

Serving the CoCo Community for

# RAINBOW

11  
YEARS

THE COLOR COMPUTER MONTHLY MAGAZINE

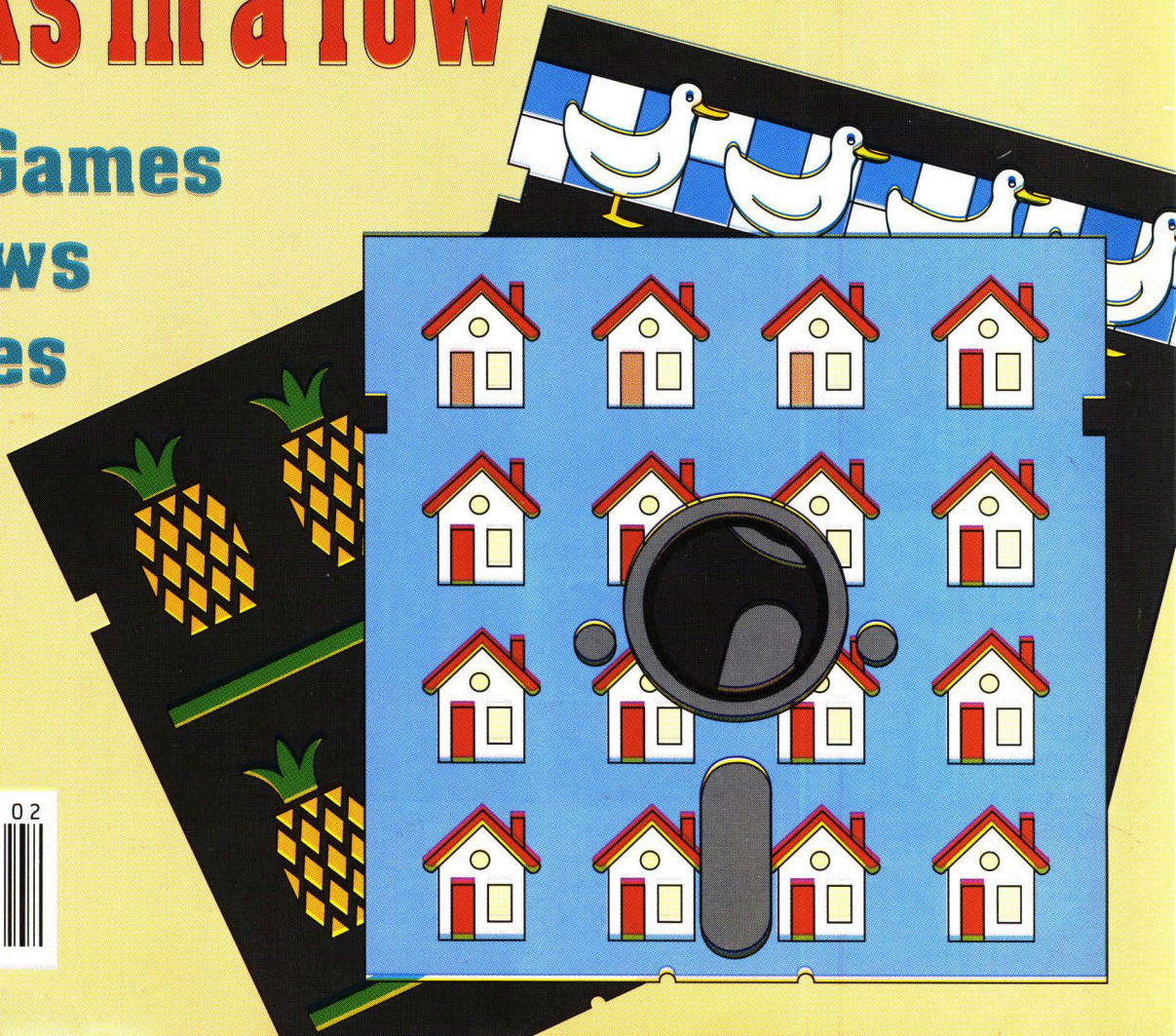
February 1992 Vol. XI No. 7

Canada \$4.95 U.S. \$3.95

**Home Help**    

## Versabase: Get all your ducks in a row

**Plus: Games  
Reviews  
Puzzles  
and  
more**





# SUNDOG SYSTEMS

## NEW! PHOTON



Energy is everything; your home world depends on it. However, someone or something is slowly siphoning it away. As your world's champion, you must climb into the experimental Power Tank to challenge this nemesis and his minions. Your key lies with the ability to teleport solid mass. Use this to manipulate and explore the endless stronghold of the enemy, and to exploit the free-floating DUPES (Dense Units of Photon Energy) to destroy the menacing Plasma Droids. Be cautious, though; those DUPES can be deadly, too! Photon, a fantastic new arcade game for your CoCo3, contains spectacular 320x200 resolution, 16 color graphics, ultra-smooth 60 Hz animation, and loads of real-time music and sound effects. It will send your mind racing over endless possibilities, requiring quick decisions and reactions. Quite simply, Photon is incredibly addictive; it will deliver hours of excitement. Will you become your world's greatest hero, or just another energy slave? Req. 128K CoCo 3 and disk drive.

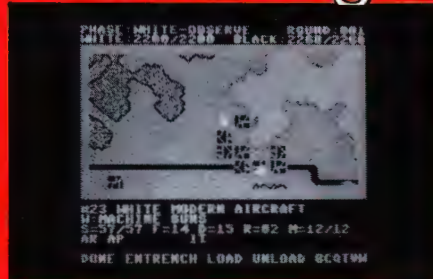
**\$34.95**

## NEW! GRAF 2.0 EXPRESS

GrafExpress 2.0 is a complete graphics and music programming environment. From the beginner to the accomplished professional, you can use GrafExpress to create lightning fast arcade games, graphic applications and utilities, and windowing multimedia demonstrations! The GrafExpress package includes two incredible systems. GrafExpress 16 works on all monitor types and offers support in 12 graphic resolutions (from 128x192 to 320x225). GrafExpress 256 offers 6 resolutions (from 128x192 to 160x225 on a composite monitor) in an astounding 256 colors! Ever see a CoCo do that before? Both systems include standard graphics commands (CIRCLE, FILL, etc.) that blow away the competition. For example, the BOX command peaks out at over 2 MegaPixels/second; that's 300 times faster than BASIC! 255 separate sprites of up to 100x100 pixels each are supported with window clipping and high-res pixel level collision checking. The 8-octave/4-voice music synthesizer has independent envelope, waveform, and volume controls, a 7+ KHz sampling rate, and much more. Other features include text/graphics mixing, different font sizes, fast window copying and scrolling, picture save/load, easy implementation from both BASIC and assembly language, multiple screen animation, and support for 128K/512K, double speed, and the high-res joystick interface. The package also contains support programs that are worth the purchase price of GrafExpress alone! These include an introductory demo, a picture editor, a waveform editor, and an art program that supports 256 colors! GrafExpress also comes with a 50 page manual that fully explains all of its incredible features. If you do any graphics programming or simply want to see what your little CoCo is capable of, GrafExpress is a must! Req. 128K CoCo 3 and disk drive.

**\$34.95**

## NEW! War Monger



The world is in unrest. Power-hungry villains and evil warlords are readying their forces. It falls to you to lead your people against these armies, and only your best strategic plans can save the day. Fight the good fight in any era or locale. Play a simple game of capture the flag armed with water balloons, or climb into the cockpit of a 100 foot high armored warrior. Explore the deepest dungeons, defend your galaxy, or create your own scenarios with this incredible war game construction set/simulator. Your imagination is your only limit. You will deploy your forces with total control over hostile terrain while you scroll a graphic bird's-eye window over an immense world. War Monger has terrific 320x200 resolution, 16 color graphics and includes a tile editor to create or edit your own. Play against the computer, battle with another player, or simply watch the computer plot against itself. The enemy is everywhere. Are you ready to take on the challenge as the War Monger? Req. 128K CoCo 3 and disk drive.

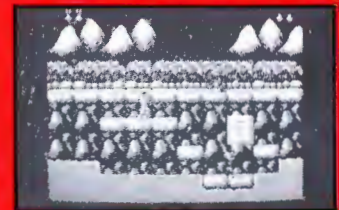
**\$29.95**

## The Quest for THELDA



An immensely popular 128K CoCo 3 arcade/adventure. Over 500 screens of fast fantasy action and puzzle solving. Great graphics and sound effects. \$34.95. Hint book only \$4.95.

## ★ THE ★ CONTRAS



A 512K two player futuristic combat arcade game. Full screen 320x225 hardware scrolling and smooth animation. Back-ground music score and sound effects! 512K CoCo3 only. 34.95. Shipping soon!

## Crystal City



This was THE game of '91! Ultra-fast space action with hardware scrolling on a 128K CoCo 3. Wild sound effects and over 30 MegaBytes of amazing graphics! 34.95.

## ZENIX



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Hall of the King Trilogy	\$74.95
White Fire of Eternity CoCo 1-3	\$19.95
Dragon Blade CoCo 1-3	\$19.95
Champion CoCo 1-3	\$19.95
Paedlin's Legacy CoCo 1-3	\$24.95

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## Sinistaar



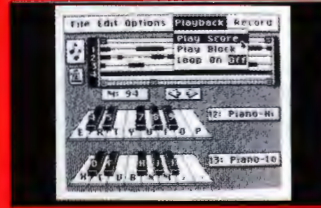
Everyone loves this 512K arcade game. 3 disks packed with spectacular graphics and eerie background digital sound effects. 512K CoCo 3 only. \$34.95.

## KUUM-SAI TO BE NINJA



The best selling 128K CoCo 3 martial arts arcade game. Now available in both RS-DOS and OS-9 versions. Play the incredible combat experience you've been missing under the operating system of your choice! \$29.95.

## SOUNDTRAX



A polyphonic digital sound sequencing system for your 128K/512K CoCo 3 with a user-friendly point-and-click graphic editor. Create music scores with your own sounds or from the many we provide. \$34.95. Sample instrument disks: 6 sides of sampled sounds/instruments. Only \$12.95 each or \$29.95 for all three.



# SUNDOG SYSTEMS



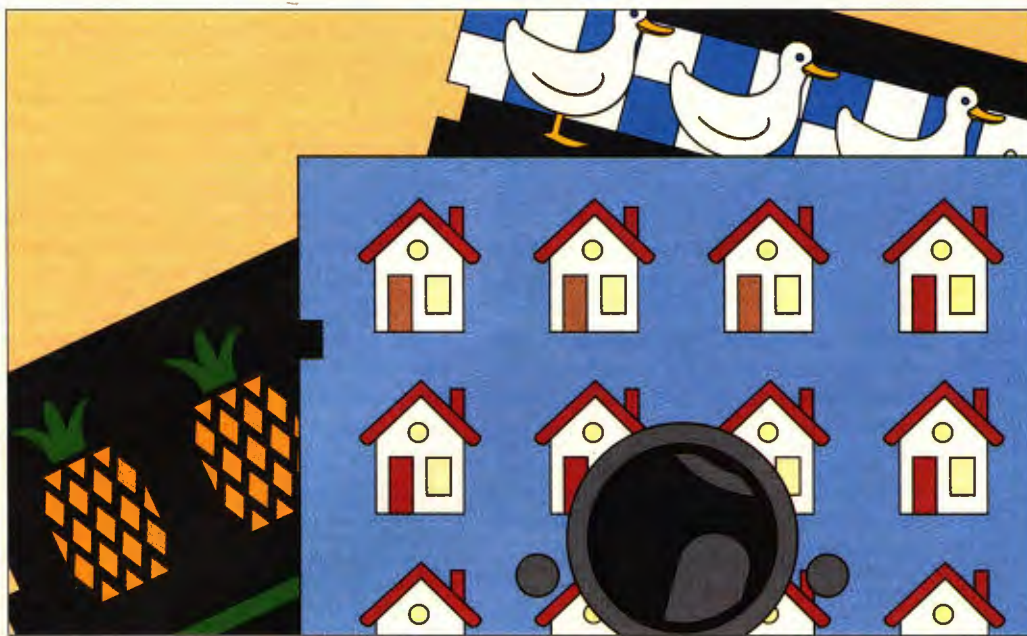
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The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details,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

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For RAINBOW Advertising and Market-  
ing Office Information, see Page 49

# Letters to the RAINBOW

## CoCo Max III and the NX-1020 Rainbow

### Editor:

We have received many customer questions and comments regarding the letter from Wayne A. Johnson published in the November 1991 issue. In his letter, Mr. Johnson wrote of an incompatibility between the Star NX-1020 Rainbow printer and *CoCo Max III*.

After Mr. Johnson spoke with Colorware and wrote the letter to you, he sought help from our technical support staff. Working together over the telephone, we were able to get his system "Color CoCo Maxin" in minutes. He told us that Colorware was unaware that its existing *Color Printer Driver* for the NX-1000 Rainbow printer is also compatible with the NX-1020 Rainbow. We have informed Colorware so they can expand their support of one of the most illustrious programs ever written for the CoCo, *CoCo Max III*.

William R. Hall  
President

Dayton Associates, Inc.  
9644 Quailwood Trail  
Spring Valley, OH 45370

## Thanks for the Support

### Editor:

This brief note is to express a sincere "Thank You" to you and the dedicated readers of THE RAINBOW. Following your publication of my letter in the November issue, I had several responses from avid CoCo users offering assistance in my attempt to adapt the Star NX-1020 printer for *CoCo Max III*. Responses included letters, phone calls, and samples from those who had working programs. I was overwhelmed by the response. It is proof positive there is a loyal and dedicated elite who are not prepared to abandon the little computer that proved it could! Again, thanks to THE RAINBOW and your considerate readers, the program is now up and running.

Wayne A. Johnson  
Route 2

Thamesford, ON N0M 2M0  
Canada

## New vs. Old

### Editor:

As your covers sail to 68K (CPU) oceans

far past my 64K (RAM) horizon, I am thrilled to see THE RAINBOW's publisher praising *Telewriter-64*, admitting there has been no real improvement since that classic came out. I'd love to try *Simply Better's* foreign character font, etc., but Mr. Falk is absolutely correct.

A while back, I wrote to Mr. William Barden about his offer in the June issue for a copy of his *EZ Assembler*. He wrote back saying he has put his CoCo away. Mr. Barden is a pioneer and a researcher. To hear he's hung up his CoCo is like hearing that Daniel Boone put away his flintlock. Computer Island is deserted, Microcom doesn't advertise, and even the kind gentleman at CoCoSoft in House, New Mexico, has gone offline. I'm glad you're still with us; there is so much I still have to discover about my CoCos!

Charles Scanlon  
2 Eagle Lane  
Simsbury, CT 06070

*We all have our preferences regarding word-processors, and some do offer many new and useful features. But we agree; Lonnie's point ("Do you really need a more powerful machine in order to do what you want to do?") is a good one.*

## Scanners and Double-Sided Drives

### Editor:

Radio Shack sells a 4-inch page scanner (Cat. No. 900-2383) with a serial interface. Can I use this device with my CoCo 3, and are there any programs that are compatible with it? I am also looking for a DOS with which I can gain access to the second side of my FD-502 disk drive.

Charles Rempel  
P.O. Box 245  
Plum Coulee, MB R0G 1R0  
Canada

*Presently, hand scanners are not supported by the CoCo. However, Chris Burke of Burke & Burke has been doing some work toward using a hand scanner with OS-9. Most of the alternate DOSs that have been developed for the CoCo allow the use of 40-track double-sided drives. OS-9 Level II also supports double-sided drives. The following pokes allow you to use both sides of an FD-502 (double-sided) drive with*



## CBASIC Editor/Compiler The ULTIMATE Color Computer Basic Compiler!!!

If you want to write fast machine language programs but you don't want to spend the next few years trying to write them in Assembly Language, then CBASIC is the answer!!!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly.

"The most complete Editor/Compiler I have seen for the CoCo..." -The RAINBOW March 1986

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or M.L. programmer. CBASIC features well over 150 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/PUT, PLAY and H/DRAW, all with 99% syntax compatibility.

Specify Coco 1, 2 or 3 Disk \$149.00

## DataPack III Plus V1.1

AUTOPILOT and AUTO-LOG Processors  
X-MODEM DIRECT FILE TRANSFER  
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- No lost data even at 2400 Baud on the Serial I/O port.
- 8 Selectable Display Formats, 32/40/64/80 columns
- ASCII & BINARY disk file transfer via XMODEM.
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- VT-100 emulation for VAX, UNIX and other systems.
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- Programmable Word Length, Parity, Stop Bits
- Complete Full and Half Duplex operation,
- Send full 128 character set from Keyboard.
- Complete Editor, Insert, Delete, Change or Add.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 Baud.
- Send Files from the Buffer, Macro Key Buffers or Disk.
- Display on Screen or Print the contents of the Buffer.
- Freeze Display & Review information On line.
- Built in Command Menu (Help) Display.

Supports: Modem-Pak & Deluxe Pak or Serial Port.

Specify Coco 1, 2, 3 Disk \$49.95

## EDT/ASM III

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features of the COCO 3. It has 8 Display formats from 32/40/64/80 columns. The disk also contains a free standing ML Debug Monitor.

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

- Local and Global string search and/or replace.
- Full Screen line editing.
- Load and Save standard ASCII formatted files.
- Block Move & Copy, Insert, Delete, Overtyping.
- Create and Edit files larger than memory.

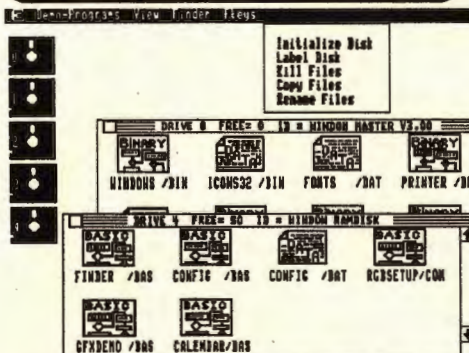
The Assembler features include:

- Conditional If/Then/Else assembly.
- Disk Library files up to 9 levels deep.
- Supports standard Motorola directives.
- Allows multiple values in FCB/FDB directives.
- Allows assembly from Buffer, Disk or both.

Specify Coco 1, 2 or 3 Disk \$59.95



## Window Master V3.0



The Ultimate User Friendly Point & Click operating System for your Coco 3. Simple enough even for children to use, just point and click to run programs, select files, do disk or file maintenance or almost any

task you currently do by typing commands. You also get things like a print spooler, Programmable Function Keys, a Buffered Keyboard,

Ramdisk, Serial I/O port and Deluxe Pak support along with Windows, Icons, Buttons, Pull Down Menus, Edit Fields and Mouse functions all in one program. It has multiple fonts in 54 possible sizes and styles, Enhanced Basic Editing and much much more. It add over 50 commands and Functions to Basic to fully support the Point & Click System without OS9.

"...it offers so many features that it is probably underpriced. I recommend this software to all CoCo3 owners." -The Rainbow February 1989

It is completely compatible with existing Basic programs and takes absolutely no memory away from basic. It requires 1 Disk Drive, R.S. hires interface & Joystick or Mouse.

Includes 128 & 512K  
Versions Only \$69.95

## "The Source"

The SOURCE will allow you to easily and quickly Disassemble machine language programs directly from disk and generate beautiful, Assembler Source Code. And "The Source" has all the features and functions you are looking for in a Disassembler.

- Automatic Label generation.
- Allows specifying FCB, FCC and FDB areas.
- Disassembles programs directly from Disk.
- Automatically locates addresses.
- Output listing to the Printer, Screen or both.
- Generates Assembler source directly to disk.
- Built in Hex/ASCII dump/display.
- 8 Selectable Display formats 32/40/60/80.
- Built in Disk Directory and Kill file commands.
- Menu display with single key commands.
- Written in Ultra fast machine language.

Specify Coco 1, 2 or 3 Disk \$49.95

## Window - Ware

**Window Writer**- A point & click Word Processor, powerful formatting capability, works with any printer. On screen Italic, bold etc. WYSIWYG..... \$59.95

"Window Writer is a powerful word processor that is fun to use, very user friendly..... The Environment compares favorably to that of Microsoft Windows" - RAINBOW Dec. 1989

**Window Writer/W**- for non W/M owners.....\$79.95

**Window Basic Compiler**-similar to CBASIC...\$99.00

**Window Edit/Asm**- A full featured Assembler...\$49.95

**Font/Icon Editors**- Basic & M.L. versions..... \$19.95

**Advanced Programmers Guide**..... \$24.95

**The Memory game**- Concentration game .....\$19.95

**Desk Accessory Pak**-7 resident programs .....\$39.95

## Deluxe Terminal

A Completely New and Easy to use Terminal Program designed specifically for the CoCo III.

With advanced features you would expect to find only in a Hi-Priced MS-Dos program. It has a 26 Entry Phone Directory with complete Configuration information for Communications and Automatic logon. Supports the Serial I/O Port up to 2400 baud, Deluxe & Modem Pak and the Disto Serial I/O board up to 9600 baud. It has a Full Screen Text Editor, XY Modem File transfer support, Split Screen Conference Mode, Macro Keys. Full Disk Support including Multifile Copy, Kill, Rename, Arc/Un-Arc and Disk Initialize and it is Completely Compatible with ADOS.

Requires 128K, Disk & 80 Col. Display \$44.95

## CoCo III Tool Kit

### Disk Commands

Backup, Initialize, Directory, Verify, Compare, Search, Edit, Erase, Speed Test, Step Rate Test, Gran Table Analysis & Repair

### File Commands

Archive, Copy, Kill, Rename, Erase, View, Edit, Print, Compare, Salvage, Search, Verify, Test Archive, Un-Archive, Xmodem Send/Rec.

The Disk Utility Program that you always dreamed of is now a Reality.

Coco Tools is a comprehensive disk utility Program providing the most complete set of functions available for the standard R.S. DOS disk system. Comparable in scope and functionality to that of the famous utility available for MS-DOS computers "PC-TOOLS".

Coco Tools is also the most Comprehensive Disk Repair program available, it Automatically diagnosis and repairs file allocation errors, locates corrupt directory information and cross linked files. It provides fast and easy recovery of deleted files without the drudgery normally associated with killed file recovery.

Requires 128K, Disk & 80 col. display \$49.95

## This Months Specials

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EDT/ASM III .....\$49.95  
Window Master.....\$49.95  
Window Master & Window Writer.....\$79.95  
Deluxe Terminal.....\$34.95

VISA, MASTERCARD or COD

Call Toll Free 1-800-383-8529

(Monday thru Saturday, 8am to 5pm PST).

To order by mail, send check or money order for the amount of the program plus \$4.00 for shipping to:

**Cer-Comp Ltd.**

**5566 Ricochet Avenue**

**Las Vegas, NV 89110**

**702-452-0632**



Disk BASIC on the CoCo 3, assuming you are using a disk-drive cable in which all teeth are used in the drive connectors.

#### Disk BASIC 2.0:

POKE &HD7AC,&H41  
POKE &HD7AD,&H42

#### Disk BASIC 2.1:

POKE &HD89F,&H41  
POKE &HD8A0,&H42

### SR-1000 and the CoCo

Editor:

I have a CoCo 2 and recently borrowed a Peripheral Sears SR-1000 printer from one of my friends. What pins would I connect from the CoCo to the printer to make it work?

Brian Miranda  
4449 N. Larmie Avenue  
Chicago, IL 60630

*We don't have access to an SR-1000 so we can't determine just what you need to do. If the printer uses a serial interface, you need to make a special serial cable to use it with the CoCo. However, if the printer features a standard Centronix parallel interface, you can use a serial-to-parallel converter to drive it with the CoCo. To locate one, try calling Dayton Associates, Owl-Ware and/or CoCo PRO!*

### The Three Mugateers, Again

Editor:

My friend was playing with his Color Computer 3 one day and a picture of three guys appeared on the screen. He told me it was a very detailed picture, as if taken with a camera. What caused this to happen?

Gabe Ashe  
6151 E. Linda Vista  
Apache Junction, AZ 85219

*The picture your friend saw was the rage of the CoCo Community when the CoCo 3 was first introduced. The three men in the picture are programmers from Microware who patched and added to the BASIC interpreter for Tandy. For more information about the image of the "CoCo Three," see "Building December's Rainbow" on Page 16 of the December 1986 issue.*

### RAINBOW ON DISK Extras

Editor:

I have seen many people write to you, explaining that they have no access to Delphi. They have also requested you print some of the patches and advice to which others have easy access. Thank you very

much for all the extra files (for "Making the Move", October 1991, Page 10) on the October RAINBOW ON DISK, but why couldn't they have been included in the magazine as well? Putting them on the disk is a step in the right direction, but a listing in the magazine would help a lot more people.

