinsky, Executive Director
Radin Campus, POB 4177
Netanya, Israel

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falssoft 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 space.

Letters to the editors may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RA! 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.

Continued on Page 172
Includes 20 oft-used utilities such as:

• And much much more!
• Find/Replace phrases in your Basic Program
• Create a character set for your DMP printer
• Fast Sort for Basic Strings
• Automatic Directory Backup
• Let the computer locate your errors!
• Programming Clock
• Super EOITing for Basic Programs
• Coco Calculator
• Design your own commands!
• Add SUPERSCRIPTS to your DMP printer
• PAINT with 65000 styles

UTILITY ROUTINES (TAPE-DISK- DISK: Copy Basic and ML programs AND MUCH MUCH MORE!!)

These are 100% Position Independent

REPEAT KEY: Repeat ANY key
KEY CLICKER: Ensure key input accuracy
SUPER SCROLLER: Save/view scrolled lines
TAPE-TO-DISK: Copy Basic and ML programs AND MUCH MUCH MORE!

For 16K/32K/64K cassette or Disk Systems, Coco 1, 2 & 3
BOOK $19.95
THESE ROUTINES (READY-TO-RUN) ON CAS/DISK:
$24.95
BOTH BOOK AND CASSETTE or DISK
$36.95

UTILITY ROUTINES (VOLUME II) (Disk Only)
Includes 20 oft-used utilities such as:

• PAINT with 65000 styles
• Add SUPERSCRIPts to your DMP printer
• Design your own command
• Programming Clock
• Fast Sort for Basic Strings
• Create a character set for your DMP printer
• Find/Replace phrases in your Basic Program
• Let the computer locate your errors!
• Coco Calculator
• Super EDITing for Basic Programs
• Automatic Directory Backup
• And much much more!

40K DISK, BASIC $19.95
32K DISK $24.95
64K DISK ONLY $29.95

UTILITY BONANZA I
Includes 20 best-selected utilities:

• 40K Disk Basic
• 32K Disk Cataloger
• Super Tape-To-Disk Copy (with Automatic Relocate)
• Disk-To-Tape Copy
• Disk-To-Disk Copy
• LList Enhancer (with page numbering)
• Graphics Typsetter (two text sized)
• LARGE DMP Graphics Dump
• X-Ref for Basic Programs
• Hidden 32K (Use the "hidden" 32K from your 64K Coco)
• Basic Stepper (Super Debugger)
• RAM Disk (for cassette & disk Users)
• Single Key Printer Text Screen Dump

Most programs compatible with Coco 3
DISK (64K Req.) ONLY $29.95

"MUST" BOOKS

UNRAVELLED SERIES: These 3 books provide a complete annotated listing of the BASIC/ECB and DISK ROMs.

COLOR BASIC UNRAVELLED: $19.95
EXTENDED BASIC UNRAVELLED: $19.95
DISK BASIC UNRAVELLED: $19.95
ALL 3 UNRAVELLED BOOKS: $49.95
RAINBOW GUIDE TO 6599 (Book): $18.95
RAINBOW GUIDE TO 6599 (2 Disk): $29.00
BASIC PROGRAMMING TRICKS: Tips and tricks for Basic Programmers: Only $19.95
COCO 3 SECRETS REVEALED: $16.95

WE HAVE ALL THAT YOU NEED TO SUCCEED!
Promoting CoCo —
Everyone’s a Winner

We got into a lively exchange of messages on Delphi the other night concerning the Color Computer (what else?) and how we might help promote it. One of the things people were saying was that they sure wished we could work with sales personnel at Radio Shack stores to “educate” them into selling CoCos.

It is always dangerous when someone bounces an idea off my head. The reason for this is simply that I tend to come up with more ideas and then, often, things get out of hand. In this case, though, I think the idea that we all seemed to come up with is a pretty good one, and it’s one you can participate in as well.

One of the “other” things I do is fly an airplane and, as such, I am a member of the Aircraft Owners and Pilots Association (AOPA), a group of people who fly light planes (as opposed to big jets) around in the sky. One of the interesting relationships in the aviation field is between air traffic controllers and light plane pilots. They very much (as they should) depend on one another, but sometimes they get at odds, too.

AOPA came up with a good program a few years back called something like “Fly A Controller.” Under the plan, private pilots have been encouraged to offer a ride to ATC personnel in an effort to give them a chance to “see” flying from the “other side.”

According to all reports, this has been a good program for all concerned. The AOPA members have gotten to know — and understand the problems of — ATC personnel on a personal basis. By the same token, controllers have had the opportunity to see what it is like to deal with instructions and directions from the cockpit.

AOPA even has a small area of its monthly magazine devoted to reports from both controllers and pilots. I read these regularly, because oftentimes some of the comments are very interesting indeed.
**Printer Interface Package**

Compatible with the new COCO3

**Seikosha SP-1000A Printer**

**Free shipping**

- Graphics
- Multiple Copies
- Variable Line Spacing
- Paper Width
- Pin and friction — 4” to 10”.
- Centronics parallel.
- Impact dot matrix method, bi-directional in logic seeking, uni-directional in graphic printing.
- 100 (Draft mode), 20 cps (Near Letter Quality) print speed, with reduced noise level.
- Pin-feed or friction-feed.
- Automatic paper loading function.

**Metric Industries Model 104P Interface with Modem Switch**

- True descenders
- A variety of functions including Underline, Bold print, Double striking.
- A variety of print character sets including Pica, Elite, Italics, Super/Subscripts, Proportional, Elongated, Condensed, and Italic Super/Subscripts.
- Standard 1.5K buffer.

Printer is covered with a two-year warranty.

---

**Model 101 Interface**

$39.95

The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4” x 2” x 1” and comes with all cables and connectors for your computer and printer.

**Model 102 Switcher**

$35.95

The Model 102 has 3 switch positions that allow you to switch your computer’s serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy gauge anodized aluminum cabinet with non-slip rubber feet.

**Model 104 Deluxe Interface**

$51.95

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5” x 2.5” x 1.25” and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

**Cassette Label Program**

$6.95

New Version 1.3 Tape transferable to disk. Now save and load Labels from tape or disk.

This fancy printing utility prints 5 lines of information on pinfeed cassette labels. “Cassette Label” is menu driven and is very easy to use. It uses the special features of your printer for standard, expanded or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

---

**Ordering Information**

Free shipping and insurance in the United States (except Alaska and Hawaii) on all orders over $50.00. Please add $2.50 for shipping and handling on orders under $50.00.

Ohio residents add 5.5% sales tax.

Call (513) 677-0796 and use VISA, MASTERCARD or C.O.D., or send check or money order to:

Metric Industries Inc.
P.O. Box 42396
Cincinnati, Ohio 45242

---

**Other Quality Items**

- High Quality 5 Screw Shell C-10 Cassette Tapes $7.50 per dozen
- Hard Plastic Storage Boxes for Cassette Tapes $2.50 per dozen
- Pin-Feed Cassette Labels White $3.00 per 100 Colors $3.50 per 100 (Red, Blue, Yellow or Tan)
- Ribbons for your SP-1000 series
- Seikosha printers $8.00

The Model 101, 102, and 104 work with any COCO including COCO3, any level basic and any memory size. These products are covered by a 1 year warranty.

The 101 and 104 require power in order to operate. Most printers can supply power to your interface. Star, Radio Shack, and Okidata are just a few that do. Epson and Seikosha do not. The interfaces can also be powered by an AC adapter (Radio Shack Model 273-1431 plugs into all models). If you require a power supply, add a $10 to the Model number and $5.00 to the price (Model 101P $44.95, Model 104P $56.95).
I thought about this program as the discussion was continuing on Delphi. Then I recalled we did something very much like this several years ago, when the original Color Computer came out. There were a lot of people excited about the CoCo — and quite a number of them spent some time in their Radio Shack stores and computer centers infecting store personnel with that same excitement.

"A number of Color Computer Clubs have become strong by working with people in their local Radio Shack stores."

Some of those relationships last until this day. A number of Color Computer Clubs have become strong by working with people in their local Radio Shack stores. Store personnel have directed new CoCo owners to users groups when they sold computers. A few clubs even have "designated salesmen" to whom they direct business. These salesmen are usually very CoCo-oriented.

It strikes me that we can do this all again, and that it is very much like the AOPA program. As with everything, something like this has to be a win/win situation — but there is no reason it should not be so. Let's look at it for a moment.

Of course, we all want more people in the CoCo Community for so many reasons it would be almost silly for me to enumerate them. At the same time, a Radio Shack salesperson is interested in making sales — and commissions. Obviously, the two go together.

May I suggest that each of you — individually or through your club, if you belong to one — take 10 to 20 minutes out and stop by your local Radio Shack store (of whatever kind). Tell the store manager you'd like to help him generate some business and ask whom you could work with. Then help. Make sure you answer any questions (or find someone who can). Tell them about your club (if you belong to one). And promise to direct some business to whomever it is that is interested.

That's a win/win situation. And, point out two things to whomever you speak with.

The first is that you're willing to help as much as you can. That is really important. The second is that almost no CoCo owner stops buying things for his or her computer once the computer itself is purchased. The additional sales any person in a store can make through the sale of just one CoCo can be considerable. So, even if the original "box" is not too expensive, all the things that will be bought for that "box" over the years can add up to significant commissions for the salesperson who is interested and develops a rapport with the typical CoCo owner.

Let me know how things work out. As I said, you can do this through a club or on your own. One thing is for sure, you'll be doing something to help the CoCo Community grow and you will be enabling more people to learn about our wonderful computer. I think it will benefit all of us.

And let me know how it works out. We'll run some of your responses in our "Letters" column.

— Lonnie Falk

ORDER PHONE (416) 456-0032
Call or Write! For your free catalogue, more info or give us suggestions!
Duck Productions, 18 Rowe Court, Brampton, Ontario, Canada L6X 2S2
Please add $2.00 for handling. Ontario residents add 7% provincial tax
Watch our catalogue for discounts. hints and tips and chance to win software.

Micro • Fire the ultimate secret weapon.
Have you beat your thumbs more than the aliens? This is a great rapid fire circuit that's easily installed on any joystick. Has no computer side effects. Comes with complete instructions and calibration program for adjustment to taste. $19.95 ($24.95 CDN)

Class Monitor Dual monitor driver
The best monitor driver for any Coco. It drives any composite, colour or monochrome monitors. Complete with dual audio outputs for immediate access of either or both monitors. Simple installation instructions. $31.50 ($39.50 CDN)

Laser Mazer master puzzle of reflection
Captain Starfleet wants Regula One protected from intruder attack. A battle of wits, pitted against six cloaked Roman vessels lurking in the quadrant. Can you find and engage them in time? A master puzzle of reflection for your sensors. Identify the locations of physical mass in space and command your attack. Misjudgement is a deadly option. Adventure in thoughtware for only $24.95 ($29.95 CDN)

RainBow CERTIFICATION SEAL
Machine language disassembler
Three terrific programs to explore machine language. Screen or printer accurate disassembly of binary code. Simple prompt procedure with some instruction to dissect and understand your ROMs. Fully documented for only $19.95 ($24.95 CDN)

Battle to D-Day The multiple player adventure
Can you change the course of history? General, your mission is to locate and secure the Third Reich's emergency command post before the allied landing on Normandy. Think through obstacles, battle after battle to find the entrance code. Then command your assault! Battle against time! Battle against three opponents. Adventure in thoughtware for only $29.95 ($38.95 CDN)

Keeping Track more than a disk manager.
If you own more than two disks you'll love Keeping Track. A manager menu of nine utilities that do it all! The real highlight is "O", the directory/autostart. It's a continuous access I/O directory that loads and executes any program with a single keystroke. All programs fully documented, $29.95 ($39.95 CDN)

Map'n Zap semi automatic disk repair
The layman's step by step kit for directory and grain table repair. Locates errors, maps out disk contents to screen or printer, backs up any flawed disk and prompts built in disk zap for repair. Complete with full tutorial on Coco's disk input / output access operation. $19.95 ($24.95 CDN)

Semi automatic disk repair
The layman's kit for directory and grain table repair. Locates errors, maps out disk contents to screen or printer, backs up any flawed disk and prompts built in disk zap for repair. Complete with full tutorial on Coco's disk input / output access operation. $19.95 ($24.95 CDN)

Class Monitor
The best monitor driver for any Coco. It drives any composite, colour or monochrome monitors. Complete with dual audio outputs for immediate access of either or both monitors. Simple installation instructions. $31.50 ($39.50 CDN)

RainBow Map 'n Zap
The layman's step by step kit for directory and grain table repair. Locates errors, maps out disk contents to screen or printer, backs up any flawed disk and prompts built in disk zap for repair. Complete with full tutorial on Coco's disk input / output access operation. $19.95 ($24.95 CDN)
Making the of CoCo's AFFORDABLE....

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoCo II</td>
<td>$87</td>
</tr>
<tr>
<td>CoCo III</td>
<td>$169</td>
</tr>
<tr>
<td>Drive 0</td>
<td>$175</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disks (SS)</td>
<td>$7.50/box</td>
</tr>
<tr>
<td>Disks (DS)</td>
<td>$8.00/box</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM-8 Monitor</td>
<td>$248</td>
</tr>
<tr>
<td>Sakata Monitor</td>
<td>$185</td>
</tr>
<tr>
<td>(composite driver incl.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deluxe Joystick</td>
<td>$24</td>
</tr>
<tr>
<td>Mouse</td>
<td>$40</td>
</tr>
<tr>
<td>MultiPak</td>
<td>$75</td>
</tr>
<tr>
<td>RS-232 Pack</td>
<td>$27</td>
</tr>
<tr>
<td>CCR-81 Cass.Rec.</td>
<td>$42</td>
</tr>
<tr>
<td>CCR-82</td>
<td>$27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMP-105</td>
<td>$110</td>
</tr>
<tr>
<td>DMP-430</td>
<td>$545</td>
</tr>
<tr>
<td>DMP-130</td>
<td>$215</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tandy 1000 EX</td>
<td>$550</td>
</tr>
<tr>
<td>Tandy 1000 SX</td>
<td>$870</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM-4 Monitor</td>
<td>$99</td>
</tr>
<tr>
<td>CM-10 Monitor</td>
<td>$360</td>
</tr>
<tr>
<td>CM-5 Monitor</td>
<td>$240</td>
</tr>
</tbody>
</table>

| CoCo 3 512K Upgrade | $130 |
| MultiPak Upgrade (26-3024) | $8  |
| MultiPak Upgrade (26-3124) | $7  |

* Please Note - Our ads are submitted early, so prices are subject to change!!!
  We appreciate your cooperation & understanding in this matter.

Method of Payment:
MC, Visa, AmEx. - Sorry, No Cit/Time!
Certified Check or Money Order.
Personal Checks - Allow 1 week to clear!

FREE PRICE LIST AVAILABLE
20% OFF ALL TANDY SOFTWARE
MIN. 15% OFF ALL TANDY HARDWARE

* Full TANDY Warranty
** CALL ** In Pa:
* 100% TANDY PRODUCTS In N.J.:
* FREE Shipping

ALL PRICES INCLUDE SHIPPING !!!
100% TANDY EQUIPMENT WITH FULL RADIO SHACK WARRANTY

COMPUTER CENTER
MicroWorld
230 Moorestown Road, Wind Gap, PA 18091
Laneco Plaza, Clinton, N.J. 08809

215/759-7662
201/735-6777
We've come a long way, CoCo . . .

. . . and there's a long way to go.

It seems that what I need is a CoCo 3 mode for my old CoCo. Now, I could "get into" that. Yeah, I know all that stuff about it not being economically feasible, but it would give me a real kick to flip a toggle switch on the side of my "CoCo I" and have it shift into a full-blown CoCo 3 emulation.

Hmm, maybe I could bolt a CoCo 3 on the bottom side of my computer desk and run a few more wires into the back end of my present CoCo. "What is he talking about?" you ask. Well, the truth is, I have been sort of dragging my heels about getting a CoCo 3. Yep, it appears that the managing editor of RAINBOW may be the last kid on the block to get a new machine.

While two new Color Computer 3s are waiting, in the box, right outside my door, I still have a CoCo 2 in my office and my faithful first CoCo at home. Even though Cray, Dan, Jutta and even Angela and Jody latched onto 128K and 512K CoCo 3s here at the office like hungry hounds on a meat wagon, I'm still a holdout. People are beginning to talk, too. I feel like the last bottom-land farmer who refuses to move out to make way for the TVA. "Poor Jim," they must be saying, "he just won't go with the flow."

Well, why should I? I mean, I didn't spend four years with my battle-scarred veteran just to chuck it aside and replace it with some shavetail rookie fresh off the boat. I feel like that guy in the Midas TV commercials who is still driving "O'l Betsy" and still cashing in on that lifetime muffler guarantee. The biggest difference is that my machine (no, I haven't named it) has never been in the shop since I first took delivery of it in Lonnie Falk's basement. Yessir, my ol' buddy, Dr. Doom, and I both got 16K CoCos for our birthdays and Bob Rosen himself had added 32K "piggyback" upgrades to each. Since that time, my CoCo's gone through some changes, that's for sure: lowercase board, 64K chips, new keyboard, you name it. And, far from slowing down with age, my CoCo's just as fast as it ever was, has a much better memory, does more than it ever did and learns new tricks every day. So, we're not ready to part company by any means. We go back a long way and we have the momentum to keep forging on, too.

Without getting maudlin about a plastic shell full of silicon, I do have a soft place in my heart for my numero uno. And, while it is inevitable that the playful puppy of a new machine, with its own special appeal, eventually will find a way to my heart, too (I do like that 80-column text mode), I'm not going to cast my old CoCo aside any more than I'd trade in my loyal, gray-muzzled Newfoundland, Onyx, for some new, improved model of dog.

Why am I telling you all this? Just so you'll know that we know there's plenty of life left in our CoCo Is and 2s and that, as attractive as that new model is, as long as this "ol' Sarge" is M.E. of this outfit, RAINBOW's going to keep marching to the same drummer who got us here and nobody's going to fall out of the ranks.

So, old soldier or new recruit, if you want to get into step with the CoCo Community, why not ease into the rhythm with a year's subscription? It provides a once a month cadence that's hard to beat: CoCo 1, 2, 3, CoCo 1, 2, 3, CoCo 1, 2, 3 . . .
COMPUTER AIDED INSTRUCTION
Educational Programs for Students Grade K-12 and Adult Self Studies

NEW PROGRAMS FOR YOUR TANDY 1000 AND TRS-80 COLOR COMPUTER
Compatible with Apple - Atari - Commodore - TRS 80 I, III, 4 - IBM PC Jr.
16 New Programs now available in Basic Spanish

- NEW! VIDEO CASSETTES FOR VHS!
  InnerActive™ Video Tutorials
  Complete with audio narration
  4 cassettes with 8 programs in each of the following subject areas:
  - Basic Spanish Grammar
  - Basic Algebra
  - Reading by Phonics
  - Basic Fractions
  2 programs per tape. Running time: 45 minutes per tape.

  $19.95 per/tape

16 Programs on 8 VHS Tapes $159.95

CALL TOLL FREE FOR MORE INFORMATION

Interactive Tutorial Programs for Home or Classroom Use
Over 1000 programs for your selection with 32 now available on disk for the Color Computer and 500 now available for the Tandy 1000.

"We're Your Educational Software Source"

Subject                  No. of Programs
Reading Development      256 (4 on disk)
Reading Comprehension    48 (4 on disk)
Mathematics              128
Algebra                  16 (16 on disk)
History                  32 (4 on disk)
Spelling                 16
Government               16
Physics                  16 (4 on disk)

16 Programs in each of the following:
  Children's Tales - Carpentry - Electronics
  Health Services - Office Skills - Statistics
  First Aid/Safety - Economics - Business Accounting - Psychology - MUCH MORE!

APPLE II, TRS 80 I, III, & 4, and Commodore 64 computers require respective conversion kits (plug-in board and stereo cassette player), $99.00. Atari 400/600/800/1200 computers require the Atari cassette recorder and the DORSETT 4001 Educational Master Cartridge, $9.95. For the IBM PC Jr. a cassette adapter cable and a good cassette recorder are required. The Tandy 1000 requires the DORSETT M1601 speaker/PC board kit, $99.00, and a standard cassette recorder. A Radio Shack CCR-81 or CCR-82 is recommended.

CASSETTES: $59.90 for an album containing a 16-program course (8 cassettes with 2 programs each); $58.80 for a 2-program cassette.

DISKS: $14.95 for a one-program disk; $28.95 for two disks; $48.95 for four disks. All disks come in a vinyl album.

Dorsett Educational Software features:
  - Interactive Learning
  - User Friendly
  - Multiple Choice and Typed
  - Program Advance with Correct Response
  - Full-time audio narration (Cassette Programs Only)
  - Self-Paced Study
  - High Resolution Graphics
  - Easy Reading Text

For more information, or to order call:
TOLL FREE 1-800-454-3671
IN OKLAHOMA CALL (405) 288-2301

DORSETT
Educational Systems, Inc.
Box 1226, Norman, OK 73070
Once again, John enhances the gallery with a scene from the Cascade Range, created with BASIC on his CoCo 3. John is also the owner of Cylon Software.

Jenny Grist Mill
John Murvine
Edensburg, Pennsylvania

This wonderful picture was created with BASIC on one of the new CoCo 3s. The Jenny Grist Mill is a real mill located in Plymouth, Mass. John is a self-taught programmer and commercial artist.

Mountain
John Murvine
Edensburg, Pennsylvania

Once again, John enhances the gallery with a scene from the Cascade Range, created with BASIC on his CoCo 3. John is also the owner of Cylon Software.

Maison
Claire Beaupre
Montreal, Quebec

Claire designed this winter scene to use as one of her Christmas cards. Maison was created with CoCo Max and Color Designer. Claire is a laboratory technologist of clinical chemistry in a hospital.
One of baseball's most valuable player/managers is depicted here in the gallery, and was created with BASIC. Wally is new to the CoCo Community, and purchased his 64K CoCo 2 a few months ago. He also noted that most of what he has learned has been from Fred Scurbo's "Wishing Well."

Pete Rose
Wally Mayes
Hamilton, Ohio

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 several facts about yourself, the more the better.

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 a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Jody Doyle, Curator

Send your entry on either tape or disk to:
CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle

February 1987 THE RAINBOW 19
Those renegade hackers will be stymied when they come up against . . .

InvisiList

When creating a program in BASIC, it is impossible to keep out users, or safeguard it from tampering and having someone put their own name in it.

Load Mask was made as a counter measure to just that. Until the program is executed, the user has no way to enter and change it, and afterward, a BREAK key disable and other routines can keep him out completely. The program itself is simply a machine language loader that fools the computer into thinking that the BASIC program in memory is machine language. This loader also encrypts the BASIC program using a very simple technique that stops the listing of the BASIC program after it is loaded.

The BASIC Program

In this section I assume you have a disk-based system. This is different from the tape system because of where the CoCo locates the BASIC program. In the disk-based system, the computer throws the program to the end of graphics memory ($E00-$25FF on startup). This can be changed later by the PCLEAR command within the BASIC program, but not before the program is run. This is because the memory ($2500-$25FA) is used for the ML loader and can be written over after the BASIC program is loaded and run, but not before. Therefore, a program that clears memory before the program is run using the PCLEAR command or the various pokes (POKE 25, 6; NEW, etc.) cannot use this loader.

Now we have established where the BASIC program starts, ($25FF) but not where it ends. The CoCo has a place in memory where it keeps track of the start and end of the BASIC program. This area is drawn on from the loader to configure it to encrypt only the part of memory that holds the BASIC program. You must also access this information, but I'll tell you how to do this later.

Glen Dahlgren has created many professional games for the CoCo including Hall of the King, Dragon Blade and White Fire of Eternity. He is currently a student at Penn State College. His non-computer interests include fantasy/science fiction role playing and racquetball.
Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc. Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

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

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries). The complete set of A-BUS User's Manuals is available for $10.

Smart Stepper Controller SC-149: $299
World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 6 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: $69
Inexpensive driver to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: $79
Stepper motors are in the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two low level signals (12V, bidirectional, 3 phase, 350mA per phase).

Special Package: 2 motors (MO-103) + ST-143: PA-181: $199

Stepper Motors MO-103: $15 or 4 for $39
Pancake type, 2½”, dia. x 0.75” step, 5 oz-in torque, same as Airpax KB2701-P2.

Current Developments
Intelligent Voice Synthesizer, 14-Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:
- IBM PC, XT, AT and compatibles. Uses one short slot. 
- Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot. 
- TRS-80 Model 102, 200 RS-232C adapter for $44.
- Model 100, (socket is duplicated on adapter). 
- TRS-80 Mod 3, 4, 4-D, 5 and 6 (with hard disk, use Y-cable). 
- TRS-80 Model 4, 6 (with extra cable, 50 pin bus is necessary). 
- TRS-80 Model 5. Plug into 40 pin I/O bus on KB or EA. 

Color Computers (Tandy) Fits ROM slot. Multikey, or Y-cable.

A-BUS Cable (3 ft, 50 cond.) CA-163: $24
Connects the A-BUS adapter to one A-BUS card or to first Motherboard. Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard MB-120: $99
Each A-BUS Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be connected to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

The A-BUS is not a replacement for the Multi-pak
You’ll use it all the time and love using it.

What is CoCo Max?
Simply the most incredible graphic and text creation “system” you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.

Is CoCo Max for you?
Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success?
First there’s nothing to learn, no syntax to worry about. Even a child who can’t read will enjoy CoCo Max. Its power can be unleashed by simply pointing and clicking with your mouse or joystick. With icons and pull down menus, you control CoCo Max intuitively; it works the same way you think. Don’t be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you. It lets you work on an area 3.5 times the size of the window on the screen. It’s so friendly that you will easily recover from mistakes: The undo feature lets you revert to your image prior to the mistake. As usual, it only takes a single click. Later, we will tell you about the “typesetting” capabilities of CoCo Max II, but first let’s glance at a few of its graphic creation tools:

With the pencil you can draw free hand lines, then use the eraser to make corrections or changes. For straight lines, the convenient rubber-banding lets you preview your lines before they are fixed on your picture. It’s fun and accurate. Lines can be of any width and made of any color or texture.

The paint brush, with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple. For special effects, the spray can is really fun: 86 standard colors and textures, all available at a click. It’s like the real thing except the paint doesn’t drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included. The Glyphics are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They’re really great for enhancing your work without effort.

Control Over Your Work
CoCo Max’s advanced “tools” let you take any part of the screen, (text or picture) and perform many feats:

- You can move it around
- Copy it
- Shrink or enlarge it in both directions
- Save it on the electronic Clipbook
- Flip it vertically or horizontally
- Rotate it
- Invert it
- Clear it, etc., etc.

All this is done instantly, and you can always undo it if you don’t like the result.

For detail work, the fat bits (zoom) is great, giving you easy control over each pixel. To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

Printing Your Creations
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers!

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max’s magic on any standard binary image file. There are also many advanced features such as the incredible lasso.

Is CoCo Max II, but first let’s glance at a few of its graphic creation tools:
The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are unretouched screen photos or printouts (on an Epson RX-80).

1. Publish a newsletter or bulletin

2. Fun for children while stimulating creativity.

3. Business graphs, charts, diagrams. Also memos

4. Junior's homework and science projects. Term papers too!

5. Over 200 typestyles to choose from! Generate flyers.

6. A new way to express your imagination.

7. Video portrait (with optional digitizer).

8. This is a cartoon.

9. Schematics and floor plans.

10. Logos and letterheads.

System Requirements:
Any 64K CoCo and a standard joystick or mouse. (The koala pad and the trackball work, but are not recommended.)

Disk systems need a Multi-Pak or our Y-Cable. CoCo Max is compatible with any Radio Shack DOS and ADOS.

Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except Shrink, Stretch, Rotate, and Glyphics. Also, it has 5 fonts instead of 14.

CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, DS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:
Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 16X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220 (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.

Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape ................................ $69.95

CoCo Max II (disk only) ..................... $79.95

Upgrade: CoCo Max to CoCo Max II
New disk and manual .................... $19.95
New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.

Upgrade: CoCo Max tape to disk manual, disk and binder........................................ $24.95

Y-Cable: Special Price .................. $19.95

Super Picture Disks #1, #2, and #3
each: $14.95

All three picture disks .................. $29.95

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. .................................. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50 .................. $99.95

New: faster DS-69A ........................ $149.95

Guaranteed Satisfaction

Use CoCo Max for a full month. If you are not delighted with it, we will refund every penny.

Colorware Incorporated
79-04A Jamaica Avenue
Woodhaven, NY 11421

800 221-0916
Orders only.
NY & Info: (718) 296-5916
Hours: 9-5 Eastern time.

Add $3.00 per order for shipping. We accept Visa, MC, checks, M.O. C.O.D. add $3.00 extra.

NY and CT: add sales tax.

Shipping to Canada is $5.00

Overseas, FPO, APO add 10%
The Machine Language Loader

The loader is divided into two parts. The first part encrypts the BASIC program and is located at $2500. This is done simply by finding the end address and exchanging every other byte up to it. This is very easily done and requires no code to encrypt, but it serves its purpose and disables the LIST command upon loading the program. This section also puts the end address of the BASIC program into the second part, a permanent part of the final product.

The section is not used until the execution of the BASIC program and is saved along with it. Its processes include de-encrypting the program and setting the BASIC pointers in memory, or telling the computer exactly where the program is. It is because of these pointers that you can't just save the BASIC memory as an ML program.

Creating the Loader

The loader can be made in two ways. If you have Disk EDI TASM or some other compatible assembler, then you can enter and assemble the assembly language listing, otherwise, simply use the BASIC program that posts the loader directly into memory. You can save it by typing: SAVE "filename", start address, end address. You must type this in as follows: SAVE "filename", &H2500, &H25FB, &H2500 and press ENTER. The first part of the loader encrypts the BASIC program and returns. Then you must save the program as a machine language file. The format for this is SAVEM "filename", &H2500, &H2500, &H25FB, &H2500 and pressing ENTER.

Using the Program

First you must load a BASIC program into memory. Make sure you have a backup of the program saved in case something goes wrong. Then you must find its end address. This can be done by typing PRINT PEEK(27) * 256 + PEEK(28). It is these two locations (27 and 28) that hold the end address of the BASIC program in Hex. Using the equation given, they are modified to a decimal number equaling the end of the program. Write this number down.

Next, load in the completed ML loader already saved on disk. Then type EXEC &H2500 and press ENTER. The first part of the loader encrypts the BASIC program and returns. Then you must save the program as a machine language file. The format for this is SAVEM "filename", start address, end address, execute address. You must type this in as follows: SAVE "filename", &H2500, &H25DB, the number obtained from our equation, &H2500. This saves the file as an ML program starting at &H25DB and ending at the end of your BASIC file with its execution at &H25DB. This is the execution location of the ML loader included in the saved file.

You're finished! You now should have a newly-created machine language program that can be loaded and executed independent of any other file. Note that this loader does not interfere with the BASIC interpreter or BASIC functions and can be overwritten after its execution. It simply allows the loading and execution of the BASIC program after which the memory it takes up is free.

Modifications and Additions

Other routines that might be of use to a BASIC programmer would be a reset and BREAK key disable. These should be put directly in the beginning of the BASIC program so as to disable these functions as soon as possible.

To disable the reset button, you should enter POKE 113, 0. It will give you a cold start upon pressing it.

To disable the BREAK key on all but INPUT and LINEINPUT commands, you can use a routine taken, with permission, from the book 500 Pokes, Peeks 'N' Execs. Enter the following into your BASIC program:

```
FOR I=330 TO 336:READ A:POKE I,A:NEXTI
A:NEXTI:DATA 50,98,28,175,126,173,165:POKE 410,126:POKE 411,1:POKE 412,74
```

If you are familiar with machine language and want to modify the loader to disable any of these things, simply remember the new start and execute number for the completed ML program, and make sure the line in the first section that puts the end location in the second section is also modified. One can do this without changing the first section or the encryption part of the loader because they are separated in memory by approximately 200 bytes (via the ORG statements). Therefore, one could modify the second section without changing the first.

(Questions about this program may be directed to Mr. Dahlgren at 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674. Please enclose a SASE for a reply when writing).
```
2509 EC 84 00140 START1 LDD ,X
250B 1E 89 00150 EXG A,B
250D ED 81 00160 STD ,X++
250F BC 25FA 00170 CMPX ENADAD END
2512 2F F5 00180 BLE START1
2514 39 00190 RTS
25DB 8E 2601 00200 ORG $25DB
25DE 10BE 25FA 00210 LDX #9729 START ADDRESS
25E2 EC 84 00220 LDY ENADAD GET END LOCATION
25E4 1E 89 00230 START LDD ,X
25E6 ED 81 00240 EXG A,B
25E8 BC 25FA 00250 STD ,X++
25EB 2F F5 00260 CMPX ENADAD END
25ED 19F 1B 00270 BLE START
25F0 108E 2601 00280 *START RUN PROCEDURE
25F4 109F 19 00290 STY $1B PUT END LOCATION
25F7 7E AD21 00300 LDX #9729 GET START
25FA 0000 00310 STY $19 PUT START LOCATION
25FB 0000 00320 JMP $AD21 GOTO 'RUN'
25FC 0000 00330 ENADAD FDB $0000 END

00000 TOTAL ERRORS
```

CoCo Cat Says

Drugs Are NOT User-Friendly

Get your own CoCo Cat button by writing to Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Please enclose $1.50 for shipping and handling.
One of the Rainbow staff is an imposter bent on murder and mayhem


The game takes place in a hotel which contains the following rooms: Lobby, Kitchen, Dining Room, Bar, Swimming Pool, Stairs, and six hotel rooms (rooms 101 through 106).

Besides the detectives (the players), there are six guests at the hotel, one registered in each of the six hotel rooms. The guests are Ms. Kapfhammer, Ms. Arnott, Ms. Hutchinson, Mr. Falk, Mr. Reed and Mr. Augsburg. The guests move freely about the hotel with the exception that no guest has the key to any hotel room but his own. Each of the guests comes to the hotel with a valuable possession. Whenever the guests go back to their hotel rooms they may decide to leave the valuable in the room or they may decide to take it with them.

Dale Lear owns Dale Lear Software and makes his living developing programs for the Color Computer. He has authored games and other software such as Double Back, Baseball, TSEDIT, TSWORD and D.L. LOGO. Dale, his wife, Laurel, and their six children live in Petaluma, California.
One of the guests is really a killer in disguise. Whenever the killer ends up alone in a room with only one other guest and no detectives snooping about, he strikes! The victim is left at the scene of the crime and, if the victim was carrying his valuable at the time, the killer steals it and immediately stashes it away in his hotel room.

Each player is a detective. Each detective takes his turn using the arrow keys to move about the playing board according to the spin of the wheel. All the detectives have passes and can go freely into all rooms of the hotel including the guests’ rooms. When in a room, the names of the guests currently in the room are displayed. Also, a list of the valuables in the room is displayed. Whenever a room is entered, the detective has a chance to make a guess as to who the killer is, or pass.

The game begins with the prompt “number of players:” Next, each player’s name is entered one by one. The screen then displays the hotel registration. It is advisable to make a copy of this list, as it can be valuable information in trying to locate the killer. At the press of a key the game begins.

A spinner appears giving the first player a number between one and nine. This number is the number of squares that the player can move on this turn. The playing board is then displayed and the player makes his moves using the four arrow keys. The number of squares left to be moved is displayed in the lower-right corner of the screen. The player’s name is displayed in the lower-left corner.

If the player enters a room, a picture of the room appears and a list of the people and things in the room is presented. Listen carefully at this time because if a murder takes place anywhere in the hotel you will hear a chord played. At this point the player either enters 5 to make a guess as to who the killer is, or presses the space bar to pass.

If a correct guess is made, the player wins. If a wrong guess is made, the player is eliminated from the game. If the player passes, his turn is ended. Each player takes his turn in a similar fashion until either the killer is identified or all players are eliminated by wrong guesses.

To run HOTEL, first boot the OS-9 operating system and execute D.L. LOGO. Then enter and save Listing 1, SETUP. Now, enter and save HOTEL. Remember to delete the comments in order to conserve memory. At this point, you can reload SETUP and execute it. This will create several files required for play. After you have run this, you should not need to run it again.

All you have to do now is load and execute HOTEL. Good luck, super sleuths!

Editor’s note: See Dan Downard’s review of D.L. LOGO on Page 147 in the January 1987 issue.

Listing 1: SETUP

;============================================
; SET UP PROGRAM FOR HOTEL COCO
; TO SETUP
SET SPLIT 2
SPLITSCREEN WINDOW HT PD PRINT PRINT [- SETTING UP PICTURES]
; *** SAVE ROOM INFO
MAKE "R
[[ROOM 1],[0],12]
[[ROOM 2],[0],16]
[[ROOM 3],[6],16]
[[ROOM 4],[12],16]
[[ROOM 5],[18],16]
[[ROOM 6],[18],12]
[[LOBBY],[9],2]
[[BAR],[8],8]
[[POOL],[6],6]
[[KITCHEN],[18],4]
[[DINING],[15],6]
[[STAIRS],[9],18]
IF MEMBER? "ROOMS CATALOG [ERASEFILE "ROOMS"
OPENWRITE "ROOMS WRITE "ROOMS :R CLOSEWRITE "ROOMS"
; *** DRAW AND SAVE
; ROOM PICTURES
MAKE "RR [BOARD ROOM LOBBY BAR POOL KITCHEN DINING STAIRS]
FOR "RN 1 COUNT :RR 1
[CS
RUN LIST ITEM :RN :RR SAVEPICT ITEM :RN :RR TO ROOM1 :z WINDOW SETXY -1,0+1,0*ITEM 2 :z HT cs -73+1,0*LAST :z PD PRINT [PICTURE SETUP COMPLETE] TT PRINT END
;*** DRAW ROOMS
; DRAW PLAYING BOARD
; TO BOARD
SET BG 12
CS
; *** DRAW GRID
; SETPC 2
; SETH $ FOR "I -12 $ 12 10
[SETXY $I $I -75 PD 17$]
SETH $ FOR "I -75 95 10
[SETXY $I -120 $I PD 24$]
; *** DRAW ROOMS
; SETPC 1
FOR "$I 1 12 1
; [ROOM1 :I $R] END
;============================================
; DRAW ROOM ON PLAYING BOARD
; ENTRY: -ROOM VARIABLE
; TO ROOM1 $Z SETXY -$H+1*$ITEM 2 $Z
-73+1*$LAST $Z TT LAST FIRST $Z SETXY XCOR-10 YCOR-10 SETH $ REPEAT 2
[FD 16 RT 9$ FD 54 RT 9$]
END
;============================================
; DRAW LOBBY
; TO LOBBY
SET BG 12
CS
; *** DRAW FLOOR
; SETPC 2
SETXY -128 -4$ SETH $ REPEAT 16
[FD 16 RT 45 FD 50 BK 58 LT 45]
; *** PUT DOTS ON THE WALL
REPEAT 4@
[SETPC 1 RANDOM 3
DOT 128-RANDOM 256
96-RANDOM 136]

*** DRAW DOORS
DOOR -40 -40 "CO
DOOR 0 -40 "CO

*** DRAW STAR DECORATION
SETXY 0 48
SETPC 1
REPEAT 18
[FD 25 BK 25 RT 20]

=====

DID.W BAR
ENTRY:
EXIT:
TO BAR
SETBG 12
CS

*** DRAW BAR
SETPC 2
SETH 9
FOR "I 1 8 1
[SETX ITEM :I (-40 -40 -60 -60)
-60 -60 -60 -60]
SETY ITEM :I [16 -6 32 34 36 38 40 60]

FD 256]
SETXY -40 -16
SETH 9
FD 48
SETXY -60 40
SETH 60
FD 42

*** DRAW FLOOR
SETPC 3
SETH -120 20
SETH 270
FD 88

*** DRAW DOOR
DOOR -120 20 "BAR

*** DRAW BAR STOOLS
FOR "X -40 80 40
[STOOL :X 0]

FD 240]

*** DRAW POOL
SETPC 2
SETXY -40 -40
SETH 60
FOR "X -100 20 4
[SETXY :X -40
FD 180]

*** DRAW LADDERS
LADDER -95 -35
LADDER 80 -35

*** DRAW POOL
ENTRY:
EXIT:
TO POOL
SETBG 14
CS

*** DRAW WALL LINE
SETPC 0
SETXY -120 0
SETH 0
FD 240

*** DRAW DOORS
DOOR -100 20 CHAR 32
DOOR 0 20 CHAR 32

*** TABLES AND CHAIRS
SETPC 1
TABLECHAIRS -120 -50
TABLECHAIRS 0 -40
TABLECHAIRS 100 -100

=====

*** DRAW DINING ROOM
TO DINING
SETBG 14
CS

*** DRAW WALL LINE
SETPC 0
SETXY -120 0
SETH 0
FD 240

*** DRAW DOORS
DOOR -100 20 CHAR 32
DOOR 0 20 CHAR 32

*** TABLES AND CHAIRS
SETPC 1
TABLECHAIRS -120 -50
TABLECHAIRS 0 -40
TABLECHAIRS 100 -100

=====

*** DRAW STAIRS
TO STAIRS
SETBG 15
CS
SETPC 2
SETH 88
REPEAT 15
[REPEAT 10]

*** VERTICAL PORTION OF STAIR
[RT 60 FD 50 BK 50 LT 60 FD 1]
RT 60 FD 50 LT 150

*** BACK WALL
SETPC 1
REPEAT 4
[RT 90 FD 150 BK 150
LT 90 FD 4]
SETPC 2
BK 15 RT 150 BK 50 LT 150

*** FRONT OF STAIRCASE
REPEAT 16
[LT 90 FD 150 BK 150
RT 90 FD 1]
RT 150 FD 50 LT 60 FD 10

February 1987 THE RAINBOW
[DRAW HOTEL ROOM

TO ROOM

SETBG 12

CS

*** DRAW WALL LINES

SETPC 1

SETXY -4,0 2,0

SETH ,0 FD 7,0 BK 7,0

RT 9,0 FD 16,0 BK 16,0

RT 15,0 FD 5,0

*** DRAW BED

BED 

-25 -25

*** DRAW CHAIR

SETPC 1

CHAIR 1,0 -7,0

*** DRAW TABLE

SETPC 2

TABLE 5,0 -2,0

*** DRAW DOOR

DOOR 4,0 2,0

END

DRAW BED

ENTRY: -X COORDINATE

-Y COORDINATE

TO BED :X :Y

SETPC 2

SETH ,0

SETXY :X :Y

FD 4,0 LT 12,0 FD 4 LT 6,0 FD 4,0

SETPC 3

RT 9,0 FD 28 RT 12,0

SETPC 2

FD 4,0 LT 12,0 FD 4 LT 6,0 FD 4,0

SETPC 3

RT 9,0 FD 7,0 RT 9,0 FD 2,0 RT 9,0

FD 7,0 LT 3,0 FD 36 LT 15,0 FD 7,0

FD 36 FD 36 RT 15,0

SETPC 2

FOR "I 1 6,0 2

[RT 7 FD 1+15/:I) ENSD

DRAW TABLE AND CHAIRS

ENTRY: -X COORDINATE

-Y COORDINATE

TO TABLECHAIRS :X :Y

CHAIR :X :Y

CHAIR :X+2,0 :Y+2,0

TABLE :X+4,0 :Y+5,0

END

DRAW CHAIR

ENTRY: -X COORDINATE

-Y COORDINATE

TO CHAIR :X :Y

SETPX 1

SETH ,0

SETXY :X :Y

FD 15 RT 9,0 FD 2,0 RT 9,0 FD 15

BK 15 LT 12,0 FD 28 RT 7,0 FD 28

LT 19,0 FD 15 LT 8,0 FD 20 LT 10,0

FD 15

END

DRAW TABLE

ENTRY: -X COORDINATE

-Y COORDINATE

TO TABLE :X :Y

SETPXY :X :Y

OVAL 14

SETH 18,0

FD 25

SETX XCOR-15

OVAL 6

END

DRAW BAR STOOL

ENTRY: -X COORDINATE

-Y COORDINATE

ARTIFICIAL INTELLIGENCE

FOR YOUR COCO 1, 2 OR 3

THREE GREAT PROGRAMS —

1. COCO HAPPINESS EXPERT · INCREASE YOUR HAPPINESS

2. COCO THERAPIST - DISCUSS YOUR PROBLEMS

3. COCO POET - ENDLESS STIMULATING POETRY

NEW! AI Pack I $24.95

(SPECIFY TAPE OR DISK)

AND LEARN YOUR HAPPINESS QUOTIENT

COMPLETE DOCUMENTATION INCLUDES "THE HISTORY OF AI"

COCO JOKESTER

JUST TELL HIM YOUR NAME AND HE'LL TALK YOUR EAR OFF $26.95 (DISK ONLY)

BUILD YOUR OWN EXPERT SYSTEM USING SIMPLE MENU COMMANDS:

— DEMOS, TUTORIAL, EXPERT SYSTEM SHELL, CLEARLY WRITTEN KNOWLEDGE ENGINEERING MANUAL

— CREATE YOUR OWN KNOWLEDGE BASE

— $59.95 * DISK ONLY * 64K REQUIRED

INCLUDED: TWO FREE EXPERT SYSTEMS

— STOCK MARKET EXPERT

— EXECUTIVE HEALTH EXPERT

$45.00

30 DAY UNCONDITIONAL MONEY-BACK GUARANTEE!

* AUTOMATICALLY LOADS DATA FROM MOST POPULAR SPREADSHEETS.

* 250% GRAPHING SYMBOLS AND UNLIMITED OVERLAY OF DATA.

* AUTOMATICALLY SCALES AND LABELS ALL THREE OF THE AXES.

* CALCULATES MATH FUNCTIONS, INTEGRALS AND MOVING AVERAGES.

* FULLY AUTOMATIC, MENU DRIVEN WITH COMPLETE ERROR TRAPPING.

* FULL-PAGE SCREENPRINTS ON ANY PRINTER SPECIFY WITH QBDOS.

* REQUIRES 32K EXT. BASIC TAPE - *$40.00 DISK - *$45.00

NOW AVAILABLE

COCO EXPERT SYSTEM TOOLKIT

BUILD YOUR OWN EXPERT SYSTEM USING SIMPLE MENU COMMANDS:

— DEMOS, TUTORIAL, EXPERT SYSTEM SHELL, CLEARLY WRITTEN KNOWLEDGE ENGINEERING MANUAL

— CREATE YOUR OWN KNOWLEDGE BASE

— $59.95 * DISK ONLY * 64K REQUIRED

INCLUDED: TWO FREE EXPERT SYSTEMS

— STOCK MARKET EXPERT

— EXECUTIVE HEALTH EXPERT

CALL NOW FOR FREE INFORMATION (415) 547-7057, OR WRITE!

HAWKES RESEARCH SERVICE: 355 STANFORD AVE, OAKLAND, CA 94608

YOUR PERSONAL CHECK IS WELCOME! SHIPMENT WITHIN 48 HOURS! ADD $3.00 SHIPPING ON ALL ORDERS. CAL RESIDENTS ADD 7.25% SALES TAX
** CAPTURE CURRENT X,Y
MAKE "PX ITEM 2 :PL
MAKE "FY ITEM 3 :PL
SETH $ ST

** REPEAT FOR EACH SQUARE
DO [SETCURSOR 15 3]$ PRINT1 :N

** LOCATE TURTLE ON CURRENT SQUARE
SETYX :PX*18-115 :PY*18-85
** GET ARROW KEY
MAKE "Z ASCII RC
** CALCULATE NEW X,Y
SOUND 40$0 3$ TT :Z

*** QUICK CHECK TO SEE IF IN ROOM
IF MEMBER? (WORD INT :PX/3 INT :PY/2) :L
***YES, DETERMINE ROOM
CALL "INROOM" ZERO SQUARE COUNT [MAKE "W INT (WHERE+l) / 2 INROOM :W MAKE "N 0]
ELSE
***NO, DECREMENT SQUARE COUNT
SET CURRENT ROOM=0
[MAKE "W INT (WHERE+l) / 2 INROOM :W MAKE "N 0]
END

*** ALLOW GUESS
IF RC="G [GUESS] END

; ** SUBROUTINE GUESS
ENTRY: - THING TO PRINT
TO TPRINT :Z
SOUND 4,0,0,0 3,0 TT :Z
SETY YCOR-1,0
END

; ** SUBROUTINE SCRAMBLE
MOVE GUESTS/VALUABLES TO SCRAMBLE
*** RELOCATE EACH GUEST

; *** DISPLAY LIST OF GUESTS
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** ATTEMPT MURDER
TRYKILL

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]

; *** DROP/PICK EACH VALUABLE
FOR "I 1 6 1 [MAKE "Z WORD "V :I MAKE "Z DROP THING :Z]

; *** ALLOW SELECT WITH CURSOR
IF LINE+:D>=0 [SETCURSOR LINE+:D COLUMN]
WHILE :Z<=$

; *** TEST FOR CORRECT ANSWER
IF LINE+1<=K [SETCURSOR 1$ $ PRINT [GOOD GOING SLUETH] MUSIC [T4$0 LG C E G X E 4CEG] PRINT PRINT:C "TURNS TOPLEVEL] ELSE [SETCURSOR 1$ $ PRINT [YOU HUNG THE WRONG MAN]

; *** PRINT GUESTS IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :GST]

; *** PRINT VALUABLES IN ROOM
FOR "I 1 6 1 [PRINT ITEM :I :VBL]
IF (FIRST
WORD "G FIRST :V))=
LAST THING (WORD "G FIRST :V)
[OUTPUT LPUT RANDOM 2
BUTLAST :V]
ELSE
/ ELSE NO CHANGE
/ [OUTPUT :V]
END

;==================================
| SUBROUTINE TRYKILL
| ATTEMPT MURDER IF ALL
| THE ELEMENTS ARE RIGHT
| TO TRYKILL
| *** DETERMINE KILLER'S ROOM
| MAKE "RK LAST THING WORD "G :K
| *** KILLER WONT STRIKE
| IF ANY PLAYER IN THE ROOM
| FOR "I 1 :NP 1
| [IF :RK=LAST THING WORD "P :I
| [STOP]]
| *** SEE IF A GUEST IS ALONE
| WITH THE KILLER
| MAKE "VICTOM ®
| FOR "I 1 6 1
| [MAKE "Z THING WORD "G :I
| *** DONT COUNT KILLER
| IF :K<>:I
| *** IS GUEST IN KILLERS ROOM?
| [IF :RK=LAST :Z
| *** DON'T COUNT DEAD PEOPLE
| [IF ®=ITEM 2 :Z
| *** IS ANYONE ELSE HERE
| [IF :VICTOM=®
| [MAKE "VICTOM :I]
| ELSE
| [STOP]])]]
| IF :VICTOM<>®
| / *** ALL ELEMENTS OK! STRIKE!
| / [KILL :VICTOM]
| END
;==================================
| SUBROUTINE SPIN
| EXIT: - NUMBER OF SQUARES
| TO SPIN
| *** DRAW WHEEL
| SPLITSCREEN
| CS
| PD
| HT
| SETPC 1
| SETH -9~
| FOR "I 1 9 1
| [SETPC 3-PC
| FD 8©
| PU
| LT 2© BK 4© TT :I
| FD 4© RT 2© BK 8© RT 4©
| PD]
| / *** SPIN TURTLE
| / PU
| ST
| SETXY -72 -4
| SETH ®
| REPEAT 27+5*RANDOM 1®
| [SOUND 1®© 1®©
| FD 1® RT 8]
| OUTPUT 1+INT HEADING/4®
| END
;==================================
| SUBROUTINE ROOM
| TO ROOM :Z
| SETXY 55 6®
| TT :Z
| SETXY -128 9®
| END
;==================================
| SUBROUTINE BAR
| TO TOUCH UP BAR PICTURE
| TO BAR
| SETXY -128 1®
| END
;==================================
| SUBROUTINE POOL
| TO TOUCH UP POOL PICTURE
| TO POOL
| SETXY -128 9®
| END
;==================================
| SUBROUTINE KITCHEN
| TO TOUCH UP KITCHEN
| TO KITCHEN
| SETXY ® 9®
| END
;==================================
| SUBROUTINE DINING
| TO TOUCH UP DINING ROOM PICTURE
| TO DINING
| SETXY ® 9®
| END
;==================================
| SUBROUTINE STAIRS
| TO TOUCH UP STAIRS PICTURE
| TO STAIRS
| SETXY -128 9®
| END
;==================================
Most Howard Medical products are COCO 3 compatible, some require special patches. Please inquire when you order.

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 compatibility. If you’re not happy with it for any reason, return it in 30 days and we’ll give you your money back, (less shipping).

COCO MAX II
Let the graphic capabilities of your CoCo EXPLODE on the screen or on paper. $78.45

Y CABLE
Needed to connect CoCo Max and disk drive at same time. $19.45

MAX FONTS
Three sets include 72 different fonts for typesetting bulletins, brochures and announcements $63

COLORING BOOK™
by Glenside Color Computer Club Twenty-two pictures of clip-art add the professional look to your pamphlet, menu or catalog sheets $15

(Disk Cables for each product) $2 shipping)

DISK CONTROLLER
NEW FROM J&M
The DC-4 is a scaled down version of the popular DC-2 without a parallel port or memory minder. It includes a switch with 2 ROM sockets, JDOS, manual and such features as gold connectors and metal box. It accesses double sided drives and accepts RS-DOS 1.1 for Radio Shack compatibility. $65

(Disk controllers) $2 shipping)

TEAC DISK 55B DRIVE
The Teac 55B fits into the spare slots in the Radio Shack 501 Disk Drive. This bare drive features 40 Track, double sided 360K potential and a six millisecond track seek rate. $132

The DD-2 combines the Teac 55B with our 1/2 height horizontal case and heavy duty power supply. $188

DE-1 disk enclosure 1/2 height horizontal with heavy duty power supply. Includes all mounting hardware. $35.00

DE-2 full height disk enclosure. Accepts two 1/2 height drives. Includes power supply for 2 drives and all mounting hardware. $39.50

RS DOS ROM CHIP
ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1. For CoCo 3 Compatibility
Reg. $40 ($2 shipping) $20 each

BOTEK
Serial to parallel converter converts the CoCo 4 pin serial output to run a parallel printer like Star or Epson. Includes all cables. Add $10 for modem attachment. $6845

WORD PACK RS
This ROM pack is the hardware answer for an 80 column display. It includes a built-in video controller to drive a monochrome monitor like our 123A. To get started, you need OS-9 2.0, a Y-cable or multipack interface drive 0, and a monochrome monitor. $89

New basic driver runs word pack without need for an OS-9. $10

TYPEWRITERS
Howard Medical has located and tested a select few typewriters that can connect to the Tandy Color Computer and we offer them here at mail order prices. These typewriters bridge the gap between dot matrix and daisy wheel printers with excellent letter quality and keyboard access. Try one in your home for 30 days and if you do not agree that this is the best of both worlds return it pre-paid for a courteous refund.

OLIVETTI CX880 with built-in parallel port $395*

OLYMPIA ORBIT XP with built-in parallel port $286*

OLYMPIA CARERRA with free $75 starter kit $225*

SMITH CORONA 6100 with spell checker $315* *(7 shipping)
Drive 0 and 1 $269.95
One double sided drive with doubler board and new RS controller so you can have the equivalent of 2 drives in one. You can even backup from 0 to 1. Works with all CoCo's. Compatible with RS DOS. No special operating system needed.

EPSON® LX-80 PRINTER $239.95
The logical choice for your CoCo! 80 column, 100 CPS in draft mode, 16 CPS in near letter quality mode, 1K Buffer, compatible with CoCo max. 1 year warranty. LX-80 Tractor Feed $27.95. Serial to parallel converter starting at only 49.95.
*We are authorized Epson® Sales and Service

Drive 1 Upgrade $119.95
Add a second ½ height drive to your Radio Shack® Thin Line Disk Drive. Comes with 3 minute installation instructions, screwdriver required. Please specify either catalog #26-3129 or 26-3131 when ordering.

2 Drives $299.95
Both our drive 0 and 1 in one case, with cable and R.S. controller. The best just got better!

Drive 1 $125.95
Your Choice Silver or White

$199.95 Drive 0

SUPER DRIVE SALE
Special prices on new first quality disk drives. They even have GOLD connectors on the back… Some other places charge 229.00 for dr. 1 and 299.00 for dr. 0, not us! Drive 1 is I, Second Color Computer drive, or external mod III, IV. Drive 1 just plugs into the extra connector on your Drive 0 cable. Both drives are compatible with any version of the Color Computer and all versions of drives. Drive 0 is your first Color Computer drive and comes complete with cable, manual, and R.S. controller. Bare full hgt SSD drive only 79.95.

THE COMPUTER CENTER
901-761-4565, 5512 Poplar, Memphis, TN 38119
Add $4.90 for shipping and handling—Visa, MC & money orders accepted, No CODs
Allow an additional 3 weeks for personal checks—Drive faceplates may vary slightly
Prices subject to change without notice. Radio Shack is a registered trademark of Tandy Corporation
Prices subject to change without notice.
Love is in the air . . . and on the screen

CoCo Can Play
Cupid, Too

By Ernie DiZazzo

Move over Hallmark! Here's a program for telling that "certain someone" exactly how you feel, with colorful graphics and a sentimental love song.

Lovecard starts with a title screen and the instruction to press any key to begin. Following the introductory message and graphics, pressing ENTER starts the music (sort of like high-tech strolling violinists) while the lyrics are displayed on the screen. After the song has concluded, a hearts-and-roses finale bursts on the screen, vividly declaring, "I love you" to the object of your affections. At the bottom of the screen, the name "Rainbow" appears as the recipient of this message, but you can edit it to display a different name.

Lovecard is perfect for bestowing upon a loved one on special occasions, such as anniversaries or Valentine's Day — or just any ol' time you want someone you care about to know how you feel.

(Questions about this program may be addressed to the author at 10800 A Esplanade Avenue, Montreal, Quebec, Canada H3L 2Y6. Please enclose an SASE for a response.)

Ernie DiZazzo lives in Montreal and is a veteran of World War II. Formerly a statistician with an electronics company, Ernie enjoys listening to music and sharpening his programming skills by reading THE RAINBOW.
BY M. MARANDOLA & E. DI Z

AZZO.

90 PRINT$"448","-----PRESS ANY KEY TO BEGIN-----
100 EXEC41172
110 CLEAR298
120 CLS:PMODE3,1:PCLS4:SCREEN1,0
130 DRAW"BM5,5;C2D2B8R8U28L8;BM35,25;D28R18U6L10U22L8
140 DRAW"BM65,45;BD3D22F3R15E3U2
2H3L15G3B5RD4D14F3R4E3U14H3L4G3
150 DRAW"BM95,65;D22F8R6E8U28L6D
18G3L4H3U18L6;BM125,85;D29R18U6L6
1GoR6V8U6L8R10U6L8
160 DRAW"BM160,115;F21D16R6U16E1;
2L8G6L2H6L6
170 DRAW"BM190,135;BD3D24F3R15E3U2
U243H1L5G3B3R6BD4D16F3R3E3U16H3L3
G3
180 DRAW"BM225,155;D25F3R14E3U25
L7D2G2Z3H2U20L6
190 PAINT(6,6),3,2:PAINT(38,28),1,2:PAINT(68,48),2,2
200 PAINT(98,68),1,2:PAINT(128,8)
8),3,2:PAINT(172,124),2,2
210 PAINT(193,138),1,2:PAINT(226,
158),3,2
220 EXEC41172
230 PMODE3,1:PCLS(5):SCREEN1,1
240 PAINT(0,0),4
250 FORT=30 TO -30 STEP-1
260 A=\(2*3.1415)*T/0
270 LINE(128,96)-(75\*SIN(A)+128,
75\*COS(A)+96),PSET
280 LINE(128,96)-(75\*SIN(A)+128,
75\*COS(A)+96),PRESET
290 Q=-60+2*T:FOR Q TO 0 STEP-1:
NEXT
300 NEXT:CLS
310 CLS(7):PMODE4,1:PCLS:SCREEN1,
1
320 PRINT$"224, "A SONG OF LOVE IS
A SAD SONG, HI-LI-LI, HI-LI-LI, HI-
LO
330 A$="V3102T3:L4C:L2A:L4F:C:F;
A;O3L2.D:L2C;O2L4C:C;A;C;A;L4B
-;O2L1G
340 PLAY A$
350 CLS(2)
360 PRINT$"224, "A SONG OF LOVE IS
A SONG OF WOE, DON'T ASK ME HOW
I KNOW
370 B$="P4:L4C:L2G:L4E;C;E;G;O3L
2D:L4C;O2L2G;L4C;O3L2C:L4C;L2C;
O2L8-;L1A
380 PLAY B$
390 CLS(3)
400 PRINT$"224, "A SONG OF LOVE IS
A SAD SONG, FOR I HAVE LOVED AND
64K Disk or Tape  BATTLE HYMN — The Battle of Gettysburg
Player controls Lee’s army of 11 divisions (39 individual) brigades including 3 cavalry (Stuart) and 3 artillery (Alexander) and must capture 5 victory objectives to win decisively, it’s all here, from Culp’s Hill to Little Round Top, from Pickett’s charge to Hood’s heroic victory at Devil’s Den.
Play starts on the second day of the battle with Johnson, Early and Rodes facing an unrefined Union line running from Culp’s Hill down to Cemetery Hill East.
Player has early size advantage but must act quickly as Union reinforcements are seen arriving and must form the line and charge up hill over a great distance. Where is Stuart?
Brigades must be turned to march or fire. Union troops must reload after firing.
Player may limber or unlimber cannon; must watch his fatigue factors and prevent troops from routing. The object is to force the flanks and pin the enemy in a cross fire.
Easier said then done. Very historic, with an Ark Royal touch.
Hi res graphics; machine language. Game save. Play takes 3-5 hours. $29.00

32K Disk Only  THE FINAL FRONTIER
You have been chosen as commander in a struggle to gain control of an unexplored section of the galaxy. Your foe: an alien race called VOLSUNG. Here in the distant future, when space travel has become commonplace, on uncharted star systems you hope to find the raw materials which are vital to your industry and construction of a fleet of space craft.
Starting with limited ships and resources, you must quickly search, locate and bring needed systems under your influence, before the aliens can gain a foothold and threaten your expansion.
A star system can support industry, mining, energy or farming. You must decide on how to concentrate your efforts to maintain a balance to best serve your needs for developing your civilization and producing new space craft. Spacecraft that you will surely need when you and the alien VOLSUNGS eventually collide in a titanic struggle for the control of the Final Frontier.
100% hi res, total machine language, disk based. $25.00

32K LUFTFLOTTE — The Battle of Britain
Player takes the German side and tries to succeed where Goering and the entire Luftwaffe failed; destroy Britain’s will to fight from the air.
A mammoth game, Luftfotte has it all. Twenty-four British cities producing one of six war materials: petroleum, armaments, aircraft, shipping, morale, electronics; 26 air bases, 18 low radar sites, 17 high radar sites all forming a complex web of intercommunication and defense. Can you break the web?
Player controls 3 Luftfotltes of over 2000 individual planes including Sruka, Junkers, Dornier and Heinkel bombers; Me109 and Me119 fighters. Player may launch bomb runs, recon missions, strafing sorties or transfers; up to five flights per Luftflotte.
Player watches as his flights head for London or Bath or Glasgow or lorad site ‘j’ or..... It’s up to you. There are 85 individual targets in the game.
Hi res screen shows aerial combat, bombing and strafing missions and supplies brief information. Watch targets and planes explode! Semigraphic strategic map of England and targets. For conclusive information, view the intelligence screen to see everything.
Unless, of course, you prefer playing EXPERT in which case you’ll be flying blind as the real Germans did not so long ago.
Playing time: 3-6 hours. Game save. Machine language. $29.00

ARK ROYAL GAMES
P.O. Box 14806
Jacksonville, FL 32238
(904) 786-8603

Prices include shipping to U.S., APO’s, and Canada. COD’s (USA only) add $3.75. Florida residents add 5% sales tax! All orders shipped within 24 hours. Programs require Color Computer (Tandy Corp.). Be sure to state system when ordering.
Introducing

TURBO RAM
THE MEMORY TANDY LEFT OUT

and

TURBO HARD DISK

For the serious OS9 user, we offer Turbo Hard Disk, a half height 10 or 20 megabyte blazing fast hard disk with incredible storage capacity. Installed in an industrial quality fan cooled enclosure with oversized power supply with room and power for 4 half height drives (hard or floppy).

Turbo Hard Disk comes complete ready to run. Order OS9 Level 1 or 2 on your COCO 1, 2, or 3.

. . . . . . . . . 10 megabytes . . . $599.95 . . . 20 megabytes . . . $699.95
(C.O.D. Cash/Certified check only)

Exclusively From Speech Systems

SPEECH SYSTEMS COMMITMENT TO THE COCO

We are proud to offer TURBO RAM to our COCO 3 customers. However, rest assured we are committed to the COCO 1 and 2 as well as both the tape and disk user. We will continue to offer you the highest quality products. A few are under development that will knock your socks off. So stay tuned.
TURBO RAM™
TURBO CHARGE YOUR COCO 3

$119.95

$35 Free Extras

$119.95

- 512K Fast High Quality Memory.
- Super Easy Solderless Installation. Installs in minutes.
- Assembled, tested, and burned-in.
- Gold Connectors assure ultra high reliability.
- High Quality Double Sided, Solder Masked, Silkscreened PC Board.
- Ideal for OS9 Level II
- 2 Year Warranty.
- Free GIME Chip Technical Specs ($10.00 without Turbo Ram).
- Free 512K Ram Test Program ($10.00 without Turbo Ram).
- Free MUSICA RAM Disk ($10.00 without Turbo Ram).
- $5 OFF TURBO RAM Disk.
- Also available, TURBO RAM less memory chips. ........ $69.95

INSTALLATION
If you know how to hold a screwdriver, we’re convinced you can install Turbo Ram in minutes. However, if you like, send us your COCO 3 insured, postage paid, and we will install it, pay the return postage and guarantee it for 1 year. ............... $15.00

TURBO RAM DISK
TURBO RAM DISK adds 2 lightning fast Ram Disks to your COCO system. Imagine saving and loading programs instantaneously and having hundreds of your programs “on line” for fast access. Single disk system users can use TURBO RAM DISK to easily make backups without continuously switching disks.
Requires 512K Turbo Charged COCO 3 .................. $24.95
When purchased with TURBO RAM .................. $19.95

COLOR CONNECTION IV
This is the most comprehensive modem package for the COCO 3. All standard protocols are supported including CompuServe’s Protocol B, XMODEM protocol, and XON/XOFF. Full support of the auto answer/auto dial feature for both Hayes compatible and some Radio Shack modems is provided. Single key macros allow easy entry of often-used passwords and ID’s with a single key stroke.
Disk ................................................. $49.95

THE MAGIC OF ZANTH
In the Land of Zanth, magic is commonplace. Dragons, Griffins, Centaurs and Demons abound. You are sent on a quest to discover the source of magic in the Land of Zanth. This intriguing adventure features over 2 dozen hi-res 16 color animated graphic screens, 4 voice music and sound effects. The 16 color, 320 x 192 graphics look great.
Disk ................................................. $34.95

RETURN OF JUNIOR’S REVENGE
This is the same Junior you’ve seen in the Kong arcade series, but with new COCO 3 graphics. This tireless little monkey must overcome all sorts of obstacles (4 screens worth) to rescue his father, The King, from the mean zookeeper. He will traverse the jungle and swamp, climb vines, avoid chompers and birds, open locks, and more before he finally meets with his big daddy. The 16 color, 320 x 192 graphics are superb.
Disk ................................................. $34.95

#35 802 555 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880

We accept CASH, CHECK, COD, VISA and MASTERCARD orders.
Shipping and handling US and Canada .................. $1.00
Shipping and handling outside the US and Canada ... $3.00
COD Charge ........................................ $2.00
Illinois residents add 6% sales tax.
LYRA is the most powerful music composition program we have seen on any computer. We don't mean just the COCO, we really mean any computer. Whether you are a novice trying to learn music or a professional musician with MIDI equipment you will find LYRA a powerful tool. You see, we wrote LYRA for musicians that hate computers. If you want proof, purchase a LYRA demo for $7.95. We will apply the demo price to your purchase. MIDI output requires the LYRA MIDI cable (#MC158) or COCO MIDI Seq/Editor (#CM147).

- Ultra Easy to use, just point with joystick or mouse and click.
- Compose with up to 8 completely independent voices.
- Room for over 18,000 notes. (This is not a misprint!)
- Super Simple Editing Supports:
  - Note insert
  - Note delete
  - Note change
  - Output music to:
    - TV Speaker
    - STEREO PAK
    - ORCHESTRA 90
    - MIDI Synth
    - MIDI Drum Machine
  - Output up to 4 voices without additional hardware.