John Coldwell  
McInnes Island Lightstation  
C/O Bag 3670  
Prince Rupert, BC V8J 3R1  
Canada

*The source code for just a few of those extra programs would more than fill an entire RAINBOW. Based on this, we chose the disk-only medium for two reasons: Some people won't be interested in using the extra programs, and we doubt any readers would forego the other things they get from THE RAINBOW to have these programs listed.*

### A Change of Scenery

Editor:

I subscribe to THE RAINBOW, and I use and enjoy it immensely — I have every issue ever printed. I am looking for scenery disks for Radio Shack's *Flight Simulator II*. Do you know where I might find them?

Charles Baker  
3140 Center Street  
Bakersfield, CA 93306

*At the October CoCofest in Atlanta, CoCo PRO! had several unused copies of the Japan scenery disks on hand. Give CoCo PRO! a call — you might get lucky.*

### Shareware Blues

Editor:

I seldom write to any magazine to complain about anything, but I want to share a problem I had. In July 1991 I downloaded from Delphi what I consider to be a useful OS-9 program, CCTools. The program was uploaded to the OS-9 Group as shareware from the Micro80 Users Group in Winnipeg, Canada. According to the documentation, for a \$15 registration fee the group promised to send a module to "disable the annoying screens" in the program. I sent my registration fee on July 22.

After a more-than-reasonable wait (three months), I wrote a letter to the same address, advising the group that I had not yet received the promised module. I have not received a reply, though my cancelled check did come back. I have not had any luck contacting the group via Delphi or Fidonet, either.

I do not expect THE RAINBOW to do

anything about this; I consider it \$15 down the tube, not to mention a black-eye for the concept of shareware. During these days of dwindling support for the Color Computer, more and more people are relying on shareware for quality software. Groups like the Micro80 Users Group take away a lot of credibility from those honest folks who deserve all the credit and donations they can get.

As a long-time subscriber to THE RAINBOW, I'm concerned about its smaller size and content. But as long as I have a CoCo, I'll continue to subscribe to the best magazine around. Keep up the great work!

Tom Brakel  
12628 S. 30th Street  
Omaha, NE 68123

### The Quest for Higher Learning

Editor:

I am looking for educational programs (Dorsett, Computer Island, etc.) for my CoCo 2. Do you know of any that are still available? Any help would be appreciated.

Ryan Hecht  
717 Brentwood  
Auburn, IN 46706

*Unfortunately, we know of no companies exclusively marketing educational software for the Color Computer. However, T & D Subscription Software does offer several disks containing Public Domain educational programs. Also you may still find some offerings from Tandy in its Radio Shack stores. CoCo PRO! often re-sells original software packages, and a call might be worth your quarter. And THE RAINBOW will continue to include shorter educational programs.*

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space. Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.





# At Home With the CoCo

I was asked the other day to talk about how THE RAINBOW and Falsoft got started. It was a terrific hour and a half, and I think some of the things I said fit right in with our theme this month — “Work At Home.”

Few people know these days, but THERAINBOW was very much a one-person show for almost the first year of its life. In that time, it grew from a four-page newsletter to a hundred or so pages (or would have been had we not begun typesetting it) and all of it was done on a plain Color Computer with pretty limited memory, floppy disk drives and a television set for a monitor.

I say this not only because it is a nifty story, but because I think many times we downgrade the CoCo in our own eyes. The Color Computer you are using today is much more powerful and flexible than the one I had at my disposal back then, yet I was able to build a business from that single box.

This means, of course, that you can do the same thing. And you have the machine to do it sitting right in front of you.

Whether you work at home or have work at home, your CoCo is an excellent partner. It can, indeed, be the “secret” to your success. How come? Because, as the old saying goes, genius is 10 percent inspiration and 90 percent perspiration. All you need is an idea and the willingness to spend a lot of time at it.

There are, my friends, a million schemes out there to help you make money: peddling products door-to-door, holding “sales parties” in your home or office, conducting telephone sales, and even the old standby — “addressing envelopes at home.” The trouble is, most of these schemes are something thought up by someone else. And while you can do all right with some of them, few ever achieve major success.

The reason is simply that it is always someone else’s idea. Rather than that, try your own

idea. Look at your CoCo — what can you do with it? Where is a niche that needs some doing and a bit of firepower to make it happen?

How can you do this? Well, you have to have the idea, but let me give you but one example of what you have available to help you.

If you remember the wonderful magazines of the ’30s and ’40s (*The Saturday Evening Post*, *Look*, *Life*, *Colliers* and the like), you might wonder (as I have) just how those magazines ever got mailed. They had millions of subscribers and nary a computer. Computers were unknown at the time.

Think of the time and manpower it must have taken just to get labels on all of those magazines. It had to be done, at least partially, by hand. There was technology, but it was slow technology.

Once the computer was invented — the early vacuum-tube machines — things changed drastically. And your Color Computer has a heck of a lot more power than those room-sized giants of the ’50s. Imagine it.

In fact, imagine putting your computer to work today doing something no one else is doing. Maybe only a niche in some large market, but one that *you* can fill — because *you* thought of it.

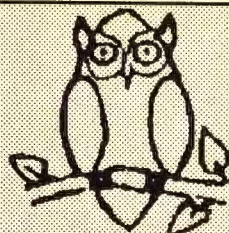
With a powerful ally such as your CoCo, perhaps *your* business at home will outgrow your home altogether. Mine did. So can yours.

\* \* \* \* \*

I am pleased to announce that THE RAINBOW will have a new look starting with the March 1992 issue. We are excited about the changes we are making — changes that give us more options in providing you with the best information you can have for your Color Computer.

— Lonnie Falk





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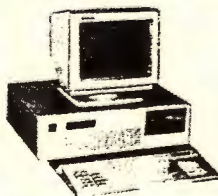
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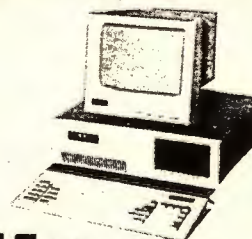
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# Versabase

by David Polonsky

**A**rithmetic operations may be the reason computers were originally developed, but storing and retrieving information is where most of the action is.

We use word processors for text and spreadsheets for numbers. To handle information that would otherwise be put in a metal file, we use a database.

*Versabase* provides a foundation from which many different disk-based database applications for the CoCo 3 can be formed. Before going further, however, it must be clear that *Versabase* is *not* a free-form database. Rather it is a framework, in the form of a BASIC program, to which you can add program code to create independent, single-purpose databases. Let's see how this works.

The program shown in Listing 1 is a database for VCR tapes. VCRDATA allows you to enter data for up to 60 tapes in the fields listed in Figure 1, with the indicated field lengths. When you run VCRDATA, you are asked whether you want a 40- or an 80-column screen. Then you see a menu listing the options provided by the *Versabase* skeleton. They are as follows:

**Load Data File** — When you select this option, you are prompted for a filename. Type the desired name and press ENTER.

**Save Data File** — Once you have entered new data or modified data in an exist-

ing file, use this option to save the file to disk.

**Data Entry** — Use this option to add data to a file, whether new or previously saved. When you select this option, the screen clears and six data-entry fields appear. To the right of each field is a colored block indicating the suggested length limit for data in that field. As you type, the colored block disappears. When it is gone, you have reached the maximum number of characters you can enter in that field using the Data Entry option.

Enter your data in the appropriate fields, pressing ENTER after each entry. If you press ENTER without entering any data in the first field, *Versabase* returns to the main menu. When you have completed the record, you are asked if you want to enter another. Respond by pressing Y or N. Note: When entering several records at one time, it is wise to return to the main menu and save the file every five records or so. Otherwise an Out of Memory error could crash the program, forcing you to re-enter the data from the beginning.

**View/Edit Data** — Use this option to see and edit single records in the current database file. You are asked to enter the number of the starting record, which then appears onscreen. At this point, press E to edit the record, N to see the next record, P to see the previous record, M to return to the main menu or W to toggle the width between 40 and 80 columns.

**Print Data** — When you select this option, you are asked whether you want the data printed to the screen or the printer. If you enter S, a paginated summary of the

data in all records is displayed on the screen, one record per line. The Screen option works only in the 80-column mode. Even with this, because of the width limitations, only the first portion of the data fields is shown. However, more than enough is displayed so you can tell what record number holds what item; and care was taken to ensure the important data is completely visible. This is important because the *Versabase* foundation does not support searches.

If you request a printed copy (by entering P at the above prompt), the data for all records is sent to the printer. Each record is printed on its own line, and the entire field contents are printed, based on the filed lengths set up in the BASIC program.

**Toggle Width** — Select this option to toggle the screen width between 40 and 80 columns.

**Quit Program** — This option is self-explanatory. You *are* asked if you are sure you want to quit.

Title	30
Star	30
Co-Star	30
Tape Number	5
Date	8
Counter Number	5

Figure 1: VCRDATA Data Fields

The *Versabase* skeleton provides little error-trapping; however, it does work intuitively. For instance, if you have not entered or loaded any records into memory, selecting the Save Data File, View/Edit or Print Data options has no effect.

## **Versabase in Other Applications**

The versatility of the *Versabase* founda-

*David Polonsky worked as a special education teacher for 14 years. He is disabled and enjoys working with the Color Computer. Most of his programs were designed to address the needs of his former students. David may be reached at 4 Tudor Court, Apt. 15, Elizabeth, NJ 07208, (908) 352-8931. Please include an SASE when requesting a reply.*



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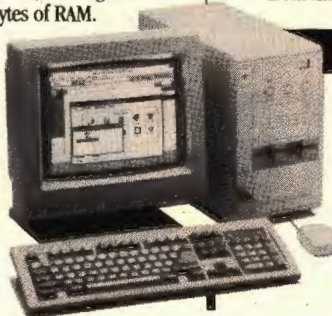
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tion comes from the fact that it is written in BASIC and is easily modified to suit many different filing needs. Take a look at listings 2 through 5. When merged with the VCRDATA program, the programs in these listings create four new filing programs. The *Versabase* portion of VCRDATA remains unchanged, but the program lines controlling the data fields and printing options are modified.

To use one of these "merge" files, first enter and save to disk the program in Listing 1. After checking to be sure VCRDATA works properly, enter NEW, then enter the merge listing as it appears here. When you have finished, save the merge file to disk in ASCII format by entering

SAVE "filename.ext",A

Once the merge file is saved, load VCRDATA and create the new database program by entering

MERGE "filename.ext"

Then save the complete database program to disk, using the filename shown in the appropriate listing. That's all there is to it. Using this method and the listings here, you get five complete database programs for storing information about VCR tapes, addresses, compact discs, photograph information and medical prescription records. The field titles and lengths for the last four databases are shown in Figure 2. Otherwise each database works just like VCRDATA, as described above.

As written, the programs require a disk drive. All five database programs are included on this month's RAINBOW ON TAPE and DISK. They are already merged (they are complete and ready-to-run) and are saved in tokenized format. To use them, simply save them on a new formatted disk.

### Making Changes

The BASIC code used to create *Versabase* applications is straightforward and should be easily understood by even novice

ADDRESS.BAS:		COMPACT.BAS:	
Name	25	Title	25
Address	25	Composer	25
City	20	Orchestra	25
State	2	Tracks	2
Zip	10	Conductor	25
Phone	12	Soloist	20
PHOTOS.BAS:		MEDICINE.BAS:	
Date	8	Doctor	15
ASA	5	Person	15
F-Stop	5	Prescription	15
Shutter Speed	7	Number	9
Location	30	Date	8
Camera	15	Cost	7

Figure 2: Field Titles and Lengths

users. To refine a database for specific needs, consider adding more fields. (For instance, you could add fields that would allow you to list the actual song titles in the compact disc database.)

The *Versabase* programs allow up to 60 records per database file. You can increase this number by changing the value of Variable ME in Line 50. The main thing to consider when adding fields or allowing more records per file is that *Versabase* is designed to work with its data in memory — data items are stored in dimensioned arrays, not loaded from disk one record at a time. This makes it easier to manipulate the data but limits the size of *Versabase* files.

The limit on file size is based on the amount of free memory in your CoCo 3. Reducing the size of the fields gives you more room for other types of information. Also the CLEAR 8000 in Line 20 can be increased to allow a little more room.

When entering data, you might encounter a situation where you really need a few characters beyond the indicated field length. Since *Versabase* saves data to disk as a contiguous ASCII file, it is possible to have much longer data entries. You can add a few characters to a field by entering the

record normally (observing the appropriate field lengths), then using the View/Edit option to change the information for a specific field. However, use this sparingly or you will soon encounter Out of Memory errors.

*Versabase* does not support any form of data sorting. The records are stored in the order in which you enter them. Consider adding data-sorting routines if you find them necessary.

Another possible change is to allow searches. It should be a simple matter to add a routine that scans certain array elements looking for a specific string of characters.

The printer codes used in Line 1040 are designed for Tandy printers. They are used to set the printer for bold, condensed type. You can change them for your specific printer if necessary. (For help, see "Printer Diversions and Conversions" on Page 142 of the August 1988 issue.)

After you have experimented with the existing code, try writing your own merge files to create more databases. It's easy to do. The possibilities are endless, and you'll find *Versabase* can handle most of your filing needs. □

## Definitions

Three terms are often confused when people speak of databases. To help minimize the confusion, let's define the terms.

A database *field* represents a single piece of information about a person, place, event, etc. The term *record* is used to mean all of the fields (individual pieces of information) about the single person, place, event, etc. A *file* is comprised of a related group of records about several persons, places, events, etc.

Using VCRDATA as an example, the file would hold information about all the VCR tapes you own. Each record would contain all the information about a specific tape, and the fields would be the title, star, tape number, etc., for that tape.

You can still have several different files, however. For instance, you might have one file with records for all of your tapes and another containing information about all of your best friend's tapes.

### CoCo 3 Disk



#### Listing 1: VCRDATA

```

1 'VERSABASE/VCRDATA
2 'BY DAVID POLONSKY
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
6 '*****
7 'THANKS TO BILL BERNICO FOR
  HIS SUBROUTINES AND IDEAS
20 CLEAR8000:WIDTH32:CLS:INPUT"4
0 OR 80 COLUMN WIDTH":W
30 IF W<40 THEN 40 ELSE 50
40 IF W>80 THEN 20 ELSE 50

```



```

50 ME=60:WIDTH W:RGB:PALETTE8,63
:PALETTE0,1:CLS1
60 DIM NM$(ME),AD$(ME),CT$(ME),S
T$(ME),BB$(ME),DP$(ME),FD$(6)
70 FD$(1)="TITLE":FD$(2)="STARRI
NG":FD$(3)="CO-STARRING":FD$(4)=
"TAPE #":FD$(5)="DATE":FD$(6)="
COUNTER #"
80 WIDTH W:LOCATE15,7:ATTR3,3:PR
INT"DATABASE MENU":ATTR0,0:PRIN
T
90 LOCATE12,9:PRINT"1. LOAD DATA
FILE":LOCATE12,10:PRINT"2. SAVE
DATA FILE":LOCATE12,11:PRINT"3.
DATA ENTRY":LOCATE12,12:PRINT"4
. VIEW/EDIT DATA":LOCATE12,13:PR
INT"5. PRINT DATA":LOCATE12,14:P
RINT"6. TOGGLE WIDTH":LOCATE12,1
5:PRINT"7. QUIT PROGRAM
100 LOCATE12,17:ATTR1,0,B:PRINT"
YOUR CHOICE (1-7)":ATTR0,0
110 K$=INKEY$:IFK$="" THEN 110 E
LSE P=VAL(K$):ON P GOTO 130,230,
330,570,930,1100,1120
120 GOTO110
130 LOCATE12,9:ATTR1,0:PRINT"1.
LOAD DATA FILE":GOSUB1180:IFF$=
"" THEN80
140 OPEN"I",#1,F$:INPUT#1,NE
150 FORI=1 TO NE
160 LINEINPUT#1,NM$(I)
170 LINEINPUT#1,AD$(I)
180 LINEINPUT#1,CT$(I)
190 LINEINPUT#1,ST$(I)
200 LINEINPUT#1,BB$(I)
210 LINEINPUT#1,DP$(I)

```

```

220 NEXT:CLOSE#1:GOTO80
230 IFNE=0 THEN110
240 LOCATE12,10:ATTR1,0:PRINT"2.
SAVE DATA FILE":GOSUB1180:IFF$
="" THEN 80
250 OPEN"O",#1,F$:PRINT#1,NE
260 FORI=1 TO NE
270 PRINT#1,NM$(I):PRINT#1,AD$(I
)
280 PRINT#1,CT$(I)
290 PRINT#1,ST$(I)
300 PRINT#1,BB$(I)
310 PRINT#1,DP$(I)
320 NEXT:CLOSE#1:GOTO80
330 IFNE=0 THEN 110
340 NQ=NE+1
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"VCRDATA RECORD #""NQ"
":LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT" TITLE : "
:LY=3:AY=3:PL=31:GOSUB1230
370 LOCATE3,5:PRINT" STARRING : "
:LY=5:AY=4:PL=31:GOSUB1230
380 LOCATE3,7:PRINT" CO-STAR : "
:LY=7:AY=2:PL=31:GOSUB1230
390 LOCATE3,9:PRINT" TAPE# : "
:LY=9:AY=5:PL=6:GOSUB1230
400 LOCATE3,11:PRINT" DATE : "
:LY=11:AY=7:PL=9:GOSUB1230
410 LOCATE3,13:PRINT" COUNTER# : "
:LY=13:AY=1:PL=6:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>30 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:

```

```

LY=3:AY=3:PL=31:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>30 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=31:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>30 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=31:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>5 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=6:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>8 THEN LOCATE15,1
1:PRINTSTRING$(60,32):GOSUB1200:
LY=11:AY=7:PL=9:GOSUB1230:GOTO50
0
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>5 THEN LOCATE15,1
3:PRINTSTRING$(60,32):GOSUB1200:
LY=13:AY=1:PL=6:GOSUB1230:GOTO52
0
540 FORXX=1TO300:NEXT
550 NE=NE+1:NM$(NE)=D$:AD$(NE)=C
$:CT$(NE)=T$:ST$(NE)=Y$:BB$(NE)=
X$:DP$(NE)=Z$
560 LOCATE4,16:ATTR1,0:PRINT"ENT
ER ANOTHER? ":ATTR0,0
562 K$=INKEY$:IF K$="" THEN 562
564 IF K$="Y" OR K$="y" THEN 330
566 GOTO 80
570 IFNE=0 THEN 110

```

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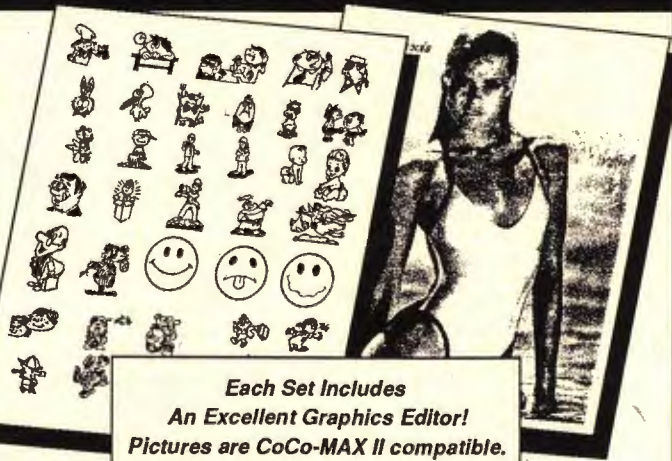
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```

580 WIDTH W:LOCATE8,4:ATTR1,0:IN
PUT"ENTER RECORD NUMBER -> ":PT
582 IF PT<1 THEN 580
584 IF PT>NE THEN PT=NE
586 ATTR 0,0
590 WIDTH W
600 LOCATE6,2:ATTR1,0:PRINT"VCRD
ATA RECORD #":PT;ATTR0,0
610 LOCATE0,4
620 PRINT"          TITLE : ";NM$(
PT)
630 PRINT"          STAR : ";AD$(
PT)
640 PRINT"          CO-STAR : ";CT$(
PT)
650 PRINT"          TAPE # : ";ST$(
PT)
660 PRINT"          DATE : ";BB$(
PT)
670 PRINT"          COUNTER # : ";DP$(
PT)
680 LOCATE2,23:ATTR1,0,B:PRINT"E
";ATTR0,0:LOCATE3,23:PRINT"DIT"
";ATTR1,0,B:LOCATE8,23:PRINT"N";
:ATTR0,0:LOCATE9,23:PRINT"EXT";
ATTR1,0,B:LOCATE14,23:PRINT"P";
ATTR0,0:LOCATE15,23:PRINT"REVIUO
S";
690 ATTR1,0,B:LOCATE24,23:PRINT"
M";:ATTR0,0:LOCATE25,23:PRINT"EN
U";:ATTR1,0,B:LOCATE30,23:PRINT"
W";:ATTR0,0:LOCATE31,23:PRINT"ID
TH";
700 K$=INKEY$:IFK$="M" THEN800
710 IFK$="P" THEN 760
720 IFK$="N" THEN 770
730 IFK$="E" THEN 780
740 IFK$="W" THEN 1210
750 GOTO700
760 IFPT=1 THEN700 ELSEPT=PT-1:G
OTO590
770 IFPT=NE THEN700 ELSEPT=PT+1:
GOTO590
780 LOCATE2,23:PRINTSTRING$(37,3
2);:FORI=1TO6:LOCATE1,I+3:PRINTU
SING"("#);I;:NEXT
790 LOCATE6,12:ATTR3,3:PRINT"Pre
ss 1-6 To Edit - E To Exit";:ATT
R0,0

```

```

800 K$=INKEY$:IFK$="" THEN 800
810 IFK$="E" THEN 590
820 K=VAL(K$):IFK<1 OR K>6 THEN
800
830 LOCATE5,12:PRINTSTRING$(33,3
2);:LOCATE5,12:ATTR1,0:PRINT"NEW
"FD$(K)": ";:LINEINPUT A$
840 ON K GOTO 850,860,870,880,89
0,900,910,920
850 NM$(PT)=A$:GOTO590
860 AD$(PT)=A$:GOTO590
870 CT$(PT)=A$:GOTO590
880 ST$(PT)=A$:GOTO590
890 BB$(PT)=A$:GOTO590
900 DP$(PT)=A$:GOTO590
910 GOTO590
920 GOTO590
930 IF NE=0 THEN 110
940 CLS1:INPUT"Print to (S)creen
or (P)rinter? (S/P)";DN$:CLS1
950 IF W=80 THEN 980
960 IF W=40 THEN CLS:LOCATE 1,1:
PRINT"SCREEN LIST OPTION ONLY WI
TH 80-COLUMN SCREEN. RETURN TO
MENU TO TOGGLE WIDTH
970 LOCATE 1,20:PRINT"HIT ANY KE
Y TO RETURN TO MENU":EXEC44539:G
OTO800
980 IF DN$="S" THEN DN=0:GOTO 101
0
990 IF DN$="P" THEN DN=-2:GOTO 10
40
1000 GOTO 940
1010 PRINT"NO. TITLE
STAR CO-STAR
TAPE# DATE CNTR#":PRIN
TSTRING$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
% % % % % % % %
% % %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRIN
T"NO. TITLE STAR
CO-STAR TAP
E# DATE CNTR#":PRINTSTRING$(
79,45):GOTO1070ELSEI070

```

```

1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. TITLE
STARRING
CO-STARRING
TAPE# DATE CNTR#":PR
INT#-2,""
1051 FORI=1TONE:PRINT#-2,USING"#
## %
% % % % % % %
% % % % % % %";I;NM$(I)
;AD$(I);CT$(I);ST$(I);BB$(I);DP$
(I):PRINT#-2,""
1060 IFI=30 OR I=60 OR I=90 OR I
=120 OR I=150 THEN CLS:PLAY"04T6
0CBCBCBC":PRINT"INSERT NEXT PAGE
AND HIT <ENTER> TO CONTINUE PRI
NTING":PRINT#-2,CHR$(12):GOSUB11
60:CLS
1070 NEXT I
1080 IF DN=0 THEN GOSUB1160
1090 GOTO800
1100 IF W=40 THEN W=80:GOTO 80
1110 IF W=80 THEN W=40:GOTO 80
1120 LOCATE12,17:ATTR1,0:PRINT"A
RE YOU SURE? (Y/N)";:ATTR0,0:PLA
Y"04T60CBCBCBCBCBC
1130 K$=INKEY$:IFK$="N" THEN 80
1140 IFK$<>"Y" THEN 1130
1150 WIDTH32:ATTR0,0:PALETTE8,0:
PALETTE0,63:END
1160 LOCATE5,23:PRINT"Press <ENT
ER> To Continue";
1170 IFINKEY$<>CHR$(13) THEN 117
0 ELSE RETURN
1180 LOCATE12,17:PRINTSTRING$(17
,32);:LOCATE15,17:PRINT"Filename
: ";:LINEINPUT F$
1190 RETURN
1200 ATTR1,0:SOUND191,1:LOCATE3,
18:PRINT"INPUT TOO LONG! TRY AG
AIN";:FOR X=1 TO 700:NEXT:ATTR 0
,0:LOCATE3,18:PRINTSTRING$(28,32
):RETURN
1210 IF W=40 THEN W=80:GOTO 590
1220 IF W=80 THEN W=40:GOTO 590
1230 LOCATE 15,LY:ATTR 2,AY:PRIN
TSTRING$(PL,32);:ATTR0,0:RETURN

```

## Listing 2: ADDRESS

```

1 'VERSABASE/ADDRESS
70 FD$(1)="NAME ":FD$(2)="ADDRE
SS":FD$(3)="CITY ":FD$(4)
="STATE ":FD$(5)="ZIP ":FD$(6)="
PHONE "
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"ADDRESS RECORD #":NQ"
";:LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT"          NAME : "
:LY=3:AY=3:PL=26:GOSUB1230
370 LOCATE3,5:PRINT"          ADDRESS : "
:LY=5:AY=4:PL=26:GOSUB1230
380 LOCATE3,7:PRINT"          CITY : "
:LY=7:AY=2:PL=21:GOSUB1230
390 LOCATE3,9:PRINT"          STATE : "
:LY=9:AY=5:PL=3:GOSUB1230
400 LOCATE3,11:PRINT"          ZIP : "
:LY=11:AY=7:PL=11:GOSUB1230
410 LOCATE3,13:PRINT"          PHONE : "
:LY=13:AY=1:PL=13:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>25 THEN LOCATE15,

```

```

3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=26:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>25 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=26:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>20 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=21:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>2 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=3:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>10 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200
:LY=11:AY=7:PL=11:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>12 THEN LOCATE15,

```

```

13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=13:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"CLER
ICAL RECORD #":PT;ATTR0,0
610 LOCATE0,4
620 PRINT"          NAME : ";NM$(
PT)
630 PRINT"          ADDRESS : ";AD$(
PT)
640 PRINT"          CITY : ";CT$(
PT)
650 PRINT"          STATE : ";ST$(
PT)
660 PRINT"          ZIP : ";BB$(
PT)
670 PRINT"          PHONE : ";DP$(
PT)
1010 PRINT"NO. NAME
ADDRESS CITY
ST ZIP PHONE ":PRINTSTRI
NG$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
% % % % % % %
% % %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)

```



```

% % % % %
% %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IF I=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRIN
T"NO. NAME ADDRESS
SS CITY ST Z
IP PHONE":PRINTSTRING$(79,45):
GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. NAME ADDRESS CIT
Y PHONE
1051 FOR I=1 TO NE:PRINT#-2,USING"#
##% % % %
% % % % %
%";I;NM$(I);AD$(I);CT$(I)
:ST$(I);BB$(I);DP$(I)

```

### Listing 3: COMPACT

```

1 'VERSABASE/COMPACT
70 FD$(1)="TITLE":FD$(2)="COMPOS
ER":FD$(3)="ORCHESTRA":FD$(4)="T
RACKS":FD$(5)="CONDUCTOR":FD$(6)
="SOLOIST"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TRI,0:PRINT"COMPACT DISK RECORD

```

```

#N"Q"";LOCATE4,1:PRINTSF$:ATTR0
,0
360 LOCATE3,3:PRINT" TITLE : "
:LY=3:AY=3:PL=26:GOSUB1230
370 LOCATE3,5:PRINT" COMPOSER : "
:LY=5:AY=4:PL=26:GOSUB1230
380 LOCATE3,7:PRINT"ORCHESTRA : "
:LY=7:AY=2:PL=26:GOSUB1230
390 LOCATE3,9:PRINT" TRACKS : "
:LY=9:AY=5:PL=3:GOSUB1230
400 LOCATE3,11:PRINT"CONDUCTOR : "
:LY=11:AY=7:PL=26:GOSUB1230
410 LOCATE3,13:PRINT" SOLOIST : "
:LY=13:AY=1:PL=21:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
=" " THEN 80
430 IF LEN(D$)>25 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=26:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>25 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=26:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>25 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=26:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>25 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=3:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>25 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200

```

```

:LY=11:AY=7:PL=26:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>20 THEN LOCATE15,
13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=21:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"COMP
ACT DISK RECORD #N"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT" TITLE : ";NM$(
PT)
630 PRINT" COMPOSER : ";AD$(
PT)
640 PRINT" ORCHESTRA : ";CT$(
PT)
650 PRINT" TRACKS : ";ST$(
PT)
660 PRINT" CONDUCTOR : ";BB$(
PT)
670 PRINT" SOLOIST : ";DP$(
PT)
1010 PRINT"NO. TITLE
COMPOSER ORCHEST
RA TRKS CONDUCTOR":PRINTST
RING$(79,45)
1020 FOR I=1 TO NE:PRINTUSING"###
% % % % %
% %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I)
1030 IF I=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRIN
T"NO. TITLE COMPO
SER ORCHESTRA
TRKS CONDUCTOR":PRINTSTRING$(79,

```

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```

45):GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. TITLE
COMPOSER

```

ORC

```

HESTRA
NDUCTOR
":PRINT#-2,""
1051 FORI=1TONE:PRINT#-2,USING"#
## %

```

TRACKS CO  
SOLOIST

```

% % %
% % %
% %
%":I;NM$(I);AD$(I);CT$(I);S
T$(I);BB$(I);DP$(I):PRINT#-2,""

```

#### Listing 4: PHOTOS

```

1 'VERSABASE/PHOTOS
70 FD$(1)="DATE":FD$(2)="ASA":FD
$(3)="F-STOP":FD$(4)="SHUTTER SP
EED":FD$(5)="LOCATION":FD$(6)="C
AMERA"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"PHOTO RECORD #""NQ"";
:LY=9:AY=5:PL=8:GOSUB1230:GOTO4
360 LOCATE3,3:PRINT" DATE : "
:LY=3:AY=3:PL=9:GOSUB1230
370 LOCATE3,5:PRINT" ASA : "
:LY=5:AY=4:PL=6:GOSUB1230
380 LOCATE3,7:PRINT" F-STOP : "
:LY=7:AY=2:PL=6:GOSUB1230
390 LOCATE3,9:PRINT" SHUTTER : "
:LY=9:AY=5:PL=8:GOSUB1230
400 LOCATE3,11:PRINT" LOCATION :
":LY=11:AY=7:PL=31:GOSUB1230
410 LOCATE3,13:PRINT" CAMERA :
":LY=13:AY=1:PL=16:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>8 THEN LOCATE15,3
:PRINTSTRING$(60,32):GOSUB1200:L
Y=3:AY=3:PL=9:GOSUB1230:GOTO420
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>5 THEN LOCATE15,5
:PRINTSTRING$(60,32):GOSUB1200:L
Y=5:AY=4:PL=6:GOSUB1230:GOTO440
460 LOCATE15,7:LINEINPUT T$

```

```

470 IF LEN(T$)>5 THEN LOCATE15,7
:PRINTSTRING$(60,32):GOSUB1200:L
Y=7:AY=2:PL=6:GOSUB1230:GOTO460
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>7 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=8:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>30 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200
:LY=11:AY=7:PL=31:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>15 THEN LOCATE15,
13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=16:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"PHOT
O RECORD #""PT":ATTR0,0
610 LOCATE0,4
620 PRINT" DATE : ";NM$(
PT)
630 PRINT" ASA : ";AD$(
PT)
640 PRINT" F-STOP : ";CT$(
PT)
650 PRINT"SHUTTER SPEED : ";ST$(
PT)
660 PRINT" LOCATION : ";BB$(
PT)
670 PRINT" CAMERA : ";DP$(

```

```

PT)
1010 PRINT"NO. DATE ASA F-
STOP SHUTTER LOCATION
CAMERA":PRINTSTRING$(
79,45)
1020 FORI=1 TO NE:PRINTUSING"###
% % % % % % % %
%":I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRINT
"NO. DATE ASA F-STOP SHUTT
ER LOCATION
CAMERA":PRINTSTRING$(79,45):GOT
01070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. DATE ASA F-STOP
SHUTTER LOCATION
CAMERA "":PRIN
T#-2
1051 FORI=1TONE:PRINT#-2,USING"#
## % % % % % % % %
% %
%":I;NM$(I);A
D$(I);CT$(I);ST$(I);BB$(I);DP$(I
):PRINT#-2

```

#### Listing 5: MEDICINE

```

1 'VERSABASE/MEDICINE
70 FD$(1)="DOCTOR":FD$(2)="PERSO
N":FD$(3)="PRESCRIPTION":FD$(4)=
"NUMBER":FD$(5)="DATE":FD$(6)="C
OST"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"MEDICAL RECORD #""NQ"
":LY=9:AY=5:PL=8:GOSUB1230:GOTO4
360 LOCATE3,3:PRINT" DOCTOR : "
:LY=3:AY=3:PL=16:GOSUB1230
370 LOCATE3,5:PRINT" PERSON : "
:LY=5:AY=4:PL=16:GOSUB1230
380 LOCATE3,7:PRINT"PRESCRIPT : "
:LY=7:AY=2:PL=16:GOSUB1230
390 LOCATE3,9:PRINT" NUMBER : "
:LY=9:AY=5:PL=10:GOSUB1230
400 LOCATE3,11:PRINT" DATE :
":LY=11:AY=7:PL=9:GOSUB1230
410 LOCATE3,13:PRINT" COST :
":LY=13:AY=1:PL=8:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>15 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=16:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>15 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=16:GOSUB1230:GOTO44

```

```

0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>15 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=16:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>9 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=10:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>8 THEN LOCATE15,1
1:PRINTSTRING$(60,32):GOSUB1200:
LY=11:AY=7:PL=9:GOSUB1230:GOTO50
0
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>7 THEN LOCATE15,1
3:PRINTSTRING$(60,32):GOSUB1200:
LY=13:AY=1:PL=8:GOSUB1230:GOTO52
0
600 LOCATE6,2:ATTR1,0:PRINT"MEDI
CAL RECORD #""PT":ATTR0,0
610 LOCATE0,4
620 PRINT" DOCTOR : ";NM$(
PT)
630 PRINT" PERSON : ";AD$(
PT)
640 PRINT" PRESCRIPTION : ";CT$(
PT)
650 PRINT" NUMBER : ";ST$(
PT)

```

```

660 PRINT" DATE : ";BB$(
PT)
670 PRINT" COST : ";DP$(
PT)
1010 PRINT"NO. DOCTOR P
ERSON PRESCRIPTION N
UMBER DATE COST":PRINTSTR
ING$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
% % % % % % % %
%":I;NM$(I);AD$(I);CT$
(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRIN
T"NO. DOCTOR PERSON
PRESCRIPTION NUMBER
DATE COST":PRINTSTRING$(79,4
5):GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. DOCTOR PERSON
PRESCRIPTION NUMBER
DATE COST "
1051 FORI=1TONE:PRINT#-2,USING"#
## % % % % % % % %
% %
%":I;NM$(I);AD$(I);C
T$(I);ST$(I);BB$(I);DP$(I)

```



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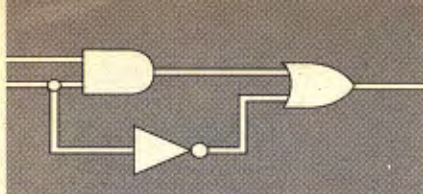
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# Uppercase Directories

by Greg Law  
Technical Editor

**A**fter using our new `makedir` utility (April 1991, Page 28) for a while, I began thinking of ways in which it might be improved. One idea that seems the most beneficial is to automatically convert all of the directory names to uppercase. The fact that directory names should always be in all uppercase as a de-facto standard further enhances the idea.

new function that converts a string from a combination of upper- and lowercase letters to all uppercase. This function must be created because no similar function exists in the C library. However, the C library does include the `toupper()` and `tolower()` functions that convert a single character to

either its upper- or lowercase counterpart. And it is the `toupper()` function on which our `strupr()` function is based.

The `strupr()` function (shown in the listing) is passed a pointer to a null-terminated string, which is called `s` in the listing. A while loop is then used to compare the



For the insatiably curious, directory names appear in all uppercase to make it easier to distinguish (lowercase) filenames from directories.

The modification involves creating a

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

OS-9

### The Listing: `makedir.c`

```
#include <modes.h>
#include <stdio.h>
#include <string.h>

main(argc, argv)
int argc;
char *argv[];
{
    char *path;
    char *ptr;
    int i = 0;

    if(argc < 2)
        help(argv[0]);

    while(--argc)
    {
        ptr = path = argv[++i];
        strupr(ptr);

        if(path[0] == '/' || path[0] == '.')
            ptr = index(ptr + 1, '/') + 1;

        while((ptr = index(ptr, '/')) != 0)
        {
            *ptr = '\\0';
            I_MakDir(path);
            *ptr = '/';
            ptr++;
        }

        I_MakDir(path);
    }
}
```



```

    }
}

I_MakDir(path)
char *path;
{
    int status;

    status = mknod(path, 077);

    if(status == -1)
        printf("%-40s - ERROR %03d\n", path, errno);
    else
        printf("%-40s - created\n", path);
}

help(name)
char *name;
{
    printf("This utility is used to create multiple directories\n");
    printf("and subdirectories in one pass. It will also create\n");
    printf("all directories specified in a pathlist as required\n");
    printf("\n");
    printf("The syntax for %s is: \n", name);
    printf("    %s pathlist <pathlist> <...>\n", name);
    exit(0);
}

strupr(s)
char *s;
{
    while(*s != '\0')
        *s++ = toupper(*s);
}

```

character pointed to by *s* to the null character. If the character is null, the `while` loop is terminated and the function returns to the caller. Inside the `while` loop, each character is converted to uppercase by

```
*s = toupper(*s)
```

and the pointer is incremented to the address of the next character in the string (`s++`).

As you can see, operator precedence rules are used to advantage in this one statement so that it performs two operations. I warned you a long time ago that operator precedence plays a major role in programming, especially with C. In this case the pointer (`*`) and assignment (`=`) operators have higher precedence than the post-increment (`++`) operator. The net effect is that the statement is equivalent to

```
*s = toupper(*s);
s++;
```

with less overhead.

For an equivalent function that converts a string to lowercase, change the name of the function to `strlwr()` and change `toupper(*s)` to `tolower(*s)`. The remainder of the function is the same. ☺

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# The Assembly Line

# Zig-Zag

by William P. Nee

**Z**ig-Zag is based on the first computer game I ever bought, RCA's *Studio II*. In addition to playing BlackJack and Bowling, *Studio II* allows you to program a simple pattern, then keep repeating that pattern over the entire screen. Any time the pattern crosses itself, black changes to white and white to black.

Now, twenty years later, I've updated this game to work on the CoCo, adding color and the speed of machine language. *Zig-Zag* lets you predefine a pattern as a string variable rather than making you enter it each time. The pattern starts at the lower-left corner, and each successive square used to create it can be in any of eight different directions — I used the DRAW command directions (U, D, R, L, E, F, G, and H). As you press these keys, squares appear forming the pattern. When you press ENTER, the pattern starts repeating.

The key to the pattern changing is what the cursor does when it reaches a border.



*Bill Nee bucked the snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of his 13-part series, "Machine Language Made BASIC" (July 1988 to July 1989), prompted him to continue writing articles about Color Computer machine-language programming. You may contact Bill at Route 2, Box 216C, Mason, WI 54856-9302, (715) 746-2952. Please include an SASE when requesting a reply.*

Look at Line 290 of the BASIC program shown in Listing 1. If you press F, the program transfers control to Line 390, where the x location is increased by 1. If the value in this location is greater than the right boundary (63), two things happen: First the x location is reset to zero and the y location is increased by one. (If this becomes greater than the height, 31, it wraps back to zero). Second, the y location is again increased by one (and may be reset to zero). For example, if the cursor is at Location (63,31), pressing F moves it to (0,1).

As I mentioned before, when the pattern crosses itself, the colors at that point reverse. This happens when you're creating the pattern and while it is being repeated. When the pattern goes over a square, the new color is drawn and the value of that square increased. Program options allow you to select black-and-white or color patterns, and have the program read a pattern from a DATA statement, poking the direction letters into the movement array.

The machine-language program shown in Listing 2 starts with four macros: one to clear the MOVE and ARRAY locations, two to PSET and PRESET black and white, and one to CPSET color. Then each letter in the MOVE array is read, the x and y locations are adjusted accordingly, that square is PSET, and the value in the array is increased. Press any key to stop the program and return to BASIC.

Enter and save Listing 1 to disk as ZIGZAGDR.BAS. After you've entered Listing 2, check it for errors by entering A/NO/

NS/WE. Then save it using W ZIGZAG.ASM and assemble it into machine language by entering A ZIGZAG.BIN /NS/WE.

When you run it, the BASIC program loads the machine-language portion. The machine-language routine uses the CLEAR macro to clear a one-dimensional array of 256 bytes for the pattern and a 63-by-31-byte, two-dimensional array for the values of each square. To see the program in action, choose the Black-and-White and the Enter-Your-Own options. Then press five E's followed by four H's and ENTER. Now try this same pattern using the Color option. Next use the Read Data option, making sure one of the REM markers is removed from one of the lines between 560 and 610.

Even though the display is only 63 by 31, it fills the entire screen by drawing each square as a 2-by-3 rectangle. One possible change would be to make the actual display larger. Since the MOVE array is only 256 bytes in length, that is the largest pattern you can use. Try increasing the size of this array and having the program read each individual direction instead of the string pattern.

There it is — a 20-year-old computer game updated for current computers. We've certainly come a long way in two decades. I appreciate hearing from you, so send me your comments and ideas for future articles. If you have any questions about these articles or machine-language programming in general, don't hesitate to write. Next month I'll show you my version of a popular Russian video game. □





## Listing 1: ZIGZAGDR

```

1 'THE ASSEMBLY LINE
2 'WRITTEN BY WILLIAM P. NEE
3 'COPYRIGHT (C) FEBRUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 PMODE1,1:PCLEAR2
20 IF PEEK(&H4000)<>204 THEN LOA
DM"ZIGZAG":POKE &HFF40,0
30 CLEAR 500,&H4000-1
40 LX=63:LY=31:X=0:Y=LY
50 CO=&H4550:MV=&H4553:LO=&H4653
60 XL=&H454A:YL=&H454B
70 EXEC &H4000
80 CLS:PRINT"1> BLACK & WHITE","
  2> COLOR"
90 A$=INKEY$:IF A$="" THEN 90
100 C=VAL(A$):IF C<1 OR C>2 THEN
  80
110 POKE CO,C-1
120 PRINT:PRINT"1> READ DATA",,"
  2> ENTER YOUR OWN"
130 A$=INKEY$:IF A$="" THEN 130
140 IF A$="2" THEN 230
150 IF A$<"1" THEN 120
160 READ M$:L=LEN(M$)
170 PRINT:PRINT" READING -":PRIN
TM$:PRINT@224,"";
180 FOR N=1 TO L:A$=MID$(M$,N,1)
190 POKE MV+N-1,ASC(A$):PRINTCHR
$(ASC(A$)+32);NEXT
200 POKE XL,X:POKE YL,Y
210 IF C=1 THEN PMODE 0,1:COLOR0
,5:PCLS:SCREEN1,1:EXEC &H4100:ST
OP
220 PMODE 1,1:PCLS:SCREEN1,1:EXE
C &H4100:STOP
230 IF C=1 THEN PMODE0,1:COLOR0,
5:PCLS:SCREEN1,1:GOTO 250
240 C=3:PMODE1,1:PCLS:SCREEN1,1
250 A$=INKEY$:IF A$="" THEN 250
260 IF A$=CHR$(13) THEN SOUND 50
,5:POKE XL,X:POKE YL,Y:EXEC &H41
00:END
270 SOUND 100,2
280 IF A$="E" THEN POKE MV+K,69:
GOTO 370
290 IF A$="F" THEN POKE MV+K,70:
GOTO 390
300 IF A$="G" THEN POKE MV+K,71:
GOTO 410
310 IF A$="H" THEN POKE MV+K,72:
GOTO 430
320 IF A$="U" THEN POKE MV+K,85:
GOTO 450
330 IF A$="R" THEN POKE MV+K,82:
GOTO 460
340 IF A$="D" THEN POKE MV+K,68:
GOTO 480
350 IF A$="L" THEN POKE MV+K,76:
GOTO 490
360 GOTO 280
370 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
380 Y=(Y-1) AND LY:GOTO 500
390 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
400 Y=(Y+1) AND LY:GOTO 500
410 X=X-1:IF X<0 THEN X=LX:Y=(Y-
1) AND LY
420 Y=(Y+1) AND LY:GOTO 500
430 X=X-1:IF X<0 THEN Y=(Y-1) AN
D LY
440 Y=(Y-1) AND LY:GOTO 500
450 Y=(Y-1) AND LY:GOTO 500
460 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
470 GOTO 500
480 Y=(Y+1) AND LY:GOTO 500
490 X=X-1:IF X<0 THEN X=LX:Y=(Y-
1) AND LY
500 V=PEEK(LO+Y*(LX+1)+X)
510 COLOR V,5
520 LINE(4*X,6*Y)-(4*X+2,6*Y+4),
PSET,BF
530 V=(V+1) AND C:POKE LO+Y*(LX+
1)+X,V
540 K=K+1:GOTO 250
550 'SAMPLE MOVES
560 'DATA "ERRRRRRRRRRRRRRHLLLL
LLLLLLERRRRRRRRRRHLLLLLLERRRR
RRHLLLLERRH"
570 'DATA "UUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUU
FFFFFFFFFFDDDDDDDDDDDDDDDDDD
DDDDDDDDDDDDGGGGGGGGGGGGGGGGGG
GGGGGGGGGGGG"
580 'DATA "EEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEE
FFFFFFFFFFF"
590 'DATA "EEEEHHHHEEEEEHHHEEEE
HHHH"
600 'DATA "EUUUUUUUUUUUUUUUUUUU
RRRRRRRRDDDDDDDDDDDDDDDDLLLL
LLLLLEEGEUUUUUUUUUUUUUUUUUUU
RRRRRRRRDDDDDDDDDDDDDDDDLEEGEU
UUUUUUUUUUUUUUUUUUUUUUUUUUUU
DDDDLEEGEEEEEEEEEEEEEEEE"
610 'DATA "ERRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR
RRRRRRRRRRRRRRRRRRRRRRRRRR"

```

## Listing 2: ZIGZAG.ASM

00100 CLEAR	MACRO		00360		
00110	LDD	#0	00370 PSET	MACRO	
00120	LDD	#\0	00380	LDA	\1
00130 \.A	STD	.X++	00390	LDB	\$B9
00140	CMPL	#\1	00400	MUL	
00150	BLO	\.A	00410	ADDA	\$BA
00160	ENDM		00420	TFR	D,X
00170			00430	LDB	\0
00180 PRESET	MACRO		00440	LSRB	
00190	LDA	\1	00450	LSRB	
00200	LDB	\$B9	00460	LSRB	
00210	MUL		00470	ABX	
00220	ADDA	\$BA	00480	LDA	\0
00230	TFR	D,X	00490	ANDA	#7
00240	LDB	\0	00500	LDY	#\$92DD
00250	LSRB		00510	LDA	A,Y
00260	LSRB		00520	COMA	
00270	LSRB		00530	ANDA	.X
00280	ABX		00540	STA	.X
00290	LDA	\0	00550	ENDM	
00300	ANDA	#7	00560		
00310	LDY	#\$92DD	00570 CPSET	MACRO	
00320	LDA	A,Y	00580	LDA	\1
00330	ORA	.X	00590	LDB	\$B9
00340	STA	.X	00600	MUL	
00350	ENDM		00610	ADDA	\$BA