- Output all 8 voices using either SYMPHONY 12 or one or more MIDI synthesizers and drum machines.
- Output any voice on any of the 8 MIDI channels.
- Transpose music to any key.
- Modify music to any tempo.
- Automatically inserts bar for each measure as you compose.
- Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- Each voice may be visually highlighted or erased.
- Each measure is numbered for easy reading.

LYRA OPTIONS

These LYRA options are not required. They are provided for those wishing additional flexibility.

LYRA CONVERT
A program to convert MUSICA 2 files to LYRA files.
(T or D) #LC164 $14.95

LYRA SYMPHONY 12 ENHANCER
Lets LYRA play all 8 voices through SYMPHONY 12.
(T or D) #LS177 $19.95

LYRA STEREO ENHANCER
Gives the LYRA stereo output when used with the STEREO PAK or ORCHESTRA 90.
(T or D) #LS149 $14.95

LYRA MIDI CABLE
A cable to connect your computer to your MIDI synthesizer.
#MC158 $19.95

We accept CASH, CHECK, COD, VISA and MASTER CARD orders. Shipping and handling US and Canada $3.00. Shipping and handling outside the US and Canada $5.00. COD Charge $2.00. Illinois residents add 6 1/2% sales tax.
Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn’t matter as long as it’s MIDI equipped. Choose from our entry level MUSICA MIDI system that plays MUSICA files or our Professional COCO MIDI 2 system.

- Supports 16 Track recording and playback.
- Adjustable tempo.
- Over 45 Kbytes available (Over 15,500 MIDI events possible).
- Record to any track.
- Low Level track editing.
- LYRA editing. (one voice per track).
- Playback from any number of tracks.
- Quantizing to 1/4, 1/8, 1/16 intervals.
- Filter out MIDI data: Key pressure, Program change, Pitch wheel
- Control Change, Channel Pressure, System Message
- Graphic Piano Keyboard Display in both record and playback mode.
- Adjustable Key (Transposition).
- Save recording to disk for later playback or editing.
- Syncs to drum machine as MASTER or SLAVE.
- Sequencer features.
- 100% machine code.
- “Musician Friendly” Menu Driven.
- Metronome
- Many songs included.

DX LIBRARIAN™

Comes with professionally developed voices for the DX-7 worth 10 times the price. Requires COCO MIDI hardware interface.

<table>
<thead>
<tr>
<th>Voice</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX LIBRARIAN (Disk only) #DX143</td>
<td>$39.95</td>
</tr>
</tbody>
</table>

CASIO LIBRARIAN

Save and load voice parameters for any Casio synthesizer (CZ-101, CZ-1000, CZ-5000 etc.) You can save from the: presets, cartridge, memory or buffer. Requires COCO MIDI hardware interface.

<table>
<thead>
<tr>
<th>Voice</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASIO LIBRARIAN (Disk only) #CL169</td>
<td>$39.95</td>
</tr>
</tbody>
</table>

MUSICA MIDI™

MUSICA MIDI takes any MUSICA 2 music file and plays it through your MIDI synthesizer. We offer you over 800 tunes from our MUSICA LIBRARY series (sold separately) or create your own music using MUSICA 2. Includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer.

<table>
<thead>
<tr>
<th>Voice</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSICA MIDI Complete (Disk Only) #CM126</td>
<td>$39.95</td>
</tr>
</tbody>
</table>

MIDI KEYBOARD

If you own the Casio CZ-101 or similar MIDI synth, you know that the mini keys and the short 3 or 4 octave keyboard is limiting. MIDI KEYBOARD when used with our full size 5 octave keyboard gives you the flexibility you need. Comes with cable to connect the COCO to your MIDI synth.

<table>
<thead>
<tr>
<th>Voice</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIDI KEYBOARD (Disk only) #MK167</td>
<td>$29.95</td>
</tr>
</tbody>
</table>
EARS

Electronic Audio Recognition System

$99.95

• SPEECH RECOGNITION
• HANDS OFF PROGRAMMING
• HIGH QUALITY SPEECH REPRODUCTION

EARS Does It All!

INcredible!

Two Years In the Making. Speech Systems was formed to develop new and innovative speech products. After 2 years of intensive Research and Development, we have created a truly sophisticated speech recognition device. Recognition rates from 95% to 98% are typical. Until now, such a product was outside the price range of the personal computer market, and even small businesses.

EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

Speech and Sound Recognition. EARS is really a sound recognition system, so it really doesn't matter whether you speak in English, Spanish, or French. In fact you do not have to speak at all, you can train EARS to understand sounds such as a musical note or a door slamming.

Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call (312) 879-6844, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

VOICE CONTROL

Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF".

$24.95
Super Voice

Coco's Most Advanced Speech Synthesizer.

It talks, sings and more.

Only . . . $79.95

With ears purchase

Only . . . $59.95

Super Voice is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. Super Voice is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned Super Voice into a monophonic Super Music Synthesizer with our Piano Keyboard.

It talks. A free Translator text-to-speech program makes writing your own talking program as easy as saying "Hello."

Super Voice works in any 32K or 64K computer. A disk system requires a Y-Cable or Multi-Pak.

Here are the facts; the decision is yours.

<table>
<thead>
<tr>
<th></th>
<th>Super Voice</th>
<th>Real Talker</th>
<th>RS Speech Cartridge</th>
<th>Voice-Pak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesizer Device</td>
<td>SSI-263</td>
<td>SC-01</td>
<td>SP-256</td>
<td>SC-01</td>
</tr>
<tr>
<td>Speaking Speeds</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Volume Levels</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Articulation Rates</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vocal Tract Filter Settings</td>
<td>255</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Basic Units of Speech</td>
<td>64 phonemes</td>
<td>64 phonemes</td>
<td>64 phonemes</td>
<td>64 phonemes</td>
</tr>
<tr>
<td>Pitch Variations</td>
<td>4096 (32 absolute levels with 4 inflection speeds)</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Paul and Pauline, our talking heads program is normally $24.95. Until Dec. 15 we will include them with each Super Voice order.

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.
Shipping and handling US and Canada ........................................... $3.00
Shipping and handling outside the US and Canada ............................... $5.00
COD charge .............................................................................. $2.00
Illinois residents add 6 1/2% sales tax

Call any day to order. Also order by mail or BBS.

38W 255 Deerpath Road
Batavia, Illinois 60510
(312) 879-6880 (TO ORDER)
Presidents Take Precedence

By Steve Blyn
Rainbow Contributing Editor

This month, for a change of pace, we are presenting a Social Studies program to help students become more familiar with our U.S. presidents. Our main problem in developing this program was how to present the material. This was more an educational problem than one of programming.

We found that many junior high school and even some high school students who field-tested our ideas were totally unfamiliar with close to a dozen of our presidents. Some of our less popular presidents had completely eluded these students' school careers. We hope to remedy that deficit.

The easiest way of presenting the presidents would have been to match their names with their order of presidency, for example, "James Monroe-5, Zachary Taylor-12," and so on through the list. The problem with this approach is that only a person with both an excellent memory and an extreme interest in the topic could possibly succeed in such a program. We met no such interested individual.

We decided, therefore, on the approach of asking which president came before the one in the question. We give a president's name and his years of presidency. The student is then asked to choose which of three other presidents immediately preceded the one in question.

The three choices are randomly selected. We could have modified the program to select three other presidents who were in a close time-frame to the president in question, but we purposely did not do this. We felt this would be too difficult. Being randomly chosen, one of the three usually turns out to be obviously incorrect. For example, Reagan would be a silly choice for the president who preceded Truman.

This feature serves to give an alert student an edge in figuring out the correct answer. He can reduce the possibilities often to two and sometimes even to one. This process of elimination helps reinforce the student's knowledge of the presidents. On the other hand, the student who is really lost in this game will not be able to benefit by even two obviously incorrect choices.

The programming of this game is quite straightforward. There have been 40 presidents, and this is reflected in the DIMENSION statement in Line 40. Lines 50-70 read all of the presidents' names and years in office. These are contained in the DATA lines beginning with Line 390.

Lines 120-220 select and print out the question and the three choices. Variable X keeps track of the correct answer. Lines 230-250 prevent any duplication of names. Line 290 asks for the student's answer, which becomes variable A. Lines 310-320 check and print out the correct answer. Line 330 prints out the current scoreboard. Line 340 prints out the final score. Line 350 asks if you would like to go again. If the ENTER key is pressed, the game begins again. If the E key is pressed, the game is ended.

We hope that those of you who use this program in a classroom as well as those who use it at home will enjoy playing this game. While we do not really expect or even hope that anyone will memorize all of the presidential information, we do expect that each will learn more factual information on his own level about some of our presidents. As always, I enjoy hearing from readers about my articles and programs.
Only NRI teaches you to service all computers as you build your own fully IBM-compatible microcomputer

With computers firmly established in offices—and more and more new applications being developed for every facet of business—the demand for trained computer service technicians surges forward. The Department of Labor estimates that computer service jobs will actually double in the next ten years—a faster growth rate than for any other occupation.

**Total systems training**

No computer stands alone... it’s part of a total system. And if you want to learn to service and repair computers, you have to understand computer systems. Only NRI includes a powerful computer system as part of your training, centered around the new, fully IBM-compatible Sanyo 880 Series computer.

As part of your training, you’ll build this highly rated, 16-bit, IBM-compatible computer system. You’ll assemble Sanyo’s “intelligent” keyboard, install the power supply and disk drive and interface the high-resolution monitor. The 880 Computer has two operating speeds: standard IBM speed of 4.77 MHz and a remarkable turbo speed of 8 MHz. It’s confidence-building, real-world experience that includes training in programming, circuit design and peripheral maintenance.

**No experience necessary— NRI builds it in**

Even if you’ve never had any previous training in electronics, you can succeed with NRI training. You’ll start with the basics, then rapidly build on them to master such concepts as digital logic, microprocessor design, and computer memory. You’ll build and test advanced electronic circuits using the exclusive NRI Discovery Lab®, professional digital multimeter, and logic probe. Like your computer, they’re all yours to keep as

Send the coupon today for NRI’s 100-page, full-color catalog, with all the facts about at-home computer training. Read detailed descriptions of each lesson, each experiment you perform. See each piece of hands-on equipment you’ll work with and keep. And check out NRI training in other high-tech fields such as Robotics, Data Communications, TV/Audio/Video Servicing, and more.

**SEND COUPON TODAY FOR FREE NRI CATALOG!**

For career courses approved under GI Bill check for details.

- Appliance Servicing
- Small Engine Repair
- Air Conditioning, Heating, Refrigeration
- Locksmithing & Electronic Security
- Building Construction
- Automotive Servicing
- Photography
- Bookkeeping & Accounting

NRI is the only technical school that trains you on a total computer system. You’ll install and check keyboard, power supply, disk drive, and monitor, following step-by-step directions.

**Send for 100-page free catalog**

Send for the coupon today for NRI’s 100-page, full-color catalog, with all the facts about at-home computer training. Read detailed descriptions of each lesson, each experiment you perform. See each piece of hands-on equipment you’ll work with and keep. And check out NRI training in other high-tech fields such as Robotics, Data Communications, TV/Audio/Video Servicing, and more.
The listing: PRESDNTS

10 REM "PRESIDENTIAL QUIZ"
20 REM "STEVE BLYN, COMPUTER ISLAND, STATEN ISLAND, NY, 1987"
30 Q=RND(-TIMER)
40 DIM A$(40), B$(40)
50 FOR T=1 TO 40
60 READ A$(T), B$(T)
70 NEXT T
80 G$=STRING$(32, 255)
90 CLS
100 PRINT@32, 11 CORRECT = "CR"!
110 R=RND(38)+1
120 PRINT@6, "presidential quiz"
130 PRINT@96, 11 WHICH PRESIDENT CAME BEFORE "
140 PRINT@16, 0, G$;: PRINT@352, G$;
150 PRINT@128, A$(R) ; " "; B$(R)
160 X=RND(3)
170 P=RND(40)
180 PRINT@194, "1. "; IF X=1 THEN N PRINT A$(R-1) ELSE PRINT A$(P)
190 P1=RND(40)
200 PRINT@258, "2. "; IF X=2 THEN N PRINT A$(R-1) ELSE PRINT A$(P1)
210 P2=RND(40)
220 PRINT@322, "3. "; IF X=3 THEN N PRINT A$(R-1) ELSE PRINT A$(P2)
230 IF P=R THEN 110
240 IF P1=P OR P1=R THEN 110
250 IF P2=P OR P2=R THEN 110
260 PRINT@222, CHR$(207)+CHR$(207);
270 PRINT@286, CHR$(207)+CHR$(207);
280 PRINT@350, CHR$(207)+CHR$(207);
290 PRINT@384, " "; LINEINPUT "ENTER A NUMBER... "; AA$
300 A=VAL (AA$)
310 IF A=X THEN PRINT@404, "CORRECT"
320 IF CR+WR=20 THEN PRINT "03L"+WR "BAGBAGGAGBFGEDC": PRINT@455,"final score="CR*5; "$": CR=0; WR=0
330 PRINT@484, "press ENTER to continue";
340 IF CR+WR=20 THEN PRINT "03L"+WR "BAGBAGGAGBFGEDC": PRINT@455,"final score="CR*5; "$": CR=0; WR=0
350 PRINT@484, "press ENTER to continue";
360 DATA 160, G$, PRINT@352, G$
150 PRINT@128, A$(R); " "; B$(R)
160 X=RND(3)
170 P=RND(40)
180 PRINT@194, "1. "; IF X=1 THEN N PRINT A$(R-1) ELSE PRINT A$(P)
190 P1=RND(40)
200 PRINT@258, "2. "; IF X=2 THEN N PRINT A$(R-1) ELSE PRINT A$(P1)
210 P2=RND(40)
220 PRINT@322, "3. "; IF X=3 THEN N PRINT A$(R-1) ELSE PRINT A$(P2)
230 IF P=R THEN 110
240 IF P1=P OR P1=R THEN 110
250 IF P2=P OR P2=R THEN 110
260 PRINT@222, CHR$(207)+CHR$(207);
270 PRINT@286, CHR$(207)+CHR$(207);
280 PRINT@350, CHR$(207)+CHR$(207);
300 A=VAL (AA$)
310 IF A=X THEN PRINT@404, "CORRECT"
320 IF CR+WR=20 THEN PRINT "03L"+WR "BAGBAGGAGBFGEDC": PRINT@455,"final score="CR*5; "$": CR=0; WR=0
330 PRINT@484, "press ENTER to continue";
340 IF CR+WR=20 THEN PRINT "03L"+WR "BAGBAGGAGBFGEDC": PRINT@455,"final score="CR*5; "$": CR=0; WR=0
350 PRINT@484, "press ENTER to continue";
360 DATA 160, G$, PRINT@352, G$
150 PRINT@128, A$(R); " "; B$(R)
160 X=RND(3)
170 P=RND(40)
180 PRINT@194, "1. "; IF X=1 THEN N PRINT A$(R-1) ELSE PRINT A$(P)
190 P1=RND(40)
200 PRINT@258, "2. "; IF X=2 THEN N PRINT A$(R-1) ELSE PRINT A$(P1)
210 P2=RND(40)
220 PRINT@322, "3. "; IF X=3 THEN N PRINT A$(R-1) ELSE PRINT A$(P2)
230 IF P=R THEN 110
240 IF P1=P OR P1=R THEN 110
250 IF P2=P OR P2=R THEN 110
260 PRINT@222, CHR$(207)+CHR$(207);
270 PRINT@286, CHR$(207)+CHR$(207);
280 PRINT@350, CHR$(207)+CHR$(207);
Color Text is a machine language utility that gives your CoCo something it really needs: a better text display. More specifically, Color Text gives colored text, text with graphics, redefinable characters and lowercase characters. It requires Extended Color, Disk BASIC. It runs on a 16K machine, but can take advantage of 32K and even 64K.

To get Color Text up and running, enter Listing 1, which contains the character set. This program creates a file called CHARS.

Next, you need to enter and run Listing 2. Don't worry about merging CHARS and COLRTXT, since Progload combines them for you.

Now you have a file called COLRTXT, which is the program.

To execute COLRTXT you should use the loader included in Listing 3. If you do not want to use the loader, COLRTXT can be executed on a 16K system by entering:

```
CLEAR200,&H34FF:LOADM"COLRTXT";EXEC
```
or on a 32K system with the line:

```
CLEAR200,&H74FF:LOADM"COLRTXT",&H4000:EXEC
```

The loader is self-explanatory and accommodates loading COLRTXT into the upper RAM bank on a 64K system. The program is position independent, meaning it can be loaded anywhere in memory.

Color Text is actually so compatible with BASIC that there is not much to explain. The text is on the PMODE 4,1 graphics screen to begin with. The text automatically adjusts itself to all graphics commands, including COLOR, SCREEN and PMODE.

Since, in the Hi-Res modes, Color Text uses a 32-by-24 screen, the PRINT function's range has been expanded to accommodate this. CLS has also been modified to work with Color Text.

You can no longer type CLS followed by a number representing the color you want the screen to clear to, but you can type CLS followed by the ASCII code of a character you want the screen cleared with. So, for example, CLS42 would fill the screen with asterisks and home the cursor.

There are also several control characters that affect the display.

A list of control characters follows:

<table>
<thead>
<tr>
<th>Character</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Toggles scroll lock. (Scroll lock keeps the screen from scrolling up when a character is printed at the bottom.)</td>
</tr>
<tr>
<td>6</td>
<td>Inverts the character at the current cursor location, without updating the position of the cursor.</td>
</tr>
<tr>
<td>11</td>
<td>Inverts the screen.</td>
</tr>
<tr>
<td>12</td>
<td>Clears the screen.</td>
</tr>
<tr>
<td>27</td>
<td>Terminates Color Text.</td>
</tr>
</tbody>
</table>

Of course, the standard characters 8 and 13 do their thing too.

There really is not much more to say! Utilizing the full versatility of Color Text requires an understanding of Extended Color BASIC's graphics com-

---

David Billen lives in Nashville, Tenn. and is a system software designer for Gibson Guitar Corporation.
Micro Smart Inc. says what you want to hear.

MEGADISK PLUS

Drive a hard bargain from 5 to 40 megabytes of reliable high-speed systems, the newest technology—hard plated media, automatic ECC error correcting, fan cooling, EMI/RFI filter, gold connectors thoroughly burned in and tested just to mention a few standard features. Both fixed platter and removable cartridge systems available starting at a low $499.95

MEGAPLEXER

NETWORK YOUR MEGADISK WITH UP TO 10 TRS/80 COMPUTERS

Attach 2 to 10 Model III/V/IVP computers to one megadisk through our easy to use megaplexer—share files, data, programs, and make more efficient use of one megadisk with up to 10 computers. For a novice or expert. It will operate right out of the box.

Four port systems start at a low $399.95 Plus Cables.

TOLL FREE ORDERING 1-800-343-8841
Megadisk™ Hard Disk Drive Systems

Complete with Hardware, Cables, Software and Quikfit Installation

5 Megabyte Removable Cartridge Drive .......................................................... Starting at $399.95
10 Megabyte Removable Cartridge Drive .......................................................... Starting at $599.95
10 Meg Internal Mount IBM/Tandy 1000 .......................................................... Starting at $349.95
20 Meg Internal Mount IBM/Tandy 1000 .......................................................... Starting at $449.95
5 Mb External Cartridge System ................................................................. Starting at $499.95
10 Megabyte External Cartridge System ....................................................... Starting at $699.95
10 Megabyte External System ........................................................................... Starting at $699.95
20 Megabyte External System ........................................................................... Starting at $699.95

WOW! NEW LOW PRICES
Call for unadvertised specials

Floppy Disk Drives, Power Supplies and Cabinets

Our Disk Drives are UL approved—Our Floppy Drive Cabinets and Power Supplies are Underwriters Laboratory Listed and have passed the required Federal Communications Part 15 Section B-EMI/RFI test. Warranty on all disk drives is one full year parts and labor. Warranty on floppy disk drive power supplies is five (5) years. In warranty or out of warranty service is 24 hour turn-a-round on all disk drives and power supplies.

Half High Drives

Dual Sided 40 tk Bare .................................................. $99.95
In Case with Power Supply .................................................. $199.95
Dual Drive in One Cabinet .................................................. $239.95
Apple/Franklin Disk Drives
35/40 Track in Case with Cable and Software .................. $129.95

Call for our unadvertised CoCo Specials

See our Outstanding Service Promise on the preceding pages!

Terms and Conditions:
The prices quoted here are for cash. We will accept MasterCard, VISA, Discover and American Express. Please ask for details.

COD’s are accepted without any deposit. Purchase orders accepted based on prior approval, call for details.

Our hours are from 9:30 am to 5:30 pm, Monday through Friday and until 4:00 on Saturday.

Our telephone number of technical service is 617-872-9090.

Addresses:
Wholesale/Mailorder
200 Homer Avenue
Ashland, MA 01721

Retail Outlet
271 Worcester Road
Framingham, MA 01701

Not responsible for typographical errors. Terms and specifications may change without notice.

Trademark:
IBM Corp.
Montezuma Micro
Tava
Eagle Computer

© 1987 Micro Smart, Inc.

FULLY WARRANTED
FIFTEEN MONTHS
PARTS AND LABOR!

Model III/4 floppy disk drive upgrade kits
Our kits, which are a snap to install, just need a screwdriver and about 1 hour of spare time to have dual sided drives, just like the 4D. They will operate single and dual sided. Just ask us how—it’s easy, even for the beginner.

With one dual sided drive, floppy controller, heavy duty power supply (no lightweight stuff), all cables, instructions, and our expert technical staff to assist you, $289.95
Want a second drive? $99.95

Color computer drive kit
Drive 0 and 1
Our dual headed drive allows you to write on both sides just as though you had two floppy drives. Our special DOS 1.1 will even let you use Radio Shack DOS 1.0 and 1.1 in dual sided mode. Specially priced at $219.95

Toll Free Ordering
1-800-343-8841

MICRO SMART INC.
200 Homer Avenue
Ashland, MA 01721
1-617-872-9090

Hours: Mon.—Fri. 9:30 am to 5:30 pm (est) Sat. 4:00 pm
Dealer Inquiries Invited
The letter 'A' in its 8-by-8 grid. The character appears just as it was designed when printed in the two-color modes. But bits 2, 4, 6 and 8 are doubled in the four-color modes.

(most of these are not legible in the four-color modes.)

mands. Color Text automatically adjusts to the current and active page, mode, screen, color, etc.

The character definer utility was designed to be as self-explanatory as possible. Notice that no matter how you boot Color Text, the definer reboots it in the 16K mode. This also means you don't need to boot it before running the definer.

The purpose of the character definer is to create and modify characters to your own likes/needs. The menu has an option to save them and an option to save as loader. As a rule, when you are working on a character set, you should save them. Then, to actually use the character set, select "save as loader." You are asked for the name. This file will actually be Color Text, both program and character set. If you want to use the boot program to load it, you will have to save it with the name COLOR TEXT, or modify the boot program.

The menu also has an option to warm boot and cold boot. Warm booting simply terminates Color Text. A cold boot leaves your computer in the state it's in when you first turn it on.

If you select Design, you will first select the character to be modified. When selected, its image is brought up on a big PMODE0,1 screen. To alter it, move the blinking cursor with the arrow keys. Press the space bar to toggle the color of a block. Press ENTER when finished, or CLEAR to abort.

Here comes the trickiest thing there is to know about Color Text. When it prints the characters in a four-color mode, it only looks at (from left to right) the second, fourth, sixth and eighth bits. Your character set must be designed accordingly.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>255</td>
<td>TOOTHIAN SOFTWARE</td>
</tr>
<tr>
<td>255,255</td>
<td>SUBTRACT 10% FROM LIST PRICES THIS MONTH!</td>
</tr>
<tr>
<td>180 DATA 199,179,179,179,179,179,179,179,179,179,179,179</td>
<td>New version! Make multiple choice, matching, true/false, completion, short answer tests. Complete randomize function. Requires printer with underline ability. 32K ECB. $19.95</td>
</tr>
<tr>
<td>190 DATA 131,243,131,191,179,179,179,179,179,179,179,179</td>
<td>TEACHER PAK II</td>
</tr>
<tr>
<td>200 DATA 179,179,131,243,243,243,243,243,243,243,243,243</td>
<td>New version! Four programs. Weighted &amp; regular grading, seating charts, alphabetizing, and statistics. 16K ECB. $34.95. Will include Testem II for $47.95.</td>
</tr>
<tr>
<td>220 DATA 131,179,131,191,179,179,179,179,179,179,179,179</td>
<td>Computerized garden planning. 16K ECB. $19.95</td>
</tr>
<tr>
<td>260 DATA 131,187,179,191,179,179,179,179,179,179,179,179</td>
<td>Keep track of phone numbers, addresses, etc. Print address labels. Minimum 16K ECB. $19.95</td>
</tr>
<tr>
<td>270 DATA 7,179,135,179,179,7,255,255,199,179,191,191,191,191,191,255</td>
<td>INVENTORY</td>
</tr>
<tr>
<td>280 DATA 7,179,179,179,179,7,255,255,3,191,143,191,179,3,255,255,255</td>
<td>Simple home data base. Minimum 16K ECB. $19.95</td>
</tr>
<tr>
<td>290 DATA 3,191,143,191,179,3,255,255,255</td>
<td>Specify tape or disk. Pa. residents add 6%. Send check or money order - no cash - to:</td>
</tr>
</tbody>
</table>
Listing 2: PRGLOAD

10 PMODE, 1:PCLEAR1:CLEAR50,&H34
20 READA:IFA<>999THENPOKEX,A:X=X+1:GOTO20
30 LINEINPUT "PREPARE TO LOAD CHAR$ THEN PRESS ENTER";A$ 
40 LOADM "CHARS";LINEINPUT "PREPARE TO SAVE";A$
50 SAVEM "COLRTEXT",&H35,0,0,&H3FF,F,&H35,0,0
30,0,0
5

February 1987 THE RAINBOW 55
Challenges Await You In

The Second Rainbow Book Of

SIMULATIONS

Put your wits and skills to the test with 16 outstanding programs from the winners of our Second Simulation Contest. You'll encounter explosive action as the leader of the Rainbow City Bomb Squad. As the Master Train Dispatcher, the pressure is intense to avoid accidents and keep the trains on time. When all this activity seems too much, who ya gonna call? Ghostgetters, of course! Then it's off to CoCo's Bowling Alley for a little Monday night relaxation.

Plunge into real-life action with:

**Bush Pilot** — Danger lurks above the canopy of the dense African jungle

**Nereid Countdown** — Many different skills are needed to launch the massive Ezekial into orbit

**Stock Market** — Failure or fortune in the world of high finance

Vacation U.S.A. — On the trail of adventure through the American heartland

Project Theta — Alone in your fighter, you stand before Zygor's invasion fleet

Olympic Decathlon — Qualify in 10 grueling events

Our award-winning authors: Curtis Boyle, Peter Brandt, Audrey DeLisle, Bill English, Aryeh Glaberson, Floyd Keirnan, Ray Ligocki, Brian Malorano, Chris McKernan, Baron Quintana, Joel Robbins, Charles Santee, Randy Simpson, Bob Tyson, E.L. Vasser and Duane Wood.

All This For Only $9.95!

And for all the fun without the fuss — The Second Rainbow Simulations Tape or Disk

Save yourself hours of typing listings. Just load these great Simulations into your computer and run them. What could be easier?

The tape or disk is an adjunct and complement to the book. Even if you buy either the Second Rainbow Simulations Tape or Disk, you'll want and need the book for the introductory material and loading instructions.

**Tape Only $9.95 Disk Only $10.95**

Please send: □ The Second Rainbow Book Of Simulations for $9.95*
□ The Second Rainbow Simulations Tape $9.95
□ The Second Rainbow Simulations Disk $10.95

Name ________________________________________________________________
Address ______________________________________________________________
City ______________________________________ State ________ ZIP ________
□ My check in the amount of ________ is enclosed.*
Please charge to my: □ VISA □ MasterCard □ American Express
Account Number _________________________ Exp. Date _______________
Signature ____________________________________________________________

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

*Add $1.50 shipping and handling per book. Outside the U.S., add $4. Allow 6 to 8 weeks for delivery. Kentucky residents add 5% sales tax for book and tape. In order to hold down costs, we do not bill. U.S. currency only please.
Listing 3: BOOT

10 PCLEAR4:CLS
20 PRINT TAB(9);"* COLOR TEXT *
30 PRINT:PRINT "SELECT LOAD TYPE ...
40 X=0:RESTORE
50 READ A$:IF A$<"." THEN X=X+1
60 DATA 7 TOP OF 16K, TOP OF 32K, UP PER RAM,
100 A=VAL(INKEY$):IF A<1 OR A>X THEN 100
110 ON A GOTO 200,300,400
120 NEW
200 CLEAR 200, &H34FF:LOADM "COLR TEXT":EXEC:GOTO 120
300 CLEAR 200, &H74FF:LOADM "COLR TEXT", &H4000:EXEC:GOTO 120
400 CLEAR 200, &H7F00
405 READ A$:IF A<"." THEN 405
410 FOR X=&H7F,0,0 TO &H7F19:READ A$:A=VAL("&H"+A$):POKE X,A:NEXT
420 DATA 34,01,1A,5,8E,8,0,0,1,8E,FF,DE,A6,84,6F,21,A7,80,6F,20
,8C,FF,825,F3,35,82
430 EXEC &H7F,0,0:POKE &HFFF,0
440 LOADM "COLRTEXT", &HAB00:EXEC
450 CLEAR 200, &H7FFF
460 GOTO 120

9 F$=CHR$(254):E$=CHR$(255)
10 PMODE 4,1:SCREEN 1,1
20 PMODE 3,1:COLOR 0,1:CLS:COLOR 2,0
30 PRINT "* Color text - ",;COLOR 3,0:PRINT 
"* Character Define Module ";
40 PMODE 4,1
50 PRINT@128,"Select...
60 RESTORE:X=0:PRINT
70 READ A$:IF A<"." THEN X=X+1
80 DATA Design characters, save character set, save as loader, load character set, exit (also CLEAR),
90 Warm boot, Cold boot, Directory,
100 A$=INKEY$:IF A$=CHR$(12) THEN
110 IF A=6 THEN PRINT CHR$(27):;
120 EXEC &H827 ELSE IF A=7 THEN POK E &H71,0:EXEC &H827
130 IF A<>8 THEN 110 ELSE COLOR 0,1:CLS:SCREEN 1,0:DIR:
140 IF INKEY$="." THEN 100 ELSE 0
150 IF A=5 THEN COLOR 0,1:CLS:END
160 IF A=2 THEN GOSUB 200:SAVEM
170 IF A=3 THEN GOSUB 200:SAVEM
180 IF A=4 THEN GOSUB 200:LOADM
190 PMODE 4,1
200 'get and verify a file name
210 PRINT@48,0,"":LINEINPUT "FILE NAME =->";NM$,
220 IF NM$="" THEN SOUND 2,0,0,1:GOTO 220
230 IF INSTR(NM$,"/")=0 AND INST R(NM$,"." )=0 THEN NM$=NM$+"/BIN"
240 FOR X=1 TO LEN(NM$):A=ASC(MID$(NM$,X,1)):IF A>96 AND A<123 THEN MID$(NM$,X,1)=CHR$(A-32):A=A
-32
250 NEXT X:RETURN
500 IF INKEY$="." THEN 500 ELSE 500
510 'select a character
520
530 PMODE 4,1:SCREEN 1,1:COLOR 0,1:CLS:PRINT "Select a character ...
540 FOR X=32 TO 255:PRINT CHR$(X)
550 NEXT
Cycldraw demonstrates some of the best features of the new CoCo 3 — a high resolution screen with 16 colors and color text, a PALETTE command to change those colors at any time (you choose from 64 possible colors), a BUTTON function for easy access of the joystick buttons, an ON BRK GOTO (on break) command and an ON ERR GOTO (on error) command.

Cycldraw is a symmetrical drawing program. What you draw in one quadrant of the screen is duplicated in the other three screen quadrants (a kaleidoscope effect). Also the palette of colors is continuously changing ("color cycling") as you draw, demonstrating a fascinating feature of the new CoCo.

All you need to do is CLOAD "CYCLDRAW", use the right joystick and follow the instructions you see on your screen. Happy Cycling!

(If you have any questions, feel free to direct them to B. Matthews, 3917 Baxter Street, Nashville, TN 37216. Please enclose an SASE.)

Becky Matthews has a degree in music education from the University of Mississippi. She and her husband, David, have three CoCos and two CoCo cats.
The listing: CYCLDRAW

10 *** CIRCLE CYCLE DRAW ***
20 *** BY BECKY MATTHEWS ***
30 ON BRK GOTO 920
40 ON ERR GOTO 60
50 POKE 65497,0
60 'TITLE PAGE
70 HSCREEN 2
80 HCLS 8
90 HCOLOR 4,8
100 HPRINT (11,4)," CIRCLE CYCLE DRAW ",
110 ' SMALL CIRCLES
120 C=1
130 FORX=15TO315STEP14
140 C=C+2:IFC>15THENC=1
150 FORY=9TO182STEP173
160 HCIRCLE(X,Y),5,C
170 HPAINT(X,Y),C,C
180 NEXTY: SOUND X/2,1:NEXTX
190 ' MEDIUM CIRCLES
200 C=1
210 FORY=3TO16STEP2
220 C=C+2
230 FORX=1TO31STEP30
240 HCIRCLE(X,Y),10,C
250 HPAINT(X,Y),C,C
260 NEXTY: SOUND Y/2,1:NEXTY
270 ' LARGE CIRCLES
280 C=1
290 FORY=45TO18STEP49
300 C=C+2
310 FORX=45TO275STEP230
320 HCIRCLE(X,Y),20,C
330 HPAINT(X,Y),C,C
340 NEXTY: SOUND Y/2,1:NEXTY
350 ' MENU
360 HPRINT (10,11)," CHOOSE CIRCLE SIZE"
370 HPRINT (14,14)," 1 - SMALL ",
380 HPRINT (14,15)," 2 - MEDIUM ",
390 HPRINT (14,16)," 3 - LARGE ",

---

Formmaker

**clean paperwork for business**

"It will give the small or home business professional-looking forms and effortless, errorless totals, accounting for taxes, discounts, shipping and deposits."

The RAINBOW, May 1986

- Menu driven
- Customize for your company
- On screen instructions
- Creates: Invoice, quote, purchase order, mail order, receipt, letter
- Printer customization
- And much, much more
- "You have to look good to the customer . . . This program helps . . . by providing neat, well-prepared forms . . . ."

The RAINBOW, May 1986

**SUPER TUTOR**

**Makes learning so much FUN . . . . . . . . . that kids think it's a game!**

Letter and number recognition. Ages 2 to 6

- Log on to the super, learn the alphabet, numbers and early vocabulary
- "If you are looking for a program to teach young children the alphabet, numbers and early vocabulary, SUPER TUTOR may fit the bill."

The RAINBOW, June 1986

Send for more information:

**Challenger Software**

42 4th Street
Pennsburg, PA 18073
Call (215) 679-8792 (Evenings)
410 A$=INKEY$:IF A$="" THEN 410
420 A=VAL(A$)
430 IF A<1 OR A>3 THEN 440
440 'SET CIRCLE RADIUS
450 R=A*5
460 'INSTRUCTION PAGE
470 HCLS4
480 HCOLOR 8,4
490 HPRINT (13,2),"INSTRUCTIONS"
500 HPRINT (2,7),"USE THE RIGHT JOYSTICK TO DRAW."
510 HPRINT (2,10),"PRESS JOYSTICK K BUTTON TO CLEAR SCREEN."
520 HPRINT (2,12),"(RIGHT BUTTON ON NEW JOYSTICK)"
530 HPRINT (2,14),"PRESS SPACEBAR TO PAUSE DRAWING AND"
540 HPRINT (2,15),"SEE FAST CYCLE."
550 HPRINT (2,18),"PRESS SPACEBAR AGAIN TO RESUME."
560 HPRINT (7,22),"(PRESS ANY KEY TO START)"
570 A$=INKEY$:IF A$="" THEN 570
580 X=148:Y=96
590 T=1:C=1
600 'SET BACKGROUND TO BLACK PALETTE RGB:
610 PALETTE 0,0
620 HCLS4
630 'BUTTON CHECK
640 IF BUTTON(0)=1 THEN 620
650 'SPACEBAR CHECK
660 A$=INKEY$:IF A$=CHR$(32) GOSUB 1220
670 'GOSUB ADVANCE PALETTE
680 GOSUB 850
690 'JOYSTICK CHECK
700 H=JOYSTICK(0)
710 IF H>41 THEN X=X+4
720 IF H<20 THEN X=X-4
730 IF X<10 THEN X=10
740 IF X>310 THEN X=310
750 V=JOYSTICK(1)
760 IF V>41 THEN Y=Y+4
770 IF V<20 THEN Y=Y-4
780 IF Y>182 THEN Y=182
790 IF Y<10 THEN Y=10
800 IF H<160 AND V<96 THEN 980
810 IF H>160 AND V<96 THEN 1940
820 IF H<160 AND V>96 THEN 1100
830 IF H>160 AND V>96 THEN 1160
840 GOTO 630
850 'ADVANCE PALETTE SUB
860 FOR P=1 TO 15
870 PALETTE P,T+P
880 NEXT
890 T=T+5:IFT>49 THEN T=1
900 C=C+1:IFC>15 THEN C=1
910 RETURN
920 '*END
930 PALETTE RGB:CLS
940 PRINT"BYE FOR NOW."
950 POKE65496,0
960 FOR N=1 TO 1:PAUSE 5:SOUND N,1:
970 NEXT
980 'QUADRANT 1 SUB
990 HCIRCLE(X,Y),R,C:HPAINT(X,Y),C,C
1000 HCIRCLE(320-X,Y),R,C:HPAINT(320-X,Y),C,C
1010 HCIRCLE(X,192-Y),R,C:HPAINT(X,192-Y),C,C
1020 HCIRCLE(320-X,192-Y),R,C:HPAINT(320-X,192-Y),C,C
1030 GOTO6630
1040 'QUADRANT 2 SUB
1050 HCIRCLE(X,Y),R,C:HPAINT(X,Y),C,C
1060 HCIRCLE(320-X,Y),R,C:HPAINT(320-X,Y),C,C
1070 HCIRCLE(X,192-Y),R,C:HPAINT(X,192-Y),C,C
1080 HCIRCLE(320-X,192-Y),R,C:HPAINT(320-X,192-Y),C,C
1090 GOTO6630
1100 'QUADRANT 3 SUB
1110 HCIRCLE(X,Y),R,C:HPAINT(X,Y),C,C
1120 HCIRCLE(X,192-Y),R,C:HPAINT(X,192-Y),C,C
1130 HCIRCLE(320-X,192-Y),R,C:HPAINT(320-X,192-Y),C,C
1140 HCIRCLE(320-X,Y),R,C:HPAINT(320-X,Y),C,C
1150 GOTO6630
1160 'QUADRANT 4 SUB
1170 HCIRCLE(X,Y),R,C:HPAINT(X,Y),C,C
1180 HCIRCLE(X,192-Y),R,C:HPAINT(X,192-Y),R,C
1190 HCIRCLE(320-X,Y),R,C:HPAINT(320-X,Y),C,C
1200 HCIRCLE(320-X,192-Y),R,C:HPAINT(320-X,192-Y),C,C
1210 GOTO6630
1220 'CYCLE ONLY SUB
1230 FOR P = 1 TO 15
1240 PALETTE P,T+P
1250 NEXT
1260 T=T+4:IFT>49 THEN T=1
1270 'SPACEBAR CHECK
1280 IF INKEY$="" THEN 1230
1290 RETURN
Return of Junior’s Revenge

The best graphics you’ve ever seen on a Color Computer 3! Junior (with your help) has to make it through all sorts of obstacles to rescue his father from the mean zookeeper. You must get him through the swamp and the jungle, guide him up vines, and help him avoid the Chambers and more before he finds his father, the King. This is a great arcade and adventure that really takes advantage of the graphic capabilities with 16 colors and 320 x 192 graphics. It’s superb on a composite color monitor, RGB analog monitor, or TV. Also works great with 512K.

Returns 128K, CoCo3, Disk $34.95

Color Scribe III

Take advantage of the power of your Color Computer 3 for all of your word processing and editing needs. Have it your way with either a 40, 64, or 80 column display on either a green, amber, blue, or monochrome screen, and reverse video! A huge buffer of over 64K is available. No more guessing how much buffer space is left as a command tells you how many bytes are available. There are over 20 line editing commands. You can even move a block of text from one file to another. Save keystrokes with macro commands. Includes extensive text formatting, pagination with headers and footers, left and right justification, etc. Color Scribe III is a must for anyone who is serious about word processing.

Requires 128K, CoCo3, Disk $49.95

The Magic of Zanth

Dragons . . . Demons . . . Griffins . . . Centaurs . . . kind of stirs the imagination, doesn’t it? You have been sent on a quest to discover the source of the magic in the Land of Zanth. Watch the 16 color graphics come alive with over 2 dozen hi-res animated screens. There are 4 voice music and sound effects, and speech (when used with the Tandy SSC pak). The graphics look great on either a composite color monitor, RGB analog monitor, or TV. It takes advantage of 512K if available. Excellent graphics, and an excellent game.

Requires 128K, CoCo3, Disk $34.95 (SSC pak optional)

Call or Write to:

COMPUTERWARE

Box 668 • Encinitas, CA • 92024

(619) 436-3512

Name ____________________________

Address __________________________

City __________________ State _______ Zip _______

Yes! Send me your FREE catalog! ____________

CoCo ____________

VISA ____________ MasterCard ____________

Card # _______ Exp. _______

Signature _________________________

Item Format Price

Shipping ____________ 6% Calif. Sales Tax

Surface — $2 minimum ____________ COD Add $5

2% for orders over $100 ____________ Shipping* —

Air or Canada — $5 minimum. ____________ TOTAL

5% for orders over $100 ____________

Checks are delayed for bank clearance

Ask for our FREE CoCo Catalog!
The Complete Rainbow Guide to OS-9
The book that demystifies the state-of-the-art operating system for the Tandy Color Computer. Authors Dale L. Puckett and Peter Dibble show you how to take advantage of OS-9's multitasking and multi-user features, and the capability of redirecting input and output commands at will. An easy-to-read, step-by-step guide packed with hints and tips, tutorials and free software in the form of program listings.
Book $19.95
Disk Package $31 (2 disks, book not included)

The Second Rainbow Book of Adventures
This sequel features 24 of the most challenging Adventure games ever compiled. Meet the Beatles and battle the Blue Meanies, find a hidden fortune, or win the heart of a beautiful and mysterious princess. Experience the thrills and chills of the most rugged Adventurer without ever leaving your seat. Ring Quest, Secret Agent Man, Dark Castle, Curse of Karos, Island and more!
Book $13.95, Tape $13.95

The Second Rainbow Book of Simulations
The 16 winning programs from our second Simulation contest. Fly through the dense African jungle as a bush pilot, bull your way down Wall Street, lead the Rainbow City bomb squad, or try your hand at Olympic events. Test your skills and talents.
Book $9.95, Tape $9.95, Disk $10.95

Coming Soon: The Rainbow Introductory Guide to Statistics

I want to start my own Rainbow Bookshelf!

Please send me:
☐ The Rainbow Book of Simulations $9.95
☐ Rainbow Simulations Tape $9.95
☐ The Second Rainbow Book of Simulations $9.95
☐ Second Rainbow Simulations Tape $9.95
☐ Second Rainbow Simulations Disk $10.95
☐ The Complete Rainbow Guide to OS-9 (book only) $19.95
☐ Rainbow Guide to OS-9 Disk Package (2 disks) $31.00
☐ The Rainbow Book of Adventures (first) $3.50, Tape $7.95
☐ Rainbow Adventures Tape (first) $3.50, Tape $7.95
☐ The Second Rainbow Book of Adventures $13.95
☐ Second Rainbow Adventures Tape $13.95

Add $1.50 per book Shipping and Handling in U.S.
Outside U.S., add $4.00 per book
Kentucky residents add 5% sales tax

Total

Name ____________________________
Address _________________________
City _____________________________
State __________ ZIP __________

☐ Payment Enclosed, or ☐ Charge to:
☐ VISA ☐ MasterCard ☐ American Express

Account Number __________________
Card Expiration Date ____________
Signature _______________________

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.

Please note: The books 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. OS-9 is a registered trademark of the Microware Systems Corporation.

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.
Many studies in the past have looked at the numbers of computers in schools. In this column, we have reported the growing number of machines available to students and teachers. With such unusual growth, most people now accept that computers have an important role to play in schools. The type of role, however, will depend in large part on how teachers use computers and how teachers view the effectiveness of computers.

There has not been much study of how teachers view computer use in schools, or of teacher attitudes about computers. One study, however, was conducted by H.J. Baker and reported by the U.S. Department of Education, Center for Educational Statistics. Baker’s study was based on 2,700 questionnaires sent to teachers in all grade levels throughout the country. Questionnaires were returned by 80 percent of the teachers (2,160) — a return rate that is very impressive for mailed surveys.

In addition to asking how the teachers use computers, eight questions were asked about teacher attitudes toward computers. The questions, along with the percent of each response, are presented in the table.

Most teachers (82 percent either agreed or strongly agreed) felt that computers can help teachers teach more effectively. Thirteen percent had no opinion about the question. This indicates fairly strong support for educational uses of computers by teachers, even by non-users. Just considering those who provided an opinion (eliminating the “No Opinion” group), about 95 percent agreed or strongly agreed with the statement.

Since any educational activity is dependent on teachers, this support is crucial for computer use in schools. If teachers do not support using machines for educational purposes, then any efforts by administrators will collapse. A potential positive teacher attitude for classroom computers may also be demonstrated by the second question about disruption to classes. Thirteen percent of the teachers thought having one or two students working on a computer would disrupt the rest of the class, while 63 percent thought it would not be disruptive. Nearly one-fourth (24 percent) had no opinion about disruption.

One possible explanation for the large number of “No Opinion” responses is the use of computer labs in schools. Many teachers who have students use computers do so in a lab situation; computers are not available in classrooms. Thus, some teachers may have had limited experience with computers.

### Table 1: Teacher Attitudes About Computers

<table>
<thead>
<tr>
<th>Item</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers can help teachers teach more effectively.</td>
<td>28</td>
<td>54</td>
<td>4</td>
<td>*</td>
<td>13</td>
</tr>
<tr>
<td>Having one or two students work at a computer is seriously disruptive to the rest of my classroom activity.</td>
<td>2</td>
<td>11</td>
<td>40</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>I want more training in computers.</td>
<td>46</td>
<td>44</td>
<td>3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>The software available to me is quite good, instructionally.</td>
<td>5</td>
<td>30</td>
<td>10</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>I do not feel comfortable about working with computers.</td>
<td>8</td>
<td>23</td>
<td>31</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Previewing software should be done by teachers before purchase.</td>
<td>46</td>
<td>44</td>
<td>1</td>
<td>*</td>
<td>9</td>
</tr>
<tr>
<td>Integrating computer time with other subject areas is a fairly simple matter.</td>
<td>4</td>
<td>28</td>
<td>25</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>The hardware, or equipment, is difficult to use.</td>
<td>1</td>
<td>7</td>
<td>37</td>
<td>14</td>
<td>41</td>
</tr>
</tbody>
</table>

---

* SA = Strongly Agree  
  A = Agree  
  D = Disagree  
  SD = Strongly Disagree  
  NO = No Opinion  
  * = Less than 1 percent

---

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.
never have been in a position of having students work on a computer while something else is going on in the classroom.

In one sense, the question of disruption is not very powerful for measuring teacher attitudes about support for computer use in schools. I used the term "potential positive teacher attitude," but another factor is involved besides teacher acceptance of computers — teacher style. Some teachers want all students in the class to be doing the same work at the same time. Other teachers encourage, even thrive, on a variety of activities in the same physical space at the same time. It is possible that some of the "all the same" teachers have a very positive attitude toward educational use of computers, but do not want a few students away from the lesson and working on computers. It is also possible that some of the "different activities at the same time" teachers do not think any disruption would occur in their class if a few students were working on the machines, but do not have a positive attitude toward computers. Thus, it is difficult (maybe impossible) to gauge teacher attitudes by this question.

An overwhelming majority of teachers (90 percent) said they want more computer training. Four percent said they do not want more training, and 7 percent had no opinion on the question.

It is possible, of course, that the 4 percent of teachers not wanting more training support computer use in schools, but feel they already know enough. While possible, this is unlikely. It is much more probable that this 4 percent represent teachers who feel no need for computer use in their classes. One of the features of computer knowledge is that mastery is never totally achieved. There is always additional software to learn, extra "helpful hints" to file away, and even new machines to examine.

The next survey question, about quality of software, does not appear to be a very productive item. Nearly half of the teachers (49 percent) did not express an opinion about the question. Of those who did have an opinion about software, about twice as many (35 percent compared to 17 percent) thought available software is instructionally good.

It seems to me that teachers can fall into three broad categories: those who have examined almost no educational software; those who have examined a little bit of software; and those who are familiar with a lot of software. The question, as stated, is somewhat inappropriate for teachers with very limited or very great experience with software. Those who have very limited experience with software cannot really answer the question. Teachers who have examined a great deal of software have probably seen some very bad materials and some very good materials; it would be difficult to respond to the question.

About half of the teachers surveyed (51 percent) said they feel comfortable working with computers. Nearly one-third (31 percent) said they do not feel comfortable. It is interesting to note that whether teachers feel comfortable with computers or not, most still want more training. This question is probably the single most changeable item on the whole survey. Teachers are continually receiving in-service instruction on computers, sponsored by school districts, regional centers, computer consortia and state education agencies. Each month, a few more teachers will feel comfortable working with computers. Naturally, there will always be a few teachers who are not comfortable with computers and who will have minimal use of the machines in classes. But, that number will decrease with each successive year.

Nearly all respondents to the survey felt that teachers should preview software before purchase. I wonder why 9 percent of teachers had no opinion on this item and 1 percent disagreed. Could they be thinking of review by school people other than teachers, such as administrators, parents or students?

If you want to start a spirited discussion in a teachers' lounge, make the comment, "Integrating computer time with other subject areas is a fairly simple matter." About one-third of the respondents to the survey (32 percent) agreed with the statement; about one-third (33 percent) disagreed; and about one-third (34 percent) had no opinion. The degree of ease or difficulty of integrating computers with other subjects may be related to several factors: particular subject matter taught, age and abilities of students, degree of knowledge and creativity of teachers, and quality of available software.

About half of the teachers (51 percent) said the equipment is not difficult to use; only 8 percent said it is. This leaves 41 percent without an opinion. Are the "No Opinion" people those who have not used computers, or those who realize some equipment is easy to use and some is hard to use?

In conclusion, it seems there are some generalizations from this study that would be worthwhile for educators to consider. First, in-service training about computers is still important for teachers. A small amount of that training should be for operating equipment. The bulk of the training should concentrate on two major topics: suggestions for integration of computers into subject matter areas and selection of educational software (possibly including sessions of "what makes a good software package").

For more information about this study, contact Janice Ancarrow at the Center for Educational Statistics, 555 New Jersey Avenue, N.W., Washington, DC 20208. If you want to communicate with me about the study, please send your thoughts to 829 Evergreen, Chatham, IL 62629.

One-Liner Contest Winner

This one-liner will convert any positive, two-byte integer (0-65535) into its binary form. If the number entered is negative, out of range or not an integer, the computer will return INVALID.

The listing:

```
10 CLEAR: INPUT "DECIMAL #":Y: FOR X =1 TO 0 STEP -1: IF Y > = Z+INT(2^X) THEN Z=Z+INT(2^X): A$=A$+"1": NEXT X: IF Y < 0 THEN PRINT "INVALID": GOTO1: ELSE PRINT $A$: GOTO1
```

Gregory Satir
Fairfield, CT

>65535ORY<ABS(INT(Y)) THENPRINT"INVALID":GOTO1: ELSEPRINTA$: GOTO1: IF Y<ABS(INT(Y)) THENPRINT"INVALID":GOTO1"$ELEAS=ASCII+"0"$:NEXTX: IF Y > 65535 OR Y<ABS(INT(Y)) THENPRINT"INVALID":GOTO1: ELSEPRINTA$: GOTO1

(For this winning one-liner contest entry, the author has been sent copies of both The Second Rainbow Book of Simulations and its companion The Second Rainbow Simulations Tape.)
GREAT COCO III PRODUCTS

SECRETS REVEALED
An introduction to the Color Computer III!!!
Compares differences between the CoCo II/III and the NEW CoCo III.

C III GRAPHICS
It’s here! A drawing program for the CoCo III using the new Enhanced graphic features. Requires
128K CoCo III w/Disk
Analog RGB monitor recommended.

Buy ‘em both for $29.95

128K CoCo III w/Disk
Uses 320x192 graphics
16 of any 64 colors
Save & Load 32K screens
See Dec’86 review

$19.95

ELITE WORD-80
THE THIRD GENERATION CoCo Word Processor is here! All the power of ELITEWORD plus 40/80 column
display for the CoCo III. AVAILABLE ONLY FROM SPECTRUM! $79.95
ELITEWORD-80 & ELITESPELL $99.95

FKEYS III - Add 20 PRE-DEFINED functions to your CoCo III using THE CTL, F1 and F2 KEYS!! $24.95

512K UPGRADE
IT'S HERE! THE FIRST 512K UPGRADE FOR THE CoCo III. EASY INSTALLATION WITH A SUPERIOR DESIGN & AVAILABLE NOW. USES (16) PRIME 256K DRAMS - $139.95
512K UPGRADE w/o CHIPS - $99.95
512K RAMDISK - IT'S LIKE ADDING TWO (2) MORE DISK DRIVES TO YOUR CoCo III FOR ONLY $24.95

VIDEO DIGITIZER III
25 FRAMES PER SECOND
The fastest CoCo Video Digitizer ever (3 Xs faster than DS-69A!!)
Now available for the CoCo III. Req. 128K CoCo III Disk (w/40 pin "Y" cable or Y-Box) $149.95

CoCo III MULTIPAK PAL CHIP $19.95
CoCo III SERVICE MANUAL $39.95

RGB ANALOG MONITOR
Our monitor is much more versatile than the TANDY CM-8! Takes RGB Analog, Color composite & RGB TTL video. Unlike the CM-8, PMODE 4 artifact colors don’t show up BLACK & WHITE (thru the Color Composite input) $299.95

CoCo III MONOCHROME DRIVER $39.95*
512K CoCo III COMPUTER $299.95

*Why spend $300 just for Hi-Res text on your CoCo III when you can purchase Amber monitors for under $100 ?? ??

All orders plus $3.00 S/H (Foreign $5.00) - COD add $2.00 extra - NYS Residents add Sales Tax

SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414
COCO HOT LINE 718-835-1344
SIG Changes Include New Selections, New Sections

By Cray Augsburg
Rainbow CoCo SIGop

Several changes have taken place on the CoCo SIG. First, the subscriptions menu has been changed to “Rainbow Magazine Services.” To enter this area, type R at the CoCo SIG prompt. To make things more logical, the “Order RAINBOW-fest Tickets” and “Address Change” selections have been moved from the Questions & Feedback section to this new section. The new section includes a selection, “Ask The Experts,” for sending mail to Marty Goodman, Dan Downard or Richard Esposito. Just select the person you want the technical question to go to and then fill in the blanks. You will be asked for your name and address and then be given plenty of space to ask your question. We believe this will help us get your questions answered in a timely manner.

Another change has come about that has somewhat altered the SIG structure as we knew it before. To better handle the increasing interest in OS-9, we decided to create a new SIG specifically pertaining to the OS-9 operating system. While designed for CoCo OS-9 users, it can be used by OS-9 68K users, too, and even has a database topic set aside for such computers. This new area can be reached by typing DS at the CoCo SIG prompt. Once in “OS-9 Online,” you will be greeted with the menu. This new SIG includes a Forum and a Mail section, and most importantly, its own database area. This database area is separate from the normal CoCo SIG database area. This will make it easy for those interested in OS-9, since the database area will have 16 topics corresponding to more specific aspects of OS-9.

Clearing Up Telnet
Several people have said they were

DATABASE REPORT

To further assist us with providing our membership with prompt, expert advice, we have enlarged our staff complement of OS-9 experts. Greg Law (GREGL) now joins Dale Lear (DALELEAR) and Rick Adams (RICKADAMS) as part of our Delphi OS-9 staff. Greg has many years of experience with OS-9, and is a C and 6809 assembly language programmer as well. Welcome, Greg!

We have quite a treat in store for you OS-9 Level I users. Mike Dziedzic (MJD) has sent us a set of drivers for the 80-column screen of the CoCo 3, to be used under OS-9 Level I Version 2.0. Along with the addition of material from Kevin Darling (K DARLING), this should be a very popular set of files. These can be found in the OS-9 section of the CoCo SIG database or, if “OS-9 Online” is open by the time you read this, in the Drivers section of this new OS-9 SIG.

We haven’t forgotten all you RS-DOS users, though. For all CoCo RS-DOS users we have a treat in store: Greg Miller (GREGMILLER) who, with Erik Gavriluk (ERIKGAV), brought us McPaint, has kindly uploaded his CoCo terminal program Greg-E-Term. GETerm runs on all models of CoCo. On the CoCo 1 and 2 it supports either the bit-banger or the hardware RS-232 pak.

It offers screen display options of 32, 51, 64, or 85 columns, or support for the Word-Pak II (and with soon-to-be posted minor patches, support for the Word-Pak I and Word-Pak- RS as well) and the double-density, 80-column board. It works perfectly for Xmodem up- and downloading at 1200 baud through the bit-banger port. Of course, its terminal mode function in full duplex at 1200 baud through the bit-banger is less than perfect, but it is usable.

GETerm comes with a configure program, a help file, and two documentation files that total over 540K of information on the program. This is a major new “guiltware” terminal program entry into the CoCo world. Believe me, this is a must get program. It is well worth the time needed to download all 50K or so worth of material in the GETerm group. GETerm is to be found in the Data Communications section of the CoCo SIG. The CoCo Community owes Greg Miller a big thank you.

Greg’s partner, Erik, has not been loafing either. He has sent us a version of the Macintosh Picture Converter for the CoCo 3. This program allows you to download a Macintosh picture file from Macintosh-oriented CBS systems or a friend with a Mac, and then view it on the CoCo 3. The CoCo 3 version of the Mac converter displays the full horizontal width of the Mac image, though of course it has to scroll through the full vertical height of the larger Mac pictures.
SUPER CHIP -SALE- ...
6821 Standard PIA $34.95
Basic ROM 1.1 Chip $34.95
6847 VDC $34.95
6809E CPU Chip $34.95
CoCo III Multipak - "NEW" PAL chip (For Gray and White 26-3024 models ONLY) $19.95
Orig SAM Chip (6883) $39.95
Basic ROM 1.3 (Newest version) $19.95
Disk Drive Cable (34pin - 34pin) $19.95
Modem Cable - 6ft (DB25-D825) $19.95
Joystick/Mouse 10' Ext Cable $19.95
Dual Disk Drive Cable (3-34pin) $24.95
CoCo III Analog RGB monitor cable (Specify manufacturer and model number) $24.95
"15" Multi-Pak/ROM Pak Extender - Move your Multi-ROM Paks further away $27.95
40 Pin "Y" Cable - Hook up any three (3) Voice/Pak, Word Pak, CoCo Max, etc. $29.95
Triple RS232 Switcher - Now easily select any one of three RS232 peripherals $39.95
40 pin "Y" Cable - Hook up any three (3) Voice/Word/RS232/Digitizer PAKs $39.95

COCO LIBRARY 
New 200 MORE Pokes, Peeks 'N Execs $9.95
Basic Programming Tricks Revealed $14.95
CoCo Memory Map $16.95
500 Pokes, Peeks 'N Execs $16.95
Basic OS Tour Guide $19.95
New! New! CoCo II Service Manual (Specify CoCo II Catalogue model number) $39.95
Official MICROVAX OS9 Manual Set $49.95
The Complete Rainbow Guide to OS9 $49.95
Guide with Two Disk Package of demo programs $49.95
Color/Extended/Disk Basic Unraveled - A completely commented disassembly of the CoCo ROMS! Comprehensive (3) Book Set - Save $101 $49.95

COCO CABLES AND ...
Printer/Modem 15' Extender Cable $14.95
Tired of unplugging devices from your RS232 port? Try a RS232 "Y" Cable $19.95
Disk Drive Cable (34pin - 34pin) $19.95
Modem Cable - 6ft (DB25-D825) $19.95
Joystick/Mouse 10' Ext Cable $19.95
Dual Disk Drive Cable (3-34pin) $24.95
CoCo III Analog RGB monitor cable (Specify manufacturer and model number) $24.95
"15" Multi-Pak/ROM Pak Extender - Move your Multi-ROM Paks further away $27.95
40 Pin Dual "Y" Cable - Hook up a Disk with a Voice Pak, Word Pak, CoCo Max, etc. $29.95
Triple RS232 Switcher - Now easily select any one of three RS232 peripherals $39.95
40 Pin Triple "Y" Cable - Hook up any three (3) Voice/Word/RS232/Digitizer PAKs $39.95

OTHER GOOD STUFF ...
C-10 tapes in any quantity .49 cents
5 1/4" Diskettes, any quantity .79 cents
OS-9 Quick Reference Guide $3.95
RomPak w/Blank PC Board 27xx series $9.95
Video Clear - This cable will reduce TV interference created by CoCo! $19.95
The Magic Box - Load Mod I/III Basic program tapes into the CoCo $24.95
DOS Switcher - Select from any two DOSs (Disk 1.0, 1.1, JDOS) in a J&M disk controller $29.95
Orig CoCo II "P" Rev motherboard. Includes all chips (SAM, CPU, PIA's, VDG) except RAM and Ext Basic 1 Fantastic source for Spare Parts! $39.95
256K RAM Chips (Set of 8) $39.95
HUL-57 Keyboard - CoCo III version! Comes complete with special FREE Function Key Software $39.95
HBS Controller w/1.1 ROM ($50) $79.95
Super Controller - Up to 4 DOSs by a POKE $99.95
1200 baud Modem (Hayes compatible) Auto-dial/answer $139.95
Includes Modem cable (4pin DB25) $19.95
Amdek Drive System with controller $239.95
Magnavox 8515 RGB Analog Monitor $349.95

MORE GOOD STUFF ...
WICO Adapter - Hookup 2 Atari type joysticks $19.95
CoCo Keybd - Low profile, fits all CoCo IIs & "Fs" $39.95 - NOW $19.95, D/E CoCo I adapter $12.95
WICO Trackball - Regularly $69.95, Now only $24.95
Universal Video Drvr - All monitors & CoCos $29.95
(2) Chip 64K Upgrade - 26-3134 A/B CoCo II $29.95
28 pin Ext Basic - 26-3134 A/B CoCo II $34.95
Computize "Y" Box - Better than a Y cable $39.95
KAMELEX: 64K COLOR COMPUTER III $199.95

HUL-57 Keyboard - CoCo III version! Comes complete with special FREE Function Key Software $39.95
HBS Controller w/1.1 ROM ($50) $79.95
Super Controller - Up to 4 DOSs by a POKE $99.95
1200 baud Modem (Hayes compatible) Auto-dial/answer $139.95
Requires Modem cable (4pin DB25) $19.95
Amdek Drive System with controller $239.95
Magnavox 8515 RGB Analog Monitor $349.95

SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414

COCO HOT LINE
718-835-1344
unable to log onto Delphi at eight bits, no parity and one stop bit. After checking into the matter, we discovered some features of Telenet that should help. If you are accessing at 300 or 1200 baud, when a connection is made, press ENTER, then type D and press ENTER again. Note that the ‘D’ must be upper-case. Then proceed to log on as usual. If you are accessing Delphi at 2400 baud, when a connection is made, type @D and press ENTER. Again, the ‘D’ must be upper-case. As an aside, if you are using a terminal package that features VT-100 emulation, you can type @1 (uppercase ‘D’) and press ENTER at the “Terminal=” prompt. This will tell Telenet you want to use VT-100 emulation.

More on Settings

The Xmodem settings area (in the Settings area of your Workspace) lets you set four different parameters regarding how you want the system to handle Xmodem file transfers. They are “Error Check Mode,” “Last Block Handling,” “Retry Count” and “Timeout Period.”

Two types of Xmodem error checking are available on Delphi: Checksum and CRC (Cyclic Redundancy Check). Checksum error checking has been around for a long time and is the most common method, so any terminal program that supports Xmodem will support this method of error checking. Because of this, Checksum is the default error-checking method on Delphi. However, CRC error checking is considerably more accurate. If your terminal program happens to support this, by all means use it. In any event, the error-checking selection you choose only affects uploading. For downloading, Delphi automatically adjusts itself to the mode requested by your terminal package.

The “Last Block Handling” option is of little consequence to most users. It lets you set how the last block of an Xmodem text download is handled by the system. In the “Normal Handling” mode, which is the default, the last block is padded with null characters to fill it out to a standard 128-byte Xmodem block and a CONTROL-Z is sent to close the file.

Two other methods for handling the last block are available: “Atari Mode,” which is obviously for users of an Atari microcomputer, and a “No CONTROL-Z” mode for users of certain Apple computers.

Of more direct importance to users of the CoCo SIG are the “Retry Count” and “Timeout Period” Xmodem settings. The Retry Count is the number of times the system tries to recover from

The Macintosh Picture Converter for the CoCo 3 can be found either in the CoCo 3 News section or in the Graphics database.

Art Flexser (ARTFLEXSER) has sent us patches for modifying Colorcom/E to work on the CoCo 3. These will be found either in the CoCo 3 News section or in the Data Communications section of the CoCo SIG.

Why the uncertainty on my part about where to find some of these files? By the time you read this, we will be taking apart our CoCo 3 News and Information topic area and moving most of the files in it to the other topic areas on the CoCo SIG database. As we move each file, if it is a CoCo 3-specific file, we will flag it with (“C3”) in the group name title, and will give it a keyword of C3, to allow you to scan the other databases to look for CoCo 3-specific files. This change is being implemented during December and January, and should be completed by the time you read these words.

In the CoCo 3 News and Information database (or, more likely, in other appropriate databases by the time you read this), we have from Steve Bjork (6809ER), NewBoot, a program to allow owners of Ghana Bwana, Desert Rider and One on One the ability to fix CoCo 3-incompatibility problems in these games, and manipulate the color set. Jim Shoop (BAZAR) has provided a patch for some versions of VIP Writer to make it run on the CoCo 3. Bob Wharton (BOBWHAR­TON) sent us a color-bar utility and an X­MAS newsletter for the CoCo 3, and Kevin Darling has sent us a text file with yet more information on the working of the GIME chip, including a full pin-out of it. Bill Jackson (BILLJACKSON) provided a printer spooler for the CoCo 3, and Damon Hill (DWHILL) has sent us an interesting Microware press release. Frank Hogg (FROGG) of Frank Hogg Lab has also given us a text file telling us of his company’s plans to support the CoCo 3 under OS-9 Level II. Loren Howell (XENOS) has sent us a CGP-220 scan dump program. He also has given us a CoCo 3 drawing utility called hHDOODLE. Roger Bouchard (HARBIE), our official CoCo 3 BASIC Bug Finder and Swatter, has sent us an update to his previous file of CoCo 3 BASIC bugs and fixes for them. Michael Fischer (MIKE88) has given us some “Fun Pokes” for the CoCo 3, and Steve Macri (DRACMAN) has sent us his Kellybook program. Gene Loefer (GLOEFER) has given us a RGB palette utility. Mike Dziedzic has presented us with a real tour de force: An ML program that displays all 64 RGB palette colors on the CoCo 3 screen at once (using the same sneaky trick that Rick Adams used in his article in RAINBOW). Doug Masten (DMASTEN) has sent us a lower case utility. Al Gengler (AGJ) has sent us a utility for calculating HBUFFER sizes. Andrew Ellinor (CROPPER) has sent us C3 Stari, containing some start-up pokes for the CoCo 3 BASIC. Derrick Kardos (DTG) has also sent us some CoCo BASIC programs.

Finally, in this area (or in the Hardware Hacking area), I have uploaded for hardware hackers a fascinating file that contains a complete description of exactly what goes on inside the new Tandy PAL chip for the older multipacks. Bob Lentz (president of the Microworks, makers of Macro 80C Assembler and the DS-69 and DS-69A digitizer for the CoCo) “read” that PAL chip, and has provided us hackers with invaluable information on just what it does.