00620	TFR	D,X		01520	STB	YCORD	
00630	LDB	\0		01530	BRA	WHICH	
00640	LSRB			01540			
00650	LSRB			01550	UU	CMPA	#'U
00660	ABX			01560	BNE	RR	
00670	LDA	\0		01570	LDB	YCORD	
00680	ANDA	#3		01580	DECB		
00690	LDY	#\$92E5	COLOR OR TABLE	01590	ANDB	LENY	
00700	LDA	A,Y		01600	STB	YCORD	
00710	TFR	A,B		01610	BRA	WHICH	
00720	COMA			01620			
00730	ANDA	.X		01630	RR	CMPA	#'R
00740	ANDB	\$B5	CURRENT COLOR	01640	BNE	DD	
00750	PSHS	B		01650	INC	XCORD	
00760	ORA	.S+		01660	LDA	XCORD	
00770	STA	.X		01670	CMPA	LENX	
00780	ENDM			01680	BLS	RR1	
00790				01690	CLR	XCORD	
00800	ORG	\$4000		01700	LDB	YCORD	
00810	START	CLEAR	MOVE,ARRAY+\$1000	01710	INCB		
00820	RTS			01720	ANDB	LENY	
00830				01730	STB	YCORD	
00840	ORG	\$4100		01740	RR1	BRA	WHICH
00850	PARSE	LDU	#MOVE	01750			
00860	P1	LDA	.U+	01760	DD	CMPA	#'D
00870		CMPA	#'E	01770	BNE	LL	
00880		BNE	FF	01780	LDB	YCORD	
00890		INC	XCORD	01790	INCB		
00900		LDA	XCORD	01800	ANDB	LENY	
00910		CMPA	LENX	01810	STB	YCORD	
00920		BLS	EE1	01820	BRA	WHICH	
00930		CLR	XCORD	01830			
00940		LDB	YCORD	01840	LL	CMPA	#'L
00950		INCB	Y+	01850	LBNE	PARSE	INCORRECT ENTRY
00960		ANDB	LENY	01860	DEC	XCORD	
00970		STB	YCORD	01870	LDA	XCORD	
00980	EE1	LDB	YCORD	01880	BPL	LL1	
00990		DECB	Y-	01890	LDA	LENX	
01000		ANDB	LENY	01900	STA	XCORD	
01010		STB	YCORD	01910	LDB	YCORD	
01020		LBRA	WHICH	01920	DECB		
01030				01930	ANDB	LENY	
01040	FF	CMPA	#'F	01940	STB	YCORD	
01050		BNE	GG	01950	LL1	BRA	WHICH
01060		INC	XCORD	01960			
01070		LDA	XCORD	01970	WHICH	TST	COLOR B/W OR COLOR?
01080		CMPA	LENX	01980		LBNE	CSHOW 0-B/W; 1-COLOR
01090		BLS	FF1	01990			
01100		CLR	XCORD	02000	SHOW	LDY	#ARRAY
01110		LDB	YCORD	02010		LDA	LENX
01120		INCB		02020		INCA	
01130		ANDB	LENY	02030		LDB	YCORD
01140		STB	YCORD	02040		MUL	
01150	FF1	LDB	YCORD	02050		ADDB	XCORD
01160		INCB		02060		ADCA	#0
01170		ANDB	LENY	02070		TST	D,Y LOCATION-64*Y+X
01180		STB	YCORD	02080		LBEO	YES ZERO OR ONE?
01190		LBRA	WHICH	02090	NO	CLR	D,Y IT'S ZERO
01200				02100		LDA	XCORD
01210	GG	CMPA	#'G	02110		LSLA	2*XCORD
01220		BNE	HH	02120		STA	XX
01230		DEC	XCORD	02130		LDB	YCORD
01240		LDA	XCORD	02140		PSHS	B
01250		BPL	GG1	02150		LSLB	
01260		LDA	LENX	02160		ADDB	.S+ 3*YCORD
01270		STA	XCORD	02170		STB	YY
01280		LDB	YCORD	02180		PRESET	XX,YY 2*3 BLOCK
01290		DECB	Y-	02190		INC	YY
01300		ANDB	LENY	02200		PRESET	XX,YY
01310		STB	YCORD	02210		INC	YY
01320	GG1	LDB	YCORD	02220		PRESET	XX,YY
01330		INCB	Y+	02230		INC	XX
01340		ANDB	LENY	02240		PRESET	XX,YY
01350		STB	YCORD	02250		DEC	YY
01360		LBRA	WHICH	02260		PRESET	XX,YY
01370				02270		DEC	YY
01380	HH	CMPA	#'H	02280		PRESET	XX,YY
01390		BNE	UU	02290		JSR	[\$A000] ANY INPUT?
01400		DEC	XCORD	02300		LBEO	P1
01410		LDA	XCORD	02310		RTS	
01420		BPL	HH1	02320			
01430		LDA	LENX	02330	YES	INC	D,Y
01440		STA	XCORD	02340		LDA	XCORD
01450		LDB	YCORD	02350		LSLA	
01460		DECB		02360		STA	XX
01470		ANDB	LENY	02370		LDB	YCORD
01480		STB	YCORD	02380		PSHS	B
01490	HH1	LDB	YCORD	02390		LSLB	
01500		DECB		02400		ADDB	.S+
01510		ANDB	LENY	02410		STB	YY

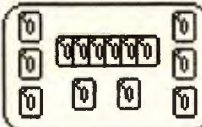


02420	PSET	XX,YY	
02430	INC	YY	
02440	PSET	XX,YY	
02450	INC	YY	
02460	PSET	XX,YY	
02470	INC	XX	
02480	PSET	XX,YY	
02490	DEC	YY	
02500	PSET	XX,YY	
02510	DEC	YY	
02520	PSET	XX,YY	
02530	JSR	[\$A000]	
02540	LBEQ	P1	
02550	RTS		
02560	CSHOW	LDY	#ARRAY FOR COLOR
02570		LDA	LENX
02580		INCA	
02590		LDB	YCORD
02600		MUL	
02610		ADDB	XCORD
02620		ADCA	#0
02630		STD	LO
02640		LDA	D,Y
02650		DECA	
02660		ANDA	#3
02670		LDB	#\$55
02680		MUL	
02690		STB	\$B5 CURRENT COLOR
02700		LDA	XCORD
02710		LSLA	
02720		STA	XX
02730		LDB	YCORD
02740		PSHS	B
02750		LSLB	
02760		ADDB	,S+
02770		STB	YY
02780		CPSET	XX,YY 2*3 BLOCK
02790		INC	YY
02800		CPSET	XX,YY
02810		INC	YY
02820		CPSET	XX,YY

02830	INC	XX	
02840	CPSET	XX,YY	
02850	DEC	YY	
02860	CPSET	XX,YY	
02870	DEC	YY	
02880	CPSET	XX,YY	
02890	LDD	LO	
02900	LDY	#ARRAY	
02910	LEAY	D,Y	
02920	LDA	,Y	
02930	INCA		
02940	ANDA	#3	
02950	STA	,Y	
02960	JSR	[\$A000]	
02970	LBEQ	P1	
02980	RTS		
02990			
03000	XCORD	RMB	1
03010	YCORD	RMB	1
03020	LENX	FCB	63
03030	LENY	FCB	31
03040	XX	RMB	1
03050	YY	RMB	1
03060	COLOR	RMB	1
03070	LO	RMB	2
03080	MOVE	RMB	256
03090	ARRAY	RMB	1
03100	END	START	

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# Logic Puzzler

by Kevin Speight

I have always found logic puzzles interesting and fun. But instead of buying more puzzle books, I decided to write a computer program to generate them. *Logic Puzzler* is the result, and it runs on any Color Computer with at least 16K.

*Logic Puzzler* creates puzzles that involve between three and six people, each having between one and four different characteristics. The goal of the puzzles is to determine which characteristics belong to which people. When you run the program a title screen appears, and you are asked how many people you want in the puzzle and how many characteristics each will have. Then *Logic Puzzler* goes to work and begins providing you with clues.

The clues given by the program are straightforward, with one exception: The "if" clues should be taken to mean "if and only if." That is, if one clue states "If Peter lives in Sydney then Igor owns a hamster," and other clues tell you that Peter doesn't live in Sydney, then you know that Igor doesn't own a hamster.

You can have up to 100 clues (more than you should need), and at any time during play you can see a list of the clues that have

already been given. You can view these clues onscreen or print them. This is handy since some clues will be meaningless until you get more information.

When you are ready to solve the puzzle, press G. The computer then quizzes you to determine if you know the characters' characteristics.

*Logic Puzzler* creates random games, so you play a new game every time. Although many people enjoy logic puzzles, solving them is an especially good exercise in reasoning for younger people. Feel free to change the names and characteristics given in the DATA statements (lines 40 through 80) to better suit your child (or class). If you need to change the syntax of the sentence clues, edit the text in lines 530 through 600.

I hope you have fun with *Logic Puzzler*. □

16K



## The Listing: LOGIC

```
1 'LOGIC PUZZLE
2 'WRITTEN BY KEVIN SPEIGHT
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 CLEAR5000:DIMEW$(100):CLS:PRI
NT@73,"logic puzzler":PRINT@200,
"BY KEVIN SPEIGHT":PRINT@425,"PR
ESS ANY KEY":GOSUB520:CLS:PRINT:
X=RND(-TIMER)
20 INPUT"HOW MANY PEOPLE WOULD Y
OU LIKE TO HAVE IN THIS PUZZLE
(3-6)":N:IF N>6 OR N<3 THEN 20
30 PRINT:INPUT"HOW MANY CHARACTE
RISTICS SHALL EACH PERSON HAVE
(1-4)":C:IF C>4 OR C<1 THEN 30
40 DATAJOHN,NANCY,CLAUDE,IGOR,SU
ZETTE,RAJIV,ROGER,JULIA,PETER,HE
LMUT,MARGARET,DON,ALEXA
```

Kevin Speight is a university student who enjoys using his CoCo for programming and word processing. He can be contacted at Box 266, Howe Hall, Dalhousie University, Halifax, Nova Scotia, B3A 4J5. Please include an SASE when requesting a reply.



```

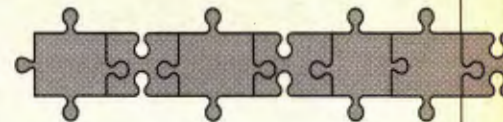
50 DATA CHICAGO, TORONTO, BANGOR, PH
   OENIX, LAS VEGAS, PARIS, LONDON, MEM
   PHIS, BONN, MOSCOW, DELHI, SYDNEY, RO
   ME
60 DATA CAT, A DOG, AN ELEPHANT, A
   CAMEL, A GOLDFISH, A PIGEON, AN OT
   TER, A GERBIL, A HORSE, A HAMSTER, A
   BUDGIE, A SNAKE, A CHICKEN
70 DATA BLUE, GREEN, RED, YELLOW, WHI
   TE, ORANGE, BROWN, BLACK, PURPLE, GOL
   D, SILVER, MAROON, GREY
80 DATA PIZZA, CHICKEN, HAMBURGERS,
   STEAK, ESCARGOTS, PEA SOUP, POACHED
   EGGS, CAVIAR, FISH & CHIPS, EGG RO
   LLS, GRITS, CRUMPETS, SALAD
90 PRINT:PRINT"RANDOMIZING..." :D
   -60:FOR Y=1 TO N:FOR Z=1 TO C+1:R
   ESTORE
100 IF DL>0 THEN FOR X=1 TO DL:FO
   R Y=1 TO 13:READ X$:NEXT Y:NEXT X
110 Y=RND(13):FOR X=1 TO Y:READ Y$(
   YY,ZZ):NEXT X:FOR X=1 TO YY:IF Y$(
   Y,ZZ)-Y$(X,ZZ) AND X<>YY THEN RE
   STORE:GOTO 100 ELSE NEXT X
120 DL=DL+1:NEXT ZZ:DL=0:NEXT YY
130 PRINT:PRINT"THE PEOPLE IN TH
   IS PUZZLE ARE:" :FOR X=1 TO N:PRINT
   Y$(X,1):NEXT X:PRINT:PRINT"FOR TH
   E FIRST CLUE, PRESS A KEY":GOSUB
   520:CLS:CL=0
140 CL=CL+1:PRINT"CLUE #":"
150 X=RND(N):Y=RND(C)+1:X1=RND(N
   ):Y1=RND(C)+1:IF X=X1 OR(Y=Y1 AND
   C>1) THEN 150 ELSE Q=RND(8):ON Q
   GOTO 160,170,180,190,200,220,25
   0,270
160 M$=M$+Y$(X,1):ON Y GOSUB,530
   ,550,570,590:M$=M$+Y$(X,Y):GOSUB
   440:GOTO 290
170 M$=M$+Y$(X,1):ON Y GOSUB,540
   ,560,580,600:M$=M$+Y$(X,Y):GOSUB
   440:GOTO 290
180 IFC=1 THEN 150 ELSE M$=M$+"THE
   PERSON WHO":ON Y GOSUB,530,550,5
   90,590:M$=M$+Y$(X,Y):ON Y1 GOSUB
   ,530,550,590,590:M$=M$+Y$(X,Y1):
   GOSUB 440:GOTO 290
190 IFC=1 THEN 150 ELSE M$=M$+"THE
   PERSON WHO":ON Y GOSUB,530,550,5
   90,590:M$=M$+Y$(X,Y):ON Y1 GOSUB
   ,530,550,590,590:M$=M$+Y$(X,Y1):
   GOSUB 440:GOTO 290
200 M$=M$+"EITHER "+Y$(X,1)+" OR
   "+Y$(X1,1):IF RND(2)=1 THEN 210 E
   LSE ON Y GOSUB,530,550,570,590:M

```

```

$=M$+Y$(X,Y):GOSUB 440:GOTO 290
210 ON Y1 GOSUB,530,550,570,590:
M$=M$+Y$(X1,Y1):GOSUB 440:GOTO 290
220 M$=M$+Y$(X,1)+" EITHER":ON Y
   GOSUB,530,550,590,590:IF RND(2)=
   1 THEN 230 ELSE M$=M$+Y$(X,Y)+" OR
   ":GOSUB 240:M$=M$+X$:GOSUB 440:GO
   TO 290
230 GOSUB 240:M$=M$+X$+" OR "+Y$(
   X,Y):GOSUB 440:GOTO 290
240 F=RND(N):IF F=X THEN 240 ELSE X$
   =Y$(F,Y):RETURN
250 M$=M$+"IF "+Y$(X,1):ON Y GOS
   UB,530,550,570,590:K=RND(2):IF K
   =1 THEN 260 ELSE M$=M$+Y$(X,Y)+" TH
   EN "+Y$(X1,1):ON Y1 GOSUB,530,55
   0,570,590:M$=M$+Y$(X1,Y1):GOSUB 4
   40:GOTO 290
260 GOSUB 240:M$=M$+X$+" THEN "+Y
   $(X1,1):ON Y1 GOSUB,530,550,570,
   590:X=X1:Y=Y1:GOSUB 240:M$=M$+X$:
   GOSUB 440:GOTO 290
270 M$=M$+"IF "+Y$(X,1):ON Y GOS
   UB,530,550,570,590:K=RND(2):IF K
   =1 THEN 280 ELSE M$=M$+Y$(X,Y)+" TH
   EN "+Y$(X1,1):ON Y1 GOSUB,540,56
   0,580,600:X=X1:Y=Y1:GOSUB 240:M$=
   M$+X$:GOSUB 440:GOTO 290
280 GOSUB 240:M$=M$+X$+" THEN "+Y
   $(X1,1):ON Y1 GOSUB,540,560,580,
   600:M$=M$+Y$(X1,Y1):GOSUB 440:GOT
   O 290
290 PRINT@320,"OPTIONS":PRINT:P
   RINT"(N)EXT CLUE","(Q)UIT","(G)U
   ESS","(L)IST OF CLUES"
300 GOSUB 520:IF X$="Q" THEN CLS:END
   ELSE IF X$="N" AND CL<100 THEN CLS
   :GOTO 140 ELSE IF X$="G" THEN 310 ELS
   E IF X$="L" THEN 380 ELSE 300
310 CLS:PRINT"HERE'S YOUR CHANCE
   TO SOLVE THE PUZZLE. WORKING..
   .":PRINT:FOR X=1 TO C
320 FOR XD=1 TO N:U(XD)=RND(N):FO
   RX=1 TO XD-1:IF U(XD)=U(XD) AND XD<
   >1 THEN 320 ELSE NEXT X:NEXT XD
330 FOR P=1 TO N:PRINT@128,"WHICH
   PERSON":M$="":ON X+1 GOSUB,530,
   550,570,590:PRINT M$:PRINT Y$(U(P
   ),X+1):"?":PRINT
340 FOR T=1 TO N:PRINT"("T") ";Y$(
   T,1):NEXT T
350 GOSUB 520:XT=VAL(X$):IF XT<1 OR
   XT>N THEN 350 ELSE IF XT=U(P) THEN PR
   INT:PRINT"RIGHT!":FOR XC=1 T
   O 500:NEXT XC:CLS:NEXT P:NEXT X ELSE
   PRINT:PRINT:PRINT"WRONG.":FOR XC

```



```

-1 TO 1000:NEXT XC:GOTO 420
360 CLS:PRINT"YOU SOLVED THE PUZ
   ZLE!!!"
370 PRINT:PRINT"PLAY AGAIN (Y/N)
   ?":GOSUB 520:IF X$="Y" THEN RUN ELS
   E PRINT:END
380 CLS:PRINT"PRINT CLUES TO (S)
   CREEN OR (P)RINTER":GOSUB 52
   0:IF X$="S" THEN 390 ELSE IF X$="P" TH
   EN 410 ELSE 380
390 CLS:TL=1
400 FOR X=1 TO 4:M$=EW$(TL):GOSUB 45
   0:TL=TL+1:NEXT X:GOSUB 520:CLS:IF
   TL<CL THEN 400 ELSE CLS:GOTO 290
410 FOR X=1 TO CL:PRINT#-2,EW$(X):
   NEXT X:CLS:GOTO 290
420 CLS:PRINT"HERE IS THE SOLUTI
   ON TO THE PUZZLE":PRINT
430 M$="":FOR X=1 TO N:PRINT@64,"";
   :FOR Y=1 TO C+1:M$=M$+Y$(X,Y)+" "
   :NEXT Y:GOSUB 450:PRINT:PRINT"PR
   ESS A KEY":GOSUB 520:NEXT X:CLS:GO
   TO 370
440 IF CL<101 THEN EW$(CL)=M$
450 PRINT:M$=M$+" ":CX$=CHR$(3
   2):LL=32:JK=INT(LEN(M$)/32):CR$=
   RIGHT$(M$,JK):IF LEN(M$)<LL THEN 5
   10
460 IF MID$(M$,LL,1)=CX$ THEN 510
470 FOR CX=LL TO 1 STEP-1:IF MID$(
   M$,CX,1)=CX$ THEN CC=CC+1:GOTO 490
480 NEXT CX:GOTO 510
490 PRINT LEFT$(M$,CC-1):M$=MID$(
   M$,CC+1,LEN(M$)-CC-1)
500 IF LEN(M$)>32 THEN 470
510 PRINT M$:M$="":RETURN
520 X$=INKEY$:IF X$=" " THEN 520 ELSE
   RETURN
530 M$=M$+" LIVES IN ":RETURN
540 M$=M$+" DOESN'T LIVE IN ":RE
   TURN
550 M$=M$+" OWNS ":RETURN
560 M$=M$+" DOESN'T OWN ":RETURN
570 M$=M$+"S FAVORITE COLOR IS
   ":RETURN
580 M$=M$+"S FAVORITE COLOR ISN
   'T ":RETURN
590 M$=M$+" LIKES ":RETURN
600 M$=M$+" DOESN'T LIKE ":RETUR
   N

```

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# Modem Pak Addressing

by Marty Goodman  
Contributing Editor

**Q** Can you refresh my memory on the port address of an (unmodified) Direct-Connect Modem Pak?

Rick Adams (RICKADAMS)  
Rhonert Part, California

**A** The Direct-Connect Modem Pak's 6551 UART is addressed at \$FF6C through \$FF6F. This is in contrast to the Radio Shack RS-232 Pak, in which 6551 UART is addressed at \$FF68 through \$FF6B.

## Substituting EPROMs

**Q** Can I put a 28-pin EPROM in a Radio Shack disk controller that has a 24-pin ROM socket in it?

Ted Jaeger (TEDJAEGER)  
Fulton, Missouri

**A** No, not without some modifications or adapters. Almost all 28-pin EPROMs for the CoCo are of the 2764 or 27128 variety. These require rewiring of a couple of address and power lines in order to connect properly to the 24-pin ROM socket in Radio Shack disk controllers issued prior to the FD-502 controller. Art Flexser of Spectro-Systems sells an adapter that does the job of adapting a 28-pin 2764 or 27128 for a disk controller that has a 24-

pin ROM in it. I have used these and recommend them. I have also made the adaptation myself by desoldering the old socket, cutting some traces and adding jumpers. The home-brew adaptation I made looked a little nicer than Art's adapter, but was a great deal of trouble and rather time consuming.

Motorola used to make a 68766 EPROM that is pin-for-pin compatible with the 24-pin ROM socket in older Radio Shack disk controllers. These have not been made for years, but some suppliers still carry them. The 68766 is several times more expensive than the cheap and widely available 2764 and 27128 EPROMs. Texas Instruments also used to make a 28-pin 2564 EPROM. This variant 28-pin EPROM could be made to fit into a 24-pin 8K ROM socket (with the outer four pins overhanging the socket) with only a jumper or two on top of the chip. The 2564, however, has also been discontinued and is even harder to find than the 68766. If you have any 2564 chips lying around (and the means to program them), all you do after programing them is short pins 1, 24 and 28 together, and short pins 2, 14 and 27 together. This pulls Vpp and Vcc high, and pulls \*CS1 and \*CS2 low. Then put the chip into the 24-pin ROM socket with pins 1, 2, 27, and 28 overhanging the socket. Note, too, that on some Radio Shack controllers there are two socketed 24-pin chips. Only one of these is the ROM chip. The other chip, a Western Digital WD1773, is the disk controller chip. Do not attempt to replace that chip with an EPROM!

## Using Digital RGB Monitors

**Q** I have a vintage 1982 NEC RGB color monitor. It has an odd-shaped connector on it (not a DB-9) and a positive/negative sync switch. How do I make a

cable to connect it to a Color Computer? Where do I find the required connectors?

Edward L. Krause (BIRTHDAYBOY)  
Santa Cruz, California

**A** Given your description and the vintage of the monitor, I speculate your monitor has a rectangular eight-pin connector on it. This was once a standard for CGA-type RGB monitors, although it also was used for pre-CGA digital RGB monitors that could display only eight colors (they lacked an intensity line). Looking at the business end of the male connector, the pin-out is as follows:

Gnd	I
Gnd	red
H	green
V	blue

where I is intensity, H is horizontal sync and V is vertical sync.

As you may know, you can hook a CGA monitor to a CoCo 3 by hooking all like-named pins together and ignoring the intensity line. This will get you six colors plus black and white in most cases, but not the full 64 colors that the CoCo 3 is capable of displaying. For 64 colors you have to get inside the monitor and make modifications to remove the digital input circuitry and provide an analog input. Use the positive sync selection for the sync inputs. The 10-pin IDC female connector needed to make a cable that plugs into the CoCo 3 is available from Jameco in Belmont, California, but that company has a \$50 minimum per order. It also is available from JDR in San Jose, California. JDR has not yet to my knowledge instituted a minimum order, although they charge handsomely for ship-

---

*Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*



ping and handling on small orders. Delphi members should note that I have lots of spare 10-pin IDC female RGB connectors, and I will happily arrange to get you one cheaply if you contact me via Delphi mail.

### Finding the Right Pin

**Q** How can I find Pin 37 on my disk controller's 40-pin edge connector so I can properly connect my SpectroSystems 28-to-24-pin EPROM adapter? How can I get at the data in Rad Warrior and Robocop to use with the programs from Delphi that allow me to put those ROM packs on disk?

George Quellhorst  
Painesville, Ohio

**A** Hold the disk controller so that you are looking down on the component side of the controller circuit board, with the 40-pin edge connector pointing away from you and the 34-pin (disk-cable) edge connector toward your chest. The traces on the component side of the 40-pin edge connector are all odd numbered. Pin 1 is at the extreme right, and Pin 39 at the extreme left.

Both *Rad Warrior* and *Robocop* have memory-manager circuits. I actually consulted with Epyx on the design of the memory manager for *Rad Warrior*. With *Rad Warrior*, setting Bit 0 at \$FF40 selects between one of two 16K banks in the 32K byte ROM that it uses. That is, POKE &HFF40, 1 selects the lower bank and POKE &HFF40, 2 selects the upper bank. *Robocop* also uses a bank selector, but it has (if I remember correctly) four 32K banks that can be selected. The lower two data bits in *Robocop* control bank selection, selecting between those four banks. Thus poking 0, 1, 2 or 4 into \$FF40 selects different banks of this ROM pak. *Robocop* is interesting, by the way, in that it uses a 1-megabit (128K-byte) ROM, which is four times larger than any other ROM pak commercially produced for the Color Computer. For more information about higher-capacity ROM paks, see "Breaking the 32K Barrier" (June 1990, Page 58) by Greg Zumwalt.

### ROM Paks and Multi-Paks

**Q** What are the limitations on the size of a ROM pak that you can use with the Color Computer? How many different types of Multi-Paks were made by Radio Shack for the Color Computer? Were any made specifically for the CoCo 3? How can I tell if a Multi-Pak has been upgraded for a CoCo 3? Can I use an RS-232 pak in some slot other than Slot 1 of the Multi-Pak?

Charles Pelosie (CPELOSIE)  
Piscataway, New Jersey

## The Rainbow Bookshelf

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<input type="checkbox"/> Rainbow Adventures Tape (first)	<del>\$ 7.95</del> \$ 2.00	_____
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<input type="checkbox"/> Third Adventure Package with Tape	<del>\$21.90</del> \$11.95	_____
<input type="checkbox"/> Third Adventure Package with Disk	<del>\$26.90</del> \$12.95	_____
<input type="checkbox"/> <b>The Fourth Rainbow Book of Adventures</b>	<del>\$10.95</del> \$ 7.95	_____
<input type="checkbox"/> Fourth Adventures Tape	<del>\$ 9.95</del> \$ 6.95	_____
<input type="checkbox"/> Fourth Adventures Disk	<del>\$14.95</del> \$11.95	_____
<input type="checkbox"/> Fourth Adventure Package with Tape	<del>\$20.90</del> \$13.90	_____
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<input type="checkbox"/> <b>A Full Turn of the Screw</b>	\$19.95	_____
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**A** The CoCo 1 and 2 can directly address nearly 16K bytes of ROM data (actually 16K less 256 bytes). The CoCo 3 is designed so it can directly address up to a full 32K bytes of ROM data (though to get the final 512 bytes you have to do some rather sneaky manipulation of the memory management unit in the GIME chip). However, if you add simple bank-select circuitry to the ROM pak (as was done with *Robocop*), you can arrange for any CoCo to address virtually any amount of ROM data. For example, a bank-select circuit consisting of two 30-cent TTL logic chips can be used to allow a CoCo 3 to address a full 512K bytes of ROM. With slightly more complex bank-select circuits, many megabytes of ROM data can be addressed.

Only two types of Multi-Pak Interfaces were made by Tandy for the Color Computer: Cat. No. 26-3024 and Cat. No. 26-3124. No Multi-Paks were made specifically for the CoCo 3. Both the 26-3024 and the 26-3124 Multi-Paks require upgrades to work properly with a CoCo 3. What is confusing is that the 26-3024 was issued first in a gray plastic case, then later in a white plastic case. The circuit boards inside these cases, however, are identical. The gray-case version tended to be supplied with an older revision of the PAL chip that literally prevented them from working with a CoCo 3 when the disk controller was in Slot 4. The PAL in the white-case version usually allows them to appear to work with a CoCo 3, although these white-case models still require an upgrade for proper, reliable operation.

If you have the newer, smaller 26-3124 Multi-Pak, just look inside it to see if a satellite circuit board has been added. If so, it has been upgraded. Otherwise you need to upgrade the unit before using it with a CoCo 3. We have posted the instructions on Delphi for making and installing an upgrade board).

It is somewhat more difficult to tell if the 26-3024 Multi-Pak has been upgraded. There is one socketed 20-pin chip, the PAL chip, on the motherboard. Tandy originally supplied these Multi-Paks with a 14L4 PAL chip. When Tandy issued the upgrade PALs to allow operation with the CoCo 3, they used Synertec PLHS18P8 PAL chips with brown paper dots stuck to them. (Any PALs I have supplied to CoCo PRO! have a sticker indicating they are for use with the CoCo 3.) A PAL chip is like an EPROM in that chips with the same part number can be burned with different internal data. I have uploaded to Delphi the logic equations and fuse maps for burning 14L4 and 16V8 PALs to upgrade the 26-3024 Multi-Pak for the CoCo 3. These can be found in the

Hardware Hacking section of the CoCo SIG database.

Most Disk BASIC programs do not care which Multi-Pak slot the RS-232 Pak is in. *Ultimaterm* and *Coterm* are exceptions because they make use of the \*CART interrupt, which is slot dependent. All OS-9 software cares very much which slot the RS-232 Pak is in because OS-9 drivers always require use of the \*CART interrupt. Note that most programs that use the \*CART interrupt have a means of telling the program to look for the RS-232 Pak in a different slot. Alternatively, you can strap the interrupt pins on your Multi-Pak (short together all the Pin 8's of the 40-pin connectors), as most OS-9 users do. If you do this, it will not matter at all in which slot you put the RS-232 Pak, even with OS-9. Strapping the interrupt lines on the Multi-Pak can also eliminate certain sources of intermittent crashes and lost characters when using serial communications with OS-9.

### Soundless CoCo

**Q** *The sound on my CoCo 3 has failed. The problem is in the CoCo 3, not my CM-8—when I hook a different CoCo 3 to the CM-8, I get sound. I have a Tandy service manual for the CoCo 3, but lack the equipment needed to diagnose the problem. Can you advise me about what chip is most likely to be the cause?*

*Ralph W. Brown  
Buffalo Grove, Illinois*

**A** If you have the service manual for the CoCo 3, you have the schematic diagram for the CoCo 3. The sound circuit for the CoCo 3 is quite linear, and so rather trivial to check out. Although an oscilloscope is handy, a simple VOM and a Radio Shack speaker/amplifier (Radio Shack Cat. No. 277-1008) is really all you need. Use the speaker/amplifier as an audio signal tracer, with ground hooked to the ground on the CoCo, and the signal-in pin as the signal tracer probe. Or you can actually use the CM-8's speaker the same way if you stick some wires into its 10-pin connector. Just remember that pins 1 and 2 of the CM-8's connector are ground and Pin 7 is the audio input. Now write a one-line BASIC program that produces a steady tone, such as 10 SOUND 100,10:GOTO 100 and run it.

Connect the audio input to the audio output jack on the CoCo. If you get sound, there is a problem with the trace that connects Pin 7 of the RGB connector to the audio output RCA jack. Restore that trace with a jumper wire. If you don't get sound, check the emitter of Transistor Q7. The fault could still lie in IC4 (the 68B21 PIA), but an isolated sound problem caused by

the PIA chip is rather unusual. Check Pin 11 of IC4 for the presence of sound.

Note that if you do not know how to use a VOM and an audio signal tracer, you would do best to turn this repair over to someone who does. Scatter-shot replacement of components and chips is not usually a wise or productive approach to electronic repair. Indeed, in some cases no components are bad, and instead the problem is a broken trace or a cold solder joint. In that case, replacement of components results in replacing one good component with another. This is a waste of time and money, and risks further damage to the computer.

### RS-232 Pak Upgrades

**Q** *Do I need to change the crystal in a Radio Shack RS-232 Pak or modify it in any other way to allow it to operate properly with a CoCo 3?*

*Allen Bourdon (BOURDON)  
Dallas, Texas*

**A** No. Most Radio Shack RS-232 Paks work fine off the shelf with no modifications when used with a 2-MHz CoCo 3. On very rare occasions the RS-232 Pak's 6551 chip, which is rated for operation at no faster than 1MHz, will have trouble working with a 2-MHz CoCo 3. The symptom is occasional lockups or lost characters when using telecommunication programs, especially with OS-9. If you suspect such a problem, remove the 6551 and replace it with a 6551A, which is rated by the manufacturer to operate up through 2-MHz bus-cycle speeds. Note that the bus-cycle speed at which the 6551 operates has absolutely nothing to do with the baud, which is controlled by a separate 1.8432-MHz crystal in the RS-232 Pak.

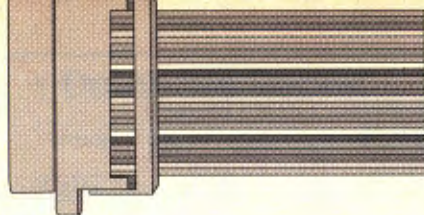
Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

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.





# Editing Submissions II

by **Eddie Kuns**  
OS-9 SIG Database Manager

**L**ast month we covered several of the easier (and more commonly used) editing commands. Let's jump right back into editing the submission. Before executing any of these commands, of course, you must be at the EDIT> prompt. I'll start with one of the more esoteric commands — one rarely used, but very useful:

EDIT> **rearrange**

Which item (? for list): ?

```
1 AR BINARY (Size: 13312 Count: 437)
2 AR DOCUMENTATION (Size: 5732 Count: 360)
```

```
3 AR SOURCE (Size: 14592 Count: 189)
```

Which item (? for list): **3**

After which item (? for list, 0 for beginning): **0**

Here I moved the third item (AR SOURCE) to the top so that it appears first in the file-description listing.

EDIT> **rearrange**

Which item (? for list): ?

```
1 AR SOURCE (Size: 14592 Count: 189)
2 AR BINARY (Size: 13312 Count: 437)
3 AR DOCUMENTATION (Size: 5732
```

---

*Eddie Kuns is pursuing a doctorate in physics at Rutgers University. He lives in Aurora, Illinois, and works as a programmer and researcher at Fermilab. Eddie is the OS9 Online database manager; his username is EDDIEKUNS.*

Count: 360)

Which item (? for list): **1**

After which item (? for list, 0 for beginning): **3**

I then changed my mind and moved it back to its original location. Notice that the files are renumbered starting at 1 each time you rearrange items. The REARRANGE command is often useful when you batch upload several files that arrive in ASCII order, not numerical order. For example, if you batch upload FILE1.TXT through FILE15.TXT, the files may arrive in the order FILE1.TXT, FILE11.TXT, FILE15.TXT, FILE2.TXT, FILE9.TXT, etc. Several rearrange commands can fix the order of the files so they appear in a more logical order. Now I've decided to add another file to the group.

EDIT> **copy**

Item edit cleanup. Please wait.

You have uploaded the following so far:

```
1 AR BINARY (Size: 13312)
2 AR DOCUMENTATION (Size: 5732)
3 AR SOURCE (Size: 14592)
```

Database Submit Menu:

```
Choose Upload Protocol
Upload File 4
Batch Upload Files
Review-edit Group
Copy File 4 from Workspace
Help
Exit
```

SUBMIT>

The COPY command in the Edit menu brings you to the Database Submit menu.

The UPLOAD command does the same thing. You can now upload or copy a new file from this menu.

SUBMIT> **copy**

Workspace filename for file 4:  
**new\_file.txt**

Delete the file during the submit?  
(Y/N) **no**

Download Filename: **new\_file.txt**  
Title: **new file for demonstration**  
Copying "NEW\_FILE.TXT".

When you have no more files to submit, press CTRL-Z. Enter a question mark (?) if you need assistance.

Workspace filename for file 5: **^Z**

I just copied an additional file into the group from my workspace. Follow a similar sequence of events to upload a new file rather than copy it from your workspace. This was the only additional file I wanted to upload, so I pressed CTRL-Z. But I do want to review (and/or edit) the group to make sure everything is OK.

SUBMIT> **review**

Name: AR V1.3: FILE ARCHIVING UTILITY  
Type: PROGRAM  
Date: 9-OCT-1990 22:07 by DODGECOLT

A new version of the popular AR archiving utility. Completely compatible with previous versions. This version now stores file attributes.

Topic: Applications (6809)

Keywords: ARCHIVERS, DODGECOLT, AR



## Contents:

```
1 AR BINARY (Size: 13312 Count:
437)
2 AR DOCUMENTATION (Size: 5732
Count: 360)
3 AR SOURCE (Size: 14592 Count:
189)
4 NEW FILE FOR DEMONSTRATION
(Size: 114 Count: 0)
```

Remember that REVIEW displays the group in its current state, and takes you back to the Edit menu.

EDIT> delete 4

```
4 NEW FILE FOR DEMONSTRATION
(Size: 114 Count: 0)
Delete this item?(y/n) yes
```

Here I changed my mind again and decided to delete the new file. If you had trouble uploading a file, use this command to remove the offending item; Delphi doesn't allow you to upload the same file twice, but you can delete the bad file and upload the new one. If you accidentally delete the wrong file, you must upload it again. Before you delete a file, it is a good idea to use REVIEW or SHOW \* to make sure



**Delphi doesn't  
allow you to  
upload the  
same file twice,  
but you can  
delete the bad  
file and upload  
the new one.**

you delete the correct item. If you don't supply an item number on the command line, Delphi prompts you for the item number. You can type ? at this prompt to see your choices.

EDIT> erase

Erase all download names? no

```
-----
February 3, Steven Bjork on Games Programming (10 pm Eastern).
February 10, Eddie Kuns and Tim Kientzle on Using Delphi (10 pm Eastern)
February 19, Jeff Parker on The CoCo Publisher (10 pm Eastern)
-----
Fridays, Rick Adams and Trix on The Art and Science of UUCP (10 pm Eastern)
Saturdays, Paul Jerkatis and Jim Sutemeier on the StG BBS (5 pm Eastern)
Saturdays, Charles West on RiBBS Help/Talk Conference (10 pm Eastern)
Saturdays, Carmen Izzi, Jr. and the authors of AcBBS (10 pm Eastern)
-----
```

Figure 1: Conference Banner

This command is rarely, if ever, used. If you want to clear all download names with one command, this is how you do it. I am now finished with this group so it's time to exit.

EDIT> exit

SUBMIT> ^Z

Do you want to review your submission?  
no

Your submission is complete. The files will now be reviewed by the Database Manager and will be moved to the appropriate topic upon approval. Thank you for your submission.

I left out three commands from the examples above. HELP is obvious — you use this command to ask Delphi about the commands I just demonstrated above. The DESCRIPTION command allows you to edit the group's description; it takes you into the same editor used in Forum. You can add more text to the end of the description or use /LIST or /EDIT, as shown last month for the CHANGE command. The NEXT command works only if you have more than one submission pending and won't necessarily appear in the menu while you are editing.

## Conferences

There are several new weekly conferences, all pertaining to various BBS or networking packages. If you type CONF from the OS-9 or CoCo SIG prompt, you will see the banner shown in Figure 1.

StG BBS, RiBBS, and AcBBS are OS-9 BBS networks that run on the CoCo. Some of these BBS networks also run on OS-9/68000 machines. UUCP is a worldwide network comprised of hundreds of thousands of computers, including CoCos.

## September Uploads

In the OS-9 SIG database, Don Vaillancourt (DONVAIL) uploaded information about the new OS-9 community network that many are trying to form. Brother Jer-

emy (REVVCP) contributed BASIC09 source code for a 3-dimensional X-Windows-style demonstration program. Chris Hyde (CHYDE) released the latest version of his calendar utilities: cal, month and day. cal displays a calendar for the given year; month displays the given month's calendar, and day prints the day of the week for the given day. Tim Taylor (TIMLTAYLOR) contributed a front-end for Pete Lyall's HDKit backup utility.

Darren Kindberg (DKINDBERG) submitted information describing how to run several Epyx games from within GShell: Rogue, Sub-battle Simulator and Koronis Rift. Larry Olson (LARRYOLSON) released an updated version PacOS9 — a better version with more features, including the assembly-language source code.

Jason Bucata (JBUCATA) uploaded a preliminary version of a C program that emulates OS-9/6809 programs. Scott Griepentrog (TREVNIK) released a program that tests if a serial port on your OS-9/68000 machine implements carrier detect. He also released a collection of several other useful utilities. The ar archiver uploaded by Randy Wilson (RANDY-KWILSON) for OS-9/68000 is the same ar archiver commonly used on the CoCo. Paul M. Fitch, Jr. (EMTWO) contributed a recent version of the GNU C compiler — a powerful C compiler that requires a lot of memory.

If you have auto-centering joysticks, Erich Schulman (ESCHULMAN) released a program that may help you align them. You can find this program in the CoCo SIG Utilities & Applications database. Johnny Williams' (DRILLMASTER) guitar chord program shows 192 chords. Robert Newhart (BNEWHART) uploaded a horse-racing game. Michael Trammell (LLEMMART) contributed eight different strategy maps for Oblique Triad's game, Overlord. William Miller (WKMILLER) released SPELLDOWN — a spelling program that uses digitized speech and animation. Andrew Jackson (AJACK) uploaded AUTOMACRO — a program designed to make downloading files using Delphi-term 4.1 macros simpler. □



# Database Report

## OS-9 SIG

### General Information

WINDOW WRITER KEY LISTS  
BOBKEMPER Robert Kemper  
OS9 COMMUNITY NETWORK  
OSK GFX STANDARDS SUGGESTION  
DONVAIL Don Vaillancourt

### Applications (6809)

FIX CLEANUP  
BOBKEMPER Robert Kemper  
THREE D X-WINDOW DEMO  
REVWCP Br. Jeremy, CSJW  
SETDFP: SET DEFAULT PALETTES  
MIKEHAN Mike Hanewinkel  
AC: FIND LOCATION FROM AREA CODE  
JOELHEGBERG Joel Mathew Hegberg  
DISCOPY: ONE STEP "DSAVE"  
DKINDBERG Darren Kindberg  
BANNER MAKER 2.0  
ESCHULMAN Erich Schulman  
CALENDER:UNIX-LIKE CAL. UTILS  
CHYDE Chris Hyde  
JBUDGET 2.0  
DISKNAME:CHANGE DISK VOLUME NAME  
JIMBM Jim Manning  
EASYBACK BACKUP UTIL.  
TIMLTAYLOR Tim Tailor  
JOVE FORMATTED DOCS  
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PAC20S9: PACMAN GAME V2  
LARRYOLSON Larry Olson  
VIEW 4.4  
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JBUCATA Jason Bucata

### 68K-OS9

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PAGAN Stephen Carville  
CD TEST PROGRAM, OSK SERIAL DRIV  
MM1 UTILITIES PAK #1 FROM STG  
TREVNIK Scott Griepentrog  
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--	---	--

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# Novices Niche



## Sine Lines 3 by Mikel Voss

CoCo 3

While transferring files between my many disks, I came across a cute quickie from the past. *Sine Lines* originally appeared in the October 1983 issue of THE RAINBOW (Page 80). After watching the program run for a few minutes, I began to wonder why nobody had rewritten it to take advantage of the CoCo 3's graphics screens. I decided to take the bull by the horns. *Sine Lines 3* is my version of this pretty graphics program, and it provides some colorful twists not available in the original. I hope you enjoy it.

### The Listing: SINLINE3

```
1 'SINE LINES 3
2 'BY MIKEL VOSS
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 PALETTE RGB:POKE 65497,0:HSCR
EEN2:HCLS2:ON BRK GOTO110
20 B=B+I:S=S+.1:D=D+Q
30 Z=RND(8):IF Z=2 THEN 30
40 IF B>250 THEN HCLS2:I=-2:HCOL
OR Z
50 IF D>180 THEN Q=-2
60 IF D<5 THEN Q=2
70 IF B<5 THEN I=2
80 X=(SIN(S)*160)+160
90 HLINE (X,D)-(D,B),PSET
100 GOTO20
110 POKE 65496,0:CLS:END
```

## CoCo Hangman by John Saya

CoCo 3

*CoCo Hangman* is a one-player (you play against the computer) game in which you try to guess a phrase the computer picks. This computerized version of the popular game for youngsters is designed for the CoCo 3.

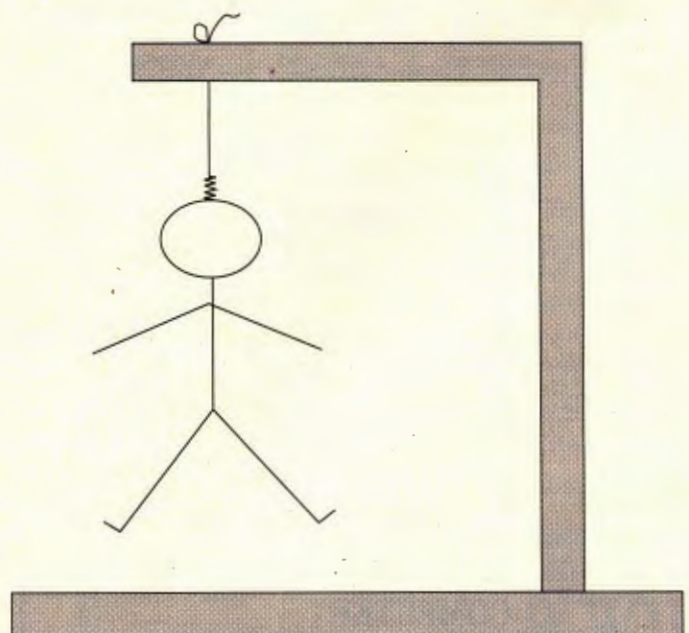
When you run the program, a gallows appears on the right side of the screen. Below the gallows are several dashes indicating how many words are used in

the phrase and how many letters are used in each word. By pressing a key, you can pick a letter from the alphabet that you think might appear in the phrase. If you are successful, the letter is shown wherever it occurs in the hidden phrase. However, if you pick a letter that is not in the phrase, the computer draws a part of a person hanging from the gallows. Keep trying letters until you have guessed the phrase (in which case you win) or the computer has drawn a complete body (you lose). When you win a game, the screen clears and the computer picks a new phrase.

The body the computer draws for incorrect guesses is a stick figure consisting of a head, a torso, two legs and two arms—you get six wrong answers before you lose. On the lower left portion of the screen is a box that shows the incorrect letters you have picked. Multiple attempts with an incorrect letter count as another wrong guess, resulting in another body part being drawn. The phrases the computer chooses are contained in variables A\$(1) through A\$(25) and are defined in lines 60 through 300. Feel free to change them to suit your needs.