As stated above, it is likely that all the material currently in the OS-9 section of the CoCo SIG will be moved to OS9 Online by the time you read this. So you may have to look around there in an appropriate topic section to find the following new material. As I write this, the following new material has arrived in our OS-9 area: Kevin Darling has sent us an “SCF Editor Plus.” Rick Adams, one of our staff and author of the famous MDND command for OS-9 on the CoCo 3, has gone one better and given us a COLOR function to change the text colors on the CoCo 3. Mark Sunderlin (MEGABYTE) has sent us a mammoth amount of material on his favorite error-checking/error­correcting protocol, Kermit. This includes a Kermit program for the CoCo under OS-9, and complete tech specs on the Kermit protocol. Dan Connolly (CONNOLLY) has provided a grouping of files that includes instructions on modifying the hardware of some Word-Pak I’s and II’s to allow them to have Word-Pak RS moved to the same address as that of the Word-Pak RS, thereby making them compatible with the CoCo 3 Multipak. He also provides driver software for the the Word-Pak in this group. Ronald Cole (RONALDCOLE) has sent us a fix for the OS-9 Level I Version 2 clock module.

In the Utilities section of the CoCo SIG, Paul K. Ward (PKW) has sent us a very professional review of relational database programs, a field he has considerable expertise in. Kenneth L. Wuelzer (WUELZERK) has sent us an update to his amazing K015 editor, that edits RS­DOS, MS-DOS, and Flex disks. Christopher Ruk (DUSEL) has sent us a disk index program. Jim Zito (JIMZ) and Steve Fabiszak (SIFRAF) have also sent us utilities.

In the Graphics database, Greg Miller has sent us an Atari ST picture converter, that allows a CoCo to download and
MULTI-PAK CRAK
Save ROMPAKS to your 64K Disk system using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKS now by keeping all your PAK software on disk. Includes POKEs for "PROBLEM" ROMPAKS including the NEM 16K PAKS! (Demon Attack, Dragons Lair, etc) 64K DISK $24.95

TELEPATCH III
All the features of TELEPATCH plus the classically proportioned characters of the WIZARD with TRUE lowercase! Now CoCo III compatible! (Upgrade $15 w/proof of purchase) $29.95

DISK UTILITY 2.1A
A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename and kill file entries. Lightning fast Disk I/O for format, copy and backup. Examine contents of files, the Granule Table, plus the size, load addresses and entry points of all programs. Single command execution of all Basic and ML programs. 32K/64K DISK $29.95 Now also CoCo III compatible! Upgrade only $15 w/proof of purchase. (see Oct '84 Rainbow Review)

SPECTRUM FONT GENERATOR
Write files using any CoCo Word Processor (Telewriter-64, VIP Writer, etc.) and convert them to special Detailed character sets! Some of the sets supported are Italics, Old English, Futuristic and Block. A character set editor is included to create or modify custom sets! Supports most dot-matrix printers! DISK $29.95 (see Dec '85 Rainbow Review)

SPECTRUM DOS
Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-Sided drives, auto disk search, error trapping & "UNPUNCHABLE". 64K DISK $29.95 New LOW price! $29.95

64K DISK UTILITY PACKAGE
Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the Ext Basic ROM from $8000 to $0800. Copy ROMPAKS to disk (even "protected" PAKS) and create a 32K SPOOL buffer for printing. DISK $24.95

TAPE/DISK UTILITY
A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK $24.95 (see Sept '83 Rainbow Review)

COCO III UTILITIES
Terrific utility support programs for the new Color Computer III! Includes a CoCo II to CoCo III converter, 32K Hi-Res screen saver, 40/80 column Word Processor, RAM tester, DEMO BALL generator, SMOOTH scrolling demos. 128K DISK $21.95

THE OS-9 SOLUTION
NOW, a program that creates a "USER FRIENDLY" environment within OS-9! The OS-9 SOLUTION replaces 19 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more complex long pathnames or remembering complicated syntaxes! Set all parameters at the touch of keys! $39.95. New LOW price!!! $24.95 (see Sept '85 Rainbow Review)

SOFTWARE BONANZA PACKAGE
Create an instant library of Spectrum Projects TOP Colorful Utility software. Select any of the following 12 programs to customize your own SPECTACULAR SOFTWARE BONANZA! CoCo Checker, Multi-Pak Craak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, Spectrum DOS, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Basic Plus, EZ Base or Blackjack Royale (a $300 plus value) for only $99.95!!!

MIKEY-DIAL
When used with any Hayes compatible modem & Deluxe Program Pak, adds to Mikeyterm 4.0 the ability to Autodial 22 numbers from a menu & load a set of 3 MACROS for each directory choice. Also FAST radial & changing of MODRM settings by command. DISK $19.95 (See Dec '86 Review)

All U.S. orders plus $3 S/H (Other $6)
COD add $2 extra
NYS Residents add Sales Tax
CoCo HOT LINE 718-835-1344
SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414
a bad data or timeout error before giving up and aborting the Xmodem transfer. This can be set to any number between one and 127. The system default is 10 retries.

The "Timeout Period" parameter dictates how long the system waits for you to send a block during an upload, or how long it waits for a reply after sending your computer a block during a download. In either case, if the timeout period expires before the system receives the appropriate response, a timeout error is recorded internally and the block is transferred again.

The system default for timeout is 15 seconds, but can be changed to any number of seconds between one and 127. If you often experience timeout errors during Xmodem file transfers, you may want to increase this number. Also, Delphi users in other countries will probably want to select a longer timeout period because of multiple-network delays. Decreasing the timeout period will generally result in faster recovery from errors during a transfer, but may also cause unnecessary errors to be generated.

That's it for this installment of Delphi Bureau. We will try to devote a little more space to other advanced settings in Workspace next time.

As you can see, our SIG has been very busy this last month. Those of us on the staff here want to thank all of you who have ever contributed or dropped by, for your help and patronage. A few days after I send this article to RAINBOW we will have passed the 20,000 mark in forum messages, and will be the first Delphi SIG to do so. [Michael Fischer, of Great River, NY, posted the 20,000th message on December 12.]

I am extremely pleased with the success of our service, and am looking forward to all of the changes that are in progress, which will make us even better able to support CoCo and OS-9 users. Thanks again to all of you! See you on the CoCo SIG!

— Marty Goodman
RAINBOW's Delphi Database Manager

---

**Submitting Material to Rainbow**

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

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than in how you developed it. Programs should be learning experiences.

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

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

Please do not submit programs or articles currently submitted to another publication.

---

**Delay Play**

I have found an interesting way to utilize the POKE&HFF21,&H3C and POKE&HFF21,&H34. For those who don't know, these pokes turn the cassette motor relay on and off, respectively. You can use this to alter the way a tape sounds. Put a voice or music tape in your recorder and unplug all computer plugs from the recorder except the remote plug. Then run the following program:

```
10 INPUT "SPEED";A
20 POKE&HFF21,&H3C
30 FOR X=1 TO A:NEXTX
40 POKE&HFF21,&H34
50 GOTO20
```

Since the value for A is a delay factor, the larger A is, the slower the tape will be played back.

Jon Nash
Tulsa, OK
When lots of folks first get a Color Computer, they hook up a cassette recorder to save their programs, figuring they will get a disk drive later on. By the time they do get a disk drive, they have accumulated a large library of programs and data files on tape.

It then becomes something of a chore to transfer all of those files from tape to disk. A BASIC program needs to be loaded from tape and saved to disk. A machine language program needs to be CLDADMed from tape, analyzed so that the addresses may be found, and finally SAVEMed to disk. Transferring data files, meanwhile, can often be a total nightmare.

What I would like to present here is a simple tape-to-disk file transferring utility. The source code is shown in the program listing, and may be keyed in and assembled with most any editor/assembler in a straightforward manner.

In short, this utility will read just about any standard tape file and transfer it to disk. The disk file will have the exact same attributes (BASIC or machine language, ASCII or binary, etc.) as the tape file, and the disk file will be fully loadable and operational.

Since this utility uses three undocumented routines in the
To transfer a file from tape to disk, load the assembled program and execute it. The screen will clear and you will be prompted to prepare the cassette containing the file to be transferred and to press ENTER. Cue the tape to the beginning of the file and press ENTER. The tape's sound will be played over the TV's speaker to aid you in locating the beginning of the file and press ENTER. The tape's sound will be played over the TV's speaker to aid you in locating the recording on the cassette. If you cue the tape badly and the tape starts out in the middle of the file, don't worry; simply reposition the tape to the beginning. The transfer utility will sift patiently through the middle of a file, or even through garbage, until it finds what it's looking for.

When the transfer utility does find the beginning of a file, it will stop the recorder and print the file's name and type. You will be asked if you want to transfer this file. If you do, press the Y key. Otherwise press the N key. You will be prompted to prepare the cassette again.

As the file loads in, a block will blink in the upper-left corner of the screen. If there isn't enough memory to hold the whole file, or if there is an I/O Error, a message will be printed and the transfer terminated. You will then be invited to start the transfer utility over again or return to BASIC.

BASIC programs saved in non-ASCII form and machine language programs saved with the CSAVE command are organized differently on disk than on tape. So when the tape file is fully loaded into memory, the transfer utility will automatically reformat the data as needed so that it will work correctly on disk. (BASIC programs saved in ASCII form, data files and machine language programs created by EDTASM don't need any modifying.)

When the tape file is finished loading and reformatting is complete, a message to this effect will appear on the screen. You will now be asked for the name you want to give to the disk file. Enter any filespec that is valid in BASIC but don't enclose it in quotes. If you don't specify an extension, none will be used, and if you don't specify a drive number, the default will be used.

The transfer utility will next save the file onto disk. If an error occurs anywhere along the way, a message will be printed and you will be prompted again to enter the name for the disk file. So, if an error occurs while saving to disk, you won't have to reload the tape file all over again.

When the file has been successfully saved on disk, you will be asked if you would like to start the transfer utility anew. If you have more tape files to transfer, then press the Y key. Pressing the N key will return you to BASIC.

At any time the transfer utility is waiting for keyboard input, you may press BREAK to cancel the transfer in progress. You will then be asked if you would like to start over again or return to BASIC.

This utility will transfer any BASIC program, BASIC program saved in ASCII, machine language program created by CSAVE, machine language program created by EDTASM, or just about any data file to disk easily and accurately. It may not transfer protected programs or automatic execute loaders, however.

One interesting note: On cassette, there is no distinction between data files and BASIC programs saved in ASCII. That is, there is no way to tell whether a file was created with the command OPEN "O",-1,"filename" or with the command CSAVE "filename",A. What does this mean? If you use the utility to transfer a BASIC program saved in ASCII, you will be told that the file is a data file, even though it is actually a BASIC program. There is no harm in this, however, because the disk file created will load correctly with the LOAD command, in spite of being labeled as a data file.

All files created by the Color Computer start out with a 15-byte block of data called a "header." The header contains the filename, the file's type, whether it is in ASCII or binary, and whether the tape recorder must be turned off and back on between loading each block of code. This leaves four bytes that are usually unused. The one exception is in machine language programs saved by the CSAVE command. Here, the last four bytes contain the program's start and execute addresses. The transfer utility uses all of the information in a file's header to load it properly and reformat it if necessary. Some of this information is then transferred into the disk directory.

(Questions about this utility may be addressed to the author at 2054 Manning Avenue, Los Angeles, CA 90025. Please enclose an SASE for a response.)

The listing: TPTODSK

```
0100  0011  ORG  $1000  Low area of memory
0100  10CE  0100  ORG  $1000  Set up stack
0104  86  07E  LDS  #1000  Opcode for JMP nn
0106  8E  11B2  LDA  #7E  Opcode for JMP nn
0109  B7  018E  LDX  #ERROR  Address to JMP to
010C  BF  018F  STA  $18E  Patch into Basic's
010F  8E  1460  STX  $18F  Error vector
0112  A6  84  LDX  #BUFFER  Start of free memory
0114  43  LDA  ,X  Read a byte
0115  63  84  COMA  ,X  Complement register
0117  A1  84  CMPA  ,X  Complement RAM
```

(74) THE RAINBOW February 1987
1,019 26 $4 $0022 BNE GOTMEM If not, stop the test
1,01B 63 $5 $0023 COM ,X+ Restore byte and go
1,01D 20 $5 $0024 BRA MLOOP Check more bytes
1,01F 30 $9 FF $0025 GOTMEM LEAX #$100,X Lower pointer some
1,023 BF $C $0026 STX TOPMEM Set top of memory
1,026 10CE $5 $0027 BEGIN LDS #$1000 Reset stack pointer
1,02A 86 $7 $0028 LDA #$60 Blank on the screen
1,02C 8E $4 $0029 LDX #$4000 Top of screen
1,02F 9F $8 $0030 STX $88 Place cursor there
1,031 A7 $8 $0031 CLS STA ,X+ Clear the screen
1,033 8C $6 $0032 CMPX $860 One byte at a time
1,036 25 $F $0033 BNE GOTMEM
1,039 5F $0 $0034 CLRB Use ROM routine to...
EACH PROGRAM COMES WITH
10 FREE DISK

S.T.A.G. - A GRADEBOOK - $35.00
A full year gradebook for up to 50 students.
DIRECTORY VIEWER - $19.98
Create a library of disk DIR's. Recover DIR's.
B-FILES - $24.98
A new super memory saving file system.
VCR DATABASE &
MINI TITLE SCREEN MAKER - $20.98
File system for tapes & title screen maker.
FILE VIEWER - $19.98
Single key file loading. View all disk files.
Puzzle math - $19.98
18 Hi-Res Pictures. Game for learning simple math.
SYNONYM & ANTONYM - $19.98
Hi-Res game. Create lists and print test sheets.
CHECKBOOK III - $19.98 COCO III ONLY
Hi-Res graphic entry & display.

SECA - P.O. BOX 3134
GULFPORT, MS 39505
(601) 832-8236

76
THE RAINBOW
February 1987

"XPNDR2 and SuperGuide - an Ideal Expansion Card Set!" - RAINBOW 2/86 HARDWARE REVIEW

XPNDR2 $39.95 each or 2/$76
This prototype card features a 40 pin connector for projects requiring an on-
line disk system or ROM paks. The
CoCo signals are brought out to wire-
wrap pins. Special gold plated spring
clips provide reliable and noise-free
disk operation plus solid support for
vertical mounting of the controller. The
entire 4.3 x 7 inch card is drilled for ICs.
Assembled. tested and ready to run.

XPNDR1 $19.95 each or 2/$38
A rugged 4 x 6.2 inch bare breadboard
that brings the CoCo signals out to
labeled pads. Both XPNDR cards are
double-sided glass/epoxy, have gold
plated edge connectors, thru-hole
plating and are designed with heavy
power and ground buses. They’re
drilled for standard 0.3 and 0.6 inch
wide dual in-line wirewrap sockets;
with a 0.1 inch grid on the outboard end
for connectors.

SuperGuide $3.95 each
Here is a unique plastic insert that
aligns and supports printed circuit
cards in the CoCo cartridge port. Don’t
forget to ORDER ONE FOR YOUR
XPNDR CARDS.

Included with each XPNDR card
are 8 pages of APPLICATION
NOTES to help you learn about
chips and how to connect them to
your CoCo.

To order or for technical informa-
tion call:
(206) 782-6809
weekdays 8 a.m. to noon
We pay shipping on prepaid orders.
For immediate shipment send
check, money order or the number
and expiration date of your VISA or
MASTERCARD to:
ROBOTS MICROSYSTEMS
BOX 30607 SEATTLE, WA 98103
117  BE 143E 00126  LDX EOF Change end of file
117  A  35F 00127  LEAX 3,X To make the file
117  B  86F 00128  STX EOF Three bytes longer
117  A6  100129  LDA 4,X Move entire file
117  A7  800130  STA ,X Over three bytes, so
117  80A 160131  CMPX #BUFFER+3 The three extra bytes
117  82F 150132  BHI Fix2 Are at the beginning
117  83E 160133  LDD EOF Get length of file
117  84E 160134  SUBD #BUFFER+3 Minus three
117  852 830135  STD ,X Add it into file
117  85A 830136  LDA #$FF Make very first byte
117  85B 830137  STA ,X Of file an $FF
117  85C 830138  NOTBAS LDX #520 Set cursor position
117  85D 830139  STX $88 At mid screen
117  85E 830140  LDX #LDCOMP "Load is complete"
117  861 140141  JSR PRINTM Print the message
117  862 140142  JSR PRINTM Print the message
117  863 140143  JSR INPUT Get the filename
117  864 140144  JSR INPUT Get file's type
117  865 140145  LDX HEADER+8 Store it
117  866 140146  STX $957 Get default drive #
117  867 140147  LDA $95A Store it
117  868 140148  STA $EB Clear out the
117  869 140149  LDX #$94C Filename storage
117  86A 160150  STA #520 Area
117  86B 830151  CMPX #$957 ...\n117  86C 830152  BLO BLANK ...
117  86D 830153  LDX #$FF Prepare B
117  86E 830154  LDB #$FF Get the length of
117  86F 830155  INCB The person's entry
117  870 830156  TST Into B
117  871 830157  BNE GETLEN The person's entry
117  872 830158  LDU #BACK Put return address
117  873 830159  PSHS U Onto stack
117  874 830160  PSHS ,S Make space on stack
117  875 830161  CLR ,S Name person entered
117  876 830162  LDU #DFNAME Use ROM routine to
117  877 830163  JMP USEROM Prepare the filename
117  879 830164  LDA #$4F ASCII 0 for Output
117  87A 830165  LDB #$1 Use device #1 (disk)
117  87B 830166  LDU #DOPEN Use ROM routine to
117  87C 830167  JSR USEROM Open the file
117  87D 830168  LDX #BUFFER Start of memory
117  87E 830169  LDA #$1 Select output device
117  87F 830170  STA #$F #1 (the disk file)
117  880 830171  CMPX Get a byte
117  881 830172  PSHS X Save X
117  882 830173  JSR [$A802] Write it to file
117  883 830174  PULS X Restore X
117  884 830175  CMPX EOF More to write?
117  885 830176  BLO DWRITE Skip back if so
117  886 830177  LDS #DCLOSE Use ROM routine to
117  887 830178  JSR USEROM Close the disk file
117  888 830179  LDS #ALDONE "Transfer complete"
119F BD 11F1 Ø18Ø FINISH JSR PRINTM Print the message
11A2 8E 13C4 Ø181 LDX #AGAIN "Start program anew?"
11A5 BD 1224 Ø182 JSR YESNO Get yes or no
11A8 1927 FE7A Ø183 LBEQ BEGIN Restart if yes
11AC ØF 71 Ø184 CLR $71 Make it a cold start
11AE 6E 9F FFFE Ø185 JMP [$FFFE] Reinitialize system
11B2 34 Ø4 Ø186 *Control goes to ERROR when any error occurs
11B4 CE 1283 Ø188 LDU #DCLOSE Use ROM routine to
11B7 BD 126D Ø189 JSR USEROM Close the disk file
11BA 8D 22 Ø19Ø BSR MTROFF Shut off tape motor
11BC E6 4 Ø191 LDB ,S Get error code
11BE CE 13D9 Ø192 LDU #ERRS Table of error codes
11C1 AE C1 Ø193 GETERR LDX ,U+ Get addr of message
11C3 E1 C4 Ø194 CMPB ,U Compare codes
11C5 27 Ø4 Ø195 BEQ GOTE~ Skip ahead if match
11C7 6D CØ Ø196 TST ,U+ End of table?
11C9 26 F6 Ø197 BNE GETER~ Skip back if not
11CB BD 11F1 Ø198 GOTE~ JSR PRINTM Print error message
11CE 35 Ø4 Ø199 PULS B Restore error code
11DØ 8E 1399 Ø2ØØ LDX #CANCEL "Function cancelled"
11D3 C1 Ø1 Ø2Ø1 CMPB #$1 Cancel procedure if
11D5 27 C8 Ø2Ø2 BEQ FINISH Error occurred while
11D7 C1 FF Ø2Ø3 CMPB #$FF Loading the tape file
11D9 27 C4 Ø2Ø4 BEQ FINISH But if file loaded OK,
11DB 7E 113F Ø2Ø5 JMP RETRY Then ask again for filename
11DE B6 FF21 Ø2Ø6 MTROFF LDA $FF21 Shut off tape motor
11E1 84 F7 Ø2Ø7 ANDA #$F7 Reset the bit in PIA
11E3 B7 FF21 Ø2Ø8 STA $FF21 Store it in PIA
11E6 39 Ø2Ø9 RETURN RTS Return
11E7 34 16 Ø2Ø1 Ø3Ø1 VIDEO PSHS X,D save X and D
11E9 ØF 6F Ø2Ø2 Ø3Ø2 CLR $6F Device Ø (screen)
11EB AD 9F AØ2 Ø2Ø3 JSR [$AØØ2] Print character
11EF 35 96 Ø2Ø4 Ø3Ø3 PULS D,X,PC Restore and return
11F1 A6 8Ø Ø2Ø5 Ø3Ø4 BSR RETURN All done if a zero
11F3 27 F1 Ø2Ø6 Ø3Ø5 BEQ VIDEO Otherwise print it
11F5 8D FØ Ø2Ø7 Ø3Ø6 BSR PRINTM Loop back for more
11F7 2Ø F8 Ø2Ø8 Ø3Ø7 BRA INPUT LDX #INKEY Start of inkey buffer
11F9 8E 144Ø Ø2Ø9 Ø3Ø8 Ø3Ø9 Ø3ØA Ø3ØB Ø3ØC Ø3ØD Ø3ØE Ø3ØF Ø3ØG Ø3ØH Ø3ØI Ø3ØJ Ø3ØK Ø3ØL Ø3ØM Ø3ØN Ø3ØO Ø3ØP Ø3ØQ Ø3ØR Ø3ØS Ø3ØT Ø3ØU Ø3ØV Ø3ØW Ø3ØX Ø3ØY Ø3ØZ Ø3ØÁ Ø3ØÇ Ø3ØÉ Ø3ØÊ Ø3ØÍ Ø3ØÓ Ø3ØÒ Ø3ØÓ Ø3ØÚ Ø3ØÙ Ø3ØÚ Ø3ØÚ Ø3ØÝ Ø3ØÖ Ø3Ø× Ø3ØØ Ø3Ø0...
A SUPER COLOR PRINTER
The OKIMATE 20
AT A SUPER LITTLE PRICE!

Prints ten characters to the inch,
twelve characters fifteen characters to the inch.


Underline~p• r •c r ~o•

Small. Light weight. Quiet.
Prints up to 80 characters per second.

Prints four color graphics. Includes disk software for black and white, two color and four color screen dumps of Color Computer hi res graphics.

Okimate 20, Plug 'n' Print, paper, black and color ribbon, instructions, and software

Parallel $240.00
$10.00 Shipping

The only color Okimate 20 Screen Dump Now Available for the CoCo.
(Price subject to change)

DOUBLE DRIVER I
The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.

MONO II
Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

DOUBLE DRIVER II
Finally a monitor driver for the Color Computer II that lets you use a monochrome and a color monitor simultaneously. We're proud of this new driver. The six transistor circuit provides optimal signal mixing and signal gain. Excellent monochrome output and better quality resolution in the color output than any driver we have seen. Audio output also. Fits all models of the Color Computer II. $29.95.

THE COCO-SWITCHER
A QUALITY PIECE OF HARDWARE
The CoCo Switcher allows you to hook up three peripherals to your RS-232 jack. Connect your modem, printer and any other RS-232 compatible peripheral to the CoCo Switcher. An LED on the CoCo Switcher shows if your computer is on or off at a glance, The LED flickers when transmitting or receiving data.

$39.95 plus $2.00 shipping and handling
123Ø 8D BF 08243 BSR PRINTM Print the message
1232 8A FF 08244 ORA #$FF Reset equal flag
1234 39 08245 RTS Return
1235 81 59 08246 YN2 CMPA #$59 Is it "Y"?
1237 26 EE 08247 BNE YN1 Branch back if not
1239 8E 1433 08248 LDX #YES "Yes"
123C 8D B3 08249 BSR PRINTM Print the message
123E 4F 08250 CLRA Set equal flag
123F 39 08251 RTS Return
1240 34 14 08252 GETKEY PSHS B,X Save B and X
1242 A6 9F 088 08253 KEY1 LDA [$88] Get cursor character
1246 8B 1Ø 08254 ADDA #$1Ø Blink it
1248 8A 8F 08255 ORA #$8F Make it graphic
124A A7 9F 088 08256 STA [$88] Print new cursor
124E 8E 08ØØ 08257 LDX #$Ø Loop counter
1251 3Ø 1F 08258 KEY2 LEAX -1,X Decrement counter
1253 27 ED 08259 BEQ KEY1 Blink cursor if time
1255 AD 9F AØØ 08260 JSR [$AØØ] Scan keyboard
1259 4D 08261 TSTA Was key pressed?
125A 27 F5 08262 BEQ KEY2 Branch back if not
125C 8E 13BB 08263 LDX #BREAK "<BREAK>
125F 81 Ø3 08264 CMPA #$3 Was it Break key?
1261 1Ø27 FF3A 08265 LBEQ FINISH Break out if so
1265 C6 6Ø 08266 LDB #$6Ø Blank character
1267 E7 9F 088 08267 STB [$88] Erase cursor
126B 35 94 08268 PULS X,B,PC Restore and return

08269 *Routine below calls on a routine in the
08270 *Disk ROM. It accounts for the differences
08271 *between Disk Extended Color Basic 1.0 and 1.1
08272 USEROM PSHS A Save A
08273 LDA $CØØ Check which version ROM
08274 ANDA #$1 Zero=1.0 One=1.1
08275 LSLA Zero=1.0 Two=1.1
08276 LEAU A,U Increment U if ROM 1.1
08277 PULS A Restore A

08278 JMP [,U] Use ROM routine
08279 DFNAME DFB $C8A4 1.0 Process filename
08280 DFB $C952 1.1 Process filename
08281 DOPEN DFB $C468 1.0 Open disk file
08282 DFB $C48D 1.1 Open disk file
08283 DCLOSE DFB $CA3B 1.0 Close disk file
08284 DFB $CAE9 1.1 Close disk file

08285 *Tape file types
08286 TTYPES DFB TYPE1 Basic program
08287 FDB TYPE2 Data file
08288 PDB TYPE3 M.L. program
08289 FDB TYPE4 Non standard
08290 *
08291 *
08292 *Messages and prompts
08293 *
08294 *

08295 TITLE FCC " TAPE TO DISK FILE TRANSFER"
08296 FCB $ØD
08297 FCC " "--------------------"
08298 FDB $ØØD
08299 FCC "READY TAPE & HIT ENTER? "
08300 FCB $Ø
08301 TNAME FCC "THE FILE IS NAMED 
08302 FCB $Ø
08303 TTYPE FCC "$IT IS "
08304 FCB $Ø
**XTERM**

OS-9 Communications program.
- Menu oriented
- Upload/download, ASCII or XMODEM protocol
- Execute OS-9 commands from within XTERM

Definable macro keys
Works with standard serial port, RS232 PAK, or BJI 25P Pack. Includes all drivers.
Works with standard screen, XSCREEN, or WORDPAK 80 column board.

$49.95 with source $89.95

**XMENU**

Creates a menu driven environment for OS-9.
- Create your own menus
- Works with standard screen, XSCREEN, WORDPAK, O-PAK

$29.95 with source $59.95

**XSCREEN**

OS-9 hi-res screen
- Full sorting
- Easy menu operation

$19.95 with source $39.95

**XDIR & XCAL**

Hierarchical directory
- OS-9 calculator
- Full sorting
- Complete pattern matching

$24.95 with source $49.95

**XDIS**

OS-9 disassembler

$34.95 with source $54.95

---

**SMALL BUSINESS ACCOUNTING**

This sales-based accounting package is designed for the non-accounting oriented businessman. It contains 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 Disbursements, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable, Payable Aging Reports and 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 SAP 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. Suits for use in all states except Oklahoma and Delaware.

$59.95

**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/P 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 integrated with the Small Business Accounting Package.

$59.95

---

**XWORD**

OS-9 word processing system
- Works with standard text screen, XSCREEN, WORDPAK, or O-PAK
- True character oriented full screen editing
- Full block commands
- Find and Replace commands
- Execute OS-9 commands from within
- Proportional spacing supported
- Full printer control, character size, emphasized, italics, overstrike, underline, superscript-subscript
- 10 header/footer
- Page numbering in decimal or Roman numerals
- Margins and headers can be set different for even and odd pages

$69.95 with source $124.95

**XMERGE**

Mail merge capabilities for XWORD

$24.95 with source $49.95

**XSPELL**

OS-9 spelling checker, with 20000 and 40000 word dictionaries

$39.95

**XTRIO**

XWORD/XMERGE/XSPELL

$114.95 with source $199.95

**XED**

OS-9 full screen editor

$39.95 with source $79.95

---

**Microtech Consultants Inc.**

1906 Jerrold Avenue
St. Paul, MN 55112

Ordering Information
Add $3.00 shipping & handling. MN residents add 6% sales tax. Visa, Mastercard, COD (add $2.50), personal checks.

(612) 633-6161
12FC 41 $03$06 TYPE1 FCC "A BASIC PROGRAM"
13FB $00 $03$07 FCB $0
13FC 41 $03$08 TYPE2 FCC "A DATA FILE"
1317 $00 $03$09 FCB $0
1318 41 $03$10 TYPE3 FCC "AN M.L. PROGRAM"
1327 $00 $03$11 FCB $0
1328 49 $03$12 TYPE4 FCC "IN NON STANDARD FORM"
133C $00 $03$13 FCB $0
133D $0D $03$14 XFERIT FCB $0D
133E 54 $03$15 FCC "TRANSFER THIS FILE?"
1352 $00 $03$16 FCB $0
1353 54 $03$17 LDCOMP FCC "THE LOAD IS COMPLETE"
1367 $00 $03$18 FCB $0
1368 $0D $03$19 DNAME FCB $0D
1369 44 $03$20 FCC "DISK FILENAME?"
1378 $00 $03$21 FCB $0
1379 $0D $03$22 ALDONE FCB $0D
137A 54 $03$23 FCC "THE FILE TRANSFER IS COMPLETE"
1397 $0D$00 $03$24 FDB $0D$00
1399 $0D $03$25 CANCEL FCB $0D
139A 54 $03$26 FCC "THE PROCEDURE HAS BEEN CANCELLED"
13BA $00 $03$27 FCB $0
13BB 3C $03$28 BREAK FCC "<BREAK>"
13C2 $0D$00 $03$29 FDB $0D$00
13C4 53 $03$30 AGAIN FCC "START PROGRAM ANEW?"
13D8 $00 $03$31 FCB $0
13DB 13E8 $03$32 ERRS FDB E1
13DC 38 $03$33 FCB $38
13DF 13F8 $03$34 FDB E2
13DD 3C $03$35 FCB $3C
13DE 141$0 $03$36 FDB E3
13E1 3E $03$37 FCB $3E
13E2 141D $03$38 FDB E4
13E4 FF $03$39 FCB $FF
13E5 1429 $03$40 FDB E5
13E7 $00 $03$41 FCB $00
13E8 44 $03$42 E1 FCC "DISK SPACE FULL"
13F7 $00 $03$43 FCB $0
13F8 44 $03$44 E2 FCC "DISK IS WRITE PROTECTED"
14$0F $00 $03$45 FCB $0
1410 42 $03$46 E3 FCC "BAD FILENAME"
141C $00 $03$47 FCB $0
141D 42 $03$48 E4 FCC "BUFFER FULL"
1428 $00 $03$49 FCB $0
1429 49 $03$50 E5 FCC "I/O ERROR"
1432 $00 $03$51 FCB $0
1433 59 $03$52 YES FCC "YES"
1436 $0D$00 $03$53 FDB $0D$00
1438 4E $03$54 NO FCC "NO"
143A $0D$00 $03$55 FDB $0D$00
$0356 *
$0357 *
$0358 *Variables and pointers
$0359 *
$0360 *
143C $00$00 $03$61 TOPMEM FDB $0 End of system's memory
143E $00$00 $03$62 EOF FDB $0 End of tape file
144$0 $03$63 INKEY RMB $0$1 Space for input buffer
145$0 $03$64 HEADER RMB $0$1 Space for tape file header
146$0 $03$65 BUFFER *All of the rest is for the BUFFER
108$0 $03$66 END START Execution begins at START

$0000 TOTAL ERRORS

82 THE RAINBOW February 1987
Color Computer 3 Is Top Dog at Princeton RAINBOWfest

It was a cool evening in Princeton, New Jersey, when literally thousands descended upon the local Hyatt Regency hotel. “What's going on?” was heard from several passers-by. What else??

It was the 12th RAINBOWfest. It was the premier show for the new Color Computer 3. At 7, Friday evening, the vendors were ready and the doors were opened.

There was a mad dash for the Radio Shack booth; everyone wanted to get a glimpse of the new machine. For many, it was the first look at the CoCo 3. As the night went on, it became a common sight to see people purchasing their CoCo 3s, tucking them under their arms, and heading off to their hotel rooms to see what they needed to do to the hotel's TVs to make their CoCo 3 work. It was somewhat reminiscent of the "Cabbage Patch" craze. Later, after an hour with the new machine, those people would reappear in the exhibit hall to see what other things they could find.

To put it in simpler terms, the Color Computer 3 was the hit of the show. Few could speak of anything else. Questions and rumors were flying. To offset this, the show was attended by Barry Thompson, Mark Siegel, Fran McGeehe and Srih Vasan. These representatives of Tandy Corporation did their best to answer all the questions people had. Barry Thompson and Mark Siegel were also panel members for the roundtable discussion on the CoCo 3.

People appeared in the exhibit hall in waves. Just as you started to move down an aisle, it would crowd up and you would be blocked. Several groups of people gathered outside the exhibit hall just so they could talk with each other.

While excitement about the CoCo 3 was high, several "outside" discussions turned to a more serious matter; how best to support the enhancements of the new machine. A great topic was the exchange of technical information. (As more and more producers of CoCo software get their new machines, it is becoming quite apparent the support is there. We are already seeing new products on the market designed to take full advantage of the CoCo 3.)

CoCo 3 was high, several "outside" discussions turned to a more serious matter; how best to support the enhancements of the new machine. A great topic was the exchange of technical information. (As more and more producers of CoCo software get their new machines, it is becoming quite apparent the support is there. We are already seeing new products on the market designed to take full advantage of the CoCo 3.)

Computer Plus — Great Bargains on Tandy Equipment

Computer Plus occupied two booths at the Princeton fest. The hot item was the Color Computer 3 selling for $169. Computer Plus sold out of their CoCo 3s by noon on Saturday. In addition, several people took advantage of the opportunity to buy the DMP-105 for $110 and the DMP-130 for $210. Another hot item was the FD-501 disk drive system, which was selling for $170. Fran Purcell, owner of Computer Plus, said, "The crowd seems larger than usual. Financially this is the best RAINBOWfest we've ever been to.”
Radio Shack — Consumer Division Takes Over Booth Management

At the Radio Shack booth, we spoke with District Manager Hank Boyer. That is, we tried to speak with Hank, but every time the conversation started, he would have to run off to write up another sale. People pressed around the Radio Shack booth watching the CoCo 3 and CM-8 do their thing. Radio Shack was selling the CoCo 3 for $199 and taking prepaid orders for the CM-8 for $259.95. Other bargains included the FD-501 drive system for $170, 64K CoCo 2s for $85, 16K Standard CoCo 2s for $49, Deskmate for $59.95 and the Color Mouse for $29.95. When the Show opened Sunday, Radio Shack dropped the price of the CoCo 3 to $179 and shortly sold out. Hank told us, “The Tandy Business Products Division used to run the Radio Shack booth at the RAINBOWfests. Now, the Consumer Division has taken over the responsibility and we hope to be doing many new things in future shows.”

OS-9 Users Group — More Popular Than Ever

Several heavy discussions were started at the OS-9 Users Group booth. In between signing up new members, Brian Lantz, president of the Users Group, said, “There appears to be a high interest in OS-9. We have taken twice as many memberships as we have at previous RAINBOWfests.” At the OS-9 Users Group breakfast Sunday morning, Esther Puckett, wife of Dale Puckett, was unanimously voted in as a lifetime honorary member.

Disto’s Many Marvels Include CDOS 4.0

At the Disto booth we spoke with Chris Roshon, who appeared to have taken over sales since Tony DiStefano was always caught up in explaining his “many marvels” to the ever-present crowd. Chris said, “We are enjoying the show very much. We especially liked the round-table discussion. It’s good to meet the people who control the CoCo’s destiny in Fort Worth.”

On a nearby table, CoCo Max was running on a CoCo 2 and people were loading full CoCo Max pictures in a flash. Tony had done it again. In a system running CDOS 4.0, it is possible to load CoCo Max files from the Disto RAMDisk instantly.

Disto was selling the controller for $80 and the Display 80 add-on for $110. Also, RAMDisks were pretty inexpensive, as the 256K model sold for $90 and a full 512K card was going for $130.

Delphi Gives Long-Distance Friends a Chance to Meet

The Delphi booth was teeming with activity as Delphi members gathered to meet and see what their online friends looked like. While Marty Goodman was busy showing off several features of Delphi’s system, Dick Ellisco was busy selling Telenetics Pony Express 2400 baud modems for a special show price of $349. The modems regularly cost $500. For several people, it was quite a thrill to see Marty accessing Delphi at 2400 baud. John Gibney of Delphi said, “We are letting people perceive the full value of 2400 baud operation.”
Computize: Graphicom Selling Well

Bruce Farrington of Computize discusses CoCo 3 compatibility with RAINBOWfest attendees.

At the Computize booth, workers were busy selling Graphicom and Graphicom Part II. The reason for high sales on these products is that CoCo Max is incompatible with the CoCo 3. People seemed to have CoCo 3 on their minds and wanted software that would work on their new, as well as their old machines.

Ken Klosinski of Computize said, “This is the best show so far for us.” In addition to Graphicom sales, Computize did well selling digitizers and ‘Y’ cables. The biggest item at this booth was the Hardcopy printer utility.

Southwestern Digital Has Show-End Blow Out Sale

Hot items at the Southwestern Digital booth were the Drive 0 for $95, and serial/parallel converters. Southwestern had a show-end blowout of drive systems, as well, with Drive 0 and 1 combo systems complete with controller going for an unbelievably low $140. Also, complete Drive 0 systems were selling for $85.

Diecom Plans to Support CoCo 3

While fewer software houses were at this RAINBOWfest than at previous ‘fests, Diecom was there in full force. Two new programs by David Dies, president and programmer for Diecom, were available. Gates of Delirium, a fantasy role-playing game was selling for $31.95. Also, Bouncing Boulders, a fast-paced, arcade-style game, sold at $23.95.

Special show prices were also in effect for Gauntlet, Wrestle Maniac and Marble Maze, which were being sold for $23.95. While the programs were not compatible with the CoCo 3, David Dies assured us that Diecom will fully support the new machine. To prove this point, they were allowing exchanges for up to three weeks for upgrades of their programs to CoCo 3 versions. David also told us to “look for newer things in the future which will take full advantage of the machine’s enhanced capabilities.”

Howard Medical Has a Hit With Monochrome Monitors

Howard Medical was quite busy selling monochrome monitors from $67.50. Another big seller was the dual mode Epson LX-80 printer for $199.

Ross Litton, manager of Howard Medical, told us, “The CoCo 3 is definitely the high point of this show, but there seems to be some confusion about the CoCo 2s and CoCo 3s and which monitors work with them. Once this is cleared up, sales will be even better.” In any case, picking up a Comrex color monitor for $139 wasn’t too bad a deal, at all!

Microworld: Business Booming — Only Vendors to Offer CM-8 Monitors at RAINBOWfest

The two booths occupied by Microworld were crammed with Radio Shack hardware and software. They completely sold out their 200 CoCo 3s at $169. Other items included the Radio Shack Drive 0s for $169 and Multi-Pak Interfaces for $75 apiece. Microworld was also offering Deluxe RS-232 Paks for a mere $25. Being an authorized Radio Shack Repair Center helped, too, as Microworld is able to supply the required Multi-Pak fix for the CoCo 3.

Perhaps one of the highest points in the exhibit hall came when Microworld was able to announce they had several new CM-8 monitors for sale. At a price of $275 each, they sold the special shipment of 10 in less than 15 minutes. Being first in line really helped at this booth. Richard Kromer, owner of Microworld commented, “We’ve done a world of business this Saturday alone.”

A CoCo fan sports a “No Commodores” T-shirt.
Spectrum Projects’ Poul Rosen (right) wraps up a sale.

Spectrum Projects’ CC3DRAW Proves Popular Among New CoCo 3 Owners

Spectrum Projects was on hand with all of their CoCo products. They sold out of several, such as Telepatch II and Mikey-Dial. Spectrum’s new CC3DRAW was a big hit at $19.95 as the new CoCo 3 owners wanted to get it for their new machines. Asked what he thought the future held for the CoCo Community, Bob Rosen, owner of Spectrum Projects, replied, “There is definitely life in the CoCo market. I feel people have been holding back since the July 30 announcement. They came here to see and buy the CoCo 3 and now they want software.”

Microcom: No Reasonable Offer Refused

Several items were being sold at the Microcom booth. The Intronics EPROM programmer was selling for $137, the new Supplement to 500 Pokes, Peeks and Execs was being sold for $9, while the original edition was selling for $15. On Sunday, Microcom announced that no reasonable offer on their products would be refused!

HDS Does Well With MS-DOS, Too

Kevin Franciotti, who was manning the Hard Drive Specialists booth, feels some software vendors were missing out by not attending the Princeton show. In addition to their controller and CoCo disk drive sales, HDS sold quite a few of their offerings in the MS-DOS line.

T & D Software Offers Special Deals

Tom Dykema and Marianne Hoving were definitely doing well at the T & D Subscription Software booth. T & D offers one tape or disk per month for one year for a price of $70. This means more than 120 programs. At the RAINBOWfest, they were offering a special show deal of a one year’s subscription for $60 plus four tapes free. Needless to say, several people were taking advantage of this offer.

Computer Island: Educational Market Is Wide Open

Steve Blyn, a RAINBOW Contributing Editor, was at his Computer Island booth selling everything from blank disks to T-shirts. Steve says the educational market for the CoCo is wide open. To prove this point, Computer Island promptly sold out of several of its educational software products.

Public Domain Software Makes ‘fest Debut

Don Johnson of Public Domain Software told us, “This is our first RAINBOWfest and I like it. The crowd enabled us to let people know who we are.” Public Domain was selling disks filled with PD software for $5 apiece or $99 for the complete library of 27 disks. The normal rate is $10 per disk.
ADOS a Big Seller at Spectrosystems Booth

In the Spectrosystems booth, owner Art Flexser was on hand selling copies of his ADOS with config utilities and documentation for $25. He was also selling Peeper, a program tracer, complete with source listing for $25. Art said, "People here are looking for CoCo 3 stuff. While ADOS doesn't entirely work on the CoCo 3, most features do work and I hope to be releasing a version for the CoCo 3 soon."

Mercer County CoCo Club — Raffle Mania

The Mercer County CoCo Club was selling RAINBOWfest T-shirts as well as raffle tickets. The club held four raffles for 30 disks each and a Sunday raffle for a new CoCo 3. Ed Whitman said, "I'm here to see the CoCo 3 and be involved in the excitement around it. It really is great to meet and talk with the people who work with the new machines."

CompuServe Offers Free Life-Time Subscriptions

The CompuServe booth was filled with people. CompuServe's Wayne Day was offering free lifetime subscriptions along with $15 free credit for system use. Mike Ward, who was selling copies of his famous Mikeyterm, said, "It appears to be much more frantic than previous RAINBOWfests!"

CoCo 3 Undergoes Implant Surgery

RAINBOW and Delphi regular Martin H. Goodman, M.D., "operates" on a CoCo 3.

While several onlookers watched with great interest, Marty Goodman dissected Art Flexser's newly purchased CoCo 3. The reason for the operation was to install a socket for the ROM chip internal to the CoCo 3. Art seemed to be pacing the floor, much as an expectant father would, as Marty carefully explained each step of the procedure. The operation was a success and Art became one of the first people to own a CoCo 3 with a socketed ROM chip.

Computer Center Shows Off CoCo/PC

The Computer Center was busy selling slimline Drive 1 upgrades for $89.95 and single full-height drives complete with case and power supply for $74.95. However, according to head technician Logan Ward, they were doing quite a bit of EPROM burning as well. They burned several prepurchased copies of ADOS into EPROMs for customers for only $12.95, which included the cost of the EPROM. When Logan wasn't wearing his "Rainbow hair"(a multi-hued wig), he was busy showing off his CoCo/PC. The CoCo/PC is a CoCo 2 with two slimline drives, disk controller and CoCo Max all packed into an IBM PC case. To power the system, Logan wired in a 130-watt IBM power supply. The system has also been modified to use switchable composite video as well as an inboard audio amp and lap keyboard.
While amazingly efficient, those eight-character filenames leave a lot to be desired when it comes to graphic images. This is especially true if you are as lazy as I am and file seven progressive images of a dogwood blossom as 01, 02, 03, etc. I used to find myself loading in a program to scan each picture on a disk, then, once I found the image I wanted, loading in another program to use that picture. Those days are over. Now I have GRADIR, which is my six-letter abbreviation for "Graphic Graphics Directory Image Processor and Filer Program."

GRADIR is a BASIC program that can take a disk full of graphics images (up to \(22\) PMODE 4 screens, each \(6,143\) bytes long) and produce, on one screen, a complete graphic directory of all the images on the disk. In a very reduced rendition, every picture stored on a disk is shown, complete with its filename, on one PMODE 4 screen. As small as the images are, they are still easily recognizable. A photographer might compare one of GRADIR's screens to a contact print of a roll of 35 mm film. It's very handy for selecting images and filing.

This program is simple to use. Load GRADIR, then PCLEAR8 before you run. The program uses the first four PMODE 4 pages for loading graphics from disk and the last four pages for assembling the directory.

First, you are greeted with a request to stand by while the program initiates. The standby lasts only a couple of seconds while the alphanumeric and "long file" arrays are set up. During initiation, the grid for the directory screen is also set up. It's sometimes amazing how many things our CoCo can accomplish in a short time. After set up, you are asked for an eight-character filename (the program won't take a longer one). This is the name of the disk you are cataloging and will be used to label and save the graphics directory created by the program.

Then you are asked for a date (any format), which will also be used to label the finished directory. After you have entered the date, the program prompts you to put the disk to be cataloged in Drive 0 and press ENTER.

Now you can sit back and watch the computer do its work, or go do something else. The processing of each graphics image takes about one minute. If you have a disk full of single-screen images (22 is the maximum number you can have on one side of a standard disk), it will take about 22 minutes to create the Graphic Graphics Directory for that disk. When the last image on the picture disk is complete, the computer displays the complete directory on the screen and makes a pleasant beeping until you press any key.

Now comes the rest of your labor: swapping disks. You are prompted to put a directory disk in Drive 0. I have a lot of graphics on disk and I've found that I prefer to segregate these graphic directories onto disks by themselves. There would be no harm in saving the directory on the disk cataloged, pro-

---

Chris Brown lives in Siloam Springs, Ark., and has been a professional artist for 20 years. A CoCo enthusiast for five years, he has used his computer for everything from managing rental property to designing special logos and fonts. His computer art is distributed by Grafx.
provided enough free space is available. If there isn't, the program will warn you. In fact, it won't allow you to try to save the disk directory at all on a disk with less than three free grans, thanks to Line 700.

A note about the quality of the small images before we take a walk through the program's functions: It doesn't matter in which PMODE the image was created. GRADIR uses PMODE 4 to allow the capture of the most detail. PMODE 0 through PMODE 3 screens require the same amount of time to process, but appear scrunched up (PMODE 0 - PMODE 2) or not in color (PMODE 3). You won't, except in very rare instances, see the glorious colors of your original in the small directory version. Remember, the small directory version is a "proof copy" only.

Now to the workings of the program. A quick glance at the list of routines (Figure 2) and the program (Listing 1) shows a pretty straightforward approach, with the subroutines located at the beginning of the program for speed. The first subroutine (lines 30-100) draws the Hi-Res characters on the PMODE 4 Hi-Res screen. This subroutine requires five variables: color, K2 (0-8); size, S2 (1-63); X position, PW (0-255); Y position (PQ (0-192)); and words, N$.

The Check File Length subroutine is a bit more esoteric. Grabbing one record at a time from the disk file, this routine calculates the start and end addresses from the MSB and LSB (most-significant and least-significant bytes) information contained in records 1 and 2, 3 and 4, 6, 8 and 9. The result, the length of the file in bytes, is stored in the variable LONG, which is used later in the program.

Line 180 contains the heading for the text screen. Revise this as you will. The poxes to the screen only put black spaces after my first and last names.

Line 200 sets up the array GP which positions each of the 22 possible small images in a discrete position on the screen. Reading the numbers in the DATA statement in pairs gives you X, Y coordinates. These coordinates, as determined by the processed picture number (CN), are used in Line 580.

Lines 210 to 300 set the array L$(1) to L$(59). This array contains the DRAW instructions used by the Draw Letters subroutine. This, plus the drawing routine, I keep as an ASCII file on one of my many utility disks, merging it when I need alphanumerics on a graphics screen. This particular version is special for GRADIR because the letters had to be small. Different versions of this approach have been seen here in THE RAINBOW.

The heart of the program is in lines 390 to 460, the original of which is in the Disk BASIC Manual from Radio Shack. Of special note is Line 40, which rejects any file whose extension is not PIC. If your graphics are not filed as PIC but rather as PIX, the solution is simple. Make Line 410 read PIX. However, if you commonly use the extension BIN for your graphics screens, a real problem exists. If you substitute BIN for PIC in Line 410, the program will try to load any and all BIN extension files, which, if the file is not a graphic, could cause the computer to go nuts and lock up. My suggestion is to rename your graph-
ics, using either PIC or PIX for the extension.

Lines 510 to 600 comprise the image processor. The routine loads each 6,143-byte-long image on the disk in turn, then processes it by taking every sixth byte on every sixth line and composing a picture in the upper left-hand corner of the screen. You may notice that the creation of the small image, because of the STEP 6, allows a dual use of the first screen. This small image is transferred with the GET and PUT in Line 580 from PMODE4 Screen One (pages 1-4) to Screen Two (PMODE4 pages 5-8) and labeled with the Draw Letters subroutine in the wink of an eye.

Lines 490 and 540 enable this program to avoid graphics files longer than the single PMODE4 screen, such as the eight-page saves made with Derringer's Master Design or Colorware's CoCo Max. If the whole eight-page file were to be loaded, it would destroy the directory being created on PMODE 4 pages 5-8. To keep this from happening, the place marker created by Line 310 is used, with the proper filename, instead of a reduced image.

After the directory is completed, it is copied from pages 5-8 to pages 1-4 by Line 630. The disk filename you entered earlier, the date and the free grans on the picture disk are written to the directory screen and then the beeping begins in Line 680.

Pressing N when the program asks if you want to save the directory allows you the option of entering a new disk filename for the directory. If, at this point, you want to start over, simply press ENTER, which sends you to the end-of-program menu. Pressing Y at the SAVE prompt sends the program execution to Line 730.

Line 730 is a standard four-page graphics save. Line 740 starts the end-of-program menu. This menu gives you three choices: restart, end or menu. Restart runs the program from scratch. This is what you choose when you are ready to catalog your next graphics disk. End stops the program and returns you to BASIC. Menu is a convenience I added for myself. I have several graphics design program disks. All of them are menu driven, and the menu program on each disk is named MENU.BAS. A switch of the disks, two key presses and I'm three programs away. The lazy artist's graphic system.

Having cataloged all of your graphic disks, run each of the directories through a screen dump utility. Using the hard copy produced, you have a compact, concise and impressive catalog of all your graphics efforts, a computer artist's portfolio.

I will be glad to answer any questions about this program. My address is P.O. Box 648, Siloam Springs, AR 72761.

The listing: GRADIR

```
10 CLEAR 2000: DIM L$(59), M(98), V(200), Q(100), DF$(30), GP(22, 2)
20 GOTO 100
30 "*****DRAW LETTERS*****
40 DRAW"BM"+STR$(INT(PW))+","+STR$(INT(PQ))+"C"+STR$(K2)+"S"+STR$(S2)+"
50 FOR L=1 TO LEN(N$)
60 Q$=MID$(N$,L,1): IF ASC(Q$)>97 THEN Q$=CHR$(ASC(Q$)-32)
70 IF ASC(Q$)-31<1 THEN RETURN
80 IF Q$=CHR$(34) THEN DRAWL$(3): GOTO 100
90 DRAWL$(ASC(Q$)-31)
100 NEXTL: RETURN
110 'check for file length
120 OPEN"D",1,F$:1:FIELD #1,1 AS A$: P=1:gosub l50
256:gosub 150: L=C+
140 CLOSE #1: RETURN
150 IF P>LOF(I) THEN C=1:RETURN
160 GET #1, P: C=ASC(A$): P=P+1: RETURN
170 RETURN
190 GOSUB 180: PRINT: PRINT "PLEASE STAND BY WHILE THE PROGRAM INITIATES. THANKS." "
200 FOR I=1 TO 22: READ GP(I, 1), GP(I, 2): NEXT I:
210 IF ASC(#2)=1 THEN GOSUB 150: RETURN
220 IF ASC(#2)=1 THEN GOSUB 150: RETURN
```

THANKS."
SUPER PROGRAMMING AID

"Best value of the year", see the review in the July Rainbow.

The Super Programming Aid is the best integrated software utility available for your COCO. Add what Tandy left out, COPY and MOVE statements, FIND, PRINT FORMATTER, KEY CLICKER, PROGRAMMABLE KEYBOARD, MULTIPLE EDIT SESSIONS, MERGE PROGRAMS, TYP-O-MATIC keys and much more, saves hours of time for BASIC programmers. Version II and III add many more features, PRINT SPOOLER, FULL SCREEN EDIT, COMAND, SCREEN PRINTING and more.

VERSION I — $19.95 — for 16K & 32K COCO
VERSION II — $24.95 — for 64K COCO
VERSION III — $29.95 — for COCO 3

Call or Write Bangert Software Systems for Info P.O. Box 21056 Satisfaction Guaranteed! Indianapolis, IN 46221

We Carry the Complete Line of Tandy Computer Products at Discount Prices CALL FOR A FREE PRICE LIST 800-257-5556 IN N.J. CALL 609-769-0551 WOODSTOWN ELECTRONICS Rt. 40 E. WOODSTOWN, N.J. 08098

TANDY COMPUTER DISCOUNTS

COLOR COMPUTERS
26-3127 64k color comp 140.00
26-3131 1st disk drive 269.95

PRINTERS
26-1276 DMP-3010 650.00
26-1277 DMP-3051 950.00

MODEL 4 and MSDOS COMPUTERS
25-1050 Tandy 1000 EX 155.00
25-1051 Tandy 1000 SX 145.00
25-0101 Plus expansion board 110.00
25-1050 2nd drive mod 100k 920.00
25-1020 VM-4 Monochrome monitor 25-1070 mod 4D 64k 2dr.
**Customizing Color**

While disassembling Extended BASIC on the CoCo 3, I found that the `PALETTE CMP` default values occupy memory locations from $E654$ to $E663$. Default values for `PALETTE RGB` are in locations $E664$ to $E673$ and the present `PALETTE` values are in locations $E678$ to $E687$. You can customize two color sets by poking respective values in the `PALETTE CMP` and `PALETTE RGB` ranges and then switching between them with one command. You can then peek the present `PALETTE` values to find out what color is in what slot.

Jason Forbes

Mexico, NY
**PRO-COLOR-DIR**

ENHANCED 2.0

- 60 Data Fields for each record
- 1024 spaces available per record if needed
- Maximizes multiple drive operation
- 256 equation lines (+ - / * ^)
- IF-THEN-ELSE logic text in equations
- Full Screen editing on up to 6 data entry screens
- Key click and auto key repeat
- Stores custom designed report formats
- Obtain totals, averages, or summaries for any field
- Output reports to printer, screen, or disk file
- Send data out to a DYNACALC compatible file
- Separate label generator for up to 10 across labels
- Pre-define up to 16 indexes for searching/reporting file
- Sorts 750 records in under 5 minutes
- User defined selection menus
- Repeated data performance with one keystroke
- Comes with 75 pages of documentation in a 3 ring binder
- Supported by a national users group
- Full time programmer support
- Supplied on an unprotected disk

FOR BOTH

**$29.95**

**$19.95**

**PRO-COLOR-DIR**

© 1984 by Derringer Software, Inc.

**PRO-COLOR-DIR** will read your directories and create a master data file that can be accessed by **PRO-COLOR-FUNCH** for sorting and reporting. 1000 + records can be stored on one diskette with valuable information about each program. You can obtain hard copies of the information and create labels of the filenames for placing on the diskette itself.

- DISK ID NAME
- FILENAME/EXT
- TYPE OF FILE
- DATE CREATED
- DATE UPDATED
- NUMBER OF SECTORS
- ALLOCATED
- ALLOCATED AND USED
- MACHINE LANGUAGE ADDRESSES

**$29.95**

**$19.95**

**PRO-COLOR-FORMS 2.0**

© 1984 by Derringer Software, Inc.

**PRO-COLOR-FORMS** will access data files created with **PRO-COLOR-FUNCH** and merge them with a letter or place them on pre-printed forms.

- STORE UP TO 6 FORMATS
- USER DEFINED PAGE SIZE
- SUPPORTS SPECIAL PRINTER CONTROL CODES
- RIGHTJUSTIFICATION
- PASSWORD PROTECTION
- MERGES WITH GRAPHICS FROM MASTER DESIGN OR TELEGRAPHICS

**$68.95**

**$49.95**

**DYNACALC**

SPREAD SHEET FLEXIBILITY

(Includes Dynagraph, Sidewise)

**$79.95**

INCLUDES @SUMMARY!

Telewriter-64...

WORD PROCESSOR POWER

**$59.95**

INCLUDES MASTER DESIGN

CoCo Max II

GRAPHICS SUPERIOR

**$79.95**

INCLUDES TELEGRAPHICS!

**@ SUMMARY**

© 1983 Derringer Software, Inc.

If you use your spreadsheet program to keep track of your expenses then @SUMMARY can help you analyze those expenses. For example if you included a "Category" for each expense then @SUMMARY will produce a report that shows a total for each category, the highest amount, the lowest amount and the average amount. In addition, @SUMMARY can produce a hi-res line graph or bar graph of the analysis and allow you to place titles on the graph. A hardcopy of the graph can also be generated as well as saved to disk.

The analysis can be saved in a "data file" which can be loaded into DYNACALC or read in by @SUMMARY for future additions to the analysis. If you use other Spreadsheets such as ELITE*CALC then you have added a graphing feature to your spreadsheet application. The analysis can also be saved in an ASCII file which can be read by word processors for inclusion in a report.

© 1984 Derringer Software, Inc.

**TELEGRAPHICS**

PRINT HI-RES GRAPHICS USING TELEWRITER-64!

Use CoCo Max, Graphicom or other graphic programs to create letterheads and print them while using Telewriter-64. Telegraphics interfaces with Radio Shack, Epson, Gemini, C-1toh and Okidata printers having dot-addressable graphics. A simple modification to Telewriter-64 will allow you to exit Telewriter via the DISK 1/0 MENU and print out the graphic without affecting any of your text in the buffer.

This is the same feature that is included in our MASTER DESIGN program. Since we felt you don't need to buy two graphic designing programs, we have made this feature available at a reduced price.

**$9.95**

(For disk only)

NO OTHER DISCOUNTS APPLICABLE

**SIDEWISE**

* RS-DOS version included FREE with DYNACALC*

OS9 is a registered trademark of MICROWARE and MOTOROLA

**TELEGRAPHICS**

© 1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also works with the Telewriter-64 word processor for printing hi-res displays with your letters. Take full advantage of all the extended BASIC-graphics commands to create commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squash displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or **PRO-COLOR-FORMS**.

Interfaces with dot matrix printers having dot addressable graphics.

**$29.95**

See reviews in...

July '84 Rainbow. Oct. '84 Hot CoCo

*CoCo 3 Compatible

**DYNACALC** is a registered trademark of Computer Systems Center, ELITE*CALC is a trademark of Elite Software

OS9 is a registered trademark of MICROWARE and MOTOROLA

© 1984 by Derringer Software, Inc.

**SIDEWISE RS-DOS**

© 1984 by Derringer Software, Inc.

Add a new "twist" to your printer's capabilities!

**SIDEWISE** makes your printer do something you never thought possible—print side ways!

**SIDEWISE** will read in any ASCII text file and print it out side ways using a Radio Shack, Epson, Okidata, C-1toh or Gemini printers having dot-graphics ability.

**SIDEWISE D9S** is compatible with DYNACALC D9S and requires Basic89

**$99.50**

(No disk only)

**$249.95**

* RS-DOS version included FREE with DYNACALC*

© 1984 by Derringer Software, Inc.

**TELEGRAPHICS**

© 1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also works with the Telewriter-64 word processor for printing hi-res displays with your letters. Take full advantage of all the extended BASIC-graphics commands to create commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squash displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or **PRO-COLOR-FORMS**.

Interfaces with dot matrix printers having dot addressable graphics.

**$29.95**

See reviews in...

July '84 Rainbow. Oct. '84 Hot CoCo

*CoCo 3 Compatible

© 1984 by Derringer Software, Inc.

**TELEGRAPHICS**

© 1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also works with the Telewriter-64 word processor for printing hi-res displays with your letters. Take full advantage of all the extended BASIC-graphics commands to create commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squash displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or **PRO-COLOR-FORMS**.

Interfaces with dot matrix printers having dot addressable graphics.

**$29.95**

See reviews in...

July '84 Rainbow. Oct. '84 Hot CoCo

*CoCo 3 Compatible

© 1984 by Derringer Software, Inc.

**TELEGRAPHICS**

© 1984 by Derringer Software, Inc.

Generates lettering in hi-res graphics that can be different sizes, skinny, bold, textured, drop shadowed, raise shadowed or tall. Also works with the Telewriter-64 word processor for printing hi-res displays with your letters. Take full advantage of all the extended BASIC-graphics commands to create commands including boxes, circles, lines, copy displays and utilize GET and PUT features. Added commands include mirror reflection, turn displays backwards or upside down. Squash displays, create dot patterns for shading or diagonal lines.

The Letterhead Utility allows you to access hi-res graphics from Telewriter-64, your own BASIC programs or **PRO-COLOR-FORMS**.

Interfaces with dot matrix printers having dot addressable graphics.
A handy disk utility for the CoCo 3

Take Command of CoCo 3 Drives

By Michael N. Jorgenson

I have a vast assortment of utilities for the older CoCos, but only a few of them will run on the new CoCo 3. So, I have written my own utility.

DU-3 is a disk utility written in BASIC, and it contains many interesting features. The operating commands are Copy, Drive, Kill, Load, Name, Scan, Quit and Verify. An INKEY$ control letter is given for each command.

Upon start-up, the directory of a disk in Drive 0 is read and displayed in split format on the 40-column text screen in numerical order with extensions and granule allocations. The free granule space of the disk, if any, will also be shown.

The BREAK key can be used to escape any function, or to read in another disk on the same working drive. Pressing C copies any or all files from one disk to another. The program prompts for the destination drive number (the default is Drive 0). A single-drive copy can be made on any working drive. Use the D key to change your working drive. Press D and the number of the drive you want to use (0 to 3); the default is 0. Pressing K kills any or all files on the working drive disk.

To load any file on the working drive disk, press L. Use N to rename any file on the working disk drive, including the extension. S scans the working drive disk; the program prompts for a starting track and sector. Use Q to exit, and use V to toggle Verify on and off.

DU-3 only works on the Color Computer 3. It does not use a speed-up poke, but it will execute a PCLEAR1. This is to minimize disk-swapping on single-drive systems. The “Insert Destination Disk” prompt that appears on single-drive copies is in Disk BASIC, which looks a bit crummy on the 40-column screen. I could not find a way to work around it.

DU-3 reads and displays up to 68 files. If there are more than 36 files, the display scrolls upward off the screen, but does not affect program operation.

(Questions about this program may be directed to the author at 749 Tower Blvd., Lorain, OH 44052, 216-282-9355. Please enclose an SASE for a reply when writing.)

The listing: DU-3

10 '****************
15 'A DISK UTILITY
20 'FOR THE COCO-3
25 'MIKE JORGENSON
30 '****************
35 '40 PCLEAR1:CLEAR3500
45 DIM FL$(68),XF(68),V(68)
Now Create Your Own Signs, Banners, and Greeting Cards.

Introducing The Coco Graphics Designer

Last Christmas we introduced our COCO Greeting Card Designer program (see review April 86 Rainbow). It has been so popular that we’ve now expanded it into a new program called the Coco Graphics Designer. The Coco Graphics Designer produces greeting cards plus banners and signs. This program will further increase the usefulness and enjoyment of your dot matrix printer.

The Coco Graphics Designer allows you to mix text and pictures in all your creations. The program features picture, border, and character font editors, so that you can modify or expand the already built in libraries. Plus a special “grabber” utility is included to capture areas of high resolution screens for your picture library.

With Zebra's Coco Graphics Designer it's easy and enjoyable making your own greeting cards, signs, and banners.

Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1, ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, LX-100, C-10, DAC 910, DMP-100/200, SG-10, SG-120, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers.

Over 100 More Pictures

An optional supplementary library diskette containing over one hundred additional pictures is available.

Colored Paper Packs

Now available are packs containing 120 sheets of tractor-feed paper and 43 matching envelopes in assorted bright RED, GREEN, and BLUE. Perfect for making your productions unforgettable.

WICO TRACKBALL

Now $19.95

Order Code TBR501
(Was $69.95)

You can benefit from our purchase of brand new WICO Trackball Controllers at closeout prices. This model was designed specifically for the Radio Shack Color Computer and plugs right into your joystick port. WICO is the largest designer and manufacturer of control devices for commercial arcade video games. If you've ever played an arcade video game, chances are you've used a WICO joystick or trackball and experienced its superior control, pinpoint firing accuracy, and exceptional durability. Includes one-year limited warranty. Phonic ball offers 360-degree movement. Two optical encoders provide split-second response. Quick-action fire button for smooth, two handed arcade response and feel. Long commercial arcade video game control devicea for handed arcade response and feel. Long commercial arcade video game connection. Heavy duty plastic case for long hard use. Compatible with all color computer models.

We have bargain priced trackballs for ATARI, Commodore, TI, and other computers. Call or write for our price list.

With Zebra’s Coco Graphics Designer It's easy and enjoyable making your own greeting cards, signs, and banners.

February 1987 THE RAINBOW 95
ANNOUNCING... the Development of a Major Breakthrough in HARD DRIVE SYSTEMS for the COLOR COMPUTER!!!

Several months ago OWL-WARE introduced the Finest OS9 Hard Drive System for the Color Computer. Now we are about to introduce the only RSDOS Interface System worthy of our computer, OWL-WARE Winchester Basic. For the first time you have available a true Winchester System, although there are 10 directories made available to BASIC, the only limit to size of any file is the size of your drive. On a 10 meg drive you could have a 8 meg file on directory 5 and a 1 meg file on directory 8 and small files everywhere. You turn the computer on and you can immediately access your drive from BASIC or any language using commands you already know. You do not have to know or use OS9 to use OWL-WARE WINCHESTER BASIC, but if you do, all files saved from RSDOS are available to OS9. All files generated from OS9 can be made available to RSDOS by copying to the WINCHESTER BASIC directories. There are no partitions to wall you into, only one operating system, but nothing forces you to use an operating system you don't like.

Call for further details and availability on this breakthrough product!!!

OS-9 HARD DRIVE SYSTEMS

Disk Access is at Least... 8 Times Faster than Floppy Drives.

Control up to 2 Drives. EACH with Continuous Massive Memory!!! Complete OS-9 Hard Drive System Includes... Software, Hard Drive, Controller and L.R. Tech Interface.

NOTE: OS-9 and RS DOS... "This may prove to be the perfect mating of both systems." RAINBOW (May 86)

NEW PRICING!!!

$599. $629. $729. $859.

10 MEG 15 MEG 20 MEG 30 MEG

OWL-WARE is pleased to announce an exclusive arrangement to Distribute the L.R. TECH Hard Drive Interface and Software.

DEALERS INQUIRES INVITED
Special Bundled Software Disk Drive Purchase!

SHhhhh... Ask about the WISPER DRIVE!!!

DRIVE 0 $179. to $239. Single
Call for SPECIAL PRICES on Drive 0, 1, 2, 3 Combos.
DRIVE 1 $109. to $145. Double

Single

All drives are new and fully assembled. We ship FULLY TESTED and CERTIFIED DRIVES at NO ADDITIONAL CHARGE!