### The Listing: COCOHANG

```
1 'COCO HANGMAN
2 'BY JOHN SAYA
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
40 POKE&HE414,0:POKE&HE42A,0
50 POKE65497,0:CLEAR1000:DIMA$(2
5)
60 A$(1)="FLOWER BASKET"
70 A$(2)="GINGER BREAD"
80 A$(3)="MERRY CHRISTMAS"
90 A$(4)="BACON AND EGGS"
100 A$(5)="TOASTED MARSHMALLOWS"
110 A$(6)="ORANGE JUICE"
120 A$(7)="BAKED CHICKEN"
130 A$(8)="FRUIT AND SALAD"
140 A$(9)="BREAD CRUMBS"
150 A$(10)="PAPER DOLLS"
160 A$(11)="COLOR COMPUTER"
170 A$(12)="CORN BREAD"
180 A$(13)="HEALTHY SNACKS"
190 A$(14)="OLIVE OIL"
200 A$(15)="SOUR GRAPES"
210 A$(16)="DISK DRIVE"
220 A$(17)="CORN FLAKES"
230 A$(18)="WHOLE WHEAT BREAD"
240 A$(19)="CARAMEL SWEETS"
250 A$(20)="MEAT AND VEGETABLES"
260 A$(21)="CORN SYRUP"
270 A$(22)="PEANUT BUTTER AND JE
LLY"
280 A$(23)="SUB SANDWICH"
290 A$(24)="LOLLI POP"
```





```

300 A$(25)="SLOPPY JOE"
310 PALETTE CMP
320 HSCREEN2:0=14:I=0:J=0:A$="":B$="":V$=""
330 PALETTE0,0:PALETTE1,63:PALETTE2,18:PALETTE3,36:PALETTE4,11:PALETTE5,7:PALETTE6,31:PALETTE7,9:PALETTE8,38:HCLS 1
340 HCOLOR7,7:HPRINT(15,0),">>>COCO HANG MAN <<<"
350 HCOLOR0,0:HLINE(96,0)-(96,19),PSET
360 HCOLOR0,0:HLINE(96,88)-(0,88),PSET
370 HCOLOR5,5:HPRINT(1,0),"* TRI ES *"
380 HCOLOR4,4:HPRINT(1,12),"* WRONG *"
390 HCOLOR0,0:HLINE(96,9)-(0,9),PSET
400 HCOLOR0,0:HLINE(96,104)-(0,104),PSET
410 HCOLOR0,0:HLINE(96,94)-(0,94),PSET
420 HPAINT(0,89),2,0
430 HCOLOR0,0:HLINE(241,26)-(241,11),PSET
440 HCOLOR0,0:HLINE(241,26)-(229,26),PSET
450 HCOLOR0,0:HLINE(229,26)-(229,17),PSET
460 HCOLOR0,0:HLINE(241,11)-(135,11),PSET
470 HCOLOR0,0:HLINE(229,17)-(144,17),PSET
480 HCOLOR0,0:HLINE(135,11)-(135,167),PSET
490 HCOLOR0,0:HLINE(144,17)-(144,167),PSET
500 HCOLOR0,0:HLINE(106,167)-(172,177),PSET,B
510 HPAINT(240,25),5,0
520 HPAINT(107,168),4,0
530 A=RND(25):A$=A$(A):X=LEN(A$)
540 FORZ=1 TO X:IF MID$(A$,Z,1)=" " THEN B$=B$+" ":NEXTZ ELSE B$=B$+"-":NEXTZ
550 HCOLOR0,0:HPRINT(13,24),B$
560 X$=INKEY$:IFX$="" THEN 560
570 FORZ=1 TO X:IF MID$(A$,Z,1)=X$ THEN 580 ELSE NEXTZ:GOTO590
580 H=13:FORZ=1 TO X:IF MID$(A$,Z,1)=X$ THEN MID$(B$,Z,1)=MID$(A$,Z,1):HCOLOR1,1:HPRINT(H,24),"-":HCOLOR2,2:HPRINT(H,24),X$:H=H+1:NEXTZ:PLAY"T803ADBFCBGA":IF B$=A$ THEN 660 ELSE 700 ELSE H=H+1:NEXTZ:PLAY"T803ADBFCBGA":IF B$=A$ THEN 660 ELSE 700
590 HCOLOR0,0:HPRINT(J,0),X$:J=J+1:GOSUB600:I=I+1:IF I=6 THEN 670 ELSE PLAY"T504B03B02BT101B":IF J=11 THEN J=0:0=0+1:GOTO700 ELSE 700
600 IF I=0 THEN HCOLOR0,0:HCIRCLE(235,54),29:RETURN
610 IF I=1 THEN HCOLOR0,0:HLINE(236,80)-(236,133),PSET:RETURN
620 IF I=2 THEN HCOLOR0,0:HLINE(236,133)-(208,157),PSET:RETURN
630 IF I=3 THEN HCOLOR0,0:HLINE(236,133)-(257,157),PSET:RETURN
640 IF I=4 THEN HCOLOR0,0:HLINE(236,96)-(210,83),PSET:RETURN
650 IF I=5 THEN HCOLOR0,0:HLINE(236,96)-(260,83),PSET:RETURN
660 HCOLOR5,5:HPRINT(19,3),"TERR

```

```

IFIC":SOUND175,25:HCLS1:T=T+1:GOTO60
670 HCOLOR0,0:HPRINT(19,3),"HANGMAN":SOUND100,25:HCLS1:HCOLOR5,5:HPRINT(5,5),"YOU WON":HPRINT(12,5),T:HPRINT(18,5),"GAMES !!!":HCOLOR0,0:HPRINT(10,10),"PLAY AGAIN?"
680 V$=INKEY$:IFV$="" THEN 680
690 IF V$="Y" THEN 50 ELSE WIDTH 32:CLS:POKE65496,0:POKE&HE414,3:POKE&HE42A,3:POKE113,0:EXEC40999
700 HCOLOR1,1:HPRINT(4,5),K:K=K+1:HCOLOR0,0:HPRINT(4,5),K:GOTO560

```

## Pre-fab Arkitekt by Keiran Kenny

### 16K Extended

*Arkitekt* allows you to design simple graphic images using four basic building blocks: a pair of pillars, a solid block, a spire and a dome. When you run the program, a menu showing the four building blocks appears at the top of the screen. Next to one of the blocks is a diamond-shaped cursor. Select a building block by using the arrows to position the cursor and pressing ENTER. The block appears in the drawing area and can be moved with the arrow keys; the blocks are moved in eight-pixel increments. Once you have placed the block where you want it, press ENTER to set it. Otherwise press CLEAR to erase it. Press any key to return to the menu and select another block.

If you move a block over an existing design, the path over which the block moves is erased. You can use this to create special effects, such as openings in solid walls. Keep this in mind, but also remember that you can rebuild erased structures.

When you are finished drawing, return to the menu and press S to save the image. Enter an appropriate filename with eight or fewer characters and the image is saved to disk (if you have a disk drive) or tape. *Arkitekt* automatically defaults to the disk drive if both are connected. To load a picture, press L at the menu and enter the filename. After saving or loading an image, press any key to return to the menu.

The four blocks are drawn in 32-by-32-pixel frames and are stored in arrays named C through F in lines 60 and 80 through 100. In Line 40 an area of blank screen (for use as an eraser) is stored in Array G.

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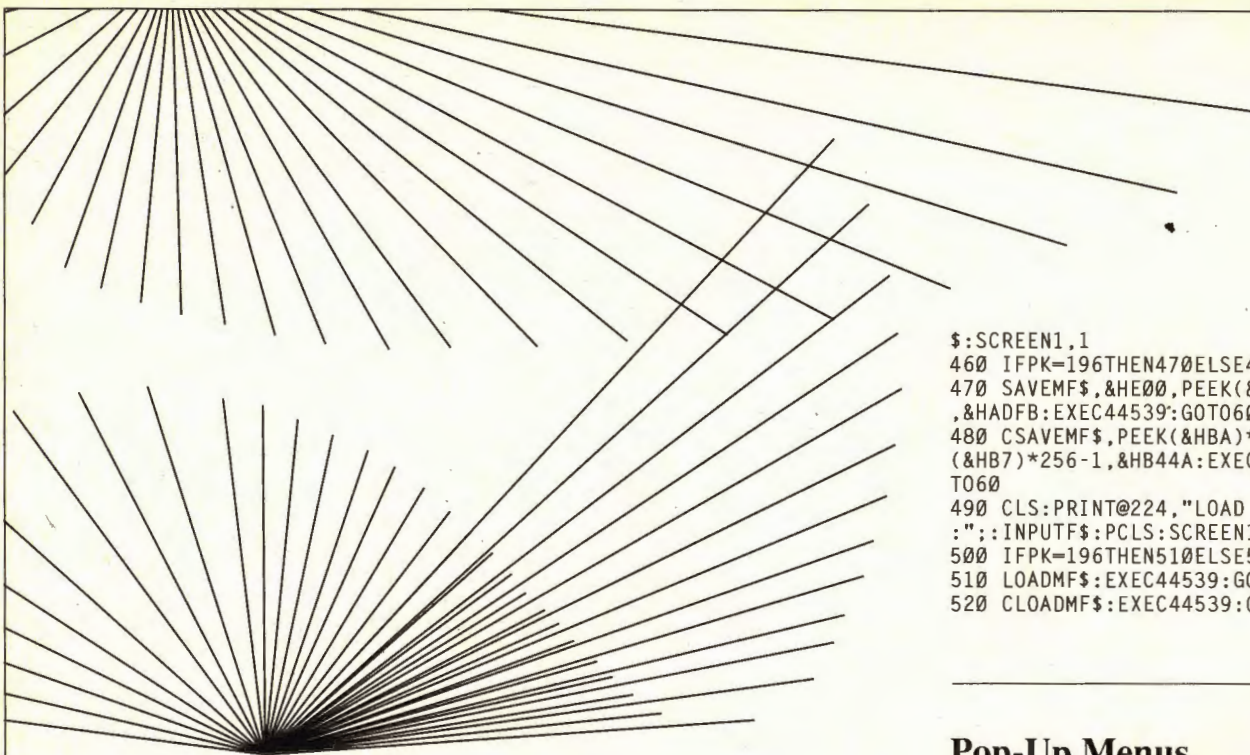
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```

$:SCREEN1,1
460 IFPK=196THEN470ELSE480
470 SAVEMF$, &HE00, PEEK(&HB7)*256
, &HADFB: EXEC44539: GOTO600
480 CSAVEMF$, PEEK(&HBA)*256, PEEK
(&HB7)*256-1, &HB44A: EXEC44539: GO
T060
490 CLS: PRINT@224, "LOAD PIX NAME
: "; INPUTF$: PCLS: SCREEN1,1
500 IFPK=196THEN510ELSE520
510 LOADMF$: EXEC44539: GOTO600
520 CLOADMF$: EXEC44539: GOTO600

```

### The Listing: ARKITEKT

```

1 'ARKITEKT
2 'BY KEIRAN KENNY
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 DIMA(3),B(3),C(38),D(38),E(38
),F(13),G(38)
20 D$="F3G3H3E3":PK=PEEK(&H15F)
30 PMODE4,1:COLOR0,5:PCLS:SCREEN
1,1
40 GET(0,0)-(31,31),G
50 GET(0,0)-(5,6),B
60 DRAW"BM16,31U31R5D31NL5BR21U3
1R5D31NL5":PAINT(18,30),0,0:PAI
T(44,30),0,0:GET(16,0)-(47,47),C
70 DRAW"BM56,16"+D$:PAINT(56,18)
,0,0:GET(53,16)-(59,23),A,G
80 LINE(80,0)-(111,31),PSET,BF:G
ET(80,0)-(111,31),D
90 DRAW"BM144,31NR31M+15,-31M+16
,+31":PAINT(160,30),0,0:GET(144,
0)-(175,31),E
100 CIRCLE(224,15),16,,1,.5,1:CI
RCLE(224,15),10,,1,.5,1:LINE(209
,15)-(214,15),PSET:LINE(234,15)-
(239,15),PSET:PAINT(235,14),0,0:
GET(208,0)-(239,15),F
110 FORX=0TO256STEP64:LINE(X,0)-
(X,31),PSET:NEXT
120 ST=53:N=1
130 K$=INKEY$:IFK$<>CHR$(8)ANDK$
<>CHR$(9)ANDK$<>CHR$(13)ANDK$<>"
S"ANDK$<>"L"THEN130
140 IFK$="L"THEN490
150 IFK$="S"THEN450
160 IFK$=CHR$(13)THEN240
170 IFK$=CHR$(9)THENST=ST+64:GOT
O180ELSE200
180 IFST>245THENST=245:GOTO230
190 PUT(ST-64,16)-(ST-58,23),B,P
SET:PUT(ST,16)-(ST+6,23),A,PSET:

```

```

N=N+1:GOTO230
200 IFK$=CHR$(8)THENST=ST-64
210 IFST<53THENST=53:GOTO230
220 PUT(ST+64,16)-(ST+70,23),B,P
SET:PUT(ST,16)-(ST+6,23),A,PSET:
N=N-1
230 GOTO130
240 X=112:Y=32
250 IFN=4THENPUT(X,Y)-(X+31,Y+15
),G ELSEPUT(X,Y)-(X+31,Y+31),G,P
SET
260 IFN=4THENLL=176ELSELL=160
270 IFPEEK(341)=247THENY=Y-8
280 IFPEEK(342)=247THENY=Y+8
290 IFPEEK(343)=247THENX=X-8
300 IFPEEK(344)=247THENX=X+8
310 IFX<0THENX=0
320 IFX>224THENX=224
330 IFY<32THENY=32
340 IFY>LL THENY=LL
350 IFN=1THENPUT(X,Y)-(X+31,Y+31
),C
360 IFN=2THENPUT(X,Y)-(X+31,Y+31
),D
370 IFN=3THENPUT(X,Y)-(X+31,Y+31
),E
380 IFN=4THENPUT(X,Y)-(X+31,Y+15
),F
390 IFINKEY$=CHR$(13)THEN410
400 GOTO250
410 K$=INKEY$:IFK$=" "THEN410
420 IFK$=CHR$(12)ANDN<4THENPUT(X
,Y)-(X+31,Y+31),G ELSEIFK$=CHR$(
12)ANDN=4THENPUT(X,Y)-(X+31,Y+16
),G
430 PUT(ST,16)-(ST+6,23),B,PSET:
PUT(53,16)-(59,23),A,PSET
440 GOTO120
450 K$=INKEY$:FORT=0TO224STEP32:
PUT(T,0)-(T+31,31),G:NEXT:CLS:PR
INT@224,"SAVE PIX NAME:":INPUTF

```

## Pop-Up Menus by Bill Bernico

CoCo 3

If you like to write menu-driven graphics programs, *Pop-Up Menus* can show you how to add a professional touch. The techniques used by *Pop-Up Menus* allow you to place menus over graphics and text already on the screen. Once you choose a selection from the menu, the menu disappears, leaving the original screen intact. Run POPUPMEN to see what I mean. Let's look at how the program works.

Memory for the menus is set aside using the HBUFF command in Line 3. Then Menu 1 is defined (lines 5-10) and stored in a buffer (Line 11). Next, Menu 2 is defined (lines 12-18) and stored (Line 19). Finally, for purposes of this demonstration, a 40-column graphics screen is filled with random ASCII characters using HPRINT. In a true application, the graphics screen can also contain pictures.

In Line 24, the program jumps to the subroutine at Line 31 to place the menu on the screen. Line 31 immediately jumps to Line 33 to get a random set of coordinates (H,V). You can program the menu to pop up at the same location every time, but I want to show that the background stays intact no matter where the menu appears. When control returns to Line 31, the existing text and graphics image where the menu is to be placed is stored in Buffer 3 and the program waits for you to press a key. When you do, Menu 1 is



displayed (Line 25) and the program pauses again. When you press a key while the menu is displayed, the program restores the original screen by replacing the menu with Buffer 3. This gives the impression that the background image was never removed. When you press another key, Menu 2 is displayed in a similar fashion.

I use only two menus in POPUPMEN, but you can use as many as the memory in your CoCo will allow. The menus can also be used on the 80-column graphics screens.

Give these techniques a try in your own BASIC programs. You'll find your creations look like you've been programming for years.

#### The Listing: POPUPMEN

```
1 'POP-UP MENUS
  BY BILL BERNICO
  COPYRIGHT (C) JANUARY 1992
  BY FALSOFT, INC.
  RAINBOW MAGAZINE
2 HSCREEN2:HCLS2:HCOLOR8,4:RGB:P
  OKE65497,0:ON BRK GOTO 35
3 HBUFF 1,1660:HBUFF 2,1660:HBUFF
  F 3,1660:'CREATE THREE STORAGE B
```

```
UFFERS-ONE FOR REGULAR BACKGROUN
D AND TWO FOR MENUS
4 HCOLOR 0:'MENU TITLE #1 WILL B
E GREEN
5 HPRINT(8,1),"MENU #1":'NEXT 5
LINES ARE MENU #1 TEXT
6 HCOLOR1:'MENU TEXT WILL BE YEL
LOW
7 HPRINT(8,2),"S=Save
8 HPRINT(8,3),"L=Load
9 HPRINT(8,4),"P=Print
10 HPRINT(8,5),"2=MENU 2
11 HGET(60,4)-(130,49),1:HCLS3:'
STORE PICTURE OF MENU #1 IN BUFF
ER 1 & CLEAR SCREEN
12 HCOLOR 4:'MENU TITLE #2 WILL
BE WHITE
13 HPRINT(8,1),"MENU #2":'NEXT F
IVE LINES ARE MENU #2 TEXT
14 HCOLOR 5:'MENU TEXT WILL BE L
IGHT BLUE
15 HPRINT(8,2),"1=Sort
16 HPRINT(8,3),"2=List
17 HPRINT(8,4),"3=Append
18 HPRINT(8,5),"4=MENU 1
19 HGET(60,4)-(130,49),2:HCLS4:'
STORE PICTURE OF MENU #2 IN BUFF
ER 2 AND CLEAR THE SCREEN
20 HCOLOR8:'RETURN TO BLACK TEXT
ON WHITE BACKGROUND
21 FOR X=0 TO 23:'HPRINT ON LINE
S 0 THRU 23
22 HPRINT(0,X),STRING$(40,RND(90
)+32):'FILL THE SCREEN WITH RAND
OM TEXT
```

```
23 NEXT X:'COMPLETE LOOP
24 GOSUB 31:'CHOOSE RANDOM LOCAT
IONS & STORE SCREEN BACKGROUND (
WHATEVER THAT MAY BE AT THE TIME
) AND STORE IN BUFFER 3
25 HPUT(H,V)-(H+70,V+45),1:EXEC
44539:'DISPLAY THE PRE-STORED ME
NU #1 & PAUSE
26 GOSUB 32:'REPLACE ORIGINAL BA
CKGROUND WHEN MENU DISAPPEARS
27 GOSUB 31
28 HPUT(H,V)-(H+70,V+45),2:EXEC
44539:'CHOOSE DIFFERENT LOCATION
S & DISPLAY MENU #2 AND PAUSE
29 GOSUB 32
30 GOTO 24:'GO BACK AND PUT MENU
#1 AT ANOTHER LOCATION
31 GOSUB 33:HGET(H,V)-(H+70,V+45
),3:EXEC44539:RETURN
32 HPUT(H,V)-(H+70,V+45),3:RETUR
N:'DISPLAY ORIGINAL BACKGROUND &
GO BACK FOR ANOTHER RANDOM MENU
LOCATION
33 H=RND(249):V=RND(145):'RANDOM
HORIZONTAL & VERTICAL LOCATIONS
FOR MENU TO APPEAR
34 RETURN:'GO BACK
35 POKE65496,0:CLS:END
```

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## Reliable host operation through the CoCo 3's serial port

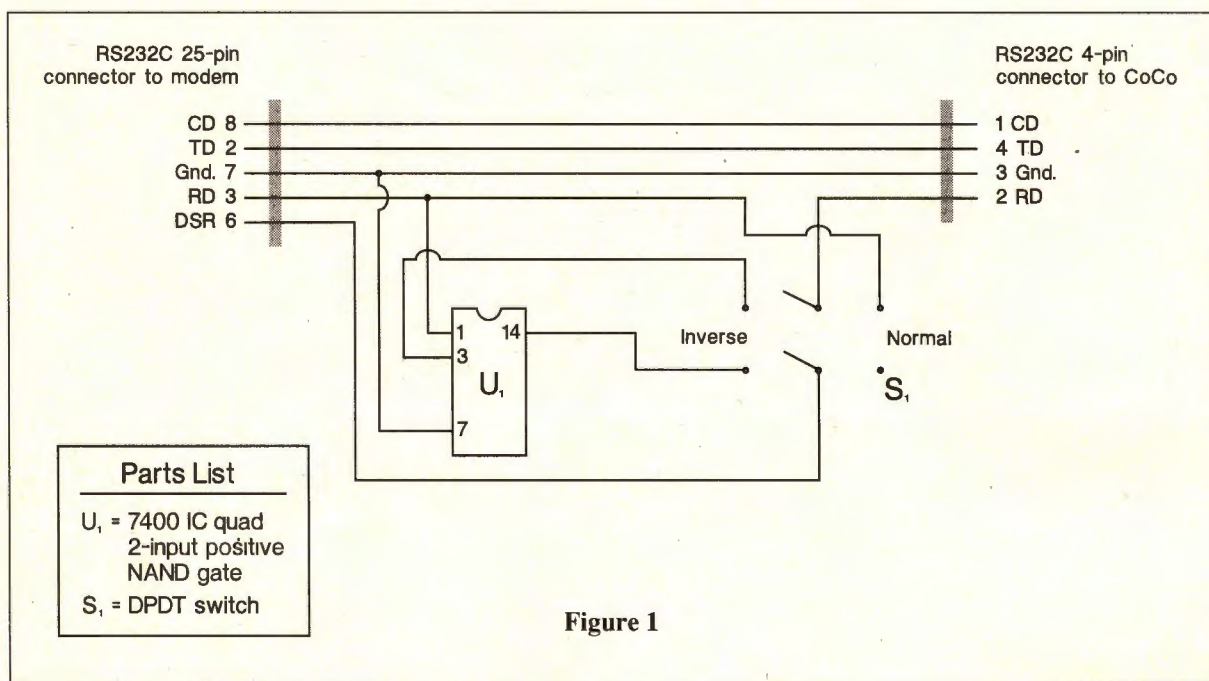


Figure 1

# Interrupt-Driven Serial Communications

by Dan Charrois

**W**riting a BBS program or a simple message base is not as difficult as it may sound. Once the problems of serial I/O and its related timing are addressed, all that remains is to put together a "shell," or user environment. As most CoCo users are

familiar with BASIC, this should not be too big a task. And you can get just as fancy as you need for your own application.

In this article, I present a simple circuit and terminal driver that handle the I/O for you. This hardware/software project enables you to send and receive data reliably via the serial port on the rear of the CoCo 3. The supporting software (the environment) is left to you, giving you the freedom to put together a BASIC system that best suits your needs.

### Technical Basis

Communication through the serial port on the rear of the CoCo has never been totally reliable. Sending data through the port is fairly straightforward, but receiving data poses problems simply because the

computer may not be monitoring the port at the particular moment data starts to arrive. The RS-232 Pak eliminates this problem by dedicating itself to sending and receiving serial data, allowing the computer to retrieve the data at its leisure. However, the high cost associated with the RS-232 Pak, and the fact that it is no longer being produced, has left many CoCo owners searching for alternatives.

For the computer to flawlessly receive data through the serial port with a minimum of hardware requires a monitoring algorithm that uses an interrupt as a trigger for execution. Some software sets the CoCo to interrupt at regular time intervals. By setting the interrupt frequency appropriately, the serial port can be monitored once for every time interval in which its status could

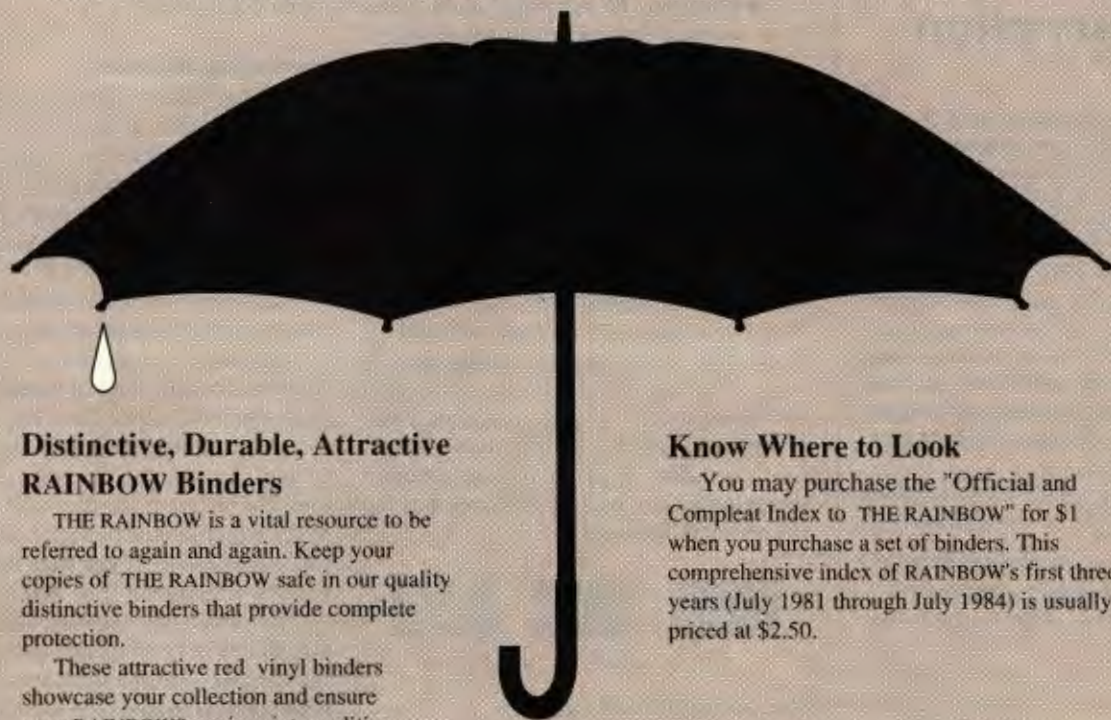
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*Dan Charrois is a third-year faculty member at the University of Alberta, where he teaches computer technology. He operates Astrobases, an Edmonton-based BBS that uses the terminal driver outlined here. Dan can be contacted at Box 75, Legal, Alberta T0G 1L0, Canada, (403) 961-2383. Please include an SASE when requesting a reply.*



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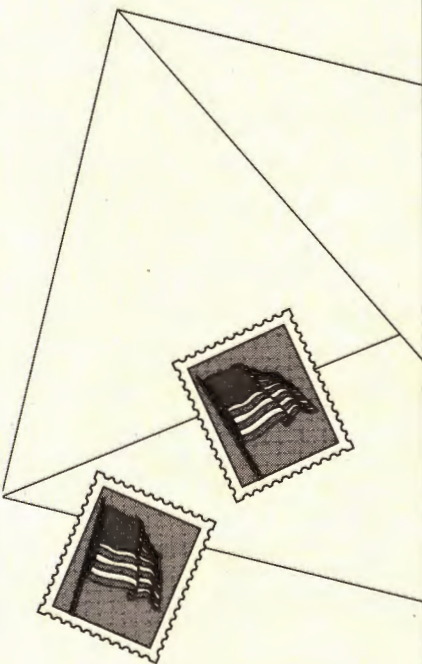


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be changing. This method works quite well for terminal programs. However, these applications usually have a fairly simple foreground task. A foreground task of any complexity (such as operation of a BBS) would be slowed down appreciably by the interrupts, especially at high bps rates.

On the CoCo 3, there is a more reliable way to receive data: The GIME chip provides a serial-input interrupt that is ideal for the application. To make this work, however, we must overcome a minor problem: Modems send a logic One (High) when idle and a Zero (Low) as the start bit for an incoming byte. The computer, on the other hand, interrupts on a logic One — without any modifications, the CoCo would be interrupting continuously while the modem sits idle.

To counter this, I designed the inverter circuitry shown in Figure 1. The circuit requires a minimum of parts and only a slight modification to an existing modem cable. The sole purpose of the circuit is to invert the incoming data. All logic Ones become logic Zeroes and vice-versa. Therefore logic Zero of the start bit is inverted into a logic One, which can be used as the trigger to an interrupt.



### The Inverter Hardware

The DPDT switch shown in Figure 1 allows both inverse and normal operation of the modem with the same cable. This switch controls the power to the IC. This conserves power under normal operation. Alternatively an SPDT switch could be used instead if the IC were wired directly into the power supply.

The IC itself need only be a NOT inverter. I used a 7400 (Quad Two-input Positive NAND), wired as an inverter, since it is easy to obtain. However, a less complex IC could be used as long as it performs the NOT operation. To power the IC, I chose to

tap into the 5 volts produced by my modem between the signal ground and data set ready pins, but virtually any 5-volt source can be used.

One further point should be made: If both your printer and modem are connected to the serial port simultaneously, the printer must be turned off while operating the inverter circuitry — it cannot simply be placed "offline." Otherwise interrupts will occur continually.

### Supporting Software

Listing 1 shows the assembly-language source code for a driver that allows the computer to operate as a simple "host." It lacks many of the bells and whistles found in some other terminal drivers, but operates reliably. BBS programs can use the routine as their terminal driver.

The driver is well-commented, but a little further explanation may help clarify some details of its operation. The algorithm provides for buffering of incoming data. If the computer does not have immediate time to read a character before another is received, the second character will not be lost. The program sets the buffer size at 256 bytes, which should be sufficient for almost every application. If you want more, change the RMB directive in Line 300.

The driver patches the INPUT, LINEINPUT and PRINT commands to use the interrupt-driven communications. Use these commands from within a BASIC program to receive and send information via the modem. In addition, INPUT and LINEINPUT are patched to disable filtering of the escape (ESC) character, and thus allow ANSI graphics (a protocol becoming more and more popular on bulletin board systems). In addition, you can generate an ESC from the keyboard by pressing SHIFT-BREAK, a feature that is not normally operational under BASIC. It should be noted that this program does not enable viewing of ANSI graphics on the host screen, but if you have an ANSI driver, it should work with the program.

CoCo 3

#### Listing 1: DANTERM.ASM

```
00100      ORG      3584      WE'LL USE PAGE 1 OF GRAPHIC MEMORY
00110      *****
00120      *INTERRUPT-DRIVEN SERIAL COMMUNICATIONS
00130      *      BY DAN CHARROIS
00140      *YOU MUST HAVE THE CIRCUIT DESCRIBED IN THE*
00150      *ARTICLE FOR THIS PROGRAM TO WORK PROPERLY*
00160      *****
00170      *PLEASE SEND ALL QUESTIONS OR COMMENTS TO:
00180      *DAN CHARROIS
00190      *BOX 75
00200      *LEGAL, ALBERTA
00210      *CANADA
```



```

00220 *T0G 1L0
00230 *****
00240 WRIBUF RMB 2 LOCATION OF WRITE TO BUFFER POINTER
00250 REABUF RMB 2 LOCATION OF READ FROM BUFFER POINTER
00300 BUFFER RMB 256 THE ACTUAL BUFFER ITSELF
00310 START JSR INSTAL SET UP ALL THE RAM HOOKS
00320 LDX #BUFFER START OF BUFFER AREA
00330 STX WRIBUF STORE TO WRITE BUFFER POINTER
00340 STX REABUF AND READ BUFFER POINTER
00350 ORCC #50 DISABLE THE INTERRUPTS FOR NOW
00360 LDX #DOFIRQ SET UP NEW FIRQ HANDLER
00370 STX $110
00380 LDB #27 THE ESCAPE CHARACTER
00390 STB $A27F PATCH KEYBOARD TO GENERATE ESC WITH SHIFT-BRK
00400 STB $A3DA PATCH INPUT TO DISABLE ESCAPE FILTERING
00410 LDX #1212 LOAD X WITH TWO NOPs
00420 STX $F772 ENABLE INTERRUPTS IN 80 COLUMN PRINT
00430 STX $8E0E ENABLE INTERRUPTS DURING SERIAL OUTPUT
00440 LDB #4 SET GIME TO INTERRUPT ON RS232 INPUT
00450 STB $FF93
00460 LDB #5C SET INIZ REG 0 TO ALLOW GIME FIRQs
00470 STB $FF90
00480 ANDCC #5AF RE-ENABLE ALL INTERRUPTS
00490 RTS AND RETURN TO NORMAL EXECUTION
00500 *****
00510 * ACTUAL RS232 INTERRUPT SERVICE ROUTINE *
00520 *****
00530 DOFIRQ PSHS A,B,X SAVE REGISTERS WE'LL BE USING
00540 BSR PAUSE1 START BIT RECEIVED, SO WAIT 1/2 BIT TIME
00550 LDB #1 WE'LL BE RECEIVING BIT 0 FIRST
00560 PSHS B TUCK IT AWAY
00570 CLRA INITIALIZE CHARACTER BEING RECEIVED TO 0
00580 LOOP2 BSR PAUSE2 WAIT FULL BIT TIME
00590 LDB $FF22 CHECK THE SERIAL PORT
00600 RORB ROLL THE BIT RECEIVED INTO CC
00610 BCS ZERO IF BIT=1 (RE-INVERT CHARACTER AS WE GO)
00620 ORC #S IF RECEIVING 0, SET APPROPRIATE BIT IN A TO 1
00630 ZERO LSL #S GET READY TO RECEIVE THE NEXT BIT
00640 BHS LOOP2 IF WE HAVEN'T RECEIVED ALL 8 BITS, RECEIVE NEXT
00650 LEAS 1,S IGNORE THE BYTE WE PUSHED ONTO THE STACK
00660 LDX WRIBUF GET WRITE BUFFER POINTER
00670 STA #X+ PUT CHARACTER INTO THE BUFFER
00680 CMPLX #START HAVE WE FILLED UP THE BUFFER YET?
00690 BLO WRIOK IF NOT, WE'RE OK
00700 LDX #BUFFER OTHERWISE START AT THE BEGINNING OF THE BUFFER
00710 WRIOK STX WRIBUF STORE NEW WRITE BUFFER POINTER LOCATION
00720 CMPLX REABUF ARE WE GOING TO OVERWRITE DATA NEXT TIME?
00730 BNE LOOP4 IF NOT, DO NOTHING
00740 LDX REABUF OTHERWISE, BUMP THE READ BUFFER POINTER UP
00750 LEAX 1,X LETS US ALWAYS HAVE THE FULL BUFFER FOR STORAGE
00760 CMPLX #START ARE WE AT THE TOP OF THE BUFFER?
00770 BLO LOOP6 IF NOT, DON'T WORRY ABOUT IT
00780 LDX #BUFFER ELSE, START AT THE BEGINNING OF THE BUFFER AGAIN
00790 LOOP6 STX REABUF UPDATE THE READBUFFER POINTER
00800 LOOP4 LDB $FF22 CHECK THE SERIAL PORT
00810 RORB ROLL BIT INTO CC
00820 BCS LOOP4 IF THE STOP BIT ISN'T THERE YET, CONTINUE WAITING
00830 CLR $FF93 RE-ENABLE THE RS232 INTERRUPT
00840 LDB #4
00850 STB $FF93
00860 PULS A,B,X PULL BACK THE REGISTERS SAVED
00870 RTI RETURN FROM THE INTERRUPT
00880 PAUSE2 BSR PAUSE1 THIS EXECUTES PAUSE1 TWICE
00890 PAUSE1 PSHS A TUCK AWAY THE REGISTER WE'RE USING
00900 LDA $E6 DETERMINE THE BAUD RATE CONSTANT FOR 1/2 BIT
00910 LOOP3 BRN LOOP3 FINE-TUNE DELAY INTERVAL
00920 DECA DECREASE THE BAUD RATE COUNT
00930 BNE LOOP3 IF WE'RE NOT AT ZERO, KEEP GOING
00940 PULS PC,A BRING BACK A, AND CONTINUE WHERE WE LEFT OFF
00950 *****
00960 *INSTALLATION ROUTINE*
00970 *****
00980 INSTAL LDA #40 FIRST, SET THE BAUD RATE TO DEFAULT AT 1200
00990 STA $E6
01000 LDX $168 CHECK OUT THE CURRENT HOOKS
01010 CMPLX #PRINT ARE THEY ALREADY IN PLACE?
01020 BEQ RETURN IF SO, FORGET ABOUT CHANGING THEM
01030 STX PROUT+1 IF NOT, INSTALL THEM AT THE END OF THIS MOD.
01040 LDX #PRINT TAKE THE START ADDRESS OF THE MODIFICATION
01050 STX $168 AND PUT IT IN THE RAM HOOK FOR PRINT
01060 LDX $16B NOW, TAKE THE INPUT RETURN LOCATION
01070 STX INOUT+1 AND PUT IT AT THE END OF THE INPUT MODIFICATION
01080 LDX #INPUT TAKE THE START ADDRESS OF THE INPUT MOD.
01090 STX $16B AND PUT IT IN THE INPUT RAM HOOK
01100 LDX #CHRN ROUTINE TO RECEIVE ONE CHARACTER AT A TIME
01110 STX $96F DEFINE THIS AS USR8
01120 LDX #CHROUT ROUTINE TO SEND ONE CHARACTER TO THE MODEM
01130 STX $971 DEFINE THIS AS USR9
01140 RETURN RTS THAT'S IT FOR NOW
01150 *****
01160 *THE PRINT PATCH*

```

The driver adds two "commands": USR8 and USR9. The command line

A=USR8(0)

causes Variable A to take on the value of the ASCII code for the last character received from the modem. If no character is received, A equals zero. USR8 operates as a type of modem-exclusive INKEY\$. The command line

A=USR9(C)

where C is the ASCII code of a character, causes the character to be sent exclusively to the modem and not the screen. This is handy for sending control commands to the modem that look messy onscreen. Both of these USR commands need not have their execution addresses defined from BASIC — this is handled by the machine-language program.

Upon execution, the terminal driver defaults to 1200 bps. This can easily be changed at any time with a POKE statement: POKE &HE6,180 sets the driver to 300 bps, and POKE &HE6,40 sets it to 1200 bps.

### Up 'n' Running

To create the machine-language driver, enter and assemble the source code in Listing 1. Alternatively, you can use the BASIC program in Listing 2 to create the machine-language driver and save it to disk as DANTERM.BIN.

To execute DANTERM, use LOADM and EXEC&HF04 from within a BASIC program to initialize the system. Note: The execution address will be different if you assemble DANTERM using a different buffer size. As written, the software doesn't support the 32-column screen — you must be using 40 or 80 columns for the driver to work properly. Otherwise you'll get a garbled mess on your screen upon execution of the driver.



After the EXEC command is executed, if the BASIC program stops execution and the system returns to the command mode, the interrupts are reset and incoming communication is disabled. This was left unpatched in order to provide a type of security for BBS systems. If a user manages to drop into the command mode, by error or otherwise, he can no longer communicate with the host. Also related to BBS security, Control-C and BREAK are left enabled. Those wanting to disable these commands can modify the source code or use the ON BRK command.



```

01170 *****
01180 PRINT PSHS B,A SAVE A BIT OF THE ENVIRONMENT
01190 TST $6F SEE WHAT DEVICE WE'RE PRINTING TO
01200 BNE PR2 IF NOT PRINTING TO THE SCREEN, RESUME
01210 JSR $8E0C OTHERWISE, SEND DATA OUT THE SERIAL PORT
01220 PR2 PULS B,A PULL BACK THE ENVIRONMENT
01230 PROUT JMP $FFFF CONTINUE NORMAL PRINT OPERATION
01240 *****
01250 *THE INPUT PATCH*
01260 *****
01270 INPUT CLR $70 TELL INPUT THAT THERE IS SOMETHING LEFT
01280 TST $6F ARE WE INPUTTING FROM NORMAL CHANNELS?
01290 BNE INOUT IF NOT, RESUME NORMAL INPUT OPERATION
01300 LEAS 2,S LET'S MODIFY THE STACK A BIT
01310 PSHS X,B,CC
01320 POLL JSR [$A000] CHECK THE KEYBOARD FIRST
01330 BNE PULRET IF WE HAVE SOMETHING, TELL INPUT ABOUT IT
01340 BSR LOOKBF BRANCH TO THE LOOKBUFFER SUBROUTINE
01350 BEQ POLL IF NOTHING HERE EITHER, KEEP LOOKING
01360 BRA PULRET OTHERWISE, TELL INPUT ABOUT IT
01370 LOOKBF LDX REABUF WHERE ARE WE IN THE READING BUFFER?
01380 CMPX WRIBUF ARE WE CAUGHT UP?
01390 BNE LOOKB2 IF NOT, GET THE CHARACTER
01400 CLRA ELSE, CLEAR THE REGISTER
01410 RTS AND RETURN
01420 LOOKB2 LDA X+ GET THE CHARACTER FROM THE BUFFER
01430 CMPX #START IS OUR BUFFER POINTER AT THE END OF THE BUFFER?
01440 BLO LOOKB3 IF NOT, DON'T WORRY ABOUT IT
01450 LDX #BUFFER AND IF SO, START AT THE BEGINNING AGAIN
01460 LOOKB3 STX REABUF STORE THE NEW BUFFER POINTER
01470 TSTA RESTORE CC TO THE STATUS OF A
01480 RTS AND RETURN
01490 PULRET PULS X,B,CC,PC RE-ENTRY PROCEDURE IF WE FOUND SOMETHING
01500 INOUT JMP $FFFF AND RE-ENTRY PROCEDURE IF WE DIDN'T
01510 *****
01520 *THIS ROUTINE POLLS THE KEYBOARD AND BUFFER FOR ONE *
01530 *CHARACTER AT A TIME. TO USE, TYPE A=USR8(0), AND 'A' *
01540 *WILL EQUAL THE ASCII CODE OF THE LAST CHARACTER *
01550 *RECEIVED (OR 0 IF NONE) *
01560 *****
01570 CHRIN JSR [$A000] CHECK THE KEYBOARD FIRST
01580 BNE FOUND IF SOMETHING WAS PRESSED
01590 BSR LOOKBF CHECK OUT THE BUFFER
01600 FOUND TFR A,B MAKE D=A
01610 CLRA "
01620 JMP $B4F4 PUT D INTO FPAC1, THEN RETURN TO BASIC
01630 *****
01640 *THIS ROUTINE SENDS A SINGLE ASCII CHARACTER TO THE *
01650 *MODEM BUT NOT THE SCREEN. TO USE, TYPE A=USR9(C) WHERE *
01660 *'C' IS THE ASCII CODE OF THE CHARACTER YOU WISH TO *
01670 *SEND. ('A' IS JUST A DUMMY VARIABLE) *
01680 *****
01690 CHROUT JSR $B3ED GET THE NUMBER FROM FPAC1 TO D
01700 TFR B,A PUT THE LSB INTO A
01710 JMP $8E0C SEND THE CHARACTER TO THE MODEM
01720 END START AND THAT'S ALL, FOLKS!

```

## A Caveat

Although the driver provides only for simple communication with a modem, it has performed perfectly in all my tests. The driver is capable of receiving data at full speed without misinterpreting a single character. However, one potential problem area exists: The software gives higher priority to incoming characters than to outgoing characters. Thus, if a character is received by the host while another is being sent, the character leaving may be garbled. The only time this becomes a problem is when a macro or other file is being sent to the host. As the first characters of the macro or file are being echoed by DANTERM, they may be interrupted by the incoming characters. As a result, the calling computer may receive garbled echoes. However, while this may cause some confusion on the part of the caller, the characters are perfectly received by the host.

## Summary

This small hardware/software project could be the impetus for the latest and greatest BBS. Or perhaps your needs aren't that complex. In any case, you should be able to put the commands supported by DANTERM to use in a variety of applications.

Feel free to experiment with and modify the source code. As it is interrupt-driven, the cable circuitry should work with OS-9. However, device drivers and descriptors need to be written. I would appreciate hearing from anyone who makes improvements to the routines. Although I can be reached at many Edmonton-area BBSs, you can send questions or comments to me at the address given above. □



## Listing 2: DANTERMB

```

1 'SERIAL COMM
2 'WRITTEN BY DAN CHARROIS
3 'COPYRIGHT (C) NOVEMBER 1991
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 'BASIC LOADER FOR INTERRUPT-
20 'DRIVEN SERIAL COMMUNICATIONS
30 'BY: DAN CHARROIS
40 'IF YOU DON'T HAVE A DISK
50 'DRIVE, CHANGE THE "SAVEM"
60 'IN LINE 140 TO "CSAVEM"
70 '
80 FORX=&HF04 TO &H1017
90 READA$:A=VAL("&H"+A$):T=T+A
100 POKEA,A
110 NEXTX
120 IFT<>27122THENPRINT" THERE IS
  AN ERROR IN ONE OF THE VALUES I
  N THE DATA LINES":END
130 INPUT"PRESS ENTER WHEN DISK
  IS READY FOR FILE TO BE SAVED";
  E$
140 SAVEM"DANTERM",&HF04,&H1017,
  &HF04
150 END
160 DATA BD,0F,92,8E,0E,04,BF,0E
  ,00,BF,0E,02,1A,50,8E,0F,36,BF,0
  1,10,C6,1B,F7
170 DATA A2,7F,F7,A3,DA,8E,12,12
  ,BF,F7,72,BF,8E,0E,C6,04,F7,FF,9
  3,C6,5C,F7,FF
180 DATA 90,1C,AF,39,34,16,8D,4D
  ,C6,01,34,04,4F,8D,44,F6,FF,22,5
  6,25,02,AA,E4
190 DATA 68,E4,24,F2,32,61,BE,0E
  ,00,A7,80,8C,0F,04,25,03,8E,0E,0
  4,BF,0E,00,BC
200 DATA 0E,02,26,10,BE,0E,02,30
  ,01,8C,0F,04,25,03,8E,0E,04,BF,0
  E,02,F6,FF,22
210 DATA 56,25,FA,7F,FF,93,C6,04
  ,F7,FF,93,35,16,3B,8D,00,34,02,9
  6,E6,21,FE,4A
220 DATA 26,FB,35,82,86,28,97,E6
  ,BE,01,68,8C,0F,C0,27,21,BF,0F,C
  C,8E,0F,C0,BF
230 DATA 01,68,8E,01,6B,BF,10,00
  ,8E,0F,CE,BF,01,6B,8E,10,02,BF,0
  9,6F,8E,10,10
240 DATA BF,09,71,39,34,06,0D,6F
  ,26,03,BD,8E,0C,35,06,7E,FF,FF,0
  F,70,0D,6F,26
250 DATA 2B,32,62,34,15,AD,9F,A0
  ,00,26,1F,8D,04,27,F6,20,19,BE,0
  E,02,BC,0E,00
260 DATA 26,02,4F,39,A6,80,8C,0F
  ,04,25,03,8E,0E,04,BF,0E,02,4D,3
  9,35,95,7E,FF
270 DATA FF,AD,9F,A0,00,26,02,8D
  ,DA,1F,89,4F,7E,B4,F4,BD,B3,ED,1
  F,98,7E,8E,0C

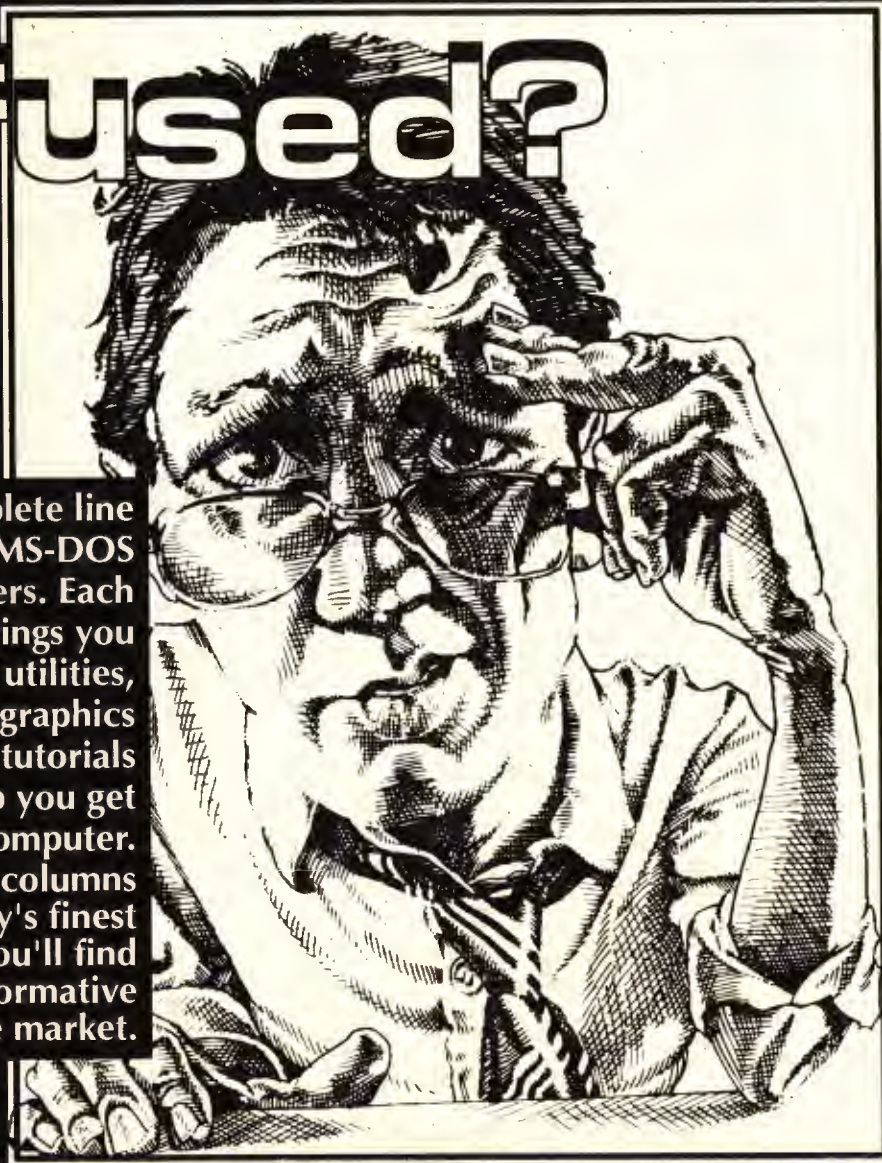
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## Super Boot

*Super Boot* is a nifty utility program designed for any CoCo system with at least 64K and Disk BASIC 1.1/2.1. It does some unique things that will make operating your favorite computer a real pleasure.