CHINON and Other Brands known as the highest quality made.

STATE-OF-THE-ART TECHNOLOGY

NOW FOR CoCo 1, 2, 3!!!

We have RSDOS, JDOS, OWL DOS, ADOS available on ROM. Call about Double Sided or Special Needs.

TOLL FREE ORDER LINE
(800) 245-6228

Call for LATEST PRICES!!!

See Special Bundled Software with Disk Drive Purchase!

WARRANTIES
90 day - 1 YEAR

M.C. & VISA Accepted

OWL-WARE
P.O. Box 116-D
Mertztown, PA. 19539

PA Res. Include 6% tax.
P.A. (215) 682-6855

OWL TIP: Version 1.1 of Disk Tutor now available. If you have not gotten yours, order today!!!

OWL-WARE Software Bundle
Disk Tutorial 3 Utilities 2 Games

DISK TUTOR Version 1.1
LEARN EVERYTHING ABOUT DISK BASIC FROM THIS MACHINE LANGUAGE PROGRAM. THE TUTOR TAKES YOU STEP BY STEP THROUGH THE LESSONS AND CORRECTS YOUR MISTAKES A MULTI-LESSON TUTORIAL THAT WILL GIVE YOU QUICK, PAINLESS KNOWLEDGE OF DISK BASIC (THIS PROFESSIONALLY WRITTEN TUTOR IS EASILY WORTH THE BUNDLE'S TOTAL PRICE).

OWL DOS
AN OPERATING SYSTEM THAT GIVES 25% FASTER DISK ACCESS AND ALLOWS USE OF DOUBLE SIDED DRIVES, CORRECTS FLOATING POINT NUMBER ERROR.

COPY-IT
QUICKLY COPIES SELECTED PROGRAMS FROM DISK. USE WILD CARD OPTION SEARCH TO SELECT GROUPS OF PROGRAMS FOR COPY (NOT FOR PROTECTED PROGRAMS)

VERIFY
VERIFIES READING EACH SECTOR. BAD SECTORS ARE LISTED ON THE SCREEN.

2 GAMES
2 GAMES FROM OUR STOCK. BOTH HAVE SOLD FOR OVER $135.00 WORTH OF SOFTWARE!!!

IF SOLD SEPARATELY OVER $125.00 WORTH OF SOFTWARE!!!

only $27.95
(or even better)
$6.95 with DISK DRIVE PURCHASE!!!

PRINTED SALE

STURDY Smith Corona
FASTEXT 80
80 CPS with 6 print spacings, graphics and extended character set. Includes serial to parallel printer interface.

ONLY... $179.

HALF HEIGHT DRIVE UPGRADE KIT FOR NEW RS SYSTEM
Why only double capacity when you can triple in the same case. KIT INCLUDES: double sided drive to fit in your case, includes hardware and chip to run double sided. Takes only 5 minutes. 1 YR. WARRANTY ONLY...

$119.

OWL-WARE’S TOLL FREE ORDER LINE (800) 245-6228
TECHNICAL ADVICE (215) 682-6855
All Prices Include Case and Power Supply
235 DRIVE A:GOT070
240 IF DF<1THEN1000 ELSEGOSUB370
245 ATTR 2,0:PRINT "KILL ALL OR SINGLE FILE: <A/S>
250 Q$=INKEY$:IFQ$="A"THEN27,0 ELSEGOSUB37,0
255 LOCATE 3,Y:LINEINPUT "ENTER THE FILE NUMBER TO KILL? ":K$=VAL(K$):IF K>DF OR K<lTHEN1,0,0
260 PRINT "KILLING: "FL$(K):KILL"+FL$(K):NEXT=GOTO700
265 PRINT "ENTER A FILE NUMBER TO RENAME? ";N$:N=VAL(N$):IF N>DF OR N<lTHEN1,0,0
270 PRINT "RENAME: "FL$(N) TO WHAT?": attractiveness
275 PRINT " <INCLUDE EXT>
280 Q$=INKEY$:IFQ$=""THEN275
285 IF Q$<"Y"THEN1,0,0
290 IF DF<1THEN100 ELSEGOSUB370
295 ATTR 2,0:LINEINPUT "ENTER A FILE NUMBER TO LOAD? ";L$:L=VAL(L$):IF L>DF OR L<lTHEN1,0,0
300 PRINT "LOADING: "FL$(L)+A$:POKE &HFF4,0,0,0:EXEC
305 PCLEAR4:CLS:END
395 ATTR 2,0:LOCATE 2,Y
400 IF X=10THENPRINTX;":ATTR
405 PRINTFL$(X);V(X):GOTO415
410 PRINTFL$(X);V(X)
415 NEXT:ATTR 2,0:IF T=$THEN Y+=1:Z=2:ELSEZ=2
420 LOCATE 2,Y:PRINT "Free = ";
425 ATTR 2,0:B=PRINT FR
430 IF DF<2 THEN Y=Y+3 ELSE Y=Y+2
435 LOCATE 3,Y:RETURN
440 GOSUB470:LOCATE 3,6:PRINT "THE SOURCE DRIVE IS: ";A:PRINT
445 PRINT " DESTINATION DRIVE: ";ATTR 2,0:PRINT 
"<ENTER=0> ?
450 B$=INKEY$:IFB$="THEN450
455 B=VAL(B$):IF B>3THEN450
460 IF B<lTHENB$="0"
465 RETURN
470 CLS:LOCATE 7,1:ATTR 3,0,B
475 PRINT " SCANNING DISK ON DRIVE: ";A-short
490 ATTR 2,0:LOCATE 3,9:INPUT "AT WHICH TRACK: <1-34> ";SX
495 IF SX>34 THEN495
500 LOCATE 3,11:INPUT "START AT WHICH SECTOR: <1-34> ";SK
505 IF SX>34 THEN495
510 FOR X=SX TO 34:FOR K=SK TO 18
515 FOR X=SX TO 34:FOR K=SK TO 18
520 DSK$ A,X,K,Y$,Z$;
525 ATTR 3,0:PRINT 
530 PRINT "FREE = ";
535 ATTR 2,0:PRINT 
540 PRINT " PRESS <ENTER> WHEN READY ••• ";Q$
545 PRINT " SCANNING DISK ON DRIVE: ";A
550 CLS:LOCATE 7,1:ATTR 3,0,B
555 PRINT " THE SOURCE DRIVE IS: ";A:PRINT
560 GOSUB370:ATTR 2,0:GOTO80
565 IF DF<1THEN100 ELSEGOSUB370
570 ATTR 2,0:LINEINPUT " ENTER A FILE NUMBER TO LOAD? ";L$:L=VAL(L$):IF L>DF OR L<1THEN100
575 ATTR 3,0:PRINT
580 PRINT " LOADING: "FL$(L)+A$:POKE &HFF4,0,0:EXEC
585 FORX=1TO10000:NEXT:WIDTH 32
590 IF X>(L)=2 THEN600
595 LOAD FL$(L)+":A$+A$:LOADM FL$(L)+":A$+
605 POKE &HFF4,0,0:EXEC
610 PCLEAR4:CLS:ATTR 3,0
615 PALETTE CMP:END
620 "*** END PROGRAM ***
Now available for all models, including CoCo 3

Enhancements for Productivity from HJL Products

Now at all-time Low prices!

To achieve maximum productivity with your Color Computer, you have to make it as easy as possible to get information into and out of the system. This is why we developed the HJL family of high-performance enhancements for ALL MODELS of the Color Computer.

The Keyboard - $79.95
The overwhelming favorite of serious Color Computer users worldwide, the HJL-57 keyboard has the smooth, consistent feel and reliability you need for maximum speed with minimum input errors. Includes 4 Function Keys and sample function key program. Installs in just a few minutes with no soldering.

The Numeric Keypad - $99.95
The NumberJack is a self-contained, cable-connected keypad for heavy-duty number-crunchers. Besides the number keys, it has all the cursors, symbols and math keys, including auto-shifted (one-touch) ADD and MULTIPLY. Comes complete with 3-foot cable and all necessary connectors for quick and easy installation without soldering.

The Monitor Adapter - $25.95
This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor - $89.95
The GoldStar high-resolution amber monitor brings you the monochrome display that's preferred by most computer professionals today. Once you've used it you'll never connect your computer to a TV set again. The 12-inch diagonal CRT has an etched non-glare faceplate. (Requires adapter sold above)

The BASIC Utility - $25.95
Quick Basic Plus, a high-performance programming utility, can be used with any color computer that has four function keys. 26 pre-defined BASIC statements, 10 user-defined macros at a time (you can save as many sets of macros as you like), automatic line-numbering, word wrap, global search, and instant screen dump to printer, make this software the BASIC programmer's dream come true. Comes with re-legendable 3-way reference chart. Specify disk or cassette.

The HJL Warranty
Every HJL product comes with a full, one-year warranty and the exclusive HJL 15-day unconditional guarantee (except software).

Pick a Pair & Save 15%
Now, for a limited time, we'll give you 15% off the price of any two or more products shown here. Just mention this ad when you order.

Call Now, Toll Free
1-800-828-6968
In New York 1-800-462-4991
International calls: 716-235-8358

Call Now, Toll Free
1-800-828-6968
In New York 1-800-462-4991
International calls: 716-235-8358
Also from Falsoft, The RAINBOW MAKER, . . .

The magazine for Tandy portable and MS-DOS users

Not only does Tandy produce our favorite CoCo, we think they produce the best and best-priced laptop portable and MS-DOS computers as well. We've found that when satisfied Color Computer users decide to add portability or move to MS-DOS, many stick with Tandy. For these people we publish PCM, The Personal Computer Magazine for Tandy Computer Users.

Each month in PCM, you'll find information and programs for the Tandy 100, 102, 200 and 600 portable computers. And you'll find even more coverage for their MS-DOS machines, the 1000, 1200, 2000 and 3000, along with the great new 1000 EX, 1000 SX and 3000 HL.

FREE PROGRAMS!
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.

BAR CODE LISTINGS AND PROGRAM DISKS!
For portable users, PCM is the only home computer publication in the world that brings you programs in bar code, ready to scan into memory like magic with the sweep of a wand! For those who don't have time to type in listings, we offer a companion disk service with all the programs from the magazine.

TUTORIALS AND PRODUCT REVIEWS!
As if all this weren't enough, we offer regular tutorials on 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!

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.

□ 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. # _____________________________ Expiration Date __________

Signature _____________________________

*Canadian subscribers U.S. $35. Surface rate elsewhere $64, airmail $85. Allow 6 to 8 weeks for first copy. Kentucky residents add 5% sales tax. U.S. currency only, please. Mail to: PCM, The Falsoft Building, P.O. Box 385, Prospect, KY 40059
Creating a Review Program

By Joseph Kolar
Rainbow Contributing Editor

The beginner who has stayed the course and faithfully struggled through these "Basic Training" tutorials, has reached the point where, after a review, he can consider himself a veteran.

Today, the project is to create a review program. A sentence in one language is displayed on the screen. A second, translating-language sentence with a randomly selected, blanked-out word/phrase is displayed below. Without any hints (except comparison with the first language) he is required to take a guess as to the missing word/phrase that would make the sentence whole. When he presses any key, the answer will be filled in. At this point, you may want to set aside this issue of THE RAINBOW, take up the challenge and see what you can come up with. If you have been studying these inspiring, fun-filled tutorials for the past year, you have the background to make a creditable program.

Key in lines 0 to 6, 20, 21, 23, 24 and 995 from Listing 1. We will use Line 20 for the first language and Line 21 for the translating language. Line 1 gives the starting locations on the text screen. It also chooses a random color, other than black or cyan, and having chosen a color, proceeds to Line 10. Line 10 clears the screen and is directed to a selected line number of a portion of the program that is currently being developed. CoCo stores (memorizes) the two strings, \$A and \$B in lines 20 and 21, respectively, and awaits our pleasure.

Temporarily, insert \$P=31: \$Q=P: GOSUB3:EXEC44539 as Line 22. \$P and \$Q are the variables that give the approximate number of characters/spaces in strings \$A and \$B, respectively. CoCo is told to go to Line 3, follow the instructions and return.

Line 3 tells CoCo to print, beginning at \$X, \$P number of character/spaces, starting from the left side of string \$A, and to abort any trailing blank spaces at the end of the last row. Ditto for the second string. CoCo returns to Line 22 and waits for any key to be pressed. Run your work.

This is a good time to check spelling, punctuation and formatting. In fact, you will want to create Line 2000: \$P=181: \$Q=P: GOSUB3: EXEC44539: RETURN and change Line 22 to GOSUB2000. Now run.

In the second translating language we want to blank out THE CITY. List Line 21. Directly from the screen, we count to the numerical value that starts the blank-out area and assigns it the variable \$A. (Remember, 0 is the upper left-hand location.)

Count the number of spaces to be blanked out. The first space after the starting quote is number 1. Count up to and include the space after the last letter to be blanked out. Assign the total a variable, \$N=11. This system gives you a little leeway. For instance, in Line 23, your calculations can be pretty casual and imprecise. If \$A=0 then \$N=10 or \$N=11; if \$A=1 then \$N=9 or \$N=10; if \$A=2 then \$N=8 or \$N=9. All these pairs will work equally well.

Delete Line 22. Line 23 provides both the \$A and \$N information that CoCo demands before it can zoom over to Line 5 and work its tail off.

List lines 3 through 5. Allowing for extra-long, multiple-row sentences, CoCo trots up to Line 3 and prints both strings, \$A and \$B, in their entirety. Then it jumps back to Line 5. Beginning at \$Y, plus any offset (\$A), it will print a row of CHAR(143) (the same color as the screen background), for a total of \$N spaces. At this point, it returns to Line 24 and waits for you-know-what!

CoCo shoots over to Line 4, where the translation line is reprinted in place and restored to a complete sentence. CoCo waits for a key to be pressed, whereupon it clears the screen, chooses a random color, and returns to be directed to the next pair of sentences. Run this.

For the heck of it, edit Line 5 so 143 becomes 128, and run. That doesn't look too bad. If you prefer a black blank-out, your \$A value should begin at the location of the first letter to be hidden, and \$N should include from the first letter through the last letter of the blanked-out word/phrase. In this case, \$A=2: \$N=8.

For the nonce, edit Line 5 so 128 is 143 and make sure \$R=0: \$N=11 in Line 21. Run to make sure.

List lines 20 to 21. It doesn't take long.

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

February 1987

THE RAINBOW

101
to note that we could blank out other areas.

Insert GOTO 25 as Line 22. Key in lines 25 and 26. Insert Line 40 as a remark statement, to hold the spot open for the next pair of sentences and to avoid the UL Error we were getting. Now run.

In Line 25, all we needed to do was select new A and N values. Line 26 is identical to Line 24. This time BIG was washed out. Change 25 to 27 in Line 22. Key in lines 27 and 28. Run and see OLD vanish. Again, the lines were similar, washed out. Change to hold the spot open for the next pair of sentences and to avoid the KEY in lines 27 and 28. Run and see that it was pointed out that there were both a MIDS statement, which we used to good advantage, and a MIDS function, which I glossed over ever so quickly?

Without being aware of it, I proved the old adage, "There is always more than one way to do anything." If you crack open your ECB manual, you will note that MIDS(X$ , A, N) equals replacement, where X$ is the string, A the position of first character to be blanked out and N is equal to the number of characters to be wiped out. Doesn't that sound familiar?

Consider: X$, A and N prepare to do exactly what we want to occur and yes, we have a replacement, STRING$ (N,'143). Look Ma, no MIDS function!

You are invited to try your hand at working out a small program to duplicate what our tutorial does, up to this point. Hint: Use lines 1, 10, 20, 21, 40 and 995. Use PART1 advisedly. In the next tutorial, you will be given one answer plus some insights on how it was constructed. In the meantime, let us continue. We have four different areas blanked out. Rather than get bored stiff displaying all four variants, wouldn't it be better if we picked one at random, displayed it and moved on to the next pair?

Key in Line 22 and run it a few times. We shall begin the next set of sentences starting at the reserved Line 40. Key in Lines 40, 41 and 43. Change Line 10 from 20 to 40, type 42 GOSUB2000 and reserve Line 60 (60'). Run this and check it out.

This time we are consolidating the two-line format (as in lines 23 and 24) and turning it into a one-liner. Insert Line 42: GOTO45. Key in Line 45 and run.

We shall reverse the languages to get another perspective. Here, again, are the steps in creating this routine. Change 60 to 68 in Line 10. Key in lines 80, 81 and 83. Reserve Line 100 (100'). Key in 82 GOSUB2000 and run.

Re-key 82 GOTO85. Key in Line 85 and run.

Re-key 82GOTO87. Key in Line 87. Run until all the variations check out.

"Without being aware of it, I proved the old adage, 'There is always more than one way to do anything.'"

Change Line 42 to read GOTO 47 and key in Line 47. Now run. You can drop the :GOT068 from Line 47, if you like. We are only making three variants. Key in Line 42 from the listing and run a few times. In Line 10, change 40 back to 20 and run.

Notice that we work methodically, checking each line as we add them. It is no sweat to isolate and correct a newly created mistake. Hasty, unverified work only guarantees a difficult debugging session later.

In Line 10, change 20 to 60. Key in Lines 60 and 61. Reserve Line 80 (80'). Insert Line 62: GOSUB2000. Run. Check the format, spelling and punctuation.

Key in lines 63 and 65 and run. Re-key Line 62, GOTO65 and run. At this stage, we note that an integral part of our program is the sequence GO SUBS : EXEC44S39 : GOSUB4. This is a pain to key in frequently. How can we shorten this repetitious task? Key in Line 6. Sure! Create a GOSUB out of the sequence! Key in Line 67. Change Line 62 to GOTO67 and run. This is good!

We could go back and change lines 23 through 30, 43 through 47 and 63 through 65 to reflect this modification. It doesn't really matter. Long form or short form, both accomplish the mission equally well. From now on, we shall use the condensed form.

Re-key Line 62 from the listing and run. In the next pair of sentences, we shall reverse the languages to see if this pairing was better than the original presentation. Why do we do the obvious and check what we know will work? We try every variation we can think of. This repeated toying with the program may turn up a dormant bug. It may also give us other ideas to pursue. You never know what you will think up while doing monotonous tasks. Using the previous procedure, work out the next pair of sentences from lines 100 through 107.

You have become aware of how un-taxing it is to create this program. A pair of sentences is chosen, portrayed and checked out on the screen; various blank-outs are decided upon; A and N values are determined; and so forth.

The line-numbering is consistent throughout. In the random-selection lines, the ON line is easy to construct. Looking at it another way, using L = 20 to indicate the program line number we have:

We switched languages to see if this pairing was better than the original presentation. Why do we do the obvious and check what we know will work? We try every variation we can think of. This repeated toying with the program may turn up a dormant bug. It may also give us other ideas to pursue. You never know what you will think up while doing monotonous tasks. Using the previous procedure, work out the next pair of sentences from lines 100 through 107.

You have become aware of how un-taxing it is to create this program. A pair of sentences is chosen, portrayed and checked out on the screen; various blank-outs are decided upon; A and N values are determined; and so forth.

The line-numbering is consistent throughout. In the random-selection lines, the ON line is easy to construct. Looking at it another way, using $L = 20$ to indicate the program line number we have:

\[
\begin{align*}
L & \quad : X$ \\
L+1 & \quad : Y$ \\
L+2 & \quad : M = RND(x) ; ON M GOTO L+3, L+5, L+7, etc. \\
L+3 & \quad : \text{variant I} \\
L+5 & \quad : \text{variant 2} \\
L+7 & \quad : \text{variant 3} \\
L+20 & \quad : \text{next X} \\
\end{align*}
\]
We increment each $L$ by +20 to allow for many variants in long sentences. The case is made to show that a simple, consistent procedure is lots of fun to use and results in rapid progress.

Thus far, we have been fooling around with the second language. Who knows when we will have an occasion to blank out a portion of the first language? Let us prepare a routine to add to the armaments in our arsenal of GOSUB routines.

To consult our program, list the first 10 lines and note that Line 5 did the blank-outs on $Y$. A similar line with one judicious change should do the trick. Key in lines 7 and 123 from the listing. Change $B$ to 7 in Line 123. Can you think of the other way that seems obvious? Run this.

CoCo displayed both sentences, blanked out and then restored the word in $Y$, and then blanked out and restored the definition in $X$.

Remember, we are experimenting! Re-key 122 GOTO125. Key in Line 125 and run.

This time, we add $A$ and $N$ values to display blank-outs and restorations in both $Y$ and $X$. In Line 125, delete the second $A=6$; and run. CoCo picked up the last $A$ value and ran with it.

List lines 120 through 123. You can see why no new $A$ and $N$ values were given for GOSUBB to work with. In lines 120 and 121, FIRST and ERSTE both begin at $A=6$ and are $N=6$ spaces long.

Change 125 to 127 in Line 122. Key in Line 127. Note the abbreviated Line 127. Again, we do not require a second set of $A$ and $N$ values, and the GOTO140 was not used because it's redundant.

Still experimenting, we try out a pair of sentences that require more than one row to display. You know the plan of attack. Check out this last routine on your own.

After you finish this task, we meditate a while and think: We have chosen one variant at random from each pair of sentences and displayed it. Then we chose and displayed a random variant from the next pair, going through all the sentences. Line 995 returns to recycle.

Instead of always beginning at the first pair at Line 20, why couldn’t we drop down at random and begin at any selected pair? Re-key 10 CL5Z. Key in Line 11 and run.

It works, but we never change background colors. Change 10 to 1 in Line 995 to go to the line that chooses a new color. We get a hint every time a new color is portrayed that we ran through a complete set and a new one is being announced.

To make $X$ in the last two pairs end up restored, change 8 to 9 in lines 143 through 149. Key in Line 9 and run.

If we don’t want the last pair of sentences in our program, we can alter Line 11 to omit them. Change 7 to 6 and, if you are a perfectionist, delete 140. Now run.

You could end by keying in lines 990 and 999, both unmasked, and masking Line 995. Run and SAVE "PROGRAM". But, that is not truly random.
Unless the last pair at lines 140 and 141 are chosen, CoCo proceeds sequentially, from its beginning, ON M, chosen in Line 11. To avoid the predictability of repeating a sequence of sentences, try this:

Make sure Line 10 reads CLSZ.

Change all the various GOTOs to GOTO 1 in the following lines: 24, 26, 28; 43 through 47; 63 through 67; 83 through 87; 103 through 107; 123 and 125. Add :GOTO1 at the end of lines 30 and 127 and run.

That is the end of the review session.

I hope you enjoyed plodding through the listing, and used some of the tricks you studied in the past. This program demonstrates how we make CoCo bend to our will — willingly!

---

The listing: LANGTRAN

```
0 'LISTING1
1 X=97:Y=225:Z=RND(7)+1:IF Z=6 GOTO1 ELSE GOTO 10
3 PRINT@X,LEFT$(X$,P):PRINT@Y,LLEFT$(Y$,Q):EXE
C444539:CLS:RETURN
5 P=181:Q=P:GOSUB3:PRINT@X+1,A,STRING$(N,143):RETURN
8 GOSUB7:EXEC44539:RETURN
9 GOSUB8:GOSUB3:EXEC44539:RETURN
10 CLSZ:GOTO20
11 M=RND(7): ON M GOTO 20,40,60,80,100,120,140
20 X$=" DIE STADT IST GROSS UND ALT. "
21 Y$=" THE CITY IS BIG AND OLD. "
22 M=RND(4): ON M GOTO 23,25,27,29
23 A=0:N=11:GOSUB5
24 EXEC444539:GOSUB4:GOTO40
25 A=13:N=4:GOSUB5
26 EXEC444539:GOSUB4:GOTO40
27 A=22:N=5:GOSUB5
28 EXEC444539:GOSUB4:GOTO40
29 A=18:N=4:GOSUB5
30 EXEC444539:GOSUB4
40 X$=" DIESER BERG IST HOCH. "
41 Y$=" THIS MOUNTAIN IS HIGH. "
42 M=RND(3): ON M GOTO 43,45,47
43 A=0:N=16:GOSUB5:EXEC44539:GOSUB5:EXEC44539:GOSUB4:GOTO60
45 A=18:N=6:GOSUB5:EXEC44539:GOSUB4:GOTO60
46 A=7:N=9:GOSUB5:EXEC44539:GOSUB4:GOTO60
60 X$=" DER ANDERE BERG IST NIE DRIG. "
61 Y$=" THE OTHER MOUNTAIN IS LOW. "
62 M=RND(3): ON M GOTO 63,65,67
67 A=6:N=A:GOSUB6:GOTO80
80 X$=" HERE IS A BRIDGE. "
81 Y$=" HIER IST EINE BRUECKE. "
82 M=RND(3): ON M GOTO 83,85,87
83 A=0:N=7:GOSUB6:GOTO100
85 A=11:N=14:GOSUB6:GOTO100
87 A=16:N=9:GOSUB6:GOTO100
100 X$=" THERE IS ALSO A BRIDGE. "
101 Y$=" DORT IST AUCH EINE BRUECKE. "
102 M=RND(3): ON M GOTO103,105,107
103 A=0:N=7:GOSUB6:GOTO120
105 A=11:N=5:GOSUB6:GOTO120
107 A=21:N=9:GOSUB6:GOTO120
120 X$=" THE FIRST HOUSE IS SMALL. "
121 Y$=" DAS ERSTE HAUS IST KLEIN. "
122 M=RND(3): ON M GOTO 123,125,127
123 A=6:N=6:GOSUB6:GOSUB8:GOTO140
127 A=21:N=7:GOSUB6:GOSUB8
140 X$=" I SHAVE MYSELF IN FRONT OF THE MIRROR. "
141 Y$=" ICH RASIERE MICH VOR DEM SPIEGEL. "
142 M=RND(4): ON M GOTO 143,145,147,149
143 A=14:N=5:GOSUB6:A=10:N=7:GOSUB8:GOTO160
145 A=0:N=14:GOSUB6:N=10:GOSUB8:GOTO160
160 'PRINT@Y+139," THE END! ";
995 CLSZ:GOTO100
999 'GOTO999
```
The Second Rainbow Book of Adventures

Twenty-four of the most challenging Adventure games ever compiled await you in this Rainbow Bookshelf thriller. Journey through time, fight World War III, or win the heart of a beautiful and mysterious princess. Experience the titillations of the most rugged Adventurer without ever leaving your seat.

Who knows what mystical delights you will encounter in Adventures like:

Yellow Submarine — Meet the Beatles, defeat the Blue Meanies and enjoy some of the Fab Four’s great hits.

The Wands of Rage Dune — Seek out and destroy the evil lord of Vogguk.

African Transference — Avoid the cannibals to win the fantastic treasure.

Pappy’s Gold — Whatever happened to Pappy and Sarah’s mine?

Secret Agent Man — Outwit Iranian terrorists, or your trip to Rio is off.

Sir Randolph Returns — Our first Adventure book hero is back and the action is hot.

Curse of Karos — Find the oracle to save Barret-town.

Experience other traditional and contemporary challenges from these winning authors: Mark Fetherston, Jeff Crow, Larry Lansberry, J.C. Jackson, Robert W. Mangum II, Robert Poppe, David Taylor, Gregory Clark, Steve Skrzyniarz, David L. Dawson, Curtis Boyle, Bruce K. Bell, Pat Pugliano, Pat and John Everest, Mike Fahy, Scott Settembre, Darin Anderson, Robert L. Thomas, Terrance Hale, Paul Hensel, Philip Courie, Michael Dennison and Robert Dickau. With the tape, receive three more adventures by Eric and Mark Riel, Carmen D. Michele and Jane Fisher.

The Second Rainbow Book of Adventures sells for only $13.95!

Three Bonus Programs When You Buy The Tape!

That’s right. You’ll receive a total of 27 fantastic Adventures when you get the Second Rainbow Adventures tape — programs with listings too lengthy to include in the book. Save yourself hours of typing listings. Load these great Adventures into your computer and run them!

The Second Rainbow Adventures Tape is only $13.95!

Please send me: □ The Second Rainbow Book of Adventures for $13.95* □ The Second Rainbow Adventures Tape for $13.95*

Name ___________________________ □ My check in the amount of _____ is enclosed.*
Address ___________________________________________ Please charge to my:
City __________ State ________ ZIP ____________ □ VISA □ MasterCard □ American Express
Signature ___________________________ Acct. Number ___________ Exp. Date ___________

Mail to: The Second Rainbow Book of Adventures, 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.

*Add $1.50 shipping and handling per book. Outside the U.S., add $4. Allow 6-8 weeks for delivery. Kentucky residents add 5% sales tax for book and tape. In order to hold down costs, we do not bill. U.S. currency only, please.
Create fast, detailed Adventure game graphics

Instant Graphics and Hogs in Space

By Courtney Powers

There have been two main types of Adventure games seen so far in these pages: text Adventures and those combining graphics and text. Text Adventures do not satisfy because they lack what our favorite computer is so famous for — color. An Adventure game with mixed text and graphics that draws the characters on the graphics screen is the best solution.

Doing this in BASIC, however, leaves us with the pictures drawn slowly in front of us or slowly on a graphics page not currently being viewed, leading to long, unexplained delays in the execution of the program. A method I have seldom seen used is the simple expedient of drawing the pictures ahead of time and saving the graphics pages to disk as machine language programs.

The instruction for saving a machine language program, SAVEM, requires four items of information: a filename, and the start, end and transfer addresses.

Where is the start of the graphics screen memory? The Color Computer stores the number of 256-byte boundaries to the beginning of the graphics pages in memory location Hex BC. Therefore, \( S = \text{PEEK}(&HBC) \times 256 \) gives us the address we are after. The variable \( S \) now contains the location in memory of the upper-left corner of the screen in Graphics Page One.

Next, we need to know the end address. Again, this is quite simple. The graphics page takes up 6K of memory. To find its end address, use \( E = S + (1024 \times 6) - 1 \). Why the \(-1\) in the assignment? You are starting to count at zero here. \( S + 6K \) is one memory address past the end of the screen.

Now we have a method for getting the entire screen saved to disk. What? I forgot the transfer address? Well, we don’t want to execute this particular program, as graphics bytes don’t make good ML instructions, so we’ll just cause this particular “program” to execute Color BASIC. Thus, our transfer address is \( T = &HA000 \), which is the beginning of our BASIC ROM. To save our picture we merely write SAVEM("filename", S, E, T).

Most of the Adventures we have seen so far do not use the entire screen for graphics, however. The top of the screen is customarily used for graphics and the bottom for the drawn-in text. So we only need to save the top half of the screen where we draw our pictures. Instead of 6K past the start address, we only go 3K. Here is our modified routine to save the pictures:

```
1000 S = PEEK(&HBC) \times 256
1010 SAVEM("filename", S, S + 1024 \times 3 - 1, &HA000
```
To get the picture back from disk and onscreen, we merely load the ML program. Type LOAD "filename".

In the demo program, I wanted a color similarity to Sands of Egypt (blue, orange, black and white), so I could have black space and white stars. However, this color combination is not available in PMODE 3.

The demo program, HOG.BAS, draws the pictures in PMODE 3 and displays them in PMODE 4. Since both modes require the same amount of memory, it is possible to locate the picture in the same memory addresses in both modes and get the color combinations I like.

The interesting things that happen to colors when you save a picture in PMODE 3 and reload them in PMODE 4 are gratifying. You can now have four colors in PMODE 4 without actually going to the trouble of poking each pixel into place!

The manner in which the graphics screen changes will be familiar. You can make your source picture as complicated as you want, and it loads in at the same speed each time — much faster than drawing in real-time.

Another thing we need for a graphics/text mix is a good routine for drawing the letters on the screen. The routine in the demo program does this nicely and can be merged into any program. Use RENUM and MERGE wherever you like, but the routine does work slightly faster if it is put at the beginning of a program.

To use HOG.BAS, first load the program. Then put a formatted, blank disk into the assigned drive. Run the program. You are first quizzed as to the color appearing on the screen. For some unknown reason, the CoCo randomly interchanges the two added colors in PMODE 4 each time the computer is turned on and off. Therefore, we have to redraw the scenes for each new session.

Once we have ascertained the correct coloring, the computer goes to work drawing the scenes for the game. This is a good time to go to the kitchen for a cup of coffee. To draw all the scenes takes a couple of minutes. A beep informs you when it is done with this task, and you are asked whether you need to go through the instructions or not. I always do, as I find them almost as much fun as the game.

After you have received your instructions, it is a simple "Hunt the Wumpus" type of game with a numbered search grid and inputting coordinates such as 1.2 or 6.6 to go to those places on the grid. A game like this is really much better with graphics, as you can visualize where you are and what you are doing there.

In the demo program, HOG.BAS, I have merged the drawing routine into the game program. You could have the drawing routine in a separate program, but this way the blue/orange colors come out correctly each time. However, if you are like me and like to chance it, once you have run the program one time and have the pictures on disk then you can avoid the delay of picture drawing. Just type RUN 3000 and start playing. If you are lucky, the blue/orange colors will come out right. If not, you must either run the program, press RESET and enter RUN 3000 again, or live with it. The subroutine that draws the letters on the screen is in lines 40 to 520. This subroutine can be isolated and merged into other programs. To use it, assign location coordinates LX (0-255) and LY (0-191), put the message to be printed in A$, and call the routine.

At Line 1 we immediately jump to Line 630 to get past our character-drawing routine, and start by making sure our disk drive is prepared. Then we check our color in lines 730 to 770 and assign the color variables C2 and C3. This is essentially the method I have seen Fred Scerbo use in his "Wishing Well" articles. Then, at Line 830 we start drawing our pictures and saving each one to disk as a machine language program.

At Line 3000, our pictures drawn, we ask the player whether he wants to go through the instruction sequence. If the player chooses immediate play, we branch to Line 4000 and the start of the game. If not, we go through an instruction sequence that consists of just loading in the pictures and showing the instructions. From Line 4030 to Line 4370 we prepare the game by setting up initial conditions.

Starting at Line 5030 (the top of the main loop) we draw in the picture appropriate to our current location, draw a "gravitonic detector," and fill in blocks to show nearby objects. At lines 5380 and 5390 we check to see if the player has won or lost the game. Then at Line 5430 we get the player's move, and go back to the top of the main loop at Line 5670.

The routine that prints a message appropriate to each location is in lines 6010 through 6130. The "win game" routine is in lines 6170 to 6280, and the "lose game" routine is in lines 7030 to 7140. The infamous INKEY subroutine is in Line 19999, ending our program.

The main purpose of all this is to provide you with the tools to construct an Adventure game that gives you a professional-looking picture change, and to get rid of all those awful text Adventures. Put in some graphics that make us proud. Let the games begin!

(Questions about this article can be addressed to the author at Rt. 1, Box 43, Davenport, ND 58021. Please enclose an SASE for a response.)
Connects to the serial I/O port!

 Speakeasy for $149.00

 The speech synthesizer that leaves the others tight lipped

 Finally...

 * No more fumbling with Multi-Pac or Y-Connectors
 * No vocabulary KOM or disk needed
 * Compatible with all operating systems
 * No driver program needed
 * Appears as a printer to Co-Co

 Speak-Easy plugs into the serial port of your Co-Co, not the card slot, and appears as a printer to the Co-Co. Incorporated in Speak-Easy is a unique state of the art two chip set which phonetically converts ASCII text to speech. What this means is that you have little ease of use, virtually unlimited vocabulary, and complete flexibility in a speech synthesizer. Just look at this sample BASIC program:

```
10 INPUT A$  
20 PRINT "BM+",A$  
30 GOTO 10  
```

Also available in RS-232C configuration with selectable baud rate, word length and stop bits. Choose between 4 pin DIN or DB-25 connectors. If you have a special need or configuration, let us know. We will have you talking in no time!

---

The listing: HOGSPACE

```
1 GOTO 630  
2 SAVE"HOG":STOP  
30 REM**************************  
40 REM START DRAW LETTERS SUB  
50 REM**************************  
60 DRAW"BM+",0,+,0;D4ND4R8U4L3":R  
70 RETURN 'A  
80 DRAW"BM+",0,+,0;D4ND4R8U4L3":R  
90 IF LI<0 THEN LI=27  
100 DRAW"BM+",STR$(LI)+",+STR$(LI)":ON LI GOSUB 130,140,150,160,1  
170,180,190,200,210,220,230,240,2  
250,260,270,280,290,300,310,320,3  
330,340,350,360,370,380,390,400,4  
410  
110 PLAY"G"  
120 NEXT LP:RETURN  
130 PRINT "HOGSPACE"
```

---

Spectrogram Magazine provides useful and interesting support material with a wide range of programs and articles by some of the best writers and programmers available.

**TELEGRAM** by Bobby Ballard: A monthly column concerning the Color Computer and its use in telecommunications.

**DOWNTIME** by Rush Caley: Little-known facts, new and different ideas, opinions, and an occasional criticism or two.

**BASIC HELP** by Bill Bernico: Answers to your questions concerning the Color Computer and the BASIC language.

**PASCAL PROGRAMMING** by Delmar Searls: An in-depth study of Pascal and how to use it effectively.

Assembly, C, OS-9, REM statements as data storage, floating point math, and graphics animation are covered with an emphasis on understanding. Utilities, games, business and home management programs are a steady diet. and all the programs in Spectrogram Magazine could become the most informative addition to your Color Computer system!

---

Please send me 12 issues of Spectrogram Magazine for $18 (40% off the cover price).

Name:

Address:

City:

State: Zip:

( ) Check enclosed ( ) Visa ( ) MasterCard

Card #: Exp. Date:

Mail to: Spectrogram Magazine

P.O. Box 138

(815)968-9600

Rockford, IL 61105

---

February 1987 THE RAINBOW 109
THE RAINBOW February 1987
2030 DRAW"BM+1Ø,+Ø;U8R6D4L4R6D4"
2040 DRAW"BM+4,+Ø;U8D4R6U4D4R2D4"
2050 SAVEM"SWEDISH",S,S+1Ø24*3-1,&HA0ØØ
2060 REM*************************************************************************
2070 REM DRAWING DOG PLANET
2080 REM*************************************************************************
2090 PCLS:GOSUB 9,0,0
2100 CIRCLE(9,45),25,3,.8
2110 PAINT(9,45),2,3
2120 SAVEM"DOGS",S,S+1Ø24*3-1,&HA0ØØ
2130 REM*************************************************************************
2140 REM DRAWING HOG KISS
2150 REM*************************************************************************
2160 PCLS:GOSUB9,0,0
2170 CIRCLE(125,5),45,C2,.6
2180 CIRCLE(125,5),45,C2,.3
2190 PAINT(125,5),Ø,C2
2200 CIRCLE(125,5),8Ø,C2,.7
2210 PAINT(125,35),C3,C2
2220 PAINT(125,65),C3,C2
2230 PAINT(6Ø,5),C2,C2
2240 LX=9Ø;LY=45:A$="KISS"
2250 GOSUB 40
2260 SAVEM"KISS",S,S+1Ø24*3-1,&HA0ØØ
2270 REM*************************************************************************
2280 REM DRAW GRAVE FOR DEAD
2290 REM*************************************************************************
2300 PCLS
2310 LINE(,0,0)-(256,95),PSET,BF
2320 OX=,0;OY=15:FOR X=1 TO 256 S
2330 PRESET=(X,Y),PRESET=OXY=V:NEXT X:
2340 LINE(OX,OY)-(256,35),PRESET
2350 PAINT(1,1),1,1
2360 FOR X=1 TO 1ØØ:PRESET=RND(256)
2370 ,RND(4Ø),Ø):NEXTX
2350 PAINT(5,9),C3,1
2360 LINE(85,55)-(168,8Ø),PRESET
2370 PAINT(1ØØ,7),C2,1
2380 LINE(9Ø,6Ø)-(16Ø,75),PRESET
2390 LX=87;LY=64:DRAW"Cl":A$="R
2400 IP":GOSUB4Ø
2410 DRAW"BM85,8,Ø;F5,Ø;R83;H5Ø"
2410 PAINT(1ØØ,9Ø),1,1
2420 S=PEEK(&HBC)*256:SAVEM"DEAD"
2430 REM*************************************************************************
2440 REM END OF PICTURE DRAWING
2450 REM*************************************************************************
3010 REM*************************************************************************
3020 REM INSTRUCTION SEQUENCE
3030 REM*************************************************************************
3040 PCLEAR 4
3050 PCLS:PMODE4,1
3060 COLOR Ø,1:SCREEN 1,1:PCLS
3070 REM*************************************************************************
3080 REM SHOW EMPTY VIEWSCREEN
3090 REM*************************************************************************
3100 LOADM"EMPTY"
3110 LX=-1;LY=1ØØ
3120 A$="YOU ARE BEING CALLED ON THE INTERSPACE TELCOMMER...
3130 REM*************************************************************************
3140 REM END OF PICTURE DRAWING
3150 REM*************************************************************************
3160 SOUND1,4:CLS:PRINT"DO YOU NEED INSTRUCTIONS?":GOSUB 19999:IF X$="Y" THEN 3Ø4Ø ELSE 4ØØ
3170 PLAY"01;T1ØØ;ABABABABABABAB"
3180 GOSUB 4Ø
3190 GOSUB 19999
3200 GOSUB 352,0
3210 A$="THIS IS YOUR BO SS-HOG. MISS HOGGY HAS BEEN HOGN APED BY THE INFAMOUS HOGS IN SPACE...
3220 REM*************************************************************************
3230 REM*************************************************************************
3240 GOSUB 4Ø
3250 GOSUB 19999
3260 GOSUB 352,0
3270 A$="YOU ARE BUT A FROG- MAN FROM PLANET SWAMP BUT YOU ARE ALL WE HAVE. YOU ARE TO GO TO... HIT -ENTER- FOR MORE"
3280 GOSUB 4Ø
3290 GOSUB 19999
3300 GOSUB 352,0
3310 A$="THE CO-ORDINATES I AM NOW SENDING TO YOUR NAV-COMP UTER. HIT -ENTER- FOR MORE"
3320 GOSUB 4Ø
3330 GOSUB 19999
3340 GOSUB 352,0
3350 A$="YOU MOVE AROUND THE ST AR SYSTEM BY INPUT -TING DATA ON YOUR NAV-COMPUTER. FOR EXA MPLE- HIT -ENTER- FO R MORE"
3360 GOSUB 4Ø
3370 GOSUB 19999
3380 GOSUB 352,0
3390 A$="YOU MOVE AROUND THE ST AR SYSTEM BY INPUT -TING DATA ON YOUR NAV-COMPUTER. FOR EXA MPLE- HIT -ENTER- FO R MORE"
HOW DO YOU GIVE A RAINBOW?

It's simple — Give a RAINBOW gift certificate . . .

Let a gift subscription to THE RAINBOW carry the premier Color Computer magazine right to your friends' doorsteps. THE RAINBOW is the information source for the Tandy Color Computer.

Each month, your friends will enjoy the intelligent programs, reviews and articles written exclusively for their CoCo.

First, your gift will be announced in a handsome card. Then, all year 'round, they'll remember you and your thoughtfulness when they get each edition of THE RAINBOW — more than 200 pages loaded with as many as 24 programs, 15 regular columns and lots of helpful hints and tips.

Generosity benefits the giver, too. There'll be no more tracking down borrowed copies of THE RAINBOW. Your collection will be safe at home.

Give a RAINBOW gift certificate and let your friends in on the fun. THE RAINBOW is the perfect companion for the Color Computer!

Get your order to us by Feb. 25 and we'll begin your friends' subscriptions with the April issue of RAINBOW.

Please begin a one-year (12 issues) gift subscription to THE RAINBOW for:

Name __________________________________________
Address ________________________________________
City ___________ State _______ ZIP ____________

From:

Name __________________________________________
Address ________________________________________
City ___________ State _______ ZIP ____________

☐ My payment is enclosed.
Bill to: ☐ VISA ☐ MasterCard ☐ American Express
Acct. # ___________________ Exp. date __________

Signature ______________________________________

Mail to: Rainbow Gift Certificate, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

For credit card orders call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

Subscriptions to THE RAINBOW are $31 in the United States; U.S. $38 in Canada. The surface rate to other countries is U.S. $66; the air rate, U.S. $103. Kentucky residents add 5% sales tax. U.S. currency only, please. All subscriptions begin with the current issue. Please allow 6 to 8 weeks for delivery. In order to hold down non-editorial costs, we do not bill.
RAINBOW’S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, best of all, it now has a special forum for Color Computer owners, and it’s operated by the people who bring you THE RAINBOW each month.

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG’s conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of programs that you can download and use, just for the cost of the time you spend transferring them. There’ll also be corrections for RAINBOW articles, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That’s right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a free bonus!

If you’re not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you’ll get the same great deal! For our $31 subscription fee, you’ll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you’re online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the Delphi Handbook and Command Card ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with Immediate CoCo Community. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:
(800) 544-4005
(617) 491-3393
There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $12 (U.S.) per hour.

**On Telenet:** The Uninet network has now merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call your local access number and make connection, press the ENTER key twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type 6 DELPH and press ENTER.

**On Tymnet:** Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type DELPH and press ENTER.

**From Canada (on Datapac):** Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 baud). Type SET 2:1, 3:126 and press ENTER. Now type p 3 1386, DELPH; and press ENTER. Delphi's new rates indicate an additional $12 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

**From other countries:** Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Telenet, or 310600601300 through Tymnet. (You'll have to pay the toll charges for this connection.)

**Type in Your Username**

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type RAINBOW and press ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type RAINBOW and press ENTER. At the "PASSWORD:" prompt, type SENDSUB and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press ENTER and start over. Remember that at any point, when you're on Delphi, you can type HELP to get help on how to use the system. To get off the system just type BYE.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

**Come Visit Us! Type: GROUP COCO**

After you sign in, you'll be prompted to set up your own personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone). If not, your account will be ready at 6 p.m. the next day. Once an account is opened, each RAINBOW subscriber will be credited with an hour of free time.

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own personal password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in GROUP COCO and join us on the CoCo SIG!
SØ.Ø TO 8.8 AND YOU START AT 4.4 ON IT.-ENTER-"
338Ø GOSUB 4Ø
339Ø GOSUB 19999
34ØØ GOSUB 352Ø
341Ø AS="THE GRAVITONIC DETECTOR AT THE RIGHT OF YOUR SCREEN WILL FLASH WHITE TO SHOW NEARBY GRAVITY SOURCES... HIT -ENTER- FOR MORE"
342Ø GOSUB 4Ø
343Ø GOSUB 19999
344Ø GOSUB 352Ø
345Ø AS="REMEMBER- MISS HOGGY IS DEPENDING ON YOU. GOOD LUCK-KEVIN, VIT. HIT -ENTER- TO ACTIVATE WARP..."
346Ø GOSUB 4Ø
347Ø GOSUB 19999
348Ø GOTO4ØØ
349Ø REM************************
350Ø REM CLS SCREEN BOTTOM SUB
351Ø REM************************
352Ø LOADM"CLS":LX=-1:LY=1:RET
3ØØØ REM**********************
301Ø REM SET UP AND START GAME
302Ø REM************************
303Ø PCLEAR 4
304Ø PCLS:PMODE4,1
305Ø COLOR Ø,1:SCREEN 1,1:PCLS
306Ø DIMSP$(8,8)
307Ø SP$(4,4)="SUN"
308Ø REM************************
309Ø REM FILL ARRAY WITH PLANETS
310Ø REM************************
311Ø FOR Z=1 TO 4
312Ø X=RND(9)-1
313Ø Y=RND(9)-1
314Ø IF SP$(X,Y)<"" THEN 412Ø
315Ø READ P$,
316Ø SP$(X,Y)=P$
317Ø NEXT Z
318Ø DATA OPENMIND,HIPPO,SWEDISH,DOGS
319Ø REM************************
320Ø REM FILL ARRAY W/ ASTEROIDS
321Ø REM************************
322Ø FOR Z=1 TO 8
323Ø X=RND(9)-1
324Ø Y=RND(9)-1
325Ø IF SP$(X,Y)<"" THEN 425Ø
326Ø SP$(X,Y)="ASTEROID"
327Ø NEXT Z
328Ø REM************************
329Ø REM PUT HOGULA-1 IN ARRAY
330Ø REM************************
331Ø X=RND(9)-1
332Ø Y=RND(9)-1
333Ø IF SP$(X,Y)<"" THEN 433Ø
334Ø SP$(X,Y)="STATION"
335Ø FUEL=2Ø
336Ø X=4:Y=4
337Ø LX=-1:LY=1ØØ
5ØØØ REM************************
501Ø REM TOP OF MAIN LOOP
502Ø REM************************
503Ø PCLS:IF SP$(X,Y)="" THEN LO ADM"EMPTY":GOTO5ØØ
504Ø LOADM SP$(X,Y) 'GET PIC.
505Ø A$="FUEL="+STR$(FUEL)+" LO C="+STR$(X)+"."+STR$(Y)
506Ø LOADM":CLS"
507Ø GOSUB 4Ø
50ØØ GOSUB 6ØØ
508Ø REM************************
509Ø REM DRAW LOCATOR GRID
51ØØ REM************************
511Ø LINE(23Ø,40) -(25Ø,55),PSET,
512Ø LINE(229,40) -(251,55),PRE,
513Ø LINE(230,45) -(250,45),PRE
514Ø LINE(230,50) -(250,50),PRE
515Ø LINE(237,41) -(237,54),PRE
516Ø LINE(243,41) -(243,54),PRE
517Ø REM************************
518Ø REM PAINT IN LOCATED ITEMS
519Ø REM************************
520Ø IF X=8 THEN 522Ø
521Ø IF SP$(X+1,Y)<"" THEN PA
522Ø IF Y=8 THEN 522Ø
523Ø IF SP$(X+1,Y+1)<"" THEN PA
524Ø IF X=Ø THEN 524Ø
525Ø IF SP$(X-1,Y)<"" THEN PA
526Ø IF Y= Ø THEN 528Ø
527Ø IF SP$(X,Y-1)<"" THEN PA
528Ø IF X=8 OR Y=8 THEN 530Ø
529Ø IF SP$(X+1,Y+1)<"" THEN PA
530Ø IF X=8 OR Y=Ø THEN 532Ø
531Ø IF SP$(X+1,Y-1)<"" THEN PA
532Ø IF X=Ø OR Y=8 THEN 534Ø
533Ø IF SP$(X-1,Y+1)<"" THEN PA
534Ø IF X=Ø OR Y= Ø THEN 536Ø
535Ø IF SP$(X-1,Y-1)<"" THEN PA
INT(231,41),1,1

5360 IF SP$(X,Y)<"" THEN PAINT(238,46),1,1
5370 IF SP$(X,Y)<"" THEN PAINT(238,46),1,1
5380 IF SP$(X,Y)="STATION" THEN
      6170
5390 IF FUEL=0 THEN 7930
5400 REM******************************************************************************
5410 REM GET PLAYER MOVE
5420 REM******************************************************************************
5430 A$="ENTER MOVE-"
5440 LX=-1;LY=180
5450 GOSUB 40
5460 M$=""
5470 FOR X=1 TO 3
5480 GOSUB 19999
5490 IF INSTR(1,".123456780",X$)=0 THEN SOUND 1,5:GOTO5480
5500 IF X<2 AND X$="" THEN SOUND
      ND 1,5:GOTO5480
5510 IF X=2 AND X$="" THEN SOUND
      ND 1,5:GOTO5480
5520 A$=X$8
5530 GOSUB 40
5540 M$=M$+X$8
5550 NEXT X
5560 REM******************************************************************************
5570 REM INTERPRET MOVE
5580 REM******************************************************************************
5590 LOADM"CLS" 'CLEAR TEXT
5600 Y=VAL(RIGHT$(M$,1))
5610 X=VAL(LEFT$(M$,1))
5620 A$="WARPING OUT..."
5630 LY=1;0;lx=-1
5640 FUEL=FUEL-1
5650 GOSUB 40
5660 IX=-1;LY=100
5670 GOTO5030
5680 REM******************************************************************************
5690 REM BOTTOM OF MAIN LOOP
5700 REM******************************************************************************
5710 REM
5720 REM******************************************************************************
5730 REM PRINT MESSAGE ROUTINE
5740 REM******************************************************************************
5750 IF SP$(X,Y)="SUN" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5760 IF SP$(X,Y)="DOGS" THEN A$="YOU SEE THE DOG PLANET. THEY ARE QUITE -SIRIUS- ABOUT
5770 IF SP$(X,Y)="SWEDISH" THEN A$="YOU SEE THE PLANET OF SWEDISH CHEFS. THEY ARE SERVING FROG LEGS TODAY... MORK-MORK..." 
5780 IF SP$(X,Y)="OPENMIND" THEN A$="YOU SEE THE PLANET OF OPEN MINDED STEW-ARDESSES..."
5790 IF SP$(X,Y)="HIPPO" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5800 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"
5810 IF SP$(X,Y)="OPENMIND" THEN A$="YOU SEE THE PLANET OF OPEN MINDED STEW-ARDESSES..."
5820 IF SP$(X,Y)="HIPPO" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5830 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"
5840 IF SP$(X,Y)="ASTEROID" THEN A$="YOU SEE AN ASTEROID BELT."
5850 IF SP$(X,Y)="" THEN A$="YOU ARE IN EMPTY SPACE."
5860 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"
5870 IF SP$(X,Y)="OPENMIND" THEN A$="YOU SEE THE PLANET OF OPEN MINDED STEW-ARDESSES..."
5880 IF SP$(X,Y)="HIPPO" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5890 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"
5870 IF SP$(X,Y)="OPENMIND" THEN A$="YOU SEE THE PLANET OF OPEN MINDED STEW-ARDESSES..."
5870 IF SP$(X,Y)="HIPPO" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5840 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"
5850 IF SP$(X,Y)="OPENMIND" THEN A$="YOU SEE THE PLANET OF OPEN MINDED STEW-ARDESSES..."
5860 IF SP$(X,Y)="HIPPO" THEN A$="YOU SEE THE PLANET OF HIPPO-BALLERINAS! -HEAVY-
5830 IF SP$(X,Y)="STATION" THEN A$="YOU HAVE FOUND SPACE STATION HOGULA-ONE!"

February 1987 THE RAINBOW 117
TOM MIX’S MINI-CATALOG

P-51 Mustang
Attack/Flight Simulation
The ultimate video experience! Link two CoCo’s together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations against another player OR against the computer.
32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95

Worlds of Flight
Small Plane Simulation
Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different “worlds.” Program models over 35 different aircraft/flight parameters. Realistic sound effects too! Manual included helps you through a typical short flight.
32K Machine Language
Flight Manual Included
Joysticks Required
Tape $29.95 Disk $34.95

Educational Best-Sellers!
Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!
• Up to 100 students, 24 items per student
• Many easy-to-follow menus
• Records can be changed, deleted, combined
• Statistical analysis of scores
• Grades can be weighed, averaged, percentaged
• Individual progress reports
• Student seating charts
• Test result graphs/grade distribution charts
64K TDBII $59.95 Disk Only
32K TDBI $42.95 Tape $39.95
NOW AVAILABLE FOR IBM PC & COMPATIBLES-Holds information on up to 250 students with as many as 60 individual items of data for each. Contains the features listed above PLUS.
Requires 128K - $89.95

Factpack—Three programs for home or school use: provide drill and practice with basic “+/-/+/-” Grades 1-6.
32K Ext. Basic
Tape $24.95 Disk $29.95

Vocabulary Management System—Helps children learn and practice using vocabulary and spelling words. Eleven programs including three printer segments for tests, puzzles, worksheets and five games; many features make this a popular seller!
Requires 16K Ext. Basic/
32K for Printer Output
Tape $39.95 Disk $42.95

Fractions—A Three-Program Package.
1/Mixed & Improper
2/Equivalence
3/Lowest Terms. Practice, review and definitions make learning easy.
32K Ext. Basic
Tape $30.95 Disk $35.95

Unique Utilities!
New! Use the tools we’ve used to create “Donkey King,” “Sailor Man” and others!
• Full use of 64K RAM
• 100% Machine Language
• No ROM Calls
• Selectable Drive
• Support 1-4 drives
• Menu Selected functions
• “Cold Start” exit to Basic
• Parameters easily changeable in basic loader
MAS Assembler—the finest ever!
(Includes EDT)
Disk $74.95
EDT—Effortless full screen editing w/2-way cursor. Text files to 48K+! Copy, save, move, delete, print blocks, much more!
Disk $39.95
Deputy Inspector—Alphabetize, resort and backup directory; fast 3-swap backups, copy files or programs, auto-reallocate granules during backup for faster loading, more!
Disk $21.95
Sector Inspector—Alphabetize, backup and print directory; repair crashes, LLIST basic programs, read in and edit 23+ granules, much more!
Disk $29.95

NEW RELEASE
GOLD FINDER
Here’s the quality you have come to expect from TOM MIX. Another outstanding color computer game. This one ranks right up there with “Donkey Kong”. Listen to this: 69 levels for one or two players PLUS you can create your own levels (up to 306 on a disk). Endless possibilities await you in this exciting new creation. Move over Goldrunner and Loderunner, here comes GOLD FINDER . . .
32K & Joysticks Required
Disk $27.95

NEW RELEASE
THE BLACK HOLE
For anyone who enjoys solving a challenging logical puzzle, here is a 3-dimensional puzzle composed of 63 numbered cubes in a 4 by 4 by 4 array that leaves one BLACK HOLE. You tell the computer to sort the cubes and the computer tells you to put them in numerical order. A real brain bender. Outstanding color and action. Years of entertainment . . .
For IBM PC & Compats
$24.95

We Have More Software Available Than Listed Here. Please Write for a Free Catalog!

Ordering Information
• Call us at 616/676-8172 for Charge Card orders
• Add $3.00 postage and handling
• MI residents add 4% sales tax
• Authors—We pay top royalties!

TOM MIX SOFTWARE
P.O. Box 201
Ada, Michigan 49301
616/676-8172

More Tandy-IBM/PC software available.

* CoCo 3 Compatible
Look What's New at NOVASOFT!

Top-quality software at affordable prices, written by well-known authors in 6809 Machine Language

NEW RELEASE
FOURCUBE
Now you can play TIC-TAC-TOE in 3D. The board consists of a 4x4x4 grid of cells. Pit your wits against the computer with six levels of difficulty or against your favorite opponent. Sound easy? Try it and you'll agree with us when we say it's a "real challenge".
Requires 32K 1 or 2 Players
Tape $15.95 Disk $18.95

NEW RELEASE
MONEYOPOLY
Play the popular board game on one of the most realistic computer game simulations ever! Contains all the features of the original. Buy, sell, rent, wheel & deal your way to fortune.
32K Joystick Required
Tape $19.95 Disk $22.95

NEW RELEASE
THE WILD WEST
Get out your six shooter and polish your spurs! Journey into the gunslinging land of the old west. As sheriff of Dry Gulch, your job is to keep the peace. But the notorious desperado Black Bart has escaped from jail and is on his way to Dry Gulch to recover his hidden fortune!
Can you set a trap to capture Black Bart? Or will he get you? You'll have to use every trick in the book, and be quick on the draw as well, as you talk to some unsavory characters. Decide what items you'll need to buy from the General Store, and lay a trap for your enemy!
The Wild West is designed to be played exclusively on the Tandy Color Computer 3. It has several features not seen in most adventures.
• Incredible animated 320 x 192 16 color hi-resolution graphic scenes!
• Four voice music and sound effects.
• Save and load games in progress.
• A vocabulary of over 100 words.
• Automatically SPEAKS with a Tandy Speech Pak.
Requires a 128k Coco³ and one disk drive
Disk $25.95

NEW RELEASE
Vegas Game Pak
Six games in all! Blackjack, Keno, Video Poker & 3 slot machine lookalikes. Super graphics!
16K Ext. Basic Required
Tape $24.95 Disk $27.95

* CoCo 3 Compatible

Tom Mix Products at New Reduced Prices!

Sailor Man—Defeat the big fat bad guy and win Elsie's heart. Super graphics.
64K Tape $24.95 Disk $27.95

Dragon Slayer—Defeat the dragon by finding your way through a mountain maze. Gather treasure but avoid the deadly traps! 100 exciting screens.
32K & Joysticks
Tape $18.95 Disk $21.95

The King—
32K Tape $24.95 Disk $27.95

Dragoon—
32K Tape $19.95 Disk $22.95

Ms. Maze—
32K Tape $19.95 Disk $22.95

Kater Pillar II—
16K Tape $19.95 Disk $22.95

Warehouse Mutants—
16K Tape $18.95 Disk $21.95

Buzzard Bait—
32K Tape $19.95 Disk $22.95

*Equals CoCo 3 Compatible

A Tom Mix Company
P.O. Box 201
Ada, Michigan 49301
616/676-8172

Ordering Information
• Add $3 shipping/handling
• MI residents add 4% sales tax
• Dealers welcome
• Many more titles—write for free catalog!

Credit Card Orders
Call 616/676-8172

*CoCo 3 Compatible
The new Color Computer owner buys his/her versatile machine for its graphics and music capabilities, organization of their home and office, educational purposes — both in the home and school and to acquire programming knowledge — and some, simply for pure fun and entertainment.

As far as the CoCo is concerned, the more you learn, the more you realize how little you actually know. That is why every session at the keyboard is an adventure in learning. THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" will contain shorter BASIC program listings that will entertain and help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

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

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

-- Jutta Kapfhammer
Submissions Editor

Fun And Games

Hand-Me-Downs
By David Hutchinson

Hand Off is a simple, but challenging game. The object is to pass a ball from one block to another as the blocks move vertically in opposite directions across the screen. The ball starts in the block in the top row and the block moves rapidly across the screen in one direction while the block in the row underneath moves across the screen in the other direction.

To pass a ball down, press any key at the exact moment the blocks meet. To accomplish a win, the ball must be passed all the way to the block at the bottom. The faster the ball is moved to the bottom, the better the score.

The listing: HAND OFF

10 CLEAR 100O,15871:DIMI(15)
20 FORC=15872 TO 15916:READD:POKE EC,D:NEXTC
30 DATA 16,142,0,31,142,4,96,230
,128,166,132,167,31,48,1,49,63,3
8,246,231,31,48,136,31,16,142,0,
31,230,132,48,31,166,132,167,1,4
8,31,49,63,38,246,231,1,57
40 DEFUSR0=15872:POKE15877,4:POK
E15878,0:U=4:V=0:W=0:SC=25:Q=0
:TIMER=0:CLS(0)
50 FORX=0TO14:Y=RND(31):P=(X*32)
+Y:I(X)=Y:PRINT@P,"":;NEXTX:PRI
NT@I(Y),":"
60 A=USR0(0):I(W)=I(W)-1:IFI(W)<
0THENI(W)=31
70 I(W+1)=I(W+1)+1:IFI(W+1)>31TH
Next to your computer,

nothing beats a Tandy® printer.

Tandy printers make fine print quality, graphics and high performance affordable.

A match for your machine
For your best value and selection in top-quality printers, shop your local Radio Shack Computer Center. We've got the printer that you need.

Dot-matrix power for business
The DMP 2200 (26-1279, $1695.00) gives you efficient, fast printing at 380 cps. It supports elongated, double high, bold, underline, super/subscripts, italics and double strike, plus bit-image graphics.

The DMP 2110 (26-2819, $1295.00) prints at 240 cps. Use the Font Editing Packages (sold separately) to load different type styles for print quality that rivals a daisy-wheel printer!

The DMP 430 (26-1277, $899) is a 132-column dot-matrix printer that delivers superior correspondence characters. Plus, in the draft mode, the DMP 430 delivers a fast 180 cps.

Low-cost, triple-mode personal printer
The DMP 130 (26-1280, $349.95) lets you choose from word processing, data processing and dot-addressable graphics with four character styles.

Letter-quality daisy wheels
Daisy wheel printers give you that crisp “electric typewriter” look. Our DWP 520 (26-2800, $995.00) prints up to 500 wpm. Or try the DWP 230 (26-2812, $399.95) for economical letter-quality and up to 200 wpm.

See the complete selection of printers and accessories at a Radio Shack or Radio Shack Computer Center today.

Prices apply at Radio Shack Computer Centers and at participating stores and dealers. All printers shown are IBM® compatible. The DMP 430 requires special order at some locations. IBM/Registered TM International Business Machines Corp.
Decisions, Decisions

By Robert Rogers

Although mostly for fun, the following program may help you make a decision, if it's not too serious. It is designed to help you determine which of a large number of alternatives is most desirable.

Upon running, the program asks you to input alternatives. Let's say, for example, you can't decide which video game to buy and you have narrowed your selections down to the following: The King, Astro Blast, Berserk, Colorpode, Lunar Rover Patrol, Ghost Gobbler and Sea Dragon. Input the selections and when the last alternative has been entered, press ENTER.

At this point, you are given the opportunity to make changes and/or add any new items; then the decision-making process begins. All items are compared to the others without repetition. Simply press 1 or 2, depending on which item you prefer. When all the alternatives are matched and you have made your decisions, the results are displayed. The alternatives are listed from the choices you made, ranked in order of the number of times you selected them. Ties are identified and ranked the same.

The listing: DECISION

```
1 '********** MICRO-DECISION *
2 '* COPYRIGHT (C) 1984 BY *
3 '* ROBERT ROGERS & RTR*SOFT *
4 '* VERSION 1.0 JUNE 1984 *
5 '* FOR 4K COLOR BASIC COCOS *
6 '********************
7 '********************
10 CLEAR10000:CLS
30 DIMA$(21),B(21),P(21),PS(21),T(21)
50 CLS:PRINTTAB(9)"MICRO DECISION"
60 PRINT"ENTER THE ALTERNATIVES THAT ARE UNDER CONSIDERATION. \n
140 O=W+32+I(W):PRINT@O,"\n150 I(W)=I(W)+1:IFT(W)<0 THEN 16
160 O=E=0:USRF(6):GOTO16
170 SC=SC-TIMER:SC=SC-(8*Q):IFSC
180 PRINT@483,11 SCORE = \n190 PRINT@483,10 TO
200 A$=INKEY$:IF A$="\n210 A$=INKEY$:IF A$=1111 THEN180 ELSE 40
220 A$=INKEY$:IF A$=1111 THEN180 ELSE 40
16K ECB

NTER> WILL TERMINATE ENTRY OF
ITEMS.";PRINTSTRING$(32,143+32);
160 SOUND2000,1
60 C=0
70 C=C+1
80 PRINT"ALTERNATIVE"C; INPUT AS (C):IFAS(C)="\n90 SOUND225,1:GOTO70
100 CLS:Z=0:FORT=1TO C:Z=Z+1:PRINT
110 T$(F):IFZ$>12 OR T=0 THEN INPUT"INCORRECT ITEM ";Z$:IFZ$=""THENZ 
120 Z$:CLS:GOTO110 ELSE INPUT"CORRECT ED ";Z$:FORZ=1TOC:IFZ$=AS(Y)TH 
130 EN$(Y)=Z$:Z=0:CLS:GOTO100 ELSE 
140 NEXTT
150 CLS:PRINT" TESTING OF PR 
160 FORT=2TOC
170 FORJ=1TOI-1
180 PRINT"WHICH ALTERNATIVE DO Y 
190 PRINTSTRING$(32,CHR$(143+96))
200 PRINT@192,"<1> \n210 PRINTTAB(5)"OR"
220 PRINT"<2> \n230 PRINT INPUT"TYPE CHOICE:";W: 
240 IFW<>1ANDW<2THENCLS:GOTO100 ELSE 
250 IFW=1THENT(I)=T(I)+1
260 NEXTJ,T
270 FORN=1TOC:PRINT@N,N=1:PRINT@N,N=N+1
280 FORJ=1TOC
290 IFN=1THENV=N:PRINT@N,N=1:PRINT @N,N=N+1
300 L=0:V=0
310 FORJ=1TOC
320 IFV<1 THENL=N:V=N+1:PRINT@N,N=1:PRINT @N,N=N+1
330 NEXTN
340 P(F)=L:H(P(F))=T(L)
350 T(L)=0
360 NEXTF
370 CLS:PRINT"HERE ARE THE ALTERNATIVES RANKED ON THE BASIS OF YO
```
Radio Shack has the...

...best of everything!

Unleash the true potential of your Color Computer with accessories from Radio Shack.

Add a pair of joysticks (A, 26-3008, Pair/$19.95) for fast 360° movement or our Deluxe Joystick (B, 26-3012, $29.95) that adjusts to your touch, allowing “fine tuning”. For maximum control of games and graphics, simply “roll” the Color Mouse (C, 26-3025, $49.95) across a tabletop to accurately position the cursor.

Maximize your Color Computer’s power with the Multi-Pak Interface (D, 26-3124, $99.95). You can change programs instantly using the selector switch, or under program control. And you can connect disk drives or other accessories, too.

Here are two more great-sounding accessories! The Sound/Speech Cartridge (E, 26-3144, $79.95) adds three-voice sound and text to speech. The Orchestra-90 CC (F, 26-3143, $79.95), lets you create electronic music and sound effects.

The 300-baud DC Modem Program Pak (G, 26-2228, $89.95) makes it possible to join the telecommunications wave. Since the modem and software are built in, you can access information services by phone. Need more memory? Hard disk storage is yours with the Hard Disk Interface (H, 26-3145, $129.95)*.

Come in today for the accessories that make your Color Computer even more of a high performer!

*Requires 64K, Multi-Pak Interface, floppy disk with controller and OS-9 (2.0 or later). Prices apply at participating Radio Shack Computer Centers and participating Radio Shack stores and dealers. Orchestra-90/TM Software Affair. OS-9/TM Microware Corp.
The following program could be a real lifesaver if the suggestion is taken seriously. The statistics prove it!

The listing: MESSAGE

1  '****************************
2   SILENT RADIO
3   BY
4   RUTH GOLIAS
5   2826 PACIFIC COAST HIGHWAY
6   TORRANCE, CALIF. 90505
7   1986
8  '****************************
9
10 CLS:PRINT@170,"silent";PRINT
11@176,CHR$(128);:PRINT@177,"radio"
12";
13 PRINT@239,"by";
14 PRINT@298,"ruth";PRINT@32,CHR$(128):PRINT@321,CHR$(128):PRINT@344,"golias";
15 FOR B=0 TO 31:PRINT@B,CHR$(18);NEXT B
16 FOR B=31 TO 479 STEP32:PRINT@B,CHR$(177);:NEXT B
17 FOR B=0 TO 448 STEP32:PRINT@B,CHR$(184);:NEXT B
18 FOR B=15 TO 1535:POKE B,15:NEXT B
19 FOR B=322 TO 353:PRINT@B,CHR$(22);:NEXT B
20 FOR B=353 TO 383:PRINT@B,CHR$(22);:NEXT B
21 FOR B=385 TO 479 STEP8:PRINT@B,CHR$(218);:NEXT B
22 FOR B=415 TO 479 STEP32:PRINT@B,CHR$(22);:NEXT B"TOP OF RADIO-RED
23 FOR B=227 TO 253 STEP2:PRINT
24 T@B,CHR$(177);:NEXT B"BOTTOM OF RADIO-RED
25 PRINT@195,CHR$(181); "LEFT SIDE OF RADIO-RED
26 PRINT@221,CHR$(181); "RIGHT SIDE OF RADIO-RED
27 FOR B=291 TO 317:PRINT@B,CHR$(22);:NEXT B"TOP COUNTER ROW-BLUE
28 FOR B=322 TO 353:PRINT@B,CHR$(22);:NEXT B"MIDDLE COUNTER ROW-BLUE
29 FOR B=353 TO 383:PRINT@B,CHR$(22);:NEXT B"BOTTOM COUNTER ROW-BLUE
30 FOR B=385 TO 479 STEP8:PRINT@B,CHR$(218);:NEXT B"COUNTER POSTS-BLUE
31 FOR B=415 TO 479 STEP32:PRINT@B,CHR$(22);:NEXT B"RIGHT COUNTER POST-BLUE
32 FOR B=15 TO 1535 STEP2:POKE
33 B,169:NEXT B"FLOOR-BLUE
34 FOR B=15 TO 1534 STEP2:POKE
35 B,185:NEXT B"FLOOR-RED
36 PRINT@196,CHR$(191);:PRINT@197,CHR$(191);:PRINT@119,CHR$(191):SCREEN1
37 121 'WALKING LETTERS
38 220 A$="FASTEN YOUR SEAT BELT
39 IT'S THE LAW"
40 230 S=300
41 240 FOR B=196 TO 220
42 250 FOR X=1 TO S:NEXT X
43 260 B=B+1
44 270 IF B=220 THEN 240
45 280 PRINT@B,LEFT$(A$,221-B)
46 290 PRINT@197,RIGHT$(A$,B-197)
47 300 SCREEN1
48 310 GOTO250

Safet y

A Public Service Message

By Ruth Golias

The following program could be a real lifesaver if the suggestion is taken seriously. The statistics prove it!
Utilities

Cassette Organization

By J. E. Rittenhouse

Tape Menu is a simple utility for cassette organization. It allows you to list all the programs filed on a cassette, assign each a program number and automatically LOAD a specific program by simply pressing a key.

To set up Tape Menu, enter the program names in the DATA statements in lines 40, 50 and 60. This can be done by retyping the lines and replacing PROGRAM NAME with the actual name of the program. Be sure to separate multiple listings in each line with commas. If you need more room on the screen to display your listings together, delete Line 250 (type DEL 250).

The program is designed for six program listings. However, you can change the amount by editing lines 7 and 10 to fit your needs:

7 DIM P$(6)
10 FOR X=1 TO 6

To do this, type EDIT 7 and press ENTER. The original program line will appear. Press the space bar eight times (to reach the point you want to change) and the following will be displayed:

? DIM P$ (insert number of programs)
10 FOR X=1 TO insert number of programs

Type D (represents delete a character) and then type I (represents insert a character), followed by the number of programs you want to use in the menu and press ENTER. For example, if you want to change the number of programs to eight, Line 7 will then look like this:

7 DIM P$(8)

You can also change a line by retyping the entire line. Line 10 should be changed in the same manner as Line 7. Refer to your user’s manual for more information on editing functions.

CSAVE”TAPEMENU” at the start of each cassette you want to organize. Then CSAVE each of the programs in numerical order as they are listed in lines 40, 50 and 60. Note: Instead of assigning each program a code name, use the listing number. For example, use CSAVE “1”, CSAVE “2”, CSAVE “3”, etc. Again, you can add new programs to the list by changing lines 7 and 10, and add new DATA statements for the additional programs. When saving Tape Menu, be sure to leave a short blank space following it on the tape in case you need the space to add additional DATA statements later.

Using Tape Menu may seem a bit bothersome to set up initially, but once you have organized all of your tapes in this manner, all you will need to do is load and run Tape Menu, and input a selection; the program will automatically be loaded.

The listing: TAPEMENU

1 REM*TAPE MENU
3 REM BY J.E.RITTENHOUSE
5 CLS
7 DIM P$(6)
10 FOR X=1 TO 6
15 READ P$
17 IF EOF(P) THEN 250
20 PRINT X;:"-";P$
30 NEXT X
40 DATA PROGRAM NAME,PROGRAM NAME
50 DATA PROGRAM NAME,PROGRAM NAME
60 DATA PROGRAM NAME
250 PRINT:PRINT:PRINT
260 PRINT"ENTER THE NUMBER OF THE PROGRAM YOU WISH TO USE";A$
270 INPUT"PROGRAM YOU WISH TO USE";A$
280 CLOAD A$

Sound Off

By Dave Lengel

The following utility uses the CoCo’s single-bit sound capability to create a click sound when any key is pressed on the keyboard.

Upon running Key Beep, you are asked to input an address where the machine language is to reside. (Use &H0FFF as an example.) The ML portion of the program is then poked into memory and executed.
Echo

By John Stewart

Echo allows you to get a hard copy of your session on the CoCo. The program gets its name from its ability to echo any character printed on the screen to your printer. To do this the program intercepts your CoCo's output routine using a RAM hook at Memory Location 360. It checks to see if a character is being sent to the screen and then sends the character to the printer and then back to the screen.

If you have Extended Color BASIC, after running, you can start Echo working by typing A=USR0(0) and pressing ENTER. The printer will start printing everything that is on the screen. To stop the echo function, type A=USR1(0) and press ENTER.

If you do not have Extended Color BASIC, you must use the EXEC command to get Echo to work. First, delete lines 80 and 90. Then, to start Echo, type EXEC 512 and press ENTER.

Note: Be sure your printer is turned on and the baud rate (600 baud: PO1<El50,87; 1200 baud: 150,41; 2400 baud: PDl<E150,18; 4800 baud: POl<El50,7; 9600 baud: POl<El) is set before you run Echo or your computer will lock up.

The listing: ECHO

5 ' ECHO
10 ' SENDS SCREEN OUTPUT
20 ' TO PRINTER
30 ' BY JOHN STEWART, MAY 1986
40 FORX=&H2,0,0 TO &H241
50 READ A$
60 POKE X,VAL( "&H"+A$)
70 NEXT X
80 DEFUSR,0=&H2~~
90 DEFUSR1=&H219
100 CLS:PRINT"TO SEND OUTPUT TO PRINTER TYPE A=USR0(0) AND PRESS ENTER":PRINT:PRINT"TO STOP OUTPUT TO PRINTER TYPE A=USR1(0) AND PRESS ENTER"
110 DATA A6,8D,~ 1 3D,26,12,6C,8D,,0,37,BE ,l,68,AE,8D,,0,22,BF,1,68
90 ,6F,8D,~ 1 D,39,2,96,6F,26,E,8
6,FE,97,6F,35,2,34,2,96,6F,26,E,8
6,FE,97,6F,35,2,34,2,AD,9F,~ 1 2
F,6F,35,2,6E,9D,~ 1 2
Joystick Directory

By Dale Atwater

Joystick Directory will organize your disk directory in two columns, keep your directory from scrolling off the screen, and automatically load and execute any program selected using the right joystick.

Upon loading the program, enter a selected disk in the drive and choose either to display another directory or execute a program.

The listing: DIRECTORY

10 CLEAR 1000
20 DIMI$(58),F$(2)
30 N=0
50 FOR I=1 TO 9
60 DSKI$,0,17,2+I,F$(1),F$(2)
70 FOR F=1 TO 2
80 FOR J=1 TO 97 STEP 32
90 IF MID$(F$(F),J,l)=CHR$(255)
THEN GOTO170 ELSE IF MID$(F$(F)
J,l)=CHR$(32) THEN GOTO 140
100 QS=MID$(F$(F),J+8,3)
110 CS=MID$(F$(F),J,8)+"/"+Q$
120 N=N+1
130 I$(N)=C$
140 NEXT J
150 NEXT F
160 NEXT I
170 CLS:PA=0
175 I$(24)=""
180 FOR I=1 TO N
190 IF I>30 AND PA=0 THEN PRINT@ 480,"press m for more, c to choose":GOSUB250:PA=480:CLS
200 PRINT@PA+2+(I-1)*16,I$(I);
210 NEXT I
220 PRINT@480,"enter to repeat - c to choose";
230 GOSUB250
240 RUN
250 I$=INKEY$:IF I$="" THEN 250
ELSE IF I$="M" OR I$=CHR$(13) THEN RETURN ELSE IF I$<>"C" THEN 2
50
260 J=JOYSTK(0):JJ=JOYSTK(1)
270 IF J=0 THEN T=0 ELSE IF J=63 THEN T=16
280 PRINT@PO," ";A=INT(JJ/4.3)*32:PO=A+T:PRINT@PO,CHR$(127+RND(8)*16);
290 IF PEEK(65280)=126 OR PEEK(65280)=254 THEN FOR X=1024+PO+2 T
Planning Ahead

By Bill Bernico

Everyone is saving for one thing or another. Maybe it's an official Donny and Marie pup tent or perhaps a Davey Crockett coonskin cap. Or maybe it's something practical, like the new CoCo 3. In any case, you'll want to know how long you have to save before you can actually buy. SavingFor will tell you exactly that, down to the week, or any part thereof.

Simply follow the prompts. When inputting money amounts, don't use the dollar sign ($). If you are entering amounts under a dollar, like 37 cents for example, input .37. After you input the amount earned from your allowance and/or job, you are asked how much you want to keep each week for spending. Obviously, the amount you want to keep can't be larger than the amount you earn. If you try to do this, a message will appear telling you just that — which proves you can't spend more than you have ... unless, of course, you have a charge card.

The listing: SAVINFOR

0 1024+PO+14:A$=A$+CHR$(PEEK(X))
:NEXT X:GOSUB331:GOSUB 335
330 GOTO 260
310 FOR X=1 TO LEN(A$)
320 IF MID$(A$,X,1)=CHR$(96) THEN MID$(A$,X,1)="" 
:NEXT X:GOTO 260
330 NEXT X:RETURN
335 FOR X=1 TO LEN(A$)
340 IF MID$(A$,X,1)="o" THEN MID$(A$,X,1)="/
:NEXT X:GOTO 26
340 IF RIGHT$(A$,4)="BIN " THEN CLS:PRINT"THIS PROGRAM REQUIRES 
COMANDS PRIOR TO LOADING";B$:IF B$="Y" THEN NEXT X
350 IF B$="N" THEN LOADLEFT$(A$,8),R
360 CLS:PRINT"PLEASE DO THESE COMMANDS THEN TYPE 'CONT':STOP:LOAD" 
M A$ 
370 CLS:PRINT@224+16-(LEN("LOADING")/2),"LOADING "A$:LINEINPUT"ARE ANY 
COMMANDS REQUIRED PRIOR TO LOAD!?";B$:IFB$="Y" OR B$="YES" THEN LOADM 
A$:EXEC E Else 371' Else 38.0
380 CLS:PRINT@224+16-(LEN("LOADING")+/2),"LOADING "A$:LINEINPUT"ARE ANY 
COMMANDS REQUIRED PRIOR TO LOAD!?";B$:IFB$="Y" OR B$="YES" THEN LOADM 
A$:EXEC E Else 371' Else 38.0
390 LOADM LEFT$(A$,8),R
400 CLS:PRINT@224+16-(LEN("LOADING")+/2),"LOADING "A$:LINEINPUT"ARE ANY 
COMMANDS REQUIRED PRIOR TO LOAD!?";B$:IFB$="Y" OR B$="YES" THEN LOADM 
A$:EXEC E Else 371' Else 38.0
410 IF I$="M" THEN LOADM LEFT$(A$,8) :EXEC
420 IF I$="L" THEN LOADM LEFT$(A$,8):EXEC
430 GOTO 41'1'

Planning Ahead

By Bill Bernico

Everyone is saving for one thing or another. Maybe it's an official Donny and Marie pup tent or perhaps a Davey Crockett coonskin cap. Or maybe it's something practical, like the new CoCo 3. In any case, you'll want to know how long you have to save before you can actually buy. SavingFor will tell you exactly that, down to the week, or any part thereof.

Simply follow the prompts. When inputting money amounts, don't use the dollar sign ($). If you are entering amounts under a dollar, like 37 cents for example, input .37. After you input the amount earned from your allowance and/or job, you are asked how much you want to keep each week for spending. Obviously, the amount you want to keep can't be larger than the amount you earn. If you try to do this, a message will appear telling you just that — which proves you can't spend more than you have ... unless, of course, you have a charge card.

The listing: SAVINFOR

Ø 'SAVINFOR by BILL BERNICO
1 CLS3:PRINT"WHAT IS YOUR NAME?";
:PRINT@32,"";:INPUTN$:CLS:PRINT" 
WELL, "N$=PRINT"WHAT ITEM ARE YOU 
SAVING FOR?";FORX=1029TO(130+ 
LEN(N$)):POKEX,PEEK(X)-64:NEXTX: 
LINEINPUT$:PRINTSTRINGS(32,175)
:PRINT"WHAT DOES "$N$:INPUT"COS 
T IN DOLLARS";B 
2 PRINTSTRINGS(32,191);PRINT@26
1,"IS YOUR INCOME FROM:";PRINT:F 
ORX=1285TO1364:POKEX,PEEK(X)-64: 
NEXTX:PRINT" 1.) ALLOWANCE": 
PRINT" 2.) JOB":PRINT" 3.
.) BOTH":PRINT:PRINT" ENTER 
(1-3)";:INPUTN:ON C GOSUB6,7,8
STAR NX-10 COMPLETE SYSTEM

Easy-to-use and ready for the heavy workloads from your TRS-80 Color Computer 1, 2, 3 or PC compatible. Control pitch, margins, NLQ, Italics and more from the Front Control Panel. Stuff the 5K data buffer with your own unique character set or use one of the 11 built in character sets. 1 Year limited warranty serviceable nationwide. Deluxe Users manual. System includes the NX-10 Dot Matrix printer with BLUE STREAK II serial-to-parallel interface and our Software Trio (see below).

$289.95 +$10 Shipping and Insurance
COMPLETE

SEIKOSHA SP-1000AS COMPLETE SYSTEM

Triple Mode Dot Matrix printer with serial interface, cable and our Software Trio (see below). Ready to run single sheet or 4" to 10" tractor paper from your TRS-80 Color Computer 1, 2, or 3. Compatible with your programs that let you control your baud rate, like CoCoMax, VIP, Basic and OS-9 etc. 24 month limited warranty. 76 page users manual.

$219.95 +$10 Shipping and Insurance
COMPLETE

CITIZEN 120D COMPLETE SYSTEM

Triple Mode, High performance Dot Matrix printer with serial interface, cable, and our Software Trio (see below). Ready to run with your TRS-80 Color Computer 1, 2, or 3. Load single sheets with one button ease or use the adjustable tractor with rear or bottom feed. Fill the 4K buffer with text and graphics from your favorite programs such as CoCoMax, VIP and Basic at rates up to 9600 baud. 12 month limited warranty. Deluxe users manual.

$229.95 +$10 Shipping and Insurance
COMPLETE

BLUE STREAK II

Transfer your data from CoCo 1, 2, 3 to your parallel printer with a fury. The Blue Streak can increase your data transmission 4 fold over conventional-compatible interfacing and increase printer throughput. An additional serial I/O port permits port sharing with another serial device without recabling.


$499.95 without power  +$2 Shipping and Insurance
$549.95 with power +$2 Shipping and Insurance

SOFTWARE TRIO

Drayton's
WORD PROCESSOR 2.2
TAPE OR DISK VERSION

A feature packed program that turns your CoCo into an office machine. Create and save letters and documents with the Word processor tailored for your printer.

SPECS: 300, 600, 1200, 2400, 4800, 9600 Switchable Baud Rates, Power Supply 276-1401A UL Listed, 1 Year Warranty, Input 4 Pin Serial, Output 36 Pin Parallel and 4 Pin Serial, Total Cable Length 54 inches, Box 4"x12"x11".

$229.95

TYPE SELECTION TUTORIAL PROGRAM

Menu driven program for the CoCo. Teaches and shows the new user the numerous features of their printer. (Specify printer when ordering)

ALL THREE PROGRAMS $19.95

DAYTON ASSOCIATES, INC.
DUN & BRADSTREET LISTED
7201 CLAIRCREST BLDG, C
DAYTON, OHIO 45424

OHIO RESIDENTS ADD 6% SALES TAX • C.O.D. ADD $2.00

TRS-80 Color Computer® Tandy Corp., CoCoMax® Colorware Inc., VIP® Software Corp. All data subject to change without notice.

AUTO-ORDER LINE 1-800-251-STAR
Personal Service
(513) 236-1454
RAINFOVER REVIEWS

CoCo III Secrets Revealed
Informative Reading/Spectrum Projects, Inc. .................. 140

CoCo Guru
AI With a Mind of Its Own/Thinking Software .................. 134

Computer Hammer
Lets You Pound Your Troubles Away/The Lyter Side ......... 141

DDAY
The Invasion of Normandy/Ark Royal Games ................. 138

Dual DOS Switcher
Simple and Inexpensive/CRC Inc. ......................... 138

Gantelet
Provides a Thrill and a Challenge/Diecom Products ........ 135

The Guidebook for Winning Adventures
Clues to Six Infocom Adventures/Baen Enterprises ....... 146

The Lottery Player
Helps You Be a Winner/Suzanne Spencer Software ......... 143

MiniDOS9
OS-9 Program for the SC68008 Coprocessor Card/Cir Pak Ltd. 149

Music Libraries 400, 500, 600, 700 and 800
For Your Listening Pleasure/Speech Systems ............... 137

Physics/Science Study Course
Educational Software/York 10 Software .................. 140

Puzzle Math
Gives the Total Picture/SECA ........................... 145

Studies in the Parables
Framework for Bible Study/Sovereign Grace Software ...... 142

UNDERWARE Ribbons and Color Pens
Iron-On Transfers From CoCo/Diversions, Inc. ............. 136

Ultra Label Maker
Create Labels of All Kinds/CMD Micro Computer Services 144

VIP Writer Enhancer
A Useful Addition to a Popular Program/Spectrum Projects, Inc. 148
RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer. Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a great opportunity for commercial programmers to show off new and innovative products for the first time. Chicago is the show to get information on capabilities for the new CoCo 3. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in different parts of the country. If you missed the fun in Princeton, why don't you make plans now to join us in Chicago? For members of the family who don't share your affinity for CoCo, RAINBOWfest is located in an area with many other attractions.

As a new feature for RAINBOWfest, we are planning an Educational Sandbox. This will feature child-oriented workshops to give hands-on experience to an age group often neglected. There will be a session for the kindergarten to third grade set and another for fourth through seventh graders. RAINBOWfest has something for everyone in the family.

The Hyatt Regency Woodfield offers special rates for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get your special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

CoCo Community Breakfast

Greg Zumwalt — CoCo 3 Programmer

Our keynote speaker for the traditional CoCo Community Breakfast is Greg Zumwalt, one of the early CoCo specialists. An independent programmer and computer designer, Greg is one of the select few writing Tandy software for the new Color Computer 3. He owns ZCT Software, of Tulsa, Okla., and also writes software for various business applications.
The following products have recently been received by THE RAINBOW, examined by our magazine staff and approved for the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the Seal of Certification has been issued to:

**The Amazin' Maze Game**, contains 60 data files from which you can choose different mazes. All places in each maze are accessible so that the player can move about and pick up points. The object is to escape from the maze. This game requires 64K ECB and one disk drive. Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $9.95 plus $.50 S/H.

**Art Gallery**, a 32K Extended BASIC graphics display program. Show off your CoCo art collection with machine language special effects. Program includes nine sample pictures, as well as instructions for viewing your own creations. Tothian Software, Box 663, Rimmersburg, PA 16248; $19.95.

**Bouncing Boulders**, a 64K game. The object is to move around the screen collecting the required number of gems to activate the Exit square. Joystick is optional. Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; (416) 878-8353, $28.95; $38.95 Cnd.

**Color Scribe II**, a 128K CoCo 3 word processing program. This program allows a choice of 40-, 64- or 80-column display in either amber, green, blue or monochrome. Buffer gives over 64K bytes, and a command is provided to tell how many bytes are available. Text formatting capabilities include justification, headers, footers, pagination and more. Macro commands are supported to save time and keystrokes. Computerware, Box 668, 4403 Manchester Avenue #102, Encinitas, CA 92024; (619) 436-3512, $49.95.

**Color Connection IV**, a 128K CoCo 3 telecommunication package. Use baud rates up to 1200 baud directly from the back of the computer, or up to 9600 with the use of a Multi-pak. Features 40-, 64- or 80-column text display in amber, green, blue or monochrome modes. This program also supports the auto-answer/auto-dial features for Hayes compatible and some Radio Shack printers. Computerware, Box 668, 4403 Manchester Avenue #102, Encinitas, CA 92024; (619) 436-3512, $49.95.

**CMOS Hitachi 63B09E and 63B21**, replacement chips for the Color Computer CPU and PIA. CMOS Conversions, 480 Oakdale Road NE, Suite 3, Atlanta, GA 30307; (404) 681-0581, CPU $49.50; PIA $19.50.

**Super Programming Aid Version III**, a CoCo 3 utility program to integrate most used functions and save disk space. The Version III print spooler has been updated to use the memory mapping unit available in the CoCo 3 and to use 12K of the memory which is not used by BASIC as a print spool area. A new screen print command has been added to allow you to print the contents of the 40- and 80-character screen to the printer. Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221; (317) 262-8865, $29.95.

**The Word Search Game**, a 64K ECB game requiring one disk drive. The disk contains 51 data files from which you can choose a list of words. All of the words are then placed in a randomly designed puzzle for you to find. This game can be used as an educational tool for children in the fourth grade and up. Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $16.95 plus $.50 S/H.

**Wrestle Maniac**, a 64K game requiring one joystick. Pin your opponent for the 3 count and win the match. You control your wrestler and can move anywhere within the ring. Wrestling moves and actions are controlled by the joystick, and up to four players may participate in the same match. Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; (416) 878-8358, $28.95; $38.95 Cnd.

The Seal of Certification program 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 product 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.

— Judi Hutchinson
NEW
DISK
DRIVES
STARTING AT
$ 89.95
WITH CASE &
POWER SUPPLY
$129.95
We carry only the finest quality disk drives - no seconds - no surplus
Satisfaction Guaranteed!!
ALL DRIVES FULLY TESTED & WARRANTED
Complete Disk Drive with Power Supply & Case ............ $129.95
Two Drives in Dual Case & Power Supply .................... $279.95 Call
1/2 ht double sided double density Disk Drives (Panasonic/Teac) $119.95
How to use your new drive system on audio cassette
Single ps & case $44.95 Dual 1/2 ht ps & case .... $54.95 Dual ps & case .... Call
Color Computer Controller (J&M) $129.95
DRIVE 0 FOR RADIO SHACK COLOR COMPUTER
TANDON, MPI OR TEAC DRIVE (SINGLE SIDED 40 TRACKS SPEED 5 MS TRK TO TRK & UP)
POWER SUPPLY and CASE, TWO DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION ........ $249.95 $ SALE!
DRIVE 0 FOR RADIO SHACK COLOR COMPUTER
PANASONIC 1/2 HEIGHT DOUBLE SIDED DOUBLE DENSITY DRIVE 500K unformatted
POWER SUPPLY and CASE, 2 DRIVE CABLE WITH ALL GOLD CONNECTORS
J&M CONTROLLER, MANUAL and DOCUMENTATION ........ $279.95 Super!! SALE!
TAKE ADDED SAVINGS ON TWO DRIVE SYSTEMS
DISKETTES with free library case ...................... $17.95
Unadvertised Specials ........................................ $29.95
Drives cleaned, aligned & tested .............................. $Call
TECHNICAL STAFF ON DUTY, PLEASE CALL FOR ASSISTANCE.

CALL US TODAY!! 617-278-6555
ORDER TOLL FREE 1-800-635-0300
* DEALER INQUIRIES INVITED.
617-278-6555

TRUE DATA PRODUCTS
9 SOUTH MAIN ST
UXBRIDGE, MASS. 01569
617-278-6555
HOURS MON-SAT 9-6 (EST)

We welcome
Visa / Master Charge
Checks (allow 2 weeks for clearing)
C.O.D. Add $2.00
New Hard Drives
------------ COMPLETE SYSTEM ------------ JUST PLUG IN ------------

Call For
BEST PRICE

Warranty - One Full Year
5 to 20 Megabyte, ready to run on the TRS 80 Model I/III/IV/4P, color computer,

64K UPGRADES $19.95
VIDEO DRIVER $24.95

Panasonic 1091 Printer 239.95
1091 Printer & SP3 & Screen Dump 299.95

SP-3 INTERFACE for Color Computer
- 300-19,200 BAUD rates
- External to printer — No AC Plugs
- Built in modem/printer switch—no need for Y-cables or plugging/unplugging cables

Only:
$54.95

COMPLETE SYSTEM
$219.95 SG-10

Nothing more to buy!
Dealer inquiries invited

IBM XT
COMPATIBLE

call for low price

SCREEN DUMP PROGRAM
The best screen dump program for the Epson & Gemini printers ever!! Have the option of standard images reverse w/regular or double sized pictures $19.95

Panasonic 1091 Printer 239.95
1091 Printer & SP3 & Screen Dump 299.95

PRINTERS

TRUE DATA PRODUCTS
9 SOUTH MAIN ST.
UXBRIDGE, MASS. 01569

CALL US TODAY!! 617-278-6555
ORDER TOLL FREE 1-800-635-0300
The CoCo Guru Has a Mind of Its Own

My Webster's Dictionary defines a Guru as one's personal spiritual adviser or teacher. It also says he is a leader, highly regarded by a group of followers and that sometimes the term is used derisively. CoCo Guru applies only to the latter part of that definition.

The machine language program is supplied on disk and requires the Radio Shack Speech/Sound Pak. No documentation is provided nor is it needed to run the program. The disk is copy-protected, and works on the CoCo 3.

Most of us think of a Guru as a wise man; a philosopher with deep religious roots. This Guru however, is nothing more than a dirty old man who rambles endlessly about nothing in general and sex in particular. If bad taste is your bag, read on.

The only input you, the user, have is typing in your name. From then on the Guru asks and answers all the questions that are directed to you.

Often when a question is asked, you might want to answer differently than the program allows, and that is a big flaw in the program. You find yourself only an observer to a conversation that leaves you speechless. The questions and answers are totally irrelevant to anything and are sometimes humorous. The program is structured to create random sentences, which I suppose is why the thing is so darned nutty. I found myself unwillingly glued to my CoCo in utter disbelief at how really awful it was. It's like watching a Pee Wee Herman movie; you just can't figure out how he can make money being so downright corny. Maybe that's what the authors of CoCo Guru had in mind when they released it for sale. They may sell a few, but it will never be a hot item for the CoCo as far as I am concerned. It's definitely not for youngsters, either; in fact, it deserves an 'R' rating for its many sexual innuendos and suggestive talk. On a scale of 1 to 5 it rates no better than a 1, and that's being generous because I like programs that use speech synthesis.

The authors of CoCo Guru would do us all a favor if they would channel their talents toward a more meaningful speech synthesis program. Or maybe they could rewrite this program so that the user could type in direct responses to the many silly questions. Maybe then I'd feel like I had some control over what is being discussed. Maybe then it would rate a 2.

(Thinking Software, 46-16 66th Place, Woodside, NY 11377; 718-429-4922, $34.95)

— Jerry Semones
Discover the Magical Maze of Gantelet

Shades of Dungeons and Dragons. Gantelet, by Diecom Products, is one of those maze-type games filled with creatures, treasures, door keys and magic objects, including the famous magic potion. The game requires a 64K CoCo and is available on tape or disk. It can be played with one to three players. Joysticks are required to play with more than one player. One player uses the arrow keys to move around the maze and the space bar to fire in the direction you are facing. The other two players use the joysticks and fire buttons.

The game consists of a multiple-level maze. The exact number of levels is unknown. The object is to find treasures and advance from level to level, scoring as many points as possible before your character dies. No mention is ever made of escaping the maze. Each player begins with 600 “health” points. You may increase health points by finding food scattered around the various levels of the maze, otherwise they decrease as time goes on. When the health points reach zero, the player is dead. The game is over when all players have died.

Creatures move around the levels searching for players to attack. An attack by a creature reduces a player’s health points. A special creature, Death, can drain your health very quickly. You must avoid him at all costs. Creatures may be shot, or all creatures and creature generators on the screen may be destroyed by using a magic potion if you happen to have found one. Other objects have magical qualities for the players to discover.

If you find a key you may walk over it to pick it up. It may then be used to open a door which consists of a series of blue squares. I never have much luck with artifact colors so my doors were always green. Entering an “exit” square moves a player to the next level, while entering a “teleporter” moves the player to another place on the screen on the same level. If more than one player participates, all players must be in the exit before anyone is placed on the next level.

The game is well-done and provides quite a challenge, especially on the higher levels where more creatures exist. The characters respond a little sluggishly to the joysticks and may take some getting used to, but this was not a serious drawback. All players must remain visible on the screen at all times. This means two players cannot go in opposite directions in the maze because the screen cannot scroll two directions at the same time. The screen appears to lock up until both players proceed in the same direction. This also takes some getting used to, as well as player cooperation.

For a gamester, Gantelet provides a thrill and a challenge. It would make a good addition to anyone’s maze collection.

(Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; 416-878-8358, $28.95; $38.95 Cnd.)

— Larry Birkenfeld
Iron-On Transfers With UNDERWARE Ribbons and Color Pens

Diversions, Inc., is marketing a line of products cleverly entitled UNDERWARE. At the heart of this product line is the UNDERWARE printer ribbon. Anything printed on plain paper with this ribbon becomes an iron-on transfer ready to adorn your favorite article of clothing. UNDERWARE ribbons are available in black for the following printers: Imagewriter I & II, Oki/Gemini Spool, Epson FX-70/80/100, Epson LQ-1500, Star Radiox 10, IBM ProPrinter, Toshiba P-1350, TI 850 & 855, and Mannesmann Tally MT-80. Prices for these ribbons range from $14.95 to $21.95.

Ribbons are available in red, blue, green, yellow, brown and purple for the Imagewriter I & II, Oki/Gemini Spool, and Epson FX-70/80 for $16.95.

Multi-color ribbons are available for Imagewriter II ($29.95) and Epson JX-80 ($34.95) color printers.

If your printer is not on the list, don’t despair; Diversions has specially formulated carbon paper that works to create transfers with any impact printer that accepts sheet fed paper.

The use of a graphics software package enhances this product. Remember, though, the image printed on paper must be the mirror image of the desired finished product. The UNDERWARE documentation indicates that many graphics packages include such a “flip” feature. If yours does not, Robert C. Montowski’s FLIP-L2R utility which appeared in the July ’86 RAINBOW may be the ticket.

You may want to spruce up the designs you create with UNDERWARE ColorPens. A set of these includes red, blue, green, orange and yellow. Whether used to decorate images created with UNDERWARE ribbons or to create free-hand works of art, anything drawn or written on paper with a ColorPen becomes an iron-on transfer.

The fabric to be decorated should be at least 50 percent polyester for best results. The documentation suggests that your iron be set to its hottest setting. Be careful here — experiment on an old shirt or something. The hottest setting on my iron scorched and nearly melted the fabric within seconds and created very unsatisfactory results. The “permanent press” setting turned out right for me.

Both the printed images and those created with ColorPens transferred well. My advice regarding printed images is the bolder the better. ColorPen creations look much better after transferred to cloth than they do on paper. Pen lines in filled in areas seem to disappear to uniform color when transferred. My daughter Emily was in charge of pens and created quite a creature from outer space!

I have a couple of questions for Diversions, Inc. Why no ribbons for Radio Shack printers? Why no mention in the documentation of Tandy computers and graphics software for them?

(Diversions, Inc., 505 W. Olive Ave., #520, Sunnyvale, CA 94086; 408-245-7575, ribbons from $14.94 to $21.95; pens, $14.95)

— Stanley Townsend
Music Libraries for Your Listening Pleasure

Speech Systems is well-known in the CoCo Community for its popular music programs, voice synthesizers and E.A.R.S. To complement these fine pieces of software, what else would a company sell? Why not sell examples of the output of these programs. Hence, Music Libraries 400, 500, 600, 700 and 800. These packages are in addition to the Music Libraries 100, 200 and 300.

Each Music Library contains five or six disks with over 100 four-voice music selections. The entire library is the work of two music lovers. Volumes 100 to 400 and 600 were transcribed and arranged by C. Clark Rulaford, and volumes 500, 700 and 800 were compiled by Speech Systems vice-president, Randy Spector. As a serious user of Musica, Musica II and Lyra, I am well aware of the time and work involved in compiling such libraries. A tip of the hat to both these gentlemen for their fine job.

While each volume is available on both tape and disk, I received the disk version. You are instructed to run a program called JUKEBOXD. After doing so, you are greeted with a two-column menu of all the selections available on the disk. From there, you may choose to listen to a single selection or all selections on the disk. (Musica is not required for listening to the music in the music libraries.)

In addition, the JUKEBOXD program supports output to the Speech Systems Stereo Pak as well as to the TV. It also supports high-speed playing. The Stereo Pak output works very well and, at high speed, you can sit back and imagine you are sitting in a concert hall.

An obvious attempt has been made by Speech Systems to ensure a variety of music styles in each volume. For example, Volume 700 contains TV Themes, Beethoven, Broadway, Blues, Kenny Rogers, The Beatles and Country Classics Parts 1 and 2. With such a wide variety of music, it is somewhat difficult to pick your favorites. Personally, I never liked the "Moonlight Sonata" by Beethoven until I heard some of the special effects introduced by the arranger. I have listened to these five libraries in their entirety four different times. There are very few mistakes in transcription. I am even considering running an output from my computer room to the stereo in the family room just so we can listen to selections. Or, better yet, I may just buy a new CoCo and set it by the stereo. With all these music packages from Speech Systems, the CoCo is quickly becoming an integral part of the stereo system.

The Speech Systems Music Libraries are packages that you can really sit back and enjoy. I definitely rate these packages a 97 out of 100. And, no single Library is better than any other. They are all worth getting.

(Speech Systems, 38W 255 Deerpath Road, Batavia, IL 60510; 312-879-6880, $29.95 per Library)

— Cray Augsburg
Dual DOS Switcher: Simple and Inexpensive

Have you ever thought about making your own customized DOS but put off the project because you couldn't think of a neat and clean way to add it to your CoCo? I like to build project boards, but I like them to plug in. I don't like the idea of hacking away at the innards of my computer.

Well, I have some good news for you. Now there is a simple and inexpensive way to add another DOS to your computer—it's called the Dual DOS Switcher. It's designed to be used inside your J&M Disk Controller. After you have completed the installation, you will be able to manually switch between a 24-pin ROM and a 28-pin EPROM or two 28-pin EPROMs.

Oddly enough, I found I could not install both the J-DOS and the RS-DOS at the same time. Both of these are 24 pin in my machine and this is one configuration the switch does not handle.

While the installation itself is simple enough and requires about 30 minutes to complete, the instructions may be inadequate for those who have never attempted any electronic modifications before.

All in all, the product works fine, and for the price it sure beats trying to come up with your own form of "kludge" to the system.

(CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8; 514-383-5293, $14.95)

— Phil Speed

DDAY: The Invasion of Normandy

DDAY from Ark Royal Games is an excellent historical program that provides hours of fun. This Simulation requires strategy and advance planning as you control the Allies in their fight against the Nazis.

The game is simple to load and execute, and is not copy-protected so backups can be made. After each turn is completed, you may play on or save the setup. This is a plus for war buffs who want to try to work different combinations of forces.

DDAY begins with the design of your invasion force. The seven pages of documentation that come with the program include an example run of the order of battle that is very helpful.

The one restriction of the game is that you are only allowed three fighter bomber squadrons. The Nazi forces are controlled by the CoCo and, in order to get control of the air, you must destroy at least four of the German airfields. If this is not done quickly, your navy and troops suffer.

DDAY is for the more advanced player; novices may have some difficulty getting started. Some knowledge of the Invasion of Normandy is needed. This game rates an 8 on my scale of 1 to 10. Now all I need to know is where to put General Patton and the tanks!

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238; 904-786-8603, tape $23; disk $25)

— Keith Smith

One-Liner Contest Winner...

Run the one-liner on your disk system. When asked for the track number, enter an appropriate response and this routine will print the information contained on every sector of that track to your screen.

The listing:

1 CLEAR5$:CLS:PRINT"READER";"(C)1985 E.D. WILKES";"MACON,GA";"(C)1985 E.D. WILKES";"MACON,GA"
2 PRINT$"ENTER TRACK # (0 TO 34)";"PRINT$"FOR=1TO18:DSK$=0,T,S,A,B$:PRINT$"TRACK#"T,"SECTOR#"S,A,B$:FORA=1TO18:PRINT$"TRACK#"T,"SECTOR#"S,A,B$:FORA=1TO18:PRINT$"FORA=1TO15":NEXT:EXEC44539:CLS:NEXT

Ernest Wilkes
Macon, GA

(For this winning one-liner contest entry, the author has been sent copies of both The Second Rainbow Book of Simulations and its companion The Second Rainbow Simulations Tape.)

One-Liner Contest Winner...

Minimon is a miniature monitor that will give you the locations at which your BASIC program and its associated commands are stored. Just type it in and save it to tape or disk in ASCII format. Then merge it in when your program is in memory. To merge Minimon from tape use the following line:

OPEN"",1,"MINIMON";POKE111,255;EXEC44539 and press ENTER.

The listing:

100$CLS:FORX=PEEK(25)*256+PEEK(26)TOPEEK(27)*256+PEEK(28)-140$T=T+1;PRINT$"LOC"X;PEEK(X)"CHR$(PEEK(X))"INT(T/15)THENPRINT$"PRESS ANY KEY.";EXEC44539:CLS:NEXT

Keiran Kenny
The Hague, Holland

(For this winning one-liner contest entry, the author has been sent copies of both The Second Rainbow Book of Simulations and its companion The Second Rainbow Simulations Tape.)
New interactive CoCo software makes learning easy, fun. Kids love it!

NEW LOW PRICE - 16 lessons for the price of 8! Educational Software for kids from 6 to 18.

Parents are depending more and more on supplemental education for their children. Educators know that the most effective teaching is done one-to-one. Through individual attention and self-paced progress, students learn more and retain more.

BEETR THAN A PRIVATE TUTOR
The Compass Education Software LOOK/LEARN approach is the next best thing to a private tutor. Unlike other educational software the Compass Library also talks to the student — in characters, not in synthesized speech, but in a real human voice. With on-screen textual information and attention-getting graphics, students of all ages actually enjoy learning!

SELF-PACED FOR BETTER RETENTION
The lessons advance only after the student has correctly answered the questions throughout the programs assuring that the material has been thoroughly absorbed.

SIMPLE EQUIPMENT REQUIREMENTS
All you need is the TRS-80 Color Computer (any model), computer cassette recorder and TV set. Once the cassette is loaded you need only enter two simple commands... and then press any key to start the lesson.

Of course you can stop the lesson at any point to study information on the screen. Just push the pause button on the cassette player. Push it again and lesson resumes.

To answer questions throughout the lesson simply press the appropriate number on the computer keyboard, type in the correct answer, or follow other easy instructions. And to go back and review, just rewind the cassette. It's that simple.

CHOOSE FROM 9 SUBJECTS
There is not sufficient space in this advertisement to list all lesson titles, but here is a sample:

MATHEMATICS
In today's advanced, HiTech world, understanding and working with numbers is essential. Compass has developed three comprehensive series of math programs. From basic numerals for the very young, to algebra and higher mathematics for the older child. In between, there are programs for everything from addition and subtraction to practical everyday percentage problems.

LANGUAGE ARTS
A practical education begins with good reading skills and is continued with increased vocabulary comprehension and, of course, spelling. Your child will learn that reading is fun while they are also learning when to use "to," "too," and "two," and how to spell when building a vocabulary.

MATH/FRACTIONS
Grades 4 to 8
MF 1 - Numerator, denominator, bar
MF 2 - Multiplication of fractions
MF 3 - Factors and prime numbers
MF 4 - Reducing fractions, reciprocals
MF 5 - Reducing fractions, lowest terms
MF 6 - Proper fractions, mixed numbers
MF 7 - Multiplication-division of fractions
MF 8 - Addition-subtraction of fractions
MF 9 - Addition of mixed numbers
MF 10 - Changing fractions to decimals
MF 11 - Converting decimal numbers
MF 12 - Word problems using percents
MF 13 - Additional problems using percents
MF 14 - Word problems using percents
MF 15 - Finding circle area using pi
MF 16 - Using a ruler to measure fractions

MATH/BASIC ALGEBRA
For all grades
Sixteen lessons: MBA-1 to 16

MATH NUMBERS
For grades 1 to 6
Sixteen lessons: MN-1 to 16

SELF DEVELOPMENT
Writing effectively means communicating effectively. Through the writing series of lesson students of all ages will develop basic skills needed to turn thoughts and ideas into expressive words and phrases.

RULES OF WRITING
For all grades
Sixteen lessons: RW-1 to 16

THE MAGIC OF SPELLING
Grades 4 to 8
MS 1 - Plurals: branches, rodeos, valleys
MS 2 - Plurals: houses, brushes, candies
MS 3 - Plurals: babies, pianos, leaves
MS 4 - Suffixes: boxed, referred, writing
MS 5 - Suffixes: paid, quickly, extremely
MS 6 - Suffixes: said, confusion, school
MS 7 - Homonyms: two, too, to; their, there
MS 8 - Homonyms: our, are, hour; ate, eight
MS 9 - Homonyms: weight, wait; who's, whose
MS 10 - Homonyms: scent, cent; sell, cell
MS 11 - Homonyms: due, dwe; course, coarse
MS 12 - Homonyms: cite, site, sight; by, buy
MS 13 - Homonyms: blue, blew, creak, creek
MS 14 - Homonyms: sale, sail; steel, steal
MS 15 - Spelling by Syllables: letter, color
MS 16 - Doubling Consonant Letters: hollow

VOCABULARY COMPREHENSION
Grades 3 to 5
Sixteen lessons: VC-1 to 16

READING COMPREHENSION
For all grades
Sixteen lessons: DRC-1 to 16

SCIENCE
SCIENCE PHYSICS
For all grades
Sixteen lessons: SP-1 to 16

HISTORY
AMERICAN HISTORY
For grades 4 to 12
Sixteen lessons: AH-1 to 16

So there it is... no-nonsense subject matter presented in a way that maximizes understanding and retention.

SPECIAL PRICING
YORK 10 is now offering, for a limited time, a complete set in any subject, 16 cassettes, one lesson on each cassette, for only $49.95. We originally offered only 8 cassettes for the same amount so now it's twice the value. The same 16 cassettes are sold elsewhere for over $150.

To order, send your check or money order for $49.95 (CA residents add sales tax) for each subject you wish, plus $3.50 shipping and handling (any quantity). For immediate shipment, call collect the number below and charge your VISA or MASTERCARD.

YORK 10
9525 VASSAR AVENUE
CHATSWORTH, CA 91311
1-818/700-0330
CoCo III Secrets Revealed Offers Good Information

The Color Computer 3 market is presently in somewhat of a waiting state. Color Computer software/hardware vendors are busy trying to get new products for the CoCo 3 while most owners of the new machine are waiting (impatiently) for those new products. When the new products are finally released, I imagine there will be quite a rush of CoCo 3 sales. However, what do we do while we are waiting? The daring, technically-minded people who dabble in programming will want to pick up CoCo III Secrets Revealed, a 34-page information manual for the CoCo 3.

The manual contains six chapters that discuss features of the new machine, and gives a modest memory map. Chapter 1 covers the basics of the Memory Management Unit (MMU) as well as explaining how the palette registers work. It includes a subjective chart of what values give what colors in the palette registers. Chapter 2 lists and briefly describes the new commands in the CoCo 3. This really is useless, as anyone who owns a CoCo 3 already has the manual, and this chapter doesn't give enough specifics to help anyone who doesn't have the new machine. Chapter 3 goes back to discuss some of the finer aspects of altering the palettes. This chapter also includes several “you type 'em” examples of how to access some fancy features. Chapter 4 is a tidbits chapter. It covers smooth scrolling of graphics, a memory test program for 128K and 512K versions of the CoCo 3, and several peeks and pokes to control the video output. Chapter 5 is devoted to an eight-page memory map. This map does not fill the need for a good disassembly of the machine. However, it does provide a great deal of information regarding operational “modes” of the CoCo 3 and where to go to control I/O on the new machine. Those technically-oriented people will be able to discern a good deal of useful information from this chapter. Finally, Chapter 6 is a brief summary. The last page of CoCo III Secrets Revealed gives the pinouts for the RGB jack located on the bottom of the CoCo 3 and also for the GIME chip. These diagrams are rough, hand-drawn pictures which might indicate they were thrown in at the last minute.

All in all, CoCo III Secrets Revealed offers some very good information which will be helpful to advanced as well as intermediate programmers. I do feel, however, the manual could have been reduced to about 10 pages and still contain the same amount of useful information. The price is not too high, especially since we are all waiting for CoCo 3 products.

(Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $16.95 plus $3 S/H)

— Cray Augsburg

Physics: The Study of Motion, Matter and Energy

The software library from York 10 Software consists of five main courses which cover standard school curriculum. Each study course consists of two volumes of material with eight cassette tapes in each volume, for a total of 144 individual lesson plans.

This library is only available on cassette tape because it contains both audio and visual presentations. The first cassette in each volume contains the loader used to run all of the lessons in that volume. As the loader is written in machine language, you need to follow this procedure when using these programs. First, insert the first cassette in the cassette player and rewind it. Then turn on your CoCo and monitor, and type \texttt{LOADM.EXEC} and press \texttt{ENTER}. When the program is loaded and running, just follow the prompts on the screen.

While you are using these lesson plans, you can stop the program at any time by pressing the pause key on your cassette player. If you don't have a pause key, just stop the recorder. You can also rewind or fast forward the tape so that you can review or skip any section of the lesson plan.

Physics is defined as the study of motion, matter and energy, and their interactions. Everything in our universe is governed by these laws. Are you curious about physics? What are light and sound waves? How does electricity work? For the answer to these and other questions, you can use one of the lesson plans contained in the Physics/Science study course.

Volume One takes you through the study of motion, matter, sound, light and optics, and wave motions. Volume Two takes you through the study of electronics, AC voltage, solid-state electronics, the elements, atomic and nuclear physics, and the theory of relativity.

Although the instruction book states that these lesson plans are made so that students of all ages can explore these concepts, each lesson plan starts out by telling you that the study of physics is a hard subject and that you should go back and review any previous lessons until you have a firm grasp of the concepts discussed. I fully agree with this disclaimer.

My son Eddie, who is 8 years old and in the third grade, was curious about this software. One night, he sat down in front of our CoCo and went through the Sound and the Light and Optics lessons. Although he finished both lessons, I don't think he really comprehended the concepts that were being explained. I would, therefore, suggest that these lesson plans are made so that students of all ages can explore these concepts, each lesson plan starts out by telling you that the study of physics is a hard subject and that you should go back and review any previous lessons until you have a firm grasp of the concepts discussed. I fully agree with this disclaimer.

My son Eddie, who is 8 years old and in the third grade, was curious about this software. One night, he sat down in front of our CoCo and went through the Sound and the Light and Optics lessons. Although he finished both lessons, I don't think he really comprehended the concepts that were being explained. I would, therefore, suggest that these lesson plans are made so that students of all ages can explore these concepts, each lesson plan starts out by telling you that the study of physics is a hard subject and that you should go back and review any previous lessons until you have a firm grasp of the concepts discussed. I fully agree with this disclaimer.

I tried the courses on AC voltage and solid-state electronics. I was impressed. These courses are set up in such a way as to explain the subject matter in a concise and entertaining way.

If you are curious about physics and the laws that govern our universe, then these programs will be very useful to you.

(York 10 Software, 9525 Vassar Avenue, Chatsworth, CA 91311; 818-700-0330, $49.95 per volume plus $3 S/H)

— John H. Appel
Pound Your Troubles Away With Computer Hammer

Have you ever felt like your computer really needed a good beating? Well, now you can take out your frustrations from syntax errors and the like on your machine without actually damaging your valuable investment.

What TV bricks did for television, the Computer Hammer does for computers. Go ahead, pound your computer's brains out! You'll feel much better when you're through, and your machine will still be intact.

All thanks to the Computer Hammer, a mallet-shaped piece of foam rubber. No frustrated computer user should be without one!

Back copies of many issues of THE RAINBOW are still available.

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.

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 state 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 order, just fill out the form on the next page and mail it with your payment to:

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

**Studies in the Parables**

Provides the Framework for Bible Study

*Studies in the Parables* is a welcome addition to the growing selection of Bible-based programs, and another fine offering from the Rev. Mark S. Camp and Sovereign Grace Software.

Like other Sovereign Grace programs, *Studies in the Parables* consists of disk text files along with a printing utility. The text files may be printed out on any word processor or by using the built-in text processor.

There are a lot of big words one can use when talking about the study of the Holy Scripture, but Mark Camp doesn't use them and I don't either.

I will make no attempt to judge or comment on the theology of these studies. I only want to evaluate their use in a general way. They are good solid outlines written by a man who knows the subject matter.

Speaking of that aspect, the *Studies in the Parables* are simple, straightforward theology, written in a clear and concise style.

This program of great value to Bible teachers, students and to people who may be interested in the study of scripture. The material on the disk could be used for a series of expository sermons on the Parables, or simply used as the framework for further study.

Mark Camp says he hopes we will use the disk as a "skeleton, on which (we) can hang (our) own meat." I can see that as a very good use. Mark has essentially prepared a good study around which we can build a commentary. The folks at my storefront church will be having a series based on Mark's outline. I suppose that is why he took all the time to prepare the study — to send it into the world to teach.

(Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011; 314-227-3238, $9.95)

— Howard Lee Ball

**Hint . . .**

**Attractive Solution**

After finding out the price of a bulk tape eraser, I decided there must be another way to accomplish complete erasure of tapes. A quick look in the junk box yielded just the right tool — a magnetic mount for a CB antenna. Any large magnet should do. Just rub the magnet in a circular motion several times over the tape on both sides. You can then use the tape to record sound or data. Though I haven't tried it yet, this should also work with VCR recording tape. Be sure to store and use the magnet far away from your tape collection so that you don't inadvertently erase other tapes, too.

Jack Demaree
Versailles, IN
Pick a Winner With The Lottery Player

If you are like millions of other people, you may have spent a buck or two on a lottery. Twenty-two states and the District of Columbia, along with Canada and Australia, are currently operating lotteries. Their popularity and increased revenue are attracting more and more states to consider them as ways to supplement declining tax bases.

Suzanne Spencer Software now offers for your 64K Color Computer The Lottery Player, which claims to increase the chances of winning lotteries. The program is available on either tape or disk and is not copy-protected, so backup copies are no problem. The purchaser should specify what state or national lottery version is wanted when the order is placed.

Most people who play lotteries select numbers based on some scheme like their birthday, social security number, address or other combination of numbers. Sometimes you might get lucky, but the odds of winning using such picks are very slim. Dave Gentry, the author of The Lottery Player, has done some serious studying in the area of mathematical probabilities and has developed a unique computerized approach to selecting lottery picks. The methods that Dave discusses in the 10-page set of instructions require that you utilize the method of Wheeling Numbers. This method, along with the purchasing of multiple Lotto tickets each week, will help you become a winner. The author is wise to point out that while there is no guaranteed return for the money you invest, you will see an improvement in your winnings that can be verified before any money is spent by keeping track of the winning numbers for a period of time.

The program requires that the user enter the winning lottery numbers each week in the program’s data statements. In this way the computer is able to determine the most frequently called numbers, which forms the basis of the Wheeling system.

Wheeling systems take a set of numbers and then combine them into various combinations of six numbers each. All of the possible combinations are not used because most of us could not afford the cost of the thousands of tickets needed. There are normally 38 to 42 sets of six numbers each that are derived, and the program produces a sufficient number of combinations to give an increased chance of winning. Since the odds of winning first place are slim, the best this program can do is improve those odds and increase your chances of winning second, third and fourth place money. You may not win the big one but the small stuff adds up, too!

The Lottery Player uses the abbreviated Wheeling system so the average player can afford the cost of the weekly lottery tickets. The program allows you to select 12, 14, 16 or 18 numbers that will be Wheeled into 38, 40 or 42 combinations of six numbers each. Three methods of number selection are used and shown in the five main menu options.

In Option 1, you are prompted to pick up to 18 numbers and the numbers are Wheeled.

Option 2 allows you to select the last 10-week period that you have winning Lotto ticket numbers for. Since it utilizes only the last 60 numbers that have been drawn, it is often considered the best way to select the “hot” numbers. This option analyzes the winning numbers from the last 10 weeks and selects only those numbers which have appeared more than twice in that period. Ticket combinations are presented on the screen and to the printer if you want.

In Option 3, the computer generates the most frequent numbers that have appeared between a beginning and ending period. These numbers are then compared to the amount of numbers you chose for Wheeling purposes and all of the other numbers are discarded. The various ticket combinations are displayed on the screen or to the printer.

Selecting Option 4 lets CoCo analyze any of the three methods chosen using data from the previous weeks of winning numbers. You can see the number of tickets Wheeled and the cost of those tickets.

The final option sends a chart to your printer and shows, graphically, the frequency that each number in your lottery appeared in the previous weeks.

This program does a lot with lottery information. It utilizes the CoCo and an optional printer to take full advantage of the Wheeling Number System. I urge any of you who play lotteries on a regular basis to use this program to improve your chances of winning. With this software, a CoCo and weekly purchases of lottery tickets, you may become the first millionaire on your block!

(For this winning one-liner contest entry, the author has been sent copies of both The Second Rainbow Book of Simulations and its companion The Second Rainbow Simulations Tape.)
Create Labels With Ultra Label Maker

I like to think of myself as an organized and precise individual. However, when it comes to labeling disks in my rather large disk library or addressing a quick envelope to RAINBOW magazine, I always seem to be just barely able to scribble it down with my trusty, felt-tipped pen. Well, look out world, now that I’m armed with Ultra Label Maker from Bob van der Poel Software, no more fooling around with handwritten scribbles. I can now, with very little effort, create the neatest labels you have ever seen. (Last I heard, my wife and kids were drafting a letter of thanks to Bob.)

Ultra Label Maker comes in either a cassette or disk version, requires 32K Extended BASIC and is not copy-protected. One of its most important features is its compatibility with any and all printers. Owning a DMP-120, I usually suffer heavily when purchasing any printer-related software. This program is one of the few exceptions. The software allows this compatibility by letting you create your own printer driver. However, unlike some programs with the same option, you do not have to be a programmer or hacker to generate the driver. The Ultra Label Maker disk also contains a program called Fontedit which takes you step by step through the creation of your own printer driver. Fontedit lets you set up from one to nine control code sequences for printer functions such as Italics, NLQ, Elite, Condensed and others. What’s more, when you run the actual Label program it allows you to mix and match any of the fonts for each and every line. It even takes into account the different type sizes, such as “expanded” and adjusts the number of characters allowed on the line.

The program also lets you set the size of the labels, allowing for any size mailing label or other label on the market. I have some rather large 5-by-1.5-inch labels and it handled them perfectly. As with the font styles above, the number of characters prompted for on each line changes with the size of the label. Also, the data entered may be automatically centered, left or right justified or left as it is at your discretion. Of course, each label can be saved for reprinting or modifications at a later date.

At this point, I have described what is possibly one of the most user-friendly and practical label-making programs on the market today. However, Mr. van der Poel didn’t stop there, but added two more options to further enhance the program. One option is called Merge File Print, which sets up a label “mask” using the features I described earlier and has the program read an ASCII file of names and addresses, and generate a label for each. Each blank line in the mask is replaced by a line from the ASCII file. This means you could put fixed information in the mask to appear on every label and input the remaining variable information from the file. The file is easily created with any word processor capable of ASCII output.

The other option allows each label to be printed with a sequential number for raffle, event or hat-check tickets. The starting number and increments are user-definable to the point of allowing a negative increment and the placing of the number anywhere within the label.

By now, you may have guessed that I was impressed by this program. For those of you who have TelePatch, also by Mr. van der Poel, you already know the forethought and precise planning that goes into his products. Being a professional programmer myself, I really appreciate a quality piece of software when I find it. Also included with the program is an extremely clear and well-written manual ranking among the best documentation I have seen in a long time. If you need to create labels of any kind, you couldn’t possibly go wrong with Ultra Label Maker.

— Ken Boyle

Great Racks, CoCo Stacks

Several department stores carry small metal grid racks that fit onto your cupboard or closet shelves. They are intended to hold such things as plates, towels or just about anything. With that in mind, I decided to use one to hold my CoCo equipment. It works perfectly! Just place it right over your CoCo (many of them even work well if you have a Multi-Pak Interface) and set your monitor and/or disk drives on them. Buy two and use one for your printer. These racks are great and, best of all, they are very inexpensive!

Stephen A. Haughey, M.D.
Whitefish Bay, WI
Get the Total Picture
With Puzzle Math

Only a generation ago one of the major ways of drilling math facts was the use of the flash card. The problem was written on one side of the card and the answer was on the other. The student used the cards individually or the teacher used them in class, many times in the form of a game. With the advent of the microcomputer, software authors began writing drill-type software that mimicked the flash card. Numerous programs have been written that provide drill of math facts. These are available either commercially or in past issues of THE RAINBOW. Certainly, one could easily argue that we don’t need any more math drill programs. However, for those who might be looking for a program that would also make the process of reviewing math facts interesting and fun for the child, consider Puzzle Math by SECA.

Puzzle Math, which requires 64K with Disk Extended Color BASIC and one disk drive, does everything that the old flash cards did and more. Each time the student answers the problem correctly, a piece of a picture (puzzle) is displayed. Thus, there is an incentive to keep answering the questions in order to see the complete picture. The program disk comes with 18 pictures that the computer randomly selects at the beginning of the program.

Puzzle Math starts out with a menu of the four math functions — addition, subtraction, multiplication and division. Having selected one of these functions, the next menu prompts for the range of difficulty. There are four ranges of difficulty, approximately corresponding with grades two through five. The third and final menu prompts for the number of puzzle pieces (problems), 8, 12, 16, 24 or 48.

After answering all of the prompts, a graphics screen appears and presents five possible answers from which to choose the correct one. If the correct answer is entered, the screen reveals another puzzle piece; if an incorrect answer is entered, you are given a second chance to enter the correct answer. The program continues in this manner until all pieces have been revealed. Then, a score card is shown that gives the total problems attempted, number of problems answered correctly and the number of problems answered incorrectly.

Now you are probably thinking all this sounds great, but what happens when the child gets tired of the 18 pictures provided with the program? No problem! Simply use any picture that is drawn in either PMODE 3 or PMODE 4 by any of the popular graphics editors. Simply rename the picture as PICTN.BIN, where N is a number between one and 18, and copy it to the program disk. Details for this procedure are provided in the manual.

Puzzle Math is a very good piece of software that does exactly what is claimed. The 18 pictures are very detailed drawings that are of interest to children. One aspect that I did not like was with the 3rd and 4th levels of difficulty for both multiplication and division. Too many of the problems were of the form N x 1, N/1, and N/N. In my opinion, such problems are much too easy for a fourth or fifth grader. Otherwise, Puzzle Math is a very good program that I would recommend for young children. I should also note that SECA includes a free box of 10 DS/DD disks with the purchase of Puzzle Math.

(SeCA, Southeastern Computer Arts, P.O. Box 3134, Gulfport, MS 39505; 601-832-8236, $24.95)

— Donald Dollberg
Clue Yourself in With
The Guidebook for Winning Adventures
By Eric Tilenius

On the front cover of The Guidebook for Winning Adventures by David and Sandy Small is a message written in small white type: “If you haven’t discovered Adventure games, you don’t know what you’re missing. If you have, you need help!” And help is just what this book is about.

In the past, lone computer Adventurers have had two choices when baffled by some puzzling situation — scream and try to work it out on their own, which could indeed take months; or madly call a friend at 2 a.m. and ask for help. Somehow, I always got stuck doing the former, as matters seemed to get worse, they suddenly improved.

Enter The Guidebook for Winning Adventures. It gives hints, clues, maps and outright solutions to some of Infocom’s fabulous games. These games (all available for the Color Computer from either Radio Shack or Infocom) are Enchanter, Infidel, Planetfall, and Zork I, II and III.

Both the authors and I suggest not looking at the outright solutions until you have completed the Adventure, as being handed the solution takes all the fun out of an Adventure. The book also offers tips on Adventures in general and includes a brief section on how Adventure games are written. These sections are not very detailed, but provide a background in Adventures for those not familiar with them.

The main bulk of this book — 299 pages, to be exact — is devoted to giving clues to the six Adventures mentioned above. These sections are similar to the InvisiClues booklets marketed by Infocom. There are, however, two chief differences between The Guidebook and Infocom’s InvisiClues: One works to this book’s advantage, and the other to its detriment. The first difference is cost. InvisiClues provides hints to just one Infocom game and costs $7.95, while for $9.95, The Guidebook gives hints and maps to six games.

The publisher, however, had a problem with The Guidebook: Namely, how to hide the clues so that a reader didn’t ruin his game by looking down a page and seeing all the answers to all the puzzles. The InvisiClues, as its name suggests, accomplishes this by putting clue answers in invisible ink and providing a decoding pen. This technique, however, would be far too costly in a 300-plus page book. Instead, the authors provided scrambled answers to clue questions. Thus, if you are stuck in a certain part of an Adventure, you need only find the appropriate question in the clue book that describes the situation and unscramble (by means of the given key) the answer to this question.

For instance, if you were playing Planetfall and wanted to find out how to fix the broken coolant system, you would simply turn to the chapter on Planetfall, find the section on The Tower Core Area (which is where the coolant system is located), then look for the question, “How can I fix the coolant system?” Unscramble the scrambled clue, and voila!

After using The Guidebook for a while, I soon became quite weary of unscrambling clues by hand. That’s when I wrote the program enclosed with this review. Simply RUN this program and type in the scrambled sentence. In the blink of an eye, the plain English clue appears on your CoCo screen. I also found that using this program forced me to try a situation before turning to the book for help, since I had to save my position in the Adventure and QUIT before I could run my decoder. The program is a real relief if you buy this book — give it a try.

<table>
<thead>
<tr>
<th>REQUIRES EXTENDED BASIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIS PROGRAM WILL TRANSLATE</td>
</tr>
<tr>
<td>THE ENCODED HINTS IN THE</td>
</tr>
<tr>
<td>BOOK &quot;THE GUIDEBOOK FOR</td>
</tr>
<tr>
<td>WINNING ADVENTURES&quot; BY</td>
</tr>
<tr>
<td>DAVID AND SANDY SMALL. WITH</td>
</tr>
<tr>
<td>THIS PROGRAM, YOU CAN DE-</td>
</tr>
<tr>
<td>CODE THE CLUES ON YOUR COCO</td>
</tr>
<tr>
<td>AND SAVE LOTS OF TIME &amp;</td>
</tr>
<tr>
<td>EFFORT. &gt;BY ERIC TILENIUS</td>
</tr>
<tr>
<td>CLEAR 12ØØ</td>
</tr>
<tr>
<td>CLS</td>
</tr>
<tr>
<td>A$=A$+CHR$(C)</td>
</tr>
<tr>
<td>NEXT C</td>
</tr>
<tr>
<td>LINEINPUT&quot;TRANSLATE&quot;&gt;;B$</td>
</tr>
</tbody>
</table>
60 PRINT
70 FOR C=1 TO LEN(B$)
80 M$=MID$(B$,C,1)
90 IF INSTR(1,A$,M$)>0 THEN M$=C
HR$(ASC(M$)-1):IF ASC(M$)=64 THEN M$="Z"
95 MID$(B$,C,1)=M$
100 NEXT C
110 PRINT"* ";B$
120 PRINT"HIT ANY KEY TO RESTART";
130 IF INKEY$=""THEN 130 ELSE RUN

One thing I like about The Guidebook is that it has different levels of clues for each question. The first clue gives a gentle nudge in the right direction, the second a big push, and the third clue usually tells you the answer straight out. This way, you get only the clues needed. Sometimes the first clue is a bit sarcastic. For instance, upon de-scrambling the first clue to the question, “What is the chemical dispenser used for?”, one is greeted with the very helpful clue, “dispensing chemicals!”

In addition to the clues, The Guidebook offers a list of all the objects used in the Adventure and their purposes, a section containing maps of each Adventure, and an “Order of Play,” which gives the complete step-by-step solution to each Adventure.

With the aid of a couple of friends, I tested a major portion of the hints given by this book and found the book to be quite comprehensive as far as providing the answers to any possible question a player might have. I checked the maps in the book against those I had drawn up and found that those, too, seemed complete and accurate.

I did come across a few errors in the step-by-step solution section, though. For instance, under the section for Planetfall, you are told to get out of the safety webbing after the pod lands under water. If you wait this long while playing the game, though, you’ll never make it to the surface. You must get out when the pod first starts to sink.

In another case, you are told to put the flask in the machine shop, and then later told to pick it up while in the “Corridor Junction.” Boy, that flask moves fast! However, with a few minor exceptions such as these, the step-by-step solutions worked and even gave the correct number of points you obtained for each puzzle.

Despite the annoyance of having to unscramble clues (made easier by the program below), and the few minor inaccuracies this book contains, I would recommend it to anyone who has, or is planning on buying, any two or more of these games. If you only have one of these games and aren’t planning to buy more, Infocom’s InvisiClues is cheaper and easier to use. However, this book is a great companion to any Adventure game lover, and, unlike the InvisiClues, can be passed on to a friend who is having troubles with other games.

(David and Sandy Small, Baen Enterprises, 8 West 36 Street, New York, NY 10018; 212-947-8244, $9.95)
VIP Writer Enhancer Provides Helpful Additions

If you use VIP Writer, this BASIC utility from Foxx Software will interest you. It allows you to use text files created by VIP Writer in another context, such as uploading them to a BBS. Or if you prefer, you can download files from another word processor or BBS and modify them for use with VIP Writer.

VIP Writer Enhancer reads any text file from disk and then modifies it as specified and creates a new corrected file while leaving the original intact.

The program is very easy to use. After running it, you are greeted with the Main Menu. A full complement of options is available to allow you to perform other useful disk functions without exiting to BASIC.

The first option allows you to Convert VIP to ASCII files. Since VIP Writer does not add a carriage return at the end of a line, problems are likely to occur if you try to upload a BBS file or read a VIP file on another word processor. Since each paragraph is saved as one long continuous line, you'll get a rather cluttered text file on any other word processor. This option adds carriage returns at the line length specified at the prompt and also enables word wrap.

The next option is converting ASCII to VIP files. It removes carriage returns so when reading a file into VIP Writer it will be readable again. Without this option, reformatting the VIP file would be a real chore.

A handy option allows you to convert to mixed-case that modifying a file written in all uppercase and changing it to lowercase, leaving only the beginnings of sentences capitalized. It can't recognize proper names, though, but you can easily correct that in your word processor. This is nice in those cases where you downloaded a file from a BBS that doesn't use lowercase. The next two options allow you to convert to all upper- or lowercase. You might want to use these options for uploading to a BBS that requires all uppercase or all lowercase.

Remove Control Characters comes in handy when mixing files from various word processors where control codes are likely to be different. It's also handy for fixing downloaded files from BBS's.

The Rename File option is like BASIC, but easier to use. Just follow the prompts. The Kill File option is also like BASIC, but prompts help prevent accidental killing of files.

View File displays any file on the screen. Use the space bar to start and stop and the up/down arrows to go forward or backward one screen at a time. Count File displays the character count of any file. Drive # selects what drive your files are in, and Exit To Writer restarts VIP Writer if a copy of VIP Writer is on the enhancer disk, or if VIP Writer is in Drive 0.

A feature I liked was the default file extension automatically added by the program. This results in a quick and accurate way to determine which files have been modified. When you select any of the options you will be prompted with FILENAME? After the program reads in the filename, it asks you NEW NAME? For example, if you had a VIP file on your disk named TEST.VIP and you selected option 1, you would answer the FILENAME? prompt with TEST. The file TEST.VIP would be read in and then you would be asked NEW NAME? By simply typing TEST, the program adds the extension ASC to TEST so that the new file is called TEST.ASC.

The automatic extensions are .ASC (convert VIP to ASCII file), .VIP (convert ASCII to VIP file), .MXC (convert to mixed case), .ALC (convert to all uppercase), .ALC (convert to all lowercase), .RCC (remove control characters) and .NEW (rename).

A six-page, spiral-bound notebook provides complete and easy to understand documentation. Instructions are provided to allow the user to customize the program. You can change the default extensions, characters per line, highest valid drive and display options.

This program is a nice addition to VIP Writer. It provides some helpful additions to an already popular program.

(Spectrum Projects Inc, P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $19.95 plus $3 S/H)

—Jerry Semones

See You at RAINBOWfest-Chicago
April 10-12
Getting the Max From MiniDOS9

In this day and age when many utility programs claim to do everything from whitening your teeth to picking up the kids after school, it is very refreshing to see a program developed that claims little but does everything it states — perfectly. This program is Cir-Pak Limited’s MiniDOS9. MiniDOS9 is a utility package that allows Cir-Pak Limited’s SC68008 coprocessor card to communicate with OS-9. You must have both the coprocessor card and OS-9 to have any benefit from this package.

MiniDOS9 can best be described as a “mini” monitor that allows one to communicate directly with the SC68008 card. The monitor contains what I consider to be the core routines and are entered from the main menu. From one place to another and the dumping of 80 contiguous memory locations (or locations), change its value or bump the memory location pointer. The program loading and execution commands are quite simple, but necessary. One developed that claims little but does everything it states — perfectly. This program is Cir-Pak Limited’s MiniDOS9. MiniDOS9 is a utility package that allows Cir-Pak Limited’s SC68008 coprocessor card to communicate with OS-9. You must have both the coprocessor card and OS-9 to have any benefit from this package.

MiniDOS9 can best be described as a “mini” monitor that allows one to communicate directly with the SC68008 card. The monitor contains what I consider to be the core routines and are entered from the main menu. From one place to another and the dumping of 80 contiguous memory locations (or locations), change its value or bump the memory location pointer. The program loading and execution commands are quite simple, but necessary. One can load data from the CoCo’s memory to the SC68008 and from the SC68008 back into the CoCo. Program execution is also made possible.

The software debugging commands are what I found the most useful. They allow the user to trace a program’s execution and stop at any point in the program, or to step through each instruction one at a time. The user is allowed to place up to five breakpoints in the code that is to be debugged. Whenever one of the breakpoints is encountered by the program, it halts and gives control back to the monitor. The user can then either check the status of the program by dumping the registers or he can manipulate the program or address space. The program can then be resumed with a single keystroke. If one finds that he wants to check a particular area of the code but doesn’t like the idea of constantly setting and resetting breakpoints, he can cause the program to go into single step mode. From here, each instruction is executed singly and then control is given back to the monitor. These are essential commands if one wants to debug machine language programs.

In addition to the three types of commands, there are provisions to execute any of the normal OS-9 commands from the monitor. This is done by invoking the shell from inside the monitor. Two of the normal OS-9 commands, chd and chd, are provided directly from the monitor so that a shell invocation does not have to take place.

To those who own an SC68008, MiniDOS9 is one of those few basic necessities that one should not be caught without. I had no problems with the documentation, since there was very little printed material (none was really needed). I had no problems with the software itself and found everything to be exactly as I had expected.

MiniDOS9 does not claim to do everything, but what it does do, it does very well. It is casually elegant.

(Cir-Pak Ltd., P.O. Box 410, Varennes, Quebec, Canada J8L 2B0. Also available from Orbit Electronics, P.O. Box 613, Derby Line, VT 05830; 819-876-2926. Coprocessor card, assembled and tested with 256K DRAM, $399 U.S.; MiniDOS9, $59 U.S. plus $4 S/H).

— J. Kleinwaechter

PRINTERS!

NEW! Okidata 192+ (Par. or Ser.) ........... $370
NEW! Okidata 193 (Parallel) .................. $540
NEW! Okidata 193+ (Serial) ................. $610
Okimate 20 Color Printer ....................... $135
Fujitsu 2100 (80 col.) .................. $410
Fujitsu 2200 (123 col.) ................. $520
Toshiba 321 (Par. or Ser.) ........... $510
Qupe Letterpro 20 (Letter Qual.) .... $445
Silver Reed 420 (Daisy Wheel) ....... $240
Silver Reed 600 (Daisy Wheel) ....... $575

(Add $10 Shipping for Printers)

ACCESSORIES!

Taxan 12" Green Monitor ............... $125
Taxan 12" Amber Monitor ............. $135
Table Top Printer Stand .................. $130
Table Top Printer Stand w/Slot (80 col.) .......... $145
Table Top Printer Stand w/Slot (123 col.) ...... $147
Stand w/Diskette Storage (80 col.) .... $147
Stand w/Diskette Storage (123 col.) ...... $157

Other Printers, Monitors, and Accessories for CoCo and IBM upon request.

$15 off interface with purchase of printer.

Find your cheapest published price and we’ll beat it

DISK DRIVE SYSTEMS!

ALL 1/2 HEIGHT DOUBLE SIDED

Drive 0 (addressed as 2 drives) ................. $235
Drive 0, I (addressed as 4 drives) ............. $350

All above complete with HDS controller, cable, & drive in case with power supply

Bare Double Sided Drives ....................... $109
Dual 1/2 Height Case w/Pwr Supply .............. $169
Double Sided Adapter ......................... $125
HDS Controller, RS-232 & Instructions ........... $199
25 CDC DS/DD Diskettes ....................... $132 & $3 s/h

We use the HDS controller exclusively. Can use 2 different DOS ROM’s.

Shipping Costs: $5/drive or power supply, $10 max.

C P.O. Box 293
RAINBOW 149
February 1987

Raritan, NJ 08869
(201) 722-1055

ENGINEERING
Wavy Word Pak

By Marty Goodman
Rainbow Contributing Editor

I find my Word Pak produces an image on my screen that "waves" slowly, but is otherwise sharp. Can this be fixed?

Bill Jackson
(BILL JACKSON)
Sacramento, CA

I have seen the same problem on all models of Word Pak. There are two ways to approach the fix. If you are comfortable with modifying ML software under RS-DOS and modifying drivers under OS-9, you can alter the fine vertical timing constants in the initialization program for the Pak.

Alternately, and probably a simpler approach, you can solder a trimmer capacitor onto one or the other side of the crystal of the Word Pak, going between the lead from the crystal and ground. Typically, one in the 5- to 25-picofarad range will do the job. Then adjust this cap until the waviness on the screen goes away. (Bill Jackson gave me this follow-up on Delphi a few days later: "A 20 pF cap worked. My screen now looks fine.")

CoCo 2 Upgrade

I'm having trouble upgrading a CoCo 2A. How do I upgrade it to 64K? I already have the two needed 4464 RAM chips. How do I add Extended BASIC?

Gary McMillian
Battle Creek, MI

To the left of the 6821 chip in the front of the circuit board is a single pair of pads labeled J6, 64K and RAM size. You must solder a wire between those two pads on the board. Then replace the two socketted 4416 chips with the two 4464 chips you bought. This will complete the 64K upgrade of that board.

To upgrade to Extended BASIC, you must first buy the Extended BASIC chip and manual (price is about $40 from Tandy). You must specify exactly what catalog number CoCo you have for them to order the right chip. Clip the soldered jumpers J1, J2, J3, J4 and J5 from their current 64K position setting and solder in new jumpers in the 128K position. J2 through J5 are located together side by side, and J1 is located a little farther away. All are near the 24-pin ROM chip that is sitting in a 28-pin socket. Remove the old ROM chip and replace it with the 28-pin ROM you bought. This completes the upgrade to Extended BASIC. Note that the "64K" and "128K" on J1 through J5 refer to the number of bits in the ROM chip, and do not refer to any 128K memory upgrade for the CoCo 2!

Multi-Pak Extension Cord

I just bought a Multi-Pak, and find it does not quite fit on my desk with my CoCo. Where can I get an extension cable so I can position it on a shelf above my computer?

Tom King
(CAPNCRUNCH)
Winter Haven, FL

I am using OS-9 Profile on a 64K CoCo 2. With it I have a Tandy FD-500 single-sided, 40-track drive. I'm interested in installing double-sided, 80-track drives. Where can I get one, and what software will I need?

Reuben Pressor
San Antonio, TX

OS-9 is well-suited for using a variety of disk drives, including the 80-track, double-sided variety. These are sold from many different vendors, including True Data Products, who advertise in RAINBOW. You will need to install disk device drivers and descriptors appropriate for 80-track drives. These can be purchased from D.P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223; (503) 244-8152. Ask for their SDISK package.

Hot-Running SAM Chips

I'm interested in what you can tell me about the old SAM chips that run hot. I will be making some heat measurements on mine soon.

Damon Hill
(DWHILL)
Atlanta, GA
Looking at RGB Monitors

For my CoCo club, I am evaluating different brands of RGB analog monitors for possible use with the CoCo 3. What should I look for? Stripe width, bandwidth, or what?

Joe Register (MAGUSII)
Naperville, IL

With color monitors, stripe width (or in the case of super-fine monitors, dot pitch) in millimeters correlates to some degree with the sharpness of the image. The CM-8 has a dot pitch of .52 mm. The Magnavox 8CM515 (professional) monitor that is becoming popular is equipped with a Computer 3 users offers a dot pitch of .42 mm. The CM-664 has a stripe width of .39 mm. The Teknika MJ307 offers a stripe width of .41. The Magnavox 8CM505 model offers a dot pitch of .65 mm.

The 3½-inch disk drives are the electronic equivalent of 5¼-inch, 80-track, double-sided drives. Both have 720K data storage capacity. The signals on all of the lines of the 3½-inch drive are identical to those of the 5¼-inch drive, so the two are electronically interchangeable. The only electrical problem is that 3½-inch drives use a dual-row header connector (two rows of 17 pins in parallel) instead of the 34 pin edge card connector that is standard on 5¼-inch drives. Thus, you will have to make up or modify a cable on your own. The connector you need is a female 34-pin, dual-row header IDC-type connector; Radio Shack sells it as part number 276-1525. There are usual considerations of setting the drive to respond as the drive number you want it to be, and of resistive termination of the drive cable, as with 5¼-inch drives. I recommend using 3½-inch drives under OS-9 with disk modules designed to use all 80 tracks and both sides. Be sure you have one 40-track (preferably double-sided) 5¼-inch drive in the system to allow you to read disks other CoCo users and producers are still using. The 3½-inch drives are fast becoming the industry standard for replaceable media drive systems.

Use of the full capacity of 80-track, double-sided drives via RS-DOS is rather difficult. You can use such drives as single-sided, 35-track drives under RS-DOS, with no modifications to either the operating system or the drives (you'd merely be using the first 35 tracks on Side 0, and ignoring the remaining 80 percent of the drive's capacity). With minor modifications to RS-DOS (such as an ADOS EPROM), you can also use them as 35- or 40-track, double-sided drives.

J&M Controller Fix

My J&M JFD-CoCo does not work with my CoCo 3. Can you tell me how to fix it?

Gil Winograd (DEMONN)
Glen Ellyn, IL

You need to desolder U11 (the 74LS04 chip) from the board and replace it with a 7404. The problem is that the gate on it used to supply the SCS line to the controller chip (pins 1 and 2 of the 7404) offers just a shade too much delay, and this causes problems. For those of you who are not hackers equipped to de-solder and replace chips, J&M generously offers to make this repair for $5 plus the cost of two-way shipping of your controller. Contact them for details. J&M has been very conscientious in both working hard to find this problem and offering a fix to the public at a nominal cost. I applaud their efforts.

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 CoCo ROS, Part III: The Robotics Program and Interfacing

By Dennis H. Weide

Now that you've built and tested the CoCo ROS hardware, it's time to show you how to interface it to the Robotix R-2000 robot kit and present the program that allows you to use it. With the ROS program, you'll be able to write ROS macros to activate robotic-type toys, electric train layouts or even your own robot if you decide to build one.

The ROS System

The ROS program is actually two separate programs. The first is a BASIC program (Listing 1) that allows you to load the machine language program, and to load and save ROS macro files to cassette. It also allows you to clear the ROS file buffer. It's menu-driven and self-explanatory. To use the ROS program, type CLEAR "ROBOT" and press ENTER. The program loads and executes the machine language program for you.

The second program (Listing 2) is the machine language program which was originally written in PASCAL. This program is also menu-driven. It allows you to write, edit, test and execute the ROS macro files.

Let's take a look at each command listed on the ROS program menu.

Append — adds lines to an existing ROS macro file. Enter X at the instruction prompt to exit the Append mode.

Delete — deletes lines from an existing ROS macro file. To terminate the delete mode, enter zero (0) for the line number when prompted.

Edit — changes an existing command in an existing ROS macro file. This is not a true editor. Because of the simplicity of the ROS program, you must retype the entire macro line. Enter a zero for the line number to exit the Edit mode.

Insert — inserts lines in an existing ROS macro file. Enter a zero for the line number to exit the Insert mode.

List — lists ROS macros resident in memory to the screen.

Print — lists ROS macros resident in memory to the printer.

Quit — returns to BASIC. You must load and save ROS macro files from the BASIC program.

Run — executes an ROS macro file.

Test — use this command to test an ROS macro file. Press the space bar for each command in the file. This steps the macro through each command so you can observe its effect.

Write — writes a new ROS macro file. It starts at the beginning of the ROS buffer. Any macro lines in the buffer will be overwritten when the Write command is executed.

ROS Macro File Structure

The ROS macro file is stored in graphics addresses 1536 to 7679. Each ROS macro line requires five bytes of memory. The ROS program encodes macro instructions and stores them in five bytes during the Write function, and decodes and executes them during the Test and Run functions. You can create ROS macros with more than 1,200 commands per file. If you PCLEAR B before loading the BASIC program, you can create macros twice as large.

The five bytes per macro line are used as follows: Instructions are stored in bytes 1 and 2 as an address. The device is stored in Byte 3 as a power of 2, and the duration is stored in bytes 4 and 5 as a decimal value from 0 to 16383.

ROS Commands

There are only five commands available for use in ROS macros. Because the ROSSP is powered from the CoCo, power requirements must be kept to a minimum. Therefore, only one movement can be executed at a time. However, the five commands allow some versatility. The basic command syntax is instruction, device number, duration. The ROS command Forward is used to turn on the specified motor in the forward direction. For example, FORWARD 2 10 turns on Motor 2 for an internal count of 10. Reverse is used to turn on the specified motor in the reverse direction. It is similar in structure to the Forward command. Halt causes macro execution to stop for the specified duration. The device number is not used in this command. Until executes the command following it until the specified device (input) goes low. Example:

UNTIL 3
FORWARD 5

This example causes Motor 5 to turn forward until Input 3 goes low. Notice that the duration is not used in either of the two commands and, finally, the command Wait stops macro execution until the specified device (input) goes low. This allows the ROS macro to be synchronized with mechanical equipment.
HOT HARDWARE AND SUPER SOFTWARE

UNIVERSAL VIDEO DRIVER
IT'S THE BEST!!! Great Price! Only $29.95

Carefully engineered to
work with ALL Color
Computer models
including the newest
COCO II. Enables your
COCO to operate with a
video monitor instead of a
television.

- Works with monochrome monitors!
- Works with color monitors!
- Audio Connection included!
- Easy installation—
  no soldering!

TANDY 1000 UPGRADES

640K upgrade board with real time clock .................. $189.95
Serial Interface Board ........................................ 49.95
Parallel Interface Board ...................................... 29.95
Hayes compatible 300/1200 Baud deluxe modem ........... 189.95

MONITORS, PRINTERS, ETC.

Magnavox BM-7622 Amber Screen - high quality, low price .... $109.95
Order a quality monitor from us and get a Universal
Video Driver for only $24.95 - Save $5.00.
Star NX-10 Printer, New model for '86 ....................... 279.95
Star LV1210, Replaces popular SG-10 model ................ 219.95
GRAFX SCREEN - versatile screen dump software. Print horizontal or
vertical, image magnification, positive or negative and more - 5 1/4" disc.

ONLY $14.95 FREE with your printer order.
SERIAL TO PARALLEL INTERFACE

300 to 9600 baud. Complete with
all cables and connectors. Only $49.95

DISC DRIVES

Teac 55B DDS Drive ........................................... $119.95
J&M JFD-CP Controller with DOS .......................... 129.95
Dual cabinet, power supply holds Radio Shack DOS Rom 1.1
2 horizontal 1 1/2 height drives ................................ 79.95

ACCOUNTING SYSTEM

Accounting System - very popular ledger
system for small businesses. ................................. $99.95 disk
Order Entry - an excellent companion
to the accounting system ................................. $99.95 disk
Easy File - get organized with this
user friendly data management system ................ $59.95 disk
Super Screen - Best screen enhancement program available.
Cassette $29.95 Disk $32.95

DISCS • CASSETTES • ROMS • CHIPS

5 1/4" discs, double density, reinforced hub w/sleeve, guaranteed.
$12.95 for 10 discs in an attractive storage box.

C-10 Cassettes w/labels ..................................... 10 for $5.50
Cassette storage box ......................................... 10 for $2.00
Basic 1.2 ROM .................................................. $39.95
Extended 1.1 ROM w/Manual ............................. $49.95

DISC STORAGE CASE - Attractive, heavy
duty acrylic case with lock. Holds and
protects 50 5 1/4" discs.
SUPER BARGAIN

ONLY $9.95

Purchase this attractive storage case including 10 discs for $21.95.

64K Memory Expansion Kit.
All parts and complete instructions (for 'E' and 'F' boards and COCO II)
NOW ONLY $19.95

COCO UTIL II - NEW VERSION

Transfer Coco disc files to your IBM compatible computer.
You may also transfer MS-DOS files to a Color
Computer disc. Save hours of retyping.
Coco Util has been so popular we decided to make it even more powerful and versatile...
extended directories, faster, improved menu
selection system and more!

Coco Util users upgrade to the new version for only $12.95 including shipping and handling.

COCO UTIL II - NEW VERSION
ONLY $39.95

SHOCK TROOPER

Intelligence has intercepted a coded message
revealing a plan to conquer Earth! Four of your
Shocktroopers must infiltrate the heavily defended
underground enemy base and steal all of the secret
TRG-5 attack saucer sub-assemblies.

Tired of flying
wimpy airplanes???

Want to try
something macho
for a change??

CYBERTANK is a real-time tank simulation that will get
your adrenalin flowing!

Your survival depends upon lightening-fast tactical decisions. Penetrate
deep into enemy territory with powerful intelligence gathering devices,
and sophisticated armaments. Cannons, heat seeking missiles, flame
throwers, pill boxes, battle tanks... 64K Disk only. $27.95

ADVENTURES

The top-selling Mark Data
Adventure Series.
Hi-res color graphics! Great story lines!
Calixto Island • Black Sanitum
Sea Search • Shenanigans • Trekboer • Vortex Factor
All adventures require 32K.

FREE — Send for our free flier.

All orders under $100 please add 2% regular, 5% air. Orders over $100 please add 1%
regular, 8% air. California residents please add 6% sales tax. Orders outside the continental U.S. check
with us for shipping amount; please remit U.S. funds. Software authors—contact us for exciting
program marketing details. We accept MasterCard and VISA. Distributed in Canada by Kelly Software.
Writing an ROS Macro
When writing an ROS macro, you’re prompted for all the inputs. Let’s enter a sample macro to see the structure.

You see: You enter:

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Forward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Number</td>
<td>3</td>
</tr>
<tr>
<td>Duration</td>
<td>12</td>
</tr>
</tbody>
</table>

This example shows the macro lines you might enter to program a robot to do some simple task. The first three lines tell the ROS to activate Motor 3 in the forward direction for a count of 12. The next three lines tell it to activate Motor 10 in the reverse direction for a count of 22. The last four lines tell it to activate Motor 3 in the forward direction until Input 1 goes low. The last line tells the ROS to exit the write or append mode. The ROS macro is now in memory and can be tested or saved to cassette.

Testing the Macro
After writing an ROS macro, test it to check its accuracy. Select the T option from the ROS menu and press ENTER.

When you’re ready to execute the macro, press the space bar. The first macro line will be displayed on the screen and executed. Press ENTER to display and execute each line of the macro. The macro will continue to loop through itself until you press N to end the test mode. Use the Edit, Delete and Insert modes to make necessary macro corrections.

Executing the Macro
Execute the macro by selecting R from the ROS menu and pressing ENTER. This mode automatically executes each
**Figure 4: Component Designations**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC1 - IC10</td>
<td>Integrated Circuit (chip) 1 to 10</td>
</tr>
<tr>
<td>K1F - K16F</td>
<td>Forward control relay 1 to 16</td>
</tr>
<tr>
<td>K1R - K16R</td>
<td>Reverse control relay 1 to 16</td>
</tr>
<tr>
<td>Q1F - Q16F</td>
<td>Forward control transistor 1 to 16</td>
</tr>
<tr>
<td>Q1R - Q16R</td>
<td>Reverse control transistor 1 to 16</td>
</tr>
<tr>
<td>R1F - R16F</td>
<td>Forward control resistor 1 to 16</td>
</tr>
<tr>
<td>R1R - R16R</td>
<td>Reverse control resistor 1 to 16</td>
</tr>
<tr>
<td>S1 - S16</td>
<td>Input switch 1 to 16</td>
</tr>
</tbody>
</table>

**Figure 5: Connecting Relay With Low Coil Resistance**

Macro instruction without any other input from you. It also loops through the macro until N or the fire button on either joystick is pressed.

**Interfacing the ROS**

I connected my ROSSP to a small robot arm I created using the Robotix R-2000 kit from Milton Bradley. Figure 1 shows the schematic representation of the Robotix switch circuit board and how it’s wired to the ROSSP. Figure 2 shows the actual circuit board. This board switches between +3 volts and -3 volts to activate forward and reverse movement. Leads M1 through M5 are the battery leads going to the motors. Leads G1 through G5 are the ground leads to the motors. The red lead on the right side of the schematic is the reverse direction lead and the black lead is the forward direction lead. The white lead is ground.

Using a short piece of cable and a connector, wire the M1 through M5 battery and ground leads to the ROSSP relays as shown in figures 3 and 4. Notice that the switch side (S1) of the motor is connected to both the forward relay (K1F) and the reverse relay (K1R). The connector must be unplugged when the ROSSP is inserted in the ROM port and power is applied. Otherwise, the +3 volts and -3 volts will be shorted together. The ROS program will instruct you when to plug in the switch circuit. Figures 3 and 4 explain all the lead and component designations.

Because of the inaccuracy of the motors supplied with the kit, I cut cams of thin plastic and mounted them on the motor.
Figure 6: Alternate Input/Output Interfacing Methods

A. LED OUTPUT DRIVER

B. OUTPUT RELAY DRIVER

C. RELAY INPUT

D. TRANSISTOR INPUT

shafts. These cams were used to operate microswitches connected to scan buffer inputs (see Figure 3). Using the Until command, the microswitches provided fairly accurate arm positioning. I was able to move a small plastic box back and forth from one spot to another automatically for several hours.

More Options

The ROSSP circuit can be used in other applications by modifying the circuit. Figure 5 shows an alternative method of connecting relays with a low coil resistance. If you use that type, you will need an external power supply. The transistors Q1F and Q1R act as low current switches. A logic high applied to the base of the transistors causes them to conduct. This places ground at the bottom of the relay winding and the relay operates. Resistors R1F and R1R are current limiting resistors.

Figure 6 shows alternate methods of interfacing inputs and outputs to the ROSSP. With some experimentation, you can connect almost any type of peripheral device you can think of. Figure 7 shows the motor assignments for the 8255 PPI chips, the instruction, addresses and values used to write the ROS program. Using that information, you can write your

Figure 7

Motor assignments for motors
1 to 8 and inputs 1 to 8
IC 8255 Chip 1 Address equals SFF43 Value equals 137

<table>
<thead>
<tr>
<th>Motor</th>
<th>8255</th>
<th>Lead</th>
<th>Number</th>
<th>Instruction</th>
<th>Addr.</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA0</td>
<td>1</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PA1</td>
<td>2</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA2</td>
<td>3</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA3</td>
<td>4</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA4</td>
<td>5</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA5</td>
<td>6</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA6</td>
<td>7</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA7</td>
<td>8</td>
<td>SFF40</td>
<td>FORWARD</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB0</td>
<td>1</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB1</td>
<td>2</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB2</td>
<td>3</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB3</td>
<td>4</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB4</td>
<td>5</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB5</td>
<td>6</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB6</td>
<td>7</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB7</td>
<td>8</td>
<td>SFF41</td>
<td>REVERSE</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC0</td>
<td>1</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC1</td>
<td>2</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC2</td>
<td>3</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC3</td>
<td>4</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC4</td>
<td>5</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC5</td>
<td>6</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC6</td>
<td>7</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC7</td>
<td>8</td>
<td>SFF42</td>
<td>WAIT/UNTIL</td>
<td>128</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Motor assignments for motors
9 to 16 and inputs 9 to 16
IC 8255 Chip 2 Address equals SFF47 Value equals 137

<table>
<thead>
<tr>
<th>Motor</th>
<th>8255</th>
<th>Lead</th>
<th>Number</th>
<th>Instruction</th>
<th>Addr.</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA0</td>
<td>9</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA1</td>
<td>10</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA2</td>
<td>11</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA3</td>
<td>12</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA4</td>
<td>13</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA5</td>
<td>14</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA6</td>
<td>15</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA7</td>
<td>16</td>
<td>SFF44</td>
<td>FORWARD</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB0</td>
<td>9</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB1</td>
<td>10</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB2</td>
<td>11</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB3</td>
<td>12</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB4</td>
<td>13</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB5</td>
<td>14</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB6</td>
<td>15</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB7</td>
<td>16</td>
<td>SFF45</td>
<td>REVERSE</td>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC0</td>
<td>9</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC1</td>
<td>10</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC2</td>
<td>11</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC3</td>
<td>12</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC4</td>
<td>13</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC5</td>
<td>14</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC6</td>
<td>15</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC7</td>
<td>16</td>
<td>SFF46</td>
<td>WAIT/UNTIL</td>
<td>128</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COLOR DISK MANAGER

Color Disk Manager will do selective initializations, verifies, backups, repairs and much more!

- will initialize single tracks, a range of tracks, or the entire disk to more than 35 tracks
- allows you to make a backup of the directory out of reach of basic and put it back if a directory crash occurs; has a repair file command which will load entire files off the disk if the directory crashes and the allocation table is good; will repair or salvage crashed disk several ways
- is 64K compatible allowing a 64K backup; does backups by track, a range of tracks, or the whole disk (will do more than 35 tracks)
- gives an allocation table map with granules x-referenced to tracks and sectors, and showing which granules are used; displays a file granule map showing which granules, tracks, and sectors the file uses, and the length
- will do a directory displaying file names in two columns, the number of free granules, and the free bytes if below 65535; has a kill file command
- loads and saves, sectors, tracks or files; loads files two ways, as done by basic, or with header bytes left in, which helps in studying how files are saved on disk; has an append sector command
- verifies 2-letter or 3-letter disk showing the track and sector if an error occurs, with the option of continue or stop
- is multiple drive compatible
- allows you to save a block of memory to disk; transfers programs from tape to disk
- has a rapid scan feature which allows you to scan the disk by tracks and sectors using the arrow keys
- will dump memory to the screen in ascii, good for listing basic programs or source files; has a move memory block command, and a transfer control command
- converts decimal to hex or hex to decimal
- allows you to examine memory using the arrow keys with displays in hex (or decimal) and ascii
- will load and execute rompac’s saved on disk; has a move rom to ram command
- allows you to change origin (start addr.) of ML programs; displays the start, end, and execute addresses of ML programs
- 32K - 64K ECB $34.95 Disk

COLOR TAPE MANAGER

- merges multiple basic programs into one; appends multiple machine language programs into one, appends machine language to basic (example included)
- converts numbers from hex to decimal or decimal to hex; allows input in hex or decimal
- rapidly scans memory using the arrow keys with auto-key repeat
- displays memory in hex (or decimal) and ascii; allows the changing of memory in decimal or hex
- deals with missing end of file blocks; loads and saves data with or without a filename block
- handles programs with varying block lengths
- displays the start, end, and execute addresses of ML programs; displays the buffer start, end and top addresses
- converts ML programs into basic data statements which can be loaded as, or merged with, a basic program
- turns the audio and cassette motor on and off with one key command; has inverted displays which lessen eye fatigue
- finds the end of programs on tape even from within a program with a skip file command; allows the transferring of control to other programs with a go command
- moves blocks of memory from start through end address to new start address; allows the changing of the origin (start adds) or ML programs
- has an 8,380 byte loading buffer with 16K systems and 24,760 byte loading buffer with 32K systems
- 16K ECB minimum $19.95 Tape $22.95 Disk

RAINBOW SCREEN MACHINE

- Add these features to your computer/program: ML extension of Basic loads on top of 16,32, or 64K machines to enable easy mixture of hi-res graphics and text in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
- User definable 224 character set featuring lower case descenders, Greek, cars, tank, planes, etc., completely interfaced with all keys, commands, and PMODES. 12 sizes (most colored) from 16 x 8 to 64 x 24. PRINT (it), TAB and comma fields are fully supported.
- 2 distinct character sets automatically switch for sharpest lettering featuring underline, subscript, superscript, reverse video, top and bottom scroll protect, double width, colored characters in PMODE 4, and help screen.
- Simple 2-letter abbreviated commands inside your program or control key entry from keyboard, even during program execution!
- Includes demo program, character generator program and manual. 16K Basic required — 32K recommended. $29.95 Tape; $32.95 Disk.

SUPER SCREEN MACHINE

All of the features of Screen Machine and more:
- Variable SMOOTH Scroll for professional displays, listings, business use.
- Variable volume KEY Click (tactile feedback).
- EDITION command for instant compatibility with cartridge EDITION.
- Superpatch + command for instant compatibility with the Superpatch + Editor-Assembler.
- True Break key disable and recognition.
- 10 User Definable commands used to activate your special drivers or subroutine.
- Dynamic Screen Dump command for use with Custom Software, Engineering’s Graphic Screen Print program for simple printer “Snapshots” of your screen even during program execution!
- Super Screen Machine - $44.95 Tape; $47.95 Disk.

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is truly unlimited.

Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer’s Basic manuals will turn you on to the power of computing with Screen Machine.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by typing.

SUGAR SOFTWARE

P.O. Box 7446
Hollywood, Florida 33081
(305) 981-1241
A complete catalog of other sweet Sugar Software products is available.

Add $1.50 per program for postage and handling. Florida residents add 5% sales tax. COD orders are welcome. CIS orders EMAIL to 70405, 1374. No refunds or exchanges.
I hope this information has been of interest to you. It's only a starting point for those really interested in experimenting with computers. The CoCo offers such easy interfacing to peripheral equipment it's a shame more people aren't taking advantage of it. Using a circuit similar to the ROSSP, we've used the CoCo for everything from a simple robot CPU to a complex industrial security system. Why not try your engineering ability at designing CoCo projects for interfacing?

As always, if you have any questions or comments, feel free to write to me at 14201 Marquette N.E., Albuquerque, NM 87123. Please include a self-addressed, stamped envelope if you would like a reply.

---

Listing 1: ROBOT

100 ' ROBOT BASIC PROGRAM
200 ' BY DENNIS H. WEIDE
300 ' (C) 1986
400 ' 500 ' 600 POKE&HFF43,137:POKE&HFF47,137
700 POKE&HFF40,0:POKE&HFF41,0:POKE&HFF44,0
800 FOR X=1 TO 100: getNext
900 CLS:PRINT:PRINTTAB(3)"ACTIVE ROBOT CONTROL NOW"
1000 PCLEAR4:PCLS:CLEAR200,19999
1100 CLS
1200 PRINT:PRINT:PRINTTAB(7)"ROBOT PROGRAM MENU"
1300 PRINT
1400 PRINTTAB(5)"1. ACCESS ROBOT PROGRAM"
1500 PRINTTAB(5)"2. LOAD ROBOT FILE"
1600 PRINTTAB(5)"3. SAVE ROBOT FILE"
1700 PRINTTAB(5)"4. CLEAR ROBOT MEMORY"
1800 PRINTTAB(5)"5. END PROGRAM SESSION"
1900 PRINT:INPUT" ENTER ONE OF THE ABOVE >";OA
2000 IF OA<1 OR OA>5 THEN SOUND
2100,10,GOTO1100
2200 ON OA GOSUB 2300,2400,2700,3100,3200
2300 GOTO 1100
2400 EXEC:RETURN
2500 CLS:PRINT:PRINT:PRINT"FILENAME">";P$
2600 CLOADM P$
2700 RETURN
2800 CLS:PRINT:PRINT"FILENAME">";P$
2900 CSAVEM P$,1536,7679,2,0,0,0,0
3000 RETURN
3100 PCLS:RETURN
3200 CLS:END

Listing 2: RBT22SRC

(** ROBOT22/SRC **)
(** ROBOTICS PROGRAM **)
(** BY DENNIS H. WEIDE **)
(** A ROBOT PROGRAMMING LANGUAGE **)  

PROGRAM ROBOT(INPUT,OUTPUT);

VAR
CHOICE,KEY,OFFSET,LOFFSET,LINENUMBER,LISTADDR,WRITEADDR,VALUE,LVALUE,LDURATION,DURATION,LISTNUM,MOTORNUM,POINTER:INTEGER;
LASTCHAR,DIRECTION:CHAR;
PRTFILE:TEXT;

PROCEDURE WRITEPROGl;
BEGIN
WRITE('INSTRUCTION >');
READLN(DIRECTION);
CASE DIRECTION OF

---

158 THE RAINBOW February 1987
'H':OFFSET:=8;
'F':OFFSET:=0;
'R':OFFSET:=1;
'U':OFFSET:=9;
'W':OFFSET:=2;
'X':EXIT
ELSE WRITELN('INSTRUCTION ERROR')
END;
IF DIRECTION<>'H' THEN BEGIN
   WRITE('DEVICE NUMBER> ');
   READLN(MOTORNUM);
END
ELSE VALUE:=O;
IF MOTORNUM<9 THEN BEGIN
   WRITEADDR:=$FF40;
END;
IF MOTORNUM>8 THEN BEGIN
   WRITEADDR:=$FF44;
END;
CASE MOTORNUM OF
   1,9:VALUE:=1;
   2,10:VALUE:=2;
   3,11:VALUE:=4;
   4,12:VALUE:=8;
   5,13:VALUE:=16;
   6,14:VALUE:=32;
   7,15:VALUE:=64;
   8,16:VALUE:=128
END;
IF (DIRECTION<>'U') AND (LASTCHAR<>'U') THEN BEGIN
   WRITE('DURATION> ');
   READLN(DURATION);
   IF DURATION>16383 THEN BEGIN
      WRITE('DURATION ERROR')
   END
END;
ELSE DURATION:=O;
LASTCHAR:=DIRECTION;
WORD[POINTER+LINENUMBER]:=WRITEADDR+OFFSET;
BYTE[POINTER+LINENUMBER+2]:=VALUE;
WORD[POINTER+LINENUMBER+3]:=DURATION;
END;
PROCEDURE LISTPROGl;
VAR FORREV:STRING;
BEGIN
   LISTADDR:=WORD[POINTER+LINENUMBER];
   LVALUE:=BYTE[POINTER+LINENUMBER+2];
   LDURATION:=WORD[POINTER+LINENUMBER+3];
   LOFFSET:=O;
   IF LISTADDR>$FF42 THEN LOFFSET:=8;
   IF LISTADDR<LOFFSET:=O;
   CASE LISTADDR OF
      $FF40,$FF44:FORREV:='FORWARD';
      $FF41,$FF45:FORREV:='REVERSE';
      $FF42,$FF46:FORREV:='WAIT';
      $FF48,$FF4C:FORREV:='HALT';
      $FF49,$FF4D:FORREV:='UNTIL'
   END;
CASE LVALUE OF
0:LISTNUM:=-8;
1:LISTNUM:=1;
2:LISTNUM:=2;
4:LISTNUM:=3;
8:LISTNUM:=4;
16:LISTNUM:=5;
32:LISTNUM:=6;
64:LISTNUM:=7;
128:LISTNUM:=8
END;
LISTNUM:=LISTNUM+LOFFSET;
IF LISTADDR=0 THEN BEGIN
FORREV:='END';
LISTNUM:=O;
LDURATION:=O
END;
WRITELN(PRTFILE,LINENUMBER:4,' ',FORREV:8,LISTNUM:2,LDURATION:6);
END;

PROCEDURE WRITEPROGRAM;
BEGIN
PAGE;
WRITELN;
DIRECTION:='A';
LINENUMBER:=5;
WRITELN('POINTER =' ,POINTER:5);
WHILE DIRECTION<'X' DO BEGIN
WRITEPROGl;
WORD[POINTER]:=LINENUMBER;
LINENUMBER:=LINENUMBER+5;
END;

Corrections

"Graphically Speaking: The Artistic BBS" (November 1986, Page 108): Eric Bailey has written us to correct the error-trapping routine for the load function in LWRSEDIT. Lines 430, 460 and 470 need to be changed as below.

430 GOSUB 730;PRINTO" ";FF$=F$;IF FF$="" THEN GOTO340
460 FF$=FF$+"/DAT"
470 OPEN "D",#1,FF$;E=LOF(1):CLOSE#1:IF E=0 THEN PRINT"FILE NOT FOUND":CLOSE#1:KILL FF$:FOR T=1 TO 1000:NEXTT:GOSUB 780:GOTO430

"Pretty Pictures on the CoCo 3 With CC3 Draw" (Review, December 1986, Page 148): In the review of CC3 Draw, we incorrectly reported Spectrum Projects as being in Florida. Spectrum is located in the state of New York.

"A PAL for Your CoCo 3" (January 1987, Page 98): Contrary to speculation in the article, Radio Shack does not offer a free upgrade of the Multi-Pak Interface, regardless of date of purchase or whether the warranty is still in effect. There is a charge for this service.

"Festive CoCo: Ready to PAINT the Town" (July 1986, Page 46), "PUT Speedy GETzales to Work" (November 1986, Page 158): H. Allen Curtis has written to describe a problem with running his programs from RAINBOW ON TAPE. It appears that, in the process of compiling RAINBOW ON TAPE, two extra bytes are added to the end of the files. This interferes with the embedded machine language Mr. Curtis uses in some of his programs. To correct the problem, merely load each program, replace POKE 337,26 in Line 2 with POKE 337,24 and resave the program.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG prompt and INFO at the Topic? prompt.
Reduce your I/O errors with the Hard Drive Specialist Floppy Drive Controller for the Color Computer. Gold edge card connectors, advanced design, and the absence of potentiometers make it the best available. Our newest version controller allows the use of either (two 24 pin ROMS), or (one 24 pin and one 28 pin ROM). Using this board with the standard Radio Shack ROM gives you 100% compatibility with all Radio Shack software.

**Completed and Tested Board**
  (Includes Case, and DOS Instructions)
- Completed and Tested Board without ROM ... $79.
  (Includes Case)
- Bare Board with Instruction manual ........ $30.
- Parts Kit For Bare Board without ROM ...... $30.
- Radio Shack ROM (current version) ........ $20.
- Radio Shack ROM 1.0 ..................... $40.

**Drive 0 SS/DD** $150.
**WHILE SUPPLY LASTS!**
- Drive 0 Complete ...................... $199.
- Drive 1 Complete ...................... $129.
- Drive 0 & 1 Dual Drive ............... $319.

**HARD DRIVE SPECIALIST**

1-713-480-6000
Order Line 1-800-231-6671
16208 Hickory Knoll
Houston, Texas 77059

Ordering Information:
Use our WATS line to place your order via Visa, MasterCard, or Wire Transfer. Or, mail your payment directly to us. Any non-certified funds will be held until proper clearance is made. COD orders are accepted as well as purchase orders from government agencies. Most items are shipped off the shelf with the exception of hard drive products that are customer built. UPS ground is our standard means of shipping unless otherwise specified. Shipping costs are available upon request.
PROCEDURE LISTPROGRAM;
BEGIN
PAGE;
CASE DIRECTION OF
  'P': REWRITE(PRTFILE, ':=-2');
  'L': REWRITE(PRTFILE, ':=-3')
END;
LINENUMBER:=5;
LISTADDR:=1;
WRITELN;
REPEAT
  LISTPROGl;
  LINENUMBER:=LINENUMBER+5;
  UNTIL LISTADDR=0;
WRITELN;
REWRITE(PRTFILE, ':=-3');
WRITE(' PRESS <ENTER> TO CONTINUE');
REPEAT KEY:=CALL(41419,0) UNTIL KEY<>0;
END;

PROCEDURE RUNPROGRAM;
BEGIN
PAGE;
WHILE TRUE DO BEGIN
  LINENUMBER:=5;
  FOR KEY:=1 TO 2000 DO BEGIN
    VALUE:=0;
  END;
  REPEAT
    IF DIRECTION='T' THEN BEGIN
      REPEAT KEY:=CALL(41419,0) UNTIL KEY<>0
    END;
    CHOICE:=BYTE[65280];
    CASE CHOICE OF
      125,126,253,254:EXIT
    END;
    MOTORNUM:=WORD[POINTER+LINENUMBER];
    VALUE:=BYTE[POINTER+LINENUMBER+2];
    DURATION:=WORD[POINTER+LINENUMBER+3];
    LISTPROGl;
    CASE MOTORNUM OF
      $FF40,$FF41,$FF44,$FF45:BEGIN
        BYTE[MOTORNUM]:=VALUE;
        REPEAT
          FOR KEY:=1 TO 1000 DO BEGIN
            CHOICE:=0;
          END;
          DURATION:=PRED(DURATION);
        UNTIL DURATION=0;
      END;
      $FF42,$FF46:BEGIN
        REPEAT
          DURATION:=BYTE[MOTORNUM] AND VALUE;
        END;
      END;
    END;
  END;
END;
UNTIL DURATION=VALUE;
END;
$FF48,$FF4C:BEGIN
REPEAT
  FOR KEY:=1 TO 1000 DO BEGIN
    CHOICE:=0;
  END;
  DURATION:=PRED(DURATION);
UNTIL DURATION=0;
END;
$FF49,$FF4D:BEGIN
WRITEADDR:=MOTORNUM-7;
OFFSET:=VALUE;
LINENUMBER:=LINENUMBER+5;
LISTPROG1;
MOTORNUM:=WORD[POINTER+LINENUMBER];
VALUE:=BYTE[POINTER+LINENUMBER+2];
BYTE[MOTORNUM]:=VALUE;
REPEAT
  DURATION:=BYTE[WRITEADDR] AND OFFSET;
UNTIL DURATION=OFFSET;
BYTE[MOTORNUM]:=0;
END
END;
BYTE[MOTORNUM]:=0;
LINENUMBER:=LINENUMBER+5;
UNTIL MOTORNUM=0;
END;

We are Canada's largest Software Distributors for the Color Computer

COCO-3 0K MEMORY UPGRADE BOARDS
$74.95
Add $5.00 Shipping

COCO-3 512K MEMORY BOARDS
$164.95
Add $5.00 Shipping

Kelly Software Distributors Ltd.
P.O. Box 608, Station 'T' Calgary, Alberta T2H 2H2
TEL: 1-403-236 2161

Send for FREE catalog
PROCEDURE EDITLINE;
BEGIN
PAGE;
WHILE TRUE DO BEGIN
  WRITELN;
  WRITE('ENTER LINE NUMBER TO EDIT >');
  READLN(LINENUMBER);
  IF LINENUMBER=0 THEN EXIT;
  IF LINENUMBER MOD 5=0 THEN BEGIN
    REWRITE(PRTFILE, ':=3');
    LISTPROG;
    WRITELN;
    WRITEPROG;
  END
  ELSE WRITELN(' INVALID LINE NUMBER');
END;
END;
PROCEDURE DELETELINe;
BEGIN
PAGE;
WHILE TRUE DO BEGIN
  WRITELN;
  WRITE('ENTER LINE NUMBER TO DELETE >');
  READLN(LINENUMBER);
  IF LINENUMBER=0 THEN EXIT;
  IF LINENUMBER MOD 5=0 THEN BEGIN
    WORD[POINTER]:=WORD[POINTER]-5;
    REWRITE(PRTFILE, ':=-3');
    LISTPROG;
    REPEAT
      WORD[POINTER+LINENUMBER]:=WORD[POINTER+LINENUMBER+5];
      BYTE[POINTER+LINENUMBER+2]:=BYTE[POINTER+LINENUMBER+7];
      WORD[POINTER+LINENUMBER+3]:=WORD[POINTER+LINENUMBER+8];
      LINENUMBER:=LINENUMBER+5;
    UNTIL WORD[POINTER+LINENUMBER]=0;
  END;
END;
END;

PROCEDURE APPENDPROGRAM;
BEGIN
  LINENUMBER:=WORD[POINTER];
  PAGE;
  DIRECTION:='A';
  WHILE DIRECTION< 'X' DO BEGIN
    WRITEPROG;
    WORD[POINTER]:=LINENUMBER;
    LINENUMBER:=LINENUMBER+5;
  END;
END;

PROCEDURE INSERTLINE;
VAR NEWLINE:INTEGER;
BEGIN
PAGE;
LINENUMBER:=WORD[POINTER];
WORD[POINTER]:=LINENUMBER+5;
WRITELN;
WRITE('ENTER LINE TO INSERT >');
READLN(NEWLINE);
IF NEWLINE>LINENUMBER THEN EXIT;
IF NEWLINE MOD 5=0 THEN BEGIN
  REPEAT
    WORD[POINTER+LINENUMBER]:=WORD[POINTER+LINENUMBER-5];
    BYTE[POINTER+LINENUMBER+2]:=BYTE[POINTER+LINENUMBER-3];
    WORD[POINTER+LINENUMBER+3]:=WORD[POINTER+LINENUMBER-2];
    LINENUMBER:=LINENUMBER-5;
  UNTIL LINENUMBER=NEWLINE;
  WRITEPROGl;
END;
END;

BEGIN
PAGE;
BYTE[150]:=1;
DIRECTION:='A';
POINTER:=WORD[186]+1;
WRITELN('POINTER=',POINTER:5);
WRITELN;
REWRITE(PRTFILE,':-3');
LINENUMBER:=5;
WHILE TRUE DO BEGIN
  PAGE;
  WRITELN('ROBOTICS PROGRAM');
  WRITELN;
  WRITELN('A - APPEND MACRO LINES');
  WRITELN('D - DELETE MACRO LINE');
  WRITELN('E - EDIT MACRO LINE');
  WRITELN('I - INSERT MACRO LINES');
  WRITELN('L - LIST ROBOT MACRO');
  WRITELN('P - PRINT ROBOT MACRO');
  WRITELN('Q - QUIT TO BASIC');
  WRITELN('R - RUN ROBOT MACRO');
  WRITELN('T - TEST ROBOT MACRO');
  WRITELN('W - WRITE ROBOT MACRO');
  WRITELN;
  WRITE('ENTER CHOICE >');
  READLN(DIRECTION);
  CASE DIRECTION OF
    'A':APPENDPROGRAM;
    'D':DELETELINE;
    'E':EDITLINE;
    'I':INSERTLINE;
    'L', 'P':LISTPROGRAM;
    'Q':EXIT;
    'R', 'T':RUNPROGRAM;
    'W':WRITEPROGRAM
  ELSE WRITE('INVALID SELECTION')
END;
END;
END.
A Spelling Program That Speaks for Itself

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: 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 that this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Approximately two years ago, Tandy introduced the Speech/Sound Pak for its Color Computer line. While several other models were already on the market, some at a considerably lower price, Tandy released this little wonder that was capable of working as a free-standing add-on. No machine language driver needed to be loaded into this ROM pack, as some other models required. The voice was clear and realistic sounding and it only took a few lines to incorporate the synthesizer into your BASIC programs.

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 Speech/Sound Pak still remains part of the Tandy catalog, while some other earlier, independent models are now hard to find. One void still remains, however. Owners of this Pak still do not have enough software to meet their needs or appetites. Therefore, at the suggestion of Mr. Don Andreatta of Houston, Texas, this month’s "Wishing Well" returns to the field of artificial voice synthesis by introducing a new program, Hear It and Spell It.

Why a Talking Speller?

When I began learning BASIC programming after buying my first CoCo, a number of programs were provided as standard introductions to the world of programming. One was, "Let's design a program that simulates the rolling of dice!" Another hot ticket was a simple "yes/no" or "true/false" format for tests. The third biggest item covered in training books was usually some kind of spelling test. I combed through these books trying to find anything I could use in my classroom, especially a decent spelling program.

There was usually one problem with all of these simple BASIC programs: None of them was really very effective for drilling or quizzing in spelling. The main reason for this shortcoming is the fact that there is no effective or realistic way to portray the word to be spelled without actually displaying it on the screen. There have been many noble attempts, however.

Some programmers have written variations on the TV game shows, Password or Wheel of Fortune. There have been other efforts such as Hangman or Tri-Planetary Hangmenoids (from an earlier "Wishing Well"), which involve a hit or miss approach to guessing what word has been selected by the computer. Since in spelling we are trying to arrive at the correct letter-for-letter version of a word, a hit or miss approach is not the best idea.

There is really only one way to correctly teach, drill and quiz spelling. That technique is to have the word pronounced to the person trying to spell it. That is the way teachers have done it for centuries. The advent of microcomputers is no reason to abandon a successful method. Instead, the improvement of artificial speech in home microcomputers has given us a better reason to adapt this new technology to the old technique, rather than vice versa.

That brings us to this month's talking program: Hear It and Spell It. Designed with these thoughts in mind, H&SPELL (its BASIC filename) offers home users a
catchy update of the old spelling bee. Granted, many users may have already come up with their own talking spellers upon purchasing the Tandy synthesizer. However, I have attempted to make the program as classy and simple as possible, while still retaining the flavor and feel of our usual “Wishing Well” offerings.

The Program
H&SPELL will fit in a standard 16K CoCo with Extended Color BASIC. (It may also work on a 16K Color BASIC machine, but I no longer have one to try it on. All my machines were upgraded long ago. Sorry, all you MC-10 users!) As you start to type in the listing, you will notice that between lines 9 and 10 there appears to be a strange space without a line number. To get this effect, when typing in Line 9, simply advance the space bar until the line appears exactly as shown on the 32-column listing in the magazine. You may then type in the string of “*”s for our border. The title card is made from our Titlemaker from several issues ago.

Every month I get letters from readers who say they get an OD Error when running one of these listings they have typed in. Once again, let me remind you that the DATA statements at the beginning of the listing must be typed in exactly as you see them. Leaving out so much as a comma will cause the program to choke. Therefore, please be precise when typing in the program.

One of the first subroutines in the program consists of the actual lines suggested by the instruction manual that comes with the Speech/Sound Pak, with a few minor changes. Many of the instructions needed to run the program will also be spoken by your CoCo as the program begins. Remarks such as, “Press ENTER to continue” are actually spoken. Anytime a phrase needs to be spoken, it is given the value of A$ and sent to the subroutine that activates the SPEECH (GOSUB 105).

One thing you will notice is that all my speech strings (A$) are written out phonetically. For example, my last name, Scerbo, is written as Skerbo. While the Pak is usually very accurate.

One-Liner Contest Winner . . .

Here are two related one-liners from the same gentleman. Asclist (Listing 1) lists an ASCII file from disk to your screen. Hexlist (Listing 2) performs the same task, except that output will be in hexadecimal form. A simple edit here and there will cause the output to go to your printer.

Listing 1:

1 LINEINPUT"FILENAME:";R$:OPEN"I",#1,R$:CLOSE:OPEN"D",#1,R$,1:FILELD#1,1AS A$:FORX=1TOLOF(1):GET#1:PRINTA$;:NEXTX:CLOSE-END

Listing 2:

1 LINEINPUT"FILENAME:";R$:OPEN"I",#1,R$:CLOSE:OPEN"D",#1,R$,1:FILELD#1,1AS A$:FORX=1TOLOF(1):B$="[\]":GET#1:MID$(B$,2)=HEX$(ASC(A$)):PRINTB$;:NEXTX:CLOSE-END

Byron Walton
Calgary, Alberta

(For these winning one-liner contest entries, the author has been sent copies of both The Second Rainbow Book of Simulations and its companion The Second Rainbow Simulations Tape.)
in pronouncing a string you give it, there are just some combinations it cannot get. That is why for each word we want to have spoken and then spelled, we must supply the correct spelling first, followed by the correct pronunciation.

The words we want to try in our spelling drill will be included starting in Line 1000. The correct entry for putting in your own words is:

1000 DATA SPELLING, PRONUNCIATION

with the last line being:

5000 DATA END, END

The program is designed to handle 40 spelling words (41 counting the END statement that is our flag to stop reading data). If you want to increase the number of words, increase the value of SW in Line 70 to be one more than the number you want. (If you want 100, then SW=101.)

Be sure to save the program before trying to run it. A mistake in the POKE statements at the front of the listing could lock up the machine and cause you to lose your whole program. Therefore, save it first.

Running the Program

I am not going to take the fun out of running the program by printing out everything the program says when you run it. You will be able to tell either when you type in the listing or when you run it for the first time. You can advance from the titlecard by pressing ENTER.

Your CoCo greets you with each new word and recites it twice before asking you how to spell it. A set of '*'s corresponding to the number of letters in the word appears. You will also notice that the set of color borders on the screen changes with each new word. An arrow flashes below the letter to be attempted.

If at any time you want to hear the word again, just press the space bar to have it pronounced again. As you select each letter to try, your CoCo will say the letter. If you are not correct, it will say, "No, not J" or whatever letter it is you pressed. Be sure not to type the letters in too quickly, or you may get ahead of the program. There is sometimes some delay when calling the sound subroutine, so typing too fast can mess you up if you make a mistake.

Once the word is correctly spelled, it is repeated and the program spells the word out loud while flashing each letter. This serves as a good reinfocer of the actual spelling because the user sees and hears the words spelled right on the screen.

As with all my programs, pressing @ gives you the score card. You may press Y to rerun, N to stop or C to continue with the word you were working on. Any error in the spelling of a word will count the whole word as wrong. (Sorry, but that's the way it is with real spelling tests, too.)

The order of the words will be different each time you run the program. Remember, putting in too many words will make the program an absolute torture for any child to use. (Would you want to sit and spell 100 words on the computer? Keep it simple.)

Try Some Other Words

You will notice I only included 10 words in the sample listing. Here are a few more suggestions you can try in place of the ones in the listing. Be sure to type DEL 1000-4999 and press ENTER to delete the words in this listing if you already have the program saved with these words.

While some words may be listed twice, since the spelling and pronunciation are usually the same, here is a short list of some that do require phonetic changes:

1000 DATA CHILDREN, CHIL DREN
1010 DATA TOMORROW, TO MORROW
1020 DATA NINETEEN, NI TNEEN
1030 DATA BREAKFAST, BREKF AST
1040 DATA FEBRUARY, FEBUARY
1050 DATA WEATHER, WETHER
1060 DATA ONIONS, UNYUNS
1070 DATA SWEATER, SWETTER
1080 DATA HEALTH, HELTH
1090 DATA AMERICA, AHMEHRl< A
5000 DATA END, END

You can get the proper rhythm in the pronunciation by adding spaces as needed in the spelling. If you would like to see some good examples of the need to use phonics in the pronunciation, try the spelling words for these states:

1000 DATA MINNESOTA, MIN EH SO TA
1010 DATA ILLINOIS, ILLINDI
1020 DATA PENNSYLVANIA, PENNSYLVANE E AH
1030 DATA CONNECTICUT, CONN ECTI T
1040 DATA HAWAII, HA HYE E
1050 DATA IDAHO, I DAHO
1060 DATA MISSISSIPPI, MISSISSIPPEE
1070 DATA GEORGIA, GORGIA
1080 DATA OHIO, O HI O
1090 DATA UTAH, U TAHW
5000 DATA END, END

Some of the states actually work out OK, but these can be a real pain. If you need to check the correct pronunciation of a word as you are typing in the list, run the program with some words in it and press BREAK. Take the spelling you would like to use for pronunciation and make it equal to AS, such as:

AS="BAH LONEY"

Press ENTER and then type in:

GOSUB 105

Then press ENTER again. If you didn't quite hear it, then GOSUB 105 again. You can repeat this process until you get the sound right. Then type it into the DATA line as needed. Remember, always put the correct spelling first and the pronunciation second. Last of all, always remember to include Line 5000 DATA END, END to make the program work.

Conclusion

Next month, we will try another new approach to your ideas, maybe even with artificial sound again. Let me know how well this program works for you, and keep your suggestions coming.

The Listing: H&SPELL

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>REM**************</td>
</tr>
<tr>
<td>2</td>
<td>REM* HEAR IT AND SPELL IT *</td>
</tr>
<tr>
<td>3</td>
<td>REM* BY FRED B. SCERBO *</td>
</tr>
<tr>
<td>4</td>
<td>REM* COPYRIGHT (C) 1986 *</td>
</tr>
<tr>
<td>5</td>
<td>REM<em>60 HARDING AV. N. ADAMS, MA</em></td>
</tr>
<tr>
<td>6</td>
<td>REM**************</td>
</tr>
</tbody>
</table>
WE’VE OUTDONE OURSELVES!

DS-69A DIGISECTOR™
THE VIDEO DIGITIZER NOBODY CAN BEAT!

The DS-69A is the best video digitizer available for your COCO at any price. This new, turbocharged version of our original DS-69 Digisector allows your 64K COCO to see clearly into the world of any television picture.

SPEED! The fastest — 8 images per second!
PRECISION! The highest — 64 levels of true grey scale!
RESOLUTION! The finest — 256 x 256 picture elements!
Compatibility Use with a black and white or color camera, a VCR or tuner.
Compactness Self contained in a plug in Rompack.
Convenience Use with a Y-cable, Multi-Pak, PBJ Bus or plug directly into the cartridge slot.
Ease of Use Software on disk will get you up and running fast!

POWERFUL C-SEE™ SOFTWARE

C-SEE is the menu driven software package included with your DS-69A. Available on disk or cassette, it provides lightning fast 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout and simple keyboard or joystick control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS—69A may be saved on disk or cassette by C-SEE and then edited with COCO MAX, MAGIGRAPH or GRAPHICOM for special effects. Any of the popular printers may be used to obtain printouts of images digitized by the DS-69A.

ONE YEAR WARRANTY

DS-69A Digisector & C-SEE III Software $149.95
OR your DS-69 & MAGIGRAPH Graphics Editor on disk $59.95
$ 39.95

DS-69 DIGISECTOR™
THERE’S ONLY ONE BETTER VIDEO DIGITIZER . . .

And that’s the DS-69A. The DS-69 is The Micro Works’ original video digitizer, tried and true since 1984. It provides almost all the features of the DS-69A and is now available at a new low price. The DS-69 features:

SLUGGISHNESS 2 images per second. Quick enough to freeze all but the fastest moving pictures.
INCOMPATIBILITY Brightly colored scenes may be striped when using a color camera.
INCONVENIENCE Will not work with a Y cable.
Otherwise, it’s a DS-69A. Precision, resolution, compactness, ease of use, software and warranty. Except one last thing.

DS-69 Digisector & C-SEE III Software $ 99.95

Superb image quality produced by both Digisectors.

NO RISK GUARANTEE

If you are not completely satisfied with the performance of your new DS-69A or DS-69 you may return it, undamaged, within ten days for a full refund of the purchase price. We’ll even pay the return shipping. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don’t like. We know which one you’ll keep.

Terms: Visa, Mastercard, Check or C.O.D.

P.O. Box 1110 Del Mar, CA 92014 (619) 942-2400

Purveyors of Fine Video Digitizers Since 1977.

THE MICRO WORKS
7 REM* THIS PROGRAM WILL NOT *
8 REM* WORK WITHOUT A SPEECH *
9 REM*SOUND-PAK BY RADIO SHACK*

10 REM*CLEAR2@00:PRINTSTRINGS(3
2,252) ;:FORI=1TO32:READA:PRINTC

15 DATA69,58,48,62,56,61,69,69,5,
8,53,69,69,58,52,62,69,69,58,8,94,85,92,93,92,93,89,16,19,27,1
8,29 DATA,59,51,58,53,51,59,58,89,99,5,
85,17,27,19,19,25 DATA,58,58,53,48,53,
58,53,59,89,99,58,5,58,16,16,16
30 DATA51,58,59,59,55,51,51,58,55,
59,49,58,61,51,48,81,91,91,
87,82,29,28,29,24
9,98,35,34,35,35,35,35,35,34
40 DATA106,96,104,101,106,1
01,96,104,101,101,1,37,4
0,37,40
45 DATA106,101,106,101,1
01,101,101,37,37,
04,101,101,1,37,37,
55 DATA,106,101,101,1
01,98,101,96,98,37,
60 DATA107,99,99,99,106,103,1
6,103,99,99,106,39,34,39,34,
65 PRINTSTRINGS(32,243):
70 T=80:K=1:SW=41:MU=RND(-TIMER)
75 DIM BS$(SW),WS$(SW),PS$(SW),P$(SW)
,Q(41),C(7)
80 FORI=1TO7:C(I)=(I*16)+143:NEX
"GOSUB105
230 FORDL=1T014:00:NEXTDL:PRINT
235 C$=W$(P(C)):A$=P$(P(C)):GOSUB
B105:PRINT
240 P=LEN(C$):PRINT@299,STRING$(P,"*"}):PRINT
245 GOSUB105
250 PRINT$=W$(P(C)):A$=P$(P(C)):GOSUB
255 FORDL=1T090:NEXTDL
260 FORI=1TOP:B$(I)=MIDS$(C$,I,1):
NEXTI
265 PRINT@448," PRESS <SPACEBAR>
TO SAY WORD. ";
270 FORI=1TOP
275 PRINT$330+I," ";
280 X$=INKEY$:PRINT
285 IFX$="THEN-GOSUB105
290 IFX$="THEN400
295 PRINT330+I," ";
300 IFX$="A"THEN275
305 IFX$="Z"THEN275
310 PRINT330+I," ";:IFX$="THEN
275
315 PRINT@298+I,X$=A$=X$:GOSUB1
320 IFX$="B$(I)THEN340
325 FORY=1TO5:NEXTY
325 NT=NT+1:A$="NO NOT "+X$:GOSUB
B105
330 FORDL=1T050:NEXTDL:A$=P$(P(C))
335 PRINT@298+I," ";:GOTO275
340 A$=P$(P(C)):NEXTI
345 A$="VERY GOOD.";GOSUB105
350 A$="P$(P(C))";IS SPELLED.";G
OSUB105
355 FORDL=1T0260:NEXTDL
360 FORI=1TOP:A$=B$(I):GOSUB105
:V=ASC(B$(I))
365 FORDG=1T06:PRINT@298+I,CHR$(V
+32);FORDL=1T025:NEXTDL;PRINT@2
98+I,B$(I);FORDL=1T025:NEXTDL:N
EXTG:NEXTI
370 FORDL=1T020:NEXTDL:A$=P$(P(C))
375 IF NT->1THEN NW=NW+1 ELSE NC
=NC+1
380 PRINT@448," PRESS <ENTER>
TO CONTINUE. ";
385 FORDL=1T090:NEXTDL:A$="PRES
S ENTER TO CON TINUE";GOSUB105
390 IFINKEY$<CHR$(13)THEN390
395 NEXTPY
400 CLS:PRINT@101,"YOU TRIED"NC+
NW"WORDS AND":PRINT@165,"SPELLED
"NC"CORRECTLY"
405 PRINT@229,"WHILE DOING"NW"WR
ONG.";
410 NQ=NC+NW:IF NQ=0THEN Q=1
415 MS=INT(NC/NQ*100)
420 PRINT@293,"YOUR SCORE IS"MS"
.
425 PRINT@357,"ANOTHER TRY (Y/N/ 
C) ?":
430 X$=INKEY$:IFX$="Y"THEN RUN
435 IFX$="N"THENCLS:END
440 IFX$="C"THEN275
445 GOTO435
1000 DATA ALLEGIANCE,AL EJENTS
1010 DATA MIXTURE,MIXTURE
1020 DATA ENCYCLOPEDIA,EN SI CLO
1030 DATA MECHANIC,MEHKAHNK
1040 DATA INDUSTRIAL,INDUHSTREE
1050 DATA ALCOHOL,AL COHALL
1060 DATA ELECTRICITY,E LEK TRIS
1070 DATA SOLUTION,SO LU SHUN
1080 DATA INVENTORY,INNVVIN TORY
1090 DATA SUPERMARKET,SOO PPER M
1100 DATA END,END

THE BOOK !
Essentially for the "unnecessary, yet completely useless, yet complete", "Computer Science: Become CoCo 1 & 2
solves / your problem in a clear and
"An excellent reference book" "For CoCo 1 & 2"
very informative "289 pages" 
expert", "289 pages" 

$18.00 U.S. + $1.50 shipping.
U.S. check or money order. Ri residents please add 6% sales tax.

TEPCO
30 Water Street
Portsmouth, RI 02871

February 1987 THE RAINBOW 171
Continued from Page 10

BRICKBATS

Editor: I have a few complaints about Four Star Software and Penpal. I purchased Penpal early this year and had only one problem at first, and that is the same one that Graham Langford wrote about in the November issue.

Occasionally when you press the A it instantly prints a@a@a@, or ihihih when the I is pressed. I wrote to Four Star about this, but got no response.

The next problem I had was when I tried the Sort routine in the database module. It does not use the computer's memory at all to sort and does all the sorting by accessing the disk intermittently. A sort of 120 items took 15 minutes. I did another sort and about halfway through, the drive crashed and I got a File Structure Error.

The next problem was when I bought a new Dual TEAC drive. When I tried to load a file from one of the modules I kept getting a Drive Not Ready error. I found out that if I quickly pressed the load function immediately after getting the error that the file would load. As long as the drive was still on from the first try, it would work. Needless to say, it was very difficult to type in a file name the second time before the drive shut off. It seems that the program simply does not give the drive enough time to come up to speed, even though it seems to almost instantly.

Dan Page
Churchill, Manitoba

PEN PALS

- I am looking for some pen pals. I have a 64K CoCo 2, disk drive, tape, modem, DMP-110 printer, and speech and sound pak.
  Steve Poates
  2056 South McVay Drive
  Mobile, AL 36605

- I am 35 years old and would like to correspond with CoCo users, especially in the northwest Arkansas four-state area. I have a 64K CoCo with disk, cassette and a DMP-105 printer.
  David Knight
  305 N. Main
  Bentonville, AR 72712

- I am 15 years old and have a CoCo 2, a Modem I, two disk drives and a DMP-100 printer. I would like to hear from people from all over the world. If you have a modem or just want to talk about something, call me at (805) 398-1029. Do not call after 10 p.m. (Pacific time) on weekdays.
  Don Lawson
  4309 Rakins Court
  Bakersfield, CA 93311

- I would like some pen pals in the CoCo Community.
  Todd Weakley
  643 E. Hawthorne Street
  Ontario, CA 91764

- I am looking for some pen pals from the Delaware, Maryland, Pennsylvania or New Jersey areas.
  Steve Slack
  6 Saddle Circle
  Newark, DE 19711

- I would like some pen pals in the Claymont/Wilmington area. I have a CoCo 2, disk drive, cassette, TRP-100 printer and direct connect modem.
  James E. McDowell
  4C Rector Court
  Wilmington, DE 19810

- I am looking for pen pals. I have a 64K CoCo, one drive and one printer modem.
  Lance Easley
  141 E. Gadsden Lane
  Cocoa Beach, FL 32931

- I am 16 years old and looking for a pen pal. I have a 64K CoCo, one disk drive and a 300 baud Modem II. I have lots of games, Adventures, etc., so someone send me a letter.
  Steve Sizemore
  25250 SW 145 Avenue
  Homestead, FL 33032

- I am 13 years old and looking for pen pals who are game nuts. It can be BASIC, binary, graphics, Adventures, etc. I love all games.
  Chris Weiss
  10106 S.W. 22 Terrace
  Miami, FL 33165

- I am 15 years old and I have been to Japan twice for a total of four months and speak fluent Japanese. I have been programming in BASIC for five years. I have a CoCo 3 with four drives, a modem, printer, multipack and Speech/Sound Pak. I'm looking for a pen pal, preferably one who has the same interests and speaks (or is) Japanese.
  Nimmi Malle
  1245 Thrush Avenue
  Miami Springs, FL 33166

- I am 15 years old and I have been to Japan twice for a total of four months and speak fluent Japanese. I have been programming in BASIC for five years. I have a CoCo 3 with four drives, a modem, printer, multipack and Speech/Sound Pak. I'm looking for a pen pal, preferably one who has the same interests and speaks (or is) Japanese.
  Paula Vaske
  3719 Casaba Loop
  Valrico, FL 33594

- I would like to be a pen pal with anybody. I am 13 years old and have a CoCo 2, disk drive and a sound and speech cartridge.
  Alex Abraham
  555 Wyncourtney Drive
  Atlanta, GA 30328

- I am 15 years old and in search of other teenage CoCo nuts. I have a 64K CoCo 2, CGP-220, two TEAC DSDD drives and a modem.
  Tony Belchradek
  3514 So. Elwood
  Berwyn, IL 60402

- I have a CoCo 2, disk drive and modem, and I'm into all types of games, Simulations, Adventures and war games. If anyone has the same interests please contact me.
  Raymond Lueders
  1341 Sea Biscuit Lane
  Hanover Park, IL 60103

- I am 16 years old and have a CoCo 2, DMP-105 printer, disk drive and cassette player. Anyone with at least a tape player can write me. I will answer all letters (SASE required).
  Dana Kramer
  802 N. DeQuincy
  Indianapolis, IN 46201

- I am 15 years old and own a 64K CoCo, cassette recorder and disk drive. I'd like to have other CoCo pen pals from anywhere around the world.
  Scott Stevens
  1810 Peachtree Drive
  Valparaiso, IN 46383

- I am 17 years old and looking for a CoCo pen pal. My present system consists of a 64K CoCo 2, cassette recorder, FD-500 disk drive and a DMP-105 printer. I plan to purchase the new CoCo 3.
  Andrew Urquhart
  6813 Arthur Street
  Metairie, LA 70003

- I am a 22-year-old looking for pen pals. I have a CoCo 2 and 3, four disk drives and cassettes. Will answer all replies.
  Bill Morse
  2 Ford Street
  Haverhill, MA 01830

- I have both the CoCo 2 and 3, one disk drive and Gemini 10K printer. I would like to write to someone who has worked with EDSTAM+, VIP Writer, Database and Musica 2. I teach at a multi-grade Christian school and would like to hear from other teachers.
  Mike Lowe
  200 N. High
  Charlotte, MI 48813

- I am 32 years old and have a 64K CoCo 2 with double disk and cassette. I would enjoy corresponding with adults of similar interests.
  Dennis Lyle
  1920 Burnham
  Saginaw, MI 48602

- I am looking for pen pals. I have an older 64K CoCo with a drive, DMP-105 and CGP-220 printers and Flatbed Printer 215. Also a 32K Model 100 computer. I would like to hear from anyone interested in any of these.
  Shirley Towns
  Box 3573
  Bozeman, MT 59772

- Are you interested in having CoCo Computer pen pals from all over the world? I write dozens of letters each week to pen pals and I know that many of them would like to hear from other CoCo users. If anybody...
HALL OF THE KING (Rainbow Review 6/86)

This program combines all the things you look for in a great two disk graphics adventure program. The Hi-Res graphics are superbly done. The text portion of the screen and the graphics change quickly as you move through the HALL OF THE KING. You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. HALL OF THE KING will challenge even the most seasoned adventurer.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl case. $39.95.

HALL OF THE KING II (Rainbow Review 9/86)

Continue your quest for the Earthstone in the Inner Chambers of the HALL OF THE KING. Outstanding graphics help show the way to success in your search to help restore the legendary power of the Earthstone to the dwarven race. The deeper you travel into the inner chambers, the more difficult your progress becomes. HALL OF THE KING II has all the fine features of the first adventure. It is designed to follow the original HALL OF THE KING but may be played as a stand-alone adventure. The adventure fills two disks and comes packaged in a handsome vinyl folder. It requires one disk drive and 64K. $39.95

WARP FACTOR X (Rainbow Review 2/86)

If you have been waiting for a game for your color computer that has everything, your wait is over. WARP FACTOR X is two disk graphics adventure program. The Hi-Res graphics change quickly as you move through the HALL OF THE KING. You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. HALL OF THE KING will challenge even the most seasoned adventurer.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl case. $39.95.

DOLLAR WISE

In todays world of high finance, variable interest rates, balloon payments, and lease options there is a program that can help you sort out the details and make sense of the small print. DOLLAR WISE is an extremely flexible program that will allow you to find the best loan by substituting values for all the different variables that make up the loan. Find the future value and interest paid for either single or multiple deposit savings accounts. Determine mortgage interest paid during a tax year—very good for estimating tax savings on credit purchases also. Should you rent or buy. DOLLAR WISE gives you all the options. It will even provide a loan amortization table print out with Tax Year summaries either by month or year. Requires 32K Tape -$24.95 Disk - $27.95.

FONTFILE - (New for the COCO III)

FONTFILE replaces the standard Hi-Res COCO III font with a character set you select. Choose from a menu of 26 or create your own and save it to disk for future use. Use the fontfile in your own basic programs or liven up an old program with a Hi-Res font screen. FONTFILE will work on all versions of the COCO but is especially written to take advantage of the special capabilities of the new COCO III. Requires 64K and one disk drive. $24.95

COMING SOON!

Hall Of The King III

Send for our free catalog

Call (915) 584-7784 or
Send Order To: PRICKLY-PEAR SOFTWARE
213 La Mirada
El Paso, Texas 79932

POLICY ON PROTECTION

We believe our customers are honest — all of our software can be backed up using standard backup procedures.

Your Personal check is welcome - no delay. Include $1.50 shipping for each order. TX residents add 5 1/8% sales tax. Orders shipped within two days.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd. 608, STNT, Calgary, Alberta T5H 2H2, (403) 236-2161
is interested, please send me a letter telling me what kind of system setup you have and I'll try to match you up as close as possible with other CoCoZoids.

Erick Molnar
65 A Park Street
Reno, NV 89502

- I have a 64K Extended Color BASIC CoCo 2 with one disk drive. I'm a loyal RAINBOW reader and would like a pen pal.

Chippers Puzzler
Box X - Palmer Hill Road
Auble Forks, NY 12912

- I am nine years old and have a CoCo 2 with 64K and a cassette recorder. I also like Adventure games.

Jonathan Wanagel
266 Sheldon Road
Freeville, NY 13068

- I am looking for a technically minded pen pal to share programming and hardware ideas with. I have a 64K CoCo and one disk drive.

Jason Forbes
RD 2, Box 380
Hurlbut Road
Mexico, NY 13114

- I am 14 years old and looking for a pen pal. I have a 64K CoCo 2 with one disk drive.

David Morgan
621 Chatham Street
Rome, NY 13440

- I would like a pen pal. I have a 64K CoCo 2, disk drive, cassette recorder and TP-10 and DMP-100 printers.

Michael J. Clerico
2648 Riverside Avenue
Seaford, NY 11783

- I am looking for a pen pal.

John White
4141 Hamilton-Eaton Road
Hamilton, OH 45011

- I am looking for anyone who can write me and tell me what they know about computers. All letters will receive a reply.

Lisa Brabb
419 Bellevue
Springfield, OH 45503

- I am 15 years old and would like to get in touch with all CoCo users in Oklahoma. I own a 64K CoCo, two disk drives, an Epson RX-80 printer and cassette player.

Brandon Knight
RT. 2
Sulphur, OK 73085

- I am looking for a pen pal outside of the U.S. I am 17 years old and have a 64K CoCo 1 and a 128K CoCo 3, two disk drives, a Line Printer VII and a cassette player.

Scotty Hulshof
35468 Riverside Drive SW
Albany, OR 97321

- I am 13 years old and looking for a pen pal. I have a 16K ECB CoCo (soon to be upgraded to 64K), DMP-105 printer and a CCR-81 cassette recorder.

John Mahan
P.O. Box 1043
Cave Junction, OR 97523

- The International (80) Pen Pal Club is being started. Any CoCo owner can join. You must have a disk or cassette player.

Nevin Keller
136 S. 15th Street
Easton, PA 18042

- I am looking for a pen pal who likes to program in BASIC with assembly language subroutines. I have a 64K CoCo 2 cassette system.

Brian Lipscomb
5106 Whitby Avenue
Philadelphia, PA 19143

- I am looking for some CoCo pen pals in the Uniontown area. Write or call me at (412) 437-6215.

Chuck Mills
222 Evans Street
Uniontown, PA 15401

- I am 15 years old and am looking for a few pen pals from anywhere. I have two disk drives, printer, 64K and soon, a CoCo 3. Anyone with similar setup who is interested in games and programming, write me.

Brad Bansner
2006 Apple Place
Wyoming, PA 19610

- I would like to know if there are any high school girls who like to program and want a pen pal. I am a junior at Greenwood High School. My setup is a CoCo with RAM disk, one disk drive, printer and Multi-Pak.

Patrick Malone
4 Harper Lane
Greenwood, SC 29646

- I would like to have some pen pals. I own a CoCo 3 and I'm interested in hearing from other people with the new computer.

Dave Bell
116½ S. 300 East
Smithfield, UT 84335

- I would like to correspond with other CoCo readers. I have a 64K CoCo 2, a DMP-105 printer and a tape recorder.

Richard L. West
3946 Tuscaloosa Way
West Jordan, UT 84084

- I am interested in getting a CoCo pen pal. I operate a BBS at (703) 365-2018 in Virginia. I have a CoCo 2, two disk drives, modem, cassette, DMP-105 printer and a Real Talker.

Ricky Sutphin
Route 1, Box 20
Henry, VA 24112

- Anyone interested in a pen pal please contact me. I will do my best to answer all letters. I have lots of good public domain software. If anyone is interested, send an SASE or call me on a weekend afternoon at (703) 361-5244.

Jerry Rossano
10153 Parkview Drive, No. 8
Manassas, VA 22110

- I would enjoy having a pen pal. I'm 14 years old and own a TRS-80 computer.

Tosha Reetz
1102 Oak Street
Bloomer, WI 54724

- I am looking for pen pals of any age. I am 27 years old and own a 64K CoCo 2 with a disk drive.

John Lentz
5100 W. 13421 Loomis Drive
Muskego, WI 53150

- Once again I'm looking for pen pals who would like to co-author some programs with me. If you are interested or if you only have the idea for a program, contact me.

Bill Bernico
708 Michigan Avenue
Sheboygan, WI 53081

- I am 17 years old and a proud owner of a CoCo 2 and CCR-82 recorder. When I moved from Holt, Missouri, to Cheyenne, I found almost no support for the CoCo. I am looking for a pen pal and/or club in the Wyoming area.

Doug Humphrey
514 Melton, Apt. A
Cheyenne, WY 82009

- I have been corresponding with several people who have written to RAINBOW asking for pen pals. I would enjoy corresponding with mature, but still fun, CoCo users, especially any who play Dungeons and Dragons. I have a 64K ECB CoCo 1 with disk drive, printer, tape and modem.

Paul "Stalker" Ingraham
2948 Killarney Drive
Prince George, British Columbia
Canada, V2K 2B1

- I'm currently looking for a pen pal with an Amiga 1000. Does anyone have an Amiga and a CoCo? If so, drop me a line. I find it very interesting to take my old issues of RAINBOW and convert the programs to the Amiga. I have some demos that you would not believe.

Leonard MacEachern
RR 1, Port Hastings
Inverness County, Nova Scotia
Canada B0E 2T0

- I would like to have a pen pal. I have a 64K CoCo with one disk drive and a printer. I also have a CoCo 2 with a printer and cassette player.

John Mahan
P.O. Box 1043
Cave Junction, OR 97523

- I am 15 years old and looking for a pen pal. I have a 16K ECB CoCo (soon to be upgraded to 64K), DMP-105 printer and a CCR-81 cassette recorder.
• I am interested in acquiring pen pals from anywhere in the world. If interested, please contact me.
  
  Rick McIntyre  
  50 Haggerty Road  
  Newbury, Ontario Canada N0L 120  

• I am 16 years old and have a gray CoCo upgraded to 64K equipped with a DCM-3 modem and a TP-10 printer. Searching for someone particularly in Canada.
  
  Derek Boucher  
  Box 341  
  Bonaventure, Quebec Canada G6C 1E0  

• I would like pen pals to exchange hints and tips, ideas, discoveries, etc. I am 17 years old and own a 64K CoCo, Epson LX-80 printer, a graphics tablet and a tape recorder. I love making programs for myself and other people. No matter how old you are, or where you live, write to me.
  
  Jean-François Darmezin  
  217 Brook Street  
  Cowansville, Quebec Canada J2K 2H6  

• I am interested in acquiring pen pals from anywhere in the world.
  
  Roberta Book  
  P.O. Box 774  
  Assiniboia, Saskatchewan Canada S0H 0B0  

• I am 13 years old and own a 16K TRS-80 CoCo extended.
  
  Ricardo Jorge Lopes da Cruz  
  Rua Santos Moreira, 138  
  Cordeiro, Recife, PE 50000 Brazil  

• I live in a small town called San Rafael and I am a new RAINBOW reader. I own a 64K CoCo 2 with a CCR-81 cassette recorder. I am 14 years old and looking for CoCo (or compatible) owners anywhere. If anyone is interested in having a pen pal in Argentine, please write me.
  
  Carlos E. Fernandez  
  Maza 176  
  San Rafael, Mendoza 5600 Argentina  

• I would like to hear from pen pals around the world and of any age. I have a 64K ECB with one disk drive and a tape system.
  
  R. Makrievski  
  4 Delamare Drive  
  St. Albans, Victoria 3021 Australia  

• I would be very interested in corresponding with any Color Computer users in the Scandinavian or European countries. I have a 64K ECB system with DMP-105 printer and cassette storage. My main interests are in BASIC and assembly language programming, electronics and flying (I am a licensed pilot). I do have flight planning programs, which I developed, if anyone is interested.
  
  Larry L. Bernard  
  Almtorget 2A  
  S-21457 Malmo Sweden  

• I would like to get in contact with German CoCo users and, of course, CoCo users from every country. My system is a 64K CoCo 1, two double-sided drives, also DMP-100 and GCO-115 printers. I am using my CoCo in machine language, BASIC, FORTH, LOGO, PASCAL and C.
  
  Hans-Joerg Sebastian  
  Kalkumerstr. 96  
  4000 Dusseldorff 30 West Germany  

• Are you interested in having a CoCo pen pal? If yes, then write to me. I’m 16 years old and have a 64K CoCo 2 with cassette recorder.
  
  Derchain Stephan  
  Peltzer Avenue, 4  
  4800 Ferviers Belgium  

• I’m Brazilian and would like to have pen pals from all over the world.
  
  Ricardo Jorge Lopes da Cruz  
  Rua Santos Moreira, 138  
  Cordeiro, Recife, PE 50000 Brazil  

• I’m looking for pen pals all over the world. I speak German, Spanish, Portuguese and, of course, English.
  
  Daniel Streitd  
  8 Hassan Sabry Street, c/o GTZ  
  Zamalek, Cairo Egypt  

---

**J&R ELECTRONICS**

Easy, Solderless Installation

"JramR"

512K COCO 3 Memory Expansion Board. Upgrades stock 128K COCO 3 to full 512K for OSG Level II. Similar to RS upgrade.

**COCO & II ONLY**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Price</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>$38.95</td>
<td>Banker II base board (with long pin socket, does not include memory Expansion Board)</td>
</tr>
<tr>
<td>1002</td>
<td>$69.95</td>
<td>Banker II base board plus parts (does not include Memory Expansion Board)</td>
</tr>
<tr>
<td>1003</td>
<td>$89.95</td>
<td>Banker II assembled &amp; tested (no memory)</td>
</tr>
<tr>
<td>1004</td>
<td>$129.95</td>
<td>Banker II (256K, upgradable to 512K) assembled &amp; tested with memory</td>
</tr>
<tr>
<td>1005</td>
<td>$159.95</td>
<td>Banker II (512K) assembled &amp; tested with memory</td>
</tr>
<tr>
<td>1006</td>
<td>$29.95</td>
<td>Memory Expansion Board + parts</td>
</tr>
</tbody>
</table>

**All software is configurable for 256K/512K operation.**

Software shipped on disk, add $10.00 for software on tape. (OS9 RAMDISK not available on tape).

**COCO 3 ONLY**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Price</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1010</td>
<td>$39.95</td>
<td>JramR II base board plus connectors</td>
</tr>
<tr>
<td>1011</td>
<td>$109.95</td>
<td>JramR II includes all parts plus memory chips</td>
</tr>
<tr>
<td>1012</td>
<td>$139.95</td>
<td>JramR II assembled and tested plus memory chips</td>
</tr>
</tbody>
</table>

**MISCELLANEOUS**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Price</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9000</td>
<td>$89.95</td>
<td>Down Under Controller. Ram Pack site controller with BOGS Gold plated, high reliability edge connectors, jumpers for 24/28 pin ROM. Compatible with COCO I and COCO II &amp; COCO 3.</td>
</tr>
<tr>
<td>9001</td>
<td>$35.00</td>
<td>BOGS (enhanced DOS on 27128 EPROM)</td>
</tr>
<tr>
<td>9002</td>
<td>$5.00</td>
<td>6K switch</td>
</tr>
<tr>
<td>9003</td>
<td>$74.95</td>
<td>New SAM 74L5785 (required only for 2.0 MHz operation)</td>
</tr>
<tr>
<td>9004</td>
<td>$24.95</td>
<td>New SAM 74L5785 (required only for 2.0 MHz operation)</td>
</tr>
<tr>
<td>9005</td>
<td>$10.00</td>
<td>S/W Pac upgrade 1.9 to 2.0</td>
</tr>
</tbody>
</table>

To place an order, write to J&R Electronics, P.O. Box 2572, Columbia, MD 21045. Or call (301) 987-9067-Jesse or (301) 788-0861-Ray.

**HOURS:** Weekdays 7 a.m. - 9 p.m.; Sat. Noon - 5 p.m. or 9 p.m. when filled. Add 5% sales tax.

**CHECKS, MONEY ORDERS OR CODS only please** (personal check - 2 weeks for clearance). **IMMEDIATE DELIVERY.** (See COCO Radio Shack model #12 or 26-1156, Disk or Tape when ordering. **QUANTITY DISCOUNT AVAILABLE**. For information on shipping or previously placed orders call (301) 788-0861. COCO II 26-31 XX owners call (ordering experience may be required).
The CoCo Is Music to the Ears

By Tony DiStefano
Rainbow Contributing Editor

Along time ago, I did an article on an analog-to-digital converter. I explained that you can take a varying signal and convert it into a digital value from 0 to 255. This time I’ll do the opposite.

This month’s project is called a D-to-A converter, where a digital value from 0 to 255 is converted into an analog voltage. But that is just part of it. I’ll show you how to make two of these things. With two of these and some software, we will be able to make music in stereo. Our scenario starts by making two D-to-A converters. Then, with a couple of preamps, some connectors, a stereo system and some software you’ll be playing computer music. We’ll start today with the D-to-A converters and finish up next month with the preamp and some music software.

You can buy a complete, two-channel D-to-A converter chip, but they are a little expensive and most require three voltages. This is a problem with the one-voltage CoCo 2 and 3. Besides, it’s more fun building your own. Now, let’s get into some theory on D-to-A converters.

Remember that a digital value from 0 to 255 is made up of eight binary bits. Each of these bits has a value of 0 (ground) or 1 (5 volts). If you use every combination of eight bits, you come up with 255.

Let’s introduce another component: a resistor. Yes, the good ol’ resistor. If you put a voltage between the two points of a resistor, you could measure the voltage across it. If you put two resistors in series (Figure 1) and measured the voltage across both resistors, you would get the voltage that you put in. For instance, in Figure 1, if you put 5 volts across both resistors, you would measure 5 volts. If you measured across just one resistor, you would get a value somewhat less than 5 volts. If you measured the voltage across the second resistor and added that value to the value of the first, you would get 5 volts. The voltage is divided between the two resistors. If you had three resistors, the sum of the voltages of the three would add up to the total voltage applied. It is a simple mathematical equation and it depends on the resistance value of the resistor. In a resistor circuit, the higher the resistor value, the higher the voltage across it.

If we had 255 different resistors hooked up to a voltage and were able to control which resistor had the voltage on it, we would have an acceptable D-to-A converter. But I’m sure you don’t want to hook 255 resistors to some circuit. Well, you don’t have to. All you need is nine resistors: eight for the eight data bits and one used as a voltage reference or source. It is used as a divider. This is commonly known as a resistor ladder.

If we use that theory, plus a bit of computer theory, we can convert a digital binary value of eight 0- and 5-volt levels to an analog level. A computer’s data bus is continually changing as the computer does its thing. In order to isolate an eight-bit value, a latch is needed. The easiest place to add a latch is on the cartridge port. So, get out the tools and let’s get started.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.
You will need all the usual things for a project. A protoboard, sockets, wire and a few parts. The first two parts are not that hard to find. A good electronics hobby shop will have them. They are a 74LS138 and a 74LS273.

You will see the circuit and how to hook it up to the CoCo bus in Figure 2. If you want stereo or two channels, you will need another 74LS273 and another nine resistors and capacitor. In fact, this circuit can have as many as four channels of D-to-A. All are identical to the one in this diagram except where Pin 11 connects to the 74LS138. Also, nine resistors are connected to each 74LS273. The diagram shows how to connect the other three circuits. The output of this D-to-A converter is about .1 volts on the low end and about 4.9 volts on the high end. The capacitor is used for high-frequency roll-off and to dampen switching noise.

So far, there haven't been any problems, but notice that I haven't given any resistor values. This is where the tricky part comes. The resistor value for R9 is simple: 47K ohms, half-watt or quarter-watt. But the other resistors are a different story. In theory, the value for each resistor is double the previous value. For example, if the first resistor value is 1K ohms, the next value must be 2K and so on. Using this method, the values are:

- R1 = 1K ohms
- R2 = 2K ohms
- R3 = 4K ohms
- R4 = 8K ohms
- R5 = 16K ohms
- R6 = 32K ohms
- R7 = 64K ohms
- R8 = 128K ohms
- R9 = 47K ohms

If you are not sure how to read the value of a resistor, Figure 3 shows a resistor color code chart and how to read it. The first and second colors are the numeric value and the third is a multiplier. For example, if you have a resistor that has a color code of red, violet and orange, its value is 27,000 ohms or 27K. Some resistor values are just not made. Here is a table of resistors that I found and used for my D-to-A circuit.

<table>
<thead>
<tr>
<th>Color</th>
<th>Significant figure</th>
<th>Multiplying value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Brown</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Red</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>Orange</td>
<td>3</td>
<td>1,000</td>
</tr>
<tr>
<td>Yellow</td>
<td>4</td>
<td>10,000</td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
<td>100,000</td>
</tr>
<tr>
<td>Blue</td>
<td>6</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Violet</td>
<td>7</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Gray</td>
<td>8</td>
<td>100,000,000</td>
</tr>
<tr>
<td>White</td>
<td>9</td>
<td>1,000,000,000</td>
</tr>
<tr>
<td>Gold</td>
<td></td>
<td>5% tolerance</td>
</tr>
<tr>
<td>Silver</td>
<td></td>
<td>10% tolerance</td>
</tr>
<tr>
<td>No color</td>
<td></td>
<td>20% tolerance</td>
</tr>
<tr>
<td>Red</td>
<td></td>
<td>2% tolerance</td>
</tr>
</tbody>
</table>

That is fine in theory, but try to find these values in any store! It is next to impossible, but don't despair; you can get these values by using more than one resistor for each value. For instance, a 4K resistor does not exist (unless you want to custom-order it in quantities of 10,000). But, if you put two 2K resistors in series with each other, you get 4K. You see, resistors in series add up in value. A 10K resistor in series with a 22K resistor gives you 32K. Now, the trick is to find the right combination of resistors, to match the values above. Some may require only one or two resistors, but other values will require as many as four or five resistors to add up to the right value. It all depends on what value resistors your dealer carries.

To make matters worse, the precision of the resistors has to be high. The ideal resistor must have a tolerance of .1 percent. Again, these are expensive and rare. If you are like me, you have a resistor bin. I went through the bin with an ohmmeter and measured the values and took the closest value. If you are not sure how to read the value of a resistor, Figure 3 shows a resistor color code chart and how to read it. The first and second colors are the numeric value and the third is a multiplier. For example, if you have a resistor that has a color code of red, violet and orange, its value is 27,000 ohms or 27K. Some resistor values are just not made. Here is a table of resistors that I found and used for my D-to-A circuit.

- R1 = 1K ohms
- R2 = 2K ohms
- R3 = 2K + 2K ohms
- R4 = 6.8K + 1.2K ohms
- R5 = 15K + 1K ohms
- R6 = 22K + 10K ohms
- R7 = 27K + 27K + 10K ohms
- R8 = 100K + 27K + 1K ohms

Again, it is important to have the right values. If you don't have the right values, keep adding more resistors until you do; they aren't expensive. Even after you get the right theoretical values, use a precise ohmmeter to fine-tune these resistors. Remember, the closer the values you use, the better the sound it will make. If your resistors are not perfect, at best, you will get a little harmonic distortion; at worst, you will get a bad sound.

As far as the parts are concerned, you can get the protoboard and the ICs from CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8. The resistors you will have to dig up yourself.

See you next month.
That Same Ol’ Boring Black and Green

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

Can I get text colors other than green/black or black/green in the 32-by-16 text mode on my CoCo 3?

Julie Malkemus
Cleveland, OH

The text and background colors are controlled by the registers at &HFFBC and &HFFBD. The following program, COLORPOK.BAS allows you to select a color combination. Note that there are 4,096 color combinations to choose from. Of the 4,096, there are 64 where the text and background are the same color, allowing you to write to the screen invisibly before revealing the text by changing the values of one of the registers. The program allows you to change text colors with the up and down arrows, and background colors with the left and right arrows. Use BREAK to exit the program.

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

Using Tapefix With a Disk

I am writing in regard to a program, Tapefix, which appeared in your June 1986 column in 80Micro. What changes are required to use this program on my 64K CoCo 2 with Disk Extended BASIC 1.0 or 1.1? I have had problems getting it to work properly.

Robert McClure
Vernon, CT

There was a typo in the program: The ‘&’ that should have preceded the ‘H’ was inadvertently dropped from Line 280. Tapefix is only needed for programs that start below &H600 and are to be used on a disk system. It will not work if the program has copy protection, an auto-loader or is larger than 16K.

Richard Esposito is a project engineer for TRW's Federal Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Step-by-step Error Tracing

Is there an easy way to trace an error, step-by-step, for a novice?

Rudolph Querard
Levittown, NY

You can use James Provost's SYNC.BAS to send a continuous log of your screen display to your printer. This program originally appeared in the August 1984 issue of RAINBOW.

Robert McClure
Vernon, CT

Since, hardware-wise, the CoCo 3 is a brand new machine that shares few circuits with the CoCo 2, such an upgrade would involve replacing the entire printed circuit board. If Tandy did this and modified the case for the additional ports (RGB and composite video outputs), with a nominal charge for labor, it would probably cost more than the current price for the CoCo 3. You may, however, see some third-party vendors with a CoCo 3 compatible memory upgrade, but as for the new display options, it would not be cost-effective.

Richard Esposito is a project engineer for TRW's Federal Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

How to Save Memory

Does it save memory if I squeeze as many commands as possible into one line using colons, and/or by taking

Richard Esposito is a project engineer for TRW's Federal Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.
C.R.C. COMPUTERS INTRODUCES

DISTO SUPER RAMS

- 512K Memory upgrade
- Easy to install
- Solderless
- Plug-in card
- Fully compatible with OS.9 Level II
- State of the art fast 120ns Dynamic Ram

512K RAM FOR THE COCO 3

SEND FOR FREE CATALOGUE

C.R.C. COMPUTERS
10802 Lajeunesse
Montréal, Québec
Canada H3L 2E8

1-514-383-5293

DEALER INQUIRIES INVITED

WE ACCEPT C.O.D. IN CANADA
PHONE ORDERS
ONLY

ONLY $129.95
I would like to preserve readability.

Ricky Suphin
Henry, VA

You save four bytes for every line number eliminated, and one byte for each space eliminated. There is a commercial product, Packer, by Bob van der Poe Software, which you may be interested in. It was reviewed in the December 1986 issue, Page 139. You can always keep two versions of your programs: a readable copy for documentation and a packed version for execution — then you’ll have the best of both worlds.

Model I — CoCo File Transfer

A local business recently gave me a Model I system, the expansion unit and disk drives 0 and 1. I also have a 64K Extended CoCo with cassette. I have written programs that will run on either. Is there a method or device that will enable me to transfer data and programs between the two?

Brian T. Sprouse
Forest, VA

You can transfer ASCII files between the two using smart terminal programs with both computers' RS-232 ports joined with a null-modem cable. One way to read Model I tapes into your CoCo is by using the Magic Box, a cable/software package marketed by Spectrum Projects. Brian, you might also consider using the drives with your CoCo and abandoning that "orphan" machine. All you’ll need is a two-drive cable and a disk controller.

Dumping Printer Control Codes

Can your text-dump program be modified so characters that control printer modes can be stripped away?

Edward R. Spadoni
Dedham, MA

The following program, CHARSET.BAS, illustrates the problem by poking the values 0 to 255 to screen memory.

Since every one of these values corresponds to a character on the screen, but most printers use some of the codes below 32 for special effects, a character translation table must be constructed to convert these characters' memory values to their corresponding ASCII codes, which are understood by BASIC's CHR$ function. This table was incorporated into the DUMP.BAS program which follows:

The program corresponding to CHARSET.BAS for the 40- and 80-column modes on the CoCo 3 is HCHARSET.BAS, which appears in Listing 3 (note the CoCo 3 has no text graphics characters):

PHYSICAL NAME: Dumping Printer Control Codes

The routines you mention are supposed to be position-independent, and if they repeated that mistake in your version.

INKEYS Versus INPUT

I do not have copies of the programs you mention, but in the earlier version of Radio Shack's screen dump, you had to change a JMP S$CB$A for DOS 1.0 or to JMP $CBSA for DOS 1.1. Perhaps they repeated that mistake in your version. The routines you mention are supposed to be position-independent, and if they
are, you can load them with an offset storage density, Konica Technology (Sunnyvale, Calif., 408-773-9551) has a new 5¼-inch drive, model KT-510 with a formatted storage capacity of 10.9 megabytes. This drive can also read normal 360K disks. These drives sell for $400 each in OEM quantities and the special 5¼-inch media for $20 each.

Detecting New CoCo 3 Keys

How can I access the F1 and F2 keys on the CoCo 3 from BASIC?

John Chitty
(ImC)
Destrehan, LA

The new keys, ALT, CTRL, F1 and F2, fill in what were the missing positions in the keyboard rollover table on the CoCo 2. You can detect these keys by polling addresses 341, 342, 343 and 344, respectively, for a change in value from 255 to 191.

Corrections

December, 1986: The $199 text-scanner is called Omnisearch, marketed by G.A.S. International, Inc., P.O. Box 1282, Euless, TX 76040, (800) 523-4898. It attaches through the RS-232 interface available.

November, 1986: A typo appeared in Line 100 of my reply to Scott Lane regarding the INKEY$ function. The "< >" should be a "='. Thanks to Allen E. Weatherford, Morgantown, N.C., for pointing this out.

November, 1986: A typo appeared in Line 130 of my response to Helga Craig. Drop the "I+" and the ';'. See the answer to Edward Spadoni, this issue, for a much improved version that strips off non-printable ASCII characters that play havoc with many printers, and a new version for the CoCo 3.

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

From the Princeton RAINBOWfest . . .

The CoCo 3 Round-Table Tape!

THE RAINBOW recorded the main event of RAINBOWfest Princeton, the Saturday evening (Oct. 18) round-table discussion:

"The Design, Development and Marketing of the CoCo 3."

Speakers included Tandy's Barry Thompson and Mark Siegel, as well as independent CoCo 3 programmers Steve Bjork and Dale Lear (filling in for Greg Zumwalt).

This was a lively and informative session and, therefore, we want as many people as possible to hear what these RAINBOWfest guests had to say.
A quick cure for I/O Errors

Fast Relief for Tape-Loading Headaches

By Mark Nelson

There are always a few built-in frustrations that go along with the use of any computer system. One of my greatest frustrations with the CoCo, and I’m sure many of you feel the same way, is the tape recorder and those darn I/O Errors. Things get quite a bit better when you get a disk drive, but there are still many times when using the old cassette recorder is the only way to go. For instance, you may subscribe to RAINBOW ON TAPE, and some of the programs you bought before you got a disk drive won’t transfer to disk (some don’t work with the controller plugged in, anyway).

Let’s face it, the tape recorder is an important part of our computer system and we’d better learn to live with it. That’s why I wrote Tape Doctor. It makes it easier to get along with the tape recorder by changing the CoCo’s method of loading programs and files. Specifically, it modifies the way I/O Errors are handled.

The familiar method of handling these errors is to put the infamous I/O ERROR message on the screen and then stop everything. With Tape Doctor, on the other hand, CoCo informs you of any errors and then continues to load the tape. This way, all good portions of the program or file are still loaded when, otherwise, they would be lost.

The program listing is quite short, so even you “two-finger” typists out there can handle this one. Be sure to save the program before you run it, because it erases itself after it runs. Tape Doctor requires 64K ECB, and yes, it will work with the disk controller plugged in. I’ve used it to help me transfer a few hard-to-load tapes to disk.

When you have the program on tape or disk, run it. After a second or two, the “OK” prompt will appear and you’re ready to load tape programs and files in the usual way with the BASIC commands LOAD, CLOADM, INPUT, etc. When a tape is loading, you’ll see a white block appear on the screen after a successful block load (a block is 255 bytes). If an I/O Error occurred during the last block, a black block will appear instead, but the program or file will continue to be loaded. Obviously, if there are some black blocks that come up during the load, there was some faulty data loaded and it will need to be fixed. If it’s a BASIC program, you may just want to run it and see where the syntax errors are, fix them and save the program again. Machine language programs are a lot harder to fix unless you’re the author, and even then it’s no picnic. But, many load errors do not have any great effect on the program’s execution. A game might not give you bonus points between rounds anymore, or some other trivial thing might be wrong, but it still may be fun to play.

If you have a program that uses tape I/O, you can use Tape Doctor in conjunction with that software by simply running Tape Doctor and then your other software. If you have a file you can’t load with Telewriter-64, you can use Tape Doctor to help by following these instructions. LOAD “TELEG64”, then when the “OK” prompt appears, type 25 GOTO 100 and press ENTER. Next, type RUN and press ENTER. Now, from the Telewriter main menu type A for BASIC. Load and run the Tape Doctor. Type EXEC 7720 and press ENTER to return to Telewriter. You’ll be missing about 3.5K of the text buffer.

To disable Tape Doctor, press the reset button on the back of the computer, or type POKE &HFFDE, 1 and press ENTER. To re-enable, type POKE &HFFDF, 1 and press ENTER.

I have had pretty good success using Tape Doctor to load otherwise unloadable programs and files. I hope you get as much use out of Tape Doctor as I have. Now, here are some suggestions on how to avoid I/O Errors in the first place.

The Tape Doctor is a last resort method of loading a bad tape. If a tape can be loaded without any errors, that’s much preferred. A dirty tape head often causes I/O Errors. You can buy an automatic cleaner that you just put in and “play” like a tape. This is a simple way of cleaning that is better than nothing. However, you can do a better job cleaning by hand. Ask a salesman at any electronics store to show you how to clean the heads with cotton swabs and cleaning solution. A bottle costs less than two dollars and will last you many years. The heads should be cleaned every two weeks or so. A good cleaning will take you less than five minutes, even on the dirtiest machine.

If you still get I/O Errors, try to load

Mark Nelson is a computer science student at Brigham Young University and author of the Second RAINBOW Adventure Contest winner, Head of the Beast.
at several different volume settings. Usually, a slightly lower volume should be tried. If you're using batteries in your recorder, buy an inexpensive battery tester and test them once a month or more often if you use your computer a lot. The recorder runs at a slightly slower speed when the batteries are weak.

If you do save a program or data onto a tape using weak batteries and you can't load it after you change batteries, try putting the old batteries back into the recorder and loading it then. If it loads, save it again after changing to the fresh batteries.

Probably the most common reason for I/O Errors is misalignment of the tape head. Aligning the head is a simple procedure that takes about two minutes to perform. You will need a small, jeweler's-type, flat head screwdriver. First, unplug the recorder from the computer. Now put the program tape that's giving you trouble into the recorder and press the play button. Locate the alignment hole, a small hole through the plastic case, right above the tape head. Now, insert the screwdriver into the hold and down into the alignment screw directly below. Turn the screw slowly back and forth while listening to the sound of the program. You may want to turn the volume down a little since it sounds terrible. You will hear the sound get clearer, brighter, and higher in pitch, and then as you continue turning, it becomes muffled. The correct setting is where the sound is the brightest and highest pitched. Turn the screw until you're satisfied that you have the clearest sound possible and you're finished with the alignment.

One final tip. If you've loaded a machine language program and you want to resave it, type `CSAVEM -filename-,PEEK(&H1E7)*255+PEEK(&H1E8),PEEK(&H7E)*255+PEEK(&H7F)+255,PEEK(&H9D)+255+PEEK(&H9E)` and then press ENTER. Good luck in your battle with I/O Errors!

(Questions about this article may be addressed to Mark at 2A-44 S. Wyomount Terrace, Provo, UT 84604. Please enclose an SASE for a response.)

The listing: TAPE DOC

5 ' tape doctor
COPYRIGHT (C) 1985
BY MARK NELSON
9 CLS:PRINT:PRINT:"tape doctor ""PRINT:PRINT"
COPYRIGHT (C) 1985":PRINT"BY MARK NELSON"
10 CLEAR 999
20 DATA 26,80,190,128,0,183,255,222,166,128,183,255,223,167,31,1
40,224,0,37,241,57
40 FOR I=1 TO 21:READ A:A$=A$+CHR$(A):NEXT I
50 P=VARPTR(A$)+1
60 POKE P,126
70 EXEC P
75 FOR X=0 TO 9:POKE &H9D$0+X,PEEK(&HA7E9+X):NEXTX: 'relocate mot or off routine
80 POKE &HA7E9, &H7E:POKE&HA7E8, &H9D:POKE&HA7E9, &H9E:branch to routines to put square
ed
86 POKE &HA74$0,4:POKE &HA74$5, &H7E:POKE&HA74$4, &H9F:POKE&HA74$7, &P
OKE&HA74$1, &H7E:POKE&HA74$2, &H9E:POKE&HA74$3, &H9E:branch to routines to put square
100 PRINT:PRINT"
THE DOCTOR IS in"
101 $1 NEW
1020 ' tape doctor
COPYRIGHT (C) 1985
BY MARK NELSON

‘Uncram’ Crowded Tapes

Many people cram several programs on one tape with very little space between each program. If you do this, you may want to follow the steps below when trying to load a program that has been saved later on the tape. It will prevent a lot of headaches.

1. Count the number of programs saved before the program you want to load. Good record-keeping will help in this step.
2. At the beginning of the tape, type `MOTORON:AUDIODON and press ENTER.`
3. Start counting the number of programs by listening for silent spots and, at the same time, type in `CLOAD,` but do not press ENTER.
4. At the end of the program just before the program you are trying to load, press ENTER.

Donald E. Deich, Sr.
Dubuque, IA
GOING TO THE DOGS New from The Softtech Group is the Enhanced Greyhound Handicapping package. This two-program set, which includes both the Enhanced Greyhound Handicapping system and the Wager Return Analysis programs, includes features for professionals, but is designed with the novice in mind. Suggested retail price for the package is $49.99 plus $2 shipping and handling. Contact Softtech Group, Inc., P.O. Box 582, Keego Harbor, MI 48033, (313) 851-4925.

PAIRING UP The ProWriter C-210 XP and wide-carriage C-215 XP, which offer dual emulation of the IBM ProPrinter and Epson FX-80+, have been introduced by C. Itoh Digital Products, Inc. Both printers are designed for business applications and are capable of speeds of up to 216 characters per second (cps) in draft mode and 45 cps in near-letter-quality modes. Both the 80-column C-210 XP and the 136-column C-215 XP include automatic vertical tabbing, right and left justification and true super- and subscript. Other features include front panel selection of NLQ and short paper tear-off capability. Centronics-type parallel interface and a 10K buffer are standard, as are both friction and tractor-feed. Graphics resolution is up to 240-by-216 dpi. Suggested retail price for the C-210 XP is $529 and $679 for the C-215 XP. Contact C. Itoh Digital Products, Inc., 19750 South Vermont Avenue, Suite 220, Torrance, CA 90502, (213) 327-2110.

HAYES ACROSS AMERICA A feature-enhanced version of the Smartmodem 2400 became available early in the fourth quarter of 1986 from Hayes Microcomputer Products, Inc. The new features are designed to provide easy access to modem configuration settings and to increase stored phone number capacity. The modem is also now capable of Hayes AutoSync communications mode. The new features include the ability to view active and stored profiles and telephone numbers, storage for two configuration profiles in EEPROM, storage capacity for four phone numbers and 36-character capacity for stored phone numbers. Since two unique configuration profiles can be stored in the modem’s EEPROM, users can save their two most widely used settings for fast, simple access to selected remote systems. The new features are implemented using new commands that expand the Hayes Standard AT command set. Estimated retail price for the Smartmodem 2400 is $899. Contact Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, (404) 449-8791.

REDUCED RATE FOR 2400 CompuServe Incorporated has announced a cost reduction, making its 2400 baud, dial-up access rate for subscribers the same as the 1200 baud access rate. The prime or daytime rate for 2400 baud access has been cut from $22.50 per connect hour to $15 per connect hour. The standard or evening/weekend rate for 2400 baud access has been cut from $19 per connect hour to $12.50 per hour. CompuServe can be accessed during standard or prime service hours. Standard service hours are from 6 p.m. to 5 a.m. weekdays, and all day Saturday, Sunday and announced CompuServe holidays. Prime service hours are from 8 a.m. to 6 p.m. weekdays. Rates for 1200 baud remain at $6 per hour for standard service and $12.50 per hour for prime service time. Costs for 1200 baud access remain at $12.50 per hour for standard service and $15 per hour for prime service hours. Communications surcharges also apply. CompuServe is an H&R Block company. Contact CompuServe, 5000 Arlington Centre Boulevard, P.O. Box 2121, Columbus, OH 43220, (614) 457-8600.

FINE PRINT Networx, a supplier of computer and electronic accessories, has introduced a Dot Matrix Cleaning Kit recommended for use on a wide assortment of printers, plotters and typewriters. Normal operation of such equipment leads to buildup of ink, dust, lint and machine-generated debris on print heads. Without regular cleaning, these deposits can cause character blurring and/or unit failure. The kit contains carefully selected and tested materials, safe for use on sensitive electronic and data processing equipment. Each kit includes a 1-ounce printer/plotter/typewriter cleaning agent and one 9-by-36 inch print element cleaning material, used to clean print heads; one 4-ounce spray can of “Air Clear” for cleaning rollers, tractors and ribbon assemblies; and six office equipment cleaning pads and ink cleaning pads for equipment exteriors and hands. Suggested retail price for the Dot Matrix Cleaning Kit is $29.95. Contact Networx, 203 Harrison Place, Brooklyn, NY 11237, (718) 821-7555.
DATAPACK II PLUS V4.1
SUPER SMART TERMINAL PROGRAM
AUTOPILotand AUTO-LOG Command Processors
X-MODUL DISK FILE TRANSFER SUPPORT
V-510 & V-52 TERMINAL EMULATION

No lost data using Hi-Res Display. Even as 1000 Baud on the Serial port.
9 Hi-Res Displays, 28 to 255 columns by 24 lines & true Upper/Lower case.
ASCII & 80-column transfer via XMODEM
Directly record receive data to disk while online.
VT-100 & VT-52 Standard for VAX, UNIX and other systems.
VT-100/52 cursor keys & position, insert/delete, PP & All. Kbd. keys.
Complete Full and Half Duplex operation, with no garbled data.
Send full 128 character set from Keyboard with control codes.
Complete alphabet, Change or Add to Buffer.
0 Variable length, Programmable Macro Key buffers.
Complete Font selection, Column widths, Tabs, line/cols.
Send files directly from the Buffer, Macro Key Buffers or Disk.
Display on Screen or Print the contents of the Buffer.
Freeze Screen/Print On Line with no loss of data.
Built in Command Menu (Help) Display.
And much more.
Supported: Word-Pak, II, R.S. and Double Density 80 Column Cards.
Disk Controller with 80 column card & parallel printer commands.
Full automatic Syntax checking and error analysis.
Requires 32K & Disk, Only $59.95

HI-RES II Screen Commander
Tired of looking at the 16 line by 32 character display on your CoCo? Wish you could see more lines and characters? Then HI-RES II is the answer. It can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without extra hardware. It is the most powerful screen package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, you only have a much better display. With HI-RES II you have to mixed text and HI-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat rate feature which allows you to protect up to 23 lines on the screen.
HI-RES II features the complete control command functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, reverse/normal, erase line/cols/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

24.95 on Tape or $29.95 on Disk

"The Source"

Now you can easily Disassemble Color Computer machine language programs directly on disk and generate beautiful, Assembler-like listings. The Data Source Code, and "The Source" has all the features and functions you are looking for in a Disassembler.

- Automatic label generation and allowed specifying FFC, FCB and FBD areas.
- Disassembles programs directly from disk or ROM.
- Output Disassembled listing with labels to the Printer, Screen or both.
- Generates files directly to disk or printed listing.
- Generated source files are in standard ASCII format.
- Built in hex/ASCII dump/display to locate FFC, FCB and FBD areas.
- Built in gregorics style source code routines.
- Menu display with single key commands for smooth, easy operation.
- Written in fast BASIC, one of the easiest to use Disassemblers.

Requires 32K Disk $34.95

TEXTPRO III
"The Advanced Word Processing System"

- 9 Hi-Res Displays from 28 to 255 columns by 24 lines & Upper/Lower Case.
- Three Programmable header lines that can be re-defined at anytime.
- Programmable Filer line & Automatic Footnote System.
- 10 Programmable commands.
- Completely Automatic Justification, Centering, Flush left and right.
- On screen editing, Without printing or saving.
- Change indentation, margins, line length, etc. parameters anytime in the text.
- Create new files, open files, save files, read files, write files.
- Easily imbed any number of format and control codes.
- Automatic Memory sense 16-64K with up to 4KB of memory workspace.
- Fully supports the use of standard column hardware.

TEXTPRO III is an advanced word processing system designed for speed, flexibility and extensive document processing. It is NOT like most of the other word processing programs available for the Color Computer. If you are looking for a simple text processor to write letters or other short documents, then most likely you'll be better off with one of the other simple word processors. But, if you want a powerful word processor with an extensive document formatting feature set, then you have found the program for you. TEXTPRO III is what you are looking for.

TEXTPRO works in a totally different way than most word processing programs. It simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formatting commands you can use without ever leaving the text. your working on. You are not limited to using the pre-defined menus and commands. TEXTPRO III will allow you to format the exact way you want. Dashes, borders, titles, page numbers, page breaks, underlining, column formatting and full justification.

DISK $59.95 TAPE $49.95

CoCo-3 S12K upgrade $149.95, card without Ram $49.95
Two Drive RAM-DISK program for S12K CoCo $3.95

The CBASIC Editor/Compiler V1.1.2
Do you want to write fast machine language programs but you don't want to spend the next few years trying to learn how??

Well with CBASIC, you could be writing them right now!!
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 unique capabilities of the Color Computer.

CBASIC allows you to create, edit, and compile programs in the language you are familiar with - Extended Disk Color Basic, including Graphics GET, PUT, PLAY and DRA... easily and quickly. We added features like a full blown program editor, Hi-Res Text Displays and 80 column hardware support for editing, compiling and your compiled programs. Plus we made it exceptionally easy to download and install the most handiest and easiest compiler available for the Color Computer.

"The most complete Editor/Compiler I have seen for the CoCo...
CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP, Register, memory allocation and so on. With CBASIC it will do it all for you automatically.
Or, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.
CBASIC features well over 100 complete 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 Extended Color Basic, including Graphics GET, PUT, PLAY and DRA, with all 99,999 syntax compatability. CBASIC also supports the built in I/O I/O port with separate printer & serial I/O baud rates. You can send and receive data with PRINT, INPUT and INKEY commands. CBASIC has its own complete inbuilt code editor which allows you to load, edit or create programs for the compiler.
It is a full featured editor designed specifically for writing and editing Basic programs. It has block move & copy, program renaming, automatic line numbers, screen editing routines.
"The editor is very good and one could be the subject for review all by itself!" -Rainbow Magazine

"Comparing CBASICs edit mode to CBASICs text editor is like comparing a World War II Jeep to a modern sedan. Get you to your destination, but what a difference in the ride!" -Rainbow Magazine

The documentation for CBASIC is an 8 1/2 * 11 Spiral bound book which contains approximately 120 pages of real information.
"CBASICs manual is easy to read and full of tips and techniques." -Hot CoCo February, 1986

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any other Basic Compiler. CBASIC has it all - assembler source files directly to disk or printed listing. The Assembler portion of EDT is a complete Basic Compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not PDOS compatible.

"A complete Editor/Compiler Worth its Price" -Rainbow Magazine, March 1986

EDT/ASM 64D
64K DISK EDITOR ASSEMBLER
EDT/ASM 64D is a Disk based co-resident Text Editor/Assembler. It has a Hi-Resolution 32, 44 or 51 line by 24 character display, so you see your program listings easily and it supports Column cards. The disk also contains a free standing MDebug Monitor, to help you analyze your assembled programs.

This is the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material.

- Local and Global string search and/or replace.
- Supports Disk Library files.
- Supports standard motorola assembler directives.
- Allows multiple values for memory addresses.
- Generates listings to Hi-Res text screen or printer.
- Assemble directly to COC0 formatted object code.
- Supports up to 8 open disk files during assembly.
- Allows assembly from editor/buffer, Disk or both.

Requires 32K Disk $59.95
Hold Those Variables

By Dan Downard
Rainbow Technical Editor

• Is there a method for the CoCo to run one program, then load a new one while holding all variables at values set by the first program (similar to the CHAIN command of other computers)?

Warren Cole
Nashville, TN

Not while using Disk BASIC, Warren. You can pass parameters using OS-9, but you didn’t mention if you were using OS-9. About the only thing I can suggest is storing all of your variables in a short random disk file before running your new program. Then you can load the variables back into memory and continue.

Using DSKCON With 128K

• I have a CoCo 3, with 128K. I want to use DSKCON with the upper memory locations. Because DSKCON only allows the I/O buffer to be in the range of memory locations 0 to 65535, I can’t put anything in the 128K range. My question is, how do I use DSKCON, or any routine using a buffer, with the 128K memory range?

Dave Bell
Smithfield, UT

One of the funny things about the new CoCo 3, Dave, is even though there is plenty of space for graphics in lower memory banks, there is no way of saving or loading the screens. Notice, I said lower memory banks. When initialized, the normal 64K occupies from $00000 to $7FFFF. All other memory is at $80000 to $FFFF.

There are several programs appearing on bulletin boards for saving and loading this information. Various methods can be used, such as swapping memory banks using the DAT (Dynamic Address Translator), or by use of a machine language program that will access the extra memory.

The only documented way to use the extended memory is by using the LPEEK and LPDKE functions to copy data from regular to extended memory. I’m sure we will run an article on how to save and load extended memory screens in the very near future.

Crashed Disk Directories

• I own a 64K CoCo 2 with Extended BASIC, disk drive with Disk BASIC 1.1, and a DMP-105 printer. I have a big problem with “crashed” disk directories. When I try to write over an existing program with the same name, I don’t get an AE Error. Disk BASIC writes over the program, but doesn’t seem to fix the file allocation table. Any programs that appear after this file are lost. When I try to load these programs I get an FS Error. Please help.

Randy Adams
Memphis, TN

Randy, I used to have the same problem. Instead of overwriting a file, I cured the problem by first killing the old file before rewriting it. I have had no further problems. If anyone knows what the exact bug is, please write and we’ll try to explain why this happens.

Color on CM-8

• I own a CoCo 3, single drive, DMP-105 printer and a CM-8 monitor. With the CM-8 hooked up to the CoCo 3 as per instructions, most of my programs run in black and white, not color. Radio Shack cannot give me a reason, other than my software is CoCo 2 compatible, and not for CoCo 3. All the programs run in color on a TV monitor, but not the CM-8.

Greg Kazian
Greer, SC

Greg, with the good comes the bad.
It's here!

RAINBOW ON DISK

ANOTHER GREAT SERVICE FROM THE LITTLE ELVES AT THE END OF THE RAINBOW

Remember the story of the cobbler and the elves, when the little people crept into the old man's shop and did all his chores while he slept? Well, there is a monthly chore we can now eliminate for you — transferring RAINBOW ON TAPE to disk!

In addition to RAINBOW ON TAPE, we're offering RAINBOW ON DISK, the perfect companion to the RAINBOW for all our readers with disk drives. No more typing. No more transfers. We take care of all the work for you.

OS-9 programs

Thanks to the elfin magic going into RAINBOW ON DISK, part of one side of the disk is formatted for the OS-9 operating system. That means that you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. And, with the introduction of the new CoCo 3, OS-9 programs will become more and more prevalent.

More than a dozen programs

If you're a RAINBOW reader and you have a disk drive, you won't want to go another month without RAINBOW ON DISK. For only $99, 12 full issues of RAINBOW ON DISK will follow the RAINBOW to your home — that's only $8.25 for each issue.

To start your subscription, call our toll-free number or use the handy order card between pages 34 and 35. When your copy of the rainbow arrives next month, you can start enjoying the programs without any extra effort. The little people at the end of the rainbow will already have taken care of all the work.

SUBSCRIBE NOW AND SAVE AN EXTRA $9!

That's right, you can subscribe to RAINBOW ON DISK between now and March 15, 1987, for only $90* — $9 off the regular subscription price of $99. Order now and receive 12 issues for only $7.50 each! It's our extended introductory offer!

* Don't miss out. During this extended introductory offer, good until March 15, 1987, subscriptions to RAINBOW ON DISK are only $90 a year in the United States (regularly $99). Canadian rate U.S. $110 (regularly $115). All other countries U.S. $115 (regularly $130). RAINBOW ON DISK single copies rate is $12 within the U.S.; Canadian rate U.S. $14; all other countries U.S. $16. Kentucky residents add 5% sales tax.

All subscriptions begin with the current issue unless otherwise specified. Please, allow 6 to 8 weeks for first copy. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

RAINBOW ON DISK and RAINBOW ON TAPE are not stand-alone products, but are intended as adjuncts and complements to the magazine. Even if you purchase RAINBOW ON DISK or RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions. For information on RAINBOW ON TAPE, see Page 103.

To order by phone (credit card orders only), call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (602) 228-1492.
The CM-8 is an RGB analog monitor. Previously, CoCo 2s produced composite video using an adapter. You cannot obtain the same resolution with a composite monitor as you can with an RGB monitor. In this context, you have purchased a superior monitor. At the same time, different signals are used for RGB from the computer to the monitor. Using the CoCo 2 and a composite monitor, quite a few of the more recent graphics programs used artifact colors, which relied on composite video's colorburst signal. The CM-8 monitor is not capable of displaying artifact colors.

A big argument is brewing on whether the CM-8 is the proper monitor for the CoCo 3. I think the main contention is that it is not compatible with a great deal of existing software, as in your case. Many other RGB monitors have a composite video mode and will display artifact colors. As soon as some of these monitors are submitted for evaluation, we will give you our opinion. In the meantime, there is nothing wrong with your CM-8. I'm sure you'll be satisfied with your CM-8 when more software is available that uses its capabilities.

By the way, for those readers with composite monitors, try the following to get a readable 80-column screen:

```
WIDTH 80: PALETTE 8, 255: PALETTE 0
```

Novice Upgrade

- I have a 16K Korean CoCo 2 ECB and I went to Radio Shack to ask about having it upgraded to 64K, They told me it would cost about $70 with parts and labor, and I would be better off buying a 64K CoCo 2 ECB on sale for $99 (at the time). While thinking this over, I purchased my first copy of THE RAINBOW. I noticed several ads for upgrade kits for about $30. Although the ads say that all instructions and parts are included, the problem is that I have practically no experience in computer or electronic technology. Is it feasible for a novice to attempt such an upgrade on his own? I have gathered from the ads that some solder joint is required in upgrading my model, but I am otherwise in the dark as to how difficult the procedure would be.

J.S. Grossman
Lubbock, TX

In the case of the Korean CoCo, upgrading will consist of replacing a few chips, in sockets, by the way, and connecting two pads by soldering a jumper between them. The instructions I have seen are more than adequate. I'd try it myself, even if I were a novice.

CoCo 3 Drive Compatibility

- Presently I am using an original gray-case CoCo (E board) with drives 0 and 1 and would like to know if these drives (Part No. 26-3022) and controller (Part No. 26-3022) are compatible with the CoCo 3. And, if not, what do I have to do to make them compatible?

Kenneth Stark
St. Ann, MO

Ken, you need 12 volts for your particular controller. Experience has been that it doesn't have to be well regulated. Find 12 volts in the power supply of your CoCo 3 and run a jumper to Pin 2 on the cartridge connector. Make sure Pin 2 is not grounded. This may require cutting a trace on the circuit board.

If you don't want to experiment, buy a Multi-Pak. It has the 12 volts necessary on the bus for the older disk controllers.

Disk Controller Necessity

- Is there any way you can use a disk drive through the I/O port without having to use the special adapter that fits into the cartridge port?

Michael S. Novak
Virginia Beach, VA

Michael, the special adapter you are referring to is the disk controller. It allows the computer to communicate with the disk drives, in addition to containing the Disk BASIC software. You need a controller to use your disk drives. I wouldn't recommend building your own.

There are alternate disk controllers on the market. Alternate disk drives are also available. The only drawback is that the software used by non-standard controllers is also, for the most part, non-standard. I'm not saying you must use a standard controller, but be sure you are aware of the consequences if you do not. Maybe you could obtain a non-standard controller with standard software. It's possible if you order your ROM from Radio Shack. Make sure the controller will accept it.

BASIC Program Merging

- I have seen numerous procedures for merging BASIC programs on the CoCo and they all appear to be essentially the same. For instance, after loading the first program, let X1 = PEEK (25), X2 = PEEK (26), X3 = PEEK (27), X4 = PEEK (28). Providing that X4 is not 0 or 1, POKE 25, X3: POKE 26, X4-2 and load the second program. Renumber, if necessary, so that the line numbers don't overlap, then POKE 25, X1: POKE 26, X2.

More often than not, I find that this process restores the first program, but loses the second, both on my 32K CoCo and my 64K. The results are the same regardless of whether my disk drive is connected and wherever in memory PMODE or PCLEAR commands force the program to reside.

Harry M. Stern
Miami, FL

You have to rearrange the procedure you are using, Harry. Renumber the second program before you load it. Make sure the line numbers do not overlap with the first program. Then, you should be in good shape.

After loading the first program, memory locations 25 and 26 contain the beginning address of your program. Locations 27 and 28 contain the ending address. You essentially tell the computer to start loading the second program at the end of the first by POKE 25, X3: POKE 26, X4-2. The -2 overwrites the end of file. Load your second program, put the original addresses back in memory locations 25 and 26, and save the combined programs.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type EXP on to arrive at the EXPERTS> prompt, where you can select the "Downloads" online form which has complete instructions.
If You Pay Taxes
You Need Coco-Accountant

"It's the most useful piece of software I own."

That's what we hear again and again from folks who buy Coco-Accountant II. This 32/64K single-entry accounting system for the home and small business is all you need to manage your finances and give you the information you need at tax time.

We wrote the original version for ourselves two years ago because we wanted to know three things: Where did the money come from, where did it go, and what can we deduct from our taxes?

As it turned out, we liked it better than anything else on the market, so we decided to sell it. And we've been improving it ever since.

People say they like it because it's easy to use. Just spend a few minutes each month entering your data: checks, cash outlays, credit card expenses or income. In any order. Coco-Accountant takes the whole mess and makes sense out of it. Here's what it does:

- Lists and totals entries by month, offsetting income against expenses.
- Lists and totals entries by account, for a month or the whole year.
- Lists and totals entries by payee or income source, for a month or the whole year.
- Provides a year-to-date summary by account.
- Prints a spreadsheet showing activity by account and month for the whole year (seeing this one is believing).
- Flags deductible expenses.
- Flags expenses subject to sales tax and figures out how much sales tax you paid!
- Lets you define up to 48 accounts (in 64K version).
- Takes 900 entries in 64K version, 500 in 32K disk and 450 in 32K tape.
- Sorts entries by date.
- Stores your data to tape or disk.

You can use Coco Accountant as a simple checkbook register or make it into a comprehensive home accounting package. Our customers tell us they use it in the home, at school, for their clubs, churches and small businesses. In fact, they use it in ways we never dreamed of!

Coco-Accountant II is so easy to use and flexible that you'll be delighted. So stop shoving all those records in a shoe box and join the computer age!

The price of Coco-Accountant II is $34.95. Please be sure to tell us your memory requirements and whether you want tape or disk.

Thoroughbred, Harness, Greyhound

Use your Color Computer to improve your performance at the track! These 16K programs for Thoroughbred, Harness and Greyhound racing rank the horses or dogs in each race quickly and easily, even if you've never handicapped before. All the information you need is readily available from the Racing form, harness or dog track program. We even provide diagrams showing you where to find each item!

**Thoroughbred factors** include speed, distance, past performance, weight, class, jockey's record, beaten favorite and post position. **Harness factors** include speed, post position, driver's record, breaking tendencies, class, parked-out signs and beaten favorite. **Greyhound factors** include speed, past performance, maneuvering ability, favorite box, class, kennel record, beaten favorite and breaking ability.

We include complete instruction and a wagering guide that tells you which races to bet and which to avoid—one of the real secrets of good handicapping. You can buy a more expensive handicapper, but we don't think you can buy a better one! Thoroughbred, Harness or Greyhound Handicapper, $34.95 each on tape or disk. Any two for $54.95 or all three for $74.95.

Federal Hill Software 8134 Scotts Level Rd. Baltimore, Md. 21208
Frank Hogg Sees the Light and a Level II Report

By Dale L. Puckett
Rainbow Contributing Editor

The speaker is Barry Thompson, the man who buys and sells Color Computers in the Tandy Towers at Fort Worth.

"If you're looking for opportunity, look no further. The potential installed base is in the millions. In fact, the installed base of the CoCo 2 is already in the millions."

As he should be, he is enthusiastic about the future of the new Color Computer 3 as he talks to members of the CoCo Community Breakfast during RAINBOWfest Princeton. Yet, Thompson isn't the only bullish about CoCo 3 prospects. At the OS-9 Community Buffet the next morning, Frank Hogg of FHL in Syracuse, N.Y., picked up the CoCo 3 ball and ran with it.

"You have inside information!" Hogg said. "With your knowledge of OS-9, you can seize an opportunity."

Hogg thinks the CoCo 3 has a very bright future and he's putting his money and marketing skills where his mouth is.

"You can grab the brass ring, make merry and have fun like we have," Hogg said. "Or, you can sit on the merry-go-round and watch the world go by. The choice is yours."

FHL plans to sell Sculptor, a fourth-generation database application that will run on 40 different microcomputers, to CoCo 3 owners soon. Hogg believes that half of the people who own Color Computers today will buy a CoCo 3.

"Then they'll be looking for things to buy!" Hogg said. "The CoCo 3 can be the opportunity of a lifetime for you. Fill a void! Find a need! Fill it! But remember — more than anything else — it is very important that you be first with your application."

Hogg told the three dozen OS-9 Users Group members present that most software developers haven't been getting the message that they must use OS-9 to capture the capabilities of the CoCo 3. He also told the developers that when they write OS-9 software for the CoCo 3, they will also be writing for the future, noting that any software written with 6809 OS-9 development tools can easily be carried into the 68K world.

"Software written in C, BASIC09 or PASCAL on the Color Computer is directly compatible with OS-9 68K," Hogg said. "Applications written with our Sculptor development system can be carried directly to more than 40 different computers, including most of the IBM clones."

Hogg was so enthusiastic about the CoCo 3 and OS-9 Level II opportunities that we asked him to do an exclusive interview for "KISSable OS-9" readers. Some of his answers may surprise you — especially if you read his now infamous blast at the Color Computer and OS-9 two years ago.

More Powerful Than a GIMIX III

Dale: How does the CoCo 3 compare to other 6809 OS-9 computers you have used?

Frank: It knocks their socks off! The CoCo 3 with OS-9 Level II and windows is probably one of the most powerful computers around. It is far more powerful than the GIMIX III I paid $12,000 for four years ago. And, the CoCo 3 only costs a few hundred dollars. As a single-user computer, the CoCo 3 can do just as much work for you as the GIMIX III. We ran our office with software developed under Sculptor on the GIMIX III for several years. Yet, with a CoCo 3, OS-9 Level II and windows, we could do a better job — faster than with the GIMIX III!

Dale: That's hard to believe.

Frank: Yes, I know it seems unbelievable, since the CoCo 3 runs at 1.8 MHz and the GIMIX III runs at 2 MHz. But, the GIMIX III must share time between several users on different terminals. Having the CoCo with windows is like having several terminals on the same screen.

For example, when we create an invoice, we need to jump from one screen to another. With the CoCo 3 we can use a different window with the flick of a key! Put in the customer information, press a key and instantly we can enter the invoice. Press the key again and we can write a letter. If the phone rings, we press the key again and we're back in the invoice program. When the phone call ends, we press it again and like magic we're back at work with our letter.

When we installed our office system in 1982 we paid almost $1,000 for the terminals alone. Now we can get the complete CoCo 3 with drives and everything for half that.

Dale: So do you think the CoCo 3 will be a good business computer?

Frank: It's good for anything and

---

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide and coauthor, with Peter Dibble, of The Official Rainbow Guide to OS-9, is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives on Governors Island in New York Harbor.
everything. For business, it's perfect. For home use, it's perfect too — both inexpensive and powerful. Of course, the key to all of the CoCo 3's power comes from OS-9, its new windows and the software that runs them.

Dale: What kind of software will FHL offer for the CoCo 3?

Frank: We plan to release a significant number of applications. As you know, we have had software running on OS-9 Level II for several years that we couldn't offer to the CoCo 2 community because of the lack of available memory. The new CoCo 3 with OS-9 Level II and 512K lets all that software work — and very well, I might add.

The first and most important product we have for the CoCo 3 is a specially priced version of Sculptor Plus. CoCo 3 owners will be able to buy it for half the price of other Level II system owners.

Dale: That would make the price about $495. Isn't that too steep for the CoCo market?

Frank: Well, the very same product compiled from the same source running on a VAX minicomputer sells for close to $15,000! At $495, the CoCo version is a real bargain. I can't begin to describe here what Sculptor is or what it can do. However, to help your readers discover the power and capabilities of Sculptor, we will be releasing a demo disk at a very low price, $5 or so, and it will be copyable. This means they will be able to see how it works for themselves. We'll also be selling the Sculptor run-time package for $99. To make that a bargain, we plan to sell a large number of application programs written in Sculptor for $10 to $50. For that price you'll receive both the source and object. This means you will be able to run the application right away. Later, if you decide to pick up the full Sculptor package, you'll be able to modify those programs so they will be a perfect match for your business.

Dale: Why do you think Sculptor will be so important to the CoCo 3 owner?

Frank: It is the most powerful development system I have ever seen on any computer. There are versions of Sculptor running on more than 40 different computers and the programs written in it are compatible between the different machines.

You could develop Sculptor programs on your $200 CoCo 3 at home, carry the program to a million dollar VAX at work and run it without any modifications! No other development system can do that. Plus, the development time is incredibly short. You can develop applications using Sculptor in about one tenth the time it would take with most other languages.

Dale: What kind of applications can you develop with Sculptor?

Frank: Most people use Sculptor when they need an application that can access a large amount of data from several different databases very quickly. We have packages written in Sculptor that can manage a dental office, a real estate office or manage property. We use other Sculptor programs to maintain general ledgers, record accounts receivables, and manage accounts payable. We also have clients using Sculptor for church management and mailing list management. All of these programs run on Sculptor and are very fast. They can access over 22 million records. And, any one of these records can be retrieved from a hard disk in less than a second.

Dale: How will Sculptor on the CoCo 3 differ from Sculptor on the GIMIX III?

Frank: Actually, Sculptor will appear to run faster on the CoCo 3 because of the windows. Keep in mind that the GIMIX III runs at almost the same clock speed as the CoCo 3 but doesn't have windows. To match the CoCo 3, the GIMIX would need to have several terminals hooked to it.

Dale: How will you use the CoCo 3 windows with Sculptor?

Frank: Imagine you run a mail order business and need to do a lot of typing and other standard office chores. For starters, you will want a hard disk to keep your business records. Even though you can keep many records on a floppy disk, business people need to have enough storage on line to hold all of their information and they need to get at it fast. With a hard disk and Sculptor you have this ability.

When you first bring the system up, you may start an invoice program in the first window. Then, open another window and start the word processor. Then, you may create another window to run a few maintenance programs. At any time you can press one key and instantly move to another window! You can bounce back and forth from one to the other at will, doing whatever is necessary along the way.

"Many people believe that OS-9 will never be popular because it is not compatible with the IBM PC. We don't agree!"

Dale: What is important that Sculptor is compatible with other computers?

Frank: Look at all the people who have written their software in BASIC. If they need to switch to another computer, like an IBM PC, they will have a major rewrite on their hands. With Sculptor running under 40 different computers — and the list is growing daily — that problem just doesn't exist. No businessman knows what his computer needs will be three years from now and Sculptor gives him the flexibility to move his applications to another machine at any time. Of course, it is the logical choice for developers for the same reason.

Dale: What do you think of the future of the CoCo 3?

Frank: It will be long and good. Most people don't realize the CoCo 3's potential at this time and it will take several years before it starts to reach its limit. The future looks very, very good indeed.

Dale: How important is OS-9 to the CoCo 3's success?

Frank: Vital! Absolutely vital! Without OS-9 you lose the windows, the multitasking and the programs like Sculptor. BASIC is only good for small jobs and has a very limited future. OS-9 is definitely the only way to fly.

Dale: What else will FHL be selling for the CoCo 3?

Frank: We are working on a WordStar clone for both OS-9/6809 and OS-9/68000. Because WordStar is so popular and has so many books and training programs available to support it, we think it will make a nice product.

Many people believe that OS-9 will never be popular because it is not compatible with the IBM PC. We don't agree! Instead of trying to run IBM software, we are going to market OS-9 software that operates like IBM software. However, because of OS-9's
superiority, the program will do many things that IBM versions will never be able to do.

Dale: How do you rate the CoCo 3 against the PC?

Frank: The CoCo 3 runs circles around the IBM PC. But, it is unfair to compare a silk purse to a sow's ear. The CoCo 3, with its windows, OS-9 Level II, and our QT CoCo hard disk — if you will — is powerful enough to run a good sized business.

"The thing that excites me about Multi-View is the fact that it creates conventions for data interchange that developers would be fools not to use."

Dale: What is the QT CoCo?

Frank: It is a hard disk and floppy disk system for the CoCo 3 or CoCo 2 that is based on our QT.

Dale: I don’t get it, why the QT?

Frank: The QT without the computer board is probably the smallest disk drive enclosure with a solid power supply and provisions for both a hard disk and a floppy you can buy. It can also be upgraded to a full 68000-based QT computer system at any time.

Dale: What do you get when you buy a QT CoCo?

Frank: You get everything that is in a QT except the computer board. You get the case, a double-sided floppy drive, a 20-megabyte hard drive, a controller, a power supply, cables, etc. These are the exact same parts that are used in the QT. They go through the same testing and quality control. We just leave out the parts that are only needed for the QT. This means nothing is wasted later if you want to upgrade to the QT. The system is fan cooled and has a power supply much more powerful than even the QT needs. In fact, the power supply alone costs more than a CoCo 2 costs today.

Dale: Why would you want to buy a QT CoCo instead of another hard disk drive?

Frank: There are several reasons. First, there’s the size. The QT CoCo is very small — less than half a cubic foot. Besides the CoCo 3, it’s all you’ll need on the desktop. One of the things that has always bothered me about the CoCo is all the little boxes and wires that you need to make a complete system. With the QT CoCo, you reduce the number of boxes and that creates a more professional appearance and takes up less desk space. Another reason is reliability — the QT has been out for two years now and it has proven to be a very reliable computer. Using this same technology in a hard disk system brings that reliability to the CoCo. Of course, the QT CoCo is the only hard disk system that can be upgraded to a full 68000-based computer later and that should be important to you if you think you will ever want to move up to a bigger system.

Dale: What do you lose when you upgrade to a QT?

Frank: I didn’t mean to imply that everything is used. Only the parts in the QT case itself can be used. You also need a controller for the hard drive and a floppy disk controller if you don’t already have one. We are selling the Disto controller and SASI interface because they both fit in a case the size of a Radio Shack disk controller. This means that you don’t need to install a multipack to use the system. The Disto hard disk interface also gives you a serial interface that you can use with a printer or terminal at full speed without losing characters. All in all, Tony has built a great system. If you upgrade later you can still use the Disto floppy controller. You will only lose the use of the SASI interface card.

Dale: If you do upgrade to a QT, how do you convert the files on the hard disk to the QT?

Frank: You don’t need to! The 68000 OS-9 file format is the same as the 6809, so the QT can read the hard disk without any reformatting.

Dale: What does it cost?

Frank: The price isn’t firm yet. But, it will be less than the price Tandy charges for their 15-Meg hard disk. You will be able to get a floppy and a 20-Meg hard disk, plus controller, plus the potential for upgrade to a QT later for less money than you would pay Tandy for their 15-Meg hard disk!

Dale: How else will you be supporting the CoCo 3?

Frank: On the hardware side, we are already selling 512K upgrade boards, disk controllers and complete disk drive systems. On the software side we will be marketing FBU, a high performance hard disk backup utility; QCom, a communication program that uses the Xmodem protocol and two additional utilities, ULDS and DLD, which let you upload and download files quickly.

Dale: What is FBU?

Frank: FBU is designed to back up a hard disk to a number of floppy disks. It is optimized for speed and uses a minimum number of floppy's because it compresses your files before it saves them. FBU comes with a utility named FRS which restores your files to the hard disk, creates directories, and sets all the attributes, owner IDs and dates.

Dale: What about your communications programs?

Frank: QCom lets you send or receive straight ASCII text files. It also lets you upload or download any file using the Xmodem protocol or simply chat on line. DLD and ULDS give you a way to transfer programs to or from your CoCo 3 when you are communicating with another computer. They also use the Xmodem protocol.

My First Look at Level II

"OS-9 Level II has to be the software bargain of the decade," said Tandy’s Mark Siegel as Bruce Warner and I followed him into a private room at the Hyatt in Princeton. "Where else can you buy all this power for $79.95?"

After seeing Level II, Warner and I both decided that Siegel’s remark had to be the biggest understatement of the year. We only got to watch the CoCo 3’s new operating system perform for about 30 minutes, but we liked what we saw.

Siegel created a few windows with short command lines from the OS-9 prompt. After he had filled the screen with windows he started a new shell in the largest window. The command sequence looked something like this:

```
059: montype m
059: iniz w?
059: ex shell l=~/w?
```

At this point, approximately 48K of memory remained free in the 128K machine we were using. Siegel remarked that he had created up to 14 windows with shells and applications running in them in a 512K machine.

While we watched, Siegel started shells in each of the three windows he had opened and ran a different utility in each — concurrently. He toggled
BEYOND WORDS
32K Ext. - $19.95 tape/$24.95 disk
These Language Arts programs cover common misspellings, and synonyms/antonyms on each level. Additionally, Level 1 tests contractions and abbreviations, Level 2 tests homonyms, and Level 3 tests analogies. Each program has three parts and contains over 400 questions and uses over 800 words. All tests are grade appropriate. User modifiable (directions included). Printer option. Specify Level.
- Level 1 Grades 3-5
- Level 2 Grades 6-8
- Level 3 Grades 9-12

CONTEXT CLUES - 4, 5, 6, 7
16K Ext. - $17.95 tape/$22.95 disk
Each reading program contains about 50 situational paragraphs with one key word missing. Child uses context clues to find correct answer in multiple choice format. Random selection of readings each round. Specify 4th, 5th, 6th, or 7th grade.

CONTEXT CLUES - 2-3
32K Ext. - $19.95 tape/$24.95 disk
A reading program wherein the child uses the context to choose the correct answer. Multiple choice format. Hi-res screen. Grades 2-3.

VOCABULARY BUILDER
32K. Ext. - $19.95 tape/$24.95 disk
200 Vocabulary questions on appropriate grade levels in a 4 part multiple choice format. 1000 words used. Extensive research has provided challenging words on all levels. When mastered, the words may be changed by the user (full directions included). Printer option. Specify Level.
- Level 1 Grades 3-5
- Level 2 Grades 6-8
- Level 3 Grades 9-12

TRIGONOMETRY TUTOR
32K Ext. - $19.95 tape/$24.95 disk
A step by step tutorial for learning to compute the sides and angles of right triangles. All examples have graphic representation. Help commands and cursor aids assist throughout.

AREA & PERIMETER
32K Ext. - $19.95 tape/$24.95 disk
Triangles, rectangles, and circles covered in this Hi-res text and graphic program.

COCO WHEEL OF FORTUNE
32K Ext. - $19.95 tape/$24.95 disk
Hi-res graphics and screen in this version of the popular TV show. One to six players. Spin the wheel for points and guess a letter to solve the puzzle. Over 200 puzzles. Have fun while strengthening language arts skills.

OPENING A BANK ACCOUNT
32K Ext. - $24.95 disk only
A set of programs designed to introduce and provide practice in the skills of filling out bank applications, deposit and withdrawal slips, and computing bank account balances. Loaded with graphic presentations. Grades 3-6.

EQUATIONS TUTOR
32K Ext. - $19.95 tape/$24.95 disk
Elementary-Intermediate algebra. Step by step tutorials. Multi-level. SPECIFY Linear or Quadratic.

MATH INVADERS
32K Ext. - $17.95 tape/$22.95 disk
A multi-level "Space Invaders" type game to reinforce the 4 basic math operations (addition, subtraction, multiplication and division). Problems become more difficult as your progress. Hi-res graphics. Joystick required.

Computer Island Educational Software
(718) 948-2748
Dept. R 227 Hampton Green, Staten Island, N.Y. 10312
Send for catalog with complete descriptions.
Please add $1.00 per order for postage. N.Y. residents, please add proper tax. FREE set of BINARY DICE, including full directions, with orders of 2 or more items.
Dealer Inquiries Invited.
TRS-80 Color Computer
All Payments in U.S. Funds.
between the windows by striking a single key on the new CoCo 3 keyboard. We were impressed.

Siegel told us that with the new Level II OS-9 software, contiguous memory would not be needed for programs. However, it is needed for windows. We also learned that OS-9 Level II looks for a file named Autoexec and that we would probably be running out of memory for process descriptors before we run out of memory for our programs. Yet, he said at one time he had run 28 individual processes before he ran out of memory.

We also learned that we would no longer be able to load drivers for new devices and then run them. We would need to use OS9PreP to put them in a new OS9Boot file. Level II OS-9 has a mouse driver built in. But, if you don't like mice, you can use the keyboard as a pseudo-mouse. A special joystick adapter that plugs into the joystick port and sells for $9.95 lets you point your mouse at any one of the 640 individual pixels in a line when you are running your CoCo 3 at its highest resolution.

Even though the OS-9 Debug utility will no longer come with the basic OS-9 release, you will still be able to patch modules in memory using a special utility named ModPatch. It will update the CRC for you automatically and eliminate the need for the separate verify step. Debug will now be part of the development package. By the way, you'll still be able to do plenty of reading when you move up to OS-9 Level II. The new manuals promise to be about 700 pages long — would you believe they started out at 900 pages?

One of the most exciting things about OS-9 Level II and the CoCo 3 is the part we didn't get to see. Siegel didn't get to show us Multi-View at Princeton because there weren't any 512K machines around to use for a demo.

Multi-View is an enhanced windowing environment designed specifically for the CoCo 3. It gives a common, graphics-based environment to run your application programs in. Title bars, menu bars, pull-down menus and dialog are all built into the system. This graphics shell lets you select picture-oriented commands (most people call them icons) to run your programs. A number of desktop utilities, or tools, are a keystroke away. An alarm clock, calculator, calendar/memo book, control panel and clipboard support are all built in. Two other accessories let you configure your printer or call for help at any time.

The thing that excites me about Multi-View is the fact that it creates conventions for data interchange that developers would be fools not to use. This means that the OS-9 programs of the future will have a central look and feel because they will use the same methodology. You, the end user, will be the real victor because you will only need to learn how to save data with an OS-9 application one time. Why? Because, all OS-9 software will carry out similar functions in a similar way. In a nutshell, you will save your data in your spreadsheet the same way you save your data in your word processor, etc. Other standard operations will also be done the same way across the spectrum of application software.

Yet, Microware and Tandy have designed the OS-9 Level II system on the CoCo 3 so that they can be flexible in the future. If the industry standard "user interface" changes in a few years, they will be able to write a new one. The internals of the operating system will

Listing 1: filesize

```
ifpl
use ...../defs/os9defs
dnc
type set sbrrtn+objcct
revs set reent+1
mod length, name, type, revs, st
art, mem
org 0
stack rmb 256
mem equ.
name fcs /filesize/

pcount equ 2
pathaddr equ 4
hiaddr equ 8
loaddr equ 12
start ldd pcount, s
  cmpb #3
  beq L01
  ldb #56
  erro coma
rts
L01 ldd [pathaddr, s]
  tsta
  beq L02
  tfr a, b
L02 tfr b, a
  ldb #2
```

Listing 2: filepir

```
ifpl
use ...../defs/os9defs
dnc
type set sbrrtn+objcct
revs set reent+1
mod length, name, type, revs, st
art, mem
org 0
stack rmb 256
mem equ.
name fcs /fileptr/

pcount equ 2
pathaddr equ 4
hiaddr equ 8
loaddr equ 12
start ldd pcount, s
  cmpb #3
  beq L01
  ldb #56
  erro coma
rts
L01 ldd [pathaddr, s]
  tsta
  beq L02
  tfr a, b
L02 tfr b, a
  ldb #2
```

- os9 I$getstt
  - bcs error
  - stx [hiaddr, s]
  - stu [loaddr, s]
  - clrb
  - rts
  - emod
  - length equ *
  - end

- Listing 1: filesize
- Listing 2: filepir
stay the same and won’t need to be changed.

The Race Is On!
The race has already started among CoCo 3 third-party hardware vendors. Three vendors have announced 512K upgrade boards for the CoCo 3.

Bob Rosen at Spectrum Projects is selling his for $139.95. It uses 16 prime 256K DRAMs. You can buy it without the RAM chips for $99.95.

Tony DiStefano, who designs hardware for CRC, Inc., has released his 512K board also. It sells for $129.95.

And finally, Frank Hogg at FHL is selling the PBJ 512K upgrade for the CoCo 3 at $129.95. FHL sells the bare PBJ board without the memory chips for $49.95.

Another Utilipak
Steve Goldberg continues to improve his Utilipak software. Now, new customers can buy Utilipak, Sr. for $20. What a bargain! For the price you get 40 utilities. And Goldberg hasn’t forgotten Utilipak veterans. They can upgrade their package by sending a blank disk, a postage paid maider and $7 to Goldberg at 695 Plainview Road, Bethpage, NY 11714.

Goldberg no longer sends a printed manual with his bargain basement utilities. Rather, he puts it on your disk and gives you a procedure file which will print it automatically. Utilipak, Sr. is a combination of Utilipak and Utilipak Too. It supercedes both by replacing a number of existing programs, adding better error handling and enhancements to others. Many of the original utilities run much faster. Especially notable are improvements to Greep, Pk, Unpk, Crypt, Head and Tail.

Skala Discovered
Back in July we mentioned some 256K RAM disk drivers for The Banker. They were written by Dennis Skala and are available in the OS-9 database on RAINBOW’s Color Computer SIG on Delphi. Since then we have received several dozen requests for Dennis’ address. Here it is: 5423 West Sebago Drive, Fairview, PA 16415. Be sure to say thanks!

CoCo 3 Programs Appearing Online
CoCo 3 OS-9 programs are starting to show up in the online databases. For example in the OS-9 database on our Delphi CoCo SIG, you can now find a CoCo 3 driver for your Word-Pak II. It was written by an OS-9 user named Connolly.

Connolly has also contributed a number of other utilities that may cause you to join the fun on the CoCo SIG. Included in the latest index compiled by OS-9 database manager Dale Lear are a file directory utility, an archive/restore utility set and Make, a UNIX-like development utility. He has also uploaded a Make script file that shows you how to patch a module. More than three dozen files have appeared since we first reported the increased activity last month. Join the fun.

On the CompuServe OS-9 SIG you can also find a number of new CoCo 3 programs in the database. The two most important this month are CO380, an 80by-24 screen driver. It runs under OS-9 Level I, Version 2.00.00 and was written by Mike Dziedzic, 134 Driftwood Drive, Grand Island, NY 14072. It supports all OS-9 Level I, Version 2.00.00 control codes and some OS-9 Level II control codes — letting devel-

```assembly
beg LØ1
ldb #56
error coma
rts
LØ1 ldd [pathaddr,s]
tsta
beg LØ2
tfr a,b
LØ2 tfr b,a
ldb #5
os9 i$getstt
bcs error
stx [hiaddr,s]
stu [loaddr,s]
cltre
rts
emod
length equ *
end

Listing 3: demoted

PROCEDURE FileSizeText
DIM filename$:STRING
DIM path$:INTEGER
DIM hi,lo:INTEGER

INPUT "Please give me a filename 
: ",filename$
```

```
OPEN #path,filename$:READ
PRINT path$,filename$

RUN filesize(path,hi,lo)
fs=hi*65536.+lo
RUN fileptr(path,hi,lo)
fp=hi*65536.+lo

PRINT "The file size is ",fs
PRINT "The file pointer is at ",fp
END

Listing 4: unload

*-----------------------------*emod * UNLOAD *length equ *
*-----------------------------*end

Repetitive Unlink Command *

* (C) Copyright 1986 *
* by Fred Sawtelle *
* 31Ø3 Montgomery Road *
* Huntsville, TX 7734Ø *
* April 1, 1986 *

nam Unload
ttl Repetitive Unlink Command
```
opers get a head start before Level II is released. It also supports the OPak Hi-Res control codes so that you can run some of the older software, such as DynaStar, on your CoCo 2.

Another interesting CoCo 3 file is CC3 Fix, a utility that lets you create an OS-9 Level I, Version 1.00.00 or Version 1.01.00 disk that will run on the CoCo 3. You boot the system normally, run CC3fix and then do a cobbler to a freshly formatted blank disk. This new system disk will boot directly on the CoCo 3 without the memory conflicts that previously caused Version 1.00.00 and Version 1.01.00 of OS-9 to crash. It was written by Kent D. Meyers.

**Unload, SysGo for Version 2.00.00 and a BASIC09 Procedure**

Mark Roseman of 736 Queenston Street, Winnipeg, Manitoba, Canada, sent us a note with an assembly language program that you can use with BASIC09 to find the size of a file, or your current position within a file — a BASIC09 equivalent of LFQ and LOC in Microsoft BASIC. To do the job, you use an OS-9 IS$GETST call. To call his routines, use a BASIC09 statement like this.

```basic
run filesize(path,hi,lo) 
fs := hi * 65536 + lo
```

Path, hi and lo are all integer variables, or parameters, and fs is a real variable which holds the file size. A call to `filesize` would be written in a similar fashion. For his program, see listings 1, 2 and 3.

This demo program asks you for a filename, then prints the size of your file and tells you where the file pointer is currently pointing. In the example it will still be pointing to the beginning of the file, or zero.

Both SysGo for Version 2.00.00 and UnLoad were contributed by Fred Sawtelle of 3103 Montgomery Road, Huntsville, TX 77340. Sawtelle is the author of several other utilities we published during 1986.

By the time I sit down to work on the March edition, I should have had some hands-on experience with OS-9 Level II on the new CoCo 3. We’ll cross our fingers! Till then, enjoy!
The checkerboard letters and tiny lines give you Telewriter gives the Color Computer a 51 simply inadequate for serious word processing.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads.

The Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads.

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

### 64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large screen width to match the width of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

### FEATURES & SPECIFICATIONS:

**Printing and formatting:** Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Termiter, etc.)

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MS-BASIC.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

**File and I/O Features:** ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto­etry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

**Editing features:** Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text, page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

### PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitc
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

Available at
Radio Shack stores via express order catalogue #80-0255

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp.; MX-80 is a trademark of Epson America, Inc.
Those Great RAINBOW Programs
Without All The Fuss!
Subscribe to RAINBOW ON TAPE!

Every month, RAINBOW ON TAPE brings as many as two dozen ready-to-run programs right to you. Using the current issue of THE RAINBOW as documentation, all you have to do is load and run them. Just a one-year subscription gives you more than 230 new programs! The typing time saved is time that can be spent with the CoCo. (RAINBOW ON TAPE does not include OS-9 programs or those less than 20 lines.)

Need a back issue of RAINBOW ON TAPE?
Issues available beginning with April 1982

Subscribe to RAINBOW ON TAPE Today!
LOOK FOR OUR ORDER CARD BETWEEN PAGES 34 AND 35

The cost for 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. **U.S. currency only, please.** In order to hold down non-editorial costs, we do not bill.

DISK USERS: RAINBOW ON DISK IS NOW AVAILABLE!
All the programs from THE RAINBOW — including OS-9 — are now available on disk. For more information, see page 187 of this issue.

NOW AVAILABLE ON DELPHI!
For your convenience, RAINBOW ON TAPE can also be ordered via the Delphi Information Network, in our Shopping Service area of THE RAINBOW's Color Computer SIG (Special Interest Group).

The individual programs from our past February issues are also available for immediate download in the RAINBOW ON TAPE Database area in THE RAINBOW's Color Computer SIG on Delphi. There is a $3.50 per program surcharge.

RAINBOW ON TAPE is not a stand-alone product, but is intended as an adjunct and complement to the magazine. Even if you purchase RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions.

To order by phone, (credit card orders only) call 800-847-0309, 8 a.m. - 5 p.m. EST. All other inquiries call 502-228-4492.

Programs from Our Past Utilities Issues:

February 1986 — Valprint and Valname, graphics utilities to help you send an original and personalized valentine; PixFiles, a graphics utility to get picture formats together; Crashproof, a disk utility that provides a menu in which you can move the arrows over the program you want and press ENTER; Debug, an ML utility that can display 30 bytes and their corresponding characters on the screen at any address and prints out in listing form; Mendump and Crun, two utilities to auto-execute tape programs; Memory Diagnostic, a confidence check for the RAM-SAM portion of your Color Computer; Quick Restore, a programming utility that allows you to restore to a specified line number; SuperCLS, a machine language subroutine that completely replaces the CLS command and adds several options to its standard features; and Sound Story 2, produces sounds without the PLAY or SOUND commands. Plus twelve additional programs.

February 1985 — WEFAK, a communications utility that processes facsimile weather pictures into graphics; Space Race, an educational game for calculating your way through the solar system by solving math equations; Buffer Stuffer, an ML utility that enhances keyboard input capabilities; Autoboot, a loading utility that makes ML programs self-EXEC; Simplify and Sharpen Displays, a basic tutorial on the ease of writing programs involving displays; CoCopadd, a utility that turns your keyboard into a numeric keypad; CoCo Merge, a utility to merge cassette-based programs; CoComon Junior, speeds up the process of finding, typing and executing ML programs; Disk Merge, merges the contents of one disk to another without erasing the contents of the destination disk; and Talking Micro Math Lab, an educational program to strengthen addition and subtraction skills. Plus eight additional programs.
Listing 5: sysgo

*-------------------------------*
* SYSGO 2.00.00 System Module *
* Revised by Fred Sawtelle    *
* May 28, 1986
*-------------------------------*

nam SysGo
ttl Refined System Module
ifpl
use /d0/defs/os9defs
endc

* CONDITION: use /d0/defs/os9defs

*---- MODULE SPECS ----
TYP set systm+objct
REV set reent+l
mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "SysGo"
 fcb $df :revision

*---- DATA SPECS ----
rmb 200
EDAT equ .

*---- STRINGS AND DATA ----
DDIR fcc "/dl"
fcb $0d
XDIR fcc "CMDS"
fcb $0d
SHELL fcc "SHELL"
fcb $0d
START fcc "/d0/startup -p"
fcb $0d

* NOTE: IF YOUR STARTUP FILE IS
* IN YOUR EXECUTION DIRECTORY,
* CHANGE PREVIOUS STRING TO:
* START fcc "startup -p"

REBOOT fcb $55,$0,$74
nop
clr $ff83
nop
nop
sta $ff8f
jmp $ef8e
RBEND equ *

*-------------------*
* EXECUTION ENTRY *
*-------------------*

----- SIGNAL TRAP ----
GO leax RTI,pcr
os9 f$icpt

----- RESET VECTOR ----
leax REBOOT,pcr
ldu #$71
ldb #$RBEND-REBOOT
GETBOOT lda ,x+
sta ,u+
decb
bne GETBOOT

*---- SET DIRECTORIES ----
leax XDIR,pcr
lda #4
os9 i$chgdir
leax DDIR,pcr
lda #3
os9 i$chgdir

SETPRIOR os9 f$id
ldb #$80
os9 f$sprior

*---- RUN STARTUP ----
leau START,pcr
ldy #$15
bra NS1

NEWSHELL ldy #0
NS1 leax SHELL,pcr
ldd #$100
os9 f$fork
bsc SHELLERR
os9 f$wait
bcc NEWSHELL

SHELLERR bra SHELLERR

RTI rti

emod
ZZ equ *
end
The CoCo 3 Color Palette From a BASIC Program

By Richard A. White
Rainbow Contributing Editor

With 64 colors to choose from, things can get confusing fast.

The Sample 23 program in the manual displays all available colors, eight at a time. This will get you started, but the next question is, how does one color look next to a similar one on a different screen? The answer is to write a program in BASIC. This kills two birds with one stone. It meets my needs and also serves as a tutorial on how the palette works and how some of the new BASIC commands that deal with high resolution screens work.

We will work in the 16-color, 320-by-192 graphics mode. The idea is to draw 16 boxes in buff on a black background. Each box is to be filled, in order, from the palette so that each color in the palette is shown. Since we can print characters to this screen, we will number each box with the palette slot it is referencing and print the number of the color displayed in each slot.

The program starts with a little housekeeping. The DIM CC(15) in Line 5 establishes a numeric array that will keep the number of the color in each palette slot. The array numbers relate directly to the palette slot numbers. POKE 65497,0 sets the microprocessor speed to 1.8 MHz. POKE 65496,0 will reset the clock to .9 MHz.

There are two different default palette color selections based on the fact that televisions and composite video monitors display colors differently from the CM-8 Analog RGB Color Monitor. Line 8 prints the question about an RGB monitor and the INKEY$ statement in Line 10 looks for a Y or N answer. Note that Line 10 is written so that only a Y or an N are accepted and that any other letter, including all lowercase entries, sends the program back to the start of Line 10.

Users with anything other than a CM-8 monitor should enter an N. When N is pressed, the program does a RESTORE to assure that the data pointer is reset and then enters a FOR-T0-NEXT loop to read 16 times. The data in lines 2000 and 2010 are the default color numbers for the RGB monitor in Line 2000 and for TV or composite video in Line 2010. When READ A has been done 16 times, the data pointer is positioned to the first data item in Line 2010. Then the PALETTE CMP command sets the palette to the composite video default.

If Y is chosen, the program restores the data pointer and does a PALETTE RGB, which loads the RGB default palette colors.

Well, this almost works. There is a small bug. It is not apparent if one simply switches from the CMP to the RGB color set, since Slot 15 is filled with Color 38 in both instances. If Slot 15 is loaded with some other color, the commands PALETTE RGB and PALETTE CMP do not reset Slot 15 to Color 38, but leave it unchanged. Once you have this program running, change the color in Slot 15, break and rerun the program. You will see all the default colors except in Slot 15 which remains the color you previously set.

If, however, you use the reset button to break the program, you will find Color 38 in Slot 15 when you rerun the program. The reset button resets the machine to the CMP default colors including Slot 15, which will contain Color 38.

Add 20 HCOLOR 4,8:HSCREEN2.

An HSCREEN command is used to both clear and display a CoCo 3 high resolution graphics screen. You have five choices:

- HSCREEN0 Low resolution
- HSCREEN1 320 X 192, 4-color
- HSCREEN2 320 X 192, 16-color
- HSCREEN3 640 X 192, 2-color
- HSCREEN4 640 X 192, 4-color

The HCOLOR C1,C2 command sets a foreground color, C1, and a background color, C2. Color numbers range from 0 to 15 and refer directly to the palette slot numbers. The default uses Slot 1 for the foreground and Slot 0 for the background. I felt the colors would show up better against a black background (Slot 8), and used buff for the foreground, Slot 4. So, in Line 20, HCOLOR 4,8 picks my choices and HSCREEN2 puts us in the graphics environment. Note that these color choices hold only as long as buff and black remain selected for slots 4 and 8.

HSCREEN0 appears to be the way for the program to break out of graphics to get back to a text screen. Since HSCREEN clears the screen with the then-current background color each time it is used, there is no way for BASIC to draw a hidden graphic and then display it like you can using PMODE and SCREEN commands in the CoCo 2 mode. The CoCo 3 way to do this is to set all the palette slots to the same number, issue an HSCREEN command and then follow with the code to generate the graphics. Use HCOLOR C1,C2 to set new foreground and background colors for PSET and PLINE when used with HLINE, HPUT, HSET and HRESET. Next, use FOR X = 1 TO 15 : PALETTE X/2 : NEXT to set all palette slots to the same color. Now, where a color number is used in a command, use any palette number in the 0 to 15 range. Since all the colors

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the coauthor of the TIMS database management program.
in the palette are the same, the screen will remain clear. When it comes time to display the graphic, load the desired color numbers into their palette slots and the picture instantly appears.

A variation on this strategy is to load colors into the palette in such a way as to make the picture grow and change on the screen. The dragon sequence in Radio Shack's CoCo 3 demo is an outstanding example of this technique, where the room comes slowly into being and wall colors lighten as torches along the walls are lighted. The torch light is made to flicker and dance just by changing palette slot color assignments. The changes are subtle, increasing their effectiveness. Although the demo is a machine language program, the types of changes used in this sequence are slow enough that BASIC will easily handle them. This sequence also illustrates the fact that the 64-color selection and the effectiveness. Although the demo is a machine language program, the types of changes used in this sequence are slow enough that BASIC will easily handle them. This sequence also illustrates the fact that the 64-color selection and the 16 colors available at a time will meet all but the most exciting needs. Scenes tend to be bright or drab or pastel, but not all these things at the same time. One color set works well in a dungeon while an entirely separate set is needed for an outdoor scene.

Line 30 uses HLINE to draw horizontal lines in the upper, center and lower parts of the screen. In the first parenthesis is the X, Y location of the start of the line. The 0,0 position is the top-left corner of the screen. The X dimension is horizontal and ranges from 0 to 319, increasing to the right. The Y dimension is vertical and ranges from 0 to 191 increasing from top to bottom. PSET draws in the pre-selected foreground color slot. RESET draws in the pre-selected background slot. A slot number (0 to 15) may be used in place of PSET or RESET.

HLINE also may be used to draw a box by using 'B' parameter. The syntax is HLINE (x1, y1)–(x2, y2), PSET,B. You can also fill the box with the color of the outline using HLINE (x1, y1)–(x2, y2), PSET,BF. Of course, all of this is the same as CoCo 2 Extended BASIC.

Line 40 draws vertical lines to generate 16 boxes. Line 50 first paints the top row of boxes with colors from slots 0 to 7 and then does the same to the bottom boxes using colors 8 to 15. This is accomplished using HPRINT(x,y), C1, C2. Of course X,Y defines the pixel where painting is to start. The color to use is put into the C1 location. Color C2 is border color where painting is to stop. Remember colors C1 and C2 really refer to palette slots. At the same time the color number for each color is read into the array CC(X).

Cheers are in order. CoCo 3 Extended BASIC lets us print text anywhere on a graphics screen. In the 320-by-192 mode the 40-column character set is used while the 80-column set is used in the 640-by-192 mode.

Enough celebration — how does it work? HPRINT(X,Y) prints text starting at X column and Y row. Note that it uses columns and rows and not pixel positions. This is consistent with the way the LOCATE X,Y command works when moving the cursor on a text screen. In Line 60, HPRINT(B,0), "CURRENT PALETTE COLORS" prints the string starting at Column 8 in Row 1.

The string may be defined in an HPRINT statement or be held in a string variable. In Line 70, text is assigned to string variables ST1 and ST2, which are then printed by the HPRINT statements in Line 80. The function here is to print ST8 through ST7 above the top row of boxes and ST8 through ST15 beneath the bottom row to identify palette slot numbers.

---

**SPECIAL DEAL ON 500 PROGRAMS!**

GET 50 DISKS OR 500 CASSETTE TAPES FULL OF OVER 500 PROGRAMS. HERE IS WHAT YOU'LL RECEIVE:

* Over 250 Utility/Home Application Programs including a Word Processor, DataBase, Spreadsheet, Account Manager, 2 Basic Compilers, Terminal Programs, ROM Copies, Mail List, Machine Language Tutorials, Plus Much More!
* Over 200 exciting games including Warlords, Star Trek, Super Vaders, Solar Conquest, Horse Races, Football, Baseball, Frog Jump, Invader, Plus Much More! (Many machine language games)
* Over 30 adventures including The College Adventure, Dungeon Master, Space Lab, Ice World, Ship Wreck, Zigma Experiment. Plus 32K Graphic Adventures.

EACH INDIVIDUAL ISSUE SOLD FOR $9.00

EACH OR $1.50 FOR ALL 50 ISSUES. WE SLASHED THE PRICE TO ONLY $1.50.

REG. $450 "NOW" $150.00

**THIS MONTH ONLY**

Buy this package of 500 programs and receive a free 6 month subscription.
(A $35 value)

---

**THE GREATEST SOFTWARE DEAL ON EARTH JUST GOT BETTER!**

THAT'S RIGHT! THIS MONTH WE'VE DROPPED OUR YEARLY SUBSCRIPTION RATE AN UNBELIEVABLE $10.00 TO ENTICE YOU INTO SUBSCRIBING WITH US. GET 12 DISKS OR TAPE A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!

---

**PRICES**

<table>
<thead>
<tr>
<th>TAPE</th>
<th>DISK</th>
<th>MONTHLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 YEAR (12 issues)</td>
<td>$25.00</td>
<td>$35.00</td>
</tr>
<tr>
<td>6 MO. (6 issues)</td>
<td>$18.00</td>
<td>$27.00</td>
</tr>
<tr>
<td>3 ISSUE</td>
<td>$10.00</td>
<td>$15.00</td>
</tr>
</tbody>
</table>

Michigan Residents Add 4%
Overseas Add $10 to Subscription Price
Personal Checks Welcome!

---

**OUR LATEST ISSUE CONTAINED**

2. Disk Disassembler 7. Canyon Bombers
3. Bak Chekers 8. Dragon Adventure
4. Pachinko 9. Graphic Scroll
5. Stock Charting 10. Auto Border

---

**T & D SUBSCRIPTION SOFTWARE, P.O. BOX 256C, HOLLAND, MI 49423 (616) 396-7577**
The next task is to print the color number directly above or below the slot number. Since we are starting with a default color set, I was able to put the color numbers for the default colors into DATA statements, which were subsequently loaded into the numeric array, CC(x). To generate a string containing a color number, the expression CC$ = "C"+STR$(CC(x)) is used and the result will have the form "C ZZ" since STR$(x) adds a leading space when converting positive numbers. The top row of color numbers is printed using the FOR-TO-NEXT loop in Line 90 while the bottom colors are printed in Row 22 using the code in Line 100. Since the loop in Line 90 starts with 0, the "C ZZ" strings will start in Column 0 and be printed at five column spaces. In Line 100, the FOR-TO-NEXT index starts at 8, so 8 must be subtracted from X in the HPRINT statement. This is why there are separate lines to print the top and bottom rows.

"Cheers are in order.
CoCo 3 Extended
BASIC lets us print
text anywhere on a
graphics screen."

The high resolution graphics use HSET and HPUT in the same way SET and PUT are used in CoCo 2 Extended BASIC. A nearly 8K memory space is allocated in the 64K memory block that contains the high resolution screen memory. HBUFF buffer, size allocates a portion of the 8K block to a buffer where buffer is a number and size is the number of bytes. Determining the number of bytes required is the confusing part.

The manual approaches the question by defining the number of dots or pixels a byte of memory can define. Read and digest that approach, then read the following where I will try a bit different tack.

Let's start with bits. A bit may be on or off. This is a two-state system. In a two-color graphics mode, the foreground and background colors are preset. It is then sufficient to know that a dot should be on or off. If the dot is to be on, it is set to the foreground color. If it is to be off, it is set to the background color. HSCREEN 1 sets a two-color, 320-by-192 mode where the default foreground is set for Slot 1 and the default background is set to Slot 0. You can change this with HCOLOR C1, C2 discussed earlier. HSCREEN 2 used in the program is a 16-color mode that requires four bits to relate any of the 16 palette locations to the dot.

Now let's look at the HSET statement in Line 190 which says HSET(0, 0) - (20, 8). The 0, 0 to 20, 8 area encompasses eight rows of 20 dots each. In a two-color mode where each dot needs only one byte of data, each row of dots would need only two and a half bytes. However, since it is necessary to move even bytes, this rounds up to three bytes. But, the row might not start on a byte boundary. It might start at the end of one byte, bridge two other bytes and end in a fourth byte. So in a worst-case situation, four bytes might be required. With eight rows, a simple multiplication of 4 times 8 yields 32 bytes. The manual says add 1 to the row number and then do the multiplication and we get 36 bytes. The manual further states the size is 1 less than the calculated size, so the buffer allocation statement would be HBUFF 1, 35.

The method in the manual tries to sort out the cases where the row of dots only bridges three bytes and allows a reduced buffer allocation. Multiple color modes need more of each byte to store their color information. A four-color mode needs to store four states, which can be done with two bits, so each byte defines four dots. The 16-color, 320-by-192 mode needs to store 16 states, which requires four bits. Each byte only defines two dots.

In the HSCREEN 2, 16-color mode, at least 10 bytes are needed to save a row of 20 dots. If the row had run from 1 to 21, 11 bytes would actually have been involved. Following the book, eight rows plus one yields a multiplier of 9 and a block size of 99. In Line 190, I properly used a size of 99 minus 1, or 98. Unfortunately, there is evidence that buffer sizes calculated by the book do not always work. A friend defined three 98-byte buffers in three successive lines of code. His machine hung up. He changed the first line to HBUFF 1, 99 and the program ran, even though the following two lines used HBUFF 2, 98 and HBUFF 3, 98, and the HPUT statement was identical in all three cases.

I originally made a mistake and defined the buffer in Line 110 as HBUFF 2, 867 when the correct code is HBUFF 2, 988 and the program ran fine on my machine. I have no assurance that it will run on someone else's machine. It seems irrational, but that's what the data I have now says. How about some of your CoCo 3 owners experimenting with this? Write if you find enlightenment.

Obviously, things are flaky with HBUFF. If you have trouble, first make sure you have properly calculated the buffer size. If you have, add 1 to that size. In fact, if you share your programs perhaps the prudent course is not to subtract that last 1 from the buffer size. Two error modes have been documented at this time. First, the machine may hang up and require use of the reset switch. If the buffer size given is too small, an FC Error results, providing BASIC chooses not to accept the definition — and BASIC seems to be doing some funny choosing these days.

Lines 200 through 215 simply use INKEY$ to get the number of the slot where you want to change a color. The single-digit or two-digit number is kept in variable SL$ as a string. VAL (SL$) is used to put that number into a numeric variable SL, which is tested to assure that it is within the 0 to 15 range.

When we did the HSET to fill Buffer 1, we got a buffer full of background color referencing Slot 8 in the palette. Now we use HPUT (0, 184) - (200, 192), 1, PSET to blank the slot number question-and-answer text. When you HPRINT to a graphic, BASIC draws each character using the foreground color active at the time. Only those dots actually defining the character are written. HPRINTing a string of spaces changes no dots which may already be on the screen. So, it is necessary to actually HPUT background color over characters to erase them. Next, we HPRINT the slot number chosen and ask for a color number. It is held in CC$ and CC and is tested to assure it is within the 0 to 63 range.

In Line 250 the color in Palette Slot SL is changed to CC. The rest of the line is housekeeping to erase the text on the bottom line of the screen. Lines 255 and 260 are used to erase the old color number and write the new one at the changed slot display. The program then returns to get another change.

1000 GOTO 1000 is a programming aid. It locked up the program so I could see the results of each piece of code as I wrote it. Of course, pressing BREAK returns to the text screen for changes or more programming. If you type in the program, put Line 1000 in first and then simply type RUN from time to time to see if things are working right.

At this point, I am very favorably impressed with the CoCo 3, its graphics
and the CM-8 monitor. Colors on a color TV before the monitor arrived were neat. Colors on the monitor are awesome for a system of its cost. It runs am writing this using rings around the Tandy 1000. Thank s to with the 1.8-MHz clock on an 80- change my start-up file so I have a buff color TV before the monitor arrived.

Mike Dziedzic, 134 Driftwood Dr., Grand Island, NY 14072 and his TERM380 and CO380 driver and device descriptors under OS-9 Version 2.0, I am writing this using DynaStar running with the 1.8-MHz clock on an 80-character screen, black on light blue.

Sorry Mike, but I don’t like buff on dark blue. The character set is much better than the one I saw on a Tandy 1000 a few hours ago. I think I may change my start-up file so I have a buff background.

The listing: BASIC

5 DIMCC(15):POKE65497,0
8 PRINT"ARE YOU USING AN RGB MON ITOR? ";
10 ANSI$:INKEY$:IFANS$="THEN 10 ELSEIFANS$="THEN RESTORE:FORX=0TO15:READA:NEXT:PALETTECMPELSE IFANS$="Y" THENRESTORE:PALETTERGB ELSE 10
20 HCOLOR(8,8):HSCREEN:CLS
30 HLINE(0,26)-(320,26),PSET:HLINE(0,1)
66-(320,166),PSET
40 FORX=0TO320STEP4:HLINE(X,27)
-(X,165),PSET:NEXT
50 FORX=0TO7:REDC CC(X):HPAINT(20+x*4,0,176)-(35+(SL-8)*4,0,183)
7,0;4:X,4:NEXT
60 HPRINT(8,0,"CURRENT PALETTE COLORS"
70 STS="S0 S1 S2 S3 S4 S5 S6 S7";SB$="S8 S9 S1 0 S11 S12 S13 S14 S15 80 HPRINT(0,2),ST$:HPRINT(0,21),SB$
90 FORX=0TO7;CC$:="C"+STR$(CC(X))
:HPRINT(5*X,1),CC$:NEXT
110 FORX=0TO75:CC$:="C"+STR$(CC(X))
:HPRINT(5*(X-8),22),CC$:NEXT
110 HBUFF1,98:HGET(0,184)-(200,192),1
190 HBUFF2,98:HGET(0,184)-(200,183),2
290 HPRINT(0,23),"SLOT NUMBER TO CHANGE?";
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
297 I$:INKEY$:IFANS$="THEN 297 ELSE
HPRINT(26,23),I$:CC$=I$
299 I$:INKEY$:IFANS$="THEN 299 ELSE
HPRINT(28,23),I$:SL$=I$
295 ANSI$:INKEY$:IFANS$="THEN 295 ELSE
HPRINT(24,23),I$:SL$=I$
T he OS-9 operating system is a very versatile environment. Perhaps most noticeable is that OS-9 gives you a multitasking and a true multiuser environment. There is a powerful feature in OS-9 that is often overlooked, a feature often misunderstood. OS-9 can handle pipes and filters!

“What are pipes and filters?” you ask.

Filters are programs that affect the output of another program. They may be used to sort the output, delete portions of the output, or add to the output. A pipe is the part of the operating system that connects the filter to the parent or master program.

Pipes and filters are tied to OS-9’s ability to perform multitasking. They are essential for running two programs at the same time and converting the output from one program to the input for another.

The easiest way of getting a set of filters is by using what is called a toolbox. The toolbox consists of a number of programs that add flexibility to your OS-9 system. While most of the programs do very little on their own, they provide extra power for the overall system. There are any number of different OS-9 toolbox kits available. My preference is Computerware’s Textools. Others are available from Frank Hogg Laboratory, Microware and D.P. Johnson.

The simplest example of the use of pipes and filters is piping something through a sort. This may come in handy when you are working with a large directory (such as a 5- or 10-Meg hard disk) or you have a large list in a file. We’ll use the example of a directory. First, look what happens when you type dir. On my system it looks like this:

```
Directory of /hd 10:15:06
OS9Boot CMDS SY5
startup COBOL_PRGAMMS
STY SPELL print_sty
DEMOs hd.driver hd.descriptor
ASSEMBLYSOURCE DEFS
CMODEM TEST MORE
KS.RUN WRITINGS CONTACTS
hold hrdek.listing
RS_DRIVES STD_DRIVES
install K.Dos.Fixed
kdos3.1 kdos.fix SRC
```

This is a fairly large directory, so it’s difficult to see if a program or directory is there. You can find it, but with the breaks in the lines, you’ll probably get confused. What do you do? For starters, you can use a program called ls (or a similar name under one of the other toolboxes) to get a directory that displays each of the files on its own line. It makes my directory look like this:

```
ls /hd | qsort > /p
```

This makes your directory a little more readable, but it still lacks a sense of order, which may be required for quick reference. Since most toolboxes come with a Sort routine, we can now take ls and “pipe” its output through a “filter” called qsort to give us a sorted version of the directory. The pipe command is represented by an exclamation point (!). The command line looks like this:

```
ls /hd | qsort > /p
```

You can replace the /hd with any device name.

---

By Bruce N. Warner

Bruce Warner holds a bachelor’s degree in computer programming, is president of the Northern Virginia Color Computer Club, and owns SoftWar, a documentation company. He is also an enlisted journalist in the U.S. Navy.
This runs the program `ls` using a hard disk drive as the input directory, pipes the output through the program `qsort` and redirects the output to the printer. Now the listing looks like this:

```
ASSEMBLY_SOURCE
CMDS
CMODEM
COBOL_PROGRAMS
CONTACTS
DEFS
DEMONS
K.Dos.Fixed
KS.RUN
MORE
OS9Boot
RS_DRIVES
SPELL
SRC
STD_DRIVES
STY
SYS
TEST
WRITINGS
hd.descriptor
hd.driver
holdl
hrdsk.listing
install
k.dos.fix
k.dos3.1
print_sty
startup
```

Notice that the order of the listing has changed. This is because the output from the `ls` program has become the input for the program called `qsort`, which puts the listing in ASCII order. This looks better, but it still isn't an alphabetical listing of the directory, since the capital letters (A-Z) all come before the lowercase letters (a-z) when sorting in ASCII format (Z is before a). If you've filed your directories using the conventions recommended by experienced OS-9 users, this could be used to tell you that the first section of the `ls` output contains directories and the second section contains single files (provided you have properly named your files). The problem is that some files contain both upper- and lowercase characters. So what good will the filter do?

Your next option is to use another filter to change the listing to either all small or all capital letters. This will put the entire directory in alphabetical order. You will lose the identification of files and directories, but you'll know everything in any directory. Just type!

```
ls /hd ! lower ! qsort > /p
```

Again, the `/hd` can be replaced with your device. This executes the program `ls` to give a listing of all the file names on the hard disk. The output will be piped through a program called `lower`, which converts all of the characters to lowercase. The output from `lower` is then piped through the program `qsort`. The `qsort` output is an alphabetical listing of the directory. The final output is then redirected to the printer. The new output looks like this:

```
assembly_source
cmds
cmode
co
contacts
defs
demos
hd.descriptor
hd.driver
holdl
hrdsk.listing
install
k.dos.fix
k.dos3.1
ks.run
more
os9boot
print_sty
rs_drives
spell
src
startup
std_drives
sty
sys
test
writings
```

Now that you have an understanding of pipes and filters, take some time and see what you can come up with to increase the power of the OS-9 operating system. Try something like piping `dsave` through a shell.

(Questions may be directed to Mr. Warner at 14503 Fullerton Road, Dale City, VA 22193, 703-670-4962. Please enclose an SASE for a reply when writing.)
## THESE FINE STORES CARRY THE RAINBOW

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

### ALABAMA
- Birmingham: Jefferson News Co.
- Brewton: McDowell Electronics
- Florence: Anderson News Co.
- Gadsden:
- Madison: Madison Books
- Montgomery: Trade TV Books

### ALASKA
- Anchorage: Electronic World

### ARIZONA
- Tempe: Computer Library

### CALIFORNIA
- Los Angeles: M & B Electronics
- San Francisco: Grass Valley
- Sacramento: Hispanic News
- San Diego: Trevco

### COLORADO
- Denver: Radio Shack

### CONNECTICUT
- New Haven: Software City

### DELAWARE
- Wilmington: SoftServe

### FLORIDA
- Miami: Tandy
- West Palm Beach: The Photo Shop

### GEORGIA
- Atlanta: Atlanta Computers

### IOWA
- Cedar Rapids: Book Market
- Davenport: Book Market

### ILLINOIS
- Chicago: B & B Electronics
- Decatur: Decatur Newsstand
- Elgin: Elgin News

### INDIANA
- Indianapolis: Indianapolis News

### KENTUCKY
- Bowling Green: Book Market

### MARYLAND
- Silver Spring: Layhill Newsstand

### MASSACHUSETTS
- Boston: Voyager Bookstore

### MICHIGAN
- Detroit: Book Nook, Inc.
- Grand Rapids: Roberts Electronics

### MINNESOTA
- Minneapolis: Software City

### MISSOURI
- St. Louis: Book Market

### MISSISSIPPI
- Jackson: Book Market

### MONTANA
- Billings: Books Plus

### NEBRASKA
- Lincoln: Book Market

### NEVADA
- Las Vegas: Music City

### NEW JERSEY
- Newark: Software City

### NEW MEXICO
- Albuquerque: Software City

### NEW YORK
- New York: Lift Bridge Book Shop, Inc.

<table>
<thead>
<tr>
<th>State</th>
<th>Cities</th>
<th>Stores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td></td>
<td>Jefferson News Co., McDowell Electronics, etc.</td>
</tr>
<tr>
<td>Alaska</td>
<td></td>
<td>Electronic World</td>
</tr>
<tr>
<td>Arizona</td>
<td></td>
<td>Computer Library</td>
</tr>
<tr>
<td>California</td>
<td></td>
<td>M &amp; B Electronics, Grass Valley, Tandy, etc.</td>
</tr>
<tr>
<td>Colorado</td>
<td></td>
<td>Software City</td>
</tr>
<tr>
<td>Delaware</td>
<td></td>
<td>Delmar Co., Milford News Stand, etc.</td>
</tr>
<tr>
<td>Florida</td>
<td></td>
<td>Software, Software, Inc., The Open Door, etc.</td>
</tr>
<tr>
<td>Georgia</td>
<td></td>
<td>Bremen Electronics/Radio Shack, Kent Radio Shack, etc.</td>
</tr>
<tr>
<td>Hawaii</td>
<td></td>
<td>Trade TV Books</td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td>Johnson News Agency</td>
</tr>
<tr>
<td>Illinois</td>
<td></td>
<td>Tandy, Illinois News Agency, etc.</td>
</tr>
<tr>
<td>Indiana</td>
<td></td>
<td>D &amp; D Electronics, Radio Shack, etc.</td>
</tr>
<tr>
<td>Iowa</td>
<td></td>
<td>Book Market, Mt. Pleasant News Stand, etc.</td>
</tr>
<tr>
<td>Kentucky</td>
<td></td>
<td>Goody Sportswear, Hazard, etc.</td>
</tr>
<tr>
<td>Louisiana</td>
<td></td>
<td>Crowley, Monroe, etc.</td>
</tr>
<tr>
<td>Maine</td>
<td></td>
<td>Voyager Bookstore, Radio Shack, etc.</td>
</tr>
<tr>
<td>Maryland</td>
<td></td>
<td>Silver Spring, Layhill Newsstand, etc.</td>
</tr>
<tr>
<td>Massachusetts</td>
<td></td>
<td>Voyager Bookstore, Out Of Town News, etc.</td>
</tr>
<tr>
<td>Michigan</td>
<td></td>
<td>Book Nook, Inc., DSL Computer Products, etc.</td>
</tr>
<tr>
<td>Minnesota</td>
<td></td>
<td>Software City, Sterling Book Center, etc.</td>
</tr>
<tr>
<td>Missouri</td>
<td></td>
<td>Rainsville, Sterling Book Center, etc.</td>
</tr>
<tr>
<td>Montana</td>
<td></td>
<td>Consumer Electronics of Whistlean, etc.</td>
</tr>
<tr>
<td>Nebraska</td>
<td></td>
<td>Lincoln, Hobby Town, etc.</td>
</tr>
<tr>
<td>Nevada</td>
<td></td>
<td>Las Vegas, Hurley Electronics, etc.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td></td>
<td>Vehem NewsCorp, etc.</td>
</tr>
<tr>
<td>New Jersey</td>
<td></td>
<td>Cedar Knolls, Village Computer &amp; Software, etc.</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td>New Horizons, Software City, etc.</td>
</tr>
<tr>
<td>New York</td>
<td></td>
<td>Lift Bridge Book Shop, Inc., etc.</td>
</tr>
</tbody>
</table>

**THE RAINBOW** February 1987

---

206
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.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Products</td>
<td>21</td>
</tr>
<tr>
<td>Ark Royal Games</td>
<td>39</td>
</tr>
<tr>
<td>Bangert</td>
<td>91</td>
</tr>
<tr>
<td>Canyon County Devices</td>
<td>170</td>
</tr>
<tr>
<td>Cer-Comp</td>
<td>185</td>
</tr>
<tr>
<td>Challenger</td>
<td>61</td>
</tr>
<tr>
<td>Cissoft</td>
<td>155</td>
</tr>
<tr>
<td>CNR Engineering</td>
<td>149</td>
</tr>
<tr>
<td>Cognitec</td>
<td>197</td>
</tr>
<tr>
<td>Colorware</td>
<td>22, 23</td>
</tr>
<tr>
<td>Compusense</td>
<td>167</td>
</tr>
<tr>
<td>Computer Center</td>
<td>35</td>
</tr>
<tr>
<td>Computer Island</td>
<td>193</td>
</tr>
<tr>
<td>Computer Plus</td>
<td>3</td>
</tr>
<tr>
<td>Computerware</td>
<td>63</td>
</tr>
<tr>
<td>CoCo Cat Anti Dung</td>
<td>25</td>
</tr>
<tr>
<td>D.P. Johnson</td>
<td>205</td>
</tr>
<tr>
<td>Dayton Associates of W. R. Hall, Inc</td>
<td>128</td>
</tr>
<tr>
<td>Delphi</td>
<td>114, 115</td>
</tr>
<tr>
<td>Derringer Software</td>
<td>93, 147</td>
</tr>
<tr>
<td>Diecom</td>
<td>1FC</td>
</tr>
<tr>
<td>Disto/CRC</td>
<td>179, 1BC</td>
</tr>
<tr>
<td>Dorsett</td>
<td>17</td>
</tr>
<tr>
<td>Duck Productions</td>
<td>14</td>
</tr>
<tr>
<td>Fazer Electronics</td>
<td>109</td>
</tr>
<tr>
<td>Federal Hill Software</td>
<td>189</td>
</tr>
<tr>
<td>Hard Drive Specialists</td>
<td>161</td>
</tr>
<tr>
<td>Hawkes Research Services</td>
<td>30</td>
</tr>
<tr>
<td>HJL Div. of Touchstone</td>
<td></td>
</tr>
<tr>
<td>Technology, Inc</td>
<td>99</td>
</tr>
<tr>
<td>Howard Medical</td>
<td>34, 210</td>
</tr>
<tr>
<td>Inventive Solutions</td>
<td>48</td>
</tr>
<tr>
<td>J &amp; M Systems</td>
<td>135, 203</td>
</tr>
<tr>
<td>J &amp; R Electronics</td>
<td>175</td>
</tr>
<tr>
<td>Kelly Software Distributors</td>
<td>163</td>
</tr>
<tr>
<td>Mark Data Products</td>
<td>153</td>
</tr>
<tr>
<td>Marty's Rubber Stamp Shop</td>
<td>58</td>
</tr>
<tr>
<td>Metric Industries</td>
<td>13</td>
</tr>
<tr>
<td>Micro Smart</td>
<td>50, 51</td>
</tr>
<tr>
<td>Micro Works, The</td>
<td>169</td>
</tr>
<tr>
<td>Microcom Software</td>
<td>9, 11</td>
</tr>
<tr>
<td>Microtech Consultants Inc</td>
<td>81</td>
</tr>
<tr>
<td>MicroWorld</td>
<td>15</td>
</tr>
<tr>
<td>Moreton Bay</td>
<td>79</td>
</tr>
<tr>
<td>NRI Schools</td>
<td>47</td>
</tr>
<tr>
<td>Novasoft</td>
<td>119</td>
</tr>
<tr>
<td>Other Guys Software, The</td>
<td>59</td>
</tr>
<tr>
<td>Owl-Ware</td>
<td>96, 97</td>
</tr>
<tr>
<td>PCM</td>
<td>100</td>
</tr>
<tr>
<td>Perry Computers</td>
<td>16</td>
</tr>
<tr>
<td>Polycon</td>
<td>144</td>
</tr>
<tr>
<td>Preble's Programs, Dr.</td>
<td>1BC</td>
</tr>
<tr>
<td>Prickly-Pear Software</td>
<td>173</td>
</tr>
<tr>
<td>PXE Computing</td>
<td>7</td>
</tr>
<tr>
<td>Radio Shack</td>
<td>121, 123</td>
</tr>
<tr>
<td>Rainbow Adventure Book II</td>
<td>105</td>
</tr>
<tr>
<td>Rainbow Binder</td>
<td>209</td>
</tr>
<tr>
<td>Rainbow Bookshelf</td>
<td>64</td>
</tr>
<tr>
<td>Rainbow Gift Subscription</td>
<td>113</td>
</tr>
<tr>
<td>Rainbow On Disk</td>
<td>187</td>
</tr>
<tr>
<td>Rainbow On Tape</td>
<td>198</td>
</tr>
<tr>
<td>Rainbow Simulation Book II</td>
<td>57</td>
</tr>
<tr>
<td>RAINBOWfest</td>
<td>130</td>
</tr>
<tr>
<td>RAINBOWfest Tape</td>
<td>167</td>
</tr>
<tr>
<td>Robotic Microsystems</td>
<td>76</td>
</tr>
<tr>
<td>Saguru</td>
<td>136</td>
</tr>
<tr>
<td>Seca</td>
<td>76</td>
</tr>
<tr>
<td>Selected Software</td>
<td>134</td>
</tr>
<tr>
<td>Software House, The</td>
<td>146</td>
</tr>
<tr>
<td>Spectrogram Magazine</td>
<td>109</td>
</tr>
<tr>
<td>Spectrosystems</td>
<td>145</td>
</tr>
<tr>
<td>Spectrum Projects Inc</td>
<td>67, 69, 71</td>
</tr>
<tr>
<td>Speech Systems</td>
<td>40, 41, 42, 43, 44, 45</td>
</tr>
<tr>
<td>Sugar Software</td>
<td>157</td>
</tr>
<tr>
<td>Sunrise Software</td>
<td>175</td>
</tr>
<tr>
<td>T &amp; D Software</td>
<td>201</td>
</tr>
<tr>
<td>TCE</td>
<td>103</td>
</tr>
<tr>
<td>Tepco</td>
<td>171</td>
</tr>
<tr>
<td>Thinking Software, Inc</td>
<td>30</td>
</tr>
<tr>
<td>Tom Mix Software</td>
<td>118</td>
</tr>
<tr>
<td>Tothian Software Inc</td>
<td>53</td>
</tr>
<tr>
<td>True Data Products</td>
<td>132, 133</td>
</tr>
<tr>
<td>Try-O-Byte</td>
<td>61</td>
</tr>
<tr>
<td>Woodstown Electronics</td>
<td>91</td>
</tr>
<tr>
<td>York</td>
<td>139</td>
</tr>
<tr>
<td>Zebra Systems</td>
<td>95</td>
</tr>
</tbody>
</table>

Call: Shackleford, Nolan, Davis, Gregg and Associates
Cindy Shackleford, president
Marian Nolan Carpenter
Advertising Representative
12110 Meridian South, Suite 5
P.O. Box 73-578
Puyallup, WA 98373-0578
(206) 848-7766

Call: Kim Vincent
Advertising Representative
The Falsoft Building
9509 U.S. Highway 42
P.O. Box 385
Prospect, KY 40059
(502) 228-4492

Call: Jack Garland
Garland Associates, Inc.
10 Industrial Park Road
Hingham, MA 02043
(617) 749-5852
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.

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.
Most Howard Medical products are COCO 3 compatible, some require special patches. Please inquire when you order.

(800) 443-1444 ORDERS (312) 278-1440 INQUIRIES AND ORDER STATUS

**PRINTERS**

**NEW**
**Dual Mode**
**EPSON LX-80**

The LX-80 offers draft or near letter quality plus a 1K input buffer for much faster graphic printing speed. LX-P package includes the LX-80, a Botek serial to parallel converter, and a Howard Printer Tutorial. **$317** ($7 shipping) Add $29.50 for tractor ET-1

**STAR**
**NX-10**

The NX-10 is the latest generation of printers and offers built-in back tractor feed giving forward and backward movement of paper plus exceptional graphic printing capabilities. NX-P package includes the NX-10, a Botek serial to parallel converter and the Howard Printer Tutorial. **$299** ($7 shipping)

**DISK CONTROLLERS**

**DC-3**
**ADD-ON BOARDS**

DC-3 includes 80 column capacity, parallel printer, real time clock, and all software **$138**

DC-256 256K RAM Board includes software to access all RAM **$125**

DC-3P Mini EPROM Programmer includes all software to program SID or SID2 **$55**

DC512 512K RAM Board **$165**

**MEMORY**

64-E for E Boards with complete instructions. Remove old chips and replace with preassembled package—from $28.45

64-F for F Boards. No soldering needed. Capacitor leads must be cut from $24.45

**SOFTWARE SPECIALS**

**PAYROL/BAS**

Written in nonprotected basic for the color computer. This easy-to-use package of programs will simplify and decrease the time spent doing payroll. Rainbow May 1986 review says, "Elegant and professional." State and Federal tables are already included. Send for FREE 11 page report guide for $79.95

**VIP LIBRARY**

Software's integrated package includes VIP writer terminal, data base, and disk zap which can fix a diskette that is giving I/O errors. **$125**

**SAP-II**

Stock analysis program organizes your portfolio and gives specific sell and stop loss points **$19.95**

**BPA-1**

Chart your blood pressure from daily readings taken in the comfort of your home **$19.95**

**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 compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping).
You Bet! There are empty spaces in your 32K and 64K CoCo. The Preble VDOS Un-DISK helps you fill them up with PROGRAMS!

- Un-DISK uses your computer’s extra memory like a fast disk drive.
- Un-DISK can store BASIC and MACHINE LANGUAGE programs.
- Un-DISK is INVISIBLE. Yup! Un-DISK does not interfere with normal Color Computer Operation.
- Un-DISK appears only when you type the magic word VDOS.
- Un-DISK comes with comprehensive instructions which you may not need because:
  - Un-DISK is self-prompting and easy to use!
  - Un-DISK is provided on cassette.
  - Un-DISK is faster than a slow clumsy DISK DRIVE and best of all... Un-DISK is CHEAPER than a DISK DRIVE!
  - Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
  - Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

**EXTRA... EXTRA... EXTRA... EXTRA...**

Additional Power For $14.95

Only with VDUMP for the Un-DISK!

- VDUMP lets you make a cassette backup copy of everything stored in the Un-DISK.
- VDUMP lets you save 5, 10, 15 or more programs on a single cassette tape file.
- VDUMP lets you switch Un-DISKs. With a single load operation replace a group of financial programs with a set of children’s programs. (The new VDUMP tape overwrites the old.)
- VDUMP can allow you to save a whole lot of RAINBOW ON TAPE in a SINGLE file.
- VDUMP is the perfect companion to the Preble VDOS Un-DISK.

Available from Doctor Preble’s Programs, naturally! Bringing you fine Color Computer Products Since 1983!

New Lower Price
Un-DISK Drives $49.95?
$34.95

The Preble VDOS Un-DISK ....... $34.95
The Preble VDUMP ......... $14.95
Shipping & handling
U.S. and Canada ............... $1.50 or $5.00 to other foreign points

VISA and MasterCard accepted

Order From:
Dr. Preble’s Programs
6540 Outer Loop
Louisville, KY 40228
(502) 966-8281

Canadians may order from Kelly Software
DISTO SUPER ADD-ONS
Four add-ons are currently available

REAL TIME CLOCK/PRINTER INTERFACE
- An internal clock that will keep the proper time, date, and year. A small battery keeps the time when the computer is off. Retrieve and set the time by using simple Basic Pokes. The Real Time Clock/Parallel Printer Adapter is a single unit. Software drivers included. $99.95

MINI EPROM PROGRAMMER
- Yes, a low cost programmer that attaches to the DISTO SUPER CONTROLLER or SUPER RAMDISK. Program those often-used utilities into EPROMs and plug them directly into your controller. Will program 2764's or 27128's. A perfect mate for the DISTO SUPER CONTROLLER. $54.95

DISPLAY 80 SUPER CARD
- A real knock-out. DISPLAY 80 is a three in one card. It's major function is to add an 80 column by 24 line display to your computer. This feature packed package also includes a REAL TIME CLOCK and PARALLEL PRINTER INTERFACE. An all-in-one package that fits neatly inside the Controller or Super Ramdisk. OS-9 software available*. $139.95

HARD DISK INTERFACE (Coming soon)
- Fits inside Super Controller or Super Ramdisk. S.A.S.E. interface compatible. OS-9 Drivers available*. Supports WD-1002-SHD or ZEBEC 1410 controller.

DISTO SUPER CONTROLLER
- Gold contacts on all connectors
- Shielded metal box
- Four 28 pin sockets for software expantility
- Uses 2764 or 27128 EPROMs only
- EPROMs are software selectable
- Internal Mini-Expansion-Bus interface for DISTO SUPER add-ons or user projects
- C-DOS included (RS-DOS compatible), single or double sided, 6 to 30 ns step rate
- Works on all COCOs or COCO II

DISTO SUPER RAMDISK
- Inexpensive 2nd drive Emulator
- Works with all COCOs (Multi-Pak required)
- Easy installation, just plug in and go
- Low software overhead
- Much faster than a regular drive
- Plain language instructions
- Complete OS-9 Drivers available*
- compatible with COCDMAX II used with C-DOS+
- Internal Mini-Expansion-Bus for DISTO ADD-ONS
- Gold contacts on all connectors
- Shielded metal box

DISTO SUPER RAMDISK
- $129.95/256K
- $169.95/512K

CRC COMPUTERS inc.
10802 Lajeunesse, Montreal, Quebec
Canada, H3L 2E8
1-514-383-5293

The DISTO SUPER CONTROLLER, add-ons and documentation are received and designed by Tony Di Stefano. The DISTO SUPER CONTROLLER and add-ons are manufactured and distributed by CRC COMPUTERS inc. DISTO and C.R.C. Computers are registered trade marks. The DISTO Super Controller and add-ons are copyrighted by DISTO.

*All OS-9 drivers sold separately