*Super Boot* is supplied on a single 5¼-inch unprotected floppy disk. Although searching the directory of this disk results in finding just one file, BCONFIG, there are hidden files that make the program do its thing. After inserting a back-up copy of *Super Boot* into your disk drive and typing BCONFIG, you are greeted with a menu of five choices:

**Step Rate** — Use this to specify the step rate of your disk drives. Disk BASIC defaults to 30ms, which is fine for older drives. But newer drives can step as fast as 6ms. Several choices are provided, and you select the one you want using the arrow keys.

**Number of Tracks** — Again, older drives could not reliably read the innermost tracks of a disk; therefore, Disk BASIC supports only 35 tracks. If you are using a newer drive, it's likely it will read 40 tracks. The system also supports 80-track drives.

**Sides** — If you have double-sided drives, you can access the back side of those drives by selecting Double. The program supports up to four single-sided drives or two double-sided drives.

**Baud Rate** — As you may already know, your CoCo defaults to 600 baud on the printer port, but most printers will run a lot faster. I use a serial-to-parallel interface that is set to 9600 baud.

**Autoboot File** — This option lets you specify what program to run or execute automatically. It's really handy to be able to execute a word processor or any other program without having to enter in routine commands.

The current version of *Super Boot* also supports double-speed disk access and the ability to set the CoCo 3's screen colors on boot up. Once you have answered all the menu options, you are prompted to insert a disk in the drive to write the new boot file. Once that is done, all you have to do from

then on is insert the boot disk in the drive and enter DOS. If you have selected an Autoboot filename, that program will execute. Otherwise a two-column directory is presented, and you can move the cursor block to select the program of your choice. Pressing the ENTER key causes the system to load and execute your selection. Your disk drives are set to the step rate and number of sides you selected, and the printer baud rate is set as well. You won't have to remember to enter time-consuming pokes every time you turn on your computer.

**Installing *Super Boot* on all your disks makes your system "wake up" to your specific requirements.**

Installing *Super Boot* on all your disks makes your system "wake up" to the specific requirements you have previously established. *Super Boot* is a super program and one that most serious CoCo users will want to have in their bag of tricks. The best news is that this super value cost less than \$15.

(Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, 409-639-3842; \$14.95 plus \$2.50 S/H)

— Jerry Semones

Programming

64K

## CF83 Forth

Until now there were only two languages that were readily available to people who use only Disk BASIC on their Color Computer 2 or 3: assembler and BASIC.

With the addition of BDS Software's *CF83 Forth* system, a very powerful computing language is now available. FORTH is a unique language in that it is not restricted to the finite set of instructions that come with the language. In BASIC you can use only the instructions that come with it; you cannot create your own. In FORTH, the programmer uses the basic set of words (instructions) to define newer and more powerful words. These words can then be added to the vocabulary of the language. In this way the programmer has the ability to create his own language tailored to a specific task.

You can find out more about FORTH in *Starting FORTH* by Leo Brodie. The book should be available in a college or university library and perhaps in your local public library. To whet your appetite, BDS Software also has a demonstration version of *CF83 Forth* available for \$3 — it is available on Delphi, too.

Each disk is available with or without printed documentation, and the prices of the disks differ accordingly. The printed manuals are not bound, but the quality of the printing is good. In either case each disk comes with its own Reader program. This program allows you to read the accompanying documentation or print it on your printer. The reader program is a sophisticated manual browser that lets you page through the documentation in either direction. You are also able to set the parameters for your printer and print a page, a range of pages or the whole document. The program works only with the documents it comes with, so it can't be used to view other files. This is an exceptionally well-designed and thought-out program and is a nice additional feature of the packages.

FORTH is intended to be a modular operating system/programming language. In keeping with this tradition, BDS Software's *CF83 Forth* is available as a series of separate modules available on separate disks. There are currently three modules available: the foundation, a block editor, and a double-number extension set. BDS also offers a technical reference manual and a tutorial package. There are plans for eleven more modules that cover graphics, sound, math, system enhancements and a module to allow FORTH programs to execute directly from BASIC.

### The Foundation Disk

The *CF83 Forth* foundation disk contains the basic FORTH operating system and the basic FORTH word set. It is the base



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- Icewar, Quest, Sorcerer, Survival, Adv. Gen.

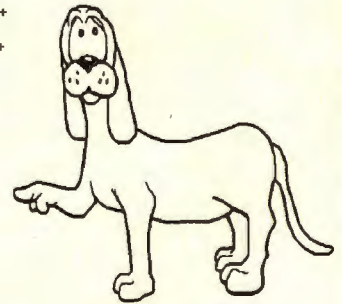
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M2	GR2	E2	U2	GA2							
M3	GR3	E3	U3	GA3							
M4	GR4	E4	U4	GA4							
M5	GR5		U5	GA5							
M6	GR6	H1	U6	GA6							
M7	GR7	H2	U7	GA7							
	GR8	H3	U8	GA8							
A1	GR9	H4		GA9							
A2	GR10			GA10							
	GR11			GA11							
T1	GR12										
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that all the other modules in the system use. None of the other modules operate without this disk. The program runs only on the VDG screen, but it creates its own 64-character graphics screen. This screen is very readable on both color or monochrome displays (including TVs).

## The CF83 Forth foundation disk contains the basic FORTH operating system and the basic FORTH word set.

FORTH is intended to be both an operating system and a programming language, and *CF83 Forth* is no exception. It uses its own routines to write to and read from disks. These routines are hard-coded to work with standard 35-track single-sided CoCo drives. I tried the programs with Burke & Burke's Hyper-I/O and they worked fine except that I was unable to use my double-sided drives as double-sided or as anything other than standard CoCo drives.

### The Block Editor

The foundation disk contains no built-in editor, so unless you are a FORTH expert and are able to write your own, you should probably purchase BDS Software's Block Editor as well. FORTH programs are stored in blocks; each block is 16 lines by 64 characters, or 1024 bytes. BDS Software's Block Editor is a full-screen FORTH editor that is designed to edit one FORTH block at a time. It contains all the features needed in a block editor. You use the cursor keys to move around the screen to edit an old block or while you are creating a new one. There are ways to load the editor with the next block, the previous block or any block you choose. You can also save a block or abort an edit of a block. All these commands are accessible with two keystrokes.

FORTH gains access to the blocks by use of block numbers. For *CF83 Forth* there are 157 blocks on a disk. These blocks are stored on the disk in binary format, so you'll be able to edit them only with BDS Software's Block Editor (or an equivalent).

This also means that the blocks will not show up on any directory listing of the disk — there is no FORTH word that lists the blocks on a disk. So you'll have to keep track of what blocks are on each disk.

### The Technical Reference Manual

This is a shortened version of the FORTH-83 standard. The standard states what features a language must have before it can be called FORTH. The FORTH-83 standard, like all language standards, is a little vague about some aspects of the language. This is especially true for implementation details. This is done to allow the designers of a FORTH system the freedom to take advantage of the special features of different machine platforms. The Technical Reference Manual removes the vagueness from the standard by specifying the details of this version of FORTH. It describes all the basic words included with the foundation disk and gives a little insight into the internals of this version. It is not intended to teach you FORTH. It assumes that you are an experienced FORTH programmer and know something about the inner workings of the language. If you are a beginning FORTH programmer, this is not for you. Leo Brodie's *Starting FORTH* and the Tutorial described next would be a better investment. The manual comes on two disks and is a fairly complete description of this implementation of FORTH.

### The FORTH Tutorial

This is a good introduction to the *CF83 Forth* system. It gives you a far more complete definition and description of FORTH than I have here. It also takes you on a tour of the FORTH language and operating system. There are several small programs you can enter to see FORTH in action, and the text is easy to read and understand. After reading through the tutorial, you should be familiar enough with FORTH to write some simple programs. With some persistence and a little trial and error, you should even be able to write more complicated programs. The tutorial is really designed to be used in conjunction with a more complete FORTH book, such as *Starting FORTH*. I bought this book when I got my first FORTH system in 1987 and it is still an indispensable part of my FORTH library.

### The FORTH Demo

I mentioned in the beginning of this review that BDS Software has a demonstration version of the foundation disk available. This is an almost complete version of the foundation disk. The only words that are missing are the words that access the disks, so you can write programs, but you

can't save them or read other programs from the disk. It also includes a good portion of the FORTH tutorial described above. If you are unfamiliar with FORTH but are interested in seeing what it is like, this is good way to go. The \$3 BDS charges is a great bargain and the demo is also available from Delphi in the CoCo SIG.

### Conclusion

Together the disks I have described form a good basic FORTH environment for both the novice and the experienced FORTH programmer. I can find only one thing missing in the system: There is very little error trapping, which makes the system remarkably easy to crash. (Note, however, that the lack of error trapping is part of the reason why *CF83 Forth* is so fast.) While it is traditional to make the programmer responsible for most aspects of error control, a little more error trapping would be helpful. Almost any disk error causes the system to either crash completely or to lock up. This may also cause the data on your disks to be corrupted, so as the manuals suggest, you should back up your disks often. This should not really deter someone from purchasing the products since you can do similar things in both BASIC and Assembler if you are not careful. One of the first things I learned about computers was where the Reset and the On/Off switches were.

I would like to say that while FORTH is a little harder to learn than BASIC, it is much faster and more powerful than BASIC. It is also much easier to learn than Assembler and for most applications just as fast or nearly so. Overall the program and the environment are of good quality, and I recommend them for anyone who wants to learn a powerful new language or anyone who already knows FORTH and wants to write some applications for the CoCo. I am already looking forward to reviewing the other modules as they become available.

(BDS Software, P.O. Box 485, Glenview, IL 60025-0485, 708-998-1656; FORTH-83 foundation disk, \$17; Block Editor, \$18.75; Technical Reference Manual, \$17.25; FORTH Tutorial, \$16; FORTH Demo, \$3)

— Chris Hyde

Utility

OS-9 Level II

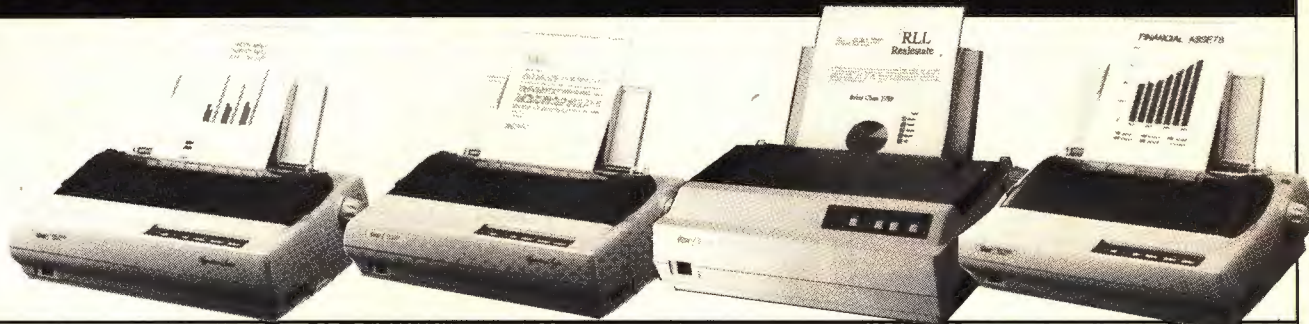
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**WHAT TO WRITE:** We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of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

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

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

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

Please do not submit material currently submitted to another publication.

users (and even some not so new), its cryptic error messages and complexity are sometimes overwhelming. This can be discouraging and very frustrating. *Tools II* from CoCoPRO! does a good job of making the OS-9 environment a little friendlier and easier to use.

*Tools II* is a collection of 27 utilities that make the time you spend on your CoCo 3 more productive and more enjoyable. The utilities should work on a 128K system, but to get the most out of the them you should have at least 256K. The utilities included allow you to manipulate windows and files, change the text in ASCII files, schedule processes and make your procedure files more powerful and flexible.

One of the nicest features of the package is the inclusion of three install procedure files. You simply run the procedure file fitting your system. Procedure files are provided for single- and dual-floppy drives, and hard drive systems. The procedure file copies the utilities from the original distribution disk to the CMDS directory of your system disk. This is a feature found with many MS-DOS and Macintosh programs and one of the reasons their programs can be installed easily. It is good to see this trend moving into the OS-9 community. If you want, you can manually copy the utilities to *any* directory or directories.

While it would take too much space to describe and discuss all 27 utilities, I will highlight seven I found most useful or interesting. The first utility is *select*. *select* simply makes the specified window the current window. This is similar to pressing the CLEAR key until the desired window is displayed. The advantage of this command is that it can be used from within a procedure file, so you can create several windows and select the one you want displayed. While the command `display 18 21 >/window` performs the same function, *select* is much easier to remember.

Next is *wmenu*, which allows you to create a menuing interface for OS-9. While it's not a point-and-click interface, it does use hot keys, so option selection is quick and easy. The program uses text files created by the user to tell it what options to display and what to do when certain options are selected. With this program and a text editor you can build a fairly extensive menuing environment for OS-9. This includes running programs, such as a word processor, from a menu and calling other menus. With the help of a knowledgeable OS-9 user to build the menu files, a novice could be using and enjoying the power of OS-9 fairly quickly and with fewer initial problems.

There is, however, one small problem with *wmenu*. I found that it would display the menu on top of a just completed directory

listing or the last page of a listed file without giving the user enough time to read what's on the screen. This is annoying, but can be avoided by using an undocumented utility included on the *Tools II* disk. The utility's name is *pse* and it simply prints a prompt

*Tools II* does a good job of making the OS-9 environment a little friendlier and easier to use.

and pauses the display until another key is pressed. In this way the menu is displayed after the user presses a key. The utility is not copied by the install procedure files so if you intend to use it, you will have to copy it into the CMDS directory yourself. *pse* is a version of the pause command provided with the original *Level II Tools* package.

If you've tried to backup two disks that were formatted differently, say a 35-track, single-sided disk to a 40-track, double-sided disk, you've found backup's limitation. While you can get around this with *dsave*, the command line can get fairly complicated. With the *bak* utility included in *Tools II* you can do this easily, and like *dsave*, you can copy only those directories you want or an entire disk. Unlike *dsave*, *bak* checks the file dates of both the source file and the destination file (if it exists). If the source file is newer than the destination file, *bak* overwrites the destination file; otherwise it does not copy the file. This should save time if you periodically backup your data disks.

The next two utilities are very useful for systems with hard drives, though they can



be used on floppy-based systems as well. If you've ever searched through directory listings for a file, `find` is for you. `find` searches a hard drive or any portion of it for a filename and tells you in which directory it is located. It also accepts wildcard characters, so you don't have to remember the exact name of the file. I should warn you that it is not very fast, so if you are searching a hard drive, you may want to get a cup of coffee and a snack while it searches.

If you are tired of entering long pathnames to move around your hard drive, `go` is the answer to your prayers. `go` uses short aliases to change directories. It uses a file to store the names of the aliases and the complete pathlists to the directory for each alias. `go` builds this file for you or you can build it using a text editor. As an example, you can tell `go` that `c_sources` is the alias for the directory `/h0/PROGRAMS/SOURCES/`. You can type `go c_sources` and the current data directory is changed.

Next is `gsar` (global search and replace), which is one of the file-conversion utilities. It replaces any text you specify in a file with almost any other text you want. For example you could type a form letter using `c_name` in place of the customer's name. You could then run `gsar` to replace `c_name` with the name of a customer and print the letter. You could then replace the customer's name with another, print the letter again and continue in this way until you've gone through your customer list. While this is not as fast or as easy to use as a mail-merge program, it serves the purpose and is also more versatile.

The last utility I'll mention is one that has a lot of potential. It is also one that I've been waiting to see for a long time. It is called `demon` and is a complete and easy-to-use background task manager. What it does is sit in the background and periodically check its list of scheduled processes to see if one needs to be run. If it is time to run one, it runs it and continues as before. It runs just about any program you want, on the date and at the time you specify. This type of program is used extensively in the UNIX world, and there are many uses for it in the OS-9 world as well. Its usefulness is limited only by your imagination and your CoCo's hardware.

The accompanying manual was complete but had one major error and a few minor typos. The major error in the manual is in the documentation for `wmenu`. In the command syntax it states that the `-c` option clears the screen before the menu is displayed. This is not the case. Using the `-c` option on the command line turns off screen clearing. It also says that the `-m` option closes the overlay window on which the menu is displayed before the options are

run. Just the opposite is true — using this option does not close the overlay, and the options run in the overlay window. These two options are actually defaults for `wmenu`, and using the `-c` or `-m` options turns them off. Also in error are the examples of specifying options on the command line for `wmenu`. The options are not indented as the text specifies and the program requires.

All of the programs in *Tools II* are designed to run with the stock OS-9 Shell and the utilities included on the original Level II disk. While they work with most of the replacement utilities available, there may be some minor incompatibilities. I used all of the utilities in the package with both the stock Shell and *Shell+* (by Ron Lammardo) and only `fconvert` had some problems with *Shell+*. *Shell+* seems to strip characters (such as `%` and `-`) from the command line. But you can use the ASCII values instead, and this is only a minor inconvenience. Another problem is that `bak` does not work correctly with Jamie Wilmoth's `cp` utility. These problems should not reflect badly on the programmer however, since there are a large number of replacement utilities available and some incompatibilities between programs is inevitable.

Dave Myers of CoCoPRO! was very helpful with the problems I had, and I find him to be very friendly and open to suggestions about improving the utilities. This friendly and open attitude is common among CoCo vendors and is one of the reasons I enjoy working with the CoCo community so much. The errors in the manual will be corrected in the next edition and the `pse` utility will be fully documented as well. Dave Myers told me the next edition of the manual should be ready by the time you read this. Overall the programs and documentation are very good. The problems I found with the package are relatively minor and do not prevent me from recommending *Tools II*. The price is extremely reasonable for everything you get, and I look forward to dealing with Dave and CoCoPRO! in the future.

(CoCoPRO!, 1334 Byron, Ypsilanti, MI 48198; (313) 481-3283; \$34.95)

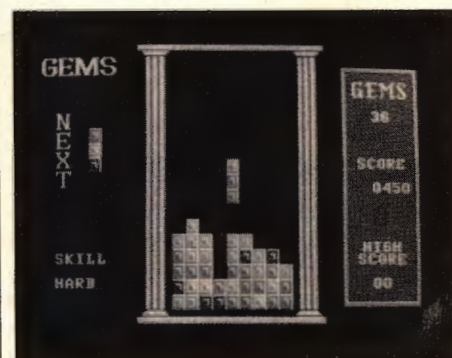
— Chris Hyde

Game	CoCo 3
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## Gems

*Gems*, a new action arcade game similar to the popular PC hit *Tetris*, runs on your CoCo 3 and requires a disk drive. *Gems*

features four to six different object shapes that fall from the top of the screen. The object of the game is to match the various shapes and colors either horizontally, vertically or diagonally. When you get a match, all adjacent *gems* (objects) vaporize and disappear, thus increasing your score. At unexpected times, a unique, universal gem will fall and vaporize all of the gems on the screen matching the first color it strikes. Although you can't rotate the falling gems horizontally, you can rotate the vertical pattern as they fall. You can also move



them from right to left and cause them to fall into the column of your choice.

There are three skill levels and 10 play levels. The various objects you can select for play include gemstones, card suits, dice, and squares. These shapes coupled with color combinations make for exciting play and numerous ways of making matches. As play progresses within a level, the speed with which the objects fall increases, thus making split-second decisions more difficult. The next pattern of gems is shown on the screen so you can plan ahead on your next move. Your score is continually displayed on the screen, and the top 10 players' names are shown after each game.

Game play is controlled with either the keyboard arrow keys or a joystick. Both worked equally well for me, and I was surprised at the ease of play while using the arrow keys. *Gems* can also provide stereo sound effects when used with an Orchestra-90 CC cartridge plugged into a Multi-Pak interface.

*Gems* is fun to play, and I enjoyed the simple theme. The graphics are colorful, sharp and vivid. Instructions are provided on a two-page sheet, but you don't really need them to play the game. I liked *Gems* and am sure you will too.

(Eversoft Games, Ltd., P.O. Box 3354, Arlington, WA 98223-3354, 206-653-5263; \$24.95 plus \$2.50 S/H)

— Robert Gray



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

**CheckBook+ OS-9**, is a checkbook balancing program for the CoCo 3 with a disk drive and OS-9. Features pull-down/mouseable menus; a pop-up calculator; the ability to graph by the month using bar-, line- or pie-graphs; and various sorting utilities. A Disk BASIC version is also available. *Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, (409) 639-3842; \$24.95 plus \$2.50 S/H.*

**Deluxe Terminal**, a Disk BASIC terminal communications program for the CoCo 3 with a disk drive and a monitor capable of displaying 80-column text. Supports the serial I/O port up to 2400 bps, and the Deluxe RS-232 Pak and the Disto Serial I/O Board up to 9600 bps. Features a full text editor, X/Ymodem and ASCII file transfers, split-screen conference mode, programmable macro keys, and full disk support including multifile copy, kill, rename, format, archive and unarchive. It is compatible with ADOS. *CER-COMP Ltd., 5566 Richochet Avenue, Las Vegas, NV 89110, (720) 452-0632; \$34.95 plus \$4 S/H.*

**Goodies Disk Two**, a set of 13 utilities written in BASIC09 and assembly language. Includes a VMS-style E-mail system, a password setting utility, a label printer, a bulk disk copier, a Delphi forum-message reader, and several other utilities. The source code is provided, and the author encourages experimentation with the software. Requires a CoCo with a disk drive and OS-9. *The Warped Drive, 54 Martindale Drive NE, Calgary, AB T3J 2V4, Canada, (403) 280-8870; \$12, \$14 Cdn.*

**MiniBanners OS-9 Version**, allows you to print single- or multiple-line banners. Included with *MiniBanners* is a collection of more than 30 character styles to use for

your banners. Requires OS-9, a CoCo 3 and a disk drive. A Disk BASIC version is also available. *Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, (409) 639-3842; \$19.95 plus \$2.50 S/H.*

**MVBanner**, a banner creator for your celebration needs. Features pull-down menus and pop-up windows, editing and saving of banner messages, configurable individual characters, two fonts, the ability to create images for banner use (20 images supplied), and onscreen viewing of completed banners. Requires a 256K minimum CoCo 3, OS-9 Level II, *Multi-View*, and an 80-column monitor. A mouse/joystick with Hi-Res adapter is recommended though not required. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; \$20.*

**OS-9 Level 2 Game Pack**, a collection of five popular games adapted for your CoCo

3. The games included are *CoCothello*, *CoCoYahtzee*, *KnightsBridge*, *Minefield*, and *Sea Battle*. Requires a 256K minimum CoCo 3, a disk drive, a single- or dual-button mouse or joystick (mouse highly recommended; keyboard mouse supported), and OS-9 Level II. *Multi-View* is not required for any of the games. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; \$34.95.*

**Variations of Solitaire**, a collection of five variations of the popular single-player card game. Variations included in this package are *Pyramid*, *Klondike*, *Spider*, *Poker*, and *Canfield*. Requires a 256K minimum CoCo 3, a disk drive, a single- or dual-button mouse or joystick (mouse highly recommended; keyboard mouse supported), and OS-9 Level II. *Multi-View* is not required for any of the games. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; \$34.95.*

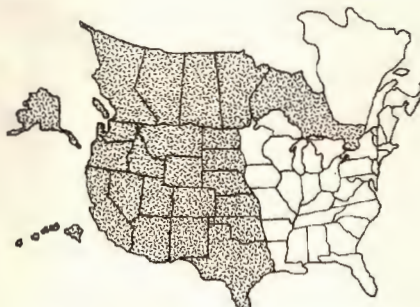
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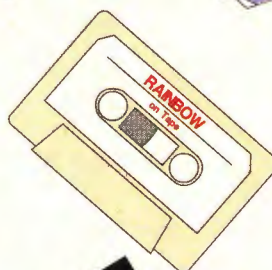


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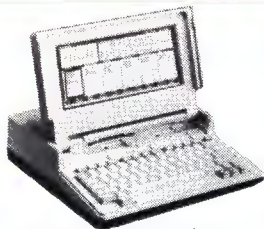
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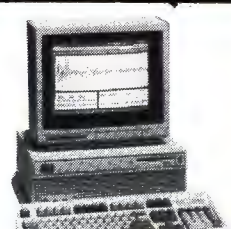
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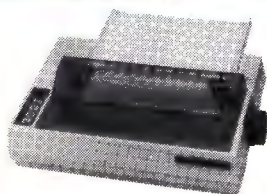
